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**The history of the  
International Meteorological Organization  
1872–1951**

by

**Hendrik Gerrit Cannegieter**

(with 10 figures in the text, 16 Appendices and 5 Annexes)

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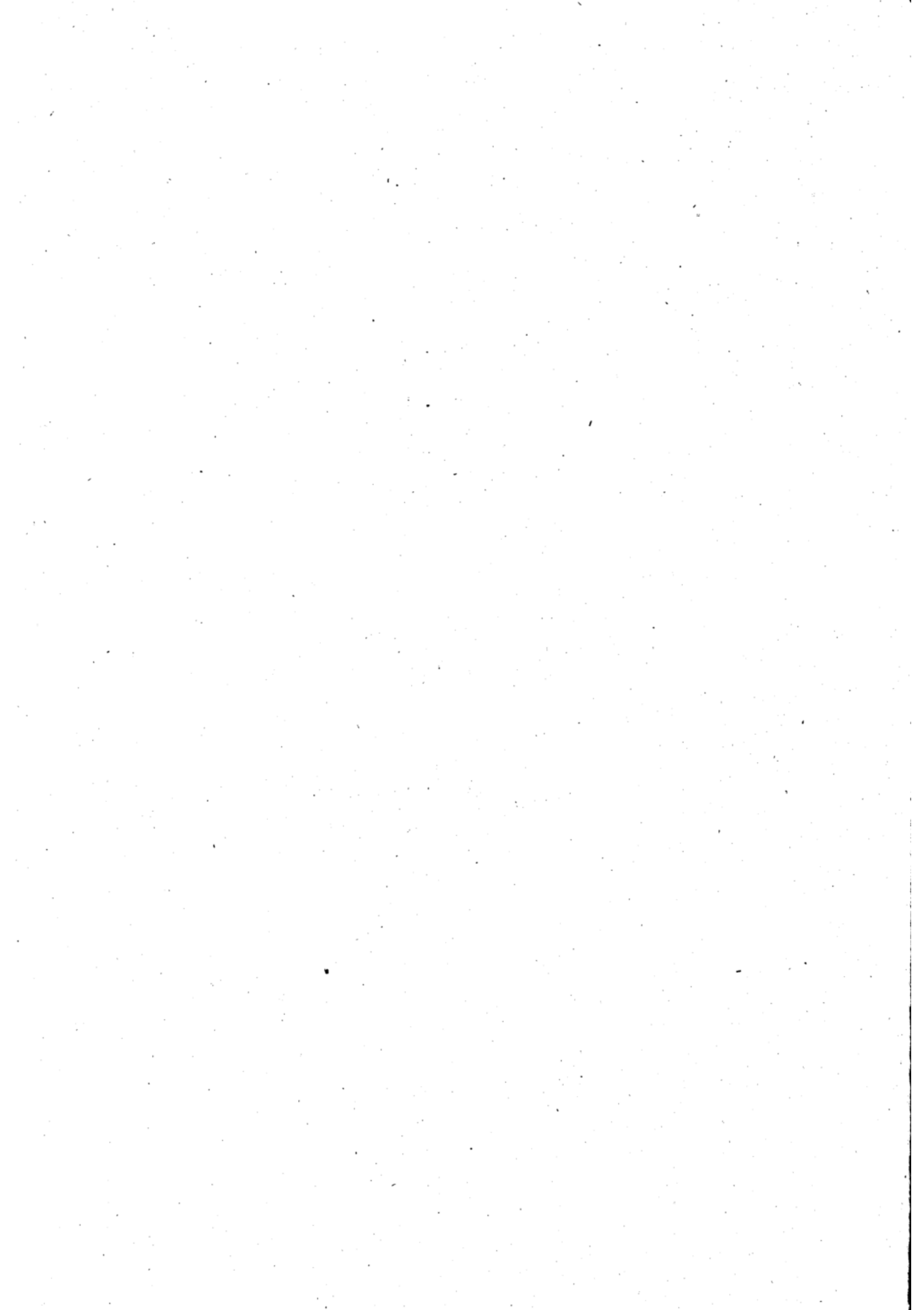
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## Zur Einführung

Die rasche Entwicklung der Meteorologie hat in neuerer Zeit zu einer so weitgehenden Spezialisierung geführt, daß der auf irgendeinem Gebiet praktisch tätige Meteorologe keine ausreichende Gelegenheit mehr hat, sich mit den Fortschritten unserer Wissenschaft auf anderen Gebieten vertraut zu machen. Die Zahl der meteorologischen Zeitschriften hat sich seit der Vorkriegszeit vervielfacht, wobei der fremdsprachige Anteil zugenommen hat. Viele grundlegende Arbeiten erscheinen nur in beschränkter Auflage in internen Berichten, die den meisten Meteorologen unzugänglich sind. Es ist daher auch nicht verwunderlich, daß es namentlich in deutscher Sprache an Lehrbüchern mangelt, die den heutigen Anforderungen genügen.

Aus diesen Gründen habe ich mich entschlossen, den „Annalen der Meteorologie“, die bisher vom Seewetteramt Hamburg herausgegeben wurden, eine andere Form zu geben. Ihre neue Folge soll in einzelnen Heften erscheinen, die jeweils einen speziellen Problemkreis umfassend darstellen, wobei auch die geschichtliche Entwicklung möglichst mit berücksichtigt werden soll. Den Meteorologen, die infolge ihrer starken dienstlichen Belastung keine Zeit finden, die Entwicklung auf anderen Gebieten selbst an Hand der immer umfangreicher werdenden in- und ausländischen Literatur zu verfolgen, soll mit dieser Veröffentlichungsreihe die Möglichkeit gegeben werden, sich über den neuesten Stand und die voraussichtliche Weiterführung eines Problems zu unterrichten.

Ich hoffe zuversichtlich, daß die auf einem bestimmten Spezialgebiet forschend tätigen Meteorologen des Deutschen Wetterdienstes, aber auch der Hochschulen und wissenschaftlichen Institute ihre hohe Verpflichtung sehen, aus der eingehenden Kenntnis der Sachlage und der Literatur ihren Kollegen eine übersichtliche Gesamtschau der Probleme zu vermitteln. Sie werden viele aufmerksame und dankbare Leser finden. Selbstverständlich sind auch entsprechende Beiträge ausländischer Meteorologen willkommen.

Ich begrüße es besonders, daß Dr. H. G. C a n n e g i e t e r (Niederlande) für das erste Heft seine Geschichte der Internationalen Meteorologischen Organisation zur Verfügung gestellt hat, die den Meteorologen der jüngeren Generation einen wertvollen Einblick in das allmähliche Werden der internationalen Beziehungen unseres Faches vermittelt.

Dr. G. B e l l

Präsident des Deutschen Wetterdienstes

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## Preface

About the end of the 17<sup>th</sup> and the first half of the 18<sup>th</sup> century regular meteorological observations had been started at a considerable number of stations (Florence 1654—1670). In later years these observations were used for calculations of means of meteorological elements for days, months and years (Societas Meteorologica Palatina, 1780—1792). Also the ships sailing on the oceans were equipped with accurate meteorological instruments and provided with meteorological log books of an international form for the study of maritime meteorology and climatology.

The first experiments to coordinate the meteorological observations of a definite day and hour with a sketch of the weather situation during devastating storms date from the first half of the 19<sup>th</sup> century (Brandes 1816/1826). About the middle of that century the electric telegraph provided quick means for transmitting weather reports of a number of stations to a central office. This application of the practice of meteorology proved to be extremely successful (London 1851) and was introduced soon nationally and later internationally in many countries.

In the meantime meteorological services directed by central institutes were established everywhere for organizing networks of stations and for collecting the observations of old existing and newly established stations. Under these conditions the need was felt for international contact in order to arrange universal rules for making the observations and for editing them in regular publications.

With a view to universal and international management and organization an international congress of meteorologists was convened at Leipzig in 1872. It led to the institution of an

"International Meteorological Organization".

This body has played a principal rôle in the development of the application of meteorology and climatology in different forms. In the year 1951 it transferred its functions to a successor named

"World Meteorological Organization".

The present volume has been composed in 4 parts. The first part reports the history of the International Meteorological Organization for the years up to 1918. The second mentions the revolutionary development of practical meteorology and its ever increasing applications in the years 1919 to 1935. The third and fourth parts respectively describe the preparation of new forms during the years after 1935 until the transfer to the completely new form in 1951, when the original Statutes of 1878, as applied to new situations, were replaced by a Convention signed by the Directors as representatives of the affiliated Governments.

The International Meteorological Organization was led from the very beginning by an executive body named the "International Meteorological Committee" and later by a large number of Commissions of Experts in several branches.

The text is completed by 16 Appendices and 5 Annexes containing a sketch of the activities of the Commissions and of the internal structure of the Organization.

After the establishment of the Secretariat of the International Meteorological Committee in 1928 the author was honourably entrusted with the lead of the new Bureau in the coming years. The nomination as Director of the Royal Netherlands' Meteorological Institute in 1938 necessitated him to resign. Dr. Gustav Swoboda was nominated as his successor.

# **1. The years 1872—1918**

## **The establishment of the International Meteorological Organization**

### **1.1. Introduction**

In 1820 H. W. Brandes used the observations obtained from the network of the Societas Meteorologica Palatina in 1783 to demonstrate the shifting of fine and bad weather patterns with time (1). The worlds first weather map was plotted by him in 1826 (2), this being the theoretical basis of weather forecasts. About the middle of the nineteenth century the electric telegraph opened the possibility of quick communications. It made possible the collection of meteorological reports from a network of stations at a central office without loss of time, and the observation of the changes of the weather elements day by day.

The regular study of the variation of the elements on daily charts formed the basis of meteorology as a new science. This had been experienced in the United States by Espy (3), later in England by Fitz Roy, and in France by Leverrier. In the Netherlands Buys Ballot did the same on a reduced scale. This led him to formulate the famous "law" which bears his name, firstly published in 1857.

The Weather Charts of Espy formed a universal statement of the applicability of Buys Ballot's "Law" everywhere, as it is caused by the influence of the rotation of the earth on moving airmasses. This had been shown mathematically by Ferrel (4) in the United States.

#### **1.1.1. The Congress in Brussels 1853**

During the initial years of development of meteorology Admiral Maury, of the U.S. Navy, made investigations on a large scale of the regular tradewinds on the Oceans and the belt of calms along the equator from ships' logs.

In order to extend these investigations it was necessary to complete the material with ships' logs of all seafaring nations.

Therefore Maury undertook the organization of a congress of seafaring nations from both sides of the Atlantic in order to effect international prescriptions for the routes to be followed and for the meteorological logs for the ships sailing on the Oceans. This meeting was convened in Brussels in the year 1853 (5). It was attended by twelve representatives of the navies of ten seafaring nations. Among them Maury himself attended for the Government of the United States. The congress was crowned by a great success in international cooperation.

In the meantime official meteorological services were established in several countries. More and more the desire was expressed for mutual and international coordination and for following the way indicated by Maury for the organization of a special International Conference of Meteorologists and the drafting of an international programme for meteorological investigations, publications, and for climatological studies.

### 1.1.2. The Conference in Leipzig 1872 (6)

It was in August 1872 that a meeting of meteorologists was arranged at Leipzig. The development of interest in meteorological investigations among all civilized nations had brought into prominence a requirement of greater uniformity of procedure in different countries. In 1872 Buys Ballot published a special pamphlet: Suggestions on a uniform system of meteorological observations. Utrecht (1872). The invitations were sent by Dr. C. Bruhns/Leipzig, Dr. H. Wild/St. Petersburg and Dr. C. Jelinek/Wien to all the Direktors of existing meteorological services in Europa and other continents, and to all scientists who used to carry out meteorological investigations as private persons.



Christophorus Buys-Ballot

The Conference lasted 3 days.

The United States were also represented. The agenda, which was in reality an inquiry, contained a list of 26 items. These regarded questions of the techniques of the observations e. g. calibration of the instruments, mutual comparison with standard instruments, exposures, hours of observation, scales and units, forms of climatological tables, calculation of mean values, publications and mutual exchange of data by telegraph.

The two last items were of remarkable interest, namely:

- 25) "Does the interchange of Weather Telegrams appear so useful that it should receive a fuller development and a firmer organization" and
- 26) "What regulations should be adopted in order to carry into effect the decisions and the objects of the Meteorological Congress."

It may be emphasized that this international meeting had absolutely the character of a scientific congress and that it had been generally recognized as such by the unlimited invitations. Nevertheless it was judged desirable to intrust the drafting of resolutions with binding power for all countries to an official body of governments' representatives. It was decided to arrange a second meeting in the near future with an agenda based on the decisions of the Leipzig Conference, but with an official character and attended only by government authorities namely the directors of services.

The report of the Conference in Leipzig has been published in "Zeitschrift für Meteorologie" as "Appendix to volume VII no. 24" and also edited separately in Vienna 1872. A translation into English has been made at the British Meteorological Office in London and published in 1873.

The remarks on the different items of the agenda were summed up in an Appendix. A report of a meeting of French meteorologists in Bordeaux some weeks after the Conference of Leipzig formed the content of a special Appendix.

## 1.2. The Congress in Vienna 1873

In the spring of the year 1873 an invitation was circulated by the Government of Austria through diplomatic channels to the governments disposing of meteorological services to send delegates to a Congress of Directors to be held in Vienna in the month of September (7).

The Congress was opened by the Austrian Minister of Instruction. It was presided over by the Dutch Meteorologist Prof. Dr. C. H. D. Buys Ballot. The Congress expressed its deep regret that with the actual procedure a number of private meteorologists, famous for their particular investigations into meteorology or climatology, were now excluded.

It was proposed to draft rules for the Congress. An agenda with twenty-eight items was presented. These were the same twenty-six items discussed in Leipzig with two additional items. A last additional question (twenty-nine) regarded the establishment of a central institute for collecting centrally all meteorological observations in order to publish them for particular investigations on climatology.

The questions to be discussed in Vienna were mainly concerning instruments and organization. Eight sub-commissions ad hoc formulated a number of definitions on meteorological phenomena for general instruction and for the observers. These definitions and special notations in climatological publications have remained practically unchanged in use for several decennia.

The general opinion was, that the time was not yet ripe for many of the numerous suggestions. A list of symbols for hydrometeors to be used in climatological tables and on weather charts had been agreed upon for international use. The observing stations were classified according to their equipments in a list as first, second or third class stations. These agreements have remained practically unchanged for several generations.

### 1.2.1. The Permanent Committee

The Congress discussed anew how to ensure that the adopted resolutions were carried into effect everywhere. It was decided to establish a "Permanent

Committee" of five, with the right to co-opt in maximo two members and with the following instruction:

„Das Comité wird die Verpflichtung haben, für die Ausführung der Beschlüsse des Congresses Sorge zu tragen und die Berufung eines kommenden Congresses einzuleiten; es wird die Delegirten des gegenwärtigen Congresses durch fortlaufende Mittheilungen in Kenntniss seiner Arbeiten und Verhandlungen setzen.“

This Committee was to play a rôle of primary importance in international meteorology in the future.

The seafaring nations had insisted on the establishment of Maritime Institutes in the great harbours for the general information of the ships sailing on the Oceans. Their task was to provide the ships with meteorological log books, to collect the observations made at sea during their cruises in the domain of meteorology, to inspect them and to check the instruments between the cruises. The Congress was of the opinion that this suggestion ought to be considered in a special maritime meeting similar to the afore-mentioned of 1853 in Brussels. It instructed the Permanent Committee to prepare a meeting of this kind that might advise the Directors' Congress (8).

With regard to the question posed at Leipzig on the value of a regular exchange of weather reports by telegraph, quite particularly of storm warnings, the general opinion was that everybody was convinced of its great importance, but also was aware of the great difficulties to be overcome in the organization of an efficient telegraphic exchange of daily weather reports on an international basis.

The Permanent Committee was invited to draft a symbolic code form for these reports to be transmitted for international use. The telegraphic authorities ought to give preference to the meteorological reports and equally to storm warnings. A system of visual storm signals ought to be generally agreed to and also the codes for transmitting the warnings by telegraph to coast stations and harbours (9).

The "law of Buys Ballot" had given the key for real forecasts of stormy weather at increasing barometric gradients.

It was absolutely necessary that the meteorological services had to work according to internationally agreed instructions. These should be followed rigorously in all services cooperating all over the world. Only then really good progress could be made.

#### **1.2.2. The Sessions of the Permanent Committee in Utrecht 1874, London 1876 and Utrecht 1878 (10)**

Immediately after the closing of the Vienna Congress the Permanent Committee started its work for the coming years. It drafted an internal working programme to be followed. The directors themselves had to communicate the decisions of Vienna to their respective governments.

The Permanent Committee decided to hold its first session in Utrecht within a year.

The Secretary convened this Session in September 1874. He had prepared an agenda of thirteen items based on fifteen memoranda regarding the accomplishment of the resolutions of Vienna in the respective services. He presented a report about

the deliberations in a Conference of Experts on Maritime Meteorology which had met in London in the days preceding the session in Utrecht (9). These Reports formed the directives for the discussions there.

The deliberations at the meetings tended to recommend a number of practical procedures to standardize the observations and to make them as simultaneous as possible.

Five items which have been used in the future may particularly be mentioned namely:

- 1) a figure code form for telegraphic weather reports,
- 2) a form for monthly tables for climatological stations and for secondary stations for the meteorological annuals,
- 3) a lower limit for the number of secondary stations in the countries of Europe,
- 4) some definitions for hydrometeors for general use and the symbols to designate them in climatological tables and in weather charts,
- 5) the codes for cloud amount and for wind force and the scale of equivalents in meters per second of the Beaufort scale.

As regards the first item a form of code was drafted consisting of two to four groups of five figures each respectively indicating:

BBBWW = BBB	barometric pressure reduced to sea level and 0° C in 0.1 mm or 0.01 inch (figure of hundreds resp. tens omitted) and
WW	Wind direction in 16 points (N = 32, W = 24, S = 16, E = 08).
SSHTT or SHTTT	SS wind force on the Beaufort scale (0—12) reduced to m. p. sec.) or in the numbers of the scale itself (Great Britain) the actual hydrometer (5 = rain, 6 = snow, 7 = fog, 8 = mist, 9 = thunderstorm),
TTT	temperature dry bulb } in 0°.1 Celsius or 1° Fahrenheit
T'T'T'	temperature wet bulb } (Great Britain T'T')
T'T'RRR or T'T'T'RR	RRR height of rain in mm or in hundredths of inches (Great Britain RR). of the preceding 24 hours (only in morning message).
MM mm Sea	MM maximum temperature mm minimum temperature (Sea only for coast stations) State of the sea in a single figure code.

In those days and many years later the international reports were transmitted once a day in six groups. The first two groups were giving the weather of the night before (about nineteen hrs. or twenty one hrs. local time), the groups three to six giving the weather in the morning at about seven hrs. to nine hrs. local time. So the full form was for British coastal stations and for continental stations respectively:

BBBWW	SSHTT	BBBWW	SSHTT	T'T'RRR	MMmmSea.
BBBWW	SHTTT	BBBWW	SHTTT	T'T'T'RR	MMmmSea.

It was recommended that the hours of observation should be as near as possible to 7, 13 and 21 hours local time mostly coinciding with the climatological observations.

The second meeting of the Committee took place in London in 1876 (10). The Secretary had forwarded some months after the first meeting a circular letter to the directors for an inquiry regarding the organization of the existing meteorological services (staff, time of establishment, yearly budget, telegraphic reports, publications, existing series of meteorological observations unpublished and extending over long periods of years). The replies had been summed up in two categories:

- A. Questions regarding the central Institutes.
- B. Questions regarding individual stations, their equipment and special instructions.



Carl Bruhns

This circular letter was followed nine months later (February 1876) by a second request as to how the recommendations of the Committee in its last meeting had been carried into effect.

Information was given by the Committee for calculating the barometric gradient in direction and amount for individual research about the general circulation in the atmosphere around the globe.

The Italian member expressed the intention of his Government to invite the second International Meteorological Congress to meet in Rome in September 1877. A third session was judged desirable for preparing this Congress (10).

Internal difficulties as the result of the political situation in Italy led to the postponement of this second Congress to a later date. As it could not be convened before the spring of 1879 the Committee resolved to hold this meeting in Utrecht in October 1878.

This session was entirely devoted to the preparation of the agenda in Rome. The Committee composed an agenda of thirty-five items. It drafted the Rules prepared in 1873 in Vienna for internal use into a definite form to be presented to the Meteorological Congress for adoption as a base of the Statutes of the International Meteorological Organization to be adopted officially in the second Congress.

A number of distinguished meteorologists had been requested by the Committee to explain in memoranda their opinions and their standpoints regarding delicate questions of an instrumental and organizing character, on which the Committee had not succeeded in giving definite instructions. The notes received as replies were forty in number and filled three voluminous parts.

In summing up the activities of the Committee in the last six years, it may be stated, that the code form for transmitting the weather reports has been in use during about a quarter of a century. It lasted to the second decennium of the twentieth century before new elements were inserted, and before arrangements permitted of the receipt of weather reports twice daily.

Reports of cloud forms have not been noted before the beginning of the twentieth century.

### 1.3. The International Meteorological Congress in Rome 1879 (11)

#### The International Meteorological Committee

The second Meteorological Congress had been convened for the month of April 1879. The President of the Permanent Committee, Prof. Buys Ballot, was prevented from attending due to regrettable family circumstances. His opening address was read by the French delegate M. Mascart.

The Secretary mentioned that sixteen countries were represented by their delegates. The U.S.A. were also represented.

Twelve Italian authorities had been invited as guests.

The by-laws drawn up at Utrecht a year ago were adopted at first provisionally. The report of the proceedings of the Permanent Committee was read. The Italian member S. Cantoni was elected President of the Congress by acclamation.

The Congress proceeded, after having adopted the agenda of thirty-five items prepared by the Permanent Committee, to the election of five Sub-Commissions ad hoc I to V, which were constituted as follows:

- I Organizations;
- II Publications;
- III Observations and Instruments;
- IV Telegraphy, Maritime and Agricultural Meteorology;
- V Elevated and distant stations.

The first Sub-Commission proposed the institution of a permanent ruling Committee for the management of funds for the Bureau. The latter considered the establishment of a Central International Meteorological Institute such as had been discussed at Utrecht in 1874, but which had at that time been judged impossible for the time being. Now it had been suggested to entrust the administration and the carrying out of the decisions of the Directors' Congresses to a permanent International Meteorological Committee to be elected by polling. This Committee would

present a report of its activities to the next International Meteorological Congress. Its President would be the acting President of the permanent International Meteorological Organization and it was intended, that he should be elected to lead the activities in the periods between the Congresses.

The third question regarded the exchange arrangements of publications of various Institutes and private persons, who had contributed to investigations in remote regions of the globe.



Congress in Rome 1879

The deliberations concerning the competences of this Committee led to an extensive resolution of great importance which would remain applicable for some time to come. It contained three paragraphs, the first of which was as follows:

- A. 1. "The second Meteorological Congress, assembled at Rome, institutes an International Meteorological Committee which is charged with everything that concerns international relations until the meetings of the next Congress."

The following paragraphs stated firstly that the number of members should be nine, elected by a poll, all of different nationality, secondly the manner of completion in the case of vacancies, thirdly the manner of constituting the bureau and the divisions of instructions. The general instruction for this Committee was expressed in the words:

- A. 5. "The Committee is charged with seeing that the decisions of the Congress are carried out; with the convening of future Congresses; with the keeping of the delegates to the present Congress informed of its proceedings and of its decisions; and lastly, with the presentation to the new Congress at the expiration of its functions, of a report embracing the whole of the period."

The following part B. stated, that the interval between the Directors' Congresses should be five years in maximo.

The third part, C., mentioned the desirability of investigations, extending over large areas of the world for the study of universal laws on meteorology, and the definition of the rules for communicating the results to those who had cooperated in different institutes.

Among the predominating decisions in the long list of resolutions may be mentioned the reduction of barometer-observations to sea-level for stations at considerable heights and a serious recommendation to add cloud-observations to the programme of some stations in each country. The main objects to be observed were the movements of the cirrus-clouds e. g. their direction and speed.

The figure-code for telegraphic weather reports of Utrecht 1874 had been adopted for general use in international transmissions. A programme for regular weather reports, alas not yet synoptically made, led to an instruction to the International Meteorological Committee to convene within a year a special International Meeting for Agricultural and Forestry Meteorology. A long series of resolutions recommended the institution of stations in remote areas of the globe and at great heights in the mountain regions.\*)

It may be mentioned here, that recommendations for stations in remote regions led to the most impressive decision of the meeting, namely the suggestion to establish a number of stations for meteorological and magnetical observations in the Polar Regions during a whole year. The Conference was agreeably surprised and proved its interest in this enterprise by deciding:

"To entrust the International Meteorological Committee with the convening of a special Conference which should be composed of delegates provided with the necessary instructions and powers by their Governments, who may think they could participate in some way in the enterprise."

The Conference recommended as sequel to this resolution the convention of a meeting at short notice to fulfil this charge. It was proposed at Hamburg on October 1<sup>st</sup> 1879. The programme of this meeting would be in brief:

"To settle the details of the scheme and the means of carrying it out."

#### 1.4. The International Polar Year 1882—1883

The decision of the Conference of Directors in Rome, to charge the International Meteorological Committee to support the organization of a scientific enterprise of so extensive a character as the International Polar Year was to prove a heavy task for the newly elected International Meteorological Committee.

Its first action was to convene the meeting mentioned in the foregoing chapter. A number of specially interested experts met in Hamburg to form the afore-mentioned Commission established in Rome 1879. This

"Commission for the Polar Year"

held its first session October 1<sup>st</sup>—5<sup>th</sup> 1879 and a second in Bern August 7<sup>th</sup>—9<sup>th</sup> 1880.

\*) The first mountain stations had been established in 1872 Hohe Sonnblick at 3106 m in the Austrian Alps, the second in 1882 on Säntis in Appenzell at 2502 m height.

The Commission was composed of nine members, among them five members of the International Meteorological Committee. The member for Austria was the originator of the plans for the enterprise, the naval officer Lt. Weyprecht. The German member Neumayer was charged with the presidency of the Commission.



Carl Jelinek

The preliminary plan had been transformed to a decisive plan. It had been drafted as follows:

- “1° a chapter about the general organization containing the proposal to establish 8 stations in the North Polar Regions and 5 in the South Polar Regions to start their observations in the month of August 1881, divided into meteorological and magnetic observations to be executed during a full year.
- 2° a special part regarding obligatory observations with presumption about the apparatus to be used and their exposure and the hours of reading sub-divided into
  - a. to execute the meteorological observations,
  - b. to execute the magnetic observations,
  - c. for special observations.”

The Appendix C reports the “Story of the Polar Year” in the years 1882 and 1883 and contains a sketch of the successes and misfortunes\*).

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\*) The Dutch crew had been forced to winter on the ice in the Kara Sea as bad ice-conditions prevented them reaching their station at the Siberian Coast; the Americans were obliged to pass a second winter on their base in Greenland as bad ice-conditions prevented their return in the summer of 1883.

As the members of the Committee met in Paris three years later, in 1885, the Polar Year had been finished and the parties had all returned safely. The International Commission for the Polar Year 1882—1883 had held a last meeting in Vienna in April 1884. The leaders of the expeditions had been invited to attend this meeting. The questions to be discussed now were the forms of publication of the observations. The Commission expressed the hope, that all publications should be finished before the end of 1885.

After this, the Commission for the Polar Year was abolished, with a hearty vote of thanks for the valuable work accomplished by the different expeditions.

#### 1.5. The International Meteorological Committee 1880—1888 (12—15)

##### The International Meteorological Congress in Paris 1889

The first session of the International Meteorological Committee was convened in Bern 1880. The report (12) of the activities of last year could only mention the arrangements with several states to carry into effect the many decisions and recommendations of the Conference at Rome as sequel to an inquiry, in a circular to the Directors, forwarded 28<sup>th</sup> May 1880.

It may be noted that a Report had been received from the meteorologists on the Southern Hemisphere in the Far South-East, that the Antipodes had organized a session in Melbourne 11<sup>th</sup>—14<sup>th</sup> November 1879. The programme had been described to be:

“to consider what means should be adopted to improve the system of international weather signals.”

Only four persons from Australia and New-Zealand attended this session to examine the resolutions adopted in Rome and to consider how to apply them in their countries. They came together for a second session in April 1881.

The Reports of both meetings had been forwarded to the Committee for notification.

In the years after 1880 the transactions for transmitting weather messages nationally to the central institutes for international exchange were fully developed. The period of the application of meteorology by means of daily weather charts, to daily forecasts to storm warnings at coastal stations and to shipping and agriculture, had started definitely everywhere.

“That the establishment of telegraphic communication with the Faroer Isles of the Polar Regions, and in the South West were looked to with impatience. The Committee stated as its opinion in 1880:

“That the establishment of telegraphic communication with the Faroer Isles and Iceland, with Greenland and with the Azores would be of the highest importance for the progress of the science of weather forecasting in Europe, and expresses its hope for the realization of the scheme.”

This hope was to prove idle for many years to come! It was to be nearly a quarter of a century later before this desire was to be fulfilled.

As important questions for discussion in the years after 1879 may be mentioned the calculation of a number of reduction tables in meteorological observations. This work had been accomplished in France 1885 and published in 1890 (16).

Proposals were received for a classification of the upper clouds with a view to insert observations of these clouds in the regular programmes of observations of meteorological institutes. Instructions were formulated to observe the movement of the clouds with a new instrument: the nephoscope\*).

It was suggested to postpone the third Meteorological Congress until the year 1889. The French Government intended to invite in that year the meteorologists to Paris for an International Meteorological Congress during the great International World Exhibition. Therefore the Committee was of the opinion that any definite decision should not be made at present, but to take the French proposal for postponement into serious consideration. This suggestion was unanimously agreed to.

The interval between the third and the fourth session was three years. Important changes could be stated in the general opinions during this lapse of time. The objections mentioned at Paris against officially convening a Congress of state delegates had become more frequent and more serious and had extended to a majority among the members. Besides this, it could be stated that the governments themselves had taken an unfavourable position to the organization of a new Conference.

So the majority among the Committee members was of the opinion that the Committee for the time being had fulfilled the instructions as they had been formulated in Rome 1879. It had considered whether, in view of the existing opposition, the time had not come to change to a free Congress of directors and staffs of different meteorological networks of an unofficial character. So the new questions arose:

Does it appear opportune to convene at an early date a third International Congress."

In view of these considerations the agenda had been limited to questions which had not been decisively arranged in the foregoing meetings, and some new questions which had to be arranged urgently. These were mainly concerning climatology.

The most important question, i. e. the form of a new organization, had been arranged in the last session by a resolution worded as follows:

"Le Comité, considérant que la réunion, d'un Congrès international avec le caractère des Congrès précédents de Vienne et de Rome présente de grandes difficultés, apprécie que son mandat est épuisé et qu'il doit se dissoudre."

"... le Comité nomme un Bureau qui sera chargé de faire des démarches pour provoquer en temps opportun une réunion internationale de représentants des différents Services météorologiques."

This meant the end of the Committee established nine years ago in Rome and opened the door to a large category of scientists in the field of practical meteorology and of theoretical science as well.

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\*) "The Committee recommends the observation of the movement of the clouds, especially of cirrus" — — — "and the introduction, at least for some stations, of these data into meteorological reports." (Paris 1885).

The first era was closed by this decision. The future of meteorology was based on new principles. More and more the field of investigations had to be divided into specialized research, to be undertaken by specialists in groups assembled in special Commissions.

In the meantime meteorologists of the whole world assembled in Paris to attend a Congress in 1889 organized by the Société Météorologique de France. They discussed mainly instrumental and scientific questions and reports about special and individual research. The list of the participants mentioned 174 names (17).

The memoranda and papers of meteorologists of the whole world formed a volume of 283 pages. They treated on very various subjects, such as climatology and synoptic meteorology, methods of constructing meteorological apparatus and their exposure, and the instructions concerning the use of them in practice. There were many papers on terrestrial magnetism. Questions on classification of clouds were also submitted for discussion. Quite new items were recent studies of the vertical temperature gradients in the atmosphere and the variations of wind with height. The Americans were pleading for active collaboration in maritime meteorology and showed their readiness on the largest possible scale.

The results of this Congress are extensively reported in the next chapter, which indicates the new way to be followed. It may be stated that the Congress was a great success. It provided a contact between the meteorologists all over the world far closer than the official International Meteorological Congresses of Directors with their seriously restricted programmes ever could. In this Congress the future splitting up of the International Meteorological Organization into special commissions of experts was prepared.

Two years later the old Bureau of the International Meteorological Committee undertook to send out the invitations for a meeting of non-official character in Munich 1891, with a description in clear terms on the aims and form of the Congress. The invitations were sent in the largest possible number in- as well as outside Europe.

#### **1.6. The Conference of Directors in Munich 1891 (18)**

On the 1<sup>st</sup> November 1890, the Bureau of the late International Meteorological Committee circulated a letter inviting the Directors to attend a Conference in 1891. In a second letter the first meeting was convened in Munich, August 26<sup>th</sup>.

There was some trouble as to whom the invitations were to be sent. There was no homogeneity in the positions of the meteorological services in different countries in Europe. Only a few were officially recognized as representing their governments. As far as the countries outside Europe were concerned, the Bureau itself had to decide who was to be invited in the absence of precise instruction. After the objections against the official character of the late Congresses of Vienna and Rome it had been expressed that the coming Conference should be an unofficial meeting of representatives of meteorological services. But how to define Meteorological Services? The Committee had indicated, that it was to consider as such only the meteorological services in each country which had an independent existence. The recognized head of chief office in each country in Europe had been asked about the eventual extension of the invitations to extra-European services and finally about what individuals should be considered as chiefs of services in their countries.

These last communications were made by Dr. Wild in his quality of President of the former International Meteorological Committee in the opening address. This concurred with the previous Secretary Mr. Scott. As regards the character of the proposed meeting he stated:

„It was clearly indicated by various utterances at meetings of the International Meteorological Committee, that the meeting was not to be official, i. e., not to consist of delegates from Governments. As soon as ever the International Meteorological Committee, in accordance with its instructions from the Congress at Rome, raised the question of convening another Congress an insurmountable opposition was met with from more than one Government. These Governments declined to have any more official Congresses, with all their formal attributes, but, on the other hand, were not ill disposed to private Conferences between the heads of Meteorological Services, for the discussion of concrete questions, for the arrangement of procedure as to methods of observation and calculation, and for the organization of common investigations. The Committee, therefore, found itself unable to carry out its instructions in this particular, and decided to dissolve itself, but entrusted two of its members with the duty of organizing a Conference of the more private character last indicated. Our way was therefore clearly pointed out for us, and we were obliged, despite a very general expression of opinion to the contrary, to decline definitely any proposal of issuing invitations through diplomatic channels.”



Heinrich von Wild

When Munich had been named for the Congress, Dr. Lang, the Director of the Meteorological Central Office of Bavaria requested permission for the meetings to be held in that town. This permission was graciously granted by the government

authorities, and suitable rooms were assigned. The conveners had felt obliged to decline a proposal for an official opening from the side of the authorities of Munich so as to preserve the private character of the Conference, on which so much stress had already been laid and which had been preferred by the President of the late Committee.

The list of invitations had contained eighty-one names from forty-one countries, twenty-three of them outside Europe. Thirty-two persons had travelled to Munich and fourteen had announced their inability to be present. Different directors from remote regions had forwarded questions by correspondence. A new rule in seven paragraphs was presented for this particular meeting. The Bavarian host was proposed for the presidency of the meeting and this proposal was accepted by acclamation.

It was regretted that the veteran Prof. Buys Ballot was missing. He had deceased six months before.

The agenda of sixty-four items was treated in eight meetings. A special Commission was appointed to examine the questions on terrestrial magnetism. Seventeen persons were nominated members. It had been intended to attribute to this Commission a permanent character, and to charge Dr. Wild with the Presidency.

Numerous questions on the agenda concerned the routine observations at meteorological stations, the form of annuals and publications, the use of reduction tables in calculations for climatology, observations for the weather-telegrams, in order to come to some uniformity in composition and form of climatological tables and in calculating monthly and yearly means. Recommendations were given for the exposure of the instruments at the stations and for mutual comparison and calibration, regulations that have been followed for many years.

For many questions the time was not yet ripe, for instance, for deciding on standard hours of observations for weather reports and for climatology. Questions of that kind had already been regulated a long time before in the United States of America (observations for synoptic meteorology at standard hours at the time of the seventy-fifth meridian West of Greenwich).

A renewed discussion on the utility of daily exchange of weather reports between Europe and America could not be brought to a conclusion owing to high costs. Equally telegrams from Iceland, the Faroers and the Azores could not be realized owing to the very great expense. As regarded the observation of clouds, their classification and division a satisfactory progress was made. A plan to compose a small observers' cloud atlas was generally adopted and a special "Commission for the study of clouds" had to be established to prepare a scheme for cloud-observations in the daily programme of a number of specially trained stations.

The creation of this Commission\*) and that for Terrestrial Magnetism was the first step towards a new situation. It stressed the tendency for decentralization of the Meteorological Organization by the establishment of particular Commissions of Experts in certain branches of meteorology.

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\*) Hann, Hildebrandsson, Teisserenc de Bort, Rotch, Singer.

The Congress did not judge itself competent for special regulations that urged financial consequences for the governments concerned. Among them was the question, discussed in Rome, of the creation of a Central International Bureau. There was some opinion that this idea could not be realized, except as a Bureau exclusively for administrative purposes. This was laid down in a proposal to establish an "International Meteorological Bureau" instructed to act as a permanent secretariat and to be paid by contributions of the cooperating governments.

The conclusion had been formulated in the following Resolution:

"The Conference is of opinion that it would be very useful, on the basis of an international agreement between all countries, to institute an International Meteorological Bureau, which should be charged with the following duties:

1. The Bureau has to see that Protocols of International Conferences, Committees or Sub-Committees should be published and distributed in the three languages (English, French and German). At the time of any of such Conferences this Bureau and its staff shall be at the service of the Conference for the supply of information, and for the preparation etc. of the Protocols.
2. During the intervals between the meetings of these International institutions the Bureau has to maintain a continuous correspondence with the different Meteorological Institutes and with meteorologists in general. It will be the authoritative channel for the communication of the Resolutions of Meteorological Congresses or Conferences to any persons interested therein, and will furthermore prepare a catalogue of all meteorological publications in different countries and hold it at the disposition of meteorologists.
3. It will assist at the preparations for Meteorological Conferences and Congresses by arranging the Programmes and procuring reports on special questions, etc.
4. The Bureau will be placed under the control of an international staff, and will be maintained at the cost of the participating states."

"The Conference refers the details of the proposal to an eventual International Committee to be established by the Conference."

The last item consisted of a discussion whether:

- "1°. Is an International Committee to be appointed or not? and
- 2°. Shall the Committee consist of many or few members?"

The reply to the first question was in the affirmative, therefore the decisions of the Conference could be summarized in the following Resolution:

"An International Committee is to be established to deal with the following matters and questions:

1. The issue of the Protocols in three languages.
2. The proposals as to the establishment of an International Bureau.
3. The proposal as to the subject of agricultural meteorology.
4. The proposals as to the establishment of stations for observing the motion of upper clouds.
5. Dr. Snellen's question as to the acceleration of telegrams.
6. The organization of the next Congress.

The Committee is to consist of 17 members, representing different countries, of these 14 are to be elected by the Conference by means of voting papers, while the three remaining places are to be filled by the Committee itself by co-optation. In the case of any vacancy caused by resignation or death, the Committee can fill such vacancy. The Committee is to appoint its own officers and distribute the work among its members."

The Committee at once appointed its officers by unanimously requesting Dr. Wild to continue as President and Mr. Scott as Secretary. Both gentlemen expressed their readiness to accept the proposed duties. It was then proposed, that a new Congress should be convened within five years, i. e. in 1896, and to meet in Paris, whether of official or non-official character was to be decided by the Committee. After the final ceremonies the Conference was closed with many thanks to the Bavarian Authorities for their hospitality.

### 1.7. The new International Meteorological Committee 1891—1896

The International Meteorological Committee held its first meeting in Upsala (Sweden) three years after the Munich Congress. Two members, those from India and Australia, had made the trip to Europe to attend the meeting personally. The agenda contained ten items. Three of them may be mentioned as items of prominent importance, namely (19):

- 1° the institution of an International Meteorological Bureau (II),
- 2° the composition of an International Atlas of Clouds (IV, V),
- 3° the acceleration of Telegraphic Weather messages (III).

The Swedish member, Prof. Hildebrandsson, had made a thorough study of the first question. He had laid down his proposals in a printed memoir which was previously circulated. He had divided his conclusions into three parts to be discussed separately as follows:

- 1° Why should it be useful to institute an International Meteorological Bureau?
- 2° The necessary staff,
- 3° The probable expenses.

Regarding the first of these items he stated that the Bureau should not be permitted to govern the work of the Institutes with regard to their observations or to exercise any control. It should abstain absolutely from giving instructions to meteorological services of different countries and limit its functions to purely administrative affairs. The Bureau should tend assistance, under the control of the Committee, to possible scientific problems, investigations and scientific enterprises.

The staff should be composed basically of a chief and two assistants and further temporary personnel for particular technical aid in calculations for publications. The salaries could be estimated at 27000 Swiss francs and the cost of administrative work could, in comparison to other Bureaus of the same constitution, be estimated at a sum of 23000 Swiss francs, thus the total costs would be 50000 Swiss francs. This amount ought to be increased by possible renting costs for the Bureau unless hospitality was given in an office building of an existing meteorological institute.

Many members expressed their opinions on the paper of Prof. Hildebrandsson. The discussions were ended at last by the adoption of the following Resolution:

"Le Comité est d'avis que la constitution d'un Bureau international ne paraît pas réalisable. Pour les questions d'intérêt général, le Comité international semble l'organe désigné pour établir des relations entre les différents Instituts et provoquer des travaux d'utilité commune."

With this decision the question was delayed for a long time. For the present the Bureau of the Committee remained at the office of the Secretary himself, in London.

After the closing of the debates on this item, another item regarding the acceleration of the transmission of weather telegrams was opened. A report regarding this question had already been presented at the Munich Conference, but it had been remitted to the International Meteorological Committee for discussion. The actual paper contained a proposal by the two countries for collective weather reports to be composed in the German Institute for retransmission to the central Institutes on the international cables. These cables had to be reserved at hours fixed in accordance with the hours of observation at the synoptic stations in order to arrange that the whole scheme of transmissions could be achieved within two hours. Arrangements of this kind should make it possible to draw the weather charts and send out the necessary warnings and forecasts at a convenient hour in the morning for the whole continent of Europe and for the British Isles as well.

But a "conditio sine qua non" ought to be a strict synoptic scheme in first instance for the whole continent of Europe and the British Isles. The Directors should decide on the arrangement of the hours of observation and transmission for the telegraphic reports by mutual agreement.

This delicate question had to be discussed firstly with the telegraphic authorities at the International Telegraphic Bureau in Bern, described as:

"de savoir si la transmission des télégrammes météorologiques internationaux pourrait être simplifiée et accélérée, et si l'introduction d'un service circulaire entre les Bureaux météorologiques centraux de l'Europe permettrait d'obtenir ce résultat."

The third question of extreme importance concerned the observations of clouds and the composition of a Cloud-Atlas. This question was examined by a number of members of the "Commission for Study of Clouds" present at Upsala. The meeting had been attended by a number of renowned meteorologists of several countries. Prof. Hildebrandsson himself took the chair.

This Commission adopted in its first meeting the classification of the Clouds in different levels (A—E) and the denotation of ten definite forms (Cirrus, 2, Cirro-Stratus, 3, Cirro-Cumulus etc. — — — 10, Stratus) with the corresponding descriptions. In the second meeting the pictures for the Atlas were selected and in the third the instructions composed for the observers of the Clouds, in five paragraphs. In a paper published by Prof. Hildebrandsson and M. Hagström instructions were given for measuring the height of the clouds (20).

The Atlas was to be composed of twenty pictures as much as possible in colour. The instruction to prepare the edition was entrusted to a special working group of three members under the chairmanship of Prof. Hildebrandsson.

The instruction to supervise the translations of the descriptive texts into other languages was addressed to the Commission for the Study of Clouds itself.

A special Appendix IX mentioned the stations destined to undertake the measurement of the altitude of the upper clouds by photographic methods. The Committee proposed that a coordinated effort for these investigations should be made in an "International Cloud Year", to be arranged for a number of stations which are well distributed and observing simultaneously (eleven stations in seven countries in Europe, seven in the United States of America and one in the Dutch East Indies at Batavia) (1<sup>st</sup> May 1896—1<sup>st</sup> May 1897).\*)

The German member, Sprung of Potsdam, presented a paper regarding the photography of clouds. This paper was inserted in the Report of the Committee meeting as Appendix X.

The agenda contained eight questions regarding Agricultural Meteorology and three on Maritime Meteorology. The first gave rise to a request to the directors to report to the Committee on the arrangements made in their national services for the use of meteorology in agriculture, the second to the distribution of a paper from the Russian side, entitled:

"Sur la nécessité d'une convention internationale concernant la discussion des éléments contenus dans les journaux météorologiques; (Saint Petersburg 1894)."

The Committee expressed its opinion that the next Congress should be convened at Paris 1896 and that it ought to have the same unofficial character as that at Munich five years before.

#### 1.7.1. The International Meteorological Congress in Paris 1896 (21)

Mr. Scott opened the session in the name of the Bureau of the International Meteorological Committee and proposed the nomination of M. Mascart as President.

M. Mascart recalled in his opening speech the Resolution of the Committee at Upsala 1894:

"que la Conférence internationale en 1896 ait le même caractère officieux que celle de Munich en 1891. — Le Bureau (du Comité) est prié de faire les démarches nécessaires pour ce but."

The twenty-four months after the Committee meeting at Upsala were devoted to the preparation of the Directors' Congress in Paris. It was convened for September 17<sup>th</sup> 1896. Seventy-six invitations were circulated; the number of directors present at the opening was thirty-six, among them eleven members of the Meteorological Committee and six directors from outside Europe.

Three vacancies in the Committee had to be filled up. Dr. Wild, the President, had been obliged to resign. His place in the chair of the Committee was left vacant for the time being. Two other members had resigned as Directors. Three gentlemen were nominated by acclamation.

M. Mascart was elected to take the chair and Mr. Scott was requested to continue the function of Secretary.

\*) Appendix J.

The Secretary recalled the Resolution of Upsala regarding the non-official character of the present Congress. The newly formed Resolution to be applied to the daily weather telegrams had been forwarded to the International Telegraphic Bureau in Bern for discussion at a future international telegraphic Conference in Budapest. The circular letter regarding cooperation during the International Cloud Year was forwarded to seventy-two directors. In a following letter the event was extended by 3 months e. g. to 1 August 1897. The number of cooperating stations was enlarged to 100, the  $\frac{1}{3}$  of which were situated in Europe and  $\frac{2}{3}$  distributed over the other parts of the globe.



Eleuthère Mascart

The forty items of the agenda were entrusted as usual to 4 Sub-Commissions, namely:

- for Terrestrial Magnetism and Atmospheric Electricity,
- „ the Study of Clouds,
- „ Telegraphic Weather Messages,
- „ Instruments and Observations.

These Commissions met separately. They nominated individual Presidents and Secretaries for composing their reports to be presented to the Conference. The burning question of the acceleration in the transmission of weather reports had not advanced. The telegraphic Conference at Budapest had declared itself unable to give satisfaction to the desires expressed by the Committee\*). So the result was absolutely negative and the question was remitted to the directors themselves "ad calendas graecas".

\*) Appendix D.

The absolute synopsis of the observations remained for Europe a dream, not to be realized. The new world was supreme in its advance on the old world. The only positive fact was the advise that weather reports should be received not later than eleven hrs. GMT.

The questions on terrestrial magnetism were so many, and the decisions caused so large a number of new regulations regarding the distribution of measurements in the international scheme (e. g. the magnetic field on the globe, magnetic survey in different countries, homogeneity in the observations), that the Congress thought it necessary to investigate whether an autonomic position inside the International Meteorological Organization would be possible. A similar procedure had to be followed for the Aerological Commission. The investigations in the field of the Upper Atmosphere were in full development and new ways for experiments with new instruments were being developed in Europe as well as in America\*) (Free balloon ascents up to 10 km in Germany, balloons with registering apparatus up to 15 km in France and meteorographs on kites and on captive balloons in the U.S.A.).

These investigations had to be directed by an autonomous Commission of particularly interested experts in the different services\*\*).

It had been pointed out in the meeting that the results raised in the field of maritime meteorology were both too difficult and too specialized to be treated in a plenary session and that these also should be referred to a special Commission. In view of the necessity for prescriptions to warrant uniform methods in observations and publications, the Conference required that a proposal be presented to the next Congress.

The member Hildebrandsson showed the result of the work of the Commission for the Cloud Atlas and presented the first copy. The Conference expressed its extreme satisfaction that this work had been completed in so short a time (22).

The questions on instruments and observations were discussed in the special Sub-Commission. The ability of different kinds of instruments with regard to handling and exposure was particularly examined. Several new methods of exposure were introduced, and research was made on the comparison of the results of measurements and indications of accurately calibrated thermometers in thermometer screens of different types and models (England, France, Russia), to the newly constructed "Aspirations-Psychrometer" (Assmanns psychrometer), which had proved to be absolutely reliable under most extreme conditions.

The other questions regarded complementary decisions on previous instructions in which neither the Conference nor the Committee judged themselves competent to give decisive recommendations. In some cases, references to previous resolutions of Vienna and Rome could give adequate satisfaction.

#### 1.7.2. The establishment of permanent commissions

In general the results of long and thorough debates had shown, that although for the time being a level of perfection was reached, this did not give entire satis-

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\*) Appendix D.

\*\*\*) Assmann, Berson, Süring, Hergesell in Germany; Teisserenc de Bort in France; Lawrence Rotch in the United States of America.

faction. The achievement of a higher level depended entirely on further development in instrumental and organizing branches. After the vertical growth during the lifetime of the previous generation it became necessary to decentralize the organizing work of the Congresses and the Committee. So the Conference decided to institute a number of permanent Commissions for the organization and development of scientific research and in order to take the lead after having noted the recommendations from the Reports of the Commissions questions remitted to them for examination. So the Congress established definitely in its final meeting the following permanent Commissions with their presidents and members:

Commission for Terrestrial Magnetism and Atmospheric Electricity (seven members)\*),

Commission for Aeronautics (seven members)\*\*),

Commission for Radiation of Sky and Sun (six members\*\*\*),

Commission for the Study of Clouds (six members\*\*\*\*).

These Commissions had the liberty to coopt new specialized members. The respective Presidents were Messrs. R ü c k e r (Gr.-Britain), H e r g e s e l l (Germany), V i o l l e (France), H i l d e b r a n d s s o n (Sweden).

In the last but one meeting the new International Meteorological Committee was elected. Existing vacancies were filled up.

There was no difference of opinion on the maintenance of a five-year period for the next Meteorological Conference. The place of convening was left to the Committee.

### 1.8. The meetings of the Committee 1896—1905

Three years after the Paris session, the International Meteorological Committee convened a meeting in St. Petersburg (23). Seven members and the President were present, all from Europe. The Secretary was prevented and the member H i l d e b r a n d s s o n undertook his duties. The member V o n H a n n had resigned as director in Austria in 1898. He was replaced by Dr. P e r n t e r.

The agenda contained the reports of the four Commissions established in Paris.

The Commission for Terrestrial Magnetism etc. had already accomplished a programme for a future organization during the Conference in Paris. The members had met in 1898 at Bristol. Thus the President could present a Report of that meeting and of the resolutions adopted by it. The Commission for Clouds presented a report of its activities since 1891.

The Commission for Aeronautics had held its first meeting in Paris 1896 for drafting a working programme, and a second meeting in Straßburg in 1898. It mentioned in its report that observations had been carried out synoptically on days selected long in advance or at short notice owing to important singular weather situations. The report contained communications on observations with kites and captive balloons respectively in Paris (Trappes, T e i s s e r e n c d e B o r t) and in

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\*) Appendix G.  
\*\*) Appendix D.  
\*\*\*) Appendix E.  
\*\*\*\*) Appendix J.

America (Blue Hill Observatory, Lawrence Rotch) and with manned free balloons in Germany (Berson and Süring).

The Commission for Radiation had sent an extensive Report with particular on its scheme of observations to be made, and on mutual comparison of the instruments and the elaboration of the results achieved by them.

Thus the agenda of the Committee meetings differed very much from previous meetings. The reports of the autonomous Commissions with their resolutions and recommendations formed the "pièces de résistance" besides specifying their standpoints regarding communications on investigations to be undertaken internationally, as suggested in reports of individual directors in extensive notes.

Ten of the twenty-three items on the agenda had been discussed in earlier meetings, but had not led to decisions or recommendations. The decisions taken now in many cases only formalized extensions of resolutions of earlier dates. The question of the telegraphic communication with Iceland was considered again, but nevertheless without success. The statement at the end of a long resolution for urging the extreme interest of this communication was the poor recognition that:

"il (le Comité) ne peut qu'émettre un voeu pour le succès des démarches entreprises à ce sujet par le gouvernement danois."

In the hope of gaining more succes, the Committee decided to establish a special Commission for Weather Telegraphy with the instruction:

"d'examiner les améliorations qu'il serait possible d'apporter dans les dépêches télégraphiques pour la prévision du temps."

This instruction may be called rather vague. The Commission had been formed by seven members of the Committee and Dr. Pernter was requested to preside\*).

The Committee was of the opinion that it was premature to convene meetings on questions regarding Maritime Meteorology. The present Committee meeting ended with a plan to convene its own members and those of the Commissions subsequently in Paris for a meeting during the large meteorological Congress to be organized on the occasion of an International World Exhibition in that capital the following year\*\*).

#### 1.8.1. The session of the Committee in Paris 1900 (24)

The session in Paris was limited to a single meeting of eleven members, one of them from outside Europe. The previous Secretary, Mr. Scott, had resigned after having fulfilled this duty for 28 years. Prof. Hildebrandsson was elected officially as acting Secretary.

All the Commissions had held all meetings in the days preceding the Committee meeting. They had presented their individual reports to the Committee meeting. The most important was a resolution by the Commission for Weather Telegraphy, that reported the advantages obtained, by extending the scheme of collective messages in some countries. The Commission proposed that the Committee should institute a commission of official delegates of the cooperating states at the shortest possible notice:

\*) See Appendix A.

\*\*) Appendix B.

"chargés de conférer avec le Bureau international télégraphique de Berne pour trouver les méthodes les plus propres à améliorer le service des dépêches météorologiques."

This Resolution proves, how urgent the situation was. But the Committee was not able to do more than instruct its President confidentially to take all necessary steps to try to achieve the measures so urgently required for further progress.

It was considered premature to fix at that moment the time of a subsequent meeting or a new directors' Conference. London and Washington had both made informal invitations but it was too early to take them into serious consideration that time.

#### 1.8.2. The session of the Committee in Southport 1903 (25)

Three years after the Paris session Committee-members met in England in Southport.

The Secretary summed up in his Report the activities of the permanent Commissions. The Commission for Terrestrial Magnetism\*) had started statistics of the magnetic character of the days divided into "quiet days" and "disturbed days". It could be expected that this work was to be extended in the future.

The Commission for Aeronautics\*\*) had followed the same procedure in collecting the results of coordinated international investigation of the atmosphere, as was requested in a circular letter of October 1900. The Secretary was able to inform the Committee that generally consideration had been given to this request.

Six very extensive memoranda (Appendices II—VI) proved the enormous activities of the Commission for Aeronautics, and the enthusiasm of its strong leader. New methods of observation were reported from all sides. New Institutes were established\*\*\*). Experiments had to be made to fly meteorological kites from specially equipped ships and motor vessels, at sea and on large lakes in calm climates (Friedrichshafen, Bodensee, Germany and the Finnish Gulf, Russia) in Europe and in America as well. The Strassburg Bureau had suggested a coordinated plan for investigation of the free atmosphere by means of a scheme of international observations made synoptically on days in a calendar of "International Days" fixed for many years in advance. This plan was examined at the sessions of St. Petersburg and Berlin in 1899 and 1902 and it had to be extended later for 1904. (Appendix D).

The President addressed Great Britain and the Scandinavian countries to take the first steps for realizing these plans. Therefore Denmark and Sweden were invited directly to create together with France a fund for the establishment of an areological station in Denmark for systematic observations during more than 12 months by regular aerological ascents.

This communication was received with enthusiasm. The three governments consented, and entrusted the general management of the station to the three

\*) Appendix G.

\*\*) Appendix D.

\*\*\*) Appendix VI. Aeronautical Observatory of the Royal Meteorological Institute Berlin at Lindenberg, Kreis Beeskow. Director Prof. Dr. R. Assmann. Blue Hill Observatory, Massachusetts U.S.A. Director M. Lawrence Rotch.

Committee members of their countries. The station was established at Hald in Jutland and it started its work in the spring of 1902. The French Commission member Teisserenc de Bort led the observations personally for ten months from July 1902 to May 1903. Several times the observations were continued night and day consecutively. The results were already printed and were presented to the Committee by Mr. Teisserenc de Bort.

The Committee reminded the Directors of a previous recommendation by the Meteorological Congress at Munich, to reduce the barometric observations for the weather reports and for climatology to 45 degrees latitude and normal gravity at that latitude, and to indicate in the tables of observations whether this correction was applied and its amount. This instruction was to be carried out from 1<sup>st</sup> January 1901 on. It was shown that these prescriptions had been carried into effect generally in nearly all countries.

The report of the Secretary of the Commission and the deliberations in the meetings had proved that the instructions contained in the resolutions and recommendations of the Committee more and more formed the routine directives for the work at the institutes. Their general application all over the world could be noted with extreme satisfaction.

The different stations in the networks forwarded their observations to the central institutes in standardized forms suitable for immediate publication and for insertion into the annuals. Calculations of means for aerology were effected according to the Committee's instructions and recommendations. The questions submitted for discussion to the Committee aimed only at extension and completion. More and more the rôle of the leading party in the Committee was passing over to the Commissions, which in fact, were arranging new schemes for an instructing and regulating body with executive power against the directors.

The Commission reports formed the hub of the Committee meetings. The activity of the last years was changed to manage the adaptation of the special decisions and particular recommendations of the Commissions for general use in all services. The President of the Commission were regularly present in the Committee meetings to provide the necessary information and recommendations for general application of the decisions taken in their own sessions. The main task of the Committee was to give the Commission Resolutions the finishing touch and to decide whether they should be adopted by it and forwarded officially to the competent authorities, or should be left to the competence of the Commissions themselves.

It may be mentioned that the observations of clouds during the Cloud Year 1896—1897 had been edited in Sweden and Germany and that they had been partly printed (26). The Dutch member of the magnetic Commission had been requested to charge himself with the collection and distribution of the magnetic "Quiet Days", leaving the question of the "Disturbed Days" to the Commission to decide. This work was to be continued at De Bilt for a long period. A number of questions on atmospheric electricity did not lead to decisions.

The commission for Weather telegraphy had not succeeded in attaining further success and its only advice could be to remit the question of improvement in the exchange of weather reports to an official Commission of representatives of telegraphic and meteorological services:

"pour étudier les meilleurs méthodes à adopter pour accélérer la communication des renseignements nécessaires à la prévision du temps." — — —  
"Si cette communication ne peut être réalisée, les Directeurs des différents instituts sont invités à faire des démarches dans leurs pays respectifs pour réduire autant que possible les retards de la transmission des dépêches météorologiques."

Surely a meagre result. A step in the right direction was that England was to advance its morning observation to 7 hrs. GMT at standard time simultaneously with the observations of 8 hrs. CET (15<sup>th</sup> meridian E) in the countries of Central Europe to warrant absolute synchronism of this observation.

A fifth Commission was established for the relations between Meteorology and Astrophysics\*).

It was decided to convene the next Directors' Conference at Innsbruck in 1905.

The Reports\*\*) of the Commission for Aeronautics form an interesting story. The organization in research work, nationally and internationally directed in the first place towards the system of International Days, was later extended to collecting the results at the observatory of Strassburg. It became the central point for publication in a suitable form. The Government of Prussia had furnished the amounts for printing and editing this publication for the four years 1901—1904 until the publications could be financed by regular contributions.

The Commission presented to the Committee a resolution expressing the desirability of the extension of aerological observations to the tropical regions and at sea on board ships. A second resolution expressed the opinion of the Committee that an international publication was indispensable. Both resolutions were adopted by the Committee.

#### 1.9. The Conference of Directors in Innsbruck 1905 (27)

The third Conference of Directors in Innsbruck was convened on September 9<sup>th</sup> 1905. The invitations were addressed to representatives of meteorological Systems and Institutes.

As the invitations had been forwarded to a wider circle than those mentioned in Art. II § 1 of the Statutes, it was to be expected that the Conference might avail itself of the knowledge and experience of those who were specialized in particular directions of pure practice of meteorology, or were closely related to the modern evolution of meteorology. In accordance with this idea the presidency of the "Commission on simultaneous Solar and Terrestrial Changes" (designated further as the "Solar Commission") established at Southport 1903, was entrusted to an astronomer; Sir Norman Lockyer. Now Sir Norman was present at Innsbruck, with his son W. J. S. Lockyer, also astronomer in London as well as Mr. S. Hale, Director of the Lick Observatory, U.S.A. and of the observatory for Solar Research at Mount Wilson, Pasadena\*\*\*).

Mr. Violle, the President of the "Commission for Radiation of the sun and the sky" (indicated hereafter as the "Radiation Commission") instituted in

\*) Appendix E.

\*\*) Appendix D.

\*\*\*) Appendix E.

Paris 1896, was not present. He had sent a report regarding the state of the radiation investigations and had forwarded some demands on the meteorological institutes concerning the procedures of measuring radiation.

The Conference was opened by the Secretary, Prof. Hildebrandsson, by reading the Report of the activities of the Committee in the period 1896 to 1905. After that the Committee was discharged. It proposed the nomination of Prof. Julius von Hann as Honorary President, one of the last survivors of the first Conference at Leipzig 1872. Dr. Pernter was nominated acting President. The Honorary President entrusted the management to him after a long opening speech, with a reference to his experience of more than thirty years in international affairs.

The thirty-nine items of the long agenda were as usual divided into groups to be discussed in Sub-Commissions, and partly in plenary meetings. The permanent Commissions were to meet separately during the session of the Committee (Terrestrial Magnetism, Solar Radiation and Meteorology).

In accordance with the directives of Munich only questions relating to practice were to be treated, while purely theoretical questions were to be excluded. The Commission for the Study of Clouds mentioned in its Report\*) that it had carried out its instructions with the edition of the Atlas of Clouds and proposed its dissolution. The other Commissions had resumed their activities in extensive and important Reports\*\*) summing up investigations in several countries, and research all over the world.

The Commission for Weather Telegraphy could report that the transactions with the telegraphic authorities regarding acceleration in the international exchange of weather telegrams had finally come to a successful end.

Decisive arrangements were started on August 1<sup>st</sup> 1903, and extended to Vigo (Spain) and Horta (the Azores) two months later. England had advanced its morning observation on May 1<sup>st</sup> 1904 by one hour to 7 hrs. GMT and had advanced the morning report by ninety minutes to 9 hrs. GMT.

This arrangement finally brought the accomplishment of long existing requirements. Recently, on July 1<sup>st</sup> 1905, it had been agreed with the Deutsche Seewarte, that the morning message should be issued at 8 hrs. 10 m GMT = 9 hrs. 10 m CET and retarded messages should follow one hour later.

These new arrangements were followed by new experiments to extend the reports to be exchanged instantly internationally, by completing the thirty-years-old code with some new elements, thus improving the forecasts by application of recent scientific studies.

The President of the Radiation Commission, Mr. Violle, had expressed his wishes regarding a general extension of the measurements of the balance of energy by in- and outgoing radiation. His Commission emphasized the use of newly constructed and exactly calibrated apparatuses, and the necessity of carrying out the observations according to equal instructions in measuring the total radiation of the sun received in different parts of the spectrum. This was in relation to

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\*) Appendix J.

\*\*) Appendix A—J.

problems of astrophysics and the apparent unperiodical changes of solar radiation, which had recently been discovered and studied in the extensive solar observatories in U.S.A. These questions gave rise to a long discussion. Finally two resolutions were adopted recommending the execution of the measurements of radiation of the sun and sky at the central observatories at 11 hrs. and 13 hrs. and that of the radiation of the earth at 22 hrs., or between 22 hrs. and 24 hrs. The measurements ought to be carried out with instruments constructed especially for that purpose by Dr. K. A n g s t r ö m in Sweden (Upsala).

The discussions closed with a recommendation for measurements of radiation during an entire year in the tropics. These measurements formed in the following year the topic of interest of many explorers in- as well as outside the circles of the Interenational Meteorological Organization.

A number of questions of detail were remitted to the International Meteorological Committee for later discussion; others were adopted without discussion.

Between the decisions of primary importance may be mentioned the reduction of barometric pressure to sea-level in the weather messages. The Deutsche Seewarte had circulated an extensive paper summing up the different ways of accomplishing this important reduction. The conclusion had been laid down in a classic resolution, which was adopted by the Conference in the following form:

"Die Direktoren der Netze werden aufgefordert, die Reduktion des Barometers auf das Meeresniveau in der Weise zu machen, daß die Resultate, nach welcher Methode immer sie berechnet werden, nicht mehr als 0.3 mm abweichen von dem mit der vollständigen barometrischen Formel gewonnenen Werte, wenn in die letztere die Temperatur und die Feuchtigkeit der Beobachtungsstunde eingeführt werden, und als Temperaturgradient  $0.5^{\circ}$  C per 100 m angenommen wird."

This Resolution was to be executed after 1<sup>st</sup> January 1906 in the international weather telegrams. By achieving this reduction only very simple reduction-tables had to be used, which made its application reliable.

On the other hand, it may be mentioned as a remarkable fact of historical significance, that the Conference recognized for the first time the possibility of receipt of weather reports from ships at sea by wireless telegraphy to coastal-stations. This opened the possibility of extending the region of observations to the Oceans. The London Institute was requested to study this question and to prepare a report for the interested institutes in it.

The Conference urgently recommended observers of ylouds to use the definitions of the International Cloud Atlas in publications and instructions accurately and without additions or changes.

The Conference referred a number of questions, e. g. relating to the study of development of showers and storms, and their special character, — a question that had been entrusted for study in Paris in 1896 to a special "Commission on storms and gales" — to a small Commission of three members. A special Commission had been established at Southport 1903 to draft an "International Meteorological Codex" of resolutions containing all decisive decisions on questions treated at the different successive meteorological conferences. A draft had been prepared by two members of the Committee, Hellmann and Hildebrandsson, for submission to the present Conference. The above mentioned "Commission for

the Codex" expressed its satisfaction on the work accomplished by both these members and recognized it:

"als ein wichtiges und zweckdienliches Mittel zur Förderung der internationalen meteorologischen Arbeit."

The Commission expressed the wish that editions in French, English and German should be made for publication in these languages. The Conference agreed to this desire and accepted the offer for translation into Spanish, made by the member of the Far East, Father F r o c.

A long discussion regarding the comparison of stationbarometers with standard instruments ended with a proposal to carry out these comparisons regionally in common centres. Finally the representatives of the meteorological institutes in Berlin, London, Paris, St. Petersburg and Vienna proved ready to undertake the comparisons with the standard-apparatus at regional centres.

A number of nine resolutions of the Commission for Terrestrial Magnetism were adopted by the Conference without discussion. That for "Solar Radiation and Meteorology" reported on meetings held at Cambridge 1904 and Innsbruck 1905. Four of its resolutions regarded the establishment of stations all over the world in distant regions at all latitudes and on a number of Ocean Islands. It proposed that these radiation stations should be equally equipped as meteorological stations. The Conference similarly adopted these resolutions and was ready to support them where possible.

Before closing the Conference a new International Meteorological Committee had to be elected for the following period.

The Commission re-elected in its constituting meeting M. M a s c a r t as its President and Prof. H i l d e b r a n d s s o n as its Secretary.

The last meeting brought a report by the Commission for the Study of Clouds with five resolutions which were all adopted without discussion. Six resolutions by the Commission for Weather Telegraphy were also adopted. One of them regarded the questions of a uniform scheme of storm warning-signals to be adopted internationally for use everywhere on the earth. As a Commission for Maritime Meteorology was still missing this question was entrusted to the Committee for consideration.

The new Committee re-established in its first meeting:

- 1° The Commission for Terrestrial Magnetism etc.  
President R y k a t c h e f f,
- 2° The Commission for Aeronautics  
President H e r g e s e l l,
- 3° The Commission on simultaneous solar and terrestrial changes  
President S i r N o r m a n L o c k y e r,
- 4° The Commission for Solar Radiation  
President V i o l l e.

It dissolved the Commission for Weather telegraphy.

After a week the agenda had been finished and the session had been closed.

#### 1.10. The sessions of the Committee in Paris 1907, Berlin 1910 and Rome 1913

##### The Committee meeting in Paris 1907

The newly elected International Meteorological Committee met two years later in Paris. Only nine members were present, among them the Japanese member Prof. Nakamura. The President of the Commission for Aeronautics was also present.

The President of the Committee was prevented from attending owing to the state of his health. He had asked his successor, M. Angot, to attend the meetings.

The English member Dr. Shaw was requested to replace the President in the chair. At the end of the meeting the Presidency was given him definitively by ballot (28).

The agenda firstly contained five questions which had been remitted to the Committee by the Directors' Conference at Innsbruck. Three regarded climatological questions (classification of stations, definition of hydrometeors, maxima and minima of temperature in weather reports), one was in the field of maritime meteorology (storm warning signals), one was in the field of general administration, namely, the charge of drafting new general rules for the International Meteorological Organization on the basis of the historical by-laws of Utrecht 1878 and Rome 1879. These Rules were to be composed in three parts namely:

1. for the Directors' Conferences,
2. for the International Meteorological Committee,
3. for the permanent Commissions.

It was intended that these rules should be presented to the next Directors' Conference for discussion and adoption.

Among the new questions — eleven in number — were some of importance for the development of synoptic meteorology in the near future, namely, the transmission of weather reports from ships at sea to coastal stations by WT as voiced from the American side and described as:

*"obliger chaque navire portant des appareils radiotélégraphiques à faire et à transmettre des observations météorologiques, et aussi à transmettre aux autres navires ou aux stations à terre toutes les observations qu'ils reçoivent."*

This question was considered from the British point of view with the Marconi-company. A scheme for an organization on the basis laid down in the resolution had resulted in the costs, being estimated at 25.000 francs\*) a year in maximo and these amounts ought to be provided by the Governments. Preliminary experiments had been succesful.

The progress made for the drawing, publication and exchange of weather maps in later years urged a tendency to unity in the projections and scales for these and other meteorological charts. Furthermore the agenda contained some practical questions of calculating mean values on a worldwide basis. It was considered advisable to establish a special commission to solve these questions by general instructions.

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\*) Current-value according to the latin money association.

It was clear that the questions to be referred to the Committee for discussion were so complex that they had to be remitted to special commissions, either ad hoc, or with a permanent character. Among the members of these commissions at least one should be a member of the Committee and a Committee member should preside. Presidents of Commissions not being Committee members were to be invited to attend the Committee meetings personally to advise on the questions discussed at their sessions.

The question of uniform storm warning signals proposed from the Chinese side (Zi-ka-wey) at Innsbruck was referred to a special Commission with representatives of all parts of the world as predecessor of a special "Commission for Maritime Meteorology and Storm Warning Signals" to be established later. The same was carried out for the achievement of uniformity in the projection and scales of charts and for the calculation of meteorological means according to uniform methods and prescriptions.

A proposal from the French side was also to be dealt with, namely:

"La nécessité de suivre journellement par les observations d'une trentaine de stations, réparties dans les zones équatoriales, subtropicales, tempérées et polaires, l'état des principaux éléments météorologiques sur l'ensemble du globe."

The Commission formed for the realization of this last plan was given the name of "Commission for the Réseau Mondial". It was to play an important part in later years and published very important editions for later use on special investigations.

In view of the important rôle to be played in organizing the extension of the weather reports from ships at sea it was decided to re-establish the Commission for Weather Telegraphy which had been dissolved at Innsbruck, in particular for arranging this as a new branch added to its former task.

The last group of the code for weather reports adopted at Utrecht 1874 (MM mm Sea) had always been a supplementary group. For those who wanted to be informed on the daily maximum and minimum temperature forecasts, this group could be made obligatory.

A request from the Swedish member Dr. Hildebrandsson to establish special meteorological stations in the regions of the great centres of action in the atmosphere was received with extreme interest and many directors promised to establish such stations in due time.

The reports of the four Commissions re-established at Innsbruck did not raise new discussions but showed a great activity in each of them. In the last meeting the draft of the Rules was read and adopted (see Annex I) after some amendments. It was to be distributed to the Directors within six months. The Committee was to follow the draft of the old Rules until the next Conference was convened.

The Secretary asked to be discharged from his function. He had to resign after his resignation as director in his country.

The function of Secretary passed over to Prof. Hellmann.

The Committee session in Berlin 1910 (29)

Three years later the Committee was convened for a meeting in Berlin, 25<sup>th</sup>—29<sup>th</sup> September 1910. The number of members was again completed to seventeen.

Twelve members were present at the opening, two from outside Europe (Far East and U.S.A.). The President of the Commission for Aeronautics attended the meeting as a guest.

In the year 1909 a session had been held in London to establish a Commission for Maritime Weather Signals (30). The Solar Commission had also met in London in 1909. The Commission for Aeronautics and that for the Réseau Mondial had met in the same year in Monaco. The Prince of Monaco had attended personally the first of these last two meetings after having taken an active part in the investigations of the Commission on his private yacht in the Mediterranean and in the North Polar Seas.

The Commission for Terrestrial Magnetism etc. (29) had met at Berlin in the days immediately preceding the Committee session which was convened in that city.

The different Commissions had all prepared Reports to be presented to the Committee. The Committee was extremely satisfied concerning the unwearied endeavours to extend observations everywhere possible, and about the immediate and complete publication of the results of the International Days of the Commission for Aeronautics by the Bureau at Strassburg. The desires mentioned at Monaco for extension of the aerological observations were followed generally by several expeditions at sea and on land at different latitudes.

It was to be expected that other promises would be realized in due time.

Half of the items of the agenda were the Reports of the Commissions. The total number of items was limited to ten.

The Commission reports led to a debate on questions of principles and to resolutions of far-going importance for the future development of meteorology. Seven of the items of the agenda related to proposals in different fields and proved how the study meteorology should be reorganized and modernized.

The Commissions for Maritime Weather Signals and for Weather Telegraphy had discussed mainly a series of documents regarding the different Storm Warning Signals in Europe and the Far East (Japan), and a change in the codes for weather reports.

The result of the meeting of the first Commission was the adoption of an International System of five Storm Signals by Day and five by Night, with red and white lanterns. The system was completely described in four resolutions.

The President circulated a paper with Maritime Weather Signals in twenty-nine countries for information.

The Committee adopted the proposed Storm Warning Signals system.

The second item of importance regarded the desirability of special projections for the polar and the equatorial regions on planes cutting the globe at two latitudes North and South of the mean latitudes. Five different scales, suggested as being the scales likely to meet international requirements, had to be generally adopted.

There were long discussions regarding the reports of the Radiation Commission and of that for the Réseau Mondial. They both concerned the aim of studying the distribution of meteorological elements over the globe, and of collecting the observations of a number of suitably situated stations in order to make them available for general use. The distribution of the observations could be carried out in the easiest possible way by means of simple tables of monthly means of the elements, if possible also daily means for stations, transmitted by telegraph. The elements should be plotted in charts to study their distribution. These should be barometric pressure, temperature and precipitation and they should be centralized by telegraph in the Central Institutes, respectively in the home-countries and in countries with colonies, for general distribution.

But the networks for the two Commissions differed in relation to their aims, the one purely meteorological, the other purely scientific, for the study of the relations between solar and atmospheric phenomena at a large number of stations well distributed on the globe.

The stations indicated by the Solar Radiation Commission were, after a long deliberation, agreed to by the Committee. The Committee recommended at the same time that the special publications of the observations of the stations ought to be arranged within a year or, if this were impossible, simply by sending copies of the log books. The President of the Committee was instructed to provide all possible help by requesting on behalf of the Committee all directors of different networks of observations to cooperate in this way. He was further requested to propose that such data, which were of particular interest for the Réseau Mondial, should be put at the disposal of Prof. Hildebrandson in view of completing his particular investigations relating to the centres of action in the atmosphere.

The Report of the Commission for Terrestrial Magnetism etc. proved that this Commission took a quite individual position in the Organization, entirely excluded, from meteorology. It also proved that it would be advisable to add to its name the word "and Atmospheric Electricity". Perhaps the establishment of a new Commission especially for these investigations could later be considered.

The "Commission on Storms and gales" of Innsbruck was dissolved as a regular Commission. This did not mean that the research should be stopped. This was intended to be continued locally and personally, and published in a way easily accessible to all interested persons, e. g. monthly publications with mean data of several institutes in printed form.

The general opinion was, that the Commission for Weather Telegraphy had to be re-instituted. This was expressed by the Committee by the statement

"Die Kommission für Wettertelegraphie soll fortbestehen."

The President communicated that a number of experts on Synoptic Weather Telegraphy had met in London in the days preceding the session of the Commission for Maritime Weather Signals in order to consider some complements to the Telegraphic Weather Reports which were considered generally necessary. A paper composed by Dr. Shaw was circulated to the Committee members to report its resolutions, and Dr. Shaw gave a summary of the replies received. The principal aim of the meeting was finally to carry out a change of the codes still dating from the year 1874, namely 1° to add the tendency and the change of the barometer in the last hours before the observations for the synoptic weather reports, and 2° to add the track of the high clouds in these reports.

The reason for the insertion of these new elements was that recent studies had shown that regions of falling or rising pressure were nearly related to, and moving with, the same regularity as the isobaric situations themselves. They could be indicated on weather charts by means of "isallobars" in the same way as the field of pressure was noted by the isobars. These isallobaric systems showed a regular form independent as to whether they were indicating positive or negative changes. They accompanied the cyclones and anticyclones in their regular tracks, either preceding or following them.

For including this barometric tendency in form and amount it would prove necessary to add to the existing code forms three figures, besides one for the track of the high clouds. The result of long deliberations was laid down in the following resolution:

"In die Internationalen Wettertelegramme am Morgen soll die barometrische Tendenz nach den Aufzeichnungen der Barographen aufgenommen werden. Die Angaben der barometrischen Tendenz sollen an die Stelle derjenigen des feuchten Thermometers (T<sup>1</sup>T<sup>1</sup>T<sup>1</sup>) auf dem Kontinent treten (T<sup>1</sup>T<sup>1</sup> in England<sup>\*)</sup>). Die barometrische Tendenz soll sich auf die drei vorhergehenden Stunden beziehen."

In view of reaching unanimous agreement on the different opinion in this revolutionary action it was resolved to try to reduce the number of three figures to two. The change was to be carried out on 1<sup>st</sup> May 1911. Surely a historical date with regard to an extensive and total evolution of the weather messages in the years to come.

It was decided that the re-established Commission for Weather Telegraphy ought to be instructed to bring into effect the reformation of the above-mentioned evolution. This task had to be entrusted to a small Committee of well-known experts in codes and forms of code. A session was necessary within two years, in London. The results had to be mentioned in a Report. A new light glowed on the horizon.

Col. Chaves (Azores) had presented a paper indicating the possibility of extending the weather reports from the station Horta at the Azores, which had been transmitted since 1903 by cable, to messages of the other Isles of this Group. These reports could be transmitted to Horta on a newly established scheme of WT stations, without any supplementary costs. This brought long cherished illusions to realization and opened wide prospectives.

A second step to a new future was made by the studies in dynamical meteorology in Austria, Norway and Germany based on frequent observations made strictly simultaneously and hourly in distinct networks with a sufficient density of first class stations in extensive regions. These schemes could be organized with the help of the stations cooperating in the International Days of the Commission for Aeronautics.

The Committee agreed to support enterprises of this kind warmly. It adopted the suggestion to recommend the aerological stations to effectuate during the International Days a number of hourly observations at as many stations as possible,

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<sup>\*)</sup> The figures 999 (99) will indicate "tendency missing".

and at the same hours GMT. These observations ought to be multiplied in the least expensive way for distribution among private explorers, if possible accompanied by original diagrams of the registering apparatus at the stations.

A paper by the English meteorologists Shaw and Lempfert was of the same tendency as the above-mentioned proposals of the Norwegian Prof. V. Bjerknes and of the Director and the staff of the Meteorological Office at Vienna Prof. Exner c. s. (31).

It was at this particular conference that another burning question was solved. It concerned the change to a new system of units for expressing meteorological data in units suitable for theoretical and thermodynamical studies in dynamical meteorology and in aerology. They were proposed by the younger generation of meteorologists and based on the cgs units used everywhere in theoretical and practical physics. Here the real physical units of "bar" and "millibar"\*) for atmospheric pressure were to replace the unit millimeter or inch of mercury, whereas the unit "geopotential" was introduced instead of the "metric height" at vertical displacements of air-masses.

After extensive discussions, unanimity for a sudden change was not reached. Therefore the Committee expressed as its opinion:

"daß es noch nicht die Zeit ist, eine endgültige Meinung darüber abzugeben."

At this meeting the second edition of the International Cloud Atlas of 1894 was submitted with some new plates and some amendments on the definitions of the clouds, such as had been considered at Innsbruck. The international table of symbols was again extended to some new ones. The proposal to edit regular "Monthly Weather Reviews" by all cooperating institutes found general support, and also the proposal to organize meteorological observations in colonies and to publish regularly the observations made in countries without official meteorological service.

The Report of the Berlin session closes with the list of members of the seven permanent Commissions. Some of them had been extended to an astonishing number of members cooperating in the work of the International Meteorological Organization. The Commission for Aeronautics reached the maximum with a number of sixty-four members. In this situation there were complaints that the frequent meetings at short intervals caused difficulties in connection with the high travelling expenses and long absences from home for the members of Commissions.

The Committee meeting in Rome April 1913 (32)

Two and a half years later the Committee members met again in Rome, the city where thirty four year ago the Committee had been established. The Italian member Prof. Palazzo, who had attended the Conference of 1879 represented the oldest generation and welcomed the members in his opening address. Three members were still alive, namely Mrs. Von Hann, Mohn and Scott.

The constitution of the Committee had not been changed since Berlin. Eleven members were present, one from outside Europe (Canada). Also the President of the Commission for Aeronautics was present, Prof. Bjerknes and Dr. Lempfert had been invited as guests.

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\*) 1000 dynes per cm<sup>2</sup>.

The agenda contained thirteen items, among them the reports of the Bureau and of the seven Commissions. It had mainly been prepared by the Commissions in sessions during the interval since the Berlin session.

The question of the institution of a special Commission for Atmospheric Electricity, mentioned at Berlin, was to be postponed until a larger number of observatories took part in these particular investigations. There was now a majority for a Commission for Agricultural Meteorology. Therefore this Commission was established and the President (M. Angot) and five members were nominated preliminarily. These persons had prepared a working programme and they coopted four Committee members.

There was much discussion on the proposals of the Commission for Weather Telegraphy which had not been solved in Berlin, and had been remitted for new consideration (33). Surely the absolutely necessary uniformity as far as form and content of the weather reports was concerned had been reached. But many of the equally necessary "wishes" had not yet been fulfilled. The absolute synchronization of the hours of observation had only been reached for the morning observation, but in the middle of the day and in the evening the meteorological services had to transmit the observations in accordance with the hours of service of the telegraphic offices which differed from country to country owing to local time.

The resolution of Berlin indicating the new form of code proposed by the Commission and the new codes for the new element to be introduced, the "barometric tendency" was now adopted by the Committee. Therefore the morning message would now be as usual in six groups, two for the evening of the day before and four with the morning-observation of 7 h MGT. The new form was to be:

(1) BBBWW (2) SHTTV (3) BBBWW (4) SHTTC (5) **bbbRR** (6) MMmmSea.

The three figures **bbb** in the fifth group indicate the barometric tendency in the last 3 hours, **b** being the characteristic of the barometric tendency (with indication of "falling" by adding 50 to WW in the fourth group) and **bb** the change as compared with the barograph reading three hours before. **C** is the direction of the motion of high clouds according to eight points (1 = NE, 2 = E — — — 8 = N, 9 = no observation), **S** the windforce in the Beaufort scale, and **V** the characteristic of the weather for the 24 hours ending at the time of the evening observation.

This form of code was to be carried into effect on 1<sup>st</sup> May 1914 for the continent and the British Isles for stations provided with a barograph. The hours for weather telegraphy approved internationally were:

for Central North and Western Europe from 30° W to 30° E of Greenwich  
7hrs., 13hrs. and 18hrs. GMT and

for Eastern Europe and for the Asiatic continent (30° E to 180° E of Greenwich)  
6hrs., 12hrs. and 18hrs. CET.

With these decisions a long era of experiments was closed. It meant an absolute divergence between the observations for the synoptic weather reports at standard time GMT and those for climatology at local time. All services would be obliged to follow these decisions without any objection. The anomalous hour 18<sup>hrs.</sup> was arranged for Western Europe to give the possibility of transmitting the evening-observation internationally before the closing of the telegraphic offices at 20<sup>hrs.</sup> local time.

Although advances had been made for the wireless telegraphy transmission of weather from ships at sea the time was not yet ripe for proposals to include these reports in the international exchange of the regular weather reports.

Neither was the time ripe for adopting a system of equivalents for wind speed, on the Beaufort scale of wind forces. The equivalents differed very much between the countries with maritime and continental climates.

No notice was taken in the reports of the discussion on a change of the 1-figure code for the amount of clouds, respectively the present weather, and of the discussion on an extension of the latter to a 2-figure code. The figure V in the second group reported "something" about the evolution of the weather on the previous day. But these poor indications resulted on the weather charts of those days instantly showing the field of atmospheric pressure by the isobars, the distribution of surface wind, the temperatures, and the regions of equal tendencies of the pressure-field by the isallobars with sufficient accuracy, but not in giving an accurate notion of the evolution of the weather situation and of the evolution of the sudden changes which accompanied the passing cyclones with storms, gales and thunder.

The Commission for Aeronautics had met in 1912 at Vienna. It regretted the loss of its enthusiastic member M. Teisserenc de Bort, who had devoted his life to aerological investigations and may be recognized as the first explorer of the stratosphere together with R. Assmann. The Commission had proposed to arrange a coordinated network of pilot balloon stations and the Committee supported this cordially. The extensive Report mentioned a number of particularly interesting investigations all over the globe.

The meeting had discussed thoroughly the introduction of the new cgs units of the "bar" for atmospheric pressure, with its subdivision "millibar" and the second, the "geopotential", for replacing the units for height in feet or metres.

These units were generally introduced by the theoreticians. The Committee did not give definitive advice but recommended the use of both in the aerological publications.

As the polar regions were practically virgin as regarded the aerological investigations, the Commission urged the exploration of these regions systematically, by expeditions to a number of stations, thus supporting the research at the isolated German station at Spitzbergen. The Committee suggested the stations of the Polar Year 1882—1883 and corresponding stations in Europe, Siberia and Alaska and Northern Canada. The Committee also supported this plan, as well as another for aerological observations near the cold-pole in Siberia with expeditions to Jakutsk and Werchojansk.

The Committee accordingly nominated a special Commission of five for the furtherance of this object under the presidency of General Rykatcheff and adopted the following resolution:

"The Committee has received with the greatest interest the information as to the further project of the St. Petersburg Academy of Sciences to initiate aerological observations in the region of the Siberian pole of cold independently of the international undertaking, and express the wish that the project will soon be realized."

The Commission for Terrestrial Magnetism reported the cooperation of a considerable number of magnetic stations everywhere and a strong extension of the magnetic network on the globe. This promoted the study of the division of regular magnetic phenomena all over the globe and of the perturbances and their characteristics and propagation.

The Radiation Commission had met at Rapperswyl in Switzerland (34), the first meeting since its establishment in 1896. Only the President, two members, and the Secretary of the Committee were present. Four of the fourteen members resided in other parts of the world (two in U.S.A., one in South-America and one in Sout-Africa). The discussions regarded exclusively instrumental questions and the indication of centres for comparing the instruments with standard pyrhelimeters in Europe (Upsala), U.S.A., and on the southern hemisphere in accordance with the Solar Commission. The measurements of radiation from the sun and sky were to be bound at the hours between 11 hrs. and 13 hrs. GMT as adopted at Innsbruck, not strictly but:

"at least once a day at a suitable time and on clear days as frequently as possible."

A second item for discussion had been the difficulties proved in the daily registrations of sunshine with the glass-sphere of the Cambell-Stokes instruments when comparing the observations in different countries. The Committee recommended the Commission to begin mutual comparisons of different instruments (size of the sphere, transparence of the glass) and to use the English instruments as standard.

The last report was that of the Commission for Maritime Meteorology and Stormwarning Signals of its meetings in London 1912 (35). Although general agreement was reached at Berlin regarding the day signals, besides additional local signals, unity had not been reached on the Night Lantern-Signals. The questions which were raised were remitted to the Commission for reconsideration.

As the President of the Commission of the Réseau Mondial had deceased and the Secretary desired to resign, the Commission had not forwarded a report, being temporarily without a Bureau.

Before closing the session the Committee recalled a resolution of Paris 1896, regarding the comparison of temperatures observed by the ordinary exposure in the thermometerscreen with the Assmannn aspiration-psychrometer. The comparisons with the Stevensons' screen would be particularly interesting in the tropics.

At the closing of the session it was decided to convene a Conference of Directors in 1915. Invitations had not as yet been received. Therefore the place of meeting had to be decided on later. No-one suspected that the next Conference of Directors would be convened in quite a new situation after the sudden break of all contacts in August 1914.

## **2. The years 1919-1935**

### **The presidencies of Sir Napier Shaw and Prof. van Everdingen The International Meteorological Organization after the war 1914-1918**

#### **2.1. Introduction**

During the years of war 1914—1918 the meteorologists in the countries engaged in the war were charged with quite new tasks. The leaders of the forecasting divisions had been sent to the battle-fields. Soon it had been shown that the usual information was quite insufficient for the demands put forward by the war and for the exigences of military aviation. New instructions had to be issued. Wireless communications had to replace the landline transmissions. Aviation required to be broadly informed about visibility and height of clouds, elements that had never been inserted in the old telegraphic codes. It was requested to be informed as exactly as possible about the local weather conditions and their evolution in frequent reports transmitted with the least delay.

The post-war conditions asked for quite a new organization with a view to the technical means that had been developed in the years of war. A total revolution could be awaited and in this respect it should be the task of the old Organization and the International Meteorological Committee to play the leading rôle.

In the mean time scientific research had not been stopped in the neutral countries. New ideas had been developed in wartime during the rest of practical work. Especially in Norway exact analyses of the weather situations and their evolution with reports in short intervals had been leading to new theories regarding "fronts and air-masses". For their general application a dense network of stations and much more detailed weather reports were necessary.

The future period of the activity of the International Meteorological Organization promised to be not less romantic than the historical one had been. After a long period of experiments a new draft of the Statutes was necessary. The Commissions established in the last decennium of the 19<sup>th</sup> century had proved their usefulness in which the International Meteorological Committee had to play the rôle of a controlling body.

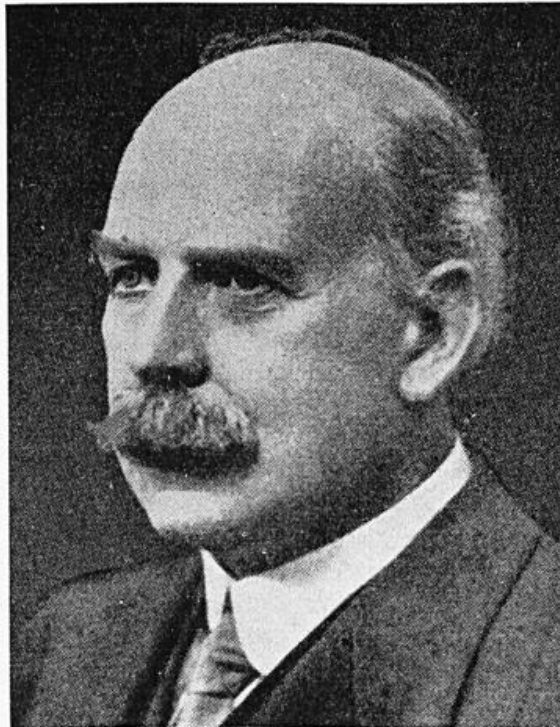
Only a few meteorologists have personal recollections of the pre-war period, and have cooperated in the revolution of the years after 1920. The author belongs to them. He may enjoy to have contributed to the reestablishment of the IMO in the period 1920 to 1946 in different functions. In the years 1928 to 1938 he served the IMO as the Chief of the Secretariat at De Bilt and 1939—1946 as a member of the International Meteorological Committee and of the Executive Committee.

#### **2.1.1. The new Start, the meeting of the Committee in London 1919**

Eight months after the armistice in November 1918 the President of the old International Meteorological Committee Sir Napier Shaw could prepare an new

start for the IMO to resume its duties. As a consequence of the war a number of places in the old Committee ought to remain open for the time being. So the President invited the old members of the allied and neutral countries to come to London for a preparatory meeting of a Directors' Conference. On July 3<sup>rd</sup> 1919 six members and four guests came together in order to prepare an Extraordinary Conference of Directors and to discuss the re-establishment of the IMO in the light of the new conditions of the present times.

Invitations had been sent to eight members, one to a resigned member and two more to representatives of deceased members (Norway and Sweden). A member of the staff of the British Service assisted as acting secretary (Colonel E. Gold) (36).



Sir William Napier Shaw

The President reported in his opening-address that already before the end of the war from sides other than the Committee new regulations had been examined for daily exchange of weather reports in the allied countries. It was not clear what should happen in future but in view of warranting the necessary uniformity the task of conducting the renewal of the international cooperation ought to be accomplished by the circles of the experts of the old Commissions. The old resolutions ought to be revised and replaced if necessary by new ones, applied to the post-war conditions.

It had been not superfluous to repeat urgently the leading rôle that the Organization ought to be playing anew in the future. Simultaneously with the present activity of the Committee two organizations were in preparation, which both intended to insert in their programmes questions relating to meteorology. One of them being a body with political character aimed at regulations of civil aviation based on an Aerial Convention (1919) with its seat in Paris. The name was "Commission Internationale de Navigation Aérienne"

(CINA) or in English ICAN. The other one had in view to form a Union of a number of associations of a purely scientific character including one for meteorology and geophysical sciences, for terrestrial magnetism, and for seismology. It was the

"Union Géodésique et Géophysique Internationale"  
to be indicated as UGGI or IGGU in English.

Mutual contact with both should be unavoidable in future.

The agenda for this London meeting was only short. Bylaws for the Organization of 12 years ago had to be revised before being presented to a Directors' Conference for definite adoption. The meeting expressed in a resolution:

"the excellence of the international system of Conferences, Committee and Commissions and its peculiar suitability to many conditions, which must be satisfied by international cooperation in meteorology. They are aware, that the extent and detail of international cooperation must be greater in the future than in the past, but the problems are essential of the same nature as those which have confronted meteorologists since 1872." (M. O. 237 p. 9)

The President had undertaken to complete the codex of Resolutions of 1910, that had been formerly composed in Germany by Hellmann and Hildebrandsson, till the year 1913.

#### 2. 1. 2. New codes and forms of code

It was clear that the code for weather reports had to be revised thoroughly. As regards the radio issues an absolute new scheme had to be examined with division of the wavelengths and the times of transmission. Experiments had started already in several countries in relation with the beginning development of civil aviation.

The International Meteorological Organization should become the leading party. This opinion was the general directive in establishing later in a special "Commission pour les Applications de la Météorologie à la Navigation aérienne" under the Presidency of the French air force officer Colonel Saconnay.

Besides the regular re-beginning of the synoptic weather reports by wire also the prewar wireless issues had started one after the other (Eiffeltower, England). But the latter came much retarded and incomplete and later than the transmissions by wire. It was necessary to improve this, and this should be the instruction to be given to a "Commission pour la Télégraphie météorologique".

So the deliberations in London prepared the way to be followed at the evolution of meteorology in the newly started period. Apart from the limited regions for aviation it was the International Meteorological Organization that had to prepare the regulations for far extended regions containing continents and remote parts of the globe. The ships at sea should have to overbridge the Oceans with general use of WT. These were questions that for the present moment ought to be considered as questions of a world-wide character.

It was not possible to reach unanimity at once regarding new codes and forms of code. New codes had to be drafted for the new data for the actual weather and its evolution as had been mentioned above, and for visibility, height of low clouds, etc. This could not be done in a few days. It was to be a battle of years before absolute agreement could be reached. The composition of the new codes

ought to be the work of Commissions and Sub-Commissions especially appointed for this work and for many years.

The Committee had to examine in the first instance how the interruption caused by the war could be overcome (daily weather charts of the Atlantic Ocean, information for publications in the field of Maritime Meteorology).

Before mentioning the results of the London Conference it is necessary to indicate clearly the new principles to be followed. Extension of the information about present weather with a 2-figure code covering 100 situations of weather in a systematic way was unavoidable.

New forms of code and new codes had already been introduced in the beginning of 1919 for interchange of weather messages for aviation purposes between England and France. They were also in use for "Reports of Individual Stations to a Central Office" in England (37). Beside messages had been composed in codeform for reporting aerological observations regarding wind direction and -speed in the upper layers of the atmosphere and for temperature and humidity observed at kite and aeroplane observations. The indication of the numbers of cooperating stations in different countries and also the transmitting of the weather reports ought to be arranged regionally in regional conferences in relation to the projected air routes and those already in action.

### 2.1.3. The Extraordinary Conference of Directors in Paris 1919 (38)

It was agreed at London to convene the Directors' Conference for the first week of October at Paris. The invitations were circulated officially by the French Government. They were sent exclusively to the Allied and Neutral Countries. Preliminarily to the discussions about the items of the agenda the last Draft of the Statutes of 1907 had to be examined. The meeting made some unimportant changes including a vice-president in the Bureau and fixing for the periods of intervals between the Directors' Conferences of 6 instead of 9 years (see Appendix Annex I).

The President offered as the first item of the Agenda the Codex of Resolutions completed by him (39) up to 1913. The applications of meteorology to aviation and the relations with the political and scientific bodies for aviation and pure science (ICAN and IGGU) formed the second and third items. As concerned the second (IGGU) a number of members attended its Congresses and took part in the deliberations and discussions.

The number of members of the International Meteorological Committee was extended to twenty. At the vote for the new members it was especially pointed out that the members were elected "personally" and not as "representatives of States or Governments". The members elected by vote should be sixteen. Four places should be left at the disposal of the Committee itself.

The questions of reports for air force information and of the radio transmissions of the weather messages were entrusted to two Sub-Commissions. A third one dealt with the concentration of material from the years of war for Maritime

Meteorology on behalf of the Netherlands Meteorological Institute as had been formerly agreed in a Resolution of Rome 1913\*).

The first of these Commissions was instructed to compose a new form of code for weather reports for aviation and the codes to be introduced for these particular messages; the second should examine the very urgent question of composing a general system for transmission of weather messages by WT. Both questions were extremely urgent in view of the fact that arrangements had already been made for them in the Annex G to the Aerial Convention of 1919.

The Sub-Commissions prepared reports to be discussed in a later plenary session.

### 2. 1. 3. 1 The Commission for Agricultural Meteorology

At the latest prewar Committee meeting at Rome in 1913 it had been proposed to establish a Commission for Agricultural Meteorology but this proposal had not yet had the desired result. Nevertheless it was judged to be a matter of importance and for this reason it was agreed to do it on this occasion\*\*).

### 2. 1. 3. 2. The new International Meteorological Committee

For a vote for a new International Meteorological Committee ten members of the prewar Committee were still eligible. They were elected en bloc. Dr. Marvin of USA, was elected to replace his predecessor Mr. Moore. After voting were elected as new members comm. J. Jaumotte (Belgium), Dr. Th. Hesselberg (Norway), Mr. Hunt (Australia), and Prof. Eginitis (Greece). The number of 4 free places was enlarged to 5. The Committee re-nominated in its first meeting as its President Sir Napier Shaw, as Vice-President M. Angot and as Secretary of its Bureau Prof. Dr. van Everdingen.

### 2. 1. 3. 3 The re-establishment of Commissions

The Conference established then the following Commissions:

Commission for Agricultural Meteorology	President A. Angot
" " Weather Telegraphy	" Col. E. Gold
" " Maritime Meteorology	" Prof. van Everdingen
" " Solar Radiation	" Dr. J. Maurer
" " Application of Meteorology to Aerial Navigation	" Col. Saconnay
" " the Réseau Mondial	" Sir Napier Shaw
" " Exploration of the Upper Air	" Prof. V. Bjerknes

\*) Res. 6. M. O. 216. Report Rome Resolution of the Commission for Maritime Meteorology reads:

8. "That the Commission invites several Meteorological Institutes to send to the Director of the Netherlands Institute extracts from their meteorological logs of ships giving the usual observations of pressure, wind, temperature of the air and sea, and weather, at 8 a. m. and 2 p. m. ship's time, within the following 20-degree squares: —

Lat.	Long.
5° to 25° N	25° to 45° W
10° to 30° N	140° to 160° W
10° N to 10° S	70° to 90° E
0° to 20° S	90° to 110° W and 90° to 110° E

with a view to the publication as a résumé of the observations as a contribution to the meteorology of the globe."

See Appendix XIV and XV pp. 57 and 60.

\*\*) Procès-verbaux, Paris 1919, p. 27 et 28.

The Committee agreed to re-establish the prewar Commissions  
Commission for Terrestrial Magnetism and Atmospheric Electricity\*)

President A. Angot

The agenda contained as an important item the composition of a meteorological vocabulary with lists of words in different languages indicating similar phenomena, a question that had been considered already long ago in the Directors' Conference at Rome 1879. At the end of the discussions it was mentioned that lists of words had been composed in England and edited by the Meteorological Office in London with the title of

"Meteorological Glossary" (40)

and noted that translations of these lists of words in different languages including e. g. Chinese and Japanese should satisfy all needs. The Committee requested the Directors to supply lists of translations of the meteorological terms that figured in the Glossary and to forward these translations to the Bureau of the Committee.

As far as the reports of the permanent commissions were concerned it was resolved to circulate them among the members of the other commissions in view of taking into account an eventual further discussion in considering questions of universal and mutual interest.

#### 2. 1. 3. 4. The presidency of Sir Napier Shaw after 1918

In this way the Conference had made the first contacts for a new cooperation, based on a new system in post-war times. The attending company was composed this time not exclusively of academic people but also of the officers of military services with purely practical aims and civil aviation circles the latter being in a state of development. The new regulations and rules to be stipulated should necessarily be fit for adaptation to the aims of purely practical character. These adaptations should cause an intensive activity of the IMO and a very extended activity of the meteorological services in alle countries. It should be necessary to reach unanimous agreement in all questions that could not be solved in the first meeting after the war without much waste of time. This should urge the newly established Commissions and the Committee to arrange meetings at short intervals for determining the new directives at a new Conference of Directors. The former President should preliminarily remain in the chair and the main direction should be left in his hands.

It was in May 1920 that civil aviation started with regular traffic in Western Europa between the 4 capitals London, Paris, Brussels, Amsterdam. The officers of the first 3 countries in charge of the organizational aspects met regularly in 3-monthly regional meetings, named "Conférence Aéronautique anglo-franco-belge". The Netherlands joined in October 1923. The decisions of these frequent regional conferences influenced in the highest degree the regulations contained in the Annexes of the Aerial Convention of 1919 (Annex G.) but the IMO as well. These

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\*) This question had to be considered in particular in view of the fact that the IGGU mentioned above obtained among the affiliated Associations one with a similar character. But from that had been noted that this Committee was of the opinion, that a second, composed of Directors of Services responsible for the magnetic services in their countries, should not be superfluous. In the question of the reestablishment of the Commission of the IMO the International Meteorological Committee was instructed to join the IGGU regarding the activities belonging to its Commission.

questions of high importance form altogether a real "Sturm- und Drang-Periode" for the resurrected IMO.

## 2. 2. The re-establishment in the years 1919—1923

### 2. 2. 1 The status of the Organization

Since the time the independent Commissions had been formed the procedure for preparing the meetings things had changed in so far as the memoranda regarding questions of administrative and scientific nature were deliberated in the first instance in the meetings of the Commissions moreover the main task of the Conference of Directors and of the International Meteorological Committee was a general discussion after having heard the reports of the Presidents of the Commissions.

The IMO desired to maintain its inofficial status. So the resolutions adopted by the Conference of Directors and by the Committee — and as well the decisions of Commissions that had been approved of for internal activity — only had to be considered as recommendations, although recommendations on general behalf and for that reason urgently to be followed by the different services.

In that respect they had a similar status as the agreements of a purely technical character reached in the periodical and regional conferences for Aerial Navigation, that had been formed shortly after the war in Western Europe. These decisions with regional tendencies in limited regions were not binding for the states affiliated to the Convention of 1919, contrary to those of the mighty body ICAN.

However the fact that the members of the "Sub-Commission for Meteorology" of the ICAN and the representatives of the Aeronautical Authorities in the Periodical Regional Conferences and of the Commissions of the IMO were the same persons, meeting in different qualities but with similar instructions, warranted that there should be no divergence in the decisions taken and that they should be recognized by the Governments as necessary arrangements and that the expenses required for their application should not meet serious objections.

After the meteorologists present in Paris had renewed the pre-war proceedings by re-establishing the different Commissions, all questions of general interest had to be deliberated again in the meetings of the Commissions in the light of adapting the old resolutions to the new requirements and techniques. New persons representing circles of practice e. g. of air navigation and shipping were sitting as experts round the table for defending their proposals bearing in mind the needs of routine work.

Radiotelegraphy was not yet able to take over the rôle of wire-telegraphy in a satisfactory way. Progress could be expected but for the time being the services remained dependent on cable-transmissions e. g. for transmitting the weather messages to the radio transmitters. Many times these links in the chains of connections caused complications and loss of time instead of gain\*).

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\*) It may be mentioned here, that aerological observations by aeroplanes on the military aerodromes in the Netherlands were transmitted early in the morning in August 1919 by wire from De Bilt to Berlin to be issued by radio via Königswusterhausen at an hour later in the morning on behalf of the services interested in Holland and neighbouring countries especially in Amsterdam on the International Air Traffic Exhibition (E. L. T. A. 1919).

### 2. 2. 2. The reconstruction of the past

Nearly a month after the armistice of 11 November 1918, on 10 December, England resumed the issue of weather reports in a considerably extended form. December 15<sup>th</sup> the Netherlands started again. The telegrams from Iceland and the Faroe-Islands waited till December 31<sup>st</sup>. They were regularly received during the year 1919.

Telegrams from France were received for the first time on March 5<sup>th</sup>. After that date they came regularly but generally too late for the morning forecasts. In the beginning of April the weather reports from the Eiffeltower could be received again and now at 9.45 GMT instead of 11.00 GMT as before the war.

As regards the weather reports by cable there were general complaints about the irregular reception from the Western as well as from the Eastern States. Radio issues thrice a day from London in the summer of 1919 were experienced to be a considerable amelioration. These weather reports were issued 1 h. 45 minutes after the observations and contained as well aerological observations.

Binding regulations for weather reports from ships at sea were still missing. They were received sporadically. The IMO had not yet arranged official prescriptions for them and for uniform codes and forms of code for aerological messages. This should be the task of the Commission for Weathertelegraphy as described in Appendix A.

### 2. 2. 3. The new structure

So the history of the IMO in the post-war epoch can be reported by a study of the steps taken by the different Commissions in view of building up stone after stone a new construction. Coordination and implementation of decisions were the task of the regular meetings of the Committee and the Conference of Directors.

So the "Story of the IMO" may be composed by a series of "stories" of the different Commissions working each in the field entrusted to them. From this point of view a series of reports has been composed to describe their activities one after the other in the years 1920 to 1940. These "stories" may form a series of 12 Appendices to this part indicated by the letters A—L respectively.

The list of Commissions established at Paris in 1919 was as follows:

- A. Commission for Weather Telegraphy  
later Commission for Synoptic Weather Information (CSWI)
- B. Commission for Maritime Meteorology (CMM)
- C. Commission for the Application of Meteorology to Aerial Navigation
- D. Commission for the Exploration of the Upper Air
- E. Commission for the Solar Radiation
- F. Commission for the Réseau Mondial
- G. Commission for Terrestrial Magnetism and Atmospheric Electricity
- H. Commission for Agricultural Meteorology
- I. Commission for the Exploration of Polar Regions\*).

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\* ) Joint at Utrecht 1923 with. F. under the designation: Commission for the Réseau Mondial and Polar Meteorology.

The following Commissions were established in 1921 resp. 1923:

- J. Commission for the Study of Clouds
- K. Commission for the Establishment of an International Meteorological Bureau
- L. Commission for Investigations on the Sound of Explosions.

### 2.3. The Meeting of the Committee in London 1921

The Committee was convened in London for its second meeting after the war starting on 12 September 1921 (41). Some of the new Commissions met in the week before: namely again the Commission for Weather Telegraphy (42), that for Maritime Meteorology, and that for the Application of Meteorology to Aerial Navigation. It was requested to arrange a joint meeting of these 3 for discussing codes and scales and the forms of code (drafted the year before) in the 3 different kinds of weather reports namely those for land stations, for ships at sea and for aviation and for the mutual interchange of information on the weather at the aerodromes.

In the same week also a meeting was planned of the Commission for the "Réseau Mondial". The Commission for Aerology had held a meeting 3 months before at Bergen (Norway) in July.

It was proved clearly, that the war had changed the world conditions completely. From the first beginning until the first and second decennium of the 20<sup>th</sup> century the continental states had been the ruling forces of international meteorology. The supremacy had come into the hands of the allied forces and the neutrals for taking the initiative for the new particular requirements with application of quite new techniques which had been developed during the war. For the particular results of the meetings of the Commissions see Appendices A-L.

There were also proposals for an edition of a new International Cloud Atlas combined with revised and broadly extended descriptions of the forms of clouds after internationally recognized schemes and specifications on an international basis and a new classification. This was absolutely necessary as the old and very restricted atlas of the last years of the foregoing century was quite insufficient for modern requirements. This question had been and was again discussed in the meetings of the Commission for Weather Telegraphy which had supported the suggestions to the utmost. The charge had to be entrusted to a special Commission to apply.

An old suggestion to compose a list of meteorological terms in different languages in the sense of a "Meteorological Glossary of Meteorological Terms" was put again on the agenda for the present Committee meeting. This idea had been realized in the British Meteorological Office and now it was requested to insert in a new edition the equivalents of the words contained in the lists of words and terms in different languages including f. i. Chinese and Japanese.

One of the final items was to compose a new International Meteorological Committee and its Bureau. Although Sir Napier Shaw had resigned in the mean time and was no more Director of the British Meteorological Office and that he had been succeeded already by Dr. G. C. Simpson, considering that it was not in contradiction to the Statutes to be maintained in the chair he was requested to remain in the Presidency until the following Conference of Directors to be held 2 years later at Utrecht. His successor in the Directorship had been elected in his place

as member of the Committee and equally General Delcambre, who had been in the mean time Director in France, to take over the duties of M. Angot, his predecessor in this function. Prof. E. van Everdingen and Dr. Th. Hesselberg were nominated respectively to Vice-President and Secretary of the Committee. After having gone through these administrative formalities the members separated to see each other again in Utrecht 2 years later.

#### 2. 4. The Conference of Directors at Utrecht 1923 (43)

##### The relations of the IMO to the IGGU and the ICAN

The above-mentioned Conference of Directors had been convened for 7<sup>th</sup> September 1923. The Commissions which had convened their members for meetings in the days before or during the Conference were the Commission for Terrestrial Magnetism und Atmospheric Electricity

- " " Solar Radiation
  - " " the Exploration of the Upper Air
  - " " Weather Telegraphy
  - " " Maritime Meteorology
  - " " Agricultural Meteorology
  - " " the Study of Clouds
- } joint meeting

Eight out of seventeen members of the International Meteorological Committee had been members before the war, nine had been elected after it. This meant a separation into two parties. Both had formed proposals for corrections of the revised Statutes adopted in Paris 1919. Those of the first group regarded the relations to the International Geodesic and Geophysical Union established in Brussels 1919, the other proposals referred to the relations of the Organization to the International Commission for Aerial Navigation (Paris) equally established after the war in 1919.

The first of these two Organizations was only dealing with the organization of scientific research. So it had quite a different character from the IMO, whose functions were in the first instance had a bearing on administrative questions and the general practice.

The second had been established as an organization for Aerial Navigation and its relations to meteorology were only limited. It disposed of a Commission for Meteorology and there should be a narrow cooperation of this "Sous-Commission de Météorologie" and the special "Commission pour l'Application de la Météorologie pour l'Aéronautique" of the IMO.

The IGGU had held a Congress at Rome in 1922. This had given the opportunity for informal discussions between the members of the International Meteorological Committee attending the Congress and other leading members of the Union regarding mutual relations\*). A following Congress at Madrid in 1924 would give again rise to further discussions concerning the decisions that must be undertaken in the present Conference of Directors.

\*) The Union had adopted in its meeting at Rome the following Resolution:

"En vue de la Conférence Internationale des Directeurs des Instituts météorologiques et magnétiques, qui va se tenir en Hollande en 1923, cette section est de l'opinion que la Conférence des Directeurs soit invitée à considérer s'il y a de double emploi entre ses fonctions et celle de l'Union, et à faire des propositions pour la plus intime collaboration entre les deux organisations."

The cooperation with the ICAN should not give rise to difficulties because mainly the same persons belonged as members to both the Committees, as had yet been pointed out. The regulations for air routes in Western Europe mentioned elsewhere were not considered here because of their informal regional nature.

The President, at the end of his opening-address emphasized again that the attendants had been convened as free Directors to consider regulations to be followed in common agreement as concerned the questions submitted. Authorization of the governments regarding the decisions should not be official. The decisions should be considered as statements warranting the best way of cooperation taking into account the financial means available.

The relations of the IMO to both bodies mentioned above were of the highest importance. As regards the IGGU a resolution was adopted:

"that there is no overlapping of the functions of the Union with those of the Conference of Directors."

The aim of this Conference had for this reason again expressively been indicated with the wording:

"which only aim at the exclusive study of the questions, which interest all the national meteorological services and which imply the utilization of their own reseaux." — "An intimate collaboration between these two organization" etc.

It was intended to notify to the Union the content of this resolution accompanied by a letter of the IMO.

As regarded the ICAN the cards were led differently. Here the attendants of the Conference of Directors were the advisers, authorized to compose and control the Annex G of the Air Convention of 1919 as far as meteorology was concerned. So in this respect it was the Commission for the Application of Meteorology to Aerial Navigation that was the directly indicated body to entertain the good contacts. Therefore the President of this Commission had been requested:

"to enter into relation with the ICAN to obtain — if possible — all the resolutions of the subcommission for Meteorology, and to communicate them to the meteorological services of those nations, which have not yet joined the ICAN."

It might be warranted without doubt that the resolutions of the "Sub-Commission for Meteorology of the ICAN" should not be in contradiction to those of the Conference of Directors, as it had been the charge of these members to control the drafting in this respect.

The question of the establishment of an International Meteorological Bureau, raised from the French side, was referred to with few words. It was the general opinion that this was a question for being discussed in a small commission formed in the final session and General Delcambre had been nominated President.

Informations on the activities of this commission are given in the Appendix K.

It might not be necessary to mention the resolutions one by one (separately). A general resumé may suffice. For the individual reports see the Appendices A—L.

The change in the Presidency of the Commission for the Exploration of the Upper Air from Prof. V. Bjerkness to Sir Napier Shaw led to a new

arrangement for fixing of the dates of the International Days and to consider again to compose newly the edition of the results of these days in a new form. The "Commission for the Sound of Explosion" intended to continue its investigations. The "Radiation Commission" presented a resolution regarding the equipment of central institutes in Europe to compare the instruments and to establish a number of secondary institutes for radiation-measurements in all countries. The question of reduction of barometric pressure to sea level was referred to the "Commission for Synoptic Weather Information". The difficulties to measure the windspeed were discussed again and instructions had been composed for exact calibration of anemometers.

After handling a series of items of secondary importance (quick publication of monthly means, extension of the 5-degree-squares on the oceans, composing of a catalogue of meteorological stations, weather charts of the Northern hemisphere to be edited by Denmark, establishment of stations on the Southern hemisphere by Argentine, weather charts of the Southern hemisphere) the Conference established the "Commission for Agricultural Meteorology". This Commission had expounded its working program in a number of 9 items that were adopted by the Conference en bloc. The Commission for Maritime Meteorology discussed some questions related to weather reports from ships and changes in the codes. The Commission was concerned about for the long delay before these reports should be received at all ships interested and brought to common utility. The reports regarding the results of the weathership "Jacques Cartier" gave rise to a recommendation to continue with organizations of this kind and to extend them generally\*).

The question regarding the continuation of the Commission for Terrestrial Magnetism in the IMO next to that newly established by the IGGU was of the highest importance. It was considered desirable for the time being and a sequel of this decision was that the Netherlands Meteorological Institute should have to continue the edition of the regular publication "Caractère Magnétique de chaque jour" with a slight extension\*\*).

The five resolutions of this Commission dealt with instrument and publication questions. They gave no rise to discussions.

The list of seventy resolutions was completed by 4 of the Commission for the Exploration of the Upper Air concerning the publication of the "International Days" and by some regarding the general organization of the publication that has been mentioned before.

The last item to be treated was the re-nomination of the Commissions. By adding two new ones mentioned above the number was enlarged to 11. At the same time it had been stipulated, which activities should be taken over immediately by the International Meteorological Committee.

By electing a new Committee it was decided to extend the number of members to twenty. The fifteen members of the old Committee were re-elected en bloc (6 pre-war und 8 post-war ones).

The remaining five ought to be elected by a vote, among them Prof. Dr. Exner of Austria (Vienna) and Prof. Hergesell of Germany (Lindenberg).

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\*) see Appendices A, H and B.

\*\*\*) see Appendix G.

The President resigned with a hearty vote of thanks to the Committee during his Presidency of twenty years. The Committee proved its appreciation to Sir Napier Shaw by nominating him as "Honorary Member".

After this the Conference of Directors was closed and the members separated till the next Conference 6 years later.

In a short meeting of the newly elected Committee which was only attended by members, Prof. Dr. van Everdingen was chosen as the new President and Dr. Hesselberg as Secretary. The election of a vice-President was postponed to a following fully attended meeting. It was judged desirable that at least the European members should meet at Madrid in 1924 on the occasion of being assembled there for a Congress of the IGGU.

## 2. 5. The Presidency of Prof. van Everdingen 1923—1929

The Conference of Directors at Utrecht had given a rich harvest of resolutions, seventy in number. Besides general decisions to be followed by all services a number of "wishes" and "recommendations" for peculiar activities about the realization of distinct aims were put into the light. The latter were notified by the Secretary to those particularly interested and in a majority of cases applications had not been missing.

In the mean time progress had been made as regards the relations with the IGGU and with the ICAN (Res. 66 and 67). An active cooperation had been reached with the first for mutual dividing of the activities and financial support had been promised in the cost for the preparation and for printing a first part of the publication of aerological research on International Days by Sir Napier Shaw and for starting again the edition of daily weather charts of the Atlantic Ocean by the Danish Meteorological Institute under the care of its Director Dr. la Cour.

These progresses had been reached at the Congress of the IGGU at Madrid in 1924. As concerned the ICAN and its Annexe G of the Convention of October 1919 an agreement had been reached from that side that:

"L'Annexe G sera aussitôt que possible révisée et dans l'avenir mise à jour en tenant compte des décisions prises par le Comité Météorologique International."

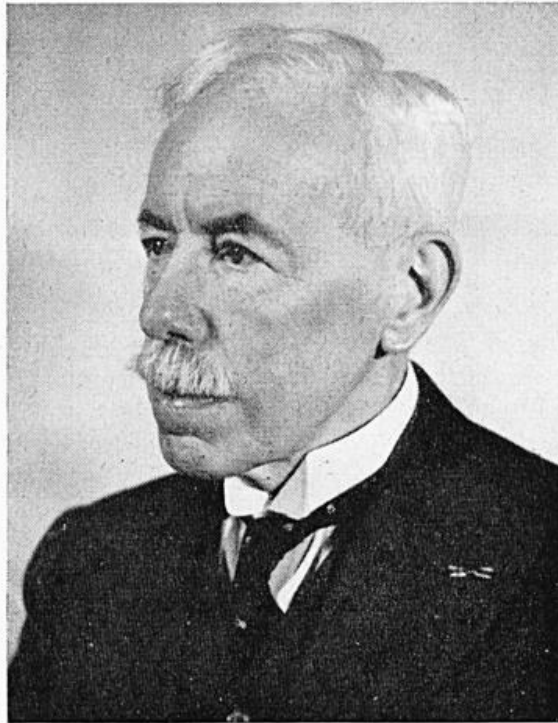
This revision of the Annex G should be the task of the "Sous-Commission de Météorologie" of the ICAN, that was as mentioned before, for the main part composed of the members of the "Commission for the Application of Meteorology to Aviation". So the ICAN was willing to sail under the flag of the IMO as concerned Meteorology.

During the Conference of Directors at Utrecht it had been arranged that the International Meteorological Committee should prepare a list of all those that ought to be invited for attending the Conference of Directors in the sense of the first Article of the Statutes (Res. 65). For this purpose a letter had been circulated in 1924. The list ought to be completed regularly.

The edition of the list of meteorological terms had not made considerable progress the more since in France a "Lexique météorologique" had been edited with translation of the expressions into Italian, Spanish, English, German and Esperanto. This made the work in England less necessary.

Satisfactory reports had been received as regarded the cooperation of the Commission for Agricultural Meteorology with the "Institut international d'Agricul-

ture" at Rome e. g. a communication of a grant of 3000 \$ of an unknown maecenas could be reported.



Ewoud van Everdingen

A pressing for moral support and encouragement of the work of the French weather ship "Jacques Cartier" on the Atlantic Ocean had been very successful (Res. 332, see Appendix A).

#### 2. 5. 1. The session of the Committee in Vienna 1926 (44)

The ordinary sessions of the different Commissions had all been held at Zürich in the week preceding the session of the International Meteorological Committee at Vienna. The only exceptions were the Commission for the Exploration of the Upper Atmosphere, which held a session at London in 1925 and a preliminary session in March and April 1926 of the Commission for the International Bureau at Paris.

The results of the deliberations of the latter session Zürich 1926 were based on a long resolution in 5 paragraphs to be presented to the Committee session at Vienna\*).

\*) The conclusions of the Zürich meeting had been as follows

- 1° "Le Comité décide de créer, aussitôt que possible, le Bureau météorologique international dont le Comité météorologique international constituera le Conseil de direction sur le programme général approuvé par la Commission du Bureau météorologique international dans sa session de mars 1926, mais en débutant avec le programme réduit approuvé à cette même session."  
Le Comité aura à prendre une décision sur les trois points suivants:
- 2° "Le Comité accepte-t-il l'hospitalité provisoire qui est offerte pour le Bureau météorologique international par l'Institut de Coopération Intellectuelle?"
- 3° "Le Comité est-il décidé à demander l'appui de la Commission internationale de Coopération intellectuelle et de la Commission internationale de Navigation aérienne pour obtenir des états les crédits de fonctionnement du Bureau météorologique international?"
- 4° "Le Comité charge-t-il son Bureau et le Président de la Commission pour la création du Bureau météorologique international de suivre, de concert, les négociations?"  
La Commission propose au Comité la résolution suivante:
- 5° "La Comité invite les Directeurs des Services météorologiques et les personnalités météorologiques de tous les pays représentés à la Conférence des Directeurs, à intervenir directement ou indirectement auprès de leurs Gouvernements respectifs et auprès des organisations privées pour appuyer la demande des crédits nécessaires pour la fonctionnement du Bureau météorologique international."

The considerations of this draft resolution at Zürich had shown immediately, that there were two opinions contradictory to each other as concerned the form and the character of the Bureau to be established and that the members were divided into two groups. A number of them were opposed to the mighty form which the President of the Commission had in mind and as had been specified under par. 2, 3, 4 of the conclusion. They preferred a purely administrative Bureau under the direct control of the President of the Committee with functions as had already been discussed in the Committee long ago in the last decennium of the foregoing century (Upsala 1894). In their opinion the finances of the Bureau should be paid by the contributions of the meteorological services represented in the Conference of Directors.

The Commission at Zürich had abstained from a conclusion regarding the 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> draft resolutions, questions which were entirely within the competence of the Committee itself. There were no objections from the side of the Committee against the 5<sup>th</sup>, regarding an appeal to the Directors of meteorological services for contributing towards the finances.

The President of the Committee expressed his personal preference for the simple plan. There was a strong divergence of opinions regarding the finances. Pessimistic opinions from different sides were expressed against the optimistic thoughts of the President of the Commission for realising his proposals, if the Secretariat should attain the strong position of a scientific Bureau. A vote showed the general preference for the simple administrative Bureau named "Secrétariat". Its function should be as expressed in the following resolution:

"Das Internationale Meteorologische Komitee beschließt, ein permanentes Sekretariat unter der Direktion des Präsidenten zu errichten. Das Sekretariat soll mit der Organisation der Sitzungen des Komitees und der Kommissionen beauftragt werden und soll die Sitzungsberichte veröffentlichen. Es soll auch als ein Zentrum für Daten betreffend die meteorologischen Dienste der ganzen Welt dienen und es soll, soweit möglich, dem Präsident des Komitees und den Präsidenten der Kommissionen bei der Ausführung ihrer internationalen Arbeiten behilflich sein."

Translation into French:

"Le Comité météorologique international décide de créer un Secrétariat permanent sous la direction du Président. Le Secrétariat sera chargé de l'organisation des réunions du Comité et des Commissions et publiera les procès verbaux. Il servira aussi de centre de documentation pour les renseignements concernant les services météorologiques du monde entier et il viendra en aide, autant que possible, au Président du Comité et aux Présidents des Commissions dans l'exécution de leurs missions internationales."

This Resolution expressed clearly the character of the Bureau to be established. As regarded the residence expressive preference proved to be on one of the smaller countries of Europe and for this reason the kind offer for rooms in the Institute for Intellectual Collaboration at Paris and the financial support promised by the French Government could not be accepted. In view of this circumstance the appeal to the League of Nations for intervening at the different Governments for financial support and a recommendation of the ICAN to the affiliated states with the same tendency should be unnecessary. Nevertheless the recognition of the Committee to the French Government and the other bodies for their willingness

to overcome the difficulties was expressed in the following resolution, emphasizing that the Committee:

"eine moralische Unterstützung für das Projekt des Sekretariats seitens der Kommission für Internationale Intellektuelle Kooperation und der Internationalen Kommission für Luftfahrt großen Wert legen würde."

So it had been decided accordingly that the name of the Secretariat should be: "Secrétariat du Comité Météorologique International"

and that it should be placed in one of the smaller countries of Europe. The President expressed his personal preference for a preliminary establishment in Holland and at De Bilt. This was agreed to until further decisions by the Committee should be possible.

The last Resolution of Zürich had been adopted with some slight changes as follows:

"Le Comité météorologique international invite les Directeurs des services météorologiques et les personnalités météorologiques des tous les pays représentés à la Conférence des Directeurs, à intervenir auprès de leurs gouvernements respectifs et auprès des organisations privées pour appuyer la demande des crédits nécessaires pour le fonctionnement du Secrétariat du Comité météorologique international."

These deliberations formed for the President of the Committee the authorization for preparing the establishment of the Secretariat at his residence. After a request to the scientific staff of his Institute he chose the present author to take the charge of the active Chief of this Bureau.

After the above mentioned action the Commission had fulfilled its tasks and could be dissolved. The President of the Committee Prof. Van Everdingen addressed hearty words of thanks to the energetic President of the Commission General Delcambre for the way he had lead the Commission.

#### 2.5.2. The Conference of Directors in Copenhagen 1929 (45)

In March 1928 an invitation was received from Denmark to held the coming Conference Directors at Copenhagen in the second half of September 1929. The invitation was thankfully accepted and in January 1929 the Secretariat of the International Meteorological Committee convened the meeting accordingly.

The six years' epoch between the Conference at Utrecht 1923 und that at Copenhagen 1929 may be characterized as a time of feverish activity. After the first attempts for an entire renewal of the old Organization a new area in meteorology hat to be prepared with a new working scheme based on new means of communication.

Copenhagen had to be a mile-stone in the new development. Everyone in the Organization, not in the least the wise President of the International Meteorological Committee, was convinced that after the 6 years of busy preparation the new Organization should get the finishing touch to be followed by a time of rest. The Secretariat assisted the President in the coming years in his responsible duties.

The meeting of the Committee, following the Conference, could be considered as to prepare the last arrangements for the decisive propositions for the regulations

to be made for a number of years. The next 6 years should give the opportunity to correct them after having been introduced in practice all over the world\*).

#### 2. 5. 2. 1. The corner-stones of the Organization

It was in August 1929 that the Secretariat of the International Meteorological Committee could circulate accompanied by a preliminary agenda the proposals received for deliberation at the Conference of Directors at Copenhagen.

In the week preceding the Conference the Presidents of the Commissions invited their members for a final review of the resolutions and to consider in joint meetings questions of common interest. It could be expected that the meteorologists from outside Europe should attend the Conference of Directors in a greater number than before.

With regard to the great scientific works and enterprises already in execution or planned, it may be mentioned that the new International Cloud Atlas was in a far advanced state of preparation. The last draft had been forwarded to the members of the Commission for the Study of Clouds in May 1929. It had been prepared in a meeting of a small number of members at Barcelona with large collections of photos of clouds from different institutes for the decisive choice of the pictures.

In the last years suggestions had been made for the organization of extended magnetic and meteorological investigations in the Polar Regions by a Second International Polar Year, to be undertaken 50 years after the First International Polar Year (1882—1883). This plan had been discussed preliminarily in a restricted conversation between particularly competent persons on polar research in March 1929 at Cologne and in July 1929 at De Bilt.

The Conference was solemnly welcomed by H. E. the Minister of National Defense of Denmark. H. E. emphasized at the end of his speech the extraordinary form that IMO had chosen to place itself in an autonomic position, by the restriction:

*"en tant qu'elle n'a pas été établie d'autorité par les Gouvernements des différents pays. Vous vous êtes groupés spontanément, vous avez vous-mêmes choisi les procédés de votre collaboration. Pourtant vous êtes la représentation officielle de la coopération des peuples sur ce terrain; les différents pays vous ont choisis pour diriger, leurs services météorologiques, et les suggestions qui émanent de votre organisation, se basent sur une si vaste compétence qu'elles seront toujours écoutées."*

After the Conference had been opened by a reply to this welcome speech the working sessions began with the lecture of the usual report of the President of the International Meteorological Committee on the 6-years' period since 1923. This report was followed by that of the Chief of the Secretariat after the first year of its existence. The different items of the agenda were divided into groups that were entrusted for discussion to 3 sub-commissions established for this purpose. The agenda contained the reports of 9 Presidents of Commissions and 10 new proposals from the said Presidents supplemented by a number of additional questions.

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\*) For the reports of the Commissions see the Appendices A—M.

### 2.5.2.2. The revision of the statutes\*)

The very first question discussed concerned a proposal from the British Meteorological service. It dealt with the permission of a member — unable to attend a meeting of the General Assembly — to nominate a representative to attend and vote on his behalf. Since no objections were raised this proposal was adopted as Resolution 1. A corresponding paragraph should be inserted in the Statutes (Art. II § 6).

At Vienna also the question had been discussed which rights a member of the Committee shall have, in case he resigns as a Director of his respective service. This has been settled by adopting Resolution 2: "Un membre du Comité qui cesse de remplir les fonctions de Directeur, reste membre du Comité jusqu'au moment où un nouveau membre pourra être nommé."

This decision had equally been inserted in the Statutes under Art. III § 4.

The number of resolutions adopted in the Conference of Directors exceeded for the first time the number of hundred by eleven. More than half of them had been presented by the Commission for Synoptic Weather Information, namely 54. 8 regarded the International Polar Year and 11 were dealing with that for agricultural meteorology.

The question of the converting the IMO into an intergovernmental organization had to be considered again. In replying to the welcome speech of H. E. the Minister the President had said:

"si notre organisation n'est pas établie par l'autorité des gouvernements, nous avons pourtant reçu des témoignages indubitables de la confiance que les gouvernements mettent dans l'efficacité de nos travaux."

He mentioned in this respect, that the ICAN:

"a accepté d'avance toutes nos décisions sur les renseignements synoptiques du temps."

and besides:

"Récemment, c'est la Convention de la sauvegarde de la vie humaine sur mer qui nous a confié une tâche importante."

It should be necessary to revise the Statutes. Proposals had been submitted from different sides. It had been in the first session that the debates of Vienna had been repeated regarding the pros and cons of the existing form of organization. The renewed discussions led to the conclusion laid down in the decision as regards the procedure provisionally to be followed:

"Vu le développement de la Météorologie et de ses évolutions, la Conférence reconnaît qu'il est désirable d'obtenir l'adhésion des Gouvernements à l'Organisation Météorologique Internationale existante.

Une Commission composée de MM. Calvert, Delcambre, Eginitis, van Everdingen et Simpson est chargée de mettre au point les Statuts en respectant les principes du règlement actuel et de les soumettre à l'approbation de la Conférence. Ces Statuts seront ensuite communiqués par voie officielle aux Gouvernements."

A new Article IV had been added to the statutes regarding the position of the Secretariat and a new paragraph to the Article III § 6 saying:

\*) see Annex I.

"Le Comité nomme un Conseil Exécutif composé du Président et de quatre autres membres choisis dans son sein. Un règlement intérieur, approuvé par le Comité, régle le fonctionnement du Conseil Exécutif."

The revised Statutes and the draft of the "Règlement intérieur du Conseil Exécutif" were presented in the last session and adopted by the Conference. Only the question of the place of the seat of the Secretariat gave rise to a prolonged discussion. It was agreed that the place ought to be a fix residence in one of the smaller countries of Europe. So it was Switzerland that had been chosen by the decision:

"Le siège du Secrétariat est fixé en Suisse" preliminarily without any indication of when and where. There were no objections that it should be at De Bilt for the time being. As regarded the time of the change it was decided that:

"La date pour l'emplacement définitif du Secrétariat sera choisie par le Comité."

So the decisive residence in Switzerland and the change to this country should to be decided upon in later years.

The Copenhagen Conference may be considered as a milestone in the history of meteorology with respect to the general application of new forms to modern meteorology. The Directors and their representatives from all countries and parts of the world were sitting round the table with equal qualities and the execution of the decisions reached, should create a unity all over the globe. The recently adopted codes for weather reports from land stations, at sea and for aviation ensured universal use all over the world; the International Cloud Atlas warranted a real help for the observers carrying out cloud observations; the international investigation of the high atmosphere had been regulated for years in advance and the form of the publications as well as the involved financial problems had been definitely fixed; the Secretariat of the International Meteorological Committee in its residence in Holland stood actually at the disposal of the Committee and the Presidents of the Commissions as a help in their activities and work.

At Copenhagen the corner-stones had been placed for the new building on the foundation laid at Utrecht. The further construction should be reserved for the years to come.

The number of Commissions had been increased by 3 namely one for the International Polar Year under the Presidency of Dr. La Cour and the others for Climatology with Prof. von Ficker as President. That for the Sound of Explosions had got a new name. The total number had been enlarged now to 12. The Commission for the formation of an International Meteorological Bureau was not continued. By the establishment of the Secretariat of the International Meteorological Committee at De Bilt it had accomplished its work. So it was dismissed with a vote of thanks to the President for the way it had fulfilled its duties. There had been no reason any more to make differences between Allied and Central Forces in Europe and with these favourable auspices the future way was open for the Organization in a decisive new era all over the world.

### 2. 5. 2. 3. The election of the Committee

The last duty of the Conference of Directors should be the election of a new International Meteorological Committee. Since the last election of members there

were now 3 vacancies. The member Melander (Finland) expressed his wish not to be re-elected as he should have to resign his Directorship before long.

The number of members had been enlarged by 1 to 21. Thus there were 5 vacancies. For these vacancies were elected the Directors:

Prof. A. F. Wangenheim (USSR)

Col. E. Meseguer (Spain)

Anm. Alvaro Morna (Portugal)

Dr. C. W. B. Normand (India)

Dr. J. Patterson (Canada)

The sixteen old members were re-elected.

### **2. 5. 3. The meeting of the Committee in Copenhagen 1929**

Before leaving the Committee held a short meeting for choosing its Bureau. In this meeting the former President Prof. Van Everdingen was chosen as the President for the next 6 years and Dr. Hesselberg as Secretary.

A last item was formed by the election of 4 members of the newly established "Executive Council" for the Secretariat. Its functions had been indicated in a new chapter in the Statutes 8 persons had been proposed, among them the re-elected Secretary of the Committee.

According to a vote by correspondence the members Gen. E. Delcambre, Dr. Th. Hesselberg, Dr. C. F. Marvin and Dr. G. C. Simpson were elected members of the Executiv Council. For the revised Statutes of Copenhagen see Annex I.

## **2. 6. The second Presidency of Prof. van Everdingen 1929—1935**

### **2. 6. 1. The meeting of the Committee at Locarno 1931**

A series of 3 meetings of Commissions was held in September 1931 at Innsbruck. A weeks' interruption enabled the members of the Committee to travel to Vienna to attend a jubilee of the Academy of Sciences in that capital. They met again at Locarno. The two eldest members, elected in the years 1900 and 1907 did no longer take part in the discussions. Two guests were present and 2 Presidents of Commissions.

There were 3 vacancies in the Committee. The two guests Dr. E. Kidson (U.S.A.) and Prof. W. Schmidt (Austria) were both elected as members of the Committee for vacancies open since Copenhagen. Still one vacancie was left open for the time being.

The agenda contained 12 items. The numbers 1 and 2 were as usual the reports of the President on his actions in the 2 years since the Conference of Directors at Copenhagen and that of the Chief of the Secretariat about its finances and its activities since its establishment. The discussions regarding the new form of the Statutes had to be continued about some complementary paragraphs in part III, concerning the instructions of the Committee. At this discussions the different members informed the meeting of the reactions of the Governments of their countries after the receipt of the Statutes forwarded to them by the President of the Committee as prescribed in the Resolution 23 of Copenhagen.

The Reports of the 3 Commissions Upper Air, Polar Year und Terrestrial Magnetism\*), which had held sessions since Copenhagen, were discussed in a following session.

The Report of the Commission for the Polar Year was very substantial and reviewed the important questions of the enterprise as had been sketched in the Appendix C. The Committee discussed a long list of Resolutions and adopted 33 with numbers 1—32 all regarding the International Polar Year and the majority originating from the Magnetic Commission and some from the Commission for Upper Air.

The 5 Resolutions 33—37 presented by the Climatological Commission have been mentioned before. The opinions were divided with regard to the question of a change from the climatological observations at local time to the hours of standard time. So these resolutions had not been adopted but only approved.

The Swedish member Dr. Wallen presented a number of resolutions of the latest Congress of the IUGG in 1930. The President proposed to divide these resolutions among different Commission for consideration in their particular fields of activity.

The last item of the agenda was a draft for a Règlement of the Executive Council. This had been discussed in the second session and some paragraphs had been amended. The final wording had been postponed to a later session and the Règlement was adopted in the one but last session.

A memorandum regarding storm signals in Europe and the China Seas, discussed at a Conference at Lisbon was referred to a later meeting of the Maritime Commission. A number of 6 resolutions adopted by the Commission for Radiation had already been considered by the Polar Commission so it was not necessary to re-open the discussions in this meeting. As the agenda had been finished the President could close the meeting with some words of high appreciation to the burgomaster of Locarno for his generous reception in that town.

As consequence of the fatal change in the world economic situation the lot of the Polar Year happened a moment to hang on a silk wire. The eloquence of the President of the Commission and of the Committee was necessary to save the enterprise.

Among the Resolutions of the Polar Year Commission of Innsbruck adopted by the Committee, there was the very important question of the publication of synoptic weather charts of the Northern hemisphere during the Polar Year (Res. 22) to be prepared and edited by the Deutsche Seewarte at Hamburg with financial help from the funds of the Secretariat at De Bilt (79).

#### 2.6.2. The session of the Committee at De Bilt 1933 (46)

The International Polar Year had been ended for some weeks when the International Meteorological Committee met at De Bilt. Only ten of the members attended, all but one from Europe, and two Presidents of the Commissions. Six guests were present one of them represented the meteorological services of the Far East for the question of the storm warning. So he was the competent man to report on this item of the agenda.

\*) See Appendices D, C and G.

The agenda contained the reports of the President of the Committee, that of the Chief of the Secretariat and those of the different Commissions.

With regard to the report of the Commission for the Study of Clouds it was a satisfaction for the Committee to have a look at the definitely completed work of "the International Atlas of Clouds". A mighty work had been accomplished and all homage was paid to the initiative of the composers in the French Meteorological Office and to all who had been cooperating in the costs of the preparatory work as has been mentioned before and of the edition itself by and not in the least to the Institució Patxot at Barcelona by furnishing liberally the amount of 150 000 French francs\*).

A report on of the work involved in the edition of the weather charts for the 13 months of the Polar Year carried out by the Deutsche Seewarte gave rise to an extensive discussion. This office had prepared on its own account the "volume d'essai" for the month of March 1931, that had now been finished for the greater part. The budget for the expenses of the Polar Year charts in 250 copies showed that by a receipt of 18 500 RM for subscriptions promised and with the subventions accorded for 9 500 RM, a considerable deficit could be foreseen (7 400 RM). A loan of the Secretariat as mentioned before should clear this deficit. It was agreed that it should be wise to apply all means possible to enlarge the edition by maintaining the price of subvention (185 RM). Besides a circular letter should be added to the trial volume for the month of March 1931 when this would be forwarded to the competent addresses.

The general opinion was that the funds, which had now been decisively accorded, surely permitted the Deutsche Seewarte to initiate the work. As regarded the edition, the Committee would agree that a number of 200 copies should be desirable in order not to increase the risks unnecessarily.

As regarded the use of the new codes for ships in remote countries the reports received mentioned clearly that difficulties had been experienced in the application and that changes had been made by India for their own responsibility. This had already given rise to a severe telegraphic protest of the Maritime Commission and had led to a resolution in which the undesirability of changing the internationally adopted codes for national needs had been greatly disapproved of.

Now it happened that the Director of the service in India was present at the meeting of the Committee so that he was able to explain things personally. The reason for changing the codes for ship reports had been based for him mainly on financial difficulties. The result of the deliberations was that the Committee drafted a less severe resolution as that of the Maritime Commission. In that resolution it was expressed, that the aim for composing the new ship codes would be missed when the codes should be changed arbitrarily in view of local considerations.

The resolutions in the domain of oceanography relating to very useful measurement of the salt-content of seawater were adopted without discussion. However the restriction was made that it should not yet be necessary to insert these observations in the codes for ships at sea.

\*) Resolution 100.

1. L'Institució Patxot met à la disposition du Président de la Commission pour l'Etude des Nuages (C.E.N.) pour la publication du nouvel Atlas international des Nuages la somme de cent cinquante mille francs français, en trois versements de cinquante mille francs, suivant le progrès de l'édition officielle. Le dernier sera fait à la parution du premier exemplaire définitif.
2. sqq. etc. etc.

About the storm signals in the Far East the Committee recommended the meteorological services there to adopt for national use generally the international storm signals. But, when they should be unable to do so, it should be attempted to exclude from the national systems all signals that had a different signification in international use. In another resolution satisfaction had been expressed that the international signals had been inserted in the Convention of Lisbon mentioned before and about a proposal made to introduce these signals eventually at the coast of China. A proposal from the Chinese side for the use of a set of supplementary signals for fishing when extremely severe local storms occur was recommended for examination by services interested. At the same time a special signal for heavy local storms, that had been inserted in the Lisbon Convention, and other signals in different countries, were recommended for examination with the intention to come to a general uniformity of signals at a later date.

The President of the Commission for Synoptic Weather Information was not present at the meeting. He had sent a report about the activity of his Commission in the 4 years 1929 to 1933 mentioning the countries in which the codes of Copenhagen had been introduced and when this had happened to be on land as well as at sea\*). Some difficulties had been experienced with the shortened forms of code for intercontinental weather reports as regards its application to the reports sent from Europe to America and vice versa. On the contrary the collective reports for Western- and Central-Europe and for Russia had given satisfaction everywhere, but some difficulties in applying the newly introduced system continued to exist and it ought to be considered how to meet the still existing requirements. One of the complaints was that the collective report for SE of Europe and the Eastern Mediterranean was still missing, although it had been foreseen in Resolution 68 adopted at Copenhagen.

The plans for the transmission of the Icelandic reports by radio by a new high power station at Reykjavik, as foreseen in the Resolution 44 of Copenhagen, had not yet been implemented. They still transmitted by wire to London and this necessitated to issue them in the British collective weather reports.

The quick edition of the Reduced Atlas of Clouds for the observers in 1930 had been tremendously useful in the application of the new codes.

The system of allocation of 3 index numbers for the synoptic stations and the division into blocks of 1000 had proved to be of considerable use in practice (Copenhagen Resolution 58). In the mean time the Secretariat at De Bilt had composed a publication containing all stations issuing wireless weather reports, which was divided into several Parts according the stations concerned. The first edition had been completed for the major part in 1933 (Fascicules I—V) and these Parts had been supplement regularly by a number of correcting sheets (47).

It may be mentioned separately as a decisive success of the International Meteorological Organization that the Copenhagen codes were adopted as a whole by the International Committee for Aerial Navigation for insertion in the Annex G to the Air-Convention of 1919. This Annex had been revised as a whole and had been completed in 1933.

A long paragraph had been devoted to a Conference of the Directors of the Far East that had been convened at Hong Kong in April 1930, following a request

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\*) (45) pp. 48—62.

of the Conference of Directors at Copenhagen in Resolution 98\*). The President of the CSWI attended the meeting personally. It had been the first time that the Directors in remote regions outside Europe met for considering in a separate assembly the resolutions and decisions adopted in the Conference of Directors and meetings of the Committee, which so far had always been held in Europe. So now they were able to discuss the application of the decisions of the Conference of Directors in view of existing objections in their particular services. It was clear, that the possibilities for general applications were in many cases for more restricted than in the highly civilized Europe. Therefore the countries in this part of the globe were often confronted with considerable difficulties which caused special arrangements. Reference is made in this connection to the report of the meeting of the Maritime Commission on pages 128—131, regarding the storm signals and the codes for ships at sea.

At the Hong Kong Conference there was a strong feeling for a decentralization of the IMO in regional parties inside the Organization. This idea should prove to be fruitful in future. Without any doubt difficulties of the same kind should be experienced in other parts of the world. The general solution for overcoming these difficulties was to be found in the next Conference of Directors.

During the session the question was considered again what persons were qualified to be considered as members of the Conference of Directors (Statutes, Art II, para. 2.) What should be the interpretation of the words "Directeurs des réseaux indépendants météorologiques de toutes les nations"? During the discussions the following criteria for being member were proposed:

- 1° that they were to be paid by governmental salaries,
- 2° that their réseau should contain a reasonable number of stations.

It was not possible to succeed in drafting a definite wording of the vague form. The President was requested to consider the question again and to revise the list of Directors (48), after it had been composed and completed by the Secretariat, before the next Conference of Directors.

At closing the session the President reminded that this had been the last meeting of the Committee under his chairmanship. September 1935 was proposed for the time of the next Conference of Directors. There had not yet been received any invitation, so the place could not yet be indicated. The Committee could look back to a period of fruitful activity. The International Polar Year 1932—1933\*\*) had been crowned with success and the publication of the weather chart of the Northern Hemisphere could take place with the help accorded by the Secretariat.

The President of the Committee had mentioned in his report that the Committee had lost three members since its last meeting at Locarno namely Prof. Palazzo by death and Prof. Hergesell and Colonel Meseguer by resigning as Director. As there was still existing one vacancy four new members could be nominated. After discussions in the second and fourth meeting Messrs. Prof.

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\*) That the Directors of Meteorological Services of Formosa, Hong Kong, Indo China, Japan, Korea, Dairen, Malay States, Philippines, Shanghai, and Tsingtau meet as soon as possible, at a place to be agreed upon later, to discuss the possibility of adopting:

- 1) A uniform code of local and non-local visual storm warning signals and
- 2) a uniform code for transmission, in the Far East of daily weatherreports by cable.

In regard to 2) the Conference emphasizes the importance of providing in the code for the including of the necessary information to permit reports broadcasted by WT to be issued according to the specifications of the international code, in particular as regards the groups DDFww BBUTT.

\*\*) See Appendix C.

F. Eredia (Italy), Prof. H. von Ficker (Germany), Dr. Nicolas Sama (Spain) and L. J. Sutton (Egypt) were elected as members.

## 2.7. The final structure

### The Conference of Directors in Warsaw 1935

In the first days of September the meteorologists from Europe and the 4 other parts of the globe travelled to the capital of Poland for the 8<sup>th</sup> Directors' Conference of the IMO. The meetings assembled in the splendid "Palais Staszic". The list of presents contained the names of the Director or their representatives of thirty nine meteorological services, among them sixteen out of Europe and five of the southern hemisphere.

The total number of attendants mentioned eighty five names.

The Conference was welcomed by H. E. the President of the Republic of Poland. At the end of his speech H. E. sketched the position of the IMO as follows:

"Votre Conférence, Messieurs, tire sa grandeur et sa signification du fait que ses décisions auront force de loi dans les services météorologiques du monde entier et qu'elles seront immédiatement appliquées."

The President of the Conference reminded in his reply to H. E. of the words of the Danish Minister at Copenhagen, who, 6 years ago, had sketched the conditions so clearly and that he in his reply to this speech had emphasized how that "force morale" had shown distinctly the confidence the Governments adjudged to the Organization.

The meeting had been prepared excellently by the Director of the Polish Meteorological Service the Swiss Ir. Jean Lugeon. A Polish Secretariat of 11 persons was put permanently at the disposal of the technical or organising staff of the Conference.

The agenda contained as usual a long list of reports of Commissions and Sub-Commissions<sup>\*)</sup> about the results of short meetings between and during the meetings of the Conference for items that ought to be arranged decisively before being presented to the Conference. The long list of questions to be considered had been closed with an extremely important item namely a review of the Statutes as sequel to a proposal from the Italian side which aimed at a closer cooperation with the bodies that were in charge of the international organization of Aerial Navigation<sup>\*\*)</sup>. A second document aimed at establishing a new "Commission for Meteorology for Aeronautics" with particular competences and a peculiar autonomic status next to the other Commissions, destined to play the part of "Liaison" between the IMO and the governmental authorities of Aerial Navigation (CINA)<sup>\*\*\*)</sup>.

This item was a matter of principle with far-reaching consequences. It had to be recognized more and more that the so far maintained non-official status of the IMO could not be maintained in future but ought to be replaced by a more official status. It would be necessary to review the Statutes in a not too distant future.

\*) Commission Réseau Mondial joint with Sub-Commission for the Physics of Clouds,  
Commission for the Study of Clouds,  
" for the Investigation of the High Atmosphere,  
" for terrestrial Magnetism etc.,  
" for Maritime Meteorology, joint meeting with the  
" for Synoptic Weather Information,  
Sub-Commission for Projections of Charts.

\*\*\*) see Appendix L.

\*\*\*) see Appendix K.

The first meeting was as usual devoted to administrative questions. Prof. van Everdingen was proposed as president to the Conference. The agenda was adopted and the reports of the President of the Committee and of the Chief of the Secretariat were read which summed up the history and the work accomplished since the Conference of Directors at Copenhagen.

The President mentioned the considerable activities of the Commissions and resumed the different actions, that had been accomplished favourably during the last 6 years. The IMO could be content with the way it had fulfilled the task with which it had been charged and which is described in Article II para. 1 of the Statutes and with the favourable consideration of its recommendations not only by the restricted meteorological world but also by the governments.

He acknowledged in his speech that a proposal had been made to dissolve the "Commission for the Application of Meteorology to Aeronautics" and to share its duties — together with that of the Joint Sub-Commission of the Maritime Commission with a number of other Commissions interested\*) — between the Commission for the Investigation of the High Atmosphere and the Sub-Commission for the Organization of Radiotelegraphic Weather Reports on the Oceans.

The Report of the Chief of the Secretariat contained a complete financial account since its establishment, i. e. for the years 1928—1935.

The financial means p. a. could be estimated at 26.000 Dutch guilders\*\*), an amount which could not be judged sufficient for the regular work of the Secretariat and its movement to Switzerland. The Report contained further a complete list of the publications amounting to twenty-two. Four of them had to be completed regularly with correcting-sheets and re-editions, two of them were still at the press, nine were in state of preparation.

The agenda items were divided among the 3 ad hoc Sub-Commissions listed here under:

- I. Sous-Commission pour la Physique du Globe et le Réseau Mondial,
- II. Sous-Commission pour les Renseignements synoptiques du Temps,
- III. Sous-Commission pour la Climatologie et les Nuages.

The President further noted his intention to entrust the consideration regarding a revision of the Statutes to a special Sub-Commission\*\*\*).

Before opening the discussions concerning the change of the Statutes the reports of the Radiation Commission and of that of the Réseau Mondial were read\*\*\*\*). The first had not yet come to positive results, the second notified the many difficulties for collecting the material for the current publications of the Commission. There was a desire that the

"Meteorological Institutes should communicate the observations of the stations under their control and destined to be inserted in the Réseau Mondial publications within 12 months of the end of the year, to which the observations refer, to the Director of the Meteorological Office in London".

This request was expressed in a Resolution (I).

\*) Joint Sub-Commission on the Organization of Synoptic Weather Reports from Oceanic Regions

\*\*) at the actual change at the moment about 60.000 Swiss francs.

\*\*\*) see Appendix L.

\*\*\*\*) see Appendices E and F.

Three volumes of the Réseau Mondial had been edited in 2 years, a remarkable proof of the activity of the Commission with the lack of cooperation of numerous Institutes.

The report mentions equally the edition of 2 volumes of the publication "World Weather Records" containing a lot of valuable series of meteorological data which had already been of great benefit to investigations of world climates and which form a mine of information for future investigations.

The second session was for the greater part devoted to the discussion of the proposal for the change of the Statutes as suggested by the Italian Air Ministry. The accompanying memorandum (49) had been based on a correspondence between this Ministry and the President of the Committee on suggestions of the International Commission for Aerial Navigation (ICAN). This document disapproved of the non-official and the private character of the IMO contrary to the officially recognized bodies that were in charge to manage Aerial Navigation all over the world. The main charge was the ruling of Aerial Navigation in all directions including the care of the weather reports for air-traffic had been one of the many particular questions which had been organized by the IMO by its Commission for Synoptic Weather Information.

The President of the Committee had clearly emphasized in his reply that the direct application of meteorology to air traffic until now had not been a field of responsibility of the IMO.

On the contrary it had been the domain of the ICAN but the realization of these applications had always been effected by the IMO with a view to being inserted in the Annex G of the Convention of 1919. So it must be acknowledged that the IMO had not neglected what might be judged to belong to its aims.

The President had pointed out at the end of his reply that the IMO embraced all meteorological services all over the world which all were following its decisions. The list of Directors, being members of the Conference of Directors, mentioned 104 names representing 73 states. As concerned the ICAN it could be stated, that its obligations were limited to the number of 30 Governments affiliated.

This correspondence had been the basis for the Italian Government to forward the extended nota to the Conference of Directors accompanied by a proposal for new Statutes for the IMO to be considered in the Conference. These nota had been circulated in due time to the Directors for examination.

The President expressed in the introduction to the discussion the extreme importance of this proposal. It mentioned the desirability of combining the International Meteorological Committee and the Executive Council, into one small body of not more than 10 members with the competence of the existing Executive Council. As regards the Commissions they should be composed exclusively of members nominated by the governments. It was further desired that all Commissions should hold their sessions simultaneously. Serious difficulties would rise in view of the large number of delegates when all governments would send their delegates to each of the Commissions. Moreover this would necessarily cause that these delegations would not consist of the most competent persons.

The fundamental ideas of the Italian Government's proposal had been laid down in a draft of revised statutes included in the memorandum. It had been

examined from all sides and gave rise to a long discussion. It was clear that a way should be found to overbridge the different standpoints in order to reach an accord of unity. Immediately after starting the discussions it had been proposed to nominate a special "Sub-Commission for the Statutes" to solve the delicate questions and to compose a decisive wording. The British member Sir George Simpson emphasized in a long speech the advantages but also the great disadvantages of the officialization of the IMO. The questions to be considered now had been discussed already long ago in the first era of the IMO. In those days there had been reasons to prefer the non-official, status rather than the official one (50). For guidance of the opinions he presented a resolution with the programme to be followed. After some amendments during the discussions, the following form was adopted by the Conference:

- Par.1. The Conference having received communications from the Government of Italy and others suggesting considerable modification in the Statutes of the International Meteorological Organization appoints a special Commission to study these Communications and to report as soon as possible to the Conference.
- Par.2. The Commission should make proposals for change in the Statutes to give the International Meteorological Organization a more official status taking into account the following considerations:
- a. Membership of the International Meteorological Organization should be limited to expert meteorologists and that whenever possible these experts should be Directors of Meteorological Services.
  - b. Membership of the Commissions should as a rule personal and not representative; the one only qualification for membership of a Commission should be specialized knowledge of the subject considered by the Commission.
  - c. All the Resolutions taken by Commissions require to be approved of by the Conference or Committee before they become effective.
- Par.3. The Commission will also consider the coordination of the organization of the meteorological protection of aerial navigation.

After designation of the members of this Commission for the Statutes Sir George Simpson was requested to take the chair. He consented to take the Presidency. After being established the Commission was immediately ready to start its activities on the basis described in the resolution. The members were nine in number among them the President of the Conference.

As regarded the Reports of the other Commissions\*) may be mentioned that the Commission for Terrestrial Magnetism presented sixteen resolutions, that for Maritime Meteorology fourteen. Twelve and eight respectively had been adopted. The final resolution of the second (Res. 99) contained the decisively adopted single form of code for weather reports from ships at sea\*\*) (six groups including two position groups).

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\*) See Appendices G and B.

\*\*) YQLLL IIIIGG DDFww PPVTT qSKdW CNN<sub>h</sub> At<sub>d</sub>

### 2.7.1. The Reports of the Commissions

The President of the Climatological Commission had not had the time to prepare a report in the few days between the meeting of his Commission at Zoppot-Danzig and the Conference of Directors at Warsaw. After having presented his Presidential Report to the meeting at Wiesbaden in 1934 he had been limited to read the resolutions approved at Zoppot-Danzig. The deliberations at Danzig had partly been a continuation of that at Wiesbaden with the aim to modernize the climatology by completing and changing the old notations of the letters and symbols in climatological and other meteorological publications, which, for the greater part dated from far more than half a century (1873, Vienna). The Conference did not object to the tendency to renewing and completing, and expressed its full appreciation without any further remarks (Res. 4, 10 and 13—20).

The following Report was that of the session of the Commission for the Investigation of the Upper Atmosphere held at Friedrichshafen, just a year ago. As was mentioned for the foregoing Commission the report of the meeting at Friedrichshafen had been completed with the resolutions of the meeting of Warsaw some days ago (Appendix D).

Only a few remarks were made and some information requested. The Conference expressed great satisfaction that instructions were given for general extension of aerological observations on the Ocean-islands and on board of ships (Res. 32) and to insert the aerological observations in the collective weather reports (Res. 33) as requested in the resolutions of Warsaw. This was equally the case for the decision about the form of publication of the material of the International Days of the Polar Year and the systematicall introduction of a number of international letter notations and the centigrade scale for temperature in the publication of the International Days, as from 1936 (Res. 26, 27).

The last but one meeting had been reserved for deliberating the important questions of the new form to be given to the Statutes. The Commission for considering this question presented a report of its discussions and its conclusions. The main conclusion was that the IMO had to pay considerable more attention to the Organization of Aerial Navigation. The way to be followed might be to create a special commission to be indicated as "Commission de Météorologie Aéronautique" with a view to comprise the different aims of the bodies out of the IMO. It would be necessary to grant to it particular competences exceeding far beyond those of the other Commissions of the IMO and these competences should be stated in a separate article of the Statutes. Its aims and procedures should have to be clearly indicated in that particular article. It ought to be composed of the special experts in meteorology for aeronautics as members. These members should be designated by their governments to represent them in periodical regional air conferences and to represent them equally in the IMO.

The President of the Commission for Synoptic Weather Information and of that for the Investigation of the High Atmosphere and besides of the Sub-Commission for Radiometeorology on the Oceans and also the General Secretary of the CINA and the President of its Sub-Commission for Meteorology, ought to be in the Commission ex officio.

Further it would be necessary to arrange and secure particularly a quick way of working for the Commission, by permitting that its decisions should need

only the approval of the President of the Committee within 6 months. The President of the Commission should be entitled to attend the Conference of Directors with right to vote in questions presented by his Commission, a privilege, that at the same time ought to be applied to the other Commissions.

The Commission had at the same time examined the changes to be accorded in the Statutes to satisfy the desire to give a more official status to the IMO. These changes had to be in such a way that the President of the Committee should contact at least 12 months before a Conference of Directors suggested to be convoked with the governmental administrations for meteorology requesting to designate the members of the Conference as sequel to Art. II para. 2 to attend to the Conference and to delegate the member that had the right of vote for the countries\*).

The rule that a designed Director remains a member until the next Committee meeting (Art. II par. 4) had to remain unchanged, but with the restriction "Si l'Administration compétente le desire."

It was decided further that, when the Committee, in the case that a vacancy in the Committee happened to occur by death or resignation of one of its members, should choose a member-compatriot to fill up the vacancy till the next ordinary meeting of the Committee after consultation of the "Administration compétente".

These changes of the Statutes had been adopted. They were circulated after the Conference as a re-print of the Publication No. 11 of the Secretariat (1935) in the way as had been followed in 1929 after the Conference of Copenhagen (Res. 23).

### 2.7.2. The Regional Commissions

In the last session an important item had been presented for discussion from two sides. One of the members present from Africa mentioned the difficulties to implement the resolutions of the IMO in the regions far from Europe. The quick development in the whole world caused urgent needs for mutual contact between the Directors in remote regions and for that reason they requested to meet periodically for discussing their peculiar problems in order to ensure that the development of meteorology be in accordance with the aims of the IMO. This suggestion was strongly supported by one of the members of the countries in the Far East.

The Conference of Hong Kong in 1930 had proved the utility of such regional conferences. The proposal to decentralize the IMO, by periodical meetings of the Directors in conformity with the competences of the IMO in remote regions, where meteorology was still in a state of underdevelopment, for discussing how to implement the resolutions of the Conference of Directors, and/or of the Committee had been fully agreed to. It was expressed in the short Resolution 116, the last of the Conference, with the words:

Res. 116 "La Conférence décide d'instituer des Commissions régionales."

After adoption of this resolution Regional Commissions were established for Africa (I) and the Far East (II\*\*).

\*) Art. II § 4. 1) "Le Président du Comité notifie, une année à l'avance, aux Administrations gouvernementales compétentes de chaque pays la convocation d'une réunion de la Conférence et leur demande d'autoriser à participer à cette réunion les Directeurs, qui sont membres de la Conférence en vertu du § 21. Quand plusieurs membres de la Conférence appartiennent au même pays, ces Administrations sont invitées à décider quel sera celui des membres qui votera au nom de ce pays.

\*\*\*) see Appendix N.

The last action of the Conference was as usual the election of a new International Meteorological Committee. It was judged desirable to extend the number to 25 in view of enlarging the number of members outside Europe. The 13 members of the former Committee were re-chosen. So there were 12 vacancies to be filled up. The President proposed a composition with 10 members outside Europe namely 3 for America, 2 for Africa and 5 for Asia and Australia, and this proposition was agreed to. So there remained 2 vacancies for Europe to be filled by voting\*).

Before closing the Conference some questions that had been examined by a restricted number of persons may be mentioned. These were 1° to get to a unity for chart projections and 2° to divide meteorological literature bibliographically into subjects and to arrange for a general system.

The first question was not a new one. It had already been examined in the first meeting of the Committee of 1921 in London and the opinions about it had been resumed in a resolution. At present the question had been considered in a Sub-Commission which drafted a new resolution and summed up the principles in general as well as in particular that ought to be considered for the blank charts. The resolution concerned the pole caps, the mean latitudes and the equatorial belt with different scales of the charts.

The resolution was adopted without discussion. It bears the number 109. By Res. 114 it was decided to change the Sub-Commission to an independent Commission.

The other question had already been discussed at Copenhagen 1929 as sequel to a memorandum of the British member Sir George C. Simpson entitled: "The classification of meteorological literature by subjects"\*\*\*). It dealt with the question of consulting experts in bibliography as it ought to be based in an already existing Universal Decimal Classification in which a section had been reserved for Meteorology. The Meteorological Office in London had composed a draft which was forwarded and had been considered in the late Committee session at De Bilt 1933. Later the "Secretary of the International Institute for Documentation" at The Hague was consulted and a new draft was composed and presented to the Conference (Appendix XX).

This draft was agreed to and recognized in a resolution as general basis for all bibliographies of the countries and institutes but expressed that it would be desirable that the Sub-Commission should continue its task (Res. 101).

One of the final resolutions insisted on arranging a number of intercontinental collective issues of weather messages of the northern and southern Hemisphere. A scheme had been inserted in a resolution, a second recommended the hours of observations (Res. 103 and 104). The scheme indicated the regions and countries, the emitting stations and the messages to be transmitted from each part of the globe. A following resolution (105) recommended to draw synoptic charts of Africa and to establish effective networks of meteorological stations in Central- and South African countries and to arrange the issue of a daily synoptic message so that the synoptic charts may be prepared for the whole of tropical Africa and for the area South of the Tropics. The Far East had already established a similar arrangement for drawing synoptic charts during 25 years and this might be an example for the other continents.

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\*) See the composition of the Committee Annex IV.

\*\*) See Appendix P.

The Climatological Commission insisted urgently in all material of daily observations being published in all countries where this is not done up to the present with the necessary instructions for this publication. The result of long discussions was that an exact indication of the word "Climate" was formulated\*) and also of the words "Oscillation of Climate" and "Change of Climate". The period of 1901—1930 was designated at Wiesbaden\*\*) to form the standard epoch for studies of the oscillations. It was recommended now to draw charts based on the data of this standard period (Res. 111\*\*\*).

The Conference adopted the resolution which contained these instructions and recommended in a complementary resolution urgently (Res. 112) that the mean values for 1901—1930 should be calculated as soon as possible.

The Resolution 113 summed up instructions for making and collecting observations of swell on long coasts for a research project to be arranged by the Maritime Commission. In Resolution 115 a new Commission was established as "Commission Radioatmosphérique" under the Presidency of Ir. Lugeon. This newly created Commission formed a sequel to the former Resolution 102 which described the importance of the radioatmosphèrical researches and the prospects of them in future with a suggested working-scheme.

As the agenda had been finished the member of the United States invited the Conference to meet the next time in the United States. This invitation was accompanied by one of Canada to choose this country for the preceding meetings of the Commissions. Formal invitations would follow soon. These preliminary invitations were heard and agreed to heartily.

A preliminary invitation for Salzburg was retained on behalf of the next meeting of the International Meteorological Committee and accompanying Commission meetings.

Before closing the Conference one of the oldest members Sir George C. Simpson expressed the thanks of the meeting to the President of the Committee who had directed for 12 years the re-construction of the IMO. He offered a souvenir for remembrance of the important work during this double presidential epoch. The Chief of the Secretariat expressed in a short address his thanks to the "Secrétariat polonais" which had always been so extremely helpful for the General Secretariat for him and both his assistants. The last action was the communication of the names of two new members of the Committee as result of the vote mentioned on page 76.

### 2.7.3. The meeting of the Committee in Warsaw 1935

Immediately after the Conference had been closed the newly elected International Meteorological Committee gathered for a short constitutive meeting. Some administrative questions were discussed. Eighteen members were present.

Following a proposal of Sir George Simpson Dr. Hesselberg was unanimously elected as President of the Committee with vivid applause of all the members. Dr. Hesselberg accepted the Presidency with a short

\*) Klima ist die statistische Zusammenfassung der Witterungsverhältnisse eines Gebietes während eines bestimmten mehrjährigen Zeitraumes.

\*\*) Resolution II. Die Kommission ist der Ansicht, daß allen Diskussionen über Klimaschwankungen Mittel einer einheitlichen und gleichzeitigen Periode 1901—1930 zugrunde gelegt werden sollen.

\*\*\*) See Appendix M.

address in which he expressed his intention to maintain above all and permanently the scientific character of the IMO.

As regarded the Executive Committee it was preferred to follow the procedure applied 6 years ago i. e. to vote by correspondence for the election of six members out of ten candidates, among them the previous President and Sir George Simpson.

The previous President expressed his hope that the new era for the new President might be a succession of anticyclones.

In reality it was to be a period of the heaviest cyclones that could be imagined.

#### 2.7.4. The change of the presidency

The words said on page 68 regarding the actions of the Commission for Synoptic Weather Information can be repeated for the Conference of Directors at Warsaw after its close. It applies to the work of the IMO as a whole in the epochs of Paris, Utrecht and Copenhagen to Warsaw 1935.

After an epoch of investigation and experiments there had been some difficulty how to meet the requirements of a new time. At the present moment the directives had been fixed how to consolidate the arrangements that had proved to be necessary for the new status of the meteorology.

But the number of important measures to be considered remained sufficient. The struggle for the officialization of the IMO in order to warrant the general ruling was not finished. The relations between the Commissions and the Committee were to be restricted for the newly established Commission for Meteorology for Aeronautics. Also the Regional Commissions should be granted an autonomic status. The Secretariat at De Bilt was in full development and for the decision of Copenhagen "Le siège du Secrétariat sera en Suisse" the time had not yet come.

The Commissions continued their work regularly each in its own domain. The Commission for the High Atmosphere happened to see itself placed before a revolution by the further development of the radiosonde because these instruments opened in the stratosphere a new field of research for daily investigation. The field of investigation for the Agricultural Meteorology had scarcely reached its limits. And the activities of the Commission for Terrestrial Magnetism were in many cases dependent on the narrow relations with the Magnetic Association of the IGGU.

The IMO and the International Meteorological Committee stood before a new era. The new President should be the leader on a new way.

### **3. The years 1935-1946**

#### **The presidency of Dr. Hesselberg**

#### **The steps to the Officialization of the Organization**

##### **3.1. Introduction**

Immediately after the Conference of Directors in Warsaw the IMO came under the direction of the newly elected President, Dr. Th. Hesselberg from Oslo.

Dr. Hesselberg was not a newcomer in the IMO. He had been a member of this Committee during the whole era described in Part 2 and had been its Secretary since 1921.



Theodor Hesselberg

The transfer of the leading functions of the Committee caused a change in the working conditions of the Secretariat at De Bilt. From this moment it was separated by a large distance from the President and this enlarged its responsibilities. It had already been necessary to extend its personal considerably and the ever growing expenses necessitated in an early future measures to revise the list of the subventions of the contributing states. The voices of those, who were urging to carry out the Copenhagen Resolution:

*"Le siège du Secrétariat sera en Suisse"*

became louder and louder. Also the new President was in favour of this idea.

The question of the officialization of the IMO was another burning question. The view that the Organization should have to abandon its free standpoint and that its Statutes should be transformed to a Convention, being ratified by the governments, became more and more urgent.

In the meantime the Chief of the Secretariat in the Netherlands was requested to take over the function of Prof. van Everdingen Direktor in Chief of the Royal Meteorological Institute at De Bilt. The consequence of this nomination was that he was obliged to resign his function in the Secretariat. A successor was found in Dr. G. Swoboda from Prague, who took over the Secretariat in July 1938.

The history of the Organization as described in this Part 3 contains three individual parts which will be treated separately:

- 1° the work done in the years of peace in the International Meteorological Committee and in the several Commissions including the Committee session in Salzburg 1937 and closing with Berlin session 1939.
- 2° The appeasement in the Secretariat at Lausanne and the limitation to only routine business and the personal activities of the President during the years of war at Oslo, and
- 3° the preparations for a renewed beginning of the Organization in a new form, the preparation of the Convention and the change to a new President of the Committee in 1946.

After the end of the war Dr. Hesselberg was to resign and a new President had to be elected.

### 3.2. The sessions of the Commissions in 1936 and 1937

An new series of sessions of Commissions was opened by a session of the Regional Commission I for Africa in Lusaka in the year 1936 and one of the Radiation Commission at Oxford. The latter was held in the week preceding a meeting of the Association for Meteorology of the International Geodesic and Geophysical Union (IGGU), September 1936 in Edinburgh.

In the beginning of 1937 the Regional Commission II for the Far East met at Hong Kong.

In June 1937 the International Commission for Meteorology of Aeronautics (Commission Internationale pour la Météorologie pour l'Aéronautique), newly established at Warsaw, hold a first meeting in Paris. Some other Commissions convened meetings for September 1937 in Salzburg in the weeks preceding the Committee meeting in that town (Commission for Synoptic Weather Information, id. for Climatology, id. for Agricultural Meteorology, id. for Projection of Charts). For the reports of this Commission meetings see Appendices A—Q.

In the year 1937 the President convened the members of the International Meteorological Committee for a session at Salzburg on 20<sup>th</sup> September. It was Austria which had invited the Committee and the Commissions to hold their regular sessions in this historical town. The Commissions and Sub-Commissions which were convening their members for sessions were the

Commission for Agricultural Meteorology . . . . .	8—11 September (52)
Commission for Synoptic Weather Information . . . . .	10—17 September (53)
Commission for Climatology . . . . .	15—17 September (54)
Commission for Chart Projections . . . . .	16 September

and besides the

Sub-Commission for fixing the hours of observations  
over the whole globe . . . . . 10—17 September

The period 20—25 September was reserved for the session of the International Meteorological Committee.

A great number of the leading meteorologists of Europe and leading persons from Asia, Africa und the USA were present at Salzburg. As concerned the Committee fourteen members, six Presidents of Commissions, five guests and the Chief of the Secretariat with two ladies-assistants attended the meeting. The President of the Regional Commission I (Africa) and a representative of the Regional Commission II (Far East) had come to Europe to be present here and to attend also the Commission meetings.

The President of the Committee reported in a long speech on the activities as sequel to the resolutions of the Conference at Warsaw, which had caused a considerable extension of the duties of the Secretariat at De Bilt. It was the extension of the number of Commissions with the Regional Commissions and that for the Meteorology for Air Navigation, that had been for the greater part responsible for this extension of the administration and the correspondence and it had been necessary for this reason to enlarge the staff. This again called for an increase of the finances by extending the number of contributing services and for increasing the amounts of their subventions to the Secretariat by a new scale.

The President had visited the Secretariat twice a year. The Executive Council had held its regular yearly meetings in the month of May for discussing internal questions with the President and the Chief of the Secretariat. Many questions were treated by correspondence.

The depreciation of the Dutch guilder in 1936 had caused many difficulties for the Secretariat. For this reason it would be necessary to revise the list of contributions from the theoretical „Franc or“ into an existing currency as the pound sterling on a base of 1000 francs or = £ 65. The President had explained the existing difficulties in a circular letter to the Directors in December 1936 and proposed a new list of contributions in £ agreed upon by the Executive Council. The Chief of the Secretariat reported about the result of this step of the Executive Council in a memorandum to the Committee (Annex XXVI) and presented the new list (Annex XXVII). The Committee approved of the new list of contributions amounting to a total of £ 6825.

The „Deutsche Seewarte“ at Hamburg had received a loan of 10 000 RM for the costs of the expensive edition of the Northern hemisphere charts of the International Polar Year 1932—1933. Provisions ought to be taken with the ICAN in Paris for warranting that the resolutions of the IMO should be inserted in the Annex G to the Convention of 1919 with the same wordings.

The colleagues from South-America had requested to establish a Regional Commission for this part of the world. This request was treated by correspondence and in May 1936 the Directors notified that the „Regional Commission III (South-America)“ had been established.

The President maintained at the end of his very extensive and well documented report the successes reached by the representatives of the IMO at the great international Congresses for Radiotelegraphy (Washington 1927, Madrid 1932). This led to consider about a new delegation to a "Conférence télégraphique et téléphonique internationale", to be held in the winter of 1938 at Cairo (1 February). This delegation had to be composed of a member of the Committee, a member of the CSWI, a member of the CIMAé und the Director of the Meteorological Service in Egypt.

The agenda for discussion in the Committee meeting contained nineteen items. Numbers 1 and 2 were the reports of the President and that of the Chief of the Secretariat. The item No. 3 contained the whole series of sixteen reports of the Commissions. So in fact there were thirty-four items. The numbers 4 to 7 regarded the extended development of the Secretariat in a new future. The number of memoranda received for discussion was thirty-one.

### 3.3. The sessions of the Committee in Salzburg 1937 (51)

The Committee examined one after another the reports of the Commissions, read by their Presidents. The Secretariat informed the regional meeting at Lima by a long telegram of six of the resolutions of the CSWI which were discussed at Salzburg.

In treating the relating item of the agenda the actual position of the activities for composing a new list of resolutions was explained and several suggestions were deliberated. Anew, now an idea from the side of France was discussed for composing a "Centre d'Information Internationale" where all material of observations should be assembled after a universal method, but the conclusion was that the time was not judged ripe for it and that the way to realize such a plan ought to be discussed in a small Sub-Commission.

In a memorandum from Portugal proposing to derive the values of the observations at the climatological hours from the registrations and to suffice with those at standard times and at the synoptic hours of observations, an old question came forward that had long before been discussed in the Climatological Commission (1934) and also by the Committee in its session at Vienna in 1926 (Res. XVIII). The meeting agreed on the serious objections in regions where the local time differs much from the standard-time and it did not like to take any decision but to postpone the question for a new deliberation in the next Conference of Directors at 1941.

The President proposed to establish a third Regional Commission (III) for the Services of South-America under the Presidency of Mr. Galmarini of Brasil and after that one for North-America with number IV (Res 90). The Director of the Service of U.S.A., Dr. Gregg was requested to take Presidency of the latter.

The presence of the President of the Regional Commission I and of a representative of Regional Commission II gave the opportunity to consider the difficulties caused by the geographical conditions of Africa as mentioned in the first resolution of Lusaka. The Committee fully recognized these difficulties and expressed its willingness to consider them by promising the Regional Commissions:

"that it will give such consideration to any of these recommendations as will lead to modifications in the internal Resolutions, Codes und practice to meet their needs and so realizes that world-wide uniformity which is so desirable."

In one of the last meetings the Committee discussed the change of the Secretariat to Switzerland. This had been decided in principle at Copenhagen preliminarily without fixing the time of the transfer. Now there had risen objections from different sides and therefore the President's proposal of the date of 1 January 1939 could not find a majority. It was resolved:

"La question de la date du transfert sera considérée de nouveau par le Conseil Exécutif en mai 1938 et après cette réunion un vote par écrit des membres du Comité sera demandé."

At last the President liked to change some paragraphs of the "Règlement intérieur du Conseil Exécutif" and the meeting agreed after ample discussion.

After ending the discussions some administrative questions were considered. U.S.A. had invited to convene the next Conference of Directors at Washington in 1941 and the preceding Commission meetings at Toronto in Canada. This invitation was received with applause and this was laid down in a resolution (92). Germany invited the Committee to hold its next meeting in 1939 in Berlin early in the summer in view of a Congress of the IGGU at Washington in September 1939. After the necessary elections 5 vacancies in the International Meteorological Committee were filled as follows:

Prof. Dr. H. von Ficker (Austria)  
Mr. G. Ouchakoff (USSR)  
Mr. J. Correia Pereira (Portugal)  
Dr. R. Habermehl (Germany)  
Mr. A. Walter (Kenya)

After deciding that the candidates for a new Executive Council be nominated through a vote by correspondence, and after the adoption of some final resolutions the usual farewell-speeches and a vote of thanks to the Bureau and the Secretariat the session was closed.

#### **3.4. The session of the Committee in Berlin 1939 (55) and the preceding sessions of the Commission**

The Committee session was as usual preceded by some sessions of Commissions namely that for Maritime Meteorology, that for Meteorology for Air Navigation and of the Aerological Commission. The latter designation was agreed upon at this session.

The Commission of Maritime Meteorology had in the mean time held a session at De Bilt in July 1938 for discussing the consequences of the decisions of the Regional Commissions on the Southern Hemisphere. The agenda included thirty-eight items, subdivided into eight groups.

The opening of the Committee session in Berlin owned a solemn character. A representative of H. E. the Minister for Aeronautics was attending to welcome the guests. The President of the Committee replied with a long speech. He mentioned the important work of the Commissions in the two years since the Committee session at Salzburg and the far reaching measures for the protection of aerial navigation on the long ocean crossings and continental flight routes and how these measures had been extended more and more to world-wide practice by general adoption in the territories of the Regional Commissions. He alluded also

to the intention of this meeting to prepare a draft of a general Meteorological Convention replacing the actual practice of a non-official status, that was still preferred by different parts. It must be definitely taken into account, that the basic principles which had always been the governing rules in the IMO and which had led to such extremely good results, should be respected and never neglected. The absolute universal character of the Organization all over the world and the general decisive character of its decisions would be warranted in the Convention. All countries must co-operate in the universal aims without any exception.

The President mentioned expressively that the Commission for Meteorology for Aeronautics had adopted in its meetings, preceding the present Committee session, unanimously "nemine contradicente" the "Reglement for the Meteorological Protection for Air Navigation". It could be especially noted, that in its meeting representatives of the authorities of air navigation of thirty-four countries attended and that besides all countries of Europe — with the regretted exclusion of Russia — four continents were represented at the table. This emphasized the extremely mutual dependence of meteorological services and explained how all countries without any exception collaborated in a friendly manner in order to implement the decisions, that had been taken unanimously or with a great majority of votes.

All this ought to be reserved in future. And as concerned the publication of the results of the activities the basic principle that all publications and researches should be put freely at every one's disposal as universal possession of all mankind, should be maintained. The collaboration of practice and pure science that had been exercised everytime by the research in the laboratories and at the universities, forms a basic rule, that always had proved to be the most fructuous for the progress of pure science.

The whole of these principles, besides the collaboration of the most prominent experts in different branches of practice and scientific research cooperating as members of the advising Commissions, should remain as the basic ideas in composing the planned Convention.

This monumental opening-address was heard with extreme attention and the vivid applause proved the general agreement with the ideals brought forward with so great enthusiasm and confidence of the acting President.

The agenda was modest as regards the number of twelve items but item 3. contained the reports of not fewer than eighteen Commissions and Sub-Commission. The highest importance ought to be given to the preliminary draft of the Convention (6\*) and the collaboration of the IMO with the ICAN (9). Items 1. and 2. were as usual the reports of the President of the Committee and that of the Chief of the Secretariat. Both reports were read in the first working meeting.

The President could communicate, that the measure for increasing the contributions for the expenses of the Secretariat as decided at Salzburg had been successful. The contributions had been really transferred along the new list of Salzburg and in pounds sterling.

The President urged that the Committee would decide to establish a Regional Commission for the South West Pacific as desired by the Directors concerned.

\*) See Appendix L.

He communicated further, that the delegation to the meeting of the "Conférence des Télécommunications" in Cairo had sent a report and also which steps had already been taken and which would be necessary in order to attain harmony of the texts of the decisions of the IMO with the prescriptions and wordings of the Annex G of the Convention for Air Navigation of 1919. It would be necessary to delete all prescriptions which were contradictory to or not in mutual accordance with the texts concerned.

#### 3.4.1. The first draft of a Convention (Berlin Draft)

The following pages will be limited exclusively to the deliberations in the Committee meetings and will mention the decisions taken, after having notified and discussed the reports of the Commissions.

In the plenary sessions, preference was given to the discussion of the Preliminary Draft of the Convention in the form as it had been circulated among the members before the session. Many members had replied already by circulating their remarks. Now the President took the opportunity to explain verbally the "pros and cons" of the Convention. The first step should be to create a tendency of the governments for the adoption and for putting into execution the different decisions of the Organization and for providing the finances in the budget for the management of the Organization as it had been proved useful at the other more officially recognized bodies with which the Organization was related. On the contrary there are disadvantages i. e. that the experts in the Commissions will be placed behind the official delegates of the governments, which means a real danger as these representatives usually are less competent in scientific and technical matters. Nevertheless the President was of the opinion that the discussion was unavoidable at this moment, and urged the deliberation on the change to a new status, especially in this session, in which the representatives of the elder generation were still present, so that they might profit from the opportunity of hearing their well considered standpoints in the matter for discussion.

In this session a draft must be composed ready to be circulated among the Presidents of the Commissions and among all the members of the Conference of Directors 1941.

The President had prepared together with the French member, M. Wehrlé a preliminary draft as a model for discussion in which another time the views of the members pro and contra had been expressed. It had been shown that the views expressed being far from unanimous, and that the elder members and also the United States made serious objections to abandoning the old status. But the general opinion was that the work which had been started now ought to be continued in charging a limited Commission of Redaction to compose a new draft after having heard the discussions article after article regarding the Preliminary Draft in the plenary sessions. This new draft should be circulated in a decisive form among the Directors etc. mentioned above.

This new draft was presented in a following session. After being fully amended and elaborated it was made ready for circulation in a decisive form. This draft is mentioned further as the "Berlin Draft 1939". It was accompanied by a resolution regarding the procedures to follow.

M. Wehrlé had been President of this Composing Commission. In his verbal explanations he mentioned that one had been obliged all the time to take into account the limited majority that had been shown in stating the competences to be charged to the Executive Council and, secondly, as regarded the representation of a country by another country. In the wordings of the present draft the opinion of the majority had formed the directive but nevertheless it should be necessary to emphasize these circumstances especially at the Conference of Directors at Washington. After having fulfilled its charge the Committee advised to nominate a new "Commission for the Convention"\*) with the charge described in the following Resolution:

Res. 41. Cette Commission est invitée:

- a) à communiquer le texte du projet de Convention — avant rédaction définitive des Annexes et en l'accompagnant des explications nécessaires — aux Directeurs des Services nationaux qui sont priés de faire connaître à la Commission leurs remarques, après avoir procédé à un échange de vues officieux avec les autorités gouvernementales compétentes de leurs pays.

Le projet sera également communiqué et des observations demandées aux Présidents des Commissions de l'OMI.

- b) à préparer les Annexes A, B, C prévues en faisant appel à la collaboration des Présidents des Commissions de l'OMI en ce qui concerne l'Annexe A et du Conseil Exécutif en ce qui concerne l'Annexe C. En ce qui concerne l'Annexe B, les Présidents des Commissions sont priés de définir, comme l'ont fait la Commission de Météorologie maritime et la Commission aérologique, les tâches qu'elles doivent remplir et les méthodes pour y parvenir;
- c) à présenter le projet complet de Convention à la Conférence de Washington de 1941 et à faciliter le travail de cette Conférence en rassemblant et classant méthodiquement les observations reçues.

### 3.4.2. The frequencies for use in meteorology

The meeting had received an extended Report of the Delegation of the IMO to the "Conférence des Télécommunications" in Cairo in February 1938. It had been pleading for reserving different bands of frequencies for meteorological messages, namely:

- for synoptical weather reports,
- for meteorological protection of aviation,
- for the radiosondes.

It had succeeded in reserving short waves of  $27\frac{1}{2}$  to 28 megacycles/sec (10.01—10.71 m) for the radiosondes, and further indication of 2 supplementary long waves to the formally reserved waves for the transmission of synoptic weather reports in European countries (7 101 m and 3 005 m) next to the old existing waves (7 212 m and 3 352 m).

### 3.4.3. The outbreak of World War II

Exactly two months after the date of closing of this Committee session Germany opened the hostilities with Poland.

\*) Appendix L.

Many important decisions had been discussed at Berlin. The actual circumstances reminded in many respects of the change to an original status being officially recognized in 1873 and being again abandoned in 1891, as described in part 1. As the war had begun by Germany in Central Europe, it extended some days later over Western Europe and in the spring of 1940 over all countries and oceans of the Western hemisphere and particularly in the Northern hemisphere. Under these circumstances the execution of all that had been prepared in Berlin had to be postponed "ad calendae graecas". The Secretariat at De Bilt changed speedily to neutral Switzerland and settled at Lausanne, where it could prepare the edition of the authentic minutes of the Berlin meeting and from where it should be possible to entertain the relations with the countries all over the world. The implementation of the Berlin resolutions ought to wait till better days.

The main part of the productive work that could be elaborated at Lausanne and in the Bureau of the President at Oslo was now the composing of the Draft-Convention in the decisive form with the complementary Annexes. At the time being no supposition could be made on the date of convening the Conference of Directors at Washington foreseen for 1941. This was all hidden in an uncertain future.

It lasted many years before the reports of the Commission sessions in Berlin could be finished and circulated. This proved to be the end of May 1941 for the Maritime Commission, the beginning of 1942 for the Regional Commission III at Montevideo and the Aerological Commission at Berlin. As concerned the edition of the "Règlement général pour la Protection internationale météorologique de l'Aéronautique" this could not be circulated before July 1943.

It might be imagined that this publication was received with less interest at that moment. The meteorological services were fully put aside in their functions in the countries under occupation and in the belligerent countries they had to follow the military instructions and rules.

Notwithstanding the existing objections for active and productive work after the outbreak of the hostilities it is nevertheless interesting to have a look at the subjects that could be studied under these very unfortunate circumstances.

### **3.5. The activities during war**

There were still some Commissions that could continue their work unhampered by the war namely those with activities on purely scientific basis as that for Terrestrial Magnetism and that for Radiation of the Sun etc., in the neutral and the later occupied countries. Further statistical tables were prepared for several aims in Climatology, in Maritime Meteorology and in Agricultural Meteorology, for the Réseau Mondial and for Oceanography as far as the relations could be maintained with the countries, which were providing the material for researches. As concerned the remaining work the meteorological world had to obey the laws of war and the prescriptions of the occupation forces.

### **3.6. The reconstruction after World War II**

It did not happen before 5 May 1945 that reconstruction came in sight in the occupied countries after the long period of limited activities. Soon it was shown that conditions in the era to begin would be quite different from the past. New

means of correspondence, teleprinter and radiotelephony, that could be used before the war exclusively internally, had made enormous progress during the years of war and were available now to take over the prewar radiotransmissions entirely. The techniques of radiosondes had developed to an industry. Air traffic over the oceans between Europe and America was no longer an enterprise with uncertain risks but was carried out using the protection of the regulations foreseen in the Commission for Aeronautical Meteorology before the war. The dreams of Berlin had become reality under the urgent circumstances.

It had been under these conditions that the President of the Committee could arrange the revival of the IMO and prepare a new start of its activities. The Secretariat could restore its old functions and the time had come for preparing the first post-war conference of meteorologists. So an Extraordinary Conference of Directors was convened for March 1946 at London.

A new era dawned for the old IMO with adaptation to newly changed circumstance and ideas by quite a new generation of men. The President of the Committee was of the opinion to leave his leading function to this younger generation after having presided the extraordinary session at London.

Existing vacancies in the International Meteorological Committee were filled up in Berlin by the election of the new members of Mrs. Alvaro Morna (Portugal), Dr. Cannegieter (Netherlands), Sir Nelson Johnson (Great Britain), Dr. Barnett (New Zealand), N. Sellick (Rhodesia), and Ir. Souza (Brasil).

The veterans Prof. E. van Everdingen and Sir George Simpson were honoured at Berlin by nomination as Honorary Members of the Committee after the long memberships of 29 and 18 years respectively.

### **3. 6. 1. The Extraordinary Conference of Directors in London 1946 (56)**

As was the case a quarter of a century ago, the long years of war had had an important influence on the evolution of meteorology. Meteorology had been related in an ever augmenting way in all actions on land, at sea and in the air. The network of meteorological stations had become denser than it had been ever before and it had been extended over uninhabited regions in the world where in former times meteorological stations had been established only occasionally and temporarily. The evolution in instrumental techniques had given rise to the organization of a network of aerological stations, which provided daily observations up to considerable heights in the stratosphere. An in this way an important basis had been created for meteorological research for scientific purposes as well as for adaptation to practical aims.

It was the extension and the development of the weather services for aviation that ought to be considered now as one of the principal aims of the International Meteorological Organization.

These words were spoken as a reply to the welcome-address to the Conference by the "Under Secretary in the Air-Ministry". He mentioned in his speech the meteorological science as "the key science of the world". In war times all had depended on this science, but in times of peace its rôle would be ever growing in importance. This should certainly be the case in the development of commercial aviation. As concerned this branch of traffic a definite directive ought to be projected and this would ensure the success of the Conference and warrant its important international signification for all mankind.

Dr. Hesselberg mentioned in his reply how in the years of war the military needs had overweighed everywhere the international regulations of peace. He described the present task as:

"to establish new international rules and make arrangements that will secure the necessary uniformity without losing the advancements achieved by the intensive meteorological activity during the war. The accomplishment of this work is however made difficult because the number of experts in our Commissions has diminished considerably. Many of them are dead, others have left meteorology and several from the defeated countries are for other reasons prevented from taking part in the work. In reality the reduction of the number of real experts in our Commissions has decreased so much that it is necessary to re-cast our Organization before we can attack the great work lying before us".

First of all it was considered necessary to convene an Extraordinary Conference of Directors before the first ordinary Conference of Directors and the Commission meetings that had been originally planned for 1941 in Washington and Toronto could be convened. A new International Meteorological Committee had to be elected and new Commissions had to replace the old ones of the prewar times. It should be necessary to start at Washington on an entirely new basis.

On account of the war the directors of the defeated countries could not be characterized as independent. So they were excluded for the time being. They could not be invited to attend meetings until it should be possible for them to re-take their places again as "Independent Directors". Temporarily their places had been taken by the military authorities in their militarily occupied countries.

As regards the Commissions the President said:

"That it is necessary to ensure that they consist of the best experts, and that they are available to take part in the work. To achieve this end it is proposed to dissolve all the ordinary Commissions and to re-establish those that we desire to maintain. The Conference will then, in accordance with the Statutes, have the right to appoint presidents, vice-presidents and members of the newly established Commissions. In this way we can give them the composition that is the best possible to-day. Later on the Commissions will have the right to supplement their membership according to future requirements."

An exception had to be made for the Commission for Aeronautical Meteorology as the members of this Commission are nominated by the Aeronautical Administrations in the different countries. Suggestions have been made to dissolve it equally and to leave that side of its work to the Provisional International Civil Aviation Organization (PICAO) which had recently been established. There must be a thorough examination of this subject before any decision will be taken.

The President remarked further as regard to the codes:

"In Copenhagen in 1929 were adopted codes for use all over the world. In the years that followed new variants were often demanded in order to satisfy local interests. The number of codes increased steadily beyond the few adopted in Copenhagen. During the war new codes were introduced to meet military needs and to-day a very great number is in use. So there should be a thorough revision of codes admitting only those that are necessary as the best possible standard."

The President mentioned as some important tasks to arrange for the Commission for Synoptic Weather Information to reorganize the system of wireless issues of weather reports. The Commission should be asked to begin its work as soon as possible, as the system of wireless issues was very urgent for weather forecasting all over the world. Also weather reports from stationary ships in the oceans, and for the observations in the upper air should be extremely valuable and it should be another important task for the Commission to make arrangements to realize such plans.

After having urged that it will be generally the duty of the appropriate Commissions to make the necessary arrangements that new observation methods are used uniformly and correctly all over the world the President referred to:

"the editing and publishing of the aerological observations made in the last few years for reason that in the last two years a network of upper air stations had been established, whose geographical extent and density in space had far been exceeding even the most optimistic expectations. Steps should now be taken to make these very important upper air observations available for scientific use. It was for the Conference to decide if this great work should be done and if so how it should be organized. The general rule, that all countries publish their meteorological observations and all scientific research in the domain of meteorology, so that it becomes the common property of the whole of mankind should be respected and maintained."

#### 3.6.1.1. The Convention Commission\*)

The war had prevented the Commissions from fulfilling their charges for many years and had also retarded the work of the Commission for the Convention. There had not been any opportunity for a meeting and consequently the President had been obliged to undertake its task himself. The Secretariat had been able in its new seat in Switzerland to sustain him in this work by composing new drafts of the Annexes A, B and C mentioned in the Berlin Resolution 41. It had been possible to forward these drafts in October 1942 to the President of the Convention Committee for information and comments thus they had nearly been finished at the end of the war and could be distributed among the members attending the Conference in a preliminary form. The work to be done now ought to enable the Committee to present a decisive draft at the next Conference of Directors at Washington 1947 and the President expressed as his personal opinion:

"In the draft of the Convention and its Annexes, I have tried to maintain the present principles and rules of an Organization as unaltered as possible. They have proved their value in 74 years that have elapsed since the IMO was established. Modifications are of course unavoidable, but the scientific and democratic character ought to be maintained."

#### 3.6.1.2. The Secretariat

The report of the Chief of the Secretariat was a romantic tale full of sensation. 5 months after the return from Berlin the office felt obliged to leave Holland and to effectuate the change to Switzerland at its own responsibility. It settled at Lausanne in order to entertain the relations with the meteorological services. There was also the possibility to entertain relations with the President of the International

\*) See (55) pp. 43, 86, App. A 96—136.

Meteorological Committee and the President of the Commissions as well as with the President of the Convention-Commission. It had been possible to circulate copies of the Berlin Draft of the Convention from Switzerland to the Directors and the Presidents of the Commissions as had been resolved at Berlin accompanied by a memorandum of the President of the Convention Commission with some „Notes Explicatives concernant le Projet de Convention Météorologique Internationale“. The report of the Convention Commission contains further details regarding these preparatory actions.

#### 3.6.1.3. The end of World War II

The armistice of May 1945 brought immediately the revival and the return to normal relations. The diminishing of the activities had led to a reduction of the personnel and diminution of the expenses of the Secretariat. As the contributions were received regularly during the years of the war the financial situation was not unfavourable.

Although meetings of the members of the Executive Council had not been possible the contact had been maintained all the time by correspondence. Immediately after the war the work of the periodicals, which had to be supplemented regularly, could be started again, but in the beginning with many difficulties.

Extensive collaboration was experienced from all sides.

The report mentions an impressive list of publications that had been edited at Lausanne during the years of war. It were the reports of the meetings of the Commissions in the years 1938 and 1939 and the report of the Committee meeting of Berlin itself. They were circulated in the years 1941 to 1944. A number of older editions had been revised and re-edited. The last report in this series was the "Règlement pour la Protection Météorologique Internationale pour l'Aéronautique" composed at Berlin 1939. Its expedition to the Aeronautical Authorities of the Governments for notifying with supplementary explanations of the President of the Commission for Meteorology for Aeronautics could not be carried out before the war had been finished for some months (November 1945).

#### 3.6.1.4. The "Publication No. 9"

Les Messages Synoptiques du temps 1936—1938\*)

The Chief of the Secretariat also dealt with in his report the resuming of the transmission of weather messages. He pointed out that the prewar system could not be considered fit for application after the practice developed in the years of war and that a total revision would be necessary as concerned the codes, the ways of transmission and the numbers of coordinating stations. The old prewar Publication No. 9 of the Secretariat (Transmissions) being quite out-of-date ought to be replaced by a new one. The first measures were taken in the second half of 1945. There were also endeavours to fill the gaps for the countries where the meteorological services had not already been re-organized and for those, which had not yet finished the reorganization of the issues of weather reports.

The report ended with a vote of thanks to the Directors and the Presidents of Commissions for trying not to loose the contact with the Secretariat in the difficult times of the years of war.

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\*) See "Manuels". Liste des Publications A.

### 3.6.1.5. The deliberations of the Conference in London

The number of resolutions adopted in this Conference was small. It was not more than twenty-two. Some of them had been preceded by long and extended discussions. The relations with some other international organizations created during the war\*) as the "Provisional International Committee for Civil Aviation" (PICAO) and the "United Nations Organization" (UNO) gave rise to long important debates. The future of the Commission for Meteorology for Aeronautics was nearly related with the first.

### 3.6.1.6. The Commissions\*\*)

The questions of maintaining the old structure with a great number of Commissions formed an extensive and long matter of discussion. It was intended to establish a reduced number of new Commissions for purely technical affairs and to divide the activities of the IMO among them. But this should not mean to attack the scientific character of the IMO and it ought to maintain its independence. This last question regarded the possibility of the IMO being affiliated to the United Nations Organization (UNO).

The particular facilities admitted to the Commission for Aeronautical Meteorology ought preliminarily also to be granted to other Commission (Synoptic Weather Telegraphy). It was agreed that the Secretariat should be extended largely at short notice and that the financial basis should be enlarged to a much broader one in order to enable it to adapt itself necessarily quickly to the extended exigences of the post-war circumstances without obligation to wait for the moment the arrangements for the Office as described in the Convention are ready for execution.

The reports of the Presidents of the Commissions were adopted and approved with the exception of some special remarks. Only the Commission for Synoptic Weather Information and the Regional Commission VI for Europe and the Mediterranean Regions was established, the latter included also the territories of North-Africa. Asiatic Russia should further be included by that for the Far East (II).

### 3.6.1.7. The Convention and the Resolutions\*\*\*)

The Commission for the Convention had not been able to send a report. The preparatory work for the composing of this document had been elaborated as mentioned above in the Bureau of the President of the International Meteorological Committee at Oslo and a report of the results of this work had been included in his Presidential Report. It should be necessary before taking any decision to examine and to amend thoroughly the last prepared draft and this should be done before the Washington Conference of next year.

So the charge of preparing the decisive draft had been now entrusted to the International Meteorological Committee itself in a future meeting (Res. 14).

In view of the great number of urgent problems a meeting of the Commission for Synoptic Weather Information should be unavoidable in a near future.

\*) See (56) pp. 57 and 61, B. VI to B. VIII.

\*\*\*) See (56) pp. 63, 64, 76, 89.

\*\*\*) See (56) p. 86, Res. 7; the Berlin Draft.

As regarded the election of candidates for Presidencies and Vice-Presidencies of the Technical Commissions to be established newly a new procedure should be followed by instructing a special Commission named "Nomination Commission" with these elections (Res. 8).

The deliberations concerning the Resolution regarding the augmentation of the number of ships contributing to the messages for synoptic forecasting services led to plead urgently:

Res. 9 (2) "that stationary weather reporting vessels be established and maintained in the most important ocean areas where reports cannot otherwise be obtained with the necessary frequency and regularity and to ensure at least a minimum network of upper air reports."

The Commission for composing the new "Technical Commissions" recommended in its proposals after dissolving the existing Commissions (other than the CIMAé subject to the separate Resolution 18)

Res. 7 "to appoint the following Commissions:

- Aerological Commission,
- Climatological Commission,
- Hydrological Commission,
- Commission for Instruments and Methods of Observation,
- Commission for Agricultural Meteorology,
- Commission for Maritime Meteorology,
- Commission for Projection for Meteorological Charts,
- Commission for Synoptic Weather Information.

The Nomination Commission had to elect the Presidents of each of these Commissions.

The Conference established by Resolution 10 the 6 Regional Commissions I—VI with the supplementary remark

"Meteorological Services of border countries may be represented on more than one Regional Commission".

The members were not elected, as they are formed in these Commissions by the Directors of the Meteorological Services, "as such". This procedure should be examined by the IM Committee in order to be stated in the Draft Convention to be prepared.

As regards the Commission for Aviation Meteorology it was resolved to replace it in its peculiar status by another new Commission with an extended charge as had been given to it on its establishment at Warsaw 1935. In view of the need for close cooperation between the IMO and the PICA0 (the CINA in Paris of 1919 had been included now in this mentioned body):

Res. 18 "it was considered:

- (1) that a Commission for Aviation Meteorology should be created and that the task of this Commission should be the working out the general problem of meteorological service for aviation.
- (2) Until this new Commission is organized the old one should make a draft agreement with the Meteorological Division of PICA0 on the relation of the two organizations.

(3) the actual President is requested to communicate with the President of the Interim Council of PICA0 with a view to implement this recommendation".

In the last Resolution (22) the President of the Committee was charged: "to call the next regular meeting of the Conference of Directors in Washington in 1947 preceded by a meeting of the Technical Commissions in Toronto."

#### **3.6.1.8. The new International Meteorological Committee\*)**

In the last meeting a new International Meteorological Committee was elected. It was limited to twenty members at the time being and was to leave five places open for a later vote when the world-situations should be more settled and cleared.

Eight out of the twenty members of this new Committee had been members of the old Berlin Committee and only Dr. Hesselberg of Oslo and Messrs. Patterson of Toronto, Keränen of Helsinki and Lugeon of Zurich were representing the senior generation of the Warsaw Committee.

After the unanimous election of the proposed group of twenty the Conference had been closed with the usual votes of thanks.

#### **3.6.2. The first session of the Committee**

The Committee re-assembled in a short meeting immediately after the final closing of the Conference. Dr. Hesselberg desiring to resign as President after a Presidency of 11 years proposed Sir Nelson Johnson who accepted the Presidency for the era to follow. Dr. Hesselberg, Dr. Reichelderfer and Gen. Fedorov were elected as Vice-Presidents and after that a new Executive Council had to be nominated. On the proposal of the new President the 3 Vice-Presidents were nominated in the same functions in the Executive Council. For filling up the 3 places still open a vote should be made by correspondence between 6 candidates designated in this meeting.

The final question to be discussed was the important question of the extension of the Secretariat. This question ought to be considered by the Executive Council at short notice. But the decisive position of the Secretariat should be arranged in the Convention. This arrangement could not be settled separately and hurriedly as it ought to be considered jointly with the Commission for the Convention at a later moment.

\*) see (56) p. 122.

**4. The years 1946-1951**  
**The presidency of Sir Nelson Johnson**  
**The adoption of a new status**  
**The Convention of 1947**

**4.1. Introduction**

The new President convened a Committee meeting at Paris July 1946. He saw as his first task to prepare the definite change of the old International Meteorological Organization into the new official status.

**4.2. The session of the Committee in Paris 1946 (57)**  
**The draft of the Convention (Paris Draft)**

The Committee session in Paris was convened for July 1<sup>st</sup>. The number of meetings in the course of twelve days was not less than twenty-one. There were



Sir Nelson K. Johnson

twelve members with the right to vote, among them five Presidents of Commissions. Thirteen guests assisted to the meetings among them M. Roper, the General Secretary of the PICAQ.

The principal items on the agenda were:

- 1° The report of the Presidents of the 3 Commissions, that had met in the month before. (CSWI, CIMAé, Europe VI).

2° The relations between the IMO and the PICAQ.

3° The composition of the definite Draft of the Convention with the Annexes joined to it ("Paris Draft").

The reports of the discussions of the 21 meetings fill not less than 230 printed pages of the 447 of the whole book. There were long extended talks about many questions. The resolutions of the Commissions had to be revised several times before they could be adopted by the Committee. The reports of the Regional Commission for Europe (VI) and the CIMAé took the modest number of ten and twenty pages respectively.

The discussions about the Convention were the main task of the session. They are reported on over seventy-four pages in the report of the session.

The Committee needed a whole meeting for the study of the standard-forms of reports adopted by the Commission for Synoptic Weather Information. At the end of the discussions a 5-group form of code was definitely adopted as a General Standard Form for all over the globe (Resolutions 5—16 of the Committee). After a long discussion it was decided that the new codes should generally be introduced "not before March 1<sup>st</sup> 1947 and not later than January 1<sup>st</sup> 1948" taking into account that a following session of the CSWI in Toronto in 1947 should have an opportunity to discuss the question of codes and forms of the code again after a general study and adaption to practice in the different meteorological services in all climates of the globe.

Up to that time the old codes remained in use. The date of re-introduction of European collective reports 4 times a day was fixed at September 1<sup>st</sup> 1946 (Resolution 39).

A delicate and difficult item on the agenda of the Committee was the suggested review and re-edition of the International Atlas of Clouds with the classification of the clouds and hydrometeor definitions. The desirability of the composing of a new atlas had been expressed in a resolution of the CSWI. As the Extraordinary Conference of Directors in London 4 months ago had dissolved the old "Commission for the Study of Clouds" the CSWI recommended to establish a special Sub-Commission of the CSWI joined with members of other Commissions interested in this work (Resolution CSWI III) to prepare the new edition. The Committee approved this procedure and urged that the Sub-Commission, when established, should start this work as soon as possible. The Director of the French Meteorological Office in Paris suggested that the technical accessories still available in Paris could be put at the disposal of the Sub-Commission and also the financial means of the old Commission on Clouds. This offer was accepted with hearty thanks. The Sub-Commission ought to be established as soon as possible and the President should be nominated by the Presidents of the CSWI and the CIMAé.

This was indeed a decision of great importance and the beginning of a great enterprise for a long series of years.

The report of the Regional Commission VI (58) did not give rise to thorough discussion besides the Resolution X regarding the stationary ships on the Ocean as floating meteorological stations for synoptic meteorology at fixed points.

The Committee was of the opinion that these plans were not yet ripe for realization and that they were for the time being too premature to sustain them otherwise than by notifying. A not far future should prove that this standpoint

was not the right one and that the realization would be effectuated in due time. The Committee adopted ten of the fourteen Resolutions as their own.

In discussing the report of the CIMAé (59) the relations between the IMO and the PICAQ as they were indicated in Resolution I\*) formed the main point. The old General Secretary of the ICAN of 1919, now acting in the same function at the PICAQ, was one of the leading men in the discussions. So these discussions were mostly of a political character in order to find a practical *modus vivendi*. The resolution was treated paragraph after paragraph and adopted with some minor changes in the wordings.

The Resolution II\*\*) was treated in the same way and the Committee adopted the resolution which contained the description of the task of the new Commission to be established. The suggested procedures in the mutual representations and the mutual cooperation between the Commission and the representations and the mutual section of the PICAQ were approved after long discussions. But the Committee did not agree with the recommended maintenance in force of the General Regulations for Aviation approved of by the Committee at Berlin 1939 in Resolution III\*\*\*), until the Regulations newly to be composed in the mutual cooperation with the PICAQ could be put into force, taking into account the strong changes in the situation of the world concerning the civil aviation.

There was no discussion as regards the three following resolutions as they were not of the competence of the Committee. The Committee was not in favour of a rapid change of the old Commission to the new one and deleted therefore the recommendation of the Commission itself in the last paragraphs of its Resolution II mentioned above to dissolve it immediately and to establish the new Commission in due time.

The most important item of the agenda, the composition of the new Draft of the Convention on the basis laid down by the Commission for the Convention at Berlin in 1939, took a considerable part of the time. It took not less than ten meetings. The Berlin Draft formed the starting point for the discussions (Annex A—I). Copies of the Convention and of the Annex B und C were in the hands of the members, that of Annex A was to follow soon.

There was a unanimity of opinion that a Convention should be extremely useful. The first talk concerned a preparatory discussion regarding the procedure to be followed. Four proposals were submitted by the Russian side (Annexes A—II—V) which ought to be treated first. The first concerned a political question and regarded a recommendation for affiliation of the IMO to the UNO as contained in the London Resolution 4 with the words

“that the IMO should examine the possibility of becoming affiliated to the United Nations’ Organization (UNO) without IMO losing its world-wide character and independence.”

The result of long discussions was the opinion that the IMO should not take steps on its own side, but preferred to wait whether any approaching steps should be taken by the UNO.

\*) see (59) p. 148.  
\*\*) see (59) p. 150.  
\*\*\*) see (59) p. 153.

The second paragraph regarded an absolutely political question by asking private privileges for the representatives of country-members of the UNO. This question had to be postponed for the time being to a later session as it was clear that a long and principle-discussion could be expected.

A following meeting was devoted to the general directions in discussing the Draft to be composed. Four Sub-Commissions were nominated the first was entrusted with the edition of the Draft itself and the sub-commissions 2, 3 and 4 with the study of the Annexes A, B and C in a 24 hours' time.

The reports of these Sub-Commissions were treated in the following meeting. The Draft prepared by the Sub-Commission 1 was divided into three chapters and seventeen articles and gave rise to many remarks. That of Sub-Commission 3 caused a long discussion regarding the language to be used for the Convention. The report of Sub-Commission No. 2 was not yet completed.

It was the second paragraph of the first Russian proposal (Annexe A—II) that caused considerable difficulties. It contained the following wording:

"Les pays membres de l'ONU doivent avoir des avantages spéciaux par rapport aux services des autres pays. Cet avantage est réalisé par l'élection des représentants des pays membres de l'ONU aux postes dirigeants de l'OMM (membres du Comité, Présidents des Commissions et des Conférences.)"

A proposal of this kind was absolutely contrary to the principles which had always been the leading principles in the IMO. For this reason they were unacceptable. After long explanations of the mutual views this proposal was rejected by a vote.

The further Russian proposals regarded the internal structure of the IMO. It was proposed after verbal explanations of the Russian representative that the Executive Committee should be transformed into a new extended form, i. e. into a Committee which should meet at least once a year and should be the authoritative body between Congresses. It should be enlarged to contain a broad representation of the Regions and be composed of fifteen members: the President, two Vice-Presidents and two representatives of each Regional Association. This composition should be specified in precise terms in the Convention.

This point gave again rise to endless discussions. But now a new idea was brought forward, namely the establishment of a new section, a "Technical Section" with a permanent seat at the Secretariat composed of the present members of the Executive Council Alternatively it was composed to establish quite a new Section with the same number of seven members but specially qualified as technical experts and being charged to assist the members of the Committee in the accomplishment of their tasks. After a vote the Sub-Commission No. 1 should privately take the charge to prepare a complete plan for a total reorganization of the IMO including the task of the Technical Section in a complete form. The discussions ended with a request to the Sub-Commissions of the Convention:

"to prepare the draft concerning the functioning and the competences of the Technical Section without giving it definitive instructions."

In that way the Sub-Commission was free to follow their private views in carrying out the plan this "Technical Commission".

The next item was the question discussed so many times in the history in preparing the Statutes which persons ought to be acknowledged to form the members of the Organization and how their indications should be inserted clearly in the Convention. At the end of the session it was agreed to stop the deliberations for the time being in order to permit the Sub-Commission to study this question before taking binding conclusions regarding the wording of the Draft Convention.

The discussions over the Draft of the Convention were continued 2 days later. In the same session the relevant reports of the Sub-Commissions were discussed.

A query of one of the members which procedure should be followed after the closing of the meeting in notifying the Convention to the governments and for presenting it for adoption was amply answered by the president. He proposed that:

"lorsque le Comité sera mis d'accord sur le texte de la Convention et de ses Annexes, ces textes seront envoyés aux Directeurs de tous les Services météorologiques avec la demande de les soumettre à leurs Gouvernements respectifs. Les Gouvernements feront leurs observations qui seront envoyées à l'OMI par l'intermédiaire des Directeurs respectifs.

Ensuite, un petit organisme au sein de l'OMI, par exemple le Conseil Executif, s'efforcera de classer et de coordonner les diverses observations et de préparer une version de la Commission, susceptible de satisfaire les points de vue de tout le monde.

Cette nouvelle version sera distribuée en vue d'une discussion finale qui aura lieu au cours de la Conférence des Directeurs à Washington. L'OMI demandera aux Gouvernements d'autoriser les Directeurs présents à signer la Convention en leur nom ou à envoyer des représentants officiels (des ambassadeurs etc.) en vue de la signature".

The meeting agreed with this procedure. The final procedure should be fixed later according to the above principle.

After that the last Draft was discussed article after article, firstly the three Chapters and the eighteen articles of the Convention as such, than the "Règlement Général de l'OMI" being a summary of the old Annex B and, as a special part, the "Règlement Général du Secrétariat" (old Annex C). Subsequently "Technical Regulations" proceeding from the old Annex A, were discussed as supplementary document.

Regarding the Convention as such it was decided to change the indication "Regional Commissions" into "Regional Meteorological Associations". In the article regarding the Executive Committee it was mentioned that it should meet every year. A supplementary article said that the official languages should be English, French, Russian and Spanish.

In treating the "Règlement d'Organisation" a vote was necessary about some articles.

As concerned the Executive Committee it was decided after long discussions regarding the "Composition" (Article 13), that the number of Vice-Presidents was reduced from three to two. The President and the Vice-Presidents of the Organization should have the same functions in the Executive Committee and the number of members should be twice that of the Regional Associations namely the Presidents of the Associations or in case of inability to be present their representatives

and an equal number of members elected by ballot. It should be provided that no region had more than one third of the number of members in the Executive Committee.

The deliberations about the above-mentioned "Règlements" gave no rise to discussions of principles besides the indication of the "Section Technique" and its status to the Executive Committee. In a lot of articles of the Convention and in the "General Reglement" may be found many of the paragraphs of the old Statutes.

The end of the conversation was a long deliberation regarding the competences, the composition and the relations of the "Section Technique" to the Secretariat. It was generally agreed that the establishment of such a Section was necessary and 2 proposals were brought forward for discussion. Both concerned the character of its activities, but the second indicated that its members should have the standing of representatives of each of the members of the Executive Committee. Otherwise they should be simple technical experts at the Secretariat with a task to be indicated definitely later on.

There was an opposition against this Russian proposal chiefly on the French side. Nevertheless it was accepted by vote after a very long and vivid discussion. It was to be inserted in the original document in the following form, as adopted in a following meeting:

"Une Section Technique sera établie pour assister le conseil dans l'exécution des travaux mentionnés sous par. 5.1 (1).

Elle sera constituée par un représentant de chacun des membres du Conseil. Elle travaillera en permanence au siège de Secrétariat. Elle n'a pas le droit de prendre des décisions au nom du Conseil."

The last item of the deliberations regarding the Convention was the stepulation of the procedure for further distribution and publication of the present "Paris Draft" and the further activities proceeding from it for the Secretariat. The latest Draft of the Convention was contained in the Annex B of the Committee Report (57). This would be the text that should be presented to Washington as the official Draft for adoption.

By the above decision the Discussion on this item was closed after 10 meetings.

There remained still some items that ought to be treated before the session could be closed. Firstly the definite decision to hold the next Conference of Directors at Washington and the preceding sessions of the Commissions at Toronto. The President was invited by Resolution (58) to make the necessary arrangements for the summer of 1947. The very end was a deliberation regarding the way to form a permanent institution for "Stationary Ships" on the Ocean in view of their immediate usefulness for Synoptic Meteorology as fixed stations on the Atlantic with the same complete programme of observations as the land stations. A call to all countries to take every measure for realizing these plans was the content of the last but one Resolution (60).

The last Resolution (61) was a compilation of the deliberations regarding the relations with the UNO and fixed the standpoint that the IMO would renounce at this moment upon any measures to this end until the information regarding the conditions for affiliation to the UNO were known.

This formed the closing of a very important Committee session. The present Draft of the Convention formed a milestone in the history of international meteorological cooperation. One had to await the reactions from the side of the governments regarding the present Draft and how these were to be inserted in the decisive form of the Convention. This was to be the task of the Conference of Directors in Washington fourteen months later.

#### **4.3. The Conference of Directors in Washington 1947 and the preceding meetings of the Technical Commissions in Toronto**

##### **4.3.1. Introduction**

In the fourteen months' time between the Paris meeting and the Conference of Directors in Washington the Secretariat had to spend much time to prepare the sessions on the other side of the Atlantic. It was in the middle of August 1947 that the large number of members of the new-established Technical Commissions of the IMO were present at Toronto for the Commission meetings convened in that city. For eight out of ten this was the first session.

In the mean time three of the Regional Associations had held meetings, namely in Paris (VI) (60), in Melbourne (V) (61), and in Salisbury (I) (62).

After having met in Toronto for four weeks the company removed to Washington, and on 22<sup>nd</sup> September the Conference of Directors was opened there.

The main points in the agenda of this Conference were the reports of the ten Technical Commissions and of four Regional Associations; the steps for the affiliation of the IMO to the UNO; the relations between the IMO and the ICAO and, the most important, the Composition of the Convention in its decisive form and the signing of this document by the Directors and their representatives.

The total number of Resolutions adopted in Washington was two hundred twenty. Forty-nine were presented by the CSWI, forty-three by the CMM and fourteen by the CIMAé. The first of this last number regarded the "Règlement pour la Protection météorologique pour l'Aéronautique Internationale" adopted in Berlin 1939 (63). This had to be revised in view of the modified situations after the war and after the establishment of the ICAO and its new Section for Meteorology.

The President of the CIMAé could report to the Committee that this work had been successful and that a new document had been prepared under the title of "General Regulations for the Provision of Meteorological Services for International Aviation" (63). It was intended that this document should be adopted by the Meteorological Section of the ICAO and inserted in its prescriptions identically, warranting in this way the most efficient cooperation of the two Organizations.

The President of the CIMAé mentioned the most excellent cooperation with the Meteorological Section of the ICAO. There was a strong tendency for complete cooperation with the IMO and for securing the treatment of meteorological questions generally to the IMO. Therefore it was intended to hold the meetings of the two Commissions simultaneously and at the same places in order to coordinate a close contact between both Commissions.

The report of the President of the CSWI was not optimistic. The new standard form of code which had been so thoroughly discussed at Paris, had not been received with general enthusiasm and so a renewed deliberation of this question was unavoidable. There existed strong divergencies of opinion which threatened to make

it difficult to come to an agreement. It was only two days before the end of the meetings when a change in the form of code could be found that could give general satisfaction for agreement and for unanimous adoption.

In this symbolic form of code the principle of a fixed number of groups had been maintained namely 1° a station index group 2° two groups with non-instrumental observations for the present weather and its evolution followed by 3° a group with the instrumental observations (pressure and temperature etc.). A 5<sup>th</sup> group contained cloud observations, a 6<sup>th</sup>, supplementary one, the barometric tendency and a 7<sup>th</sup> one, inserted twice daily at fixed hours, the precipitation over a 12 hours' interval with minimum resp. maximum temperature of the last day, resp. night. This last group was specially indicated by **7** as the first figure.

Aviation circles urged that some data in the code should be indicated in non-metric units as usual in aviation (winddirection in degrees 00—36, windspeed in knots, heights in feet).

#### 4.3.2. The Preparations for the Draft of the Convention

The deliberations regarding this item started immediately in the first work-meeting of the Conference.

The Draft of the Paris' meeting (Annex B-I) had caused a great many remarks and 4 quite new drafts, were presented respectively by Canada, the United Kingdom, the U.S.A. and France (B-II to B-V). The Secretariat had summed up complete documents regarding the Convention in a long recapitulatory memorandum (B-VI). These documents formed the basis for the following discussions.

The President resumed for the last time as introduction to the discussions the reasons, responsible for changing the historical free status of the IMO to a "World Meteorological Organization" with an officially recognized Convention. Nevertheless the Draft to be prepared should have a meaning different from the signification as ordinarily was recognized in political and legal circles, but able to help the directors in their actions with the governments concerned to implement the resolutions and to get the necessary finances for their accomplishment on behalf of the efficiency of the IMO.

His request to state repeatedly, that a Convention should provide indeed the means desired gave rise to a long discussion, that filled the whole 2<sup>nd</sup> meeting. The deliberations showed clearly the existence of the following main items that should be the directives in preparing the decisive Draft:

1. Retention of the world-wide character of the Organization.
2. Retention of its independence.
3. Retention of professional representation.
4. Direct link with the UNO.
5. Possibility of link with the UNO.
6. No reference to link with the UNO.
7. Retention of the equality of the countries represented and the newly added supplementary directives:
8. Retention of the flexibility of working of the Organization.
9. Promotion of research.
10. Abolition of the International Meteorological Committee.
11. Omission of any mention to languages in the Convention.

These points, settled in this way, ought to be the directives of the "Committee for the Convention" to be established for accomplishing the responsible task of the preparation of the decisive Draft of the Convention in the 3<sup>rd</sup> meeting. These directives were discussed item after item.

After the general discussion of the items 1 to 3 the President exposed once more clearly the meanings for real understanding. The meeting had unanimously declared to agree to their signification before.

In treating the alternatives 4 to 6 regarding the mutual contact with the UNO the first was put aside. By voting between 5 and 6 there showed a majority for 6, in view of the possibility of reconsidering this question in a general discussion of the item 7 of the agenda concerning the "Relation of the IMO to the United Nations".

There were no objections against item 8. There was a general agreement as regards item 9. Regarding item 10 it was suggested to combine the old International Meteorological Committee with the more restricted "Executive Council". This had to be necessarily enlarged, a proposal which was unanimously accepted.

The final item 11 was purely administrative. It was adopted by a vote after a short discussion.

The item 7 was the latest for the deliberations of the procedures as concerned the countries affiliated to the UNO and those not affiliated. In the long discussions the question of principle was raised whether lists should be attached to the Convention of the countries affiliated or not affiliated to the UNO. By a final vote there was a majority for not attaching such lists. In this way the absolute equality of all countries was recognized as leading principle in the Convention.

Having thus formulated the leading ideas the time had come to fulfil the charge of the composition of the Committee of the Convention and to formulate its instructions.

As regards the number of members it was proposed in the fourth meeting to have twelve members representing the different standpoints. The Committee had also to contain representatives of the 6 Associated Regions. Representatives of large and small countries and services had to be included and also those should be represented, who had sent new proposals for the Convention (Annexes B-II to B-VI).

The meeting agreed with the proposed composition of the Committee for the Convention. It was required as soon as possible to nominate the President and to start its activities after being established.

#### **4.3.3. The resolutions of Toronto**

Several hundred resolutions of the Technical Commissions were adopted in the Toronto meetings. The Conference of Directors decided in its first meeting to establish a special "Commission for Coordination of the Resolutions", instructed to control whether they contained equal or contrariant recommendations and, as concerned the first, to combine them in a number as limited as possible and in a form as simply as possible.

This "Coordination Commission" was composed of the Presidents of the Technical Commissions. The Presidents of the Regional Associations would be requested to assist them if necessary. The President of the Conference attended

personally the first meeting. It followed the usual way grouping the resolutions that could be adopted as a whole, into blocs and further by dividing the resolutions into three categories namely those which ought to be "adopted", those which could be "approved of" and those which were only "notified" by the Conference (Annexes K-I, A, B and C).

The work of a decisive edition of the resolution for being adopted by the Congress formed the task of the special "Resolution Drafting Commission". The President of this Commission had to report on its work in the last meetings.

It is not possible to comprise otherwise than in a limited form the reports of the Presidents of the Technical Commissions regarding the deliberations in their meetings in Toronto. So the continuation of this historical summary will in principle be limited to the discussions regarding the Convention.

#### 4.3.4. The decisive Draft of the Convention

The Commission for the composition of the Convention in its decisive form had chosen as its President the President of the Regional Association for the SW Pacific (V) Mr. Warren. In the 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> meetings he reported shortly about the preparatory work for composing a first Draft and the method of proceeding, and announced when this first Draft would be ready for discussion.

In the mean time the Conference considered the reports of the Technical Commissions of the sessions of the Commissions in Toronto. That of the CIMAé (64) initiated a long discussion regarding the collaboration between the IMO and the ICAO after the Paris session of June 1946. A closer cooperation between the Commission and the ICAO by the mutual attendance of representatives at some meetings was discussed. The reports of these representatives were inserted in the Annexes (Annex D-IV). The President of the Council of the ICAO had been found ready to come to Washington for assisting at the deliberation and to prove the earnest willingness of the IMO to collaborate in all questions regarding meteorology. This was expressed in a resolution of the CIMAé meeting in Toronto for fixing the mutual collaboration of the two organizations with the text:

"that meetings of the Commission for Aeronautical Meteorology and the Meteorological Division of the ICAO be held simultaneously and in the same place, in the interest of efficient and economical collaboration in matters related to the provision of meteorological service for civil aviation."

The way of the collaboration was indicated in a later resolution. The President of the CIMAé was authorized to correspond directly with the ICAO and other organizations of civil aviation (e. g. International Air Traffic Association). By these measures the IMO was recognized to be the leading Organization in questions of meteorology.

In view of the treatment of the relations with the UNO it was considered desirable to invite the UNO to send a delegate as a "silent observer" at the discussions in the future meetings, with the instruction to be at hand for giving to the Conference legal and juridical advice in the redaction of the Convention.

In the mean time the period indicated by the Commission for the Convention for preparing its first report had come to an end (11<sup>th</sup> meeting). The President of the Commission reported in a preliminary note introducing the Draft Convention to the Conference, that the major considerations for drawing up the Draft Convention had been

1° that a formal agreement on an international level can only be entered into by sovereign States, thence, only those Services which are Services of sovereign States can engage their Governments in contractual obligations involved,

2° that for Services other than those of sovereign States, any agreement at an international level must be entered upon by their central Governments,

3° that for purposes of a world-wide meteorological organization it is essential that all countries having independent meteorological services should be enabled to join the Organization to participate on an equal footing in the discussions of meteorological matters and to have a vote in its decisions.

These considerations lead inevitably to a requirement of two classes of membership: members legally qualified to conclude agreements at an international level and members, who are not legally qualified to do so. The proposed Draft provided for this unavoidable legal distinction in power by providing, firstly, M e m b e r s, meaning Directors of networks from sovereign States whose countries sign or accede to the Convention, and secondly Associate members, meaning Directors of networks from non-sovereign States, whose mother-countries have to sign or accede to the Convention on their behalf.

With regard to international and political matters, voting must legally be restricted to the members representing sovereign States. In all matters of internal concern, whether administrative or technical, in its Congress or in its Commissions, members and associate members will exercise equal privileges and powers.

Once could legally not escape this distinction if any form of Convention was to be secured. Attendance at the Congress of Directors of non-member Services and individuals by invitation from the competent body of the Organization must be foreseen to. They would be entitled to join the discussions of the Organization, but would not be entitled to vote.

Furthermore the President gave a complete sketch of the form of the Convention with the bodies of the WMO. It followed in principle the old Statutes of the IMO. The Secretariat had been instituted as the central agency of the Organization. The Draft might be varied in wording or detail but the basic principles upon which it had been founded, must be sustained. The document to be prepared now could meet the desires expressed by the Conference closely, and therefore the conditions mentioned before were slightly modified, as indicated by underlinings.

- 1° the retention of the world-wide character of the Organization;
- 2° the retention of m a x i m u m independence;
- 3° the retention of professional representation as d i s t i n c t from political;
- 4° the retention of equality of nations and in the Congress equality of rights for M e m b e r s and A s s o c i a t e M e m b e r s;
- 5° retention of flexibility of working as between the M e t e o r o l o g i c a l S e r v i c e s and the O r g a n i z a t i o n;
- 6° the possibility of linkage with the UNO as a s p e c i a l agency.

After this long and clear introduction the discussions could be opened, but the President said that the amendments proposed might be limited to essential matters rather than to matters of detail.

The parts I and II regarding the creation of a "World Meteorological Organization" and indicating its aims were agreed to by the Conference. There was a great divergence of opinions regarding the two kinds of members and the separation of Members and Associate Members. This was not in agreement to the world-wide character of the Organization because it opened the possibility of excluding a meteorological service from the activities of the Organization for other than meteorological reasons. There proved to exist an opposition towards the proposed Draft mainly by this dividing of the members into first class and second class members and by inserting them in the two lists I and II to be annexed. But this last regulation was absolutely based on "legal requirements", and was necessary according to persons competent in juridical international affairs in view of the possibility of recognizing the IMO by the UNO as containing members representing sovereign states.

The part III was adopted provisionally with a slightly amended text in Article 3 (a).

The battle was not yet over. An agreement concerning the inferior indication "Associate Members" had been reached soon. Peace was restored by a concise indication in Article 4 (a) concerning the procedure to be followed for admission as "Associate Member". This closed the deliberations regarding this delicate matter.

The eligibility to professional functions in the Organization was an internal question in the WMO but it should be clearly expressed that the members elected for functions in the respective bureaus of the Organizations, should exercise these functions as members and not as private persons.

The following discussions regarded principally internal regulations (voting, composition of bureaus). It was decided that the extension of the Executive Committee after the dissolving of the International Meteorological Committee should be:

- a. the President of the Executive Committee newly established,
- b. 2 Vice-Presidents,
- c. 6 members elected by ballot,
- d. 6 Presidents of the Associated Regions, with the limitation:

"provided that no Region has more than one third of the members on the Executive Council including the Presidents and the Vice-Presidents of the Organisation."

There was a long discussion concerning the question whether "Associate Members" could be elected as members of the Executive Council. Some of the associate members represented territories that are meteorologically important and should not be deprived from the right to be heard in important questions. Important networks should not be excluded automatically from being represented. In order to be consistent with the view that there should be the widest possible representation on any international Organization provision must be made therefore for the representation of Associate Members in deliberations. Full use should be made by provisions in the Convention for securing the services of directors with outstanding knowledge, experience and ability, representing territories that are included in the Organization as Associate Members.

The Convention Commission should find an answer to the problems that had been raised in the last meetings. The President proposed, that the Draft should be returned to the Convention Commission for re-examination of the points raised

during the discussions on the Draft, in order to make available a revised version incorporating the decisions taken so far. There should be an interruption of the deliberations for incorporating the amendments agreed upon just now, and to try to find ways to remove existing difficulties. Untouched portions of the Draft Convention should await the Commissions' revision.

During this interruption four meetings were devoted to the reports of the Presidents of several Commissions. The deliberations regarding the Draft Convention were re-opened in the seventeenth meeting with a explanation of the President of the Convention Commission of the way to bring the articles in accordance with the decisions taken and to compose a "Second Draft".

He closed his report with a very valuable communication. The question of the "Members" and "Associate Members" had been discussed with a representative of the UN. Out of these discussions arose the clear fact that there is no reason why there should be a distinction in title of Members of the Organization. It should be quite practicable to class as "Members", subject to the reservation on legal aspects of power on the international level, which showed sufficiently the difference to "those who are Members representing sovereign States". So, when the Conference, having already agreed to the division into "Members" and "Associate Members", prefers to revert to a position in which all shall be "Members", the documents could be provided within a short time.

It appeared that there was no legal difficulty to adopt the suggestions coming from the elder members that everybody should be called "Member", but that the rights of contracting members should be stated differently than those of other members. The Annex B—IX could be amended accordingly without serious difficulties. The President suggested to consider later whether it should be necessary to change the nomenclatures from "Members and Associate Members" to "Members" and to start now the discussion on certain points which were still open.

There was a long political discussion regarding the new text of the Article 3 (a) in the Convention which regarded the membership, and the composition of the lists I and II of the affiliated States to be annexed to the Convention. It was the position of Spain that caused the difficulty and also Russia was interested because of the number of 17 Sowjet-Republics. For the time being the list II was adopted preliminary in an amended form; the final discussion was postponed to a later meeting.

The parts V, VI and VII and the articles 7—18, all regarding internal regulations and announcements, did not give rise to difficult discussions neither Part VIII Art. 20 dealing with the Regional Associations and regarding the Technical Commissions and the admission of individual persons as "technical experts" as members of the Commissions, as had always been done and as wanted generally in future. This should be inserted in the Convention by a slight amendment of paragraph (a).

The question of the membership came back in the 19<sup>th</sup> meeting and gave rise to animated deliberations concerning elimination of the term "Associate Members". There was a majority for deleting the term "Associate Members". It was the representative of the U.S.A. Dr. Reichelderfer who resumed the pros and cons of operating under a Convention or under the existing IMO Statutes and consequences of the proposal to omit the term Associate Members and generally "whether we do

or do not proceed with the Draft Convention". He pleaded strongly and urgently for the adoption of the Convention and the affiliation with the UNO in the early future which should be unavoidable. He mentioned the difficulties that might exist in affiliation to the U.N. which ought to be on the same footing as other international Organization all with a Convention. The affiliation including the recognition as "Specialized Agency" gave definite advantages exclusively for these Organization. The "royal way" to affiliation ought to be followed.

This formal and enthusiastic speech made deep impression on both sides. Now the burning question was raised:

Do we really want the Convention? and  
how should the text be formulated in order to give to the Organization its official status?

In recapitulating Dr. Reichelderfer said that he strongly supported adoption of a new Convention and affiliation to the UNO in an early future.

Postponing was not permitted. A short interval was given to resume the discussions of the members after lunch.

History repeats itself. The present discussion reminds of that in Munich 1891 when the official status was abandoned, and of the objections of the elder generation in the years 1929 to 1935 at the rising ideas of a transfer of the Organization from a status of "chrétiens mais pas baptisés" to an officially recognized status.

Now the President put at the beginning of the twentieth meeting, in order to elucidate the positions, the definite questions:

Question 1: "Does the Conference desire:

- a) to drop the Convention completely and finally or
- b) to continue with a view to completing a revised text of a possible Convention on a basis of Annex B—IX."

After the impressive philippica of the member for the U.S.A. the voice of the President did remind to that of the President of the International Polar Year 1932—1933. Dr. la Cour in the meetings at Innsbruck and Locarno 1931 for turning away the growing menace to stop the preparations of this enterprise because of the deteriorations of the world economy. The above mentioned questions were followed by a second one namely

Question 2: "If the decision is in favour of 1 (b):

Should the Conference endeavour to get the text of the revised Draft agreed upon in this Conference in Washington?

If the answer to question 2 is "yes", then we can consider:

- a) whether the Convention is to be signed,
- b) when it is to be signed.

The latter question could be left until we have seen the text in a revised form."

These considerations prove that the patience of the President had come to an end. The question was put to the point, "continue or stop". A vote showed that the reply to question 1 (b) was unambiguously affirmative and also that to 2, so that the work could be continued. The changes in the text caused by the

decision to omit the term "Associate Members" should be left to the Convention Commission. One of these changes ought to be the combination of the Articles 3 and 4 in Part III into one single Article 3.

The deliberations were temporarily interrupted now until a new revised Draft could be presented for discussion. In the mean time the long and extensive report of the President of the CSWI in Toronto was discussed\*).

One day later, in the 21<sup>th</sup> meeting, the third Draft was ready for discussion. The President of the Convention Commission gave an extensive introduction in the first instance for the new Part III article 3 concerning the position of the Members. The Convention Commission had now decided to resubmit for the Conferences' consideration a Convention, at which the original membership was confined to States which were represented at this Conference in Washington. The revised Draft defined the difference in the powers and the rights of the Members who represented sovereign States, and those who represented territories maintaining individual meteorological services. A complete list of those countries, which were at present members of the IMO, should be inserted in a "Final Act". Forty states were represented at the Conference by their Directors. Twenty states were not attending, of which 12 were in the UN and therefore eligible for legal entry. For the remaining 8, being non-members of the UN and not represented by their respective Directors the door must be left open.

After these introductory notes the President suggested, that the Members should now be asked to communicate this Draft Convention, as embodied in Annex B—XII, to their respective governments through the appropriate channels. Furthermore, delegates should seek instructions from their governments as to whether their governments were prepared to accept the Convention on the basis of Annex B—XII so that, when the Conference finally considered the acceptance of the Convention, be acquainted with the desires of their governments, and whether, in the event of this Convention being adopted by this Conference by a substantial majority, they were authorized to sign this document.

It lasted to the last part of the 26<sup>th</sup> meeting before the Conference turned to the examination of the revised Draft Convention, contained in Annex B—XII. The deliberations were continued in the 27<sup>th</sup> meeting. At the end a supplementary document (Annex B—XIII) was presented with the resolutions relating to the arrangements which were proposed for the activities of the WMO after the Convention should have come into force. This should be after the dissolving of the IMO and at the appropriate stage, for the International Meteorology during the periods when both the IMO and the WMO were in existence. To define those arrangements four resolutions appeared to be necessary for embodiment in the Final Act as given in Annex B—XIII.

This was in fact the end of the drama. The questions still brought forward were of a political character. Now the Credentials Commissions, which had been appointed a few days ago, collected the declarations of agreement of the governments and the authorizations to their representatives to sign the Convention after the adoption by the Conference. Versions in French and English should be produced in time for signature in two days. The original documents should be deposited in the archives of the United States.

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\*) see (64) pp. 491 sqq.

In the 30<sup>th</sup> meeting the communication could be made that the Secretariat had finished the preparation of the Convention in the decisive form for engrossing and that the engrossed copies would shortly be available for signature. At this last revision each word had been weighed on a gold scale. All things could be arranged now for signing the complementary document: the Final Act in which in four resolutions the procedures had been mentioned for the interim epoch when the Convention should be in force and the IMO had to transmit its functions to the WMO. That the convening of the first Congress of the WMO still had to be effectuated by the President of the IMC was mentioned in the Convention itself in Part IV Art. 12. During this interval both functioning parties the IMC and the Executive Committee should remain in their respective functions. For this reason a new IMC was elected with twenty five members\*).

In the urgent needs of the Secretariat for extension of its finances under the actual conditions it was arranged to double for the year 1947 the amounts of the contributions as enumerated in the list of Salzburg 1937 and to enlarge it 3-fold for the coming year, beginning 1 July 1948. For limiting the high expenses for printing the reports it was agreed that the documents of Toronto and Washington should be printed in one single language with the exception of the resolutions, which should be reproduced in English and French.

After having ruled these internal regulations and decisions came at last the deciding moment of the formal adoption the Draft for the "World Meteorological Convention" as a whole could be formally adopted. The result of a vote showed 31 of votes for and 0 against. USSR abstained from voting because while there were many parts of the Convention which were satisfactory to the Sovjet Delegation she had voted against membership on the Executive Committee of others than Members of the UN, and also against the provisions concerning membership in the Organization.

There remained still one difficulty namely the membership of Spain, the country which at that time also had to be excluded from the WMO, owing to the exclusion from the membership of the U.N. under the actual governmental status. A purely political matter, which was solved by adding at the end of the resolution the words:

"until such time as the said Resolution shall be abrogated or cease to be applicable."

The position of Spain should be stated in a supplementary document to be signed together with the Convention.

The President emphasized for the last time, that the Conference should not have binding power until the governments had ratified it. The arrangements for signing by the not represented States were laid down in the Convention, being open for 120 days after the date on which it should have been open for signature (Part XX article 35). Those who had not yet signed should, when authorized, be able to sign it within that period during which the documents would be at the main Department of the State Building at 21<sup>st</sup> and Virginia Avenue, N.W., Washington D.C.

#### 4.3.5. The signature of the Convention

The signing was undertaken on October 11<sup>th</sup> 1947, the date of the 31<sup>st</sup> meeting of the Conference. In this last meeting the historical moment took place of signing the three documents:

\*) see Appendix IV a.

of the Convention of the World Meteorological Organization, of the Final Act and of the Protocol relating to Spain.

The first was signed by 31, the second by 42 and the third by 22 members in alphabetical order of the States.

In this last meeting of the Conference there remained still some formal matters; election of Presidents and members of some newly established Commissions (Radio-Electric-Meteorology, Polar Meteorology), Reports of Commission which were not fully finished (Sub-Committee on Index Numbers), a splitting up of the CSWI, and a reorganization of CSWI Sub-Commission T (for Transmission of Weather Information). Before closing the Conference it had to be decided which would be the single language for printing the report. There was a preference for English. For the Convention the four languages French, English, Russian and Spanish should be the official languages.

The signing of the Convention was a solemn closing of the 12<sup>th</sup> Conference of Directors of the IMO. The President summarized in a long speech the results obtained in those often difficult gatherings. This Conference had been a mile-stone in the history of the International Meteorological Organization. Thanks to the everlasting spirit of cooperation in all sometimes serious diversions of opinions the meetings had been always led to the decision for fructual application of meteorology for the daily life of mankind.

Before the session was closed the President was thanked from all sides for the patient und wise leadership in order to neutralize opposite standpoints. In many cases it had been necessary to abstain from certain advantages for obtaining others.

After this ceremony the present members of the newly elected International Meteorological Committee came together for a short session, at present still under the old Statutes. Sir Nelson Johnson was elected as President and Dr. Reichelderfer, Dr. Hesselberg and M. Viaut as Vice-Presidents after a second ballot.

After that a new Executive Committee ought to be elected. Three members were elected as result of a secret ballot out of eight candidates proposed. This did not give a sufficient representation of the Associated Regions and as the old Statutes were not against extending the number of members another three were elected. This led already to a composition as had been indicated in the Convention (Part VII article 13).

With these two governing bodies the IMO started the last epoch of its life.

#### **4.4. The End of the International Meteorological Organization**

The Extraordinary Conference of Directors in Paris 1951 (65)

The interim period during which the old International Meteorological Organization maintained its activities lasted three and a half years.

On March 23<sup>th</sup> 1950 the Convention of the World Meteorological Organization came into force. After having notified the Convention generally, the President of the Committee convened a last Conference of Directors as an Extraordinary Con-

ference with the object of taking the necessary steps for transferring to the WMO the function, the activities, the assets and the liabilities of the IMO. The last task being the dissolution of the old Organization.

This session was held on March 15<sup>th</sup> in Paris. It was attended by representatives of 50 countries and by the international organizations: UNO, ICAO and UNESCO. During the interim period the time had been spent in the regulation of the means and forms for the execution of a number of resolutions and recommendations of Washington and Toronto by the Organization and the Technical Commissions under supervision of the IMC and the Executive Committee nominated in 1947 (e.g. new codes, proposals arising from joint meetings of the CIMAé and the MET Division of the ICAO).

It was intended, that the Extraordinary Conference of Directors should last 3 days. It should come to an end with the dissolution of the old IMO and by handing on the torch to the new Organization to maintain and foster it. Immediately after this transfer the new WMO should start its task by a first Congress under the rules of the Convention.

In order that WMO should not inherit from IMO any resolutions to be rescinded, a considerable number of IMO Resolutions was cancelled which, though out of date and no longer necessary, were still in force.

The invitations were sent out by the French Government. The President of the last International Meteorological Committee should be in the chair in both sessions. A set of special rules of procedures were prepared for this Extraordinary Conference of Directors. These were adopted in the first meeting of March 15<sup>th</sup> 1951. There were five meetings.

The Conference was opened by the French Minister of Public Works. After that the President summed up in an extended report the activities of the IMO during the interim years. There had been a period during which the Washington Resolutions had been introduced and consolidated and also for taking the steps to prepare the way for transferring the functions of the "International Meteorological Organization" to the "World Meteorological Organization". Besides this period had shown a very large increase in the active collaboration of the IMO with other international organizations.

In the 3<sup>1/2</sup> years after Washington the number of members of the International Meteorological Committee had diminished to 15 by the resignation as director or decease of members. The Executive Committee had held four sessions. A Working Party had spent in October 1949 three weeks in London for drafting the fundamental documents required for the effective functioning of the WMO. In the last months the Executive Committee lost four of its members. In view of the forth coming Conference of Directors the vacancies were left open for the time being.

This time of repose could be compared with that of the years after the Conference of Directors of Copenhagen 1929 after the time of stormy development in the decennium after the first world war. Equally a quite new status had to be prepared with newly extended applications of meteorology and their adaptations to quite new and greatly increased exigences after the experiences of the years of war.

This related especially to aviation. A much more intensified cooperation with the so enormously extended civil aviation was necessary. The germ, that had been laid in the years before 1929, should be brought to full development actually.

A formal request was submitted to the U.N. asking that the IMO should be recognized as the preparatory body for the WMO. The U.N. agreed to this request and invited the IMO to participate in its activities to a much larger degree than otherwise should have been the case.

Recently the ICAO had raised the question of securing a more effective coordination of the activities of the IMO and ICAO. There had not been time to study this question fully, but it would be one which the WMO should have to examine.

The IMO had carried on its functions since the entering into force of the WMO Convention. The question of an agreement between the U.N. and the WMO as provided for in Article 25 of the Convention which occupied an important place on the agenda for the forthcoming First Congress of the WMO.

The report of the President was followed by a long report of the Chief of the Secretariat.

The regulations for the transfer to the WMO were contained in 4 draft resolutions submitted to the Conference by the Executive Committee. They formed the content of an Annex D-I with Appendices. The agenda was composed of 11 items, the number of documents sent in for discussion amounted to 27.

The new standard codes and forms of code symbols for the exchange of weather reports over the whole globe were generally applied on January 1<sup>st</sup> 1949.

There had been no sessions of the Technical Commissions with the exception of the CIMAé in Paris (66) in February-March 1950 which met for five weeks together with the MET-Division of the ICAO and other organizations for civil aviation. A big volume had been composed containing all regulations for the organization of civil aviation, based on the work done before the war in the International Aeronautical Conferences, which had been held periodically from 1919 to 1939, and which were inserted a great many times in the above mentioned "Règlement" (63) etc. of Berlin 1939.

On the other hand five of the six Regional Associations (66a) had held meetings. There had been changes in their Presidencies. The reports of the Presidents of Regional Associations and of the Technical Commissions and Recommendations submitted by these Commissions formed the items 6 and 7 of the agenda. The above mentioned cancellation of IMO Resolutions was item 8.

There was also report of a Commission established at Washington for the final liquidation of the Second International Polar Year 1932—1933 (Annex B-XII). This will be mentioned later. 44 States and 20 Territories, in total 64 should be acceded to the membership of the WMO according to the conditions of acceding of the WMO to the U.N.O. as indicated in Part XII Article 25 of the Convention. The form of acceding should be as was mentioned in the Annex C-I of the Washington Report.

The report of the Chief of the Secretariat mentioned the large quantity of work caused by the preparation of the coming change. The size of the last publications had enlarged considerably the care for editing them, and the financial burden involved. It had been necessary to extend considerably the ordinary personal from 3 or 4 in wartime to 15 on June 30<sup>th</sup> 1947 and 24 on 1<sup>st</sup> March 1951, 15 of them were engaged on a permanent basis.

The State Department at Washington had provided authentic copies of the Convention in French and English. Translations into Spanish and Russian would be provided by the Meteorological Services of Argentina and of the URRS. It was to be foreseen that the four texts of the Convention could be published in printed forms. The Bureau at Washington informed the Secretariat continuously about new signings of the Convention.

The first meeting only dealt with the formal items of the agenda. In the second and the third the reports of the Regional Associations were read and discussed (Annexes A-I to A-VI) and also those of the Technical Commissions Annexes B-I to B-XII). They did not give rise to technical debates, excluding a report concerning a correspondence of the President of the International Meteorological Committee with the President of the "Polar Commission", established in Washington, who had been nominated in that function in his absence. This new President, Dr. Sverdrup (Oslo), advised in his correspondence to reject this decision and dissolve this Commission again as there was insufficient reason for an individual body for this purpose.

The meeting agreed with this standpoint and adopted a corresponding resolution (23).

#### 4.4.1. The liquidation of the International Polar Year 1932—1933

After the war 1939—1945 a small Commission was established in November 1946 to consider what should be done for the completion of the results of the Polar Year 1932—1933. It presented a report to the Congress at Washington in 1947 and this led to the establishment of a "Temporary Commission on the liquidation of the Polar Year 1932—1933".

This Commission established a Central Office at Copenhagen under the supervision of the Danish Meteorological Office to be conducted by Dr. Laursen, one of the most active collaborators of the late Dr. la Cour, the enthusiastic President of the second Polar Year 1932—1933.

This Temporary Commission met in Oslo in August 1948. The President of the IMC attended this session. Dr. Laursen reported on the programme of the work still to be carried out. He was of the opinion that he could elaborate the working plan in 3 years.

For the activity of the Commission see Appendix C.

A financial report with 1° accounts for the whole liquidation period until January 31<sup>st</sup> 1951, 2° a statement concerning the balance taken over from the International Polar Year Commission and 3° a summary of payments and firm commitments as compared with the preliminary budget of November 1948 was added to the report. The list of firm commitments showed, that a sum of a little less than 2.000 \$ available now for return to the Rockefeller Foundation.

#### 4.4.2. The cancellation of superseded IMO Resolutions

The last item 8 of the meetings of the second day was the cancellation of the number of the old resolutions of the IMO. The resolutions 29 contained a list of them. The Conference had no objections and agreed.

#### 4.4.3. The transition from IMO to WMO

The meetings of the third day were of the greatest importance for the history of international meteorology. In the morning meeting the important item of the agenda was discussed:

“Transfer to the World Meteorological Organization of functions, resources and obligations of the International Meteorological Organization.”

Drafts of the resolutions regulating the questions involved relating to the Secretariat and to internal questions had been mentioned in the four memoranda D-I to D-IV.

All questions concerned were considered point to point in the meetings and finally a long and exact resolution was containing in a number of paragraphs the conditions for the transfer regarding the Secretariat in order to enable this Bureau to fulfil its instructions and duties on the basis described in the Convention.

In the last paragraph the Chief of the Secretariat was instructed\*):

(a): “to transmit to the President of the World Meteorological Organization an audited statement of the financial assets and liabilities of the IMO as at the date referred to on paragraph (c) of this Resolution on condition that the transfer shall not involve any additional assessment on Members of the World Meteorological Organization other than contributions.”

A preliminary list per March 1<sup>st</sup> 1951 was annexed in Annex D-V to the Conference Report.

#### 4.4.4. The closing of the Conference

After the adoption of this resolution the agenda had been finished and the President was in a position to close the Conference. His closing speech was not long. He reminded still of some historical items, that had always been characteristic for the Organization, namely the universal membership, the efficiency of its economy and the spirit of fellowship and the goodwill which had always manifested itself within the Organization. He declared to hope that these characteristics would continue in the new Organization and exclaimed the historical words:

“We say good bye to the IMO with affection but no regret, and we go forward with confidence in the WMO to try to apply the service of meteorology more fully to the service of mankind. Gentlemen: the old IMO is dying, long live the WMO.”

#### 5. Postscript

This was the end of the governing body which had ruled internationally the meteorology during three quarters of a century in an honourable way.

The resigning President of the IMO had fulfilled the instructions given to him in Article 12 of the Convention by convening the first session of the Congress of the WMO immediately after the meeting of the last Conference of Directors of the IMO in Paris. So this first Congress met on the date of March 19<sup>th</sup> 1951 in accordance with the regulations mentioned in the Convention.

\*) see (65) p. 71—75.

Herewith ended at the same time the history of the International Meteorological Committee established in Rome in April 1879 as successor to the Permanent Committee of 6 members, that had been nominated in Vienna 6 years before to prepare the "First Directors Conference" with official status. It was this Committee that had drafted the first Statutes of the International Meteorological Organization in 1878 in Utrecht, that had been adopted in Rome one year later.

Now, after 72 years of activity the Committee should transfer its powers to the Executive Committee. It was established in 1929 as a small committee with the only task to direct the newly established Secretariat in De Bilt, and had become the regulating body in the composition ordered in Article 13 of the Convention.

The decision to nominate a "Technical Section" in order to assist the Committee in its work as had been arranged in the meeting of the IMC in Paris in 1949 has not come to execution. The establishment of this Committee became superfluous in view of the absolute reorganization of the Secretariat.

A report regarding the first Congress of the new World Meteorological Organization belongs no more to the description of the history of the old International Meteorological Organization.

The IMO had transferred the torch to the new World-Organization not as a decrepit old man but as a busy man ripe in experience to hold it burning in a long future.

## Appendices

### General introduction to the Appendices A—Q

The outbreak of hostilities in Europe in August 1914 automatically stopped the work of the International Meteorological Organization. The first Extraordinary Congress of Directors in Paris October 1919 (38) was convened with the aim of restoring the old collaboration of Meteorological Services all over the world.

An agenda of ten items was prepared, closing with the tenth

“Nomination of the commissions to continue scientific investigations”.

The first task of the meeting was to prepare a scheme for the interchange of weather reports by WT with new codes and forms of code to replace the pre-war weather telegrams by wire. A directive had already been prepared by a meeting of fifteen officers of the navies and armies of the Allied Forces held at Paris in May 1919. This meeting had succeeded in drawing up a scheme of weather reports for aviation to be issued by WT on behalf of the regular air traffic in Europe. The scheme arranged for collective messages of large regions with codes especially adapted to the needs of air traffic to be issued four times daily at fixed hours with six hours intervals.

The discussions of the Congress led to a decision to reestablish the pre-war Commissions for Weather Telegraphy, for Maritime Meteorology and thirdly to institute a “Commission for the Application of Meteorology to Aerial Navigation”. The three commissions met preliminarily as sub-commissions ad hoc. The reports of these meetings (Annexes II, III, IV of [38]) caused them to be established as permanent commissions of the IMO with staffs and members as mentioned in Annex V of (38).

This Annex V mentions a number of nine commissions. The remaining six were re-establishments of pre-war commissions instituted in the meetings of the Committee in the years before 1914.

## Appendix A

### The Commission for Synoptic Weather Information

#### Introduction

The "Commission for Weather Telegraphy", which was re-instituted in Paris in 1907, had held meetings in 1909 and 1912. At its re-institution in 1919 sixteen members were appointed and Col. E. Gold (London) was nominated as President. During the session at Utrecht (1923), the Commission resolved to change its name to "Commission for Synoptic Weather Information".

Col. Gold remained in the chair during the whole period between the two world-wars and after the second up to 1947. He created two permanent sub-commissions, one for the drafting of new codes (C) and one the organizing of a scheme for radiotransmissions of weather reports (T) and later on a Joint Sub-Commission with the Commission for Maritime Meteorology called Sub-Commission for Radiometeorology at the Oceans. He himself led the first as its president, at the second Dr. R. Bureau (French) took the chair, at the third Gen. E. Delcambre (Paris).

The number of members on the Commissions was enlarged to fifty-nine in 1929 and eighty in 1937. The Commission collaborated with the other commissions of the IMO (Maritime Meteorology, Study of Clouds, Climatology). It held nine meetings in the period 1919—1940. It was represented by delegations at the World-Radiotelegraphic Conferences at Washington 1927, Madrid 1932 and Cairo 1938.

In 1937 the work of the Commission was divided up into eleven sub-commissions for different questions in joint meetings with other commissions.

The Extraordinary Conference of Directors in London after the war in 1946 re-established the Commission with a restricted number of members (61). In the period 1946—1951 the Commission met twice, in Paris in 1946 and in Toronto in 1947. At this last meeting Col. Gold resigned from the presidency. The Commission nominated Col. Gold as Honorary President and elected as new president Mr. I. R. Tannehill (Washington).

During an activity of 28 years the Commission had met in eleven sessions. On leaving the President of the International Meteorological Committee reviewed in a long speech the extraordinarily valuable work accomplished by Col. Gold and his nearest collaborators Dr. T. Bergeron, Dr. T. Hesselberg, Dr. R. Bureau, Gen. E. Delcambre and others on behalf of the organization of synoptic meteorology everywhere on the globe.

#### The first post-war session at London 1920 (67)

The President of the International Commission for Weather Telegraphy convened the members for a meeting in London in November 1920.

Before the discussions on the nine items of the agenda were opened some difficulties had been emphasized concerning the States of Central-Europe which

were excluded from attending the Conferences of Directors. The deliberation of this very important question led to the decision which was generally agreed (68):

"That the decisions of this present meeting should be communicated to those various countries and that before any subsequent meeting of the Commission, papers and agenda should be forwarded to the Directors of their Meteorological Services in order that they might have the opportunity of furnishing their observations upon the proposals before the Commission met."

Concerning the decisions of the Conference of Directors in Paris a year ago it was noted:

"that the Commissions should regard the decisions of the Paris meeting as a guide in formulating their decisions at the meeting, but that they should not be expressly bound by them".

The items of the agenda mainly concerned practical questions. The items 3, 4 and 5 mentioned discussions respectively:

- 1° concerning extending the old forms of codes with new codes for a number of elements that could not be given in the old messages or not sufficiently,
- 2° concerning the organization of wireless weather reports for international exchange and information and
- 3° for the organization of information to aircraft in flight with radio telegraphy and radio telephony.

The President reminded the members in his opening address of the history of the old codes and the symbolic form of code drafted by the Permanent Committee in the year 1874 at Utrecht and adopted for general use in Rome 1879 (11). Notwithstanding proposals for modification in the years 1891 and 1896 the codes for telegraphic exchange had remained unchanged for 40 years but in 1913 the codes were extended by adding in a special group the barometric tendency (cbb).

The present proposals to be considered actually aimed at extending the information in the weather reports by new codes and to apply the information to the needs of shipping and aviation. This might be done by reducing the barometric pressure BBB to BB and the temperature TTT to TT (whole millimeters and whole degrees centigrade) and substituting the wet bulb temperature T<sup>1</sup>T<sup>1</sup>T<sup>1</sup> by a single figure for relative humidity in order to make room for reports regarding the amount of clouds distinguishing between upper and lower cloud and reserving a figure for the direction of motion of the upper cloud and, most important of all, to indicate the present weather with a 2-figure-code ww.

Suggestions for codes for indicating the cloud forms and their motions and for the code ww were made by the Swiss member De Quervain.

The different proposals received from different sides had formed the programme for discussing by sub-commission for Weather Telegraphy of the Extraordinary Conference of Directors at Paris.

The following decisions were taken as regards the symbolic form of the code for the exchange of weather telegrams:

- 1° that the first group should be maintained unchanged BBBDD,
- 2° that in the second group (FWTTC) the figure C for the amount of clouds or the indication of the weather should be replaced by the indication of the present weather by a 2-figure-code and that it should have the form FwwTT,

3° that the third group should contain the barometric tendency in the last three hours cbb and that the latter two figures should indicate either the precipitation RR of the last twelve hours at 7 and 18 hours or an indication WW of the past weather at 1 and 13 hours,

4° the last (fourth group) MMmmSea should remain unchanged for national purposes.

As regards the arrangements for the distribution of reports by WT it was agreed to be desirable that the issue of reports by different nations should be made from stations with a range of not less than 1500 kilometers. The number of stations from which reports should be issued was than considered and a list prepared. The task to consider the draft for a plan for the organization of the transmission of reports by radio telegraphy was given to a sub-commission with Gen. Delcambre in the chair (70). This sub-commission presented a report to the main commission which was adopted with slight amendment. It contained the general directives and a scheme for a collective European issue to begin on January 1<sup>st</sup> 1922 at the same time as the introduction of the new codes.

It was necessary to arrange joint meetings with the Commission for Meteorology for Aerial Navigation and that of Maritime Meteorology for discussing the new codes and scales and forms of codes for ships at sea and for aviation which formed altogether a new system of synoptic meteorology.

It was clearly proved that the war had changed world conditions entirely. The supremacy was now in the hands of the Allied Forces and it was for them and the neutrals to take the initiatives for the application of quite new techniques which had been developed during the war.

The President mentioned in his report to the session of the International Meteorological Committee at London 1921 (41) that the meeting of the Commission in 1921 had made some minor alterations in the specification of scales (71) so that the standard form of reports was now changed to the symbolic form:

BBDD FwTT cbWVH ALaNh,

that certain selected stations should report the direction of motion and relative speed of the clouds

C<sub>1</sub>ddVV,

that the symbolic form of reports of upper wind should be

h<sub>1</sub>ddvv

and that the symbolic form of the reports of upper air temperature and humidity should be

BBTTH.

As regards reports from ships at sea the codes to be used for reports from ships it was agreed by the Commission for Maritime Meteorology to be

PQLL lllGG BBDF wwVk'd CNTTd<sub>s</sub> Wr<sub>tt</sub>K<sup>1</sup> (Fahrenheit)  
CNTT Wr<sub>tt</sub> (Centigrade)

The discussions in this first post-war session in 1920 in London were long because of the extension of the weather-reports with a number of non-instrumental observations, for which no codes and scales existed namely

horizontal visibility, indicated as V (1-figure code)  
height of the lower clouds, indicated as h (1-figure code)  
the present weather, indicated as ww (2-figure code)

the past weather

(since the latest observation), indicated as W (1-figure code)  
the predominating low and high cloud, indicated as A and a (1-figure codes).

Besides it was necessary to construct a special one-figure code for indicating the sort of cloud  $C_1C_2$  in additional groups giving direction (dd) and speed (vv) of clouds at various heights ( $C_1ddvv$ ) ( $C_2ddvv$ ).

The presence of clouds in the sky should be reported by a special new group of the form:

ALaNh

in which L and N indicated the amounts of the clouds of forms A and a, and h the height of the lowest clouds.

#### The fourth (second post-war) session at London 1921

The session of the next year, September 1921, preceded immediately the Committee meeting in London.

The principal aim of this session was, in collaboration with the Commission for Maritime Meteorology and that for the Application of Meteorology for Aviation, to draft a homogeneous set of symbolic forms of codes for use in ships at sea and for stations on air routes.

The Commission for the Application of Meteorology to Aerial Navigation had drafted an entirely new form of code for hourly messages without instrument-readings adapted for simple observers at stations on the air routes without instrumental equipment. This form of code contained three groups and could be supplemented by the ordinary instrumental groups of the code for synoptic stations. This new form of code was:

$I_n I_n (V_s)$  wwVhL NDDFW ( $C_a$  ddF<sub>1</sub>S)

(InIn = station index,  $C_a$  form of cloud to which ddF<sub>1</sub> refer).

For the 3-hourly or 6-hourly reports the stations equipped with instruments had to use the form of code

$I_n I_n (V_s)$  BBBDD FwwTT cbWVH ALaNh  $C_a$  ddF<sub>1</sub>S.  
( $V_s$  = visibility at sea).

The suggested new codes and forms of code had been introduced already into English weather reports for aviation on August 2<sup>nd</sup> 1920. They were decoded at the main aerodromes and published with several individual systems at fixed points on the routes e.g. with figures and letters laid out on platforms as "ground signals" (signes au sol) for information of passing planes. They were in use regionally for the growing air traffic between England, France and Belgium (72). For their universal introduction in the IMO the general approval of the International Meteorological Organization had to be awaited.

The Commission for Maritime Meteorology had not been able to reach unanimity regarding a form of code for weather reports whether a form of code with two position groups and the first two groups of the code for land stations, or a quite new form of code with a check figure at the end of each individual group — a proposal from English side — would be preferable. As opinions appeared to differ considerably as to the desirability of check figures a decision had to be postponed to a following session after the opinion of the various Directors had been asked.

The Sub-Commission on the Organization of the transmission of reports by radio telegraphy had now drafted a decisive scheme for the successive order of the radio weather reports beginning at H + 30 and ending at H + 180, H being the hour of observation 1, 7, 13 or 18 GMT (73). After that a collective report would be issued by the Eiffel Tower giving a summary of the observations from Europe composed of a certain number of stations for each country. 30 groups would be added for the United States and 20 for Canada and Greenland besides ships from the Western Atlantic. The form of code for these messages would be

BBDDF  $w_1$ TTK<sup>1</sup>R for the observation at 0700 GMT.

BBDDF  $w_1$ TTK<sup>1</sup>W for the observations at other hours

in which K<sup>1</sup> = the single figure indicating the manner in which the barometer is changing

$w_1$  = the initial figure of the present weathercode ww, indicating the general state of the weather

R = the rainfall in the last 24 hours.

These last reports were intended to be heard by ships at sea and isolated stations in order to enable them to draw weathercharts on board ships.

It was agreed definitely that the range of the emitting stations for transmitting weather information should be 1500 km. A programme for transmitting was composed and besides a list with the numbers of stations in the radio reports for each of the countries of Western Europe and North Africa.

The meeting considered the collection of the stationmessages in the individual countries as an internal affair. The time of transmission to the collecting station and re-transmission had been divided into one or a number of periods of 5 minutes the last ending 2 hours and 40 minutes after the observation.

It was clear that with this programme of radio transmissions without address ("CQ") the base had been laid for a revolution in synoptic meteorology. After preliminary experiments in different countries the time had come now to draft in this meeting the decisive plan that should permit dispensing definitively with cable messages in the near future.

The projected scheme of issues ought to be provided with the fiat of the radio authorities before its general introduction.

It was decided to introduce the new codes and forms of codes for land stations in any way possible on January 1<sup>st</sup> 1922. Those for air traffic and for shipping had to be considered with the commissions especially interested i. e. that for the Application of Meteorology for Aviation and that for Maritime Meteorology.

The presence of a number of members of these three commissions in London in the week before the session of the International Meteorological Committee 12—17 September 1921 offered the possibility of meetings for a prolonged discussion of the new codes. They regarded a number of new elements and the new forms of code drafted a year ago which formed altogether a quite new and coherent system in synoptic meteorology, the use of reports for land stations and ships at sea and the application to shipping and aerial navigation.

The reports of the meetings of the three commissions form extended Appendices in the Report of the meeting of the Commission (41).

#### **The fifth session at Utrecht 1923 (43)**

Several commissions held their following meetings two years later during the Conference of Directors in Holland September 1923. New questions for discus-

sing were some particular agreements with telegraphic authorities for the Icelandic synoptic messages for addressing these reports exclusively to England for insertion into the English radio weather reports.

The meetings' aim was to continue the work started after 1919 to a general change in the transmission by WT for the regular international weather reports in new and extended forms of code.

A table showing the present position with regard to the adoption of the new international code was circulated.

As regards the preliminary table up to the time of issue of collective synoptic reports by WT it was agreed that the revision of the table adopted in September 1921 was desirable with the object of securing an earlier issue.

This revision would be made by a sub-commission of three with Dr. Hesselberg in the chair and Dr. R. Bureau and baron A. de Dordot. It would be necessary to allot a specific region of wave-lengths for meteorological reports.

A discussion on the new international code led to the decision that:

"a Sub-Commission should be appointed to consider the specification of a code for the evolution of the weather and the method of incorporating this information in the weather reports from a selection of stations in each country so that a trial might be made of the usefulness in weather forecasting of information included in the code".

As the six members of this Sub-Commission were appointed M. M. Jaumotte, Bergeron, Cannegieter, de Quervain (President), Wehrlé and J. Bjerknes. After having examined the different proposals received from the members the sub-commission should present a report to the Commission. It was agreed that the President of the main commission should circulate to the Directors of Meteorological Services the code recommended along with the explanatory notes and instructions referred to in the report and invite them to participate in a trial of the code of the commencing on January 1<sup>st</sup> 1924, or as soon thereafter as possible.

It was agreed, that the sub-commission mentioned above should continue after the conclusion of the meeting at Utrecht with the following terms of reference:

"To complete the specification of the code for evolution of the weather and explanatory notes and instructions necessary for the trial of the code: to consider the results of the trial and to make amendments, if necessary, in the specification of the code for evolution of weather with a view to arriving at a final form of the specification".

The sub-commission finished its task by submitting for the approval of the main commission a general scheme for the carrying out this resolution. Now a new sub-commission was appointed with a permanent character and nominated "Sub-Commission on Codes (C)".

It should consist of five members and be instructed:

"to consider the question of the modification of the international code, taking into account:

- (a) the proposals which had already been circulated;
- (b) the reports of the sub-commission on the code of evolution of weather, and
- (c) any other proposal received by the Weather Telegraphy Commission for amendments of the code and specification, and to report to the next meeting of the Weather Telegraphy Commission".

Col. Gold himself would be in the chair and the members would be Dr. Hesselberg (Secretary), M. Wehrlé, Comm. Carvalho Brandao and Adm. von Cappelle or his representative.

It was intended, that the sub-commission on the Time-Table (T) should equally become a permanent character and the Directors of the Services concerned should be asked if it would be possible to adopt the new time-table from January 1<sup>st</sup> 1924.

The new time-table for the issue of International Synoptic Messages in Europe and North-Africa proposed three issues simultaneously beginning five minutes after the hour of observation itself and lasting three hours, divided in thirty-six sections of five minutes each, so from H + 00—05 to H + 175—180, and immediately followed by the Collective Issue of European and American reports by the Eiffel Tower on 7300 meters wave-length in the time H + 180 to H + 195.

The reports of both sub-commissions, that "on Codes" (C) and "on the Time table" (T) form Annexes to the minutes of the four sessions of the Commission.

As mentioned above, the Commission changed its name to "Commission for Synoptic Weather Information". It held a joint meeting with the Commission for Maritime Meteorology, which is reported in Appendix B.

In the meeting at Utrecht in September 1923 the Commission presented to the Conference of Directors (43) seventeen resolutions, treating respectively 1<sup>o</sup> reports on stations and descriptions of their situations, 2<sup>o</sup> perturbations in the receipt of the meteorological radio issues, 3<sup>o</sup> a revised and ameliorated scheme for the transmissions, 4<sup>o</sup> instructions for the observers, 5<sup>o</sup> changes in the codes, 6<sup>o</sup> the weather reports of Iceland and Greenland and their transmission to London. The Commission had not been able to recommend a better solution for the reduction of barometric pressure to sea level of high level stations than the existing instruction of Innsbruck 1905, so it recommended only:

"that the resolution of Innsbruck 1905 should be revised and that other methods of reducing should be permitted for stations below 800 m".

Stations above this level were recommended to reduce to 1000, 2000 and 3000 m.

The Commission re-nominated the two permanent sub-commissions, the one "to consider the revision of the time table by radio telegraphy (T, President Dr. R. Bureau)" and the other

"to consider the question of the international code for evolution of weather (C, President Col. E. Gold)".

It was agreed that the sub-commissions should continue after the conclusion of the meeting at Utrecht with the terms of reference of page 123. It was intended that they should achieve their instructions in due time so that the revised time table should come into operation if possible on January 1<sup>st</sup> 1924, and that the changes in the codes should be introduced on the same date.

There were at last two resolutions of the series of the Conference. The first No. 59 contained a sketch of an arrangement with the telegraphic authorities, for the regular transmission of reports from ships. The second No. 60 indicated the desirability of collecting reports from the Southern Atlantic Ocean and their retransmission by the Eiffel Tower for drawing daily weather charts of whole

hemispheres based on intercontinental reports transmitted between the parts of the globe on both sides of the Atlantic Ocean and the Pacific as well, with the collaboration of Russia for the continental part of Northern Asia. Both were adopted by the Conference.

### The progress of science

A memorandum from the French side (74) formed a romantic note in the discussions of figures and codes etc. It concerned a sketch for a weather service in the open oceans on a stationary ship intended to maintain the contacts with the ships on the ocean, for collecting their reports, for retransmitting the messages from ship to ship and to coastal stations and with forecasts for limited ocean regions. It had been foreseen, that the ships within the range of the weathership should transmit the reports to ships outside this range and vice versa. Ships of this kind equipped with a staff of trained meteorologists would play the rôle of weather reporting stations at fixed points on the oceans for transmitting information to ships, and, in a distant future, to passing aeroplanes.

Experiments in that direction had already been made on a French ship especially equipped for this service and crossing in the Northern Atlantic Ocean, the ship was named "Jacques Cartier". Experience had proved, that this project was not an unrealizable illusion and that it was worth while to use every effort to prepare the plans for a regular service with "weather ships". These first experiments have been of great importance for future repetitions on a large scale\*). A later world war had been necessary for realizing them in an unexpected measure.

The President of the Commission for Weather Telegraphy had mentioned in his report to the IMC the final forms of code for land stations, the codes for upper air reports and those for reports from ships at sea and for aviation (75). The agenda contained the appointment besides the Sub-Commission for Radiotelegraphy and for the time table of a special sub-commission for the consideration of a cloud atlas for the use of observers. The sub-commission was of the opinion, that there was an universal need for revision of the classification and of a new cloud atlas and gave in its report a preliminary sketch of the work to be achieved by a future commission to lay a more sound foundation for this long and delicate work.

The Committee agreed with the opinion mentioned above and instructed the Commission to institute the above mentioned sub-commission with the character of a permanent sub-commission as a basis for the later establishment of a special "Commission for the Study of Clouds".

The Committee agreed with all questions of detail after having notified them. Agreement of the Central European powers should be awaited before universal introduction could be realized. As a first step to restoring contact the Director of the Austrian Service Prof. Dr. E x n e r was nominated member of the Commission.

The questions on weather forecasting had been studied intensively in the last years on new bases. They were of the highest importance for the real understanding of the processes influencing the evolution of weather. They had been developed in wartime by Prof. Dr. V. B j e r k n e s s and his young collaborators at Bergen (Norway) (31, 76). The imposing ideas published as a charming novel by

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\*) It may be mentioned that the German ships "Schwabensland" and "Westphalen" have been stationed later on the equator in the Atlantic Ocean on behalf of the regular air-routes to South-America.

his son J. Bjerkness with the title "On the structure of moving cyclones" (1921) soon conquered the meteorological world, especially the younger generation of meteorologists of those days and soon formed the well-known "Norwegian School of Bergen". This theory was soon generally known as the "Theory of Fronts and Occlusions".

But this theory had had its predecessors in Austria. The meteorologist Margules had published in the first years of the 20<sup>th</sup> century a study entitled: "Die Energie der Stürme" based on mathematical and thermodynamical considerations.

Equally may be mentioned a series of publications, published in England by Sir Napier Shaw and his assistant Dr. Lempfert under the title of "Life History of Surface Air Currents" (London 1908). These scientific studies had been based altogether in many respects on the results of aerological researches as published by the Bureau of the President of the Commission for the Exploration of the Upper Air at Straßburg Prof. Hergesell.

These new researches had given rise to an increasing interest in the study of the clouds and in the physical processes of their structure and development. These led, in France, to new investigations by M. M. Wehrlé and Scherschewsky of the forms of cloud that accompanied the large cyclones in their movements and in the different phases of development. Their forms and appearances were described by them as forming definite "Systèmes Nuageux" linked in their details to different sections of the moving cyclones.

These "Cloud Systems" were narrowly related to characteristic sudden changes in the weather, by equally characteristic variations in the meteorological elements by passing cyclones indicated by the writers as "noyaux de variations". In this way the French Meteorologists indicated in their theory the narrow relations between the state of the sky and the range of the meteorological elements communicated daily in the synoptic reports in code.

M. Wehrlé had subdivided the "Systèmes Nuageux" into "Systèmes dépressionnaires" and "Systèmes orageux", the different states of the sky in "ciel de corps", "ciel de traîne", "ciel de marge", "ciel d'intervalle" etc.

It is no wonder that theories of this kind were extraordinarily attractive. For real interpretation of the weather phenomena a great knowledge of the clouds was needed. This created the need for an extensive and detailed Atlas of clouds and uniformly agreed descriptions to instruct the observers in their daily work.

Their real understanding led to intensified importance of the weather charts. These were analysed in a way that in former times with the use of the simple codes of the past had never been possible. Inevitably the new reports transmitted by radio ought to contain the necessary material for the application of the new theories and also an incomparably extended réseau of stations for synoptic meteorology.

These considerations will put in the full light the immensely heavy charge that had been laid on the shoulders of the Commission for Synoptic Weather Information together with its sister commissions.

Although in the mean time the different codes had come into general use, especially in the hourly weather messages for aviation, the last word had not yet been spoken.

It was not yet possible to bring the new codes in a decisive form which satisfied all practical aims and exigences. Their form could only be stated preliminarily. So it was decided not to make any change for the time being but:

“that a sub-commission should be appointed to consider the specification of a code for evolution of weather and the method of incorporating this information in the weather reports from a selection of stations in each country so that a trial might be made in the usefulness in weatherforecasting of the information included in the code”.

It was proposed to carry out this “trial” by adding the 5-figure group for a number of stations indicated for these experiments.

It was especially the 2-figure code for the present weather *ww* and that for the past weather *W* that caused the difficulties. Also the indication for the clouds was not yet satisfactory.

#### The sixth session at Zürich 1926 (77)

The question of the new codes and forms of code for the synoptic reports had not yet been solved in a satisfactory way in the years between 1923 and 1926. As a matter of fact a good deal of experience had been gained with the codes and forms of code that had been specified in London in 1921 and in Utrecht 1923 and which had been introduced for aviation in many countries since 1922, but the great number of memoranda received with propositions for amendments showed that there would be a lot to redress before the decisive form should be found.

The new codes were requiring much more of the simple observers on isolated stations than had ever been asked of their older colleagues. Continuous attention was requested in observing the weather and the clouds and in reporting their development and forms. The receiver of the messages ought to get an exact image of the weather and the state of the sky at and between the observations.

The Conference of Directors at Utrecht had recommended the addition of a “trial group” to the form of code for synoptic reports at a number of stations. The form of this group should be  $Q_1C_iw_1W_1$  with specifications

$Q_1$  = amount of cloud, not Cirrus  
 $C_i$  = sort of cirrus cloud  
 $w_1w_1$  = present weather  
 $W_1$  = past weather

Now the Commission composed an entirely new form of code for synoptic reports as a “trial code”, and recommended that it should be introduced by all countries for internal experiments from January 1<sup>st</sup> 1927 and that these countries should compose reports regarding their experiments at the end of 1927. The Sub-Commission on Codes should state early in 1928 what changes ought necessarily to be applied in view of a decisive decision.

The form of this trial code agreed to was

IIDDF      <sup>+++ +</sup>      <sup>++</sup>  
              wwVhL      QC<sub>1</sub>WTT      BBBcb.

The conclusions were resumed in 5 items; that of the trial form of code formed the 4<sup>th</sup>. But in the last item it was stipulated (78):

“that the existing international code should not be altered for international exchange until the decision referred to in paragraph 4 had been taken”.

It was a success for the sub-commission, that it could reach agreement regarding the trial form of code and for the codes to apply for the specification of the elements of the weather and the clouds marked by +. Practice would have the last word in this respect.

The Sub-Commission T for composing a new table of issues was now enabled to present a new scheme in which the collective reports could be issued, to begin 5 minutes after the hour of observation, and in which all messages were received with two receivers for a total duration of the issues of three hours. In the first hour the reports of Central and North Europe were to be transmitted, in the second those of West and South Europe and in the third those of East Europe and the Balkan States. It was intended to start this new system on 1<sup>st</sup> January 1927.

Another important question was the distribution of the wavelengths for the reports. As the distribution of wave-lengths would be generally discussed at an international radiotelegraphic conference in Washington it was decided to delegate the President of the Commission with two of the members to Washington to defend there the requirements of meteorology (Col. E. Gold, Ir. R. Bureau and Dr. Th. Hesselberg).

The decisions were adopted by the Commission with the exception of some that were judged to be of internal character. These resolutions concerned several prescriptions for the hours of observation for the synoptic reports and instructions for the observers. It is worthwhile to mention a question that had been treated already a long time before the war (32) namely the equivalents in wind-speed in m/sec of the 12 steps in the Beaufort scale for wind-force. This had been laid down in a memorandum from the English side (80) which led to fixing the limits of the speed of the wind in each of the 12 parts of the scale reduced to a height of the anemometer of 12 m above a plane surface.

The change of the reports from Iceland from cable to radio issue necessitated a new regulation with this country for the payment of costs from the contributing states.

It may be called disappointing that the Commission had not been able to reach positive results about some urgent questions in this meeting. It would be necessary to convene the Commission again for drafting decisive proposals to be presented to the Conference of Directors to be held in three years time.

The Commission held a joint meeting with that for Maritime Meteorology. It was in this meeting that a sub-commission of both Commissions had been nominated

"to consider the collection of synoptic reports from ocean regions and their retransmission in collective messages for the use of forecast services and of ships at sea".

It was placed under the presidency of the French Director General E. Delcambre. It concerned a question that also ought to be considered at the radiotelegraphic conference at Washington and should be treated in connection with the indication of zones of silence for listening to urgent messages at sea.

It concerned a question in which delay could not be permitted for other reasons. The regulations to be composed had to be definitely decided upon in the next Conference of Directors for a long period of time, but both commissions had to be unanimously in agreement regarding these regulations before they could be presented to the Conference of Directors for application all over the world.

**The seventh session at London 1928 (81, 82)**

The programme of the meeting of the Commission may be called of great importance not so much for the number of questions to be discussed as for the character of the decisions that had now to be taken for all participants binding all the meteorological services and all the cooperating ships all over the world.

The proposals to be prepared here and presented for adoption to the next Conference of Directors to be held at Copenhagen ought to be exact and definitive and leave no room for long discussions.

The most important reports of sub-commissions were those of the delegation to the International Radiotelegraphic Conference at Washington and of the Sub-Commission for the Organization of the Cooperation of ships at sea in synoptic meteorology appointed in the joint meeting with the sister Commissions for Synoptic Weather Information and Maritime Meteorology at Zürich 1926 (82). This "Sub-Commission for Radiometeorology on the Oceans" had met in Paris in the days immediately preceding that of the main Commission (83).

The programme contained thirty items. These were divided for discussion and reports about three sub-commissions ad hoc.

The report of the Washington Delegation (84) was the first to be treated. It reported that it had been decided that two longwave-lengths between 3000 and 6000 m should be reserved for the exchange of synoptic reports. No provision had been made for short waves as the Congress had not been willing to bind itself to any part of the short-wave spectrum in use.

The Congress had not yet come to an agreement concerning these two long waves. The deliberations closed with the statement:

"that if the wave-lengths 6660 and 3350 meters can be reserved for meteorological purposes, this combination would best serve the requirements of synoptic meteorology"

and with a request to the permanent Sub-Commission for the Time-Table (T) to consider recent arrangements for

a collective report from France for Western Europe

" " " " Germany for Central Europe

" " " " Russia for Eastern Europe and Russia in Asia

" " " " South-East Europe and Asia Minor.

The question of the messages from ships at sea had been broadly discussed during the session of the Sub-Commission for Radiometeorology on the Oceans at Paris 1928. When the proposals in the reports of this sub-commission could get the agreement of the main Commission and when the main Commission should be ready to lay down these proposals in its own resolutions and when the Conference of Directors should be willing to adopt these resolutions quite a new branch would be added to synoptic meteorology.

But before that the Commission of Maritime Meteorology had to be notified of these resolutions to complement and eventually to amend them from its own side.

The Paris proposals were contained in a series of 13 resolutions. The 1st concerned the instrumental equipment and the number of ships cooperating in the organization of the reports from ships at sea. The ships should be divided into 3 categories, A<sub>1</sub>, A<sub>2</sub> and B concerning their emitting capacity and the service instructions for the radio on board. The cooperating ships had been specified as

"selected ships" ("navires sélectionnés") to a number of 1000. The observations should be made four times daily at 0, 6, 12 and 18 GMT with the limitation that in ships A<sub>2</sub> and B the observations at these hours only should be made when they coincided with the times of the watch on board. Preference should be given to the hours 0 and 12, these hours being of peculiar importance.

The arrangements for the hours of transmission of the messages from the ships to the shore stations; for the codes and code forms; for the mutual exchange of synoptic reports between the ships on the oceans; for transmitting to ships out of the organization; for especially interested addresses on shore; and for the receipt of messages from ships in different codes and forms of code or simply in plain language, formed the content of resolutions to the number of six.

As a resolution of great importance may be mentioned the decision, that all the instructions for the ships should be summed up in a "Notice" to be prepared by the acting Sub-Commission with destination for use in the meteorological services in view of notifying the international regulations prescribed to the selected ships and of the means to apply them.

This task should be entrusted in all countries to the meteorological institutes. The text of the resolution 14 was as follows:

"Une notice qui sera préparée par la Sous-Commission exposera d'une manière le plan international des transmissions en mer.  
Elle comprendra:

- 1° Les heures auxquelles les observations devront être faites;
- 2° La liste des observations à faire;
- 3° Le mode de rédactions des radiogrammes;
- 4° La liste des stations côtières réceptrices choisies pour voir les observations ainsi que les limitations fixées pour chacune;
- 5° La procédure à suivre pour assurer cette transmission à chaque station côtière;
- 6° Le mode de diffusion des observations de navires.

Chaque service météorologique remettra aux navires sélectionnés, soit cette notice elle-même, soit un extrait relatif aux routes suivies par les navires afin de leur donner les moyens de se conformer au plan international.

Au gré de chaque pays, tout renseignement jugé utile et faisant partie de cette documentation pourra être publié dans les avis aux navigateurs et dans les instructions nautiques."

After the discussion of this extended Report that of the Code Sub-Commission (C) concerning its recent meeting and of its resolutions concerning the questions entrusted to it at Zürich to draft a form of code for really international use to be introduced in all climates and over the whole world was presented for discussion.

There was a unanimous opinion that the epoch of experiments with "groupes d'essai" and "trial codes" of the last years as had been arranged at Utrecht ought to be finished now. The replies from seventeen countries regarding the requests for criticism of the codes of Zürich and of the "trial code" had proved that these still did not give real satisfaction and that it would not yet be possible to reach unanimous agreement for them. The necessary tendency should be to come to strongly separated directives for the specification of the present and past weather ww and W, and as well for the 3 kinds of clouds, low, medium and high clouds (C<sub>L</sub>, C<sub>M</sub>, C<sub>H</sub>) with an extra 1-figure code C<sub>1</sub> for the clouds in the nephoscope groups C<sub>1</sub>ddvv.

The specifications of the clouds ought to be based entirely on the International Cloud Atlas in preparation by the special Commission for the Study of Clouds (Appendix J).

These considerations had been the basic principles for the sub-commission in composing the drafts for new suggested forms of code for different aims with the use of new specifications for a number of elements mentioned above. After serious discussions the Commission agreed to the adoption of 2 forms of code namely (85):

- a form for land stations in 5 (6) groups  
(including the station index group)
- and a form for ships at sea in 7 groups  
(including the 2 position groups).

These forms of code ought to await the agreement by the Commission for Maritime Meteorology before they could be presented to the next Conference of Directors of 1929.

For the definite proposals to the Conference of Directors and the reports of both sister commissions reference should be made to the extended reports of the Conference of Directors itself (86).

The Commission had still to discuss a third shortened form of code for weather reports for collective messages for isolated stations and for the benefit of ships at sea and also for the mutual exchange of intercontinental weather messages and for messages from ship to ship. A fourth form was that for aerological messages (upper winds for aviation).

The total number of the resolutions had been not less than seventy two. A new sub-commission was established for "Aerology in the Oceans".

The further resolutions contained some special instruction regarding the number of stations in the collective messages mentioned above and to the distribution of the stations on these emissions. This distribution had been fixed at

France	100	stations
Germany	120	"
Russia	200	"
S. E. Europe	80	"
Total	<u>500</u>	stations.

As regards the wave-lengths it had been decided that as the most suitable long waves for the emissions 6660 m and 3350 m (Res. LXXI) should be recommended. The question of reservation of wave-lengths for transmitting the weather reports of the individual countries to the 4 emitting stations, had been referred to the Sub-Commission T.

#### **The eighth session at Copenhagen 1929 preceding the Conference of Directors**

The Commission for Synoptic Weather Information itself had at Copenhagen the opportunity to discuss for the last time the codes and forms of code as adopted in London the year before. The experiments in different meteorological services had shown that there were still a lot of difficulties for the practice, most of them with the introduction of the code for the specification of the clouds. It had been

suggested using two separate specifications for low and medium clouds  $C_L$  and  $C_M$ , each with a 1-figure code, both to be inserted in the station index group as  $IIIC_L C_M$ . A logical suggestion had been made for a form of code consisting of three groups identical with the simple 3-group form of code for aviation messages with non-instrumental observations, followed by 2 (3) groups containing the instrumental observations (pressure, temperature, humidity etc.) and the form of the high cirrus clouds (Res. 58). So the classic synoptic form of code should be combined with the form of code for aviation messages which had been in use for nearly ten years in the hourly reports for aviation. So the form should be:

$IIIC_L C_M$      $wwVhN_h$      $DDFWN$      $BBTT$      $HC_Hcbb$      $(RRjjj)^*$ .

The debates were long and animated. The adopted form of code was giving satisfaction for all kinds of weather reports with a different specification of the codes of the last group (6<sup>th</sup>) for inland stations, coast stations and lightships.

The shortened form of code for use in collected messages for a whole continent or similar region should be

$IIwDD$      $FBTT$ .

There were also suggestions for a slight change in the reports from ships at sea. The Joint Commission, which had been formed with members of the Commission for Maritime Meteorology had proposed two forms for the "selected ships", one for extra-tropical regions with 7, and the other for use in the tropics, with 6 groups, included the two position groups. The first 3 groups should be identical. In the form of code for the tropics the data for low and medium clouds  $C_L$  and  $C_M$ , and the 3 figures for barometric tendency and the change in the latest 3 hours should be omitted (Res. 57).

The definite adoption of these codes and forms of code by the Conference of Directors should give the possibility to prepare decisive instructions for a system of observations for synoptic meteorology and for general information in a form to be applied all over the world in all climates on land, at sea and for aviation. Although it had been intended to introduce this system on 1<sup>st</sup> January 1930, it would be desirable to await the edition of the International Cloud Atlas and the suggested Reduced Atlas for the observers at synoptic stations and on the selected ships at sea.

These decision should open a new area after a trial of 10 years' work.

It was intended, when the regulations should be adopted in decisive form and introduced all over the world, to instruct the newly created Permanent Secretariat of the International Meteorological Committee at De Bilt to prepare a publication collecting all codes and forms of code and the different issues of weather reports by WT in a separate publication. This publication should bear the title "Les Messages Synoptiques du Temps" and be composed in different parts. It may be stated that an important result for a long future had been reached. The questions of the broadcasting system for the transmission of the synoptic weather reports and of the system for the cooperation of the selected ships had not yet been brought into definite form. As matters were at this moment the last word could not yet be spoken in this Conference of Directors.

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\*)  $jjj$  having respectively the specifications  $MME$ ,  $mmE$ ,  $SV_sE$ ,  $T_dKD_k$   
( $E$  = state of the ground).

In October 1933 the President of the Commission for Synoptic Weather Information had sent a report to the Meeting of the International Meteorological Committee at De Bilt about the activity of his Commission in the four years 1929 to 1933. He mentioned the countries in which the codes of Copenhagen had been introduced on land as well as at sea. Some difficulties had been experienced with the application to the reports from Europe to America and reversely with the shortened form of code for intercontinental reports. On the contrary the collective reports for Western and Central Europe and for Russia had given satisfaction everywhere but some difficulties in applying the newly introduced system continued to exist and it must be considered how to meet the still existing requirements. One of the complaints was that the collective report for the south-east of Europe and the Eastern Mediterranean was still missing, although it had been arranged at Copenhagen by Resolution 68.

The arrangements for the transmission of the Icelandic messages by radio by a new high-power station at Reykjavik, foreseen in Resolution 44 of Copenhagen, had not yet succeeded. The transmission by wire to London was still in force and thus it remained necessary to issue them in the British collective weather report.

The recent edition of the Reduced Atlas of Clouds for the observers in 1930 had been very useful in the application of the new codes.

The system of allocation of three index numbers for the synoptic stations and the division into blocs of 1000 had proved to be of considerable use in practice (Copenhagen Resolution 58). In the mean time the Secretariat at De Bilt had composed, as a sequel to an instruction of the IMC in 1933, a publication with all items concerning the existing wireless weather reports and the division of the stations in a number of parts. The first edition had been completed, for the major part, in 1933 (Fascicules I—V) (47); and the different parts had been supplemented regularly by a number of correcting sheets. This publication was intended to replace a publication of the International Telegraphic Bureau at Bern (Bern List, Meteorological Section), which was not completely correct and free from errors. The Copenhagen codes had been adopted as a whole by the International Committee for Aerial Navigation for insertion in the Annex G to the Air-Convention of 1919. This Annex had been revised as a whole and had been completed in 1933.

A long paragraph had been devoted to a Conference of the Directors of the Far East that had been convened at Hong Kong in April 1930, on request of the Conference at Copenhagen in its Resolution 98 saying:

"that the Directors of Meteorological Services of Formosa, Hong Kong, Indo-China, Japan, Korea, Dairen, Malay States, Philippines, Shanghai and Tsingtau meet as soon as possible, at a place to be agreed upon later, to discuss the possibility of adopting:

- 1) A uniform code of local and non-local visual storm warning signals and
- 2) A uniform code for transmission, in the Far East of daily weather reports by cable.

In regard to 2) the Conference emphasizes the importance of providing in the code for the inclusion of the necessary information to permit reports broadcasted by WT to be issued according to the specifications of the international code, in particular as regards the groups DDFww BBVTT".

The President of the Commission for Synoptic Weather Information had attended the meeting personally. It was the first time that the Directors from remote

regions of Europe met for considering in a separate assembly their standpoints regarding the resolutions and decisions adopted in the Conference of Directors or in meetings of the Committee, which meetings had always been held, until now in Europe. Now they were able to discuss the application of the decisions in view of existing particular objections in their particular services. It was clear, that the possibilities for general application were in many cases far more restricted than in highly civilised Europe and this often caused considerable difficulties and special arrangements in other parts of the world.

Dr. Seilkopf of Hamburg in the session at Copenhagen 1929 had reported on the results of successful experiments with pilot balloons at sea with the mirror-theodolite of Dr. A. W e g e n e r (45). It was judged desirable to prolonge the sub-commission created by the C.S.W.I. in 1928 in London and to attribute this Sub-Commission for Aerology on the Oceans a permanent character. This name indicated the instruction to promote and organize aerological observations on board ships on the Oceans.

#### **The ninth session at De Bilt 1934 (87)**

This meeting was the first after the meeting at Copenhagen 4<sup>1</sup>/<sub>2</sub> years ago. The President had prepared a long list of items. He announced in his openings address that the Report of the Conference of Directors at Copenhagen had been printed and inserted in the Procès-Verbaux of Copenhagen (45), and that his report to the Committee meeting at De Bilt 1933 was inserted in the Procès-Verbaux of that meeting (46).

The burgomaster of De Bilt had reserved the State Room of the Village Hall for the Commission. He welcomed the Commission in the first meeting of the session.

A copy of the provisional programme had been circulated. The Commission had lost four valuable members by death and a long list of sixteen who had resigned. At the opening fifteen members and six guests were present.

The programme contained not less than 31 items. Six of them were reports of sub-commissions and that of the President himself. A long list of questions about codes, transmissions of weather reports and technical arrangements for the practice of weather forecasting in the services were presented for consideration. The long list of items was divided for deliberation among six sub-commissions, respectively among:

- a) Code-Sub-Commission (C),
- b) Sub-Commission on the Organization of Synoptic Reports from Oceanic Régions,
- c) Sub-Commission on the Timetable (T),
- d) Sub-Commission on Symbols,
- e) Joint Sub-Commission on Radio-Telegraphic Transmission of Monthly Mean Values,
- f) Sub-Commission on Wireless Pictures.

The titles of these sub-commissions show the main questions that had to be examined.

The President expressed his satisfaction to be able to announce an ever-growing number of aerological observations by the steadily extending number of aeroplane stations (e.g. 5 in Italy with a promise of three in the mediterranean area). As regards the aerological researches on the oceans it was decided to appoint two new members of the Commission to represent it in the "Joint Sub-Commission on the Organization of Synoptic Weather Reports from Oceanic Regions". This decision was agreed to and Dr. H e s s e l b e r g and Prof. E r e d i a were nominated as representatives of this Commission.

The Commission considered as the first item in a general discussion a set of symbols for plotting the data for the weather (ww, W) and other data (V, H, N<sub>L</sub> etc.) of the Copenhagen codes in the weather charts. A long series of proposals had been presented and all the members expressed their opinions. The question of inserting monthly mean values in the WT weather reports had been formerly considered by the Commission for Climatology, beside the insertion of non-meteorological information in synoptic issues. This had led to a clear description of the conditions allowing these as supplementary data, which formed the contents of Resolution III.

The delegation to a Radiotelegraphic Conference at Madrid, 1932 had composed a very valuable report, which had been forwarded to the members in a circular by the President dated January 4<sup>th</sup> 1933. It had been examined in the meeting of the Committee at De Bilt, 1933, but had not given rise to any definite decision. Now it was broadly discussed in the present meeting, and mainly the question of the taxes of the weather messages of ships at sea. It had not been possible to reach freedom of taxes generally. This had only been effectuated for a small number of countries (Holland, England, Poland, Germany and Italy). In others (France, Norway, Denmark, Sweden and Iceland) a small payment was required, in others reductions from 30 % to 60 % were allowed.

The Conference had requested the IMO to compose a manual with all telegraphic weather reports of an existing publication entitled "List of stations performing Special Services" edited by the International Telegraphic Bureau at Berne (the "Bern List, Meteorological Section"). In the mean time this work had been undertaken by the Secretariat at De Bilt as sequel to a charge of the International Meteorological Committee in 1931 with the edition of its "Publication No. 9" (47).

The Commission adopted a resolution requesting the different Meteorological Services to give all help and collaboration to the Secretariat to warrant "that the information contained in the "Publication 9" is free from error", which could not be said about the Publication of the International Telegraphic Bureau at Bern mentioned as: "Bern List, Meteorological Section" (Res. IV).

In the following Resolution V concerning the telegrams from Iceland it was agreed in three paragraphs:

- 1° that standard international codes for these weather reports should be introduced either transmitted by cable or by wireless,
- 2° a request for reports at 10 h and 16 h GMT from three stations in Iceland and from Thorshavn, and
- 3° to replace the station Akureyri by one with a better exposure.

The programme contained an item recommending that ships observing ice in the oceans should report this appearance using a particular "Ice-Atlas" existing in Norway. It was decided to draft a code for reporting "Ice in the Polar Seas" and to charge a sub-commission of experts to prepare this code.

This session may well be called one of the most important of the last decennium. At Copenhagen the general directives for the development of meteorology had been fixed and adopted to the newly developed and constantly improved means of communication. It had been necessary to indicate the way to be followed in mutual collaboration with other commissions for all time. The work to be accomplished for the correction of the new codes was the task of the permanent Sub-Commissions for Codes (C) which was working permanently. This happened to be equally the case of the permanent Sub-Commission on the Timetable (T), which had to fulfil its instructions to check carefully the application of the two waves accorded to the collective weather reports and in the second place to draft the most efficient schemes for national emissions to effectuate the receipt of the national reports in a minimum of time with a minimum of staff. These aims had to be fulfilled exactly by the emitting and transmitting stations in view of composing a generally applicable scheme of international collective radio weather reports tending to allow the reception to be made by not more than two operators on the two waves accorded internationally.

The decisions of the last sub-commissions were laid down in 11 Resolutions concerning technical and practical regulations. The importance of a night observation at 0100 GMT. was clearly indicated for aerial traffic at night but the timetable would have to be simplified in such a way that the reports could be received by one single man. A number of decisions aimed at arranging a system of control on the correct transmission of the messages. Duplication of the emissions on short waves was applied more and more.

The Sub-Commission (T) submitted its report in the fifth session. 7 out of the 11 resolutions were adopted by the main Commission after some amendments. The last contained a number of directives for a supplementary programme on resolutions 55 and 56 of Copenhagen regarding the timetable and the contents of the 5 collective issues. This system had given very favourable results up to the present.

At Copenhagen the work of drafting a scheme of symbols to use on charts had been entrusted to the Sub-Commission on the Observers' Cloud Atlas

"with a request, that they should prepare a scheme of symbols for representing the new codes in charts".

This sub-commission had made several proposals which had been examined from different sides. Finally three systems had been composed, one, the most extensive, for the thorough analysis of the charts in the forecasting divisions of the Institutes, and the other, the simpler, for charts on a restricted scale for general circulation for public use and for public instruction and information. Besides it suggested a number of indications for singularities such as cold- and warm-fronts.

The proposals of this sub-commission had already been prepared in a meeting in Paris in December 1931. At the same time it had examined proposals for a number of hydrometeor-definitions also destined for the Climatological Commission. As regards the symbols on charts it had carried out a plan for indicating the symbols on the weather charts in a rigid scheme, as a "station model" in plotting the charts intended for international use all over the world.

The adoption of these resolutions was a step of extreme importance. Their strict application allowed to interpret the weather charts, after the weather reports in the Copenhagen codes, everywhere in the same sense for all interested in all different aims.

The following group of resolutions was presented by the Sub-Commission on Symbols. They concerned the notification in the codes for clouds at mountain stations below the station level, the exact notification of some types of clouds, and corrections of the notifications in the figures of the new codes for a number of elements. The sub-commission was instructed to prepare a series of designations and notifications to be composed as a manual for the different services for the use of the codes to find a way in the tangle of notations for the observers at the stations.

In the Resolution XLVI seq. the codes for aerological reports were fixed with a set of indices for international use (D = wind direction, W = weather, H = height above sea level etc.). In further decisions the texts were adopted in three languages for the equivalents of the effect of the wind at the sea by the different steps of the Beaufort scale. The fruitful meeting ended with an extremely long and fatiguing session. The total number of resolutions was 54. The number of documents forwarded with remarks and annexes and inserted in the printed report as appendices rose to 55.

#### **The tenth Meeting at Warsaw 1935**

The report of the Commission to the Committee meeting at Warsaw 1935 was as usual the most extensive (88). It had been mainly this Commission that had furnished the materials for constructing the new edifice after the first start at Utrecht and the placing of the foundation stones at Copenhagen. It was now to receive the decisive form to be applied completely for world use.

The Commission had to report at Warsaw the results of its meeting at 1934 at De Bilt and that of a recent meeting at Warsaw preceding the Conference of Directors embracing resp. 53 and 29 Resolutions.

There had been close collaboration between the Commission and its permanent sub-commissions with the Commissions for Climatology, for Maritime Meteorology and for the Study of the Clouds.

Considerable space had been devoted to a paper entitled:

"Instructions and explanations for the International Codes for Synoptic Weather reports."

The decision to compose this Instruction (89) had been taken in the last meeting of the Commission and its Sub-Commissions at De Bilt (87). Extensive specifications had been summarized in the Resolution XLIV which had been adopted by the Commission in the form:

"The Commission requests the Sub-Commission on Codes to prepare a set of instructions and definitions for the guidance of different Services in the interpretation of the specifications of the codes. In preparing these instructions, the Sub-Commission should include:  
etc. follows the instruction in 3 paragraphs."

The three Norwegian members Dr. Hesselberg, Dr. Bergeron and Dr. Pettersen had been willing to take charge of composing this paper, which would be based principally on their memorandum, Document 10 of Appendix III of the report of the meeting at De Bilt. The tenth meeting expressed its sincere appreciation of the preparatory work they had accomplished in composing this draft.

This meant the final end of the work of many years from the year 1920 to the present day and now accomplished decisively for a long while to come. The composers had rendered great service to all meteorological institutes over the whole world. All over the world the radiotelegraphic authorities had been continuously working to arrange the issues required for the weather reports asked for by the sub-commission. In the weather bureaus at the principal aerodromes, on the ships at sea, everywhere the weather charts were prepared according to the same universal system and plotted on a universally prescribed table of symbols and using a standard station model to denote the code figures in the working chart for analysis. So every insider could immediately keep himself up to date. Everywhere the radio-operators placed themselves, punctually and automatically 8 times a day at the observations hours, at their apparatus for receiving the long series of 5-figure groups of the weather messages on the 2 standard wave lengths; to deliver the reports to the plotter who had to prepare the weather chart for the forecasting officer for his regular duties to inform all people and instances interested.

The 42 resolutions presented to the Conference by the Commission were divided into four groups namely

- Group A regarding the codes (36—55)
- Group B regarding the radiotelegraphic issues (56—63)
- Group C regarding Symbols (64—72)
- Group D regarding other resolutions of De Bilt (73—77).

In the first group the last revisions had been made to complete decisively all that had been judged capable of improvement of the system prepared in the last years; including the form of codes for the radiotelegraphic issues of the weather reports for stations on land and ships at sea all over the world in one simple form and for aerological messages.

A monumental piece of work had been finished. At the same time it is worthwhile to mention the work of the sister Sub-Commission on the Timetable (T) for decisively arranging the scheme of the radio weather reports; nationally for the transmissions to be concentrated and internationally for the four issues in a solid frame. It had succeeded in suggesting a time scheme that enabled reception, in the daytime in one and a half hours with two receivers simultaneously listening on the two waves and in the night with one, of the collective international weather messages from Western, Southern and Eastern Europe. The speed of transmission had been fixed at 18 groups per minute.

The whole scheme had been described in the series of 19 resolutions of De Bilt X-XXVIII. 5 of them had been adopted by the Conference. It had been possible in the time between De Bilt and Warsaw to realize the scheme, and at Warsaw it could be presented to the Conference for decisive adoption. The monumental resolution 63 of the Conference mentions the scheme as the "General Plan of the Collective Issues" in its supreme logical and compact form. In adopting this resolution a mighty work had been accomplished and the President could thank the President of the Sub-Commission M. B u r e a u ,

"de l'excellent et important travail qu'il a fourni depuis plusieurs années pour la Commission."

This expression of admiration was followed by the lively applause of all those present.

The resolutions 64—72 were not less important. They formed Group C and summarized the conclusions and decisions of the Sub-Commission for Codes (C). They brought the unification in practical ways of working with symbols and schemes for use all over the world.

The last Group contained:

- a) the form of code for Monthly Means for Climatology in the intercontinental issue to be published on the 5<sup>th</sup> of the month (Res. 74),
- b) that for aerological messages by aeroplanes and radiosondes in Res. 46 of Group A and
- c) that for intercontinental issues in Res. 52, and that for land stations in 54.

#### **The eleventh session at Salzburg 1937 (53)**

The report of this meeting fills a book of 289 pages. The meetings of the main Commission and those of its sub-committees lasted a whole week. The list of those present shows the names of 28 members and 18 guests. The items for discussion were divided over 24 numbers. The list of circulars and further correspondence reaches 24.

The list of resolutions numbers 62. 39 of them were adopted by the Committee, 16 were approved of and 7 noted. The discussions tended to quite new deliberations after the decisions in the meetings of the Regional Commissions I and II. The items of the agenda were as usual divided over numerous sub-committees ad hoc besides the permanent sub-commissions. The agenda contained also the reports of the 3 permanent Sub-Commissions for Codes (C), for the Timetable for the transmission of the collective continental and intercontinental radioweather messages (T), and for the synoptic weather reports from ships at sea (RMO).

The deliberations give the impression of a general and final review of the work accomplished by the Commission in the last years.

After having been introduced generally practice had shown the difficulties. The first practical difficulty was experienced in utilising the system of Copenhagen and Warsaw (4 emissions daily, a rigid re-partition of the stations in groups, transmission along a fixed timetable in 90 minutes' time, subdivided in 9 emissions of 10 minutes each and by using 2 wave-lengths) and those met in introducing them into the Regions I and II should be solved now (Resolution 63). The arrangements for receiving all the material necessary for the weather charts with not more than 2 receivers in daytime and with 1 by night in little more than one hour and the putting of the complete material at the disposal of the plotters and designers with the indication of corrections if necessary in a very limited lapse of time had given complete satisfaction.

It was recommended in the resolutions of the Commission to extend the system of emissions to a 3-hourly system with supplementary messages with 3 hours' intervals. A message of 0400 GMT should be of particular interest for aviation in the early morning. Introduction of messages 3-hourly at the intermediate hours might satisfy desires from the parts of the world outside Europe.

The scheme for a 3-hour system had already been composed at Warsaw, but it had been amended now at Lusaka with adaptation for the emitting stations in Africa, and in view of arranging intercontinental transmission of weather messages for the regions outside Europe.

The Commission had drafted at Warsaw a "station model" for plotting the elements transmitted in the weather reports in codes in the weather charts in a systematic way with internationally adopted symbols which had given plain satisfaction everywhere.

A third group of resolutions contained recommendations in case the use of some elements of the codes caused difficulties for plotting in the weather charts.

At the same time the Commission recommended a slight change in the form of code for aerological messages, and also in the warnings in code forms for sudden changes and deteriorations in the weather conditions, which had been in use already for many years in regional aviation messages. They had been adopted since long in the regional conferences for aviation. They formed long and complete lists of information in code form composed in the Bureau of the President of the Commission in his leading function in regional commissions for aviation. A special code form had been introduced for weather messages from ships at sea to aeroplanes and a sub-committee of four had been established for the study of the question of the ways of observing visibility by day and by night and the visibility from the air downward and of coding this information in the synoptic messages.

#### **The twelfth session at Paris 1946**

The Extraordinary Conference of Directors of February 1946 in London (56) had noticed the desirability of a meeting of the newly-re-established C.S.W.I. in the near future. So the President of this Commission convened the members for a meeting in Paris in the second half of June 1946 (90). The long agenda had been prepared in a considerable list of fifty four memoranda. They were divided for discussion over eight sub-committees. Four of them were intended to have a permanent character as being a continuation of the permanent pre-war sub-commissions, the others only worked during the meeting.

Three months ago the President had reported in a long report to the Conference of Directors in London on the principal questions to be treated urgently by the Commission. A return to the pre-war regulations was impossible. New instructions for the synoptic observations made simultaneously all over the world at the same hours standard time were necessary for coding and for composing the synoptic weather messages and for their transmission on regions of greater and smaller extension. Transmission by teleprinter had been generally possible after the great development of the teleprinter networks during the war. New directives ought to be followed by the Commission. The pre-war systems of Copenhagen and Warsaw had to be revised entirely.

The number of meetings in the weeks between the 18<sup>th</sup> of June and the 4<sup>th</sup> of July was 20. Besides a Joint Meeting with the C.I.M.Aé. was held (90). The total number of resolutions was 56. The discussions regarding new codes and new forms of code and new instructions led to and difficult discussions. The changes of the codes necessitated the use of different units. Revision and re-

edition of the International Cloud Atlas was unavoidable. The coordination of the work of the two commissions C.S.W.I. and C.I.M.Aé. was mentioned in a special resolution (LVI).

The results of the work done by the Commission were included in the report of the President to the next committee meeting in Paris. It contained the communication of the new codes and the weather reports in new standard code forms for universal use by land, at sea, and for aviation. New lists of indications of the elements contained in the codes had to be prepared. As regards the hours of observation a number of 8 hours at standard time with 3 hours' interval was universally fixed for the whole world by land and at sea. A new system for the index numbers of the stations all over the globe should be prepared by a special sub-committee. A network of aerological stations especially for synoptic purposes should be established along fixed directives regarding the density and the hours of observation following universally fixed rules.

As regards the coordination of the C.S.W.I. with the other Commissions of the I.M.O. may be referred to Resolution IV and V.

The C.S.W.I. reported the deliberations on 44 memoranda. The agenda contained the number of 21 items, divided over eight working sub-commissions respectively

- Sub-Commission No. 1 Times and Observations.
- Sub-Commission No. 2 Communications.
- Sub-Commission No. 3 Forms of Message.
- Sub-Commission No. 4 Scales and Specifications.
- Sub-Commission No. 5 Symbols and Diagrams.
- Sub-Commission No. 6 Exchange of Analyse and Forecasts.
- Sub-Commission No. 7 Index Numbers.
- Sub-Commission No. 8 Networks.

These sub-commissions presented their reports to the main Commission. It was decided that in future the regulating task of the Commission should be charged to a number of four standing sub-commissions namely

- Sub-Commission on Codes and Specifications (C)
- Sub-Commission on Graphic Presentation of Synoptic Information on Charts and Diagrams (G)
- Sub-Commission on Meteorological Telecommunications and Timetable (T)
- Sub-Commission on Hours of Observation and Networks (H).

The task of the sub-commission No. 6 was given to the Sub-Commission (C) who had to review all types of codes including those for forecasts and analyses.

The task of preparing new codes and forms of codes for the exchange of weather messages was very delicate and difficult. Aviation desired to be informed more extensively about a number of elements of the weather and in many cases with a greater accuracy. This caused changes in the ordinary number of informations given in the codes and in extension of the standard forms of code of the weather messages to considerable lengths (2-figure codes for visibility (V), windspeed (f) and heigh of the lowest clouds (h), a supplementary group for each of the 3 cloud groups ( $C_L$ ,  $C_M$  and  $C_H$ ).

The working group No. 3 proposed standard code forms for surface reports from land stations and for surface reports from ships with five fixed standard

groups (including the station index group) and a number of supplementary groups, partly international, partly regional or local, in maximo 9, each with a special specification number 1—9, with details regarding the clouds in three levels (5, 6, 7) and communications of incidental importance (1, 2, 3, 8) to be added when the weather conditions should give rise to it. These were therefore entitled "drop-out-groups". Regarding the five fixed groups the principle of two non-instrumental groups (2 and 3) with information of special importance for aviation and two (4 and 5) with instrumental data for synoptic purposes ought to be maintained.

The Sub-Commission itself was far from being unanimous in this proposed form of code, because it was composed by an ever changing number of groups for any station. In view of the inhomogeneousness of the weather messages, (changing length, long with bad weather conditions for aviation and short with clear weather with good flying conditions), a considerable opposition could be expected from the side of the transmitting stations. Apart from this proposal there was another proposal from a minority in the sub-committee urging a code form with 6 fixed groups (including the station index group) with the addition of supplementary groups for information regarding unfavourable weather conditions when indicated in the fixed groups. This form of code was composed by a fixed number of groups for every station, a considerable advantage in the collective messages consisting of blocks of constant lengths, considerable also in teleprinter-communication and much more convenient in decoding and plotting the messages in the working-charts.

The plenary session was not in favour of the official proposal of the sub-commission but sustained that of the minority by a majority of votes. So this proposal was adopted with some minor changes as a basis for a general standard code form with subsidiary additions of three cloud groups per station with the indication numbers 5, 6, 7, and twice a day, with 12 hours' interval, one or two precipitation groups as fixed groups with the numbers 8 and 9.

This form of code was adopted unanimously as the standard form for messages from land stations. A long resolution (XVII) contained all indications for the meanings of the letters used in symbolic forms of messages. The following resolutions (XVIII to XX) gave the standard form of messages from ships, with two position groups instead of the station index group and some supplementary groups for swell, sea disturbance and ice, an abridged form of messages for reports from ships, and the form of messages for upper air reports. The numbers XXI to XXIV contained the extended 2-figure-codes for height of the cloud base or top (hh), visibility scale (vv), some changes in the code for specifications of present weather (ww) and specifications of forms of cloud ( $C_L C_M C_H$ ). The number XXV sqq contained the necessary instructions for the observers in composing the different forms of messages for synoptic meteorology and aviation, the organization of world issues, times of surface observations, and further necessary details for the correct functioning of the regular transmissions.

#### **The thirteenth Meeting at Toronto 1947**

The Commission was convened for the thirteenth session at Toronto, Canada, in the weeks preceding the Congress of Directors at Washington.

The abridged final report, published in 1949 (92), shows a number of fifty-six attendants. The session lasted three weeks from 25<sup>th</sup> August to 14<sup>th</sup> September.

The number of meetings was eighteen; the agenda contained fourteen items and the list of „Documents consulted“ called a number of seventy-five.

The President explained in his opening address the questions to be examined in a programme of nine items. He pointed out that the resolutions of the foregoing session at Paris had not given the desired satisfaction. So it appeared that the majority of the members requested a re-consideration of the standard form of weather reports and besides a number of fundamental specification of scales, which had been approved at Paris after long and arduous deliberations.

The renewal of the basic form of the weather reports took at Toronto a large amount of the time available.

It was not until two days before the session had to be finished that an agreement was finally reached and that modified codes and forms of code were adopted unanimously to be submitted to the Conference at Washington for introduction all over the world. The result of the decisions laid down in the resolutions should mean substantial changes in the specifications of visibility and cloud height, and in the system of index numbers, as well as the modification of the symbolic forms of the weather reports approved at Paris a year ago. It should be unpracticable to introduce the new forms of codes and the new codes in due course and universally on 1<sup>st</sup> January 1948, eventually provisionally with the existing system of index numbers.

The number of resolutions presented for consideration of the Congress of Washington was forty-nine. The report of the President of the Commission to the Congress was his closing of a long career in the practice of applied meteorology. The President of the Committee expressed his thanks to Col. E. Gold for the great amount of work in the 28 years of his presidency. His nomination to Honorary President of the Commission for Synoptic Weather Information gave rise to a long and vivid applause.

## Appendix B

### The Commission for Maritime Meteorology and Storm Warnings

#### Introduction

In the first years of the 20<sup>th</sup> century wireless telegraphy started developing regular correspondence between shore stations and ships at sea. This gave meteorologists the possibility of special arrangements for extending their horizon to the open seas by the transmission of reports from ships at sea.

At the meeting of the International Meteorological Committee in Paris 1907 (23) the questions was submitted for discussion by:

"obliger chaque navire portant des appareils radiotélégraphiques à faire et à transmettre les observations météorologiques et aussi à transmettre aux autres navires et aux stations à terre toutes les observations qu'ils reçoivent".

A second question of great importance was placed on the agenda by Father F r o c of the Meteorological Services of Zi-ka-wey (China) as Director concerned:

"d'adopter un système de signaux de tempête internationaux plus complet pour communiquer les avis que les instituts météorologiques intéressés envoient déjà aux ports et aux stations sémaphoriques et de préparer un rapport pour la prochaine réunion du Comité".

The result of both questions was, that the meeting proposed to entrust the study of the necessary arrangements agreed on to two commissions to be established namely:

- a Commission for Weather telegraphy and
- a Commission for Maritime Meteorology and Storm Warnings.

As President of both commissions Mr. W. N. S h a w was nominated.

These two commissions aimed at a narrow collaboration in the future in the task for preparing new arrangements for the use of wireless telegraphy for the exchange of weather reports from ships at sea to shore stations and to study the adoption of an improved system of storm warnings. Both commissions held their first and second meetings in London in 1909 and 1912 and sent reports to the Committee meetings of Berlin 1910 and Rome 1913.

The Committee meeting in Berlin adopted a system of five international storm signals as day signals with one or two cones in different positions. That of Rome decided to approve this scheme; but the adoption of it does not preclude the adoption by individual organizations of other signals, in addition, which do not form part of the international code.

The question of an international system of light signals with two or three red and white lights was referred back for further consideration by the Commission.

#### The first post-war session at Paris 1919 (93)

The items on the agenda of the first post-war meeting of the Commission stipulated: Firstly the elements to transmit in the weather reports in the forms of

code from ships at sea and the codes to use. Secondly, general instructions as regards the equipment with instruments and recommendations concerning their exposure. Among the elements to observe and transmit were mentioned the barometric tendency, the state of the sea and cloud observations.

The first post-war Conference of Directors in Paris 1919 re-instituted the pre-war commissions and nominated Col. Gold and Prof. van Everdingen as Presidents. They held their first meetings immediately after their re-establishment. The first task for both was to draft instructions for ships collaborating in the system of international exchange of weather reports with new codes and special forms of code for the use of ships at sea and for the interchange of reports from ships and land stations. The discussion concerning the universal adoption of storm warning signals should be postponed to a later meeting after correspondence with the services interested. The last decision was to convene the next meeting not before 1921.

#### **The second post-war session at London 1921 (94)**

The main questions for discussion were different experiments with codes and forms of code suggested after the world war 1914—1918. The meeting could not reach an unanimous opinion on the difficult question of forms of code with and without check figures, so a decision had to be postponed to a following meeting.

This second meeting after the war, the fourth after the establishment, tended to positive results. From the beginning the discussions concerned decisive instructions for the number of six groups in the forms of code and the number of figures for the different elements. A second item was the cooperation of the commission with other international commissions e.g. for the Reseau Mondial, for the Climatology of the Oceans and with other international councils e.g. the International Council for the Investigation of the sea and the International Hydrographic Bureau. The item "Equivalents for the numbers of the Beaufort scale" was referred to the International Meteorological Committee for consideration.

For the new codes equivalents in absolute units m.p.h. or m.p.sec. for the steps of the Beaufort scale of wind force were necessary, a question which had been discussed already in the Committee meeting at Rome 1913. It was resolved not to take a decision now and to await new suggestions at a future meeting as the time could not be judged ripe for proposals for arrangements to include the reports from ships at sea in the international exchange of the regular reports.

The Commission considered a proposal from the Swedish side for the checking of storm warnings and was especially interested by a proposal of General E. Delcambre for a weather service for the Atlantic, as the experiment which had already been made on the "Jacques Cartier". The question of forms of code with or without check figures could not be solved in this meeting. As the results of the deliberation were discussed definitely in a Joint Meeting with the sister commissions.

The two sister commissions (CMM and CSWI) held a joint meeting with the third for the Application of Meteorology for Aerial Navigation to take part in the discussions of the new codes and forms of code from the point of view of aviation and its special aims. For further details see Appendix A.

### The session at Utrecht 1923

The Commission tried to collect the material for daily synoptic charts of the northern hemisphere, which were composed by the Canadian Meteorological Office as circumpolar charts and at publishing monthly means of chosen representative stations. At the meeting of the Commission for Maritime Meteorology in Rome 1913 it had been decided to extend this last work also over the oceans with means of indicated 20-degree-squares for collection in a separate publication. The Netherlands Meteorological Institute had charged itself with collecting these means:

"with a view to the publication of a resumé of the observations as a contribution to the meteorology of the globe".

This institute had circulated the necessary forms for booking the observations. It had started at short notice the composition of a publication with monthly means of four 20-degree-squares two of them in the Atlantic Ocean and two in the Indian Ocean both immediately on both sides of the equator. Each of these 20-degree-squares had been sub-divided into four 10-degree-squares. The publication had been published in 1914 for the first time under the title of:

"Monthly meteorological data for 10-degree-squares in the Atlantic and Indian Ocean, computed by the Netherlands Meteorological Institute from international logs and observations".

In following years this publication had been edited half-yearly with data of the year 1913; completed later with those of 1900—1912. It has been continued up to the year 1933.

As a sequel to the deliberations in Paris in 1919 the present meeting in London asked for observations inside the tropical regions from the years 1910 to 1914 and after 1922 and also for 5-degree-squares.

Now it was proposed from the side of the Commission for Maritime Meteorology, being interested in the execution of these activities, that the indication of 5-degree-squares apart from the 10-degree-squares elaborated regularly at De Bilt should be done by the institutes which were particularly interested (Great Britain, the Scandinavian countries, Japan).

The Committee meeting approved of the President's draft circular to the directors notifying them of the decisions and requesting them to bring these into operation by cooperating in forwarding the necessary material.

The question of proposals for uniformity of storm signals was not mentioned in this meeting the importance of such proposals having diminished considerably owing to the development of wireless telegraphy.

An important discussion took place with regard to a Memorandum of Col. Delcambre on the collection and dissemination of ship's reports by a mobile station in the North Atlantic "Jacques Cartier" (see Appendix A).

### The session at Zürich 1926 (95)

The presence of a number of members of this Commission at Zürich had provided the opportunity to discuss some questions on storm signals of the meeting in Rome (1913) and Utrecht (1923) which had not been entirely solved. One of them had also been a question for discussion in the Commission for Synoptic

Weather Information (see Appendix A) namely to specify the equivalents of wind speed of the steps of the Beaufort scale generally used in the codes for weather reports. The Commission agreed with the equivalents which had been adopted by the CSWI for the three units: meters per second, miles per hour and kilometers per hour. It agreed at the same time with the equivalents for the original wordings of the usual terms in English, in German and in French.

The agenda contained as a second item some changes in the system of visual storm warning signals at night as adopted in 1910 and 1913, namely the 2-lamp signals, and in the significance of the black ball as the signal for "be alert and look for further information". It was decided also that the lowest limit for storms necessitating a warning, should be "windforce 8 Beaufort expected".

All these instructions had been laid down in seven resolutions. The further items to be discussed were of an administrative character namely the forms of the log books and their use for international publications. A sub-commission was nominated to study the questions of an amplified international form for extracts from ships' logs.

The meetings of the two sister commissions at Zürich had given rise to the appointment of a sub-commission "to consider the collection of synoptic reports from oceanic regions and their re-transmission in the collective messages for the use of forecast services and of ships at sea". The number of members was seven, including the Chairman, General E. Delcambre. This sub-commission held an extremely interesting meeting in Paris, May 1928, immediately preceding the seventh meeting of the Commission for Synoptic Weather Information in London June 1928 (96). A report was read in this last meeting by Dr. R. Bureau.

#### **The session at Copenhagen 1929**

The following session took place in the week preceding the Conference of Directors 1929. The Commission held three meetings. After that a joint meeting was planned with the sister commission of Synoptic Weather Information (97).

The first meeting was aimed at a general consideration of a long list of new codes for indication of meteorological elements, adopted in the CSWI and sent to the Commission for comments and amendments. Especially noteworthy are the codes of kinds of clouds, either one or two C or CC, and barometric tendency, either cb or cbb, which might be considered as a very useful information.

The second meeting opened a long discussion regarding maritime meteorology and safe navigation. The discussion did not lead to a decision but the Sub-Commission on Radiometeorology on the Oceans was asked to give its advise, not later than June 1930. The second item was devoted again to the storm signals of the Far East which led to a resolution (98) to convene a meeting of a number of Services in the Far East

"to discuss the possibility of adopting:

- 1) a uniform code of local and non-local visual storm warning signals; and
- 2) a uniform code for transmission in the Far East of daily weather reports by cable".

Mr. Claxton should be asked to act as convenor.

The Portuguese member announced the erection of a sufficiently powerful wireless station at the Azores. The details were communicated in a memorandum

to be presented to the meeting. The President proposed a vote of thanks to the Portuguese Government which suggestion was accepted with applause.

The memorandum itself should be handed to the Commission of Synoptic Weather Information.

The third meeting discussed some administrative questions. The most important being that regarding the projection for Atlantic and Circumpolar maps edited by the Danish Meteorological Institut and the Deutsche Seewarte at Hamburg.

It was resolved that the projection should be:

- a) for the Atlantic maps a monoconic projection with intersections at 30° and 60° latitude.
- b) for the Circumpolar maps an orthogonal projection on the plane through 60° latitude.

The help of the International Meteorological Committee was asked to cover the cost of preparing and editing these maps, which were estimated at a sum of 15.000 — 20.000 Marks.

#### **The Joint Meeting with the Commission for Synoptic Weather Information**

In first instance the meeting adopted the set of resolutions of the session of the sister commission in its meeting in London May 1928 proposed there by the Sub-Commission for Radiometeorology on the Oceans. This may be considered as a great step forward, lead by the President Gen. De l c a m b r e and his collaborator Dr. B u r e a u.

The sub-commission was reappointed with some new intrsuctions for its further activities.

The meeting proposed 2 forms of code for reports from ships at sea which were accepted reading

I. PQLLL III GG DDFww BBVTT 3C<sub>L</sub>C<sub>M</sub>C<sub>H</sub>N d<sub>t</sub>kdWN<sub>h</sub> dsfcbb  
II. id. 6KdCN d<sub>t</sub>d<sub>s</sub>K<sup>1</sup>WC<sub>H</sub>

the first (I) for use outside the tropical regions, the other (II) inside. These two forms of code replaced two forms of code proposed by the sister commission some days earlier in its own meeting, and the original proposal (99).

Dr. Seilkopf of Hamburg had, in the session at Copenhagen 1929, reported on the results of successful experiments with pilot balloons at sea with the mirror-theodolite of Dr. A. Wegener. It was judged desirable to prolonge the sub-commission created by the CSWI in 1928 in London and to give a permanent character to this Sub-Commission for Aerology on the Oceans. This name indicated the instruction to promote and organize aerological observations on board ships on the oceans (100).

#### **The second session of the Sub-Commission for Radiometeorology on the Oceans**

The presence of some members or their representatives of the Sub-Commission for Radiometeorology on the Oceans at Locarno had enabled the President to convene a meeting there during the days of the meeting of the Committee. He had prepared an agenda of eight items for discussion.

Many questions had to be discussed after the first experiences to bring the resolutions of Copenhagen into execution. Many difficulties of an internal character had to be overcome in different countries to come to an agreement regarding the instructions for ships and for the officers of radio services for the transmission of the reports to the coast stations.

The first item on the agenda concerned the indications by the meteorological services for the repartition of the 1000 "selected ships" on the different countries over the oceans. A list of these ships had to be forwarded once yearly to the President of the sub-commission and to services interested. A second item of great importance was a discussion regarding the way of composing the "Notice" of Resolution 32 of Copenhagen (101) which had been charged to a special sub-commission in this Resolution. It contained the following instruction:

"Une notice\*) sera préparée par la Sous-Commission qui exposera d'une manière pratique le plan international provisoire des transmissions en mer. Elle comprendra"

etc. follows a list of instructions (103).

Although this resolution expressed all instructions for the sub-commission a general discussion in a larger group had shown it to be necessary to inform the President about the procedures applied in different countries and to come to a conclusion how to fulfill the instruction.

Experience showed, that many growing-pains still had to be overcome and that thorough consultation with the telegraphic companies would be necessary to form the regulations for warranting the international regularity of transmissions. The taxes requested for these transmissions to the coastal stations differed widely in the different countries. In some countries no taxes at all were required and in other extraordinarily high taxes. A radio conference, that was shortly to be convened at Madrid, would open an opportunity to consider this question internationally. A delegation of meteorologists would make it possible to plead the interests of meteorology there, eventually by a proposal to make these transmissions quite free of charge. This delegation received its instructions from the President of the CSWI.

The Sub-Commission adopted in total seven resolutions to be presented at the first meeting of the CSWI. They remained undiscussed in the Committee meeting for the time being. The Procès-verbaux of this meeting has been inserted in the publication No. 17 of the Secretariat (104).

### **The session at Hamburg 1932**

In view of many resolutions of several commissions which concerned marine navigation and the newly created narrow relations with synoptic meteorology it became necessary to convene the Commission for a meeting to consider the necessary arrangements for shipping after the decisions taken at Copenhagen. The meeting took place at the Deutsche Seewarte at Hamburg. The main items of the agenda were:

The international storm signals,  
the organization of synoptic reports at sea,

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\*) This notice has been definitely composed and edited separately by the Secretariat at De Bilt in 1934 as Publication No. 18 (102).

the edition of the weather charts of the International Polar Year by the Deutsche Seewarte.

The first item had already been discussed at the Conference of Directors at Copenhagen and had given rise to the resolution 98 and 99. The later could be referred to a Resolution of the Committee at Vienna 1926 (Res. VIII). The question had been discussed also in a Conference of Directors of meteorological services at Hong Kong in 1930 as sequel to Resolution 98 of Copenhagen. Besides the Portuguese member had submitted it at the Committee meeting at Locarno as the result of discussions at a Maritime Congress at Lisbon (105). The agenda contained further a number of questions relating to those main items: division of the observation regions of the Oceans into 10-degree-squares, a new form of the meteorological log for ships, international codes for reports at sea and the publication of the synoptic meteorological observations on board ships and further a number of purely oceanographic researches, such as the measurement of the salt content and so on.

Two resolutions gave instructions regarding the number of observations a day and about the way of observing the salt content (Res. VII and VIII).

It had been shown that the instructions of the International Meteorological Committee at Vienna in 1926 regarding storm signals were not followed everywhere. Especially in the Far East there were some divergent and additional signals in use differing from the international system and with local signification which might cause misunderstandings. The "Local Code" and the "Non-Local Code" that were applied there differed from the international systems adopted at Lisbon and Vienna. It was for the moment impossible to take binding decisions without representatives of the Far East being present and so the question had to be postponed to a later date. A request had been made to the Far East to use all international storm warnings and signals also locally.

The report of the Sub-Commission for Radiometeorology on the Oceans of its meeting at Locarno, mentioned above formed the basis of the discussions regarding the second item upon synoptic reports at sea and particularly for expressing the Committees' standpoint with regard to the seven resolutions adopted there. Cheerful reports had been received from the American side regarding the delicate question of taxes. A Radio-Congress at New York had been willing to plead for total freedom from taxes for reports from ships at sea to coastal stations and this had been agreed to by the great radio companies. Hearty congratulations were addressed to the U.S. Meteorological Service for this result of great importance to its activities.

The director of New Zealand had written to say that the new codes for reports from ships did not give satisfaction in the southern hemisphere as being too complicated and too difficult for the few number of ships there. This formed an obstacle that had somehow to be overcome.

There was a long discussion regarding the new form of meteorological log for ships; whether the log ought to be noted according to the reports in the new international code and every four hours standard time GMT or, as up to the present, at the watch hours at local ship time six times daily. This new procedure was asking much of the officers' time at irregular hours on local ships' time and spread over the day and the night. Opinions diverged greatly with the ships of different nationalities and the question what would be preferable for use, a reseau

spread out over all the seas with many observations at irregular hours, or a restricted number of observations at strongly synoptic hours in more or less restricted ocean areas (North Atlantic Ocean). The needs of shipping itself ought to be of peculiar urgency in the first instance. The resulting resolution about this question expressed the opinion that the time was not yet ripe for a proposal for a meteorological log based on the international codes. At all events a log of this form could only be recommended for selected snips cooperating in the synoptic reports from ships at sea.

The edition of synoptic charts of the Northern Hemisphere for the Polar Year (106) was also broadly discussed regarding the question of the forms and whether it should be stopped or continued after the Polar Year was ended. It was recommended in a resolution to prepare an edition on a large extent with as much data as should be possible and to consider the possibility of continuation in future years with the aid the secretariat at De Bilt could give.

It was judged desirable to renominate the Sub-Commission for the Aerological Observations on Board Ship on the Oceans permanently. It was recommended by a scientific session to consider the prospects of these investigations. The question of the publication of the synoptic radio reports ought to be treated later. This formed the end of the agenda.

#### **The session at De Bilt 1938**

At the meeting at De Bilt the Far East was represented by Father Gherzi of Zi-ka-wey. It was the last presided over by Prof. van Everdingen, who had resigned as Director of the Royal Netherlands Meteorological Office some days previously.

The agenda of the Commission for Maritime Meteorology (107) again contained the question of visual storm signals, because in the regions of the typhoons in the Chinese Sea local signals had been in use with a divergent meaning. The discussions ended with the resolution to request the Meteorological Services in the Far East to consider the possibility of a uniform code for the visual storm signals to be presented in a following meeting of the Committee.

The Portuguese member mentioned that a powerful WT-station had been installed at the Azores for receiving and collecting the reports of ships on behalf of shipping in the Atlantic Ocean with the broadcasting at fixed hours of a "Meteo Atlantico" with reports and forecasts for specified parts of the Ocean. The meeting expressed with applause a vote of thanks for this splendid initiative of the Government of Portugal.

#### **The session at Berlin 1939**

The Commission had reviewed in its meetings at De Bilt 1938 (107) and in Berlin (108) the results of the Regional Commissions in so far as these could be the directives for their decisions. Thirteen of their resolutions were adopted by the Committee, most of them containing instructions for the observations for synoptic reports on board ship, how they ought to be effectuated, how to transfer them from ship to ship and in which forms of codes; what information they ought to contain and how they should be inserted and transmitted in collective synoptic

reports. As regards the hours of observation it was recommended for all ships all over the world to use the four hours 00, 06, 12 and 18 GMT.

The reports for ships at sea should contain a number of land stations in reduced forms of code. At the same time it was recommended to extend the number of "selected ships" from the number of 1000 fixed at Copenhagen to an "unlimited" number now.

Some of the codes for use especially by ships at sea, were revised and new codes introduced: sea, swell, arctic ice and a specification of the descriptions of the aspects of the sea at different figures of the Beaufort scale for windforce in the open sea.

#### **The post-war Session at Toronto 1947**

The Commission convened for a Session during the weeks preceding the International Meteorological Congress at Washington 1947 (109). The President reported to the Congress that the number of resolutions amounted to eighty-six. The Congress adopted a number of thirty and approved thirty two. The remaining twentyfour were noted (64).

Extraordinary important was a group of five resolutions on "Stationary Weather Ships" at the Oceans. It was considered that these ships would be admirably suited for the work of ocean weather reporting ships as concerns instrumental and observational technique for marine purposes.

## Appendix C

### The Commission for the International Polar Year

#### Introduction

The Conference at Copenhagen 1929 had formed, on a proposal of the Presidents of the Commissions for the Réseau Mondial and Polar Meteorology, and for Terrestrial Magnetism etc. a small committee, to celebrate the 50<sup>th</sup> anniversary of the International Polar Year 1882/83 by a new International Polar Year 1932/33. The members of both Commissions held a joint meeting at Copenhagen to discuss the matter and to draft a report to be presented to the Conference of Directors. After considerable discussion the meeting agreed with 15 resolutions, 8 of which were adopted by the Conference of Directors as follows (110):

- 1) The Conference is of the opinion that magnetic, auroral and meteorological observations at a network of stations in the Arctic and Antarctic would materially advance present knowledge and understanding of the magnetic, auroral and meteorological phenomena not only within the polar regions but in general. The Conference is also of the opinion that this increased knowledge will be of practical application to problems with terrestrial magnetism, marine and aerial navigation, wireless telegraphy and weather-forecasting.
- 2) The Conference is of the opinion that such observations should be carried out for one whole year and that international co-operation is necessary to ensure this.
- 3) The Conference proposes that such international co-operation shall be established during the year 1932—33, which is the Jubilee Year of the first International Polar Year 1882—83.
- 4) The Conference has received a report of a sub-commission appointed by the Commission for the Réseau Mondial and Polar Meteorology and the Commission for Terrestrial Magnetism and Atmospheric Electricity to consider the question of the proposed Polar Year, and is of the opinion that the scheme outlined there forms a suitable basis for the scientific work to be undertaken.
- 5) The Conference appoints a new commission to be entitled: "The Commission for the Polar Year 1932—33", to be charged with the carrying out of the undertaking. This commission will prepare detailed plans of the observations to be made and the methods of making them and will take all steps possible to co-ordinate the work of the various countries and organizations taking part so that the greatest value may be obtained from the scientific work carried out during the Polar Year.
- 6) The Conference appoints:  
The President, Commission for the Réseau Mondial and Polar Meteorology,  
The President, Commission for Terrestrial Magnetism and Atmospheric Electricity,  
The President, Commission for the Investigation of the Upper Air,  
Dr. D. la Cour (Denmark),  
M. Karpinsky (U.S.S.R.),  
M. J. Patterson (Canada),  
Dr. H. U. Sverdrup (Norway),  
to be members of the Commission with power to add to their number representatives of countries which express their intention to take an active part in the Polar Year.

- 7) The Conference instructs the Bureau of the International Meteorological Organization to bring the scheme for the Polar Year to the notice of all Directors and Governments in order to obtain the international co-operation on which the scheme depends.
- 8) The Bureau is also instructed to issue an invitation to the international Union of Geodesy and Geophysics to support the undertaking and to appoint representatives to co-operate with the Commission for the Polar Year 1932—33.

The new Commission for the International Polar Year held a short constitutive meeting before leaving Copenhagen for deliberating the procedures of its organization. According to number 5 of the resolutions of the Conference of Directors, it was the first task for the different members of the Commission to prepare memoranda with proposals for the stations to be established in the Arctic, their equipment and distribution and also for the stations outside the Polar Regions co-operating elsewhere over the globe.

The Commission held its first meeting in Leningrad at August 1930 and the second at Innsbruck thirteen months later. In the years 1930 und 1931 national committees had been established in different countries to participate in the Polar Year work.

The IGGU had decided to co-operate at its congress at Stockholm in August 1930. It had established a commission of 5 experts in terrestrial magnetism instructed to arrange the co-operation, mainly with complementary observations outside the Polar Regions. It was prepared to give financial support for the instruments for the aurora observations. A later support had been suggested for schemes for the publication of the observations and the sale of the volumes with the publications to be edited by the Polar Year Commission.

#### **The session at Leningrad 1930 (111)**

The agenda for this meeting was very restricted. It contained only 7 items. 10 out of the 12 members attended and moreover 24 guests, among them 21 Russians. During the sessions 2 new members were nominated. A considerable number of memoranda had been circulated for consideration at this meeting.

The President mentioned as the principal aim of this meeting the preparation of a report on:

- 1° the present state of the preparations in the different countries
- 2° to fix the steps to be taken to carry out the investigations proposed.

The number of countries able to dispose of the necessary funds was at the time small. In most of them the co-operation was still in preparation, but the last step, the decisive one i. e. "celui qui coûte" was still to be taken.

The President summarized in his opening address the communications received from a number of countries for taking part in the enterprise. The result of the deliberations in the sessions had been summed up in twenty two resolutions and recommendations.

This set of resolutions formed a complete scheme for the Polar Year organization. The different memoranda presented to the Commission for examination in the meetings as directives for the equipment of the temporary stations and for the exposure in sometimes very difficult conditions of instruments were extremely

valuable. In order to stimulate the co-operation the British member Dr. Simpson had composed shortly after the Conference at Copenhagen a pamphlet entitled "Outline of the scheme for a second Polar Year" (112). This had been sent through diplomatic channels to the Governments.

In this paper the aims of the Polar Year were summed up, besides a preliminary sketch of the scheme for encouraging national co-operation with the international enterprise.

Dr. La Cour himself had prepared the thoroughly documented and extremely skilful memorandum regarding the magnetic instruments and their exposure in easily transportable huts. The rate of costs per station could be estimated at \$ 4000. From the German side suggestions had been made for isolated stations with registering apparatus transmitting the observations by radio e.g. on the summits of isolated mountains.

A similar idea had also been proposed in a memorandum from the Russian side by Moltchanoff after the success of the "radiosonde", the registering instrument newly constructed by him for aerological researches in the atmosphere, transmitting to the ground stations by radio the atmospheric pressure and the temperature in the troposphere and the stratosphere up to great heights.

An approximation to uniformity of the types of instruments to be used should be aimed at in order that the records and the data derived from this might be the most directly comparable.

Russia notified that it was extraordinarily interested in the investigations during the International Polar Year. They had composed an extended list of stations and suggested an extended programme for hydrological research, in accordance with a request of the "Permanent Council for the Exploration of the Sea" at Copenhagen. The French member proposed a plan for the organization of co-operation in the Antarctic Regions.

The Commission had formed a special sub-commission for the publication. It now decided to divide the question of instrumental information into seven small groups, with a maximum of three specialist members each. They were instructed to send their suggestions before the end of 1930.

In the first of the twenty two resolutions it had been fixed, that the beginning of the Polar Year should be on August 1<sup>st</sup> 1932 and that the duration should be thirteen months. The third contained the desire that the numbers of magnetic stations to be established north of 55 degrees latitude should be forty-one. The other resolutions contained all recommendations for stations to be established especially for aerological observations or for observations on mountain summits.

#### **The session at Innsbruck 1931**

A full year had elapsed between the first and this second meeting of the Commission (113). During this time the members and further persons interested had been informed of the preparations in several countries and about the activities of the Bureau of the President by a series of circulars all forwarded by the Secretariat at De Bilt. The Bureau of the President had after the first meeting composed a propaganda pamphlet for general distribution with the title "The International Polar Year 1932—1933". This paper emphasized the need for a coordinated investi-

gation for the further progress of geophysical research and the peculiar aims of the Second Polar Year besides the way to realize its programme.

But dark clouds appeared on the sky, which had been so clear at the start at Copenhagen. A financial crisis threatened in the days of the meeting at Innsbruck, that would soon influence the whole world. This caused a reaction and voices were heard which expressed doubt whether the enterprise could still be successful. They asked whether it should not be preferable to postpone the Polar Year to more favourable times. The number of pessimistic waverers was still very limited and as a matter of fact their voices were still outvoted by those, who, after all that had already been achieved, rejected all thoughts of delaying the Polar Year enterprise.

The President reported in a long opening-address, what had been achieved all over the world. He summed up the way in which the wishes and recommendations of the twenty two resolutions of Leningrad could and should be realized in different countries and the actions which had been accomplished by the national commissions everywhere. He closed his speech by communicating a great number of new proposals for investigations to be undertaken during the Polar Year from different sides, besides recommendations of a number of commissions established in different directions. This had led him to compose a second pamphlet under the title: "Programme et recommandations de la Commission de l'Année Polaire 1932—1933". A "Règlement des Affaires intérieures" for the Commission ought to be composed in order to enable it to solve more quickly and efficiently the large number of questions that must be treated and decided by correspondence. The International Meteorological Committee must be ready for close co-operation and even be willing to allow liberation of some of its competences if necessary.

A draft of the "Règlement" as mentioned formed one of the eleven items of the agenda. The items 3 to 6 regarded all the programmes for the different kinds of observations. The last but one, the 10<sup>th</sup>, concerning the publication of the results of observations during and after the Polar Year.

The first item of the agenda "Etat actuel de la participation aux travaux" contained extremely satisfactory communications and proofs of honest enthusiasm. Notwithstanding the President warned the members earnestly that above all the aim of observations, made simultaneously all over the earth during the whole year with identical programme should be universal. This proposal ought to be superior to particular scientific researches of a local character in separate regions.

In first instance there ought to be absolute accord concerning the realization of the plans for the Polar Year: In reality a difficult decision. So the President proposed to entrust the discussions regarding this question to a limited commission before deliberating it in a plenary session. Four members were requested to form this commission.

This commission summed up its decisions in 6 points. The first urgently concerned the question raised "whether the Polar Year in view of the world financial crisis could be brought to execution yes or no". In view of the promises given by different governments, and of the fact that the researches proposed would be extended all over the globe, and that great advances could be made for geophysical science and also for the needs of practical life, the commission unanimously agreed with the decision recorded in the words:

"La Commission de l'Année Polaire 1932—1933 est d'avis que les préparatifs des travaux de l'Année Polaire sont si avancées que les recherches envisagées doivent être exécutées pendant 1932—1933".

This was an extremely important resolution and therefore the President suggested to adopt it only in a later session, so that every member had full opportunity to consider with the utmost care this decision. The resolution was adopted

The question of the aerological researches had been thoroughly discussed in the meeting of the Commission for the Investigation of the Upper Air at Madrid in 1931\*) and the resolutions formulated there were adopted with slight amendments by the Commission for the Polar Year.

A correspondence from the President regarding the cloud observations and radiation researches was discussed, and also an extended memorandum on the preparatory work in Russia. The vote on the resolutions came in the last session. Their total numbers was 57 including 37 for terrestrial magnetism with the necessary instructions for a complete scheme for the magnetic stations. The complete set of resolutions had to be discussed anew in the next meeting of the International Meteorological Committee in Locarno some days later.

Dr. E c k e n e r, the Commander of the airship Graf Zeppelin, stayed at Innsbruck during the meeting in order to consider whether he could co-operate during the Polar Year by observations on flights to the polar regions after his recent successful trip there.

Resolution No. 30 of the Polar Commission (No. 12 of the Committee) regarding the continuation of the preparations notwithstanding the unfavourable conditions had been adopted unanimously. The report of the meeting does not mention the violence expressed sometimes in the discussions.

The news of the devaluation of the English pound sterling came like a thunderbolt at a clear sky. The ardent speech of the President against the waverers was a real philippica to convince them of the duty to continue against all depreciating conditions. Shortly afterwards he would have to repeat his arguments another time in the next meeting of the Committee at Locarno.

#### **The session of the International Meteorological Committee at Locarno 1931 (101)**

In the first week of October the members of the Committee met at Locarno. The main items for discussion on the agenda were the reports of the commissions that had met in the two years after the Conference of Directors at Copenhagen.

The Congress of the IGGU at Stockholm in 1930 gave the opportunity for an informal conversation of the President with the members Dr. S i m p s o n and Dr. H e s s e l b e r g about an authorization for spending part of the finances of the Secretariat of the International Meteorological Committee of the first two years for international enterprises.

The report of the President was the most impressive document to be discussed. The Committee must decide whether "to be or not to be" in view of the divergence of opinions between the members. To continue should perhaps mean restricting the programme owing to the deterioration of the world financial conditions as well as in view of the fact that the credits had not yet definitely been

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\*) see App. D.

agreed upon. Not to continue could mean a serious risk of all that had been prepared when the actual enthusiasm should die away. The conversations at Stockholm about the collaboration of the Sections for Meteorology and Terrestrial Magnetism of the IGGU had given plain satisfaction to both parties and the IGGU had decided that funds should be put at the disposal of the enterprise of the IMO.

The decision recorded in the first resolution at Innsbruck:

"The Polar Year commences on August 1<sup>th</sup> 1932 and continues for 13 months", excluded all delay. The beginning and end of the Polar Year had been decisively stated. The President of the Commission expressed the intention he had in mind of composing the propaganda pamphlet mentioned previously about the programme for the Polar Year with separate chapters for all branches such as aerology, magnetism, radioelectricity etc.

The investigations of the Polar Year should give rise to the co-ordinated application of quite new instruments. This meant systematic research of the stratosphere in the polar regions with the newly constructed "radiosondes" and, as regards terrestrial magnetism, of continuously registering by the quick running magnetic instruments, making it possible to collect important new knowledge about the magnetism of the earth and its sudden changes. As concerned the radioelectric researches the investigations of the ionosphere were in full development. The President laid great emphasis on his conclusions in the words:

"we (ought to) concentrate our work to real Polar Year investigations and postpone all additional work until time will bring the money" — "the governments ought to be convinced that their money will not be disbursed for uncertain arctic experiments but for the purpose, that their country could collaborate with other countries by taking a share on a work which would bring about a great benefit to all civilized countries of the world".

After this speech the discussion was opened on the first resolution of Innsbruck "beginning and end of the Polar Year", later mentioned as No. 48 of the Committee proceedings. The President of the Committee supported it with his full authority. He pointed out that an enterprise of this kind for co-ordinated research would probably not be undertaken in the next 50 years to come and that a Polar Year eventually on a more restricted and modest scale would warrant sufficient advantages to justify the enterprise, Dr. L a C o u r laid stress on the fact:

"that the main task of the Polar Year should result in investigations, that could only be solved by international co-operation at a great number of stations".

The decision whether the Committee should adopt the resolution had been postponed once more to a later session. The number of stations in the southern hemisphere was much smaller than in the northern but nevertheless the co-operation was judged to be sufficient.

After the reading of the resolutions of the Polar Year Commission the debates regarding No. 48 had been re-opened. It was still not yet possible to get a majority, so the ultimate vote was postponed anew.

The final discussion came in the last session. But before the opening of the deliberations Dr. L a C o u r made the following declaration:

"I wish to point out how the position is.

A sub-commission was appointed to consider a new Polar Year. The Conference of Directors charged a Commission with that work.

The Commission has obtained a participation which as far as concerned aerology, magnetism and aurora promises more than expected.

National commissions have been instituted in 14 countries. The Commission has considered carefully the effect of the very bad economic crisis.

Now the Commission presents its programme and recommends unanimously the carrying out of the work.

Now I ask:

Will the Committee on this basis take:

the responsibility of stopping very useful work?

and the responsibility of an eventual failure of participation in a new Polar Year?

I propose to the Committee simply to adopt the following resolution:

"Le Comité approuve le travail de la Commission de l'Année Polaire 1932—1933 et recommande que la Commission obtienne l'appui possible pour l'exécution de l'entreprise de l'Année Polaire".

It still took a considerable time before agreement could be reached regarding the decisive form of the yielding to the arguments, so pressingly urged by Dr. L a C o u r with such conviction of promise of success, and before the Committee could decide to take the responsibility for the enterprise. This responsibility was finally expressed in the following form:

Res. 8. Le Comité regrette beaucoup que la crise financière du monde va sans doute diminuer la participation à l'Année Polaire vu que les travaux déjà assurés procurent un ensemble d'observations d'une grande importance pour la géophysique et ses applications pratiques, que l'interruption des préparatifs dans certains pays constitue une perte certaine et, qu'une incertitude assez grande existe en ce qui concerne la réussite d'une Année Polaire après un délai de quelques années, le Comité approuve le travail de la Commission de l'Année Polaire 1932—1933 et recommande que la Commission obtienne tout appui possible pour l'exécution de l'entreprise de l'Année Polaire."

After the adoption of this Resolution the battle was over and the Polar Year was saved. Dr. L a C o u r was heartily congratulated on all sides. His aims and endeavours were worthy of all possible support.

### **The session at Copenhagen 1932**

During the last months preceding the date of August 1<sup>th</sup> 1932 the necessary preparations were made for the departure and the transport of the equipments to their stations in order to be ready to start observations on the date fixed for the beginning of the Polar Year or as soon as possible.

The President could now state in his report: to what extent the resolutions and recommendations of the foregoing meetings had been carried out, and what was going on at present and what still remained to be done in the near future.

As regard the magnetic stations he could report that forty one were in action inside 55° N, nine inside 70° N and one inside 80° N. The observations at these magnetic stations included ionosphere observations and earth-currents. As concerned aerology, aerological observations by meteorological flights and pilot balloons at Reykjavik had been made daily after September 1<sup>st</sup> 1932 and the results were transmitted daily in the synoptic weather reports. With extreme satisfaction he could announce the receipt of a gift of \$ 40.000 put at his disposal by the

Rockefeller Foundation with the condition that \$ 30.000 should be spent on magnetic observations and \$ 10.000 to buy radiosondes of different types to be distributed over the aerological stations interested. Support had also been received for radiosondes from the Meteorological Association of the IGGU (50.000 French francs). And last but not least the Danish Rask-Orsted fund had contributed in providing the amount of the expenses of the Presidents numerous foreign journeys. Finally the Commission for the Polar Year of the IGGU had supported the aurora observations by providing spectroscopes and photographic cameras for investigations of the observations of the height in the atmosphere of this phenomenon.

Forty magnetic stations had been equipped with the special instruments for fast registration. To these belonged twenty-three stations that had been especially established for the Polar Year. Five of them were outside the polar regions next to and south of the equator. Part of them were placed along a magnetic meridian.

So the President could state with satisfaction that the "cri de coeur" to the International Meteorological Committee at Locarno had been heard and had brought vigorously forward the preparations for the Polar Year notwithstanding the deterioration of the financial situation in all parts of the world.

The important question of the drawing of circumpolar weathercharts of the Polar Year at the Deutsche Seewarte at Hamburg and the publication of these charts had been considered seriously at a meeting of the Commission for Maritime Meteorology at Hamburg (114). The Commission had been supporting this plan to the utmost. It drafted a memorandum with a budget for circulation with a number of specimen charts in different editions and a list of requests as an enquête and the conditions for subscription.

The result of this action was that preference was expressed for one of the forms of execution but that the number of subscribers preliminarily would not exceed 150 (instead of the number of 400 calculated). This would mean a considerable financial sacrifice for the Deutsche Seewarte, if the originally suggested price 6000 à 7000 Reichsmark) was maintained.

It was decided to arrange as a specimen the edition of a more extended series of weather charts for the month of March, 1931 destined to be circulated before the end of the Polar Year.

During the deliberations of this question the Association for Meteorology of the IGGU notified the Commission that it intended to support the synoptic observations by an amount of 40.000 French francs.

The President of the Committee was of the opinion that 150 copies were not sufficient. The edition ought to exceed 200. He had urged the Deutsche Seewarte by correspondence to take the risk for 400 copies supposing a considerable sale. After prolonged discussion it had been decided that the President of the Commission should be authorized to approach the said Association requesting to allow the use of its subsidy for this edition in view of the urgent desirability that the charts should be printed in a number exceeding 200.

It was a great satisfaction for Dr. La Cour to be able to declare that the Polar Year, notwithstanding all disappointments, had been successful.

Surely the date of August 1<sup>st</sup> 1932 may be called historic for meteorology and geophysics.

The Commission had still to arrange a programme of observation for the last months of the Polar Year complementary to the originally planned programme. It principally concerned aerological observations with radiosondes and a distribution of these instruments over the available stations. Twenty had been supplied to the aerological station at Reykjavik for ascensions on International Days for research of the upper air in July and August 1933.

The redaction of the last decisions had been deputed to the experts present of different branches. It concerned the arrangement of some regulations and instructions for continuing the observations after the Polar Year had ended. There was also the question, what should be done with the instruments lent to the Polar Year magnetic stations. It was decided to advise to continue the magnetic observations temporarily or definitely at ten named "Polar Year Stations" inside as well as outside the polar regions especially for one whole year, among them one at the equator and two in the southern hemisphere in temperate latitudes. It was prescribed that the magnetic instruments used for the absolute measurements should be compared with designated standard instruments on the return of the expeditions.

A central organization was thought necessary to dissolve the Polar Year arrangements. It should be instructed to create a collection of copies of all the registrations of all parts of the world during the Polar Year so that they would be easily available for all scientists. It was judged desirable that the Central Bureau of the Commission should possess a complete set of photographic copies of all magnetic and earth-current registrations made all over the world during the Polar Year. A catalogue of this material had to be published in due time.

Prof. Störmer, the chief expert in the province of aurora observations, was requested to look at these observations made during the Polar Year and to lead their elaboration. It was urgently recommended that all the observations should be published with the least possible delay. At least twenty and if possible hundred copies of the publications had to be put at the disposal of the Bureau of the Commission for exchange with those who desired to elaborate the results. The Meteorological Office in London took charge of collecting all ships' observations in the southern hemisphere and of placing them at the disposal of those who intended to make use of them for scientific research.

The Commission decided in the final resolution upon a plan for a destination for the remaining radiosondes and complementing radio-receivers for the use of later expositions and at stations in peculiar situations. They were to be at the disposal of the Aerological Commission after the dissolving of the Polar Year.

The Commission presented a report (106) to the International Meteorological Committee at its meeting at De Bilt, October 1933. The President of the Commission presented nineteen resolutions. He notified that the time for dissolving the Commission had not yet come. It needed still some years for the composing of a complete summary of the results of the Polar Year. He himself and other experts were of the opinion that the Commission needed still a period of 5 years. The necessary expenses for exercising its functions could be estimated at about 300.000 Swiss francs.

The Committee agreed to continue the Commission.

### **The liquidation of the International Polar Year 1932—1933 (115)**

After the war 1939—1945 was ended, a small Commission had been nominated in November 1946 with the aim to consider what could be and what should be done for the completion and elaboration of the results of the Second International Polar Year 1932—1933. It had presented a report to the Conference of Directors at Washington in 1947 and this had led to the nomination of a "Temporary Commission on the Liquidation of the Polar Year 1932—1933".

This commission was extremely thankful to the devoted Secretary of the Polar Year Commission Miss Bruun de Neergaard, now Mrs. Sveinbjørnsen for the way in which she had governed the secretariat of the Commission after the decease of Dr. La Cour in 1942 and also to the Danish Meteorological Institute for the extremely useful help to this enterprise.

After having taken the necessary measures relating to the fulfilment of its charge this Commission had got the permission early in 1948 to establish a Central Office at Copenhagen to be conducted by Dr. Laur sen under the supervision of the Director of the Danish Meteorological Office. Dr. Laur sen had been one of the nearest and most active collaborators of the late Dr. La Cour, the enthusiastic President of the Commission of the Second Polar Year 1932—1933. The contact between the members of this Commission had entirely been broken during the war and it had officially been dissolved by the Conference of Directors in London 1946.

This temporary commission had met in Oslo in August 1948. The President of the International Meteorological Committee attended this meeting. Dr. Laur sen reported about the programme of the work to be carried out by himself and he announced a preliminary budget for the necessary financial means to the amount of \$ 19.000. He was of the opinion that they could carry out the said working plan in 3 years.

It would be possible to furnish the necessary money partly from an account of the former International Commission of the Polar Year to an amount of \$ 7000. As regarded the difference the Rockefeller Foundation had granted in December 1947 the amount of \$ 12.000.

### **The magnetic observations of the Polar Year**

In the beginning of 1951, Dr. Laur sen gave an extended report about the activities of this Central Bureau. He had gathered in Copenhagen all the material for an extensive bibliography and had completed the archives and the lacking material of the observations. The number of the publications in the archives had grown to about 800. They embraced now an extremely valuable collection of magnetic observations of the Polar Year on microfilms. The Bureau had effectuated positive copies of all films of which only one negative was available, in order to put the material of the observations at the disposal of the students rapidly and without risk of losing. The collected archives of the Polar Year had been safely stored in the library of the Danish Meteorological Institute at Copenhagen.

### **The publication of the Northern Hemisphere Chart of the Polar Year**

The publication of the collection of circumpolar weather charts of the 13 months of the Polar Year, in former times elaborated and edited at the Deutsche Seewarte at Hamburg, was in 1939 not yet completed. The bulk of material relating

to this edition had been transported to London in 1949 and placed under the care of Sir Nelson Johnson. The charts had been delivered to the subscribers to the edition up to April 1933. 50 sets of those of May and June ought still to be delivered and those of 1 July to 16 August should be still printed. The material for plotting and preparing of the last 15 days of the Polar Year and the observations of 17—31 August to be elaborated in the charts of that date had been lost in the war.

The material ready for printing being deteriorated by insufficiently storing during the years of war a new order was given in London for printing 75 sets of the charts of July/August 1933, using a very satisfactory system of reproduction. The Meteorological Office in London took care of the necessary measures for distributing them to the subscribers.

As the Secretariat, at that time at De Bilt, had supported this edition in many ways financially and morally the actual General Secretary at Lausanne took part now in the deliberations of these questions.

The report informed further about the actual destination of the magnetic instruments, that had been given in loan. This had been made possible by a grant of the Rockefeller Foundation. Dr. La Cour in 1932 had indicated the conditions for eventual continuation of the use of these instruments at permanent observatories after the Polar Year.

The further elaboration of peculiar magnetic observations (magnetic quick-run records) and the insertion of Polar Year observations in regularly internationally published magnetic publications had been considered with foreign colleagues. Wherever the Bureau was able to give further assistance it had spent the material and financial means therefore.

A financial report with

- 1° accounts for the whole liquidation period until 31<sup>st</sup> of January 1951,
- 2° a statement concerning the balance taken over from the International Polar Year Commission and
- 3° a summary of payments and firm commitments as compared with the preliminary budget of November 1948

was added to the report. The list of firm commitments showed, that a sum of a little less than \$ 2000 was available now for return to the Rockefeller Foundation.

## Appendix D

### The Commission for Aeronautics

#### Introduction

In the last decennia of the 19<sup>th</sup> century the question of the decrease of temperature and other meteorological elements in the atmosphere was predominant in Europe as well as in the United States of America. The first mountain station in Europe was established at the „Hohe Sonnblick“ in the Austrian Alps at 3100 m. in 1872. In Switzerland the first researches were made in 1787 by de Saussure at the Mont Blanc and a meteorological station had been in existence for many years on the Col du Grand St. Bernard at about 2500 m. At the International Meteorological Congress in Paris in 1889 a number of papers were read summing up the results of investigations in mountain regions in this epoch (117).

Some years earlier researches had been started in Germany by means of large manned balloons. Thirty years earlier observations of the same kind had been made in England by Welsh and Glaisher. A profound critic of these early observations revealed that the results must have been influenced by the strong solar radiation in the upper layers of the atmosphere and at great heights by the rarefied air. It was the construction of the ventilated psychrometer of Assmann which opened the way for accurate observations of temperature and humidity in the free atmosphere free from radiation errors.

In the last decade of the foregoing century considerable progress was made by explorers in Europe and in America by free balloons with registering apparatus (Teisserenc de Bort at Trappes near Paris) and with so-called meteorographs in kites launched on a steel wire (L. Rotch, Blue Hill Observatory, R. Assmann, Preussisches Aeronautisches Observatorium Berlin and Lindenberg).

In the year 1896 the International Meteorological Committee established a special "Commission for Aeronautic" to assemble the different explorers all over the world with a view to co-ordinate the different ways of making observations and to organize them in an international co-operation. The Committee nominated as President of the Commission Prof. H. Hergesell of Strassburg.

The working programme of the Commission had been laid down in the constitutive meeting during the Meteorological Congress in Paris in 1896 (118) in the following set of 6 resolutions which were unanimously adopted by the Congress. After some discussion the Congress decided:

- 1) to recognize the great importance for the science of meteorology and to urge the progress and the increase of scientific ascents,
- 2) that it recognizes the significance of synoptic scientific aeronautical experiments at different stations by manned balloons or registering balloons,
- 3) that although it is not possible for the time being to recommend peculiar methods or instruments the use of instruments of the same kind at the synoptic ascents is to be recommended as far as possible,

- 4) that the publication of the results of the observations will be accelerated as much as possible in particular those at simultaneous ascents,
- 5) that it is desirable that the observations of unmanned cable balloons be continued regularly.
- 6) The accurate results of the experiments at Blue Hill with meteorological kites and registering meteorographs up to 2000 m. recommend to undertake such experiments at other convenient stations as the officially indicated stations.

The preliminary Bureau of the Commission could report at the Committee meeting at St. Petersburg 1899 (119) that the Commission aimed at following the directives of the six resolutions. It had been able to find representatives in most countries so that now it was composed of 24 members. The Bureau had instituted its seat at Straßburg in the Institute of the President. Its first regular task was to arrange programmes of simultaneous ascents and to centralize the collection of these observations in the Presidents' Bureau and to prepare a regular publication in a standard form.

As regards the costs of the editing the Prussian Government granted a sum of 10.000 Mark for the edition of the first volumes of the international publication in the years 1901, 1902, 1903 and 1904 (120).

The enthusiastic President showed himself a brilliant leader. New methods of the research of the upper atmosphere with newly constructed instruments showed indubitably the existence of a distinct division of the atmosphere in a lower part up to about 10 km. with decrease of temperature and a higher part above 10 to 12 km. height nearly isothermal. These parts were indicated by the names "troposphere" and "stratosphere" and they were mostly separated by a temperature-inversion.

The simultaneous observations on the International Days showed the peculiarities of this remarkable phenomenon over large distances, from the tropics to the poles and on expeditions in equatorial regions and in the North-Polar seas, lead by the President himself with specially equipped ships. It lasted to the year 1908 before a satisfactory explanation of this isothermal layer was published based on theories concerning effects of radiation-balance between absorption and radiation in these layers by E. Gold (121) in London and W. J. Humphreys in Washington (122).

The first decennium has been the epoch of the progressive research of the upper atmosphere at an ever-growing number of observatories in the whole world and on scientific expeditions. The regularly edited volumes of the international publication of the International Days provided the material for systematic studies on the application of the observations in practice. The outbreak of the war in 1914 stimulated the upper air observations more than limiting them on both sides of the warfront for aims of practice at the hostilities and for aids at the quick developing military air forces.

These new aims lead the Extraordinary Conference of Directors at Paris 1919 in re-establishing the Commissions and to establish a special Commission for the Application of Meteorology to Air Navigation apart from the scientific Commission for the Investigation of the Upper Atmosphere (123).

### **The Commission for the Investigation of the Upper Atmosphere at Bergen 1921**

One of the first Commission reports presented for discussion to the International Meteorological Committee was that of the Commission mentioned in the title at Bergen, Norway (124). The Bureau of the former German President at Strassburg Professor H. H e r g e s e l l had been obliged after the war to abandon its seat in that town. Its last activities had been the editing of the well-known International Publication of the results of aerological observations on the so-called International Days of the year 1912. This was laid on the table now. The President of the International Meteorological Committee, intensely interested in this matter, had sent a memorandum regarding the continuation of this publication in the future. In this document he had set forth his ideas of how to provide the finances which would be very considerable and how to divide them over the subscribing states. Finally it was decided in the first instance in a resolution "that there should be an international aerological publication" followed by a list of indications concerning the content and the way of composing it and a new system of International Days for future years that had been agreed to without discussion.

This meant a re-beginning of the activity of this highly important scientific Commission with a mighty future. The form and content of this famous publication was to be the subject of vivid discussions in several meetings in the coming years.

Three following resolutions concerned the technical questions arising in the preparation of this publication. One of the most important was to provide the necessary finance. In the first place it was agreed upon the costs:

"should no longer be left as hitherto to the good offices of the Director who occupies, for the time being, the position of President of the Commission." and that "the funds should include the sum necessary to pay for the preparation". "That on this understanding the President of the Commission be invited to undertake the care of the International Publications."

A later resolution mentioned a sum of 80.000 gold francs as the estimated costs of printing and circulating the publication and an equal amount for preparing and composing it.

The Committee was not able to come to an agreement regarding the different suggestions to provide these considerable aims. So it instructed its President to realize the following plan:

"that as a preliminary step a communication be addressed to the principal Institutes setting out the three proposals and asking for an opinion on the points raised, inviting suggestions of definite sums in case of further development of the proposal."

In this way the Committee left the decision to be taken to the Directors themselves, but it stated in a resolution:

"that this Committee is unanimous in desiring to see the proposal put forward by Prof. B j e r k n e s carried into execution as soon as possible."

It was judged that the quickest and best way to follow was by diplomatic channels but they suggested: "that it was desirable to take the opinion of the Directors before approaching the question through diplomatic channels."

The further resolutions regarded questions of a different nature and did not give rise to extensive discussions. They concerned the establishment of a Commission for a systematic study of propagation of sound at explosions, establishing of a meteorological station at Jungfrauoch and the installation of sets of registering

instruments on high radiotowers (Eiffeltower etc.). A proposal was put forward to request the Air forces of Army and Navy to send in systematic aerological observations at daily ascents with aeroplanes and regular observations of upper winds with pilot balloons, to calculate monthly means on behalf of the synoptic services and to provide the material of the results for publication and general information about the structure of the troposphere.

The Committee proved ready to support these proposals strongly. The Netherlands had proved that a similar organization with daily aeroplane ascents early in the morning, primarily to 3000 m, later 5000 m (spring 1920), could be arranged successfully by the military air forces so that the results in code could be inserted regularly in the daily synoptic weather reports of 11.00 GMT.

#### **The session at London 1925 (125)**

The President, Sir Napier Shaw, acting President since 1921, summarized in his Report to the International Meteorological Committee the activities of the Commission in the years up to 1925 and the instructions for the observations at the International Days. He mentioned particularly the results of the six ascents for intensified investigation of the atmosphere on single days with an extraordinary weather situation above Europe (24 January 1925, strong anticyclone over Europe). The day had been communicated by wire to the collaborating Institutes at short notice besides a call in the international daily reports on the two days preceding the observation day.

A second item of great importance was the re-publication of the results of the International Days for the joint account of the co-ordinating Institutes. The two questions, both important 1. of the form to be given to this publication and 2. of that of the finances, had not been solved at the Conference at Utrecht. The financial question had been considered by the members present at the IGGU Congress at Madrid in 1924 and this body had been willing to accord a sum of £ 500 for the edition of a "specimen volume" as a base for continued considerations\*). Both items formed the main questions for deliberation at the present meeting of the Commission.

In the meantime the President himself had projected new methods for graphs for the physics of the atmosphere after aerological observations with sounding balloons and aeroplanes (126). Several members had already notified their views regarding this new question before the meeting and had sent their suggestions concerning the form and content of the international publication to be composed.

A number of items on questions of organization and a series of communications of scientific or instrumental character were discussed in the purely scientific sessions. The difficult question of the definite form of the aerological publications, national as well as international, would be postponed to the editing of the "specimen volume" (probably 1927) at a future meeting of the Commission, to be prepared for 1927.

The number of resolutions amounted to 19. They contained decisions regarding the spending of the financial support for the "specimen volume" for the years 1923 and 1924. As the number of proposals for the form of the publication was not

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\*) The Netherlands Meteorological Institute could increase this sum with an amount of £ 83.

less than seven the choice of the ideal form ought to be left to the Bureau of the Commission. It had been agreed, that this should be in tables in standard heights and at standard atmospheric pressures and besides in graphic forms for pressure and temperature in the new form as published by the President (tephigrams).

The annexes to the report of the meeting prove the intense interest from the scientific side for the further extension of aerological observations at an ever-growing number of stations in all parts of the world and in all climates on land and also at sea on oceanographic expeditions\*). In view of this evolution it had been decided to abandon the centralization in the organization all over the globe and to change to a regional decentralization in a number of six regions divided over the large continents of the earth under the Presidency of the President himself and of five Vice-Presidents in the five regions outside Europe.

These intentions had been expressed in a resolution after the discussions regarding the division of the twenty-four International Days of the year (twice a group of 6 days with 1 ascent, once a group of 6 days with 2 ascents and besides the 6 observations at the disposal of the President).

Fundamental objections had been raised outside Europe against the collaboration with the six observations of the President in a short lapse of time after a quick call and mostly unexpected for each Institute. The end of these discussions was a new proposal from the United States:

"that one month each year should be chosen as an "international month" during which observations should be made if possible once a day and that in that month an intensive investigation of six ascents should also be made."

This plan was unanimously agreed on for being presented for adoption to the International Meteorological Committee in a resolution. This resolution mentions as the general aim of the aerological investigations:

- a) étude mondiale — the study of the general circulation of the atmosphere
- b) étude régionale — the more detailed study of the structure of the atmosphere and its changes in the several regions of observation.

It had been decided that as preliminarily the six regions for "les études régionales" mentioned as (b) and their deputy-presidents should be:

- |   |                                   |
|---|-----------------------------------|
| (a) North America                                   | Deputy-President Dr. C. F. Marvin |
| (b) South America                                   | Deputy-President Dr. C. F. Marvin |
| (c) Europe with Russia, Siberia and<br>North Africa | President Sir Napier Shaw         |
| (d) Indonesia and Philippines                       | Deputy-President J. H. Field      |
| (e) South Africa                                    | Deputy-President J. H. Field      |
| (f) Australia                                       | Deputy-President J. H. Field      |

The task of the deputy-presidents had been described as follows:

"The deputy-presidents should put themselves in communication with the President of the Commission with a view to fixing the days for the regional investigations which should include at least three soundings a day corresponding with the international hours of observation."

The specification of the "international month" should be as specified in the resolution mentioned above. But it should especially be noted that the scheme of international days as fixed at Bergen in 1921 should be followed e.g. that the

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\*) Meteor expedition of Germany in the Atlantic Ocean 1925—1927.

international months to be indicated should contain the series of daily observations of sounding balloons on succeeding days foreseen in this scheme. The six ascents at the disposal of the President should be executed on one or two succeeding days in the international month, for Europe to be specified by the President, and by the deputy-presidents for the other regions. The further resolutions concerned organizing and administrative instructions to be followed by the President.

This meeting had led to a further outline for the continuation and extension of work which had already been started since long. The communications in the scientific meetings proved the ever continued evolution of the observations in aerology. The quick development of aviation caused ever growing requirements to intensify aerological research, but no longer with the limited aim of purely scientific investigation but for incorporating the observations in the programme of routine work in the meteorological services to be applied in practice for information for regular flights in civil aviation.

The example of the Netherlands in 1920 and following years of sending up aeroplanes for the daily aerological soundings on the military aerodromes of army and navy had been followed more and more. It had been shown, that this method of observation obtained aerological data with extreme regularity as regards time and height and only fog and extremely low clouds could interrupt.

#### **The session at Leipzig 1927 (127)**

The main items of the agenda were again 1° the publication of the International Aerological Days and its form and content, and 2° the fixation of a new calender of these International Days after 1928. A great number of members and guests attended the meeting.

In the years after 1925 the President had been able to finish the "specimen volume" for the year 1923 composed according to the instructions of the foregoing meeting. Copies had been put in the hands of the members present for criticism and remarks.

The publication had been divided into four separate parts containing respectively:

- I. A list of stations in the world which take part regularly in the investigations of the high atmosphere, with their geographical co-ordinates.
- II. A series of synoptic weather charts of the pressure-field over the globe on the 38 International Days of the year 1923 of both hemispheres.
- III. The tables giving the results of the international observations at the different stations.
- IV. A series of graphs of the results of the soundings with ballons-sondes showing the conditions of energy against saturated or non-saturated air (tephigrams). Part III had been the most expensive being the most voluminous.

150 copies of the "specimen volume" had been forwarded to the different meteorological services. 6 of the contributing countries had subscribed already for a total of 220 copies. A number of 500 should be reserved for sale at a price of £ 2 for the total edition of the four parts.

The account closed with a sum of £ 1086.6.6. and included an advance of £ 500 which was hoped to be repaid by the sale of 250 copies at £ 2 each\*).

The President had disposed already of a good deal of the material for the years 1924 and 1925. The Commission had to deliberate now how to finance the parts for the following years and how to arrange to collect the necessary funds for it.

A second task would be to discuss the criticisms and remarks received about the form and content of the four parts of the specimen volume separately. These discussions should be distributed over four sub-commissions, one for each of the four parts. Their reports would be studied in a 5<sup>th</sup> sub-commission that would compose a final report to be discussed in plain session. A last question should be what steps should be taken to enable the editions of the following years to be published, from the standpoint of finance.

As regards this last question the meeting adopted the following resolution (V):

"that observations of the upper air on international days should be published in an international form by the President of the Commission. To defray the cost of printing, each country which co-operates in the investigations of the upper air or is interested in that work is urgently requested either to put at the disposal of the President a fixed annual sum or to buy a definite number of copies at a price to be fixed for each volume by the President.

The price fixed should be such that after the sale of all the available copies the expenses should be completely covered.

The countries which put a fixed sum at the disposal of the President should be entitled to receive a number of copies calculated according to the price of the volume."

The President intended to resign as soon as the meeting should have succeeded in fixing the course to be followed in future and to leave the execution of the plans for later years to a successor. This successor should on behalf of his predecessors as Presidents of the Commission and of the President of the International Meteorological Committee approach the Directors of Meteorological Services requesting them to contribute to the necessary funds as outlined in the above mentioned Resolution. The Directors should at the same time send a report on the material available for the years 1924, 1925 and 1926 and about what had already been prepared for 1927.

In a scientific session at Leipzig the Commission had been surprised by the astonishing communication of the Russian member Moltchanoff about a new instrument for aerological research the "Radiosonde", which opened great possibilities for investigation of the atmosphere to an unlimited extent. Experiments with these instruments were also going on in France by Bureau and Idrac.

The reports of the five sub-commissions gave rise to a number of resolutions for purely technical instructions and with prescriptions regarding unities, observation hours and heights of levels for inserting the data in the tables.

There was much divergence of opinion concerning form and content of the tables and for this reason it was decided (resolution XX): "that a small sub-

	£	s.	d.
*) Grant IGGU for 1923 . . . . .	500	—	—
contribution of the Netherlands . . . . .	41	6	—
contribution of the Aeronautical Observatory Lindenberg . . . . .	24	9	1
contribution of the Geophysical Institute Leningrad . . . . .	20	11	5
	586	6	6
advance for sale 500 copies . . . . .	500	—	—
total . . . . .	1086	6	6

commission should be appointed to consider the best form for the publication and schedules" under the personal lead of the President himself. With respect to the graphs it had been mentioned, that these should be inserted in future "as a supplement to the tables as far as funds permit".

It was agreed that the part 1924 should be prepared for the printer generally conforming to that for 1923. As regards later years the decision of the sub-commission should be awaited.

The result of these decisions was, that the Commission declared its agreement with the specimen volume. After that the Commission fixed a new Calendar for the International Days in continuation of that of Bergen for the years 1921—1928 and ending with 1936.

Before the election of a new President the French member Mr. Wehrlé expressed in an eloquent speech the homage of the Commission for the amount of work accomplished on behalf of the Commission by the resigning President. He concluded with a proposition to entrust the Presidency to Professor Hergesell, the man in whose devoted hands that function was placed from the very beginning, more than thirty years ago until the war 1914—1918.

This proposition was received with lively applause. Here again the right man had been placed in the right place for the continuation of the work of his active predecessor.

The Commission for the Investigation of the Upper Atmosphere had sent a report to the Conference of Directors at Copenhagen 1929 of its meeting at Leipzig 1927 and of the results of the deliberations in three short meetings of the sub-commission established there for discussing the form of the tables in the publication for the International Days. The report mentioned clearly the difficulties of bringing the material received into the required forms and the great expense of this work. It ended by stating the evergrowing extent of the work of the Commission caused by the regular addition (128) of the aerological observations as well as of the results to be inserted in the publication. It would be necessary, in order to solve these difficulties definitely that the Directors subscribe for a large number of copies of the part "Results". The price to be fixed for this part should be £ 3.

Seven out of the twenty-four resolutions of the Commission were adopted as Resolutions of the Conference, the rest were agreed to as regards questions of an internal character.

### **The session at Madrid 1931**

Complying with the invitation of Spain to hold the next meeting of the Commission the President convened the members to come together in the Spanish Capital in March 1931. The items to be discussed mainly concerned two questions namely the co-operation of the Commission for the International Polar Year and the continued edition of the aerological observations on the International Days.

The Bureau had received an extensive correspondence and a number of valuable memoranda that had been circulated. The last of the documents inserted in the report of the meeting published by the Secretariat (129) bears the number 46 and contains an account from the Bureau of the President about the finances of the editing of the publication of the International Days for the years 1923—1927 in London and later in Berlin on 1 March 1931.

The number of members present was fourteen and twelve guests. The number of resolutions and recommendations were thirty seven. A series of twelve contained recommendations on the kind of observations of particular interest for the Polar Year, and a stimulation for co-operation as extensive as possible. As regards the International Days a division had been made between a first, second and third order and a special calendar had been made for the years 1932 and 1933 with the hours for the observations on these days.

A following series of seven gave the results of the discussions about the publication of the International Days. The financial conditions continued to be precarious. A suggestion for support from the side of the Secretariat at De Bilt by an advance had been rejected.

Finally after a battle of several years unanimous agreement had been reached about the form of the publication and the form *Cannegietter* had been decisively adopted. It was desirable to make haste with the editions of the years 1924, 1926 und 1927 that were decided on at Leipzig and were still missing. As concerning the data for the later years it had been decided that the data for insertion should be forwarded to the President within a year and that the President should circulate a list.

One of the resolutions contained the request to the co-operators to draw tephigrams of the observations in the graphs prepared by Sir Napier Shaw and to forward these to the President. He should regularly circulate lists of the material received in order to be able to forward photocopies at moderate prices on request of people interested.

As usual a scientific session had been held to consider purely scientific questions. These questions were devoted this time to the special investigations of the upper layers of the stratosphere according to indirect methods of research above the limit admissible for the rubber sounding ballons (30 km.) e. g. by the propagation of sound of explosions. Researches in different countries had led to the remarkable results of supposing a strong increase of the temperature with height in the uppermost layers of the atmosphere. These investigations had formerly been organized by the special Commission for the Propagation of Sound at Explosions as part of the Réseau Mondial Commission. Actually this Commission suggested being linked to the Commission for the Exploration of the Upper Atmosphere. A number of directives for deliberation in this Commission were presented for these peculiar researches.

There was no objection to the decision to join both Commissions.

Before presenting the report of the session to the Committee session at Locarno the resolutions had to be submitted to the Commission of the Polar Year. In the session at Innsbruck this Commission examined these resolution and adopted the group that were in its domain without further discussion as its own resolutions in the programme of the Polar Year.

The International Meteorological Committee had in former times declared itself willing to put an advance of £ 150 at the disposal of Sir Napier Shaw for printing the tephigrams of the year 1924. This offer could justify a proposal of the Commission to the newly elected Executive Committee for the Secretariat concerning an advance as mentioned above. After some discussion it was decided that this question ought to be left for discussion to the Executive Committee in its coming session at De Bilt.

The remaining resolutions did not give rise to discussions on principles. The procès-verbal had been agreed to without further remarks or amendments with a vote of sincere thanks for the very valuable work accomplished by the active President in his advanced age. The Report of the President of the Commission had now to be presented to the International Meteorological Committee in Locarno 6 months later. Some new members had been nominated. The number of members had reached the impressive number of eighty six.

#### **The session at Friedrichshafen 1934 (130)**

The session of 1934 was attended by eighteen members and twenty guests, respectively from ten and fifteen countries. Two guests were from outside Europe (Japan).

The discussion concerned, for a considerable part, the work to be done as sequel to the programme during the International Polar Year. The number of Annexes to the report amounted to 50 and a number of 17 concerned the Polar Year work. It could be stated that the Polar Year had been successful. Now the important question had to be considered of the publication on a uniform system to be recommended by the Commission.

The insertion of the results on the International Days of the Polar Year in the publication of the Commission, apart from the present state of this publication after the preceding discussion in 1931 at Madrid, was narrowly related to this question.

The Secretary of the Commission presented a proposal for a form of publication to be followed uniformly with an obligatory minimum of data, as had been adopted in recent preceding meetings at Madrid. Next he had formulated a second proposal for a uniform elaboration of pilot balloon observations for the upper winds at fixed levels in the atmosphere.

The Secretary had composed a cartothèque in accordance with a resolution of Copenhagen (131) which contained a collective charge to all Commissions to compose a bibliography of the literature in each individual domain. In the present case, it was aerological literature of the years 1929 to 1934. The meeting expressed its great satisfaction and requested the continuation of this work for the coming year.

The session created the opportunity to consider as usual many scientific questions, among these the state of the exploration of the atmosphere with radiosondes. The construction of these instruments had been developed to such a degree of accuracy that they could be regularly added to the routine programme of work at the meteorological institutes. It could be foreseen that these observations would in future replace aeroplane observations.

The reports to the meetings about particular researches and about experiences gained by new methods of observation as for instance aerology on the oceans by pilot balloons on board ship, and indirect observations of the conditions reigning in the upper part of the stratosphere by the propagation of sound at explosions, showed the extreme interest and activity of the members individually. The peculiar interest for these observations had been expressed in a number of resolutions for encouraging the continuance and extension of them. The decisions

of the preceding Commission meetings about symbols and notifications for hydrometeors etc. were adopted for general use in aerology and for aerological climatology.

In many cases results of wide importance could only be reached in a satisfactory way after long discussions. But the success attained was, that the highly necessary uniformity had been warranted for the elaboration in all aerological institutes.

The latest resolutions contained a plan for the continuation of the publication for the International Days of the following years. Those of 1932 and 1933 should have preference. The resolution number XXVII contained the calendar for 1934—1947 for the 3-day series and the International months in the coming years.

In the session some new members had been nominated. The full list now contained ninety-three members.

#### **The session of the Aerological Commission at Berlin 1939 (132)**

The Commission for the Exploration of the Upper Atmosphere changed its long name to the short afore-mentioned classic name. In 1934, the old President Prof. H. Hergesell decided to transfer his functions to his compatriot Prof. L. Weickmann in view of his very advanced age. His decease in the year 1938 was remembered in the opening session at Berlin in some words of deep sympathy by the actual President.

The Commission had published in the years between 1935 and 1939 four publications of highly scientific importance.

The opening speeches recalled the leading rôle which this Commission had played, all over world in the years since its establishment, in the research of the high atmosphere. At this moment many new questions presented themselves owing to the unlimited progress of research with ever new methods. Now it had been the radiosonde that opened broad views in extending the daily observations to the stratosphere; which necessitated quite new regulations for the regular transmission of the evergrowing material of daily observations in different networks of stations in habited and in non-habited regions of the world. It demanded a quite new plan for organising synoptically the numerous observations at convenient hours; and new regulations for publishing the results of the ascents in due time for practical use in the daily forecasting services.

Also here the destiny of the decisions would be that they could not come into execution as a consequence of the deep radical changes in the world situations. But the work had not been done in vain. It created the indication of the route to be followed in future and reserved as such its significance for the times, that calm should be restored and the world should have re-found its balance of peace.

## **Appendix E**

### **The Commission for Solar Radiation**

#### **Introduction**

The first meteorological conference included in the programme of regular observation the question of the balance of energy received in the atmosphere by the solar and atmospheric radiation, although it was realized, that these measurements had a pure physical character and were to be carried out by especially trained observers in laboratories and with instruments of different kinds.

The question "to find a simple and appropriate method for determining radiation", addressed to the Congress at Rome in 1879 (133), was replied by the statement "that the research into the subject of radiation are not yet sufficiently advanced to enable it to propose a method of observation".

So the Congress considered that the question should be referred to the next Congress.

This next Congress was the Conference at Munich 1891 (134), which expressed as its opinion:

"that though great progress has been made in the direction of actinometric determination no method of observation has yet been proposed which could be recommended for general adoption."

#### **The establishment of the Commission at Paris 1896**

The question of radiation was put anew on the agenda of the free International Meteorological Congress in Paris 1896 (135) by the Deutsche Seewarte at Hamburg. It was considered desirable to compare at many stations internally the different types of instruments with one as standard; that the observations may be carried out by uniform methods, and that the instruments should be placed as much as possible in the same conditions. A special commission ought to be established for the instruction of the arrangements to be made everywhere internationally.

To satisfy this desire the International Meteorological Committee established in the last session at Paris among the special commissions a Commission for Radiation and Insolation with 17 members, under the Presidency of Mr. Violle (Messrs. Angström, Christoni, Chwolson, Snellen, Stupart, Tacchini, Violle with the right of co-optation of new members).

Mr. Violle (Paris) presented an extensive memorandum to the Committee Meeting at Saint Petersburg 1899 (136) with full details and an extensive bibliography as regards the history from the year 1760 onward and the apparatus of the last decennia of the 19<sup>th</sup> century under the most different conditions (mountains summits above 3000 up to 4800 meters). In the summary he stated that notwithstanding the great progress in the knowledge of solar radiation many questions were still unknown.

The report of the session of the Committee at Southport 1903 (137) contains a further "Report on Radiation" presented by the President of the Commission

Mr. Violle. This report shows clearly the complexity of the question and the immense interest of the several investigators. It ends with the words: "We therefore take this opportunity of expressing a desire" "that actinometric observations be made regularly and continuously at all meteorological observatories". We should know the amount of radiation received at each instant by one square centimetre of surface at the place of observation, the so-called solar-constant, and consequently the daily, monthly and annual amounts which are such important factors in determining climate. From them could be deduced an approximate value of the variations of the sun itself e. g. the eventual variations of the solar-constant.

In the following rules he points out the way to come to co-ordinated research and concludes by stating that if the International Committee will support the request submitted to it:

"Meteorology will reap great profit from the developments which will consequently take place in actinometric studies."

The session of the Committee at Southport coincided with a session of the British Association for the Advancement of Science. A number of famous astronomers and physicists were present, among them the astronomer Sir Norman Lockyer, Director of the Solar Physics Observatory South Kensington. The latter sent a paper entitled: "Reports of simultaneous Solar and Terrestrial Changes" (138) with an extensive résumé of the relation of meteorological phenomena from the point of view of their connexion with solar physics, e.g. earth temperature and sun spots, with a review of the question in the past and the present and an extended bibliography.

The members of the Committee had been invited to take part in a discussion of this subject at a meeting of Section A, concerned the section of the said British Association; after that Mr. Shaw proposed:

"that a Commission should be appointed to review and discuss meteorological observations from the point of view of their connexion with solar physics."

This motion was adopted, and Messrs. Lockyer, Shaw, Pernter and Angot were elected to serve on this Commission with power to add new members and to elect its officers as an astrophysical twin-sister of the existing Commission. It was to be indicated as "Solar Commission".

#### **The Conference of Directors at Innsbruck 1905**

The agenda of this Conference of Directors contained as the first item the conclusions of Mr. Violle's long memorandum presented to the Committee session at Southport two years ago. They were summed up in a set of five resolutions (139). In the second of these five proposals he laid stress on the value of mutual comparison of the instruments for measuring the radiation with a standard instrument and recommended as such the "Angströms' Compensation-Photometer" as being the most suitable instrument for the total solar radiation at all meteorological observatories.

Mr. Violle had never held a meeting of his Commission. He had sent in now his resignation in sequel to failing health. Mr. Angström (Stockholm) was elected President in his place.

As regards the future Mr. Violles' five proposals formed a working programme for his Commission. They were thoroughly discussed by the Committee and partially adopted.

In the mean time the Solar Commission mentioned as to be established at Southport two years ago, had been instituted with the considerable number of thirty-eight members, among them a number of well-known astronomers working in the province of solar physics. Sir Norman Lockyer had sent a report upon the work done in the Solar Physics Observatory, South Kensington, from 1<sup>st</sup> January to 31<sup>st</sup> December 1905 and at sessions of the Commission at Cambridge (1904) and Innsbruck (1905). He submitted two resolutions concerning the establishment of observing stations at permanent arctic stations and on islands in the Atlantic, North Pacific, South Pacific and Indian Oceans. These resolutions were adopted by the Conference. At the end of the Conference the newly elected International Meteorological Committee appointed the Commission as an official Commission of the Organization with the name of "Solar Commission". President was Sir Norman Lockyer.

The twin Commissions continued their activities and reported to the Committee session in Paris 1907 (140). That for Solar Radiation (Appendix XII) mentioned a Congress at Oxford 1905 and at Meudon 1907, where a set of 4 resolutions had been adopted. They noticed the designation of the pyrheliometer of Ångström as the standard instrument for measuring. A standard at Stockholm should serve for the necessary comparisons and for calibration of the instruments in use elsewhere.

Unfortunately Dr. Ångström begged to resign as President. His place was taken ad interim by Prof. Pernter (Austria).

The very extensive Appendix VI to the same report contained the complete list of members of the Solar Commission and the programme and the proceedings of the meeting at Innsbruck 1905. The Commission there stipulated the way to be followed for co-ordinated research in the coming years.

The Commission for Solar Radiation had not sent a report to the Committee meeting at Berlin 1910. After the decease of Prof. Pernter in 1908, Dr. J. Maurer (Zürich) had been elected by the International Meteorological Committee in the function of President of the Commission. The Commission was composed of nine members. It had up to that moment not held any meeting.

The report of the Committee meeting in Berlin 1910 contained as Appendix IV a report of the activities of the Solar Commission. This very active Commission had met on June 1909 in London for discussing three items namely:

- the form in which temperature data should be sent to the Commission,
- the preparation of a réseau of stations to represent the meteorology of the earth,
- and lastly the form of publication.

The conclusions of the Commission should be communicated to the members not present in a circular before being adopted.

Dr. Maurer convened the members of the Commission for Solar Radiation for a meeting in his country in September 1912 in Rapperswyl. Only three members attended (34). The Commission adopted in two meetings seven resolutions all in the province of the technique of the observations and instructions for the com-

parison of the instruments in use, further concerning the division of the instrumental equipment of the stations and observatories.

The Committee meeting in Rome 1913 (32) considered the results of the meeting at Rapperswyl. The question of the adoption of centres of comparison of the pyrhelimeters used at different stations gave rise to an exhaustive discussion and the Committee resolved:

"to recognize the desirability of establishing a centre for the comparison of pyrhelimeters with standard instruments both in Europe and America, and it looks forward to the establishment of similar institutions in the southern hemisphere."

The second resolution regarded the frequency of the regular daily messages. As concerned the measurement of the duration of sunshine difficulties had been raised in the comparability of the glass-ball recording instruments of Campbell Stokes named heliographs. The makers of these instruments may be proposed to accomplish the precise specifications in constructing them in order that, as far as possible, uniformity in the size and composition of the glass of the sphere and also of the paper may be reached.

#### **The re-establishment of the Commission at Paris 1919**

The extraordinary Conference of Directors of Meteorological Services was of the opinion, that the Commission for Solar Radiation belonged to those to be re-instituted in the new form for the International Meteorological Organization. So it re-established the Commission with 15 members and re-nominated Dr. M a u r e r President.

The Conference did not re-appoint the sister Commission for Radiation of the Sun because the International Union for Geodesy and Geophysics, established after the war 1919 at Brussels, was occupied in its section for Meteorology with the questions of solar radiation (radiation of the sun, solar constant, measures of radiation of the ground and the atmosphere). This had been considered in a meeting of this section at Rome 1922.

It had not been possible to held a meeting of the new Commission for Solar Radiation of the International Meteorological Organization before September 1923 in Utrecht during the Conference of Directors.

#### **The session at Utrecht 1923 (141)**

The circular of the President of the Commission for inviting the members for a meeting was circulated in April 1923. Many members sent letters referring to publications made elsewhere and proposals to be inserted in the agenda (Ångström, Chistoni, Abbot, Gorczynski, Knox-Shaw).

The meeting was attended by only six including the Bureau. In the two meetings some questions of organisatoric character were discussed. The results were laid down in 4 resolutions which were approved by the Conference of Directors. They regarded respectively the erection of a central institute equipped with absolute instruments in Europe to make investigations regarding such instruments, and further actinometric head- and secondary stations in every country with instruments for absolute measurements to be used as standards and standardized in comparison with those at the head stations.

These instrumental questions were treated in long reports by Messrs. Ångström, Lindholm and Gorczynski. They were added to the protocol of the meeting as annexes (142). The Conference advised that the Commission should place itself in communication with the Union of Geodesy and Geophysics in order to secure more complete action.

The Commission co-opted twelve new members.

#### **The session at Davos 1926 (44)**

The President of the International Meteorological Committee mentioned in its report to the Committee at its meeting at Vienna 1926 that an informal meeting of the Commission had been held at Davos attended by seven members. This meeting formed 4 resolutions as regards investigations carried on, the first on the use of colour filters for measurements in various wave-lengths of the solar spectrum, the second on the construction of an absolute standard instrument for calibration of a national standard and for comparison with the standard adopted at Innsbruck 1905. The third and fourth contained a recommendation for radiation-observations in aeroplanes and at mountain stations above 2000 m height.

#### **The session at Copenhagen 1929 (143)**

May 1929 the President invited the members to come to Copenhagen in September for attending a meeting during the Conference of Directors convened for the month of September in the capital of Denmark. The preliminary programme of only 3 items concerned reports respectively regarding:

- 1) Investigations carried on according to the resolutions at the meeting at Davos.
- 2) Reports as regards other actinometric investigations especially those of systematic character.
- 3) Discussions as regards programmes for measurements of a) solar radiation, b) diffused sun radiation, c) nocturnal radiation (effective radiation).

A second circular, expedited July 1929, was replied by 12 letters and memoranda concerning the work accomplished in the different countries on radiation. They fill up 26 pages in the report and formed the basis of the discussions.

Eleven members and ten guests attended the meeting and took part in the deliberations. They drafted 8 resolutions for presenting to the Conference of Directors for adoption or notification. These concerned the way in which the recommendation of the technical questions raised at Davos had been followed. The Commission decided in the last one (VIII) that for preparing the Radiation Programme of the suggested International Polar Year a sub-commission should be established and that Messrs. Ångström, Kalitine and Linke should be requested to put themselves at disposal for this work.

#### **The sessions in 1931 and 1932**

The following session of the Commission anew was an informal colloquium of twelve, later seventeen members specially interested in instrumental questions at Potsdam in February 1931 on the invitation of Dr. Süring, Dr. Linke and

Dr. Ångström. They had drafted 6 resolutions concerning the programme for the coming International Polar Year which were published in the circulars of the Commission for the Polar Year for examination by the afore mentioned sub-commission established at Copenhagen September 1929.

They are inserted too in the report of Dr. Ångström — who in the mean time had succeeded Dr. Maurer as President p.t. of the Commission — to the session of the International Meteorological Committee of October 1933 at De Bilt (144).

This report mentions a second official session of the Commission at Frankfurt a. M. September 1932. As the carrying out of one of the resolution of Potsdam (II) depended on special funds to be put at the disposal of the Commission the President had approached the Meteorological Section of the International Geophysical and Geodetical Union for an application of a grant from the Union in support on the investigations to establish the absolute pyrheliometric scale. The application was immediately granted and a sum of 3500 Swiss francs had been placed at the disposal of the Commission of the Meteorological Organization for carrying out the named works.

A detailed programme of the works on the pyrheliometric standard had been drafted by a small sub-commission for it, composed by Dr. Süring (President), Dr. Mörkøfer (Secretary), Dr. Volochine, Dr. Ångström himself and Dr. Abbot (USA).

The Frankfurt meeting presented 10 resolutions that were all noted by the Committee session at De Bilt in 1933.

#### **The report to the Conference at Warsaw 1935**

The session of the Commission at Frankfurt a. M. 1932 had not been followed by another meeting in the years to 1935.

Dr. Ångström had not yet definitely succeeded Dr. Maurer as President of the Commission. He signed the report still as President p.t. He mentioned the work of the "sub-commission for absolute pyrheliometry" and the financial support given by the Union of Geodesy and Geophysics and also by the "Notgemeinschaft der Deutschen Wissenschaft". For the discussions of the results already obtained and for the planning and organization of further investigations he referred to a meeting of the sub-commission at Potsdam 12—13 February 1935, under the presidency of Prof. Süring.

The Procès-verbaux of this session formed the content of the Appendix I of the report of the session of the Commission at Oxford 1936 (145).

As regards the chief problems on which in the last 15 years the interest of the Radiation Commission had been directed Dr. Ångström mentioned those concerning instruments and methods and those concerning definitions of actinometric elements and the purpose of actinometric measurements:

"To the first group belonged the question of standard-pyrheliometry, the definition of filters for measuring radiation in separate parts of the spectrum etc. In the latter group might be included the important question of the actinometric measurements as means for determining the atmospheric turbidity."

Dr. Ångström stated further:

"That the problem of the standard pyrheliometric scale would, as he hoped, soon be finally solved, through the co-operation of several institutions on the initiative of the Commission."

He hoped also:

"that the questions regarding as well the standard pyrheliometry as also atmospheric turbidity would have advanced before the next meeting of the Commission to such a point that definite conclusions might be reached and final resolutions proposed, and that a general discussion can be expected at a meeting to be postponed to some appropriate occasion in 1936 to prove fruitful."

Dr. Ångström himself was not present at the Conference of Directors at Warsaw 1935, neither the Secretary Dr. Mörkøfer.

After having heard the reading of the report by the Secretary of the Committee the President agreed to renounce for presenting resolutions before decisive results would have been obtained. He proposed to insert the Report of great importance in the Report of the Conference (146) and to congratulate Dr. Ångström with the success of the activity of the Commission.

#### **The session at Oxford 1936**

The Procès-verbaux of the meeting of Oxford September 1936 form a separate publication of the Secretariat of the International Meteorological Organization (145). The session was attended by eleven members of the Commission and the considerable number of twenty seven guests. Eighteen scientific memoranda were submitted for discussion. Many members of the Association for Meteorology of the IGGU included in their journey to a session at Edinburgh a stay at Oxford. An "international ozone conference" simultaneously held at Oxford was another reason for the numerous attendance.

The main question to be discussed related to the instrumental side of the measurements of the radiation of the sun and the sky in different climates. Of prime importance for this question was to make the observations with instruments constructed on equal principles, calibrated on the same scales, and compared with standard instruments. The latter existed only in a very limited number. The programme of the observations of the Commission had been arranged in accordance with the IGGU and an eventual appeal to this financially mighty body for subventions would not be made in vain.

The programme contained the stationing of mutually comparable instruments at some specially designed observatories for ensuring relatively comparable and absolutely reliable data as regards radiation measurements; and at same time indications in studying the reasons that influenced them. These could be mainly the influences of atmospheric turbidity.

The discussions had been prepared by a sub-commission of a small number of experts on instrumental affairs, working in observatories specially equipped for the observation of radiation (Potsdam, Paris, Upsala, Davos, Washington). This sub-commission had met in Potsdam in February 1936. The scientific memoranda served as subjects for deliberation and as bases for discussions in the meetings at Oxford.

On a proposal of Dr. Ångström the composition of the Radiation Commission of the OMI and of the same Commission of the IGGU were made

identical by election of five new members. So the list of members called forty-four names.

#### **The report to the meeting at Salzburg 1937 (147)**

The report to the International Meteorological Committee in Salzburg was used for giving a complete summary of the standpoints concerning the many questions which had been subject for investigations in various countries.

Dr. Å n g s t r ö m and Dr. M ö r i k o f e r, President and Secretary p. t. were elected in those functions respectively. The report of Dr. Å n g s t r ö m formed a complement to the extensive report of a year ago as concerned the modern views to several questions in the field of the work of the Commission. As concerned the difference between the current standard scales it had been shown that these differences are not constant, as generally had been believed as sequel to diffuse skylight as function of atmospheric conditions as turbidity and height above sea-level. Temperature dependence may cause disturbances in creating an absolute scale free from errors and detailed examinations will be unavoidable before final conclusions may be reached.

In view of the importance of these investigations the International Union of Geodesy and Geophysics had given a new grant of 2000 gold francs.

Sub-commissions were instituted for Nomenclature and for the use of the photo-electric Cadmium cell for measuring ultraviolet light. The question as regards the atmospheric turbidity had been included as a chief item in the programme since many years which touches in close connection synoptic meteorology and air masses. Contributions to the question of atmospheric turbidity were given at Oxford by the President himself and by four of the members. The report ends by summing up the help and the collaboration with international commissions in adjacent fields of research.

The 4 resolutions were read in the first meeting of the session at Salzburg. The numbers II, III and IV were adopted by the Committee with a vote of thanks to the active President.

#### **The report to the meeting at Berlin 1939 (55)**

The report of the President of the Commission for Solar Radiation of the activity in the years after 1937 was very short. There had been no meeting since 1937, and the only item to report was:

“that the work of the Commission, especially as regards the pyrheliometric standard, atmospheric turbidity and concerning the reliability of various actinometric instruments, is under progress. The next meeting is planned to be held in the spring of 1940.”

This next meeting could not be held by the disturbance of the political situation in the next 6 years.

After the war it lasted to February 1946 before the first post-war session of Directors of Meteorological Services could be held in London. Among the many changes was a review whether the old commissions should be re-instituted in the pre-war form. The result of long discussions was that a number of them should be dissolved. Among them was the Commission for Solar Radiation after an activity of just a half century.

## **Appendix F**

### **The Commission for the Réseau Mondial**

#### **Introduction**

At the International Conference of Directors assembled in Paris in 1896 the member Hildebrandsson presented a long memorandum entitled (148): "Sur les centres d'action de l'atmosphère." This caused the Congress to add to the agenda the item: "The establishment of meteorological stations in great centres of action of the atmosphere."

The Conference recognized in a resolution the scientific importance of the question raised by the Swedish member and adopted a platonic view expressing their interest.

Mr. Hildebrandsson took the question anew at the next meeting of the International Meteorological Committee at St. Petersburg in 1899 by presenting a new memorandum entitled (149): "Report on the establishment of observations at the centres of action of the atmosphere."

This time the meeting showed a more vivid interest by a discussion to which the majority of the members took part. The Committee unanimously adopted the resolution:

"The Commission recognizes the great importance which Mr. Hildebrandsson has pointed out of securing observations carried on regularly at certain spots which appear to possess special importance in indicating the general character of the movements of the atmosphere."

The question was not mentioned in the following Committee meetings in 1900 (Paris) and in 1903 (Southport) until the Commission for Solar Radiation referred to it. This led to a proposal to the Conference at Innsbruck 1905 (27) to establish permanent stations in the regions concerned. Mr. Hildebrandsson could report in the Committee session in Paris in 1907 (150) the results which had been reached in the mean time. The meeting expressed the promise: "to make every effort that the stations would be established."

A Commission was instructed (Messrs. Teisserenc de Bort (President), Hildebrandsson (Secretary) and Hergesell) to study the question of a world-wide network of meteorological stations. This triumvirat made use of the presence of a number of members of the Commissions of the IMO at Monaco April 1909 to invite them for a meeting to institute the special commission mentioned by the Committee.

The President explained that the aim of the Commission would be to organize a network of meteorological stations near the great centres of action of the atmosphere for the study of the general circulation in the atmosphere. Thirty seven stations were mentioned in both hemispheres, in the tropics and in the polar regions. The desirable equipment and the order of the stations were indicated and the transmission discussed.

The general instruction for the Commission was indicated by the President as follows:

“Organiser un Réseau Mondial permettant de suivre dans leur grands traits les modifications de l’atmosphère et de la chaleur solaire dans les différentes régions du globe. De plus de recueillir et de publier les observations des stations nécessaires pour l’étude des centres d’action et de la compensation des types du temps simultanés en différentes régions.

La Commission pense qu’il faut dès à présent grouper les observations nécessaires pour étudier les fluctuations des centres d’action.”

The Commission received the name

“Commission of the Réseau Mondial”.

The number of members in the year 1910 was thirteen; among them nine from Europe, two from the USA, one from Canada and one from India. A narrow contact with the Commission for Solar Radiation instituted in 1903 was recommended regarding the position of the work proposed to be undertaken by this Commission. The Commission had thirty-one members most of them astronomers and physicists. The President was the astronomer Sir Norman Lockyer.

As at the Committee meeting at Rome in 1913 the President had deceased and the Secretary resigned, a report was read by the German member Hellmann (151). It was decided not to reconstitute the Bureau of the Commission for the time being. Temporarily the President of the Committee Sir Napier Shaw himself took the lead.

In the meantime the clerical work of the Commission had been initiated at the British Meteorological Office by its Director Sir Napier Shaw. He had already in 1910 presented to the meeting of the International Meteorological Committee at Berlin a specimen of the compilation for the month of January 1905 which was accepted as satisfactory and general support was promised to the enterprise provided that the resulting compilation should be published.

Sir Napier Shaw succeeded in compiling the monthly results for the year 1911 in the form which was used for the specimen presented at Berlin. Preparation of the tables for 1912 and 1913 followed in due course, and the tables for 1911, 1912 and 1913 and also specimen charts for 1911, showing the deviations of pressure and temperature from normal values, were published in 1917 and 1918. With the latter a dream of Buys-Ballot of 50 years ago had been realized.

#### **The work of the Commission in the later years**

The war 1914—1918 was a bad time for continuing the work of collecting the material to be compiled in the publication sined at by the Commission. Nevertheless the Extraordinary Conference of Directors at Paris 1919 decided the re-establishment of the Réseau Mondial Commission with 13 members, President Sir Napier Shaw. The first publication appeared in 1920 as M. O. No. 204 g (Tables). It contained the data for the year 1910 with 15 tables for each month for the stations grouped in 14 latitude belts ( $80^{\circ}$ — $70^{\circ}$  N,  $70^{\circ}$ — $60^{\circ}$  N — — —  $40^{\circ}$ — $50^{\circ}$  S,  $50^{\circ}$ — $60^{\circ}$  S) each divided into 36 10-degrees-squares as regards the longitudes. This effectively gave room to a number of 400 stations on land with a density of 2 stations in each 10-degrees-square.

The indication of the station was made with 4 figures, 2 indicating latitude and 2 longitude.

In the coming years the compilation of the results of the observations in the scheme of the Commission was continued in the British Meteorological Office. The successor of Sir Napier Shaw as Director was elected as President of the Commission. After the volume for 1910 published in 1920, the years 1911 and 1912 had both been issued in 1917, 1913 in June 1918, and 1914 in 1921 each containing about 400 stations. The work of the Commission for Maritime Meteorology procured with its publication of the five-degrees-squares on the Oceans a supplement for the Oceans. In the mean time the collection of normals in use was carefully examined and brought up to date as far as possible to require little revision for several years. 1913 had 413 stations. At the Conference of Directors of the year 1923, 1915 was at the press. The work was continued regularly in the Meteorological Office but the last years the volumes were hampered by the world-war 1939—1945. The last volume issued was for the year 1934 and was edited in 1956.

### The Polar Commission

Mr. Rykatcheff of St. Petersburg, who represented Russia in the International Meteorological Committee, had sent a proposal (152) to the Committee-meeting at Rome in 1913 as sequel of special wishes of the Commission for Scientific Aeronautics at its meeting in Vienna May 1912. It regarded the carrying out of aerological observations in the North Polar basin to organize in an international scheme of operations contemplated by Russia. The conclusion was a proposal:

“that a polar commission be appointed to fix the time, to consider the opportunities for combining these experiments with other geophysical studies and to prepare an international programme.”

The Committee agreed with this proposal and expressed in a resolution its willingness to support the plan as an exceptionally favourable opportunity for the establishment of polar stations for the study of the atmospheric conditions of different atmospheric strata. It nominated accordingly a special commission for furtherance of this object, to consist of Messrs. Rykatcheff (President), Amundsen, Hergesell, Ryder and Stupart.

The Commission was instructed in particular: “to consider the opportunities for combining experiments on geophysical studies and to prepare an international programme”.

The experiments aimed at in the proposal were:

- 1) to establish meteorological and geophysical stations at places on Russian territory where in the International Polar Year 1882—1883 stations had passed the winter or had been projected\*),
- 2) to come to an agreement with other stations in Polar Regions in Europe, Asia and America,
- 3) to prepare an expedition to the cold pole of the earth in Siberia.

The Committee received this programme of the Commission ad hoc with great enthusiasm and immediately proceeded to nominate the Commission as a special “Commission for Polar Meteorology”.

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\*) Novaya-Zemlya and Dixon-Harbour on the Lena mouth

The war 1914—1918 prevented the Commission from active work during the first years of its existence. It was the Extraordinary Conference of Directors at Paris 1919 that re-appointed the former Commission as an independent Polar Commission with ten members, President Sir Napier Shaw.

The first opportunity for a meeting of the new Commission although informal was the meeting of the Commission for the investigation of the Upper Air at Bergen July 28<sup>th</sup> 1921. The second took place in London September 6<sup>th</sup> 1921 during the days preceding the Committee session in London. A report was presented to the Committee meeting (153).

These meetings had created the opportunity to organize the research planned formerly in connection with a projected expedition of Amundsen subvented by the Norwegian Government by 500000 crown that would leave Nome (Alaska) in 1922 and at stations equipped by Canada, Finland, Great Britain and Norway (Jan Mayen). It was stated that in all these cases it was probable that these stations would be continued.

The proposals for the co-operation in the geophysical investigations aimed at in the Polar Regions were supported by a report from the Danish member Capt. Ryder on an expedition under the leadership of Knud Rasmussen to the west coast of Greenland, with the intention of wintering north of Hudson Bay from 1922 to 1924.

The notification of the report of the Polar Commission caused the Committee meeting to recommend: "that the work which had already commenced in the stations in high latitudes should continue" and to pronounce the hope: "that the Governments will provide funds for the continuation of their co-operation during the whole period of the Amundsen expedition 1921—1925 and, if possible, permanently."

It was intended that the Danish explorer Rasmussen would start from Thule in August 1922 and return in the spring of 1924.

The further resolutions concerned instructions for the Polar stations and stipulated the desire: "that the Polar Commission be united with the Commission for the Réseau Mondial." The Committee agreed to this desire and approved the new Name "Commission for the Réseau Mondial and Polar Meteorology".

The number of members nominated in London was twenty-seven. Dr. G. C. Simpson was nominated President.

#### **The consecutive reports in the years 1921—1939**

As Sir Napier Shaw resigned in 1921 from the Directorship of the British Meteorological Office in London the Presidency of the Réseau Mondial Commission devolved on his successor Dr. G. C. Simpson. The new President reported to the Conference of Directors at Utrecht in 1923 on the activity of the Commission in collecting material for the publications of the Commission.

The Conference of Directors in 1923 referred in discussing the report of the Commission for Synoptic Weather Information some questions to the Réseau Mondial Commission. The most important was a request to consider anew the question of reduction of air pressure to sea level in the light of a number of

suggestions in this matter. The Commission had to recognize, that although the decision of Innsbruck in 1905 was not satisfactory in certain cases, no general method applicable to all stations had been suggested (Resolution No. 6).

In accord with this conclusion the Commission for Synoptic Weather Information had agreed unanimously to recommend to apply the reduction only for stations below 800 meters. High level stations above 800 meters transmitted in collective synoptic messages should be sent either reduced to station level or reduced to the nearest of the levels 1000 m., 2000 m., 3000 m., but this should be published especially in both cases (154). The Conference agreed, that no immediate change should be made.

#### **The session at Zürich 1926 (167)**

In consequence of requests from the Conference of Directors the Commission had been convened for a meeting at Zürich in 1926. Unfortunately the questions for consideration were judged likely to involve the Commission in difficulties, as often the best methods to apply would be inexpedient as tending to produce undue uniformity. So the Commission could do no more than state that, realizing the importance of special requests submitted, it was not in a position to make a study of them. Nevertheless the Commission would be glad to give "all help possible to those making such studies, either in collecting information desired or in arranging the data in a form suitable for statistical methods."

The receipt of a long and well documented memorandum on the question of reduction of pressure from the Director of the meteorological Service of Barcelona (155) caused the Commission to consider anew this important question. In accordance with the former recommendation to the Conference of Directors in 1923 and referring to the Resolutions No. 51 and 52 of that Conference the advice of the Commission again was not to change the former resolutions. So the Committee resolved in its meeting at Vienna in 1926 in its Resolution LXXVII as its conclusion "that it had no change to recommend" (44).

#### **The International Polar Year**

Shortly before the Conference of Directors at Copenhagen in 1929 the President of the International Meteorological Committee received suggestions for organizing a second "Polar Year" fifty years after the first in 1882—1883. This suggestion was considered by a small commission of experts in March 1929 and submitted thereafter to the President of the Commission for the Réseau Mondial and Polar Meteorology in London.

This small commission for the preparation of a draft for the enterprise presented to the Conference of Directors at Copenhagen a complete sketch in a number of 8 resolutions. One of them (5) proposed the appointment of a special Commission for the Polar Year 1932—1933

"to be charged with the carrying out of the undertaking, to prepare detailed plans of the observations to be made and the methods of making them and to take all steps possible to co-ordinate the work of the various countries and organisations taking part so that the greatest value may be obtained for the scientific work carried out during the Polar Year."

The following resolution (6) was read as follows:

"The Conference appoints:  
the President, Commission for the Réseau Mondial and Polar Meteorology,  
the President, Commission for Terrestrial Magnetism and Atmospheric  
Electricity,  
the President, Commission for the Investigation of the Upper Air,  
Dr. D. La Cour (Denmark)  
Mr. Karpinsky (USSR)  
Mr. J. Patterson (Canada)  
Dr. H. U. Sverdrup (Norway)  
to be members of the Commission with power to add to their number  
representatives of countries which express their intentions to take an active  
part in the Polar Year."

The Conference adopted these resolutions with great enthusiasm and  
nominated Dr. D. La Cour as the President of the Commission.

For the activity of this special Commission see Appendix C.

#### **The classification of meteorological literature by subjects**

The President of the Commission for the Réseau Mondial was particularly  
interested in this matter. He proposed therefore that the Conference would appoint  
a small sub-commission for it in collaboration between Dr. C. F. P. Brooks, the  
Librarian of the Meteorological Office, and Prof. Pollard, associated with the  
staff of the Science Library, London. A preliminary draft was circulated to all  
members of the Réseau Mondial Commission and thereafter, after receipt and  
incorporation of a number of helpful criticisms and suggestions, to the members  
of the International Committee.

The questions were broadly discussed in the Committee meetings and the  
scheme of Dr. Brooks compared with one by Dr. Hesselberg, formed as a  
revision of the original after consultation with the Institute at Brussels. The end  
of the discussion was to entrust the subject to a special bibliographic Commission  
composed by Messrs. Simpson, President, Hesselberg, Knoch and  
Wehrlé. The President was requested to communicate the result of the dis-  
cussions to the Institute at Brussels.

#### **The report of Warsaw 1935 (88)**

The next report was that to the Conference of Directors in Warsaw in 1935.  
It mentioned as the last publication issued that of 1927; that of 1929 being in active  
preparation. The number of stations remained between 470 and 455 landstations,  
that of the "squares" on the Oceans had declined to 7 in 1928 and was omitted  
in 1929.

In this report, although not part of the Commission, reference was made of  
a publication in U.S.A. (Washington), entitled: "World Weather Records" in two  
series. The first, consisted of monthly averages of pressure and temperature and  
monthly totals of precipitation for several hundred stations including all the  
stations of the Réseau Mondial with records of 20 years or more. This series  
included data up to 1920. It was edited by Mr. H. H. Clayton (Washington) at  
the expense of a special fund by Mr. John A. Roebeling.

The second series containing the data of the ten years 1921—1930 was  
published a year before. Both publications formed part of the "Smithsonian

Miscellaneous Collections" issued by the Smithsonian Institute of Washington. This second series collected the data of pressure, mean temperature and precipitation for the ten years 1921—1930 for most of the stations of the Réseau Mondial. It included also marine data and was a most valuable summary of the material collected and published by the Réseau Mondial.

The President suggested that the Conference of Directors should be asked to express to Mr. Clayton and Mr. Roebeling the appreciation of meteorologists for the preparation and publication of these valuable volumes. The Conference agreed with this suggestion.

#### **The report of Salzburg 1937 (51)**

The President of the Commission presented to the Committee meeting at Salzburg in 1937 a very short report. As regards the publishing of the yearly volumes he mentioned that that for 1931 was in course of preparation and 1930 had been sent to the printer. A less expensive method of printing known as the Replika process had been applied for the last Volumes. Taking into account a resolution of the Conference of Directors at Warsaw which had adopted the period 1901—1930 as a standard for climatological purposes this resolution (18) would be best met by the separate publication of a Volume of normals for the standard period 1901—1930 for the Réseau Mondial stations at which observations were carried on throughout this period. The preparation of these normals had been commenced.

As concerning the new "Decimal Classification" of the Literature of Meteorology the President of the special sub-commission (156) for this subject could report, that this work had been finished and that the "Universal Decimal Classification" had been adopted in the libraries of a large number of Meteorological Services in all parts of the world. It had been issued by the Secretariat in Publication No. 29, Tome II (App. XX).

#### **The report of Berlin 1939**

The President of the Commission presented a very restricted report to the Committee session at Berlin 1939. The state of the publications was, that the Volumes for 1930 and 1931 were issued, those for 1932 and 1933 were in the press and that for 1934 was in active preparation. The number of stations was decreased in every volume and was not more than 423 for 1932. The data for the oceans were omitted entirely since 1931 owing to the continued decrease in the number of reports from ships at sea.

The collection of data for landstations had continued to present very great difficulties and showed large gaps. Under these conditions it was becoming questionable whether the labour and expense involved in the continued preparation and publication of the Réseau Mondial could be justified. Two large countries were missing entirely in the Volume for 1931.

In discussing the question of the suspension of this valuable publication the Committee made a resolution stating:

"that there is a danger of the cessation of the publication of the Réseau Mondial owing to the non-receipt of data. The Committee considers the continuation of the Réseau Mondial to be of such great importance to all

Meteorological Services that all possible steps should be taken to obtain the necessary data."

The meeting adopted this resolution (40) and the President thanked Sir George Simpson for the extensive work done on behalf of the publication of the series of volumes and for his activity as regarding the new bibliography.

#### **The years of war 1939—1945**

During the years of war nothing else can be reported as that there was no attention to spare for the regular work of the Commission. The arrears were too considerable to be made up in a short time.

The President had limited his report to the Extraordinary Conference of Directors in London in 1946, the first after the second world war, to a report of the Commission for Bibliography.

#### **The Commission dissolved in 1946**

The fifth and seventh meetings of the Conference in London discussed the continuation of the pre-war Commission in the post-war organization. In the new list the old Commission for the Réseau Mondial is missing as the result of a proposal to change the name of this main Commission to a newly established "Commission for Bibliography and Publication".

This proposal was adopted by the Conference and so the old Commission disappeared from the list in order to be replaced by the new one.

## Appendix G

### The Commission for Terrestrial Magnetism and Atmospheric Electricity

#### Introduction

Two centuries ago the observers of meteorology also included in their observations the elements of terrestrial magnetism, e. g. the declination and the inclination of the free magnetic needle. In the first half of the 19<sup>th</sup> century some physicists and meteorologists gathered in Germany for discussing some questions about instruments and to come to general agreement as to a set of units for use by reporting the results of their measurements on mutual comparison.

When the meteorologists held their first meetings at Leipzig 1872, Vienna 1873 and Rome 1879 the agenda did not contain questions on terrestrial magnetism, notwithstanding magnetic observations were continuously made by the Meteorological Services and although a considerable part of the programme of the International Polar Year 1882—1883 was devoted to co-ordinated magnetic observations.

The proposed "Order of the Day" for the Conference at Munich 1891 included Terrestrial Magnetism in the agenda with the items 22—26.

At the second meeting a communication was made by Prof. Wild, that a sub-commission for the consideration of questions relating to terrestrial magnetism had been constituted, composed of those present conversant with the subject with a number of seventeen with Professor Wild as Chairman and Dr. Eschenhagen as Secretary. This sub-commission had held a meeting during the Conference (157). It had treated in three meetings a programme of eight items, concerning questions on terrestrial magnetism, one on earth currents and one atmospheric electricity (22—26). It had drafted 9 resolutions, which were unanimously adopted by the Conference.

This Magnetic sub-commission at Munich was considered as a sub-commission ad hoc of the Meteorological Conference to be dissolved at the closing of the Conference. So the meeting of the International Meteorological Committee at Upsala 1894 did not mention a report on questions of terrestrial magnetism, neither does the report of the Secretary of the Committee Mr. Scott at the International Meteorological Conference at Paris 1896.

#### The Magnetic Commission established 1896

Among the questions for consideration at this Conference (158) eight were related to terrestrial magnetism and atmospheric electricity. The President of the Conference proposed to institute a permanent "Commission for Terrestrial Magnetism and Atmospheric Electricity" with ten members, President Prof. Dr. von Bezold and Mr. Th. Mouraux Secretary.

This Commission convened a session during the Conference. It held 3 meetings with twenty three attendants on an agenda of eight items (27—34). Mr. Růčker was elected Vice-President.

The Conference proceeded in its last meeting with the establishment of four permanent commissions, among them as the first, a "Commission for Terrestrial Magnetism and Atmospheric Electricity" President Mr. R ü c k e r and seven members leaving free the extension of the number by co-optations of experts in the matter of terrestrial magnetism.

#### **The meeting at Bristol 1898**

The newly established Commission started its work at an International Magnetic Conference held at Bristol in England in September 1898 during the meeting of the British Association for the Advancement of Science there.

The President Mr. R ü c k e r sent a report of this meeting to the session of the International Meteorological Committee at Saint, Petersburg September 1899 dated December 22<sup>nd</sup> 1898 (159). He mentioned the decision that the magnetic resolutions should be submitted to the next Committee meeting, and that the attention of that meeting should be specially called to the proposals for the future organization of the Magnetic Commission. These proposals were that terrestrial magnetism should continue to be within the scope of the International Meteorological Conference, provided that:

- (1) „Invitations to attend the Conference are issued as widely as possible to Directors of magnetic observatories, and to all students of terrestrial magnetism.
- (2) That the Permanent Committee on Terrestrial Magnetism and Atmospheric Electricity as established at the Paris Conference, be continued.
- (3) That in future there shall be a Magnetic Section of the International Meteorological Conference, which shall elect a Permanent Magnetic Committee.
- (4) That the Magnetic Committee have power to summon an International Magnetic Conference at times other than those at which the whole of the International Meteorological (and Magnetic) Conference may meet.”

This report was read by the President of the Committee in the first meeting at St. Petersburg particularly the proposals mentioned above. These proposals were unanimously adopted.

#### **The Congress at Paris 1900 and the meeting at Southport 1903**

The International Meteorological Congress in Paris September 10<sup>th</sup>-16<sup>th</sup> 1900 provided an opportunity for meetings of the four permanent commissions established four years ago, also at Paris.

The agenda of this second meeting of the Magnetic Commission, and also of the other three, contained exclusively scientific and technical questions.

The International Meteorological Committee held only a short meeting with eleven members present (160). It re-elected Mr. R ü c k e r as President of the Magnetic Commission. It decided in relation to a proposition of the Magnetic Commission "to request the Directors of Magnetic Observatories to send in regular epochs lists of days selected as 'quiet days' by the various observatories, and that this information should be notified to the President of the Commission, who would communicate by circular to all observatories interested."

The President of the Committee was able to report in his opening address to the meeting at Southport (161) that as a result of this request a great quantity

of these informations had been forwarded by a great number of observatories to the Secretary of the Magnetic Commission. This officer had transmitted this information in printed form to the main magnetic observatories.

It was considered preferable in future to charge with this task one of the members other than the Secretary of the Commission and to extend the information also to "disturbed days". The Committee decided, after discussion that Dr. Snellen (Holland) be requested to collect the observations on "quiet days" and to distribute them, but to leave the question of the "disturbed days" to the Magnetic Commission itself.

#### **The session at Innsbruck 1905**

In the years between the Committee meeting at Southport and the Conference of Directors at Innsbruck the President Sir Artur R ü c k e r had notified his desire to resign the office of President of the Commission. On request the chair was temporarily taken by Mr. R y k a t c h e f f and Messrs. M e s s e r s c h m i t t and R u d z k i were elected Secretaries.

The Commission had convened the members for a session during the Conference at Innsbruck for discussing some questions on

- A. Terrestrial Magnetism,
- B. Atmospheric Electricity,
- C. Organization.

The "Exchange of lists of 'quiet' and 'disturbed' day" belonged to the first category.

As regards this item four proposals had been sent by Dr. Snellen who was not present. The Commission added a fifth. These proposals were summarized in five items which acted as instructions for the exchange of the "quiet days". The last proposal indicated the definition of "quiet days":

5. "A day shall be regarded as 'quiet' if the irregular fluctuations of any of the magnetic elements do not exceed one-third part of the diurnal range for the day."

Relating to the question of a magnetic classification of days the Commission agreed on the following numerical scale proposed by Prof. Adolf S c h m i d t and others as:

- 0 = quiet days,
- 1 = disturbed days,
- 2 = very disturbed days.

It was left to the discretion of individual Directors to fix limits for defining these divisions. Magnetic observatories were requested to prepare, from January 1<sup>st</sup>, 1906, lists showing the magnetic character of each day on the aforementioned scale 0 to 2.

Concerning the exchange of records the Commission resolved:

"Magnetic observatories should exchange promptly copies of their tracing for all very disturbed days (type 2 on the Schmidt classification) and for other days of special interest. For this purpose a lists of magnetic observatories should be drawn up."

The number of meetings was 3. The last question considered led to the statement of the Commission regarding its complementary aim, atmospheric electricity.

"The Commission is of the opinion that investigations on atmospheric electricity have not progressed beyond the stage of study and that definite methods of reduction cannot be recommended as yet."

The Commission drafted in total a number of 9 resolutions which were all adopted by the Conference of Directors. The newly elected International Meteorological Committee re-elected in a short final Meeting the Magnetic Commission with 18 members, President Mr. R y k a t c h e f f. A number of additional members could be added eventually by co-optation.

The arrangement made in this meeting for fixing a scale for the indication of the magnetic character of the days, undisturbed and disturbed, and the composition of the lists of these days at various observatories in the Netherlands Meteorological Institute was the beginning of an important magnetic publication which ran for many years as will be sketched in the later parts of this report. The publication was entitled: "Commission internationale de magnétisme terrestre. Caractère de chaque jour, rédigée par le membre de la Commission Dr. Maurits S n e l l e n."

#### **The report of Paris 1907 (163)**

Prof. v o n B e z o l d, predecessor of Prof. R y k a t c h e f f as President of the Magnetic Commission had already at Innsbruck proposed a new organization in the Commission by electing a permanent Bureau of five members for the carrying out of the resolutions and to prepare the propositions for the next Conference. This Bureau was instructed to approach the Department of Terrestrial Magnetism of the Carnegie Institution and to prepare a plan for co-operation between the great Magnetic Institutes and the said Department. This plan had been submitted to the Conference of Directors at Innsbruck 1905 and had been adopted by it.

This Bureau had been constituted by the members R y k a t c h e f f (President), Ad. S c h m i d t (secretary), C h r e e, C a r l h e i m - G y l l e n s k ö l d and M o u r e a u x.

The President and the Secretary drafted a reglement for the activity of the Bureau.

The main task of the Bureau was to supervise the carrying out of the decisions and resolutions drafted in the meetings of the Commission and adopted by the Committee. The principle questions to be arranged after the discussions in the last meetings were the characterization of the magnetic data at various dates, a number of questions on instruments and comparisons with standard instruments, the distribution of magnetic stations on the earth and the magnetic survey of the earth in various countries.

#### **The meeting at Berlin 1910 (164)**

The meeting preceded that of the International Meteorological Committee September 26<sup>th</sup>—29<sup>th</sup>. Eleven members and twelve guests attended; Mr. R y k a t c h e f f presided over the session.

The Commission had not met since 1907. Some new members had been nominated for replacing resigned or deceased members. The Bureau circulated August 1910 an agenda with 5 items concerning:

- I) Report which had been carried out of the Innsbruck Conference and
- II) How to carry out the remaining decisions ((1) comparison of instruments, (2) publication of magnetic characters, (3) exchange of registration of disturbed days, (4) relations with Department of Terr. Magn. Carnegie Institution, (5) list of stations, (6) extension of the réseau of magnetic stations).
- III) Draft concerning uniformity of the contents and the form of publication of magnetic observations.
- IV) The magnetic survey along a parallel as decided by a committee of the International Association of the Academies and
- V) The magnetic survey of the whole terrestrial globe, enterprise of the Carnegie Institution, and how the magnetic institution would co-operate with the Department of Terrestrial Magnetism to accomplish both enterprises.

For discussing the two last items IV and V it would be desirable to refer to reports on the magnetic surveys that had been executed or planned in the various countries.

The results of the four meetings were summed up in 9 resolutions. The first (I) was a vote of thanks to the Italian Government for the establishment of a magnetic central observatory in Italy; the second (II.1) contained a plea to the Directors of Magnetic Institutes to effectuate the comparison of their standard instruments with those of other countries; the third (II.2) mentioned the institution of a sub-commission (Chree, van Everdingen, Ad. Schmidt) to indicate the principles on which the individual days are to be characterised; the fourth (II.3) mentioned instructions and desiderata, and the fifth (II.4) another plea to undertake magnetic observations in countries which do not yet possess Magnetic Institutes. The following sixth item (II.5) expressed a vote of thanks to three members and to their Governments for co-operation regarding effectuation and publication of the lists of Magnetic Observatories; the seventh (II.6) expressed appreciation for the communications of a number of members (9) on a recent extension of stations in the regions in the far North and in Russian Asia, in Central Africa and in the North of Canada.

The last but one resolution instructed the Bureau of the Commission, as a sequel to proposition of Dr. Ad. Schmidt (165), to adopt closer uniformity in the publications of the magnetic observatories limited to a prescribed minimum, to be followed by all observatories indicated as:

- (1) The means of observed elements for each day.
- (2) The mean daily range of all elements or at least of the components for each month in deviations from the monthly means at local time.

The last resolution expressed the appreciation of the Commission for the wonderful work done by the Department of Terrestrial Magnetism of the Carnegie Institution for a magnetic survey of the whole earth.

The Commission held no meetings in the period between the Committee meetings at Berlin 1910 and Rome 1913. The Commission had lost its Secretary

Prof. Messerschmidt deceased in 1912. He was replaced by Prof. Bidlingmayer his successor as Director at Munich. The report mentions the last extension of the reseau of magnetic stations in the North and East and the ever augmenting troubles of electric traffic everywhere.

This is a short summary of the report (166) of the President to the Committee meeting 1913. The meeting made no amendments. The Commission continued its routine work and the existing programme until the war 1914—1918 disturbed all connections.

Nevertheless the three members of the sub-commission on "Magnetic Character" Messrs. van Everdingen, Chree and Ad. Schmidt could present a report of the activity in the Meteorological Institute at De Bilt to the first post-war meeting of members of the pre-war International Meteorological Committee in London 1919. The meeting "expressed its thanks and appreciation for the successful manner in which Dr. van Everdingen, as President of the Sub-Committee, had carried out the work during the war".

The Extraordinary Conference of Directors in Paris 1919 re-established the Magnetic Commission with twelve members, President Mr. A. Angot (Paris).

#### **The first post-war meeting at Utrecht 1923 (43)**

The Commission was convened, for the first meeting after its re-establishment, at Utrecht 1923.

The President Mr. Angot had announced his wish to resign in this function after having resigned as Director in his country. His report to the Committee meeting in London 1921 was limited to notifying a number of seven newly co-opted members. His preliminary report to the Conference of Directors at Utrecht dated 30 June 1923, was his last official action.

In his absence the Secretary Prof. van Everdingen took the Chair for the meeting of the Commission and Dr. G. van Dijk was appointed Secretary.

The agenda was short and contained only four items. A quite new question was the relation of the Commission to a new star risen in the meteorological sky by the institution, in the year 1919 of the International Geodetical and Geophysical Union and its section of Terrestrial Magnetism and Atmospheric Electricity. The question whether the Commission of the Organization should be maintained or not was replied to in the affirmative.

Dr. Chree was requested to be the new President. It was unanimously agreed to co-opt the prominent organizer Prof. Ad. Schmidt as a member to the Commission.

It was considered desirable to continue the publication "Caractère magnétique de chaque jour" at the Institute at De Bilt with some small alterations. It was thought advisable that problems like the "activity" of terrestrial magnetism should be left to the Union, and those of "general organization" to the Commission after consideration and approval of the recommendations of the Union.

A number of reports had been received as regards the magnetic survey in various countries. In a resumé of the situation Prof. van Everdingen drew attention to the great activity in magnetic surveying all over the globe.

After this meeting Dr. Chree took the Presidency and Prof. van Everdingen resumed his functions as Secretary. In a second meeting Dr. van Dijk explained in a short summary the state of the edition of the publication "Magnetic character of each day". A second item was the reproduction of magnetic curves. One of the members gave some information about measurements of atmospheric electricity in connection with thunderstorms.

#### **The meeting at Zürich 1926 (167)**

The President presented an agenda of six items. Prof. van Everdingen read a report prepared by Dr. van Dijk on the publication of magnetic character data made at De Bilt. It was considered inadvisable to make any change at present.

The questions discussed were all of internal interest as to the policy to be followed under the existing arrangements. The most important as regards the future relationship between the Magnetic Commission and the Section on Terrestrial Magnetism and Electricity of the International Union of Geodetics and Geophysics led to the resolution:

"La Commission considère que la question des relations entre elle et la Section de Magnétisme et Electricité Terrestre de l'Union Internationale Géodésique et Géophysique doit être renvoyée à une Commission composée de membres des deux organismes."

#### **The meeting at Copenhagen 1929 (45)**

The next Committee meeting was that of Copenhagen 1929 during the Conference of Directors in September 1929.

The report was for the second time presented by Prof. van Everdingen as President ad interim after the loss by decease a year ago of the Commission President Dr. Chree. So the Secretary once more replaced the Chairman. He himself wished to retire as Secretary and proposed Dr. La Cour as his successor and Dr. van Dijk as second Secretary.

For the Presidency Prof. Maurain (Paris) was proposed by Dr. La Cour and Dr. Simpson. Thirteen new members were added as members by co-optation. This brought the number of members to forty-four.

The agenda was as usual short. It presented five items but the last was an extremely important question namely a proposal to undertake an International Polar Year 50 years after the First International Polar Year 1882—1883. For discussing this enormous proposal collaboration with the Commission for the Réseau Mondial and Polar Meteorology was necessary in a separate joint meeting.

## Appendix H

### The Commission for Agricultural Meteorology

#### Introduction

The last question to be submitted to the Second International Meteorological Congress at Rome 1879 (168) was formed by the inquiry "How can the development of meteorology in connection with Agriculture and forestry be forwarded by the Congress?"

The reply was formulated in the wording which forms resolution 35:

"In order to contribute to the progress of agricultural and forest meteorology, the Congress recommends as a programme for study

- 1° The influence of the meteorological elements upon vegetation.
- 2° The inverse influence of vegetation upon the meteorological elements.
- 3° Agricultural warnings.

The Congress, finding the subject too important to take a detailed resolution at this meeting, proposes to charge the International Meteorological Committee with the convening of a special International Conference before next spring, to take into consideration the development of agricultural and forest meteorology."

In order to comply with to this resolution the International Meteorological Committee forwarded a circular (169) to the different Directors informing them that such a Conference would meet at Vienna on September 1880 for probably five days. The circular was accompanied by a programme of 5 items. A number of reports had been received and were published containing replies to the particular questions posed in the programme.

The report of the Committee meeting of 1882 does not mention a report of the proposed meeting neither to those of 1885 and 1888. The International Meteorological Conference at Munich 1891 (170) reproached the Committee for failing to appoint a special Commission for the improvement and publication of meteorological observations in the interest of agriculture as had been requested in 1880 and asked them to appoint such a commission now for the purpose of considering the proper method of extending meteorological observations and publications in the interest of agriculture, so that a report on the subject might be submitted to the next general congress.

The Secretary of the Committee had not been able to draft the report mentioned in this resolution. So accordingly he sent after the Committee meeting, a circular to the Directors dated 8<sup>th</sup> September 1894 requesting individual meteorological reports for agriculture to be inserted in a collective report for the next Committee meeting at Upsala regarding:

- 1° Transmission of forecasts of the weather for agriculture,
- 2° Communication to agriculturists of explanatory climatological notes in which they were interested.

This circular was replied by about 30 meteorologists in Europe, North-America (U. S. and Canada), India and Australia. The replies proved that notices

to agriculturists and forecasts were issued in the past already for many years all over the world.

### **The establishment of the Commission at Rome 1913**

The question of agronomy being concerned in meteorology in a systematic way was not mentioned in the Meteorological Conferences until the Committee meeting at Rome 1913. It happened that before this meeting Mr. Louis Dop, Vice President of the International Institute of Agriculture at Rome had forwarded a memorandum to the Committee on the importance of organizing the study of agricultural meteorology on a uniform and comprehensive plan in all countries. As the result of this request the Committee had instituted a Commission of Messrs. Angot, Börnstein, Brounoff, Dop and Palazzo. At a meeting in Paris, September 1912, this Commission had prepared a report (171) for submission to the Committee at Rome 1913 with a number of three proposals. These proposals concerned:

- I. General Proposals.
- II. Proposals regarding Observations and their Publication.
- III. Proposals connected with Weather Forecast.

The first contained the request to nominate a permanent Commission on Agricultural Meteorology in the International Meteorological Organization.

Opinion was divided in this respect, as to whether such a commission not belonged to the sphere of the International Institute of Agriculture, but the majority considered it better, that the International Meteorological Committee should itself create a Commission for Agricultural Meteorology.

So it was agreed by ballot that the Commission should be established with Mr. Angot as President and an extension of the number of members to eight (Messrs. Hergesell, Ryder and Stupart).

The proposals in the report mentioned above, formed the scheme for a working programme of the Commission.

The list of Commissions re-established at the Extraordinary Conference of Directors at Paris 1919 contained anew that for Agricultural Meteorology, now with seventeen members and President Mr. Angot.

### **The new Commission and the International Institute for Agriculture at Rome**

The re-established Commission had in the first instance to consider its relations to the International Institute for Agriculture at Rome. It appointed a sub-commission of four consisting of Messrs. Angot, Prof. van Everdingen, Capt. Ryder and Dr. Wallén to study these relations. This sub-commission met in Paris on September 13<sup>th</sup> and 14<sup>th</sup> 1921 to discuss a proposal by the French Government to the Institute at Rome to create a quite new commission, related to the Institute at Rome, by designating a number of members nominated officially by the Departments of Agriculture in the different countries as their delegates among the experts in biology.

It was clear, that this suggestion meant a quite different commission on an official basis. This was not in line with the statutes of the IMO. When additional

members had to be appointed it should be for the IMO to consider the question of nominating representatives of agricultural sciences. So Mr. Wallén proposed that if the new commission at Rome were not realized, the International Meteorological Committee would have to consider the question of appointing additional members representing agricultural sciences to the Commission. M. Wallén also drew attention to the demand of the Agricultural Institutes for reports on the organization of agricultural meteorology in the different countries. So he asked the Directors of Meteorological Institutes to send copies of the reports upon the provision for agricultural meteorology asked for by the Institute of Agriculture also to the President of the Commission for Agricultural Meteorology.

The conclusions of the meeting resulted in a set of three resolutions, that were unanimously adopted by the Committee. The most important was the first one:

13. Resolution I — Le Comité considère que la Commission de la Météorologie Agricole rattachée à l'Organisation météorologique internationale est nécessaire, même si la nouvelle Commission de Météorologie Agricole rattachée à l'Institut Internationale d'Agriculture est établie.

The President of the Committee suggested the addition of the following note, which was unanimously approved.

76. "It is understood, that the Commission is empowered to co-opt, as members, experts in the various branches of agricultural science in which questions of the influence of weather arise."

After that Mr. Angot reported that two additional members had been appointed to the Commission and proposed a list of nine experts as new additional members. This brought the number of additional members up to eleven from 8 countries. The Commission had lost three members by death and resignation.

Mr. Angot had been unable to summon a meeting of the Commission and had therefore no report to submit to the Committee in 1921. It was his intention to resign the presidency as he was no longer Director of the French Meteorological Service. Director Wallén had offered to act as Secretary and was accordingly elected Secretary of the Commission.

### **The meeting at Utrecht September 1923**

The Commission held its first meeting at Utrecht in the days preceding the Conference of Directors. Mr. Angot had sent a report (172) of the activities since the re-establishment in Paris in 1919.

Mr. Angot was prevented from attending the meeting himself. His report was read by Dr. Wallén. He reminded the members that the Commission had the right to nominate a new President and Sir Napier Shaw proposed to elect Dr. Wallén. This proposal was adopted unanimously. So Dr. Wallén took the chair and proposed to elect M. Re y as Secretary in his stead.

He proposed to extend the number of experts members with eight, making a total of fifty-eight.

Dr. Wallén remarked, before he opened the discussions that the other aforementioned Commission for Agricultural Meteorology related to the International Institute for Agriculture in reality had been established. It had held a meeting at Rome in May 1922 and the General Council of the said Institute had adopted a long resolution in which the practical results of the application of

meteorology to agriculture were summed up and where all participating states were recommended "to take all measure to develop the studies and investigations of meteorology for application to agriculture" and as well "to call all possible attention to develop agronomic research and all which concerns the study of the meteorological influences on agriculture and further."

The resolution contained further two long paragraphs with recommendations for the practice of agricultural research and one concerning the character of the said meeting of the Commission at Rome. It should be considered of the greatest importance that this Commission had already begun its work. So indubitably all duplication of the work of the two Commissions had to be prevented, and it was granted, that a possible collaboration should be planned. As concerns this question Mr. A n g o t had expressed as his opinion that "the two Commissions distinct by their origin and their composition, ought to assist each other, and that their efforts ought to try to establish among them the perfect understanding and the intimate collaboration which are indispensable for the progress of science."

The agenda of the meeting of the Commission contained only four items. The numbers 1, 2 and 3 concerned extensive memoranda received from members from Washington (Warren Smith), Sweden (Wallén) and Great Britain (Fisher). Number 4 was devoted to miscellaneous questions. The decisions were summarized in 9 resolutions (No. 20—28). The first (20) was a repetition of a resolution of the session of the Commission of the Institute at Rome the previous year (1922), the following 5 (21—25) were recommendations for particular observations to be carried out everywhere, the next two (26—27) contained a request to the International Institute at Rome and the last (28) a recommendation to the Meteorological Institutes "to reply to a detailed questionnaire which will have special regard to the instrumental instalments and the methods of observation used. This questionnaire will be drawn up and sent to each Institute represented at the Conference by the Bureau of the Commission, which will collect the answers." These resolutions were all adopted by the Conference of Directors.

The report of the President of the Commission Dr. Wallén to the Committee meeting at Vienna 1926 (43) consisted in presenting 11 resolutions for discussion. The first and last numbers concerned both the highly appreciated collaboration of the International Agriculture Institute and the existing readiness for further collaboration when and where possible. Number 2 concerned a recommendation to develop as much as possible issues by W. T. of regional forecasts of weather. Number 4 recommends phenological observations of a modest number of plants, and the following one, observations of special interest to agricultural meteorology.

#### **The session at Copenhagen 1929**

The Conference of Directors at Copenhagen was used for convening the members of the Commission in the week preceding the Conference for a third meeting. The President published a report of this Commission meeting in a paper for his national Swedish Institute. He presented to the Committee only a résumé in a set of 11 resolutions which were all adopted by the Conference (45).

In the first (No. 78) the Committee expressed its satisfaction concerning the mutual collaboration with the Agricultural Institute at Rome and its Commissions

in the years 1927 and 1928. The following (No. 79) encouraged the collaboration of meteorologists with biologists and agronomers. Numbers 80—83 concerned publications regularly summarizing the results of observations and investigations made in a scientific review, the numbers 84—87 concerned the special observations for studies on agricultural meteorology. The last one (No. 88) emphasized the value of studies which concern the connections between weather, climates and crops. These investigations are, most interesting, undertaken in collaboration between specialists in meteorology and agriculture.

#### **The session at Munich 1932**

The report of the Committee meeting at Locarno 1931 does not mention a report of the Commission. The Commission remained silent for another year and prepared a meeting in the autumn of 1932 in Munich, being the fourth since its re-establishment in 1919.

The report of this meeting forms the contents of a volume edited separately by the Secretariat of the Organization at De Bilt (173). The report of the President to the Committee meeting at De Bilt 1933 refers to this publication. The choice of Munich for the meeting had been made in connection with the great amount of work done here in the field of the Commission by Prof. Schmauss and Dr. Geiger and that on microclimatology e.g. the meteorology of the layers nearest to the ground in Bavaria and Austria.

The principal part of the President's report was formed by the proceedings of the meeting at Munich. Two of the five resolutions were adopted by the Committee, the first urged the examination of the question of forecasting the phenomena to be expected probable in particular weather situations as night frosts, and long range forecasts warnings of the probable degree of the phenomena to be expected (resolution No. 6).

The other resolution (No. 7) called the attention of the Central Institutes to the principal influence on agriculture of dew for the growth of plants particularly and recommended to their notice the modern methods of measuring of dew as applied by the members Hiltner and Delcambre.

#### **The session at Zoppot-Danzig 1935**

Appendix V to the report of the President of the Commission (174) relates the history of the Commission in the years between the fourth meeting at Munich and the following fifth meeting 3 years later at Zoppot-Danzig. The Commission had lost its President by sudden decease and the Secretary Dr. W. Schmidt had replaced him ad interim. The first question to decide was to elect a new Bureau and so Prof. Schmidt was elected President and Dr. Brak Secretary.

The Commission presented 6 resolutions and only one was adopted by the Conference at Warsaw. It concerned a narrower collaboration of all scientists in the field of agricultural meteorology and the election for this purpose of a small special sub-commission.

#### **The session at Salzburg 1937 (52)**

Between the meeting at Zoppot and the next one two more years elapsed. Fifteen months after the Conference of Directors at Warsaw and the fifth Commis-

sion meeting, this time at Salzburg, the Commission lost by sudden death its President Prof. W. S c h m i d t. So it was Dr. B r a a k who prepared the sixth meeting and convened the members to Salzburg in the weeks preceding the meeting of the International Meteorological Commission in that town.

The Commission elected Dr. B r a a k to take the chair and to preside over the meeting. The complete Procès-verbal Publication No. 36 of the Secretariat contains the Procès-verbaux of this meeting. Dr. G e i g e r was elected Secretary.

This activity of the Commission was directed to several questions of detail and this caused it to charge small sub-commissions of experts in that particular branch with the study of these questions. The Procès-verbaux of the meeting at Salzburg 1937 contains the following list:

1. Subkommission für einheitliche Beobachtungen in der bodennahen Luftschicht. München 1932. Präsident Prof. K. K n o c h.
2. Subkommission für die Zusammenarbeit mit dem Internationalen Landwirtschaftsinstitut in Rom. Danzig 1935. Präsident Joseph B. K i n c e r.
3. Subkommission für das Studium der willkürlichen Beeinflussung des Klimas. Danzig 1935. Präsident Prof. A. R e t h l y.
4. Subkommission für das Studium des Hagelproblems. Salzburg 1937. Präsident Dr. A. S c h e d l e r.
5. Subkommission für das Studium der phänologischen Beobachtungen. Salzburg 1937. Präsident Dr. O. K e s s l e r.

The list of members at Salzburg contains the number of 57 names. The Commission was maintained at the general revision of the list of Commissions in London 1946 by the first Extraordinary Conference of Directors (175).

## **Appendix I**

### **The Commission for the Study of Clouds**

#### **Introduction**

The agenda of the International Meteorological Conference at Munich 1891 contained an important item:

"The classification of Clouds and a Cloud Atlas".

This was the sequel to a printed report on cloud classification by Prof. Hildebrandsson and it was resolved "that the Conference recommends the adoption of the cloud classification by Messrs. Hildebrandsson and Abercromby."

The next subject discussed was a cloud atlas published by Hildebrandsson and Neumayer produced in coloured pictures. The result of a long discussion was the statement:

"In view to attain uniformity in the classification and nomenclature of clouds observation it is desirable to form a Committee in order to obtain smaller and cheaper reproductions and cloud pictures, without abandoning the use of colour. The Committee should consider the cloud atlas as well as other pictures submitted to the Conference."

The Committee was accordingly appointed to consist of Messrs. Hann, Hildebrandsson, Teisserenc de Bort, Rotch and Singer with the right of co-optation.

A following question was "The Measurement of the Motion and the Altitude of the Clouds." Prof. Hildebrandsson reported on the subject and proposed that a sub-commission should be formed of all the heads of institutions who had any special interest in the subject. This sub-commission met at Munich with twelve members under the Presidency of Prof. Hildebrandsson and Dr. Billwiler as Secretary.

Different methods for these observations were discussed (nephoscope, cloud mirror, theodolites) in use at different stations. In the end it was resolved to request the Conference to name a sub-commission to superintend the execution of the propositions made and possibly to entrust the duty to the Permanent International Committee when that was constituted.

It was proposed to begin the observations at latest May 1<sup>st</sup> 1894 at a list of proposed stations and to carry them on for a year. Dr. Hildebrandsson should be requested to draw up short instructions for the observations.

#### **The activity of the new Commission**

This Commission met at Uppsala in August 1894 where seven members attended. The main question to discuss was the draft of the atlas of clouds under preparation, the instruction for the observation of clouds and their movements and the texts with an extended classification and a nomenclature of the clouds of

different forms and at different heights. These instructions were adopted by the International Meteorological Committee and the Committee resolved that the co-ordinated observations of the height of the clouds and their movements would be prolonged for another year from May 1<sup>st</sup> 1896 to May 1<sup>st</sup> 1897.

When the Conference assembled in Paris September 1896 it re-elected the Cloud-Commission as a permanent Commission of seven members with Prof. Hildebrandsson in the chair and the indication "Commission for the Study of Clouds." A circular sent out by the President in July 1895 concerning the organization of the observation of clouds had been replied to by 21 services with reports on the actual state of the observations. The cloud year should be prolonged by 3 months to August 1<sup>st</sup> 1897.

The final draft of the "International Cloud-Atlas" was presented to the meeting. The meeting thanked the composers Messrs. Hildebrandsson, Riggensbach and Teisserenc de Bort for the work achieved so quickly by them.

The report to the Committee at the meeting at St. Petersburg 1899 mentioned that until January 1<sup>st</sup> 1898 the observations of clouds had been carried out in a long list of 27 countries. In Paris 1900 a proposal of the Cloud Commission to concentrate the cloud observations on the calendar of "International Days" of the Aerological Commission was adopted by the Committee. As the first edition of the Atlas of Clouds of the year 1896 was nearly exhausted a new edition was desirable. Several Committee members had sent proposals to the Commission for amendments. So the Committee instructed at Innsbruck 1905, Mr. Teisserenc de Bort and six members to compose a new atlas of clouds taking into account the suggestions received for improvement.

This atlas was finished in 1910. It was composed of 14 plates, all in colours and 24 pages text.

With this revised edition of the International Cloud Atlas the main task of the Commission had been preliminarily completed. But new horizons opened in the following Committee meeting at Rome in 1913 as regards routine observations of the movement of the clouds now made regularly at the synoptic stations for insertion in the daily synoptic reports. Suggestions for adding a new group to the old form of code of the weatherreports transmitted daily internationally with extension with new elements\*) led to reserve a figure for indicating the "direction from which upper clouds are moving, according to eight points of the compass (1 = traveling from NE, 2 = from E, 3 = from SE, ———— 8 = from N)".

These proposals were made by the Commission for Weather Telegraphy as part of highly important questions of the extension of the 40 years old telegraphic form of code. They were adopted by the Committee to come into use from 1<sup>st</sup> May 1914 onward.

In the first days of September 1914 all experiments for extending international synoptic information were stopped for more than four years. November 1918 opened up quite new horizons and quite new application of international synoptic meteorology for aerial navigation and other branches with new means of exchange.

The Commission for the Application of Meteorology to Aviation instituted in the Extraordinary Conférence of Directors in Paris in 1919, drafted in its meeting in

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\*) amount and tendency of barometric pressure.

London September 1921 a form of code for reports for aviation with a special 5-figure group for reporting the state of the sky. The form of this special cloud group was "ALaNh" with the specifications:

- A = form of the low cloud
- L = amount of low cloud (tenths of sky covered)
- a = form of high cloud
- N = total amount of clouds (tenths of the sky)
- h = height of low cloud (estimated).

The different scales were designated by the Commission for Weather Telegraphy in its meeting in London 1920 (37).

In introducing this form of code special instructions had to be prepared for untrained observers, and the old pre-war Atlas of Clouds was insufficient. At the same time extended studies on the physics of the clouds and new applications in the development of the weather made in France and elsewhere, caused the International Meteorological Committee to re-establish the Commission for the Study of Clouds in its meeting in London in September 1921 with fourteen members from the circles of experts in aerial navigation and pure physics of the atmosphere. Here too Sir Napier Shaw took the presidential chair.

The old veteran Prof. Hildebrandsson indicated his view on the new task to be undertaken by the Commission:

"It is clear, that a classification of clouds for common use, such as the Cloud Atlas, must be simple and practical. But now when the varieties of clouds are used for forecasts, etc., and many persons have made up classifications of the varieties of the cloud forms, it is necessary to give international names to them etc. etc."

The Commission met for its first meeting at Utrecht September 14<sup>th</sup> 1923. It reported to the Conference of Directors that Prof. Hildebrandsson was elected as an honorary member of the Commission. At the end of the meeting the Presidency went over to Gen. E. Delcambre, Director of the Office National Météorologique at Paris.

#### **The Commission at Zürich 1926 (176)**

The questions to be treated by the Commission were narrowly related with the practice of synoptic reports. The exact information concerning the clouds in the sky in the synoptic reports for different purposes needed a knowledge of the clouds as had never before been required of the observers. It was clear that for their instruction and training an extended atlas of clouds with exact specifications of the clouds and descriptions of their forms, elucidated by a great number of photographs, was indispensable.

The Commission had at its disposal a number of devoted collaborators in the Office National Météorologique in Paris who were ready to undertake this work under the lead of an enthusiastic director. He had informed the members of his plans by a number of communications and circulars. Some experts in the study of clouds from different countries (Spain, England, Russia) were ready to collaborate in the suggested working programme.

It was agreed that the old classification of the clouds of Hildebrandsson of Uppsala 1894 should be retained as a base for a recent extended classi-

fication and description of the clouds. The historical division into five "families" could remain unchanged, but it would be necessary to sub-divide these into "species" and to specify these by "varieties". In some cases there was a necessity for the addition of characteristic forms and evolutions. It was clear that a new international cloud atlas ought to be composed with a great number of pictures for the different classifications and divisions but that this number should be completed with pictures of peculiar types as described in the recent publications from the French side formerly mentioned as "Systèmes Nuageux" ("Ciels"), and further with photographs taken from aeroplanes at great heights.

The new Commission had held a preliminary meeting in Paris in April 1926. The President had summarized the opinions regarding the cloud atlas to be composed in the following words:

- a. un atlas proprement dit, relié, contenant les définitions et des photographies en nombres suffisant des genres, des variations, des détails accidentels, des états du ciel et d'une introduction pour les observateurs en avion;
- b. un fichier, qui contiendrait une fiche par espèce de nuage, chaque fiche comprenant la définition et une ou plusieurs photographies de l'espèce."

Based on these principles he had formulated a number of 10 draft resolutions for discussion and for presenting to the Committee meeting afterwards. They were:

1. Le projet de l'Atlas établi par la Commission dans sa réunion d'Avril 1926 est approuvé dans son ensemble.
2. En ce qui concerne le détail du texte, des amendements pourront être suggérés à la Commission dans un délai de quatre mois.
3. En ce qui concerne l'illustration, les Membres de la Commission sont invités à recourir aux collections officielles ou privées de leurs pays et à adresser au Président de la Commission, dans un délai de quatre mois, les photographies qu'ils jugeront les plus convenables.
4. Pour arrêter les illustrations et le texte définitif, le Président de la Commission est autorisé à recourir au vote par correspondance, les abstentions étant comptées comme acceptations. Toutefois, dans le cas où la majorité serait très faible, le fait serait mentionné dans le rapport au Comité.
5. Ces opérations terminées, l'Office Météorologique français se chargera de l'édition d'un Atlas provisoire, conforme au projet de la Commission.
6. Dès sa parution, cet Atlas sera mis à l'essai dans les différents pays. Il comprendra: a. un Atlas proprement dit, pour les genres et les variétés, qui suffira aux observateurs ordinaires; b. un volume complémentaire pour les espèces, destiné aux observateurs spécialisés.
7. La Commission tiendra une réunion plénière au plus tard au début de 1929 pour statuer sur l'Atlas provisoire à l'essai et sur sa présentation — après modifications s'il y a lieu — à la prochaine Conférence des Directeurs.
8. Conformément à une demande figurant dans le paragraphe 9 de la quatrième séance à Zurich de la Commission des Renseignements synoptiques, la Commission pour l'étude des nuages choisira le plus tôt possible une collection de photographies destinée à faciliter la tâche des observateurs qui auront à utiliser le code nouveau à l'essai pour la description du ciel.
9. Des monographies pour les genres et les variétés seront établies sur la base de l'exemple (Alto-Stratus) proposé par le Président.
10. Des Commissions Nationales pour l'étude des nuages seront constituées, autant que possible, dans tous les pays, afin d'aider la Commission Internationale, avec laquelle elles se tiendront en liaison. Le travail sera réparti entre les Commissions Nationales suivant leurs goûts et leurs moyens propres.

The agreement of the Committee to these proposals for the future activity of the Commission for preparing the new International Cloud Atlas was expressed in the Resolution XLIII of the Committee meeting at Vienna 1926 (44) summarizing the contents of the Commission resolutions mentioned above.

The meeting agreed unanimously with the initiative of the active President and appreciated entirely the suitable way in which the meeting had been prepared.

The President proposed that the new Cloud Atlas should be edited as a publication of the Office National Météorologique with French text and that a number of copies as required should be forwarded to the meteorological Institutes free of charge. The translation of the text into the different languages and eventual national editions should be left to the countries themselves. It may be wondered at that never any mention had been made as regards the way of financing the expenses necessarily caused by this splendid offer of the French Meteorological Office. The reason was, that the President could communicate at Vienna to the Committee assembled there in September 1926 "qu'il croit que la Commission pourra compter sur le secours d'un généreux mécène, dont il ne lui est pas encore permis de dévoiler le nom, pour assurer une édition très soignée de l'Atlas définitif".

This communication had been heard by the Committee with extreme satisfaction. The President requested Gen. De l c a m b r e to express the gratitude of the Committee to the unknown Maecenas for his generous grant.

#### **The Commission at Copenhagen 1929**

The President of the Commission had convoked his members for discussing some questions regarding the definite edition of the cloud atlas, based on the latest review of the first draft by a small number of members at Barcelona June 1929 and the comments received. The President proposed now to nominate a small Commission of not more than three members one from Great Britain (Dr. C a v e) one from Germany (Dr. K e i l) and one from France (M. W e h r l é) to fix the official text in three languages.

A large number of members urged the composition of a "Reduced Atlas" for the use of observers with a classification of the clouds in the language of the country, with the plates in colours, and illustrating each one of the  $3 \times 10$  figures, respectively for CL, CM and Ci, in their respective codes.

As regarded the finances, the President could unveil the mystery, as to who had been the Maecenas who had bestowed the grant of 150 000 French francs and had realized in this way the plans for the issue of the Atlas of Clouds. It had been Mr. P a t x o t y J u b e r t at Barcelona. This generous gesture created the possibility to forward copies of the Atlas gratuitously to the different Meteorological Services. As regards the Reduced Atlas it should be possible to follow the procedure of forwarding it at a very low price by using the prints of the complete atlas to compose it. The translation of the texts of the classifications into the language of the country ought to be left to the Services themselves. In view of the recent studies on the physical processes of the forms of clouds by aerological research the President expressed the suggestion to charge a particular purely scientific "Commission for the Physics of the Clouds" with the investigations of clouds.

The suggestion brought forward for preparing the enterprise of a Second Polar Year had been able to express a new idea namely to apply this enterprise for further development of the cloud studies by organizing an „International Year for the Study of Clouds“ coinciding with the International Polar Year. The preparation of a draft a plan for the execution of this “International Cloud Year” and its organization had to be a charge for a special sub-commission.

The President had summed up his working projects for the future in five resolutions. The first (I) mentioned the grant of Monsieur P a t x o t y J u b e r t and fixed the conditions and duties related to it. The numbers II, III and IV concerned the charges to be entrusted to the three sub-commissions, respectively for the preparation of the International Cloud Year, for the definite completion of the International Cloud Atlas and for preparing the Reduced Atlas of Clouds and for the “Physics of the Clouds”. The terms of reference of the last should be explicitly: “d’étudier les processus physiques de formation et d’évolution des nuages, pour servir ultérieurement de base à une classification rationnelle des nuages.”

The last resolution (V) concerned the addition of three supplements to the definite Atlas

- 1° for the tropical clouds
- 2° for particular local clouds
- 3° for the physical processes at the formation and evolution of the clouds mentioned in IV to be prepared as an annex by the 3<sup>rd</sup> sub-commission mentioned above.

These five resolutions had been agreed to unanimously by the Commission for being presented to the Conference of Directors. The Conference adopted the numbers I and III in the following wordings and approved of the numbers II, IV and V as internal affairs of the Commission (177).

#### Résolution 100.

1. L’Institutio P a t x o t met à la disposition du Président de la Commission pour l’Etude des Nuages (C.E.N.), pour la publication du nouvel Atlas international des Nuages, une somme de cent cinquante mille francs français en trois versements de cinquante mille francs, suivant les progrès de l’édition officielle. Le dernier versement sera fait à la parution du premier exemplaire définitif.
2. Si le prix de l’édition officielle était inférieur à 150 000 francs, la différence sera déduite du premier versement.
3. L’édition officielle comprendra trois séries parallèles d’exemplaires avec le texte respectivement en français, en anglais ou en allemand littéralement conformes. Le Président de la C.E.N. indiquera le nombre d’exemplaires nécessaires dans chaque langue.
- 4, 5, 6, 7 suivent quelques réglémentations en ce qui concerne la distributions des exemplaires aux services gratuitement.

#### Résolution 101.

“La Conférence accrédite une Sous-Commission composée du Président, du Secrétaire et de MM. C a v e , K e i l et W e h r l é , chargée

- 1° d’établir la mise au point définitive de l’Atlas complet, sur la base de l’Atlas provisoire, compte tenu des amendements proposés et de constituer un Atlas réduit pour les observateurs ordinaires dont les planches seront en couleurs,
- 2° de préparer l’édition de cet Atlas qui devront paraître au cours de l’année 1930. La Conférence des Directeurs délègue ses pouvoirs, relativement à cet Atlas, à la Sous-Commission précédente.”

These resolutions were closed by the following vote of thanks:

Résolution 102. "La Conférence accepte avec reconnaissance le don magnifique et les propositions de M. Patxot et le remercie chaleureusement pour l'aide qu'il a ainsi apportée à la science et à la météorologie internationale."

This resolution was sent to Mr. Patxot by telegram.

In the last meeting (8<sup>th</sup>) the President of the Cloud Commission communicated to the Conference that the example of Mr. Patxot had been followed by an anonymous member of the Conference with a grant of £ 100 for the publication of the annex for the tropical clouds.

After the Conference of Directors at Copenhagen had agreed to the form of the Cloud Atlas, as it was distributed by the President of the Commission on Clouds, the different sub-commissions started their work prescribed in their different instructions without delay.

In the Committee Meeting at Locarno two years after Copenhagen Gen. Delcambre was able to report, that the preparations for the decisive edition were sufficiently advanced to state, that the atlas could be expedited to the subscribers before the end of the year 1931. A first copy was handed to the President of the Committee and Prof. van Everdingen could express his appreciation for the valuable work accomplished by the Office National Météorologique de France and its keen Director by the editing of this real "Chef-d'oeuvre" for the Meteorology, executed in so splendid a form.

The work for the reduced Cloud Atlas for the observers (Commission Cave, Keil, Wehrlé) was completed rapidly in the year 1930 and published by the O.N.M. in Paris with 40 plates, 31 of them in 2 colours. It has been of the greatest possible assistance in facilitating the correct reporting of the forms of clouds in the international codes adopted at Copenhagen after their introduction in 1931.

The agenda of the Committee meeting at Locarno 1931 did not mention a separate report of the Cloud Commission. The necessary instructions for the observations during the International Polar Year 1932—1933, being at the same time the International Cloud Year, formed part of the general programme of this enterprise.

The next report was that to the Committee meeting at De Bilt 1933. Gen. Delcambre was able to communicate that the new International Cloud-Atlas was edited in 1932. It was composed by 174 pictures and introductory texts in 3 languages (French, German, English). The edition of the reduced atlas and a French version of the supplement for the tropical Clouds composed by Dr. Brak had preceded that of the general volume (Atlas général). A third volume (Nuages Spéciaux) to be composed by Dr. Bergeron, and a fourth (Processus physiques de formation des Nuages), to be established by the sub-commission for the Physics of Clouds, President Dr. Süring, were still in preparation.

The noble grant of Mr. Patxot y Jubert made it possible to fix the price of the part Tropical Clouds at the modest sum of 28 francs and the draft for the Copenhagen meeting for the main Part and the reduced one at 90 and 55 francs. The expenses to be covered amounted to a sum of 114 000 francs and 54 250 francs should be covered by the sale of the commands for the complete atlas.

The provisional atlas composed by the Office National Météorologique de France had been edited as a draft to be submitted to the Conference of Directors

at Copenhagen for critics and comments. The meeting approved the proposals of the Commission entirely and transmitted the care for the work of completing the edition to a special redaction sub-commission.

It had been Prof. Süring, Dr. Bergeron and Mr. Wehrlé who principally had accomplished the work for the reduced atlas at Paris in 1930. The translations into German and English were conducted by Dr. Keil, Mr. Cave and the Meteorological Office at London.

The programme for the observations of clouds during the Polar Year had been entrusted to a sub-commission of twelve presided by Prof. Süring with eleven experts among them Dr. Bergeron, Dr. Braak, Dr. Keil and Dr. Stüve. This sub-commission met at Uccle in December 1930 and agreed to the programme in 4 items and to a set of instructions by some specialists containing all useful technical views. This programme was inserted as a whole in the general programme for the stations of the Polar Year. A special programme was devoted to the observations of the night luminous clouds.

The last sub-commission met for the second time at Francfort on Maine 7-9 December 1931. It was in this meeting that the sub-commission settled the total programme to be applied by the stations collaborating for the International Cloud Year coinciding with the International Polar Year. The set of instructions contained 18 resolutions and 15 annexes (178).

The last report of the President of the Cloud Commission was presented to the Conference of Directors at Warsaw 1935 (179). The Commission had fulfilled its instructions by the edition of the Atlas of Clouds in its complete form but only the sub-commission for the study of the physical processes of the development and evolution of the clouds had not yet finished its work. The agenda of the meeting of the Commission contained the following 5 items:

1. Situation budgétaire de la Commission pour l'Etude des Nuages,
2. Etat d'avancement des travaux de la Sous-Commission pour l'Etude des processus physiques de Formation et d'Evolution des Nuages,
3. Etat d'avancement des travaux de M. Bergeron,
4. Résultats de l'Année Polaire, au point de vue des nuages,
5. Projets de l'avenir.

Short afterward the meeting at Warsaw the President had to resign as Director of the Office National Météorologique, so he devoted himself in the coming two years personally to the publication of the third volume of the atlas that for the „Physique des Nuages“, to be composed by the sub-commission presided by Prof. Süring. His report to the Committee at Salzburg is inserted in the Proces-verbaux (180).

This sub-commission had met on request of Dr. Bergeron at Berlin from 7 to 11 June 1937. 5 German experts attended. In this meeting the details concerning the working programme were definitely fixed. It was intended to submit this programme to the Committee meeting at Salzburg 1937 and, if this meeting should agree with it, it could be expected that this last volume should be accomplished in May 1938 and edited at the end of 1938.

The sub-commission held a last meeting in Salzburg 17 September 1937 (181), presided by Prof. Süring with twenty attendants. Gen. Delcambre himself was prevented to travel to Salzburg. The report was read by the Vice-President Mr. Wehrlé. It ended with a draft resolution for establishing a programme for stationary ships on the oceans, and Mr. Wehrlé urged that this resolution should

be adopted. He asked an advance of 100 000 francs for a new edition of the reduced atlas in English language.

As the report of the meeting was not yet ready Dr. Braak made an oral report of the decisions of the meeting of the sub-commission for the Study of Clouds and the state of the preparations for continuing the work of the atlas for the physical process of the clouds. A draft would be prepared and circulated among the members interested and after receipt of the replies the work will be continued and a draft prepared as soon as possible.

This was the last action of the Commission for the Study of Clouds. The next meeting of the International Meteorological Committee at Berlin 1939 mentions, that no report had been submitted to it for consideration.

The Commission together with all the old Commissions was dissolved in the Extraordinary Conference of Directors at London 1946 and re-established by the new International Committee at Paris 1946.

#### **The new Atlas of Clouds and Hydrometeors**

The question of a re-edition of the old Atlas of Clouds had for the first time been urged in the meeting of the CSWI in Paris in June 1946 (90) in a resolution (XVI), which contained a plan for a sub-commission to establish contact with members of the different Commissions interested, besides experts in the study of clouds. This proposal had been adopted in the Committee meeting of 1946 after the necessary information by the French member Mr. Viaut who, as mentioned above, had the necessary material at his disposal. A year later the further deliberations of this item were laid down in Toronto (92).

The French member reported in a long memorandum to the Extraordinary Conference of Directors in London that a small commission had already been formed in 1939 to inform the Executive Committee as desired in the said resolution (56).

The cost of the new edition could be estimated at an amount of 2 000 000 French Francs. It was to be expected, that still a sum of 700 000 francs could be received from the sale of the old atlases. After a new expense of 500 000 francs the French Meteorological Service had spent 1 500 000 francs to enable the expenditure for the plates of the clouds and for showing to the Conference the models for the new Atlas. Estimates for different sizes and with different numbers of plates (225 or 280) showed, that the prices for an edition of 2000 copies, the largest size, and 225 plates as a minimum would amount to 10 300 francs, and for 10 000 copies of the smaller size with 280 plates, to 7 019 francs.

This well-documented report was verbally explained in the third session of the Conference of Directors with the result, that the Conference approved of the plans and decided as follows by adopting the resolution (28).

"The Conference decides to refer to the World Meteorological Organization the further study of the technical and financial aspects of the Reports by the President of the Commission for the Study of Clouds and Hydrometeors as well as of the International Cloud Atlas."

The treatment in the Conference of Directors in Washington (64) brought agreement on this decision by the adoption of a resolution in the following wording: 153. "La Conférence approuve, en principe, la préparation d'un projet révisé de l'Atlas des Nuages actuel et demande au Conseil Exécutif d'étudier les moyens d'obtenir les fonds nécessaires."

## Appendix K

### The Commission for the Establishment of an International Meteorological Bureau

#### Introduction

The idea to collect the material of meteorological observations all over the world in an international centre to serve as a documentation for all kind of investigations in meteorology was indicated in the first years, of the development of meteorology as a science by the Dutch veteran Buys Ballot.

This suggestion was discussed preliminarily at the first international meteorological congresses and conferences in 1873 and 1879. It formed anew an item on the agenda of the Conference of Directors at Munich 1891.

The question of the realization of this suggestion was the subject of a paper presented by the Swedish member of the International Meteorological Committee Prof. Hildebrandsson to the meeting at Uppsala 1894 (182). After broad discussions the Committee came to the conclusion, that the time was not yet ripe to draw a working programme for a Bureau like this and to procure the finances for the personnel and the lodgings.

Notwithstanding this negative statement the question of the realization of the basic idea to collect the indispensable material for world meteorological researches at a central point was addressed in a new form by the same author in 1896 to the International Meteorological Congress at Paris with a memorandum entitled "Sur les centres d'action de l'atmosphère. Etablissement de stations météorologiques dans les régions des grands centres d'action de l'atmosphère" (148).

The question did not cause a long discussion and led to the encouraging decision "that the Conference expresses the hope that satisfaction may be given to the desire of Prof. Hildebrandsson."

Not discouraged by this result the author prepared a new memorandum for the meeting of the International Meteorological Committee in St. Petersburg 1899 (149). The committee expressed in the resolution adopted a platonic wish for the success.

But Prof. Hildebrandsson persisted with the successful result at its meeting in Paris 1907 the Committee decided "to make every effort to sustain his plans" by establishing the Commission for the Réseau Mondial (see App. F).

Some years later his intentions were met by the Publication of the British Meteorological Office M. O. No. 204 g (Tables) as Part V of the British Meteorological and Magnetic Yearbook 1910 seq.

In later years the question of the institution of a World Meteorological Centre was put in the background. This changed as the growing interest for a permanent centre for international meteorology arranged a new front. The Bureau should be destined as a permanent secretariat for the International Meteorological Committee and for the Commissions.

It was the new French Director General E. Delcambre who forwarded to the Conference of Directors in Utrecht in September 1923 a memorandum entitled "Proposition au sujet d'un projet de création d'un Bureau Météorologique International" (183).

This proposition urged the institution of a permanent International Meteorological Bureau:

"dont le fonctionnement serait assuré par la contribution financière des Etats représentés à la Conférence des Directeurs et qui serait installé, si possible, dans l'un des Etats européens qui, au point de vue météorologique, ressortit à la fois du régime atlantique et du régime méditerranéen."

The question of the institution of such a permanent Bureau was narrowly related to that of the Relations of the International Météorological Organization (IMO) with the International Commission for Aerial Navigation (ICAN). The result of the long deliberations was expressed in a set of five resolutions the last of them stating: Res. 69. "The Conference agrees to nominate a Commission to consider the creation of an International Meteorological Bureau."

Gen. Delcambre was elected president of this new Commission. The members were Messrs. Carvalho Brandao (Portugal), Prof. van Everdingen (Netherlands), Prof. Exner (Austria), de Sampaio Ferraz (Brazil), Prof. Schönrock (USSR), Sir Frederic Stupart (Canada), Dr. Wallén (Sweden).

#### The meetings at Paris and Zürich 1926

The question in deliberation was to discuss by the Commission established at Utrecht what steps ought to be taken for realizing these plans. At the same time it was desirable to come to a general agreement concerning the character of the charge to be given to this Bureau and to outline its functions regarding similar offices of other instances narrowly related to meteorology. This delicate question was urgent and important and an agreement was desirable before it could be put on the agenda of the following Committee meeting in Vienna (1926) for further discussion in the full session. As there was in this Commission, under the Presidency of Gen. Delcambre, no unity of opinion it is important to compare the different standpoints and to point out the procedure that had been followed by the President of the International Meteorological Committee.

This President Prof. van Everdingen had addressed himself to the International Commission for Intellectual Co-operation of the League of Nations, under the Presidency of the Dutch physicist Professor Lorentz. This Commission had its seat in an Institute of its own in Paris. This Commission had sent the questions for consideration to three physicists of repute: Lorentz himself, Einstein and Mme Curie charging them "de bien vouloir examiner avec M. van Everdingen et quelques autres experts, la question de savoir de quelle manière la Commission pourra contribuer à la création d'un bureau météorologique international."

The President of the Commission for the Bureau Gen. Delcambre from his side had addressed himself to the Director of the "Institut international de Coopération intellectuelle" and as result of this action the meeting mentioned here of the Commission for the meteorological bureau with the trio Lorentz-Einstein-Curie had been prepared for the month of March 1926.

The President was of the opinion that it would be desirable that the Commission should be convened internally before this meeting in order to come to a mutual agreement regarding the broad lines for the programme of the work of the Bureau to be established. So he convened the members for a session preceding the other by two days and formulated as an ideal programme of the duties of the Bureau the following activities:

- a) "Gérance d'archives des Commissions météorologiques internationales et Secrétariat du Comité Météorologique International pour les liaisons avec les organismes internationaux ayant des rapports avec la Météorologie;
- b) Bibliographie et publications internationales rétrospectives (cartes de l'hémisphère nord, ballons-sondes, climatologie aéronautique, etc.);
- c) Aide à l'organisation du réseau radio-météorologique des océans (concentration radio-météorologique et extrait des journaux de bord)."

March, 29<sup>th</sup>, the trio Curie-Einstein-Lorentz attended a joint meeting convoked by the Director of the Institut de Coopération Intellectuelle. Also the General Secretary of the ICAN Mr. Roper attended in his function at the ICAN. It was agreed that the trio Curie-Einstein-Lorentz should approach the meeting of the League of Nations at Geneva for a promise to the "Commission de Coopération intellectuelle" to assist in the establishment of the International Meteorological Bureau and this in the form, that the League of Nations should be requested to plead for facilities to provide credits for the Bureau to be established but expressly "sous réserve, bien entendu, que le Comité météorologique international approuverait les propositions de sa Commission du Bureau météorologique international."

These communications are all taken from the report of the President of the Commission for the International Bureau at its meeting at Zürich in September 1926.

Before a reply to these promises affirmative or negative, could be composed the decision of the International Meteorological Organization had to be awaited and this, notwithstanding urgent pressure, caused a delay of several months. It had been agreed in Paris that, if the decisions of the International Meteorological Committee should be favourable, the ICAN would be willing from its side to support a request for help to the States affiliated to this body. It should be the task of the International Meteorological Committee itself to prepare the approach to the Governments to be supported by the League of Nations and the ICAN. So the Paris meeting led to the promise, that:

- a) "L'Institut international de Coopération intellectuelle offre des locaux (3 à 4 pièces) pour l'installation provisoire du Bureau météorologique international dans le bâtiment que l'Institut international de Coopération intellectuelle occupe à Paris et qui jouit de l'extraterritorialité;
- b) le Gouvernement français offre 50 000 francs pour faciliter l'installation matérielle du Bureau météorologique international dans le bâtiment de l'Institut de coopération intellectuelle."

The President of the Commission mentioned urgently the very slow procedure of the IMO and warned of the possibility, that other international organizations might take the initiative to install an international meteorological bureau if the meeting did not succeed in realizing the plans at short notice. It was known that the IGGU equally intended to establish at Geneva a permanent international bureau and that also the risk was to be feared, that if the ICAN in view

of the progressing development of aviation should be moved to a similar activity, it would renounce on its promise of support to the IMO.

It was for all these reasons that the President was of the opinion that quick action was necessary. Although the International Meteorological Organization did not dispose over finances such as those of other bodies, there was, in his opinion, no reason for pessimism as had been proved already by the offer of the French Government.

The President noted his views in five resolutions which were presented to the plenary meeting of the Commission at Zürich for discussion. Besides the ten members a number of eight persons interested attended here. After an extensive deliberation these resolutions were brought into a decisive form for presenting for adoption as resolutions of the International Meteorological Committee at Vienna.

The text of these resolutions was as follows:

- 1° "Le Comité décide de créer, aussitôt que possible, le Bureau météorologique international — dont le Comité météorologique international constituera le Conseil de direction — sur le programme général approuvé par la Commission du Bureau météorologique international dans sa session de mars 1926, mais en débutant avec le programme réduit approuvé à cette même session."
- 2° "Le Comité accepte-t-il l'hospitalité provisoire qui est offerte pour le Bureau météorologique international par l'Institut international de Coopération intellectuelle?"
- 3° "Le Comité est-il décidé à demander l'appui de la Commission internationale de Coopération intellectuelle et de la Commission internationale de Navigation aérienne pour obtenir des Etats les crédits de fonctionnement du Bureau météorologique international?"
- 4° "Le Comité change-t-il son Bureau et le Président de la Commission pour la création du Bureau météorologique international de suivre de concert, les négociations?"
- 5° "Le Comité invite les Directeurs des Services météorologiques de tous les pays représentés à la Conférence des Directeurs, à intervenir directement ou indirectement auprès de leurs Gouvernements respectifs et auprès des organisations privées pour appuyer la demande de crédits nécessaires pour le fonctionnement du Bureau météorologique international."

The first of these proposals to the Committee was a simple statement, the numbers 2—4 formed requests of the Commission to be informed concerning the views of the Committee, the last No. 5 a direct request regarding the future internal arrangements.

#### **The Commission dissolved**

After the adoption of the first and fifth of the resolutions of the Commission of the meetings in Paris and Zürich, respectively in March and September 1926, by the International Meteorological Committee at Vienna September 1926, the Commission for creating an International Meteorological Bureau had fulfilled its tasks. So Prof. van Everdingen could address heartily words of thank to the energetic Gen. Delcambre for the way he had lead the Commission in the years of its existence.

The last activity to settle the position of the Secretariat and its instructions for the coming years was the task of a Commission for revising the Statutes at the

Conference of Directors. A new article of 5 paragraphs had to be added to the Statutes with the heading "Article IV. Secrétariat de l'Organisation Météorologique Internationale".

There was a long discussion as regarded the paragraphe 4, stating: "Le siège définitif du Secrétariat est fixé en Suisse." This statement was adopted by ballot by 18 voices pro and 5 con, 4 countries not voting.

As concerned the arrangement and the programme of the work of the Secretariat the § 6 of the Article III "Comité Météorologique International" contained the prescription of the establishment of a new body named the Executive-Council composed of the President of the Committee and four members. The text of this paragraph was: "Un règlement intérieur, approuvé par le Comité, règle le fonctionnement du Conseil Exécutif."

The last item of the agenda was a draft for a Reglement of the Executive Council. This had been discussed in the second meeting and some paragraphs had been amended. The final redaction had been postponed to a later session and the Reglement was adopted in the last but one meeting (See Annex I C).

## Appendix L

### The Commission for the Statutes and the Universal Meteorological Convention

#### Introduction

The International Meteorological Organization was based on Statutes (see Annex 1) expressing its aims and composition. They were drafted in Utrecht 1878 and adopted by the Conference of Directors at Rome 1879. They were replaced by the Congress at München 1891 by new Statutes and these were supplemented by the International Meteorological Committee in 1907 (Paris).

The first item on the agenda of the Extraordinary Conference of Directors at Paris after the war in 1919 was a revision of the Statutes. The new draft was complemented by the Conference of Directors at Utrecht in 1923 and again at Copenhagen in 1929, where a special article was added for the newly established Secretariat and the institution of an Executive Council. Some additional paragraphs were added at Locarno 1931.

The Conference of Directors at Warsaw, 1935, brought new and significant changes of great importance. These changes were initiated by the Ministry of Aeronautics at Rome after a correspondence with the President of the Committee regarding the relations with the ICAN in Paris (Appendix G). A quite new draft for new Statutes was presented to the Conference of Directors for deliberation (184).

The principal aim of this proposal was to assure the International Meteorological Organization of an officially recognized status. It was strongly supported by the French member Mr. Wehrlé but the President Prof. van Everdingen and other members did not agree to the urgency of the change. The end of the long deliberations was to entrust the study of preference for, and the advantages, of, the new status to a special Commission ad hoc, with the instruction:

“to study the communications received from the Government of Italy and others suggesting considerable modification in the Statutes of the International Meteorological Organization and to report as soon as possible to the actual Conference.”

The Commission was charged to:

“to make proposals for changes in the Statutes to give the International Meteorological Organization a more official status taking into account:

- a. to limit the membership to expert meteorologists, whenever possible Directors of Meteorological Services.
- b. the membership should be as a rule personal and not representative.
- c. all resolutions taken by the Commission require to be approved by the Conference or Committee before they become effective.”

In a third paragraph it was expressed that:

“The Commission will also consider the coordination of the organization of the meteorological protection of aerial navigation.”

As members of the Commission were proposed: Prof. van Everdingen (Netherlands), Dr. Gregg (USA), Dr. Hesselberg (Norway), Dr. Kidson (New Zealand),

Dr. Lugeon (Poland), Mr. Sbernadori (Italy), Sir George Simpson (Great Britain), Mr. Wehrlé (France) and a member from Germany.

Sir George Simpson was elected President.

This Commission presented as the result of the discussions a quite new draft of the Statutes (184). The leading principles expressly aimed at 1° stating how to modify the Statutes to ensure the IMO a more official character and 2° to express in the Statutes how to promote the tendency of the work of the IMO on behalf of aerial navigation. The members agreed to these principles and emphasized as an absolute necessity, that on behalf of aerial navigation the IMO should dispose over a Commission especially intended to coordinate the work of the existing official Organization — ICAN. This special Commission should be subject to special regulations and have a status different from that of the other Commissions.

The Conference of Directors adopted this new change in the Statutes after ample discussion. It established this new Commission at once. It was entitled: "International Commission for Aeronautical Meteorology".

Mr. R. Bureau, the well known President of the sub-commission for Issues by WT of the Commission of Synoptic Weather Information (T) was nominated as its President.

The establishment of this Commission with a privileged character was a fundamental change in the internal structure of the IMO. A number of new arrangements would be necessary for facilitating its activities. The rôle it has played in later years is reported in Appendix Q.

After this action the Commission ad hoc for the revision of the Statutes was dissolved after having fulfilled its duties. The newly established Commission held its first session in Paris June 1937.

#### **The session at Salzburg 1937.**

The agenda for the next session of the International Meteorological Committee at Salzburg did not mention further changes of the Statutes. As regarded the Transfer of the Secretariat to Switzerland (185) the President communicated, as the final decision, that the time of the change would be considered anew by the Executive Council in May 1939.

Some paragraphs of the "Règlement intérieur du Conseil Exécutif" were slightly revised (Appendix XXX) (186).

#### **The session at Berlin 1939 (55)**

The President aimed to continue the projects for a further officialization of the IMO by replacing the Statutes by a Convention. He had composed, in co-operation with the French member Mr. Wehrlé, a first draft (187). This had been communicated to the members of the Committee and the Presidents of the Commissions by a circular on 8<sup>th</sup> June 1938.

This circular received a considerable number of replies (188) expressing the opinions of different members as to whether a Convention was desirable or necessary. The President mentioned these replies in his Presidential address (189). He pointed out that the question had to be in principle discussed by the International

Meteorological Committee and so the first thing to manage ought to be to prepare a Draft of a Convention aimed to be treated finally by the next Conference of Directors to convene (Washington in 1941).

The discussions were opened in the third meeting by Sir George Simpson and were continued in the fourth, the fifth and the eighth. After a general exchange of opinions led by Sir George Simpson it was decided to charge the drafting of the Convention to a special "Commission for the study of the Convention". This Commission should be invited to continue the work and to present a report (190) to the actual Committee meeting before the end of the present session. This was agreed to. It was decided that the Committee should draft a new plan for a convention to be distributed among the Presidents of Commissions and all Directors for general discussion at the Conference of Directors at Washington 1941.

The Committee was in favour of the preparatory work being continued and decided that a special Commission should be charged to prepare the official Draft (Berlin Draft).

The Commission should be indicated as "Commission for the Draft of the Universal Meteorological Convention".

Its instruction was formulated in resolution 41 of the Committee. The ultimate redaction (Berlin Draft) was left to this special Commission.

It was formed by the following members: Messrs. van Everdingen, Galmarini, Habermehl, Hesselberg, Infante, Jeffries, Johnson, Kyriakidis, Ouchakof, Reichelderfer, Simpson, Tannehill, Walter, Wehrlé (President) and Weickmann.

The exact instructions were:

- 1° To circulate the text of the Draft Convention to the national Directors of Meteorological Services for remarks, and also to the Presidents of the Commissions of the IMO,
- 2° to compose the Annexes A, B and C. in an exactly indicated way,
- 3° to submit the complete Draft of the Convention to the Conference of Directors at Washington in 1941 together with the remarks received.

During the war 1939—1945 all contacts between the President and the Members of the Committee were broken. Not before the year 1946 he could convene the first post-war international meeting of meteorologists. At this extra ordinary Conference of Directors in London February 26<sup>th</sup>—March 2<sup>nd</sup>. Mr. Wehrlé could communicate a report of the work done on behalf of the Commission and present the complete Draft of the Convention. The text of the Berlin Draft had been sent to the national services April 28<sup>th</sup> 1941 with a request to forward their replies before December 31<sup>th</sup> 1941, later postponed to December 31<sup>th</sup> 1943. Replies had been received from 14 countries generally agreeing with the Draft but requesting the postponement of eventual decisions until after the end of hostilities.

The annexes had been drafted during the years of war by Dr. Hesselberg himself as far as possible after a correspondence with Mr. Wehrlé as President of the Commission and with the help of the Secretariat. This Bureau had been moved in time to Switzerland (Lausanne, November 1939) to fulfil its routine duties in this neutral country.

It was decided that the new Draft (191) should be submitted for instant deliberation to a session of the International Meteorological Committee at Paris July

1<sup>st</sup> 1946. The Draft text (Berlin Draft) was annexed to Appendix A. The Paris session expressed, after ample consideration, its opinion in Resolution 14 in these words: "The Conference charges the International Meteorological Committee with the work of preparing the Draft International Meteorological Convention."

With this decision the "Commission for the Study of the Convention" was discharged and dissolved.

The Draft of the Convention was largely discussed in the above-mentioned meeting of the International Meteorological Committee. It formed the principal item on the agenda and several meetings were completely devoted to the agenda and several meetings were completely devoted to the deliberations for composing a new Draft known as the "Paris Draft".

The final discussion included a considerable part of the new deliberations. The last-mentioned discussions were submitted to the Conference of Directors in Washington in a considerable number of meetings and succeeded that the Convention could be signed on October 11<sup>th</sup> 1947 (64).

## Appendix M

### The Commission for Climatology

#### Introduction

The discussions in the first meetings of meteorologists in the foregoing century (Leipzig, Vienna, Rome, Munich) were devoted mostly to questions of climatology (climatological means, reduction tables, publications in standard forms, etc.). The resolutions contained instructions which had survived two generations and the need for a change to modern methods and ideas to comply with the evolution of meteorology had in the first decennia of the twentieth century never been felt. For this reason there was no need for the Conferences of Directors in Paris and Utrecht 1919 and 1923, to institute a special Commission for Climatology after the 1914—1918 war.

Among the many items of the agenda of the Conference of Directors at Copenhagen 1929, nine were in the field of climatology. The first of these expressed the wish (192): "It is desirable that a Climatological Commission will be formed for the study of all questions relating to this branch of science."

The Conference agreed to the desirability of this requirement and adopted, after a vivid discussion, the following resolution (193): "Résolution 103. La Conférence décide de créer une Commission climatologique."

Immediately after the adoption Prof. v o n F i c k e r (Berlin) was proposed to lead the new Commission as its President. In accepting this nomination he chose as its first collaborators Messrs. Walléen (Sweden) and H e s s e l b e r g (Norway). The close relation with the Commission for Synoptic Weather Information was expressed in an instruction for both Commissions.

The Commission formed its Bureau with Prof. v o n F i c k e r in the chair and Prof. M a r i o l o p o u l o s (Saloniki), the Vice-President. It co-opted 27 members, from 20 countries, 11 from Europe and 9 from other parts of the world. The Commission elected later another four\*) and elected Prof. K n o c h as Secretary. It held its first meeting in Innsbruck 1931, the second in Wiesbaden 1934, the third in Zoppot-Danzig 1935 and the fourth in Salzburg 1937. After the latter meeting the activity of the Commission was relatively limited and depended generally on the carrying out of the extensive resolutions of the foregoing meetings. For this reason Prof. v o n F i c k e r refrained from a session at Berlin 1939. He mentioned in his last report to the International Meteorological Committee in its meeting in Berlin 1939 only the Reports of two sub-commissions instituted at Salzburg in 1937 namely that for Medical Meteorology and that for Barometric Comparisons.

As date for the next meeting the year 1941 was mentioned.

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\*) Dr. T. B e r g e r o n (Oslo), C. E. P. B r o o k s (London), Prof. K. K n o c h (Berlin) and Dr. E. K u h l b r o d t (Hamburg), Dr. A. W i g a n d (Hamburg) having resigned.

### The meeting at Innsbruck 1931 (101)

The President of the newly established Commission convened the members for a meeting at Innsbruck September 1931, coinciding with meetings of the Commissions for Terrestrial Magnetism and for the Second Polar Year.

The number of persons invited to take part in the activities as members of this youngest child in the series of Commissions was 38. 16 were present at Innsbruck to attend the meeting and 8 guests besides.

The President remembered in his opening speech at his election to the presidency he had mentioned the narrow relation between climatology and dynamic meteorology. The 24 memoranda received for examination and recent publications had shown that this opinion existed everywhere. The way to be followed could be that of intense scientific investigations but above all it should be directed in an efficient scientific way. The Climatological Commission would have the task of paving this way by indication of schemes of observations and of publications to be projected especially for that purpose. The extraordinarily extended network of observing stations for dynamic meteorology might as a matter of fact be ready for use for climatology, but only a small percentage of the observations of these stations is inserted in the climatological publications in each country. The number of the last is not sufficient for the needs of modern climatology.

It may be asked how we can apply the observations of the numerous stations for the international synoptic weather reports to the aims of dynamical climatology. These should be applicable to researches about the actual weather situations and to all that concerns the actual weather conditions and their changes during periods of long or short range. The directives of the deliberations ought to be to consider:

- 1° will the observations of all new elements in the programme for synoptic meteorology be inserted in the climatological publications, or only a few, and of all stations?
- 2° will the meteorological publications be changed and extended in order to be applicable to the investigations of the weather situations aimed at?
- 3° shall the actual hours of observations having so long been in existence remain the same as had been fixed so long ago or should they be changed to coincide with that of the synoptic stations at the synoptic hours?

The Commission will also have to deal with these questions in future. Wireless reports could be used for quick distribution and regular information of climatological data to give a sketch of the mean weather situations in extended regions of the earth, and for the study of periods of definite long or short range as e. g. for researches about fluctuations in the general circulation in the atmosphere. This could be organized by adding a short group to the intercontinental transmissions at a fixed day early in the month with the indication "Climate" containing monthly means of a small number of elements of a restricted number of selected stations as key stations. This plan would have to be examined by a joint sub-commission, with representatives of all the Commissions interested, in the first instance by the Commission for Synoptic Weather Information and that for Agricultural Meteorology after directives to be stated in a resolution.

A similar course would have to be followed regarding the question of extending as much as possible the regular publication of the daily observations of

the synoptic stations for the benefit of scientific climatological researches about the range of the weather. The comparison between the number of reports transmitted daily by WT with that appearing in the climatological publications had been changed considerably in later years, and unfavourably for the latter. The composition of a draft for a new form of publication in the annuals for climatology would have to be given into the charge of a sub-commission.

The question of calculation of means for periods of short range for climatological statistics, as for instance a week, should be left to considerations to be made elsewhere concerning calendar reform. They should be postponed for the time being. A proposal to call the hours of the day 0—23 had been agreed to. A second proposal for the introduction of air masses and fronts in climatological means had not been agreed to generally, but there was no objection to a very limited number of stations for statistics regarding their frequencies and their general appearances.

The meeting had to discuss some questions regarding the estimation of cloudiness "with and without cirrus clouds" and the standardisation of meteorological instruments and of those for solar radiation. Further the balance of moisture in the lowest layers; questions that had been repeatedly considered since historical times. Once again this led to no decisions. The meeting urged as very important the re-edition of daily weather charts of the northern hemisphere by the Deutsche Seewarte, a question that was supported by the Committee very urgently in considering the report of the Commission in Locarno.

The activities of climatology for application to dynamical meteorology and for weather forecast had been summarized in a long memorandum from the Norwegian side by Dr. H e s s e l b e r g (194). Combination of the observations for climatology with those for synoptic reports at the hours of standard time GMT instead of at the climatological hours at local time should make a tremendous economy and simplify the work at the synoptic stations considerably. Also the divergence in the use of units and the application of different corrections would have to disappear and questions of the exposure of instruments ought to be discussed. The Committee meeting at Locarno had to examine these questions and take the necessary decisions.

A last question was the use of modern calculation machines in climatology. It would be necessary to manage a suitable form for an international scheme of publication applied to the punched cards and also for international exchanges. Anew a sub-commission had been nominated to examine this question and eventually to arrange proposals for the necessary changes of the schemes for publication in order to make them applicable to the methods of mechanical elaboration.

Summarizing, the above-mentioned report it may be stated generally that the results of this first meeting had been to fix the directives for the Commission's activities in future. Implementing the resolutions and preparing a general revision of how to arrive at modern methods and procedures in climatology had been entrusted to 4 sub-commissions with the indications:

- Sub-Commission for immediate distribution of monthly means,
- Sub-Commission for publication of daily observations,
- Sub-Commission for unification of the elements for climatology and synoptic forecasting services,
- Sub-Commission for reform of the climatological publications.

The number of resolutions was limited to 9. 5 of them had later been adopted by the International Meteorological Committee at Locarno (Res. 33—37) 1931.

Resolution 37 may be mentioned especially as recommending to charge the Secretariat of the International Meteorological Organization at De Bilt to compose a list of the climatological stations of the first and the second order and of stations with limited observations and also of old stations which had been more than 5 years in existence, with co-ordinates and heights and, for mountain stations, geographical positions. A second part of the resolution 37 recommended that the Secretariat should compose a list of all current meteorological publications of the Central Meteorological Offices with indications of particulars such as the length of the series etc.

#### **The meeting at Wiesbaden 1934**

In May 1934 the members of the Climatological Commission met in Wiesbaden in one of the rooms of the Kurhaus for the opening of the session.

The President mentioned in his opening speech that this second meeting aimed at continuing the work of the first meeting at Innsbruck two years ago. This first meeting had not yet brought real results for the advancing of science. The questions to be examined had to be first considered in the four sub-commissions. The President pointed out that uniformity of the observation, service, exposure of the stations, and many other questions all required a difficult and thorough examination. Everywhere on earth people are interested in this work and an advance can only be reached by best possible recommendations not exceeding the limits of what can be realized. The deterioration of domestic conditions, extending all over the world is forming a brake on the recommendations pointed out in the resolutions and is influencing the advance of science unfavourably. Systematic simplifications and efficient limitations are more welcome than extensions of the climatological work.

Only twelve out of the great number of members and four guests had made the journey to Wiesbaden to attend the meeting and to consider the twelve items of the agenda.

Four of these concerned the reports of the sub-commissions established at Innsbruck, which had all accomplished a considerable amount of work. Where possible they had consulted other Commissions on questions of common interest.

The "Sub-Commission on the transmission of monthly means" in the radio-telegraphic reports had inquired from the different meteorological services about their opinions by forwarding a circular and had drafted a proposal based on the replies received. After that the question was submitted to the Commission for Synoptic Weather Information at De Bilt in the days preceding this meeting. The result of a long discussion in the CSWI on memoranda from two of its members had been that, after the matter had been considered by the Sub-Commission on the Time-Table, the Commission had informed the Climatological Commission about its views for inserting special groups in the synoptic reports. One of the members had reviewed the whole question in a long report (195). The conclusions were summarized in a number of five resolutions (VII to XI) for inserting the monthly means in two groups for a small number of carefully chosen key-stations

on a fixed day in the month. With this result the sub-commission could be dissolved. The list of stations ought to be indicated by the International Meteorological Committee.

The second "Sub-Commission for the publication of daily means", had summarized its conclusion in a resolution (XXIII) containing all the necessary instructions. This resolution was adopted without or amendments.

The third "Sub-Commission on units and symbols", had been in close relation with that of the Code sub-commission of the CSWI. It had considered its charge with the members of that sub-commission during the last meeting of the International Meteorological Committee at De Bilt (1933) and newly with some members at the recent meetings of the CSWI at the same place. The result of the deliberations had been summarized in a memorandum based on the decisions of the CSWI (195) in which a number of new symbols were added to the existing ones from the foregoing century, scales were established and a number of notations in letters for a number of elements were fixed internationally. As regards the data for wind-force estimated on the Beaufort scale it was resolved that the descriptions of the effect of the wind as given in the English language should be agreed on for international use.

The fourth "Sub-Commission for Reform of the Climatological Publications", had to consider what changes ought to be made in the elaboration of the observed data and in the international climatological tables and working schemes; a question that had already been preliminarily examined at Innsbruck and before that in a meeting of the Commission of the Study of the Clouds at Frankfurt M. in 1931.

An extensive memorandum from the Norwegian side contained a proposal for a number of "Hydrometeor Descriptions and Symbols", to be used in future work based on the theories of fronts and occlusions, theories which had been agreed to increasingly in Meteorology (Anlage XVII) (196).

The discussions regarding the two questions of the simplification of units and symbols prepared in the CSWI, and the completing of the scheme of the Symbols in accordance with the new ideas, led to the adoption of two sets of five resolutions (XIII to XVII and XIX to XXIII) comprising various instructions for international use.

The Commission had been asked how many years would be sufficient for stating periodical fluctuations of climate at a place or in a region. Ten years had been judged to be the minimum. It depended also on the definition of climate. Means of 30 years ought to be available to characterize a "standard period". It was decided to designate the 30 years' epoch 1901—1930 as a standard for the researches mentioned and this decision was laid down in a short resolution (II).

The question of the estimation of cloud amount with and without Cirrus had formerly been presented to the CSWI and this Commission had referred it to the Climatological Commission to take a decision on.

It was decided to introduce the estimations without Cirrus in future, to start from January 1<sup>st</sup> 1938 and to note up to that date the amount of clouds, in duplo, with and without Cirrus (Res. III).

At last there was the important question, whether to maintain for the climatological observations the old climatological hours local time, or to change to a

simplification by a combination of synoptic and climatological observations at the synoptic hours GMT. The result of long deliberations was, that there was no objection to this change when the climatological hours differed inconsiderably from the synoptic hours, i. e. not more than  $\pm 1$  hour. It was decided that double observations ought to be continued at a small number of especially indicated stations as key-stations in view of fixing the reduction from the observations at the synoptic to that of the old climatological hours at local time.

These conclusions were laid down in Resolution IV. The epoch of the change had been fixed at January 1<sup>st</sup> 1938.

The number of resolutions amounted to 23. Before closing the meeting the President emphasized, that the realization of the decisions which had been taken here would seem to lead to a revolution in the classic observation work of climatology which had remained without any change for so many years. An absolute reform ought to be accomplished in all meteorological services including Climatology. With these prophetic words the meeting was closed.

#### **The session at Zoppot-Danzig 1935 (197)**

The President convened the members for a third meeting at Danzig (Zoppot) in the week preceding the Conference of Directors at Warsaw September 1935. The list of members had been increased during the meeting to 47. There was a large attendance of 21 members and 31 guests for taking part in the discussions of 17 items of the agenda based on 14 memoranda received by the Bureau since the last meeting 15 months ago.

Those attending represented 23 countries, 14 among them from Europe, 2 from North America, 2 from Asia, 3 from Africa. The large number of members spread over the whole globe had caused a lot of correspondence concerning how to carry out the resolutions and proposals for new activities in various directions complementing the resolutions adopted or recommended.

The work of the Commission in the first two meetings may be summarized as drafting a general programme of modern climatology. At Innsbruck the necessary preparatory work was divided among the four sub-commissions mentioned; in Wiesbaden the reports of the sub-commissions led to fixing the course to be followed by the Commission with the new proposals. The aims of the third meeting at Danzig had to be to abandon the classic rules and change to modern ones by a set of resolutions containing decisive instructions after consulting the Commission for Synoptic Weather Information. The 23 resolutions of Wiesbaden and the 12 of Danzig and Warsaw for resp. types for indicating meteorological elements (198); standard period for meteorological means 1901—1930 (199), issue of climatological means by WT (200), symbols for the elements in annuals and in weathermaps, a complete set of descriptions of hydrometeors based on generally agreed scientific principles (201) may be called a mile-stone in the history of climatology indicating the way for revolutionary new procedures and indications.

#### **The session at Salzburg 1937 (202)**

The presence of a large number of meteorologists of the whole world at Salzburg in the week preceding the session of the International Meteorological Committee at that town, in September 1937, was an opportunity for several com-

missions to convene their members for meetings, among them the Climatological Commission. The meeting was attended by 16 members and 26 guests from 24 countries. The parts of the world outside Europe represented were Asia (2), Africa (2), and USA (3). The agenda numbered 28 items, the number of sessions was 6, the number of resolutions 9. There was, as usual, a deluge of memoranda (23). The number of members was complemented by 10 new names.

Three of the sub-commissions of Innsbruck were still in function, a fourth was the "Sub-Commission for Medical Meteorology" with 30 members instituted at Danzig 1935. A fifth and a sixth were newly established at Salzburg, respectively for the Order of Stations (5 members) and for intercontinental comparison of barometers (9 members, for Europe 3, Asia 2, North America 1, South America 1, Africa 1 and Australia 1 (Resolution VII)). The President mentioned in his opening speech as the duty of the Commission to adapt as quickly as possible to the increased needs and to devote the time for discussion exclusively to the most urgent questions and in broad lines.

In the report of the President to the International Meteorological Committee at Salzburg Prof. v o n F i c k e r stipulated that the questions concerning "Unification of Units and Symbols", the "Definitions of Hydrometers", the "Symbols for Optical Phenomena" could not be considered as finished. The reports of the Regional Commissions proved the extreme difficulty of drafting uniform instructions to be applied and giving satisfaction to the aims of all meteorological networks.

The number of resolutions this time was modest, not more than nine. The Sub-Commission for Medical Meteorology held a separate session with 3 meetings (203) and drafted a long resolution (III) for guaranteeing that the local observations should be true and not locally coloured.

A special sub-commission of Salzburg for the Research on Tornados and Whirl-winds had finished its duty by drafting an excellent programme for investigation of tornados and water-spouts (204) by Dr. L e t z m a n n and Mr. K i n c e r (Lettland and USA). This programme was generally recommended as an instruction for observers by Resolution IV. After that the sub-commission was dissolved.

There was an endless discussion regarding the item "Definitions of Hydrometers" based on a very extended memorandum of Dr. B e r g e r o n (Stockholm) entitled "Hydrometer-Beschreibungen (1937)". The conclusion was laid down in Resolution VIII stating

"that the order of hydrometers proposed by Dr. Bergeron and the proposed descriptions agree to the actual state of our knowledge. They are to be recommended for general use in meteorology but have to be adapted to the momentary state of our science."

The members P. W e h r l é (Paris) and A. W a g n e r (Innsbruck) had sent memoranda concerning elaboration of aerological observations in an aeronautical three-dimensional Climatology for Aviation as instituted by the International Commission for Aerial Navigation (205). A following comment by Dr. Keil (Berlin) closed with a draft resolution to promote the start of the calculation and publication of aerological means everywhere as quickly as possible and to require the Aerological Commission to supervise the elaboration so that the results will be comparable and to carry out instructions for publication in relation to the forms proposed by Prof. W a g n e r.

Dr. Keil's resolution was adopted (206) in the form proposed as Résolution II. La Commission climatologique a pris connaissance avec satisfaction de la communication de M. Bureau et des propositions de M. Wagner. Elle exprime le voeu que le probleme des moyennes aérologiques soit abordé avec vigueur et que les calculs effectués d'une manière uniforme, donnent lieu le plus tôt possible à des publications. Elle prie la Commission aérologique et la Commission aéronautique (en relation avec la CINA) de préparer des mesures en vue d'uniformiser les méthodes d'observation et l'exploitation des résultats et de rendre ainsi comparables les mesures aérologiques. Elle prie les Commissions sus-mentionnés de prendre connaissance de l'exposé de M. Wagner relatif à la forme des publications et elle leur demande de prendre les mesures qui leur semblent nécessaires à ce sujet.

It was approved by the Committee in its second session.

#### **The report to the session at Berlin 1939**

The session at Salzburg was the last of the Commission in its pre-war constitution. The President was of the opinion that first the success of the Danzig and Salzburg resolutions had to be awaited and suggested a following meeting in 1941.

The sub-commissions for Medical Climatology and for the intercontinental comparison of barometers reported separately. The first increased the number of members to 30. It mentioned a proposed activity but preferred to refrain from convening a meeting at the moment and to await a meeting of the main Commission.

The second sub-commission limited its members to nine\*). It had reported that the comparison had been carried out in the regions represented and the measures satisfied the resolutions concerned.

#### **The Commission dissolved and re-established 1946**

The extraordinary Conference of Directors in London, February-March 1946, resolved to dissolve the pre-war Commissions altogether and to re-institute a limited number. Among them was the pre-war Climatological Commission.

The Conference appointed as the new President Ing. A. G. Galmarini (Argentine) and elected 44 new members. The Commission met in Toronto between August 4<sup>th</sup> and August 25<sup>th</sup>. It held 11 plenary meetings and passed 32 resolutions.

The report of the President formed the Annex J—IV (207).

It had established 5 sub-commissions to concern themselves with respectively:

Climatological Procedures,  
Machine Methods in Climatology,  
Applied Climatology,  
The Réseau Mondial,  
The Publication of Climatological Papers and Bibliography.

The sub-commissions were charged to maintain the closest liaison with the other Commissions also in future. 7 of the resolutions were adopted by the Conference. The Presidency devolved on Mr. de Souza (Argentine).

\*) Europe Prof. K. Knoch, (President), Prof. A. Réthly, G. Ouchakov.  
Asia: Director A. Romer, Phu-Liên.  
Africa: A. Walter, Nairobi, Dr. C. W. B. Normand, Poona.  
North America: Dr. F. W. Reichelderfer.  
South America: A. G. Galmarini.  
Australia: Dr. E. Kidson, Wellington.

## Appendix N

### The Regional Commissions

#### The Regional Commissions I and II

The International Meteorological Organization was in the first decennia of his existence mainly the ruling body for meteorological services in Europe. The other parts of the world joined in the years after the Conference of Directors in the year 1891.

The first Conference of Directors after the war 1914—1918 at Utrecht 1923 was attended by Directors from South America and Asia, that of Copenhagen in 1929 by representatives from the four other parts of the globe. Shortly after in the year 1929 the Directors from the Far East convened a session at Hong Kong and invited the President of the Commission for Synoptic Weather Information to attend this meeting (1930).

The need for regional conferences in the regions distant from Europe was expressed by Mr. A. Walter, Director of the Meteorological Service of Central Africa on behalf of his colleagues in the dark continent.

He expressed at the Conference of Directors at Warsaw 1935 the wish:

"In view of the rapid development of meteorology in Africa and the urgent need for co-operation, the Directors of the Meteorological Services concerned request that they may be allowed, with the authority of the International Meteorological Organization, to call meetings periodically for the discussion of their particular problems in order to ensure the development of meteorology in conformity with the requirements of the International Meteorological Organization."

This speech of Mr. Walter was immediately followed by a proposal on behalf of the Directors in the Far East read by Mr. C. D. Stewart (Singapore, Malaya). He expressed the hope:

"That the Directors of Meteorological Services in the Far East be authorized to meet periodically to discuss and formulate recommendations concerning their special problems."

The meeting recognized the importance of regional co-operation in large sectors of the world in distant regions where the Services were developing quickly and the need for organization by meetings and in conferences is felt. The end of long discussions on formal questions was a direct proposal of the President which was briefly formulated in the resolution 116: "La Conférence décide d'instituer des Commissions Régionales."

The adoption of this very important decision was immediately followed by the establishment of the:

Regional Commission I for Africa, and  
Regional Commission II for the Far East,

and the nomination of Mr. A. Walter (Kenya, Afrique Orientale Anglaise) as President of RC I and Mr. E. Bruzon (Phu-Liên, Indochine) as President of RC II. The last step was the designation of the services represented.

With this decision the Organization opened a new way, a way to decentralization and dividing its power between individual commissions for large parts of the world without the supremacy of the old European civilization. It would be necessary at a later date to adapt the Statutes to this new situation.

In the following pages the work of the Regional Commissions and the primordial rôle which they have played in the Organization are sketched. It would be obligatory for the Regional Commissions to send their reports to the Secretariat of the Organization and the resolutions to the President of the Organization for examining and discussing in the sessions of the International Meteorological Committee.

#### **The sessions in Lusaka (208) and Hong Kong (209)**

Sixteen persons were present at the meeting in Lusaka, five were members and two representatives of members. H. E. the Governor of Northern Rhodesia emphasized in his opening speech the great importance of meteorology for the rapidly increasing air traffic in this immensely extensive part of the world. Places formerly days distant could now by air be reached in hours.

At the beginning of the discussions regarding the items on the Agenda the President recalled once more the non-official status of the IMO and the consequences of this with regard to special procedures concerning its resolutions and recommendations.

The Hong Kong session (209) was attended by twenty-eight persons i. e. eight members and twenty guests among them three representatives of Aerial Navigation Companies with services in this part of the world extending from longitude 70°—100° E and latitude 50° N—10° S. There were also present three guests representing International Shipping Companies in the seas of this territory.

It were the meetings of Copenhagen and Warsaw that had been the directive in composing the agenda and the way of adaptation to the resolutions under the existing conditions of possibilities and their consequences in the individual meteorological services in this regions. This was clearly expressed in the wording of the first resolution at Lusaka:

"it (the Commission) would be glad to obtain an explicit acknowledgment of the fact that in tropical regions both the weather-processus and the local administrative conditions of internal organization differ materially from those of the temperate regions."

The territories in Africa were mostly still underdeveloped in comparison with Europe and North America, but they were becoming increasingly incorporated in the large total of organizations concerned in the now far-extended intercontinental traffic. These bodies being independent of frontiers and climates but requesting to be informed everywhere by equally recognized directives.

The first item for discussion was in both agendas the transfer of synoptic reports by WT, the instructions for the observations, the hours of observation, the forms of codes, the codes to be used giving the information, and the composition of the reports for mutual interchange in the forms of code adopted at Warsaw for use in tropical regions\*).

\*) Resolution Warsaw 54:

IIICLCM wwVhNh DDFWN PPPTT UURRGw DLCHDH/M MM.

In adopting these forms of codes a number of restrictions were preferred in both regions as regards the meanings of a number of figures in some of the codes. F. i. Lusaka preferred smaller heights in the forms of code for upper winds.

As regards the hours of the observations it was preferred to follow the system of the northern hemisphere and to introduce the same hours GMT for the synoptic reports. The time was not yet ripe for composing collective synoptic reports by WT and this question should be necessarily studied with the radio authorities, which were prepared to follow the regulations of Warsaw in broad lines.

The geographical structure of Africa, being for the greater part a high plain over 1000 m. height and with steep brinks at the coasts, is not apt for the reduction of barometric pressure to sea level for stations over 800 m. height and for applying the general prescription of Innsbruck 1905. It was decided to change the height of 800 to 400 m. and to reduce the barometric pressure at stations at a higher level to this. Although this inconvenience was less in the Far East it was recommended here to change the height of 800 m to 500 m. in the inland tropical regions.

Apart from the collective synoptic and intercontinental WT reports there was the weather information especially for aviation. It was decided to follow, in both regions, as much as possible the regulations prescribed in Annex G of the ICAN and also to join the Convention for Air Navigation of 1919 in calculating the climatological data for aviation purposes.

Pending the resolution of Warsaw relating to recommendations for projections of charts and the scale to be used (211) the Lusaka meeting thoroughly discussed the system to adopt, namely the suggested chart-projection for the inland tropical regions of the earth and the scales to be used in drawing the weather-charts. It was decided to introduce in the tropical regions the projection on a cylinder cutting the globe in the latitudes 25° North and South, the so-called "equal area" system and for the scales to use  $1 : 5 \times 10^6$ ,  $1 : 1 \times 10^7$  and  $1 : 2 \times 10^8$ .

The Hong Kong Conference equally joined these recommendations for the territories in the Far East. As for the rest the discussions concerned internal prescriptions relating to the adaption of the elaboration of climatological data to the recent prescriptions of the Commission for Climatology.

This regarded the calculation of mean values, in publications and in the interchange at least within 2 months of data tabulated in the forms as indicated by this Commission.

It was decided also to make regularly aerological observations of the upper winds, and, if possible, of temperature and humidity of the atmosphere by aeroplanes in the scheme as indicated by the President of the Aerological Commission and to join the calendar of the "International Days". Especially Hong Kong urged the extension of the observations of ships at sea for information for aerial navigation and shipping.

It was at Lusaka that the prescriptions for placing the instruments and the mutual comparisons had been considered (thermometer screens, placing of wind-vanes, measurements of humidity by the wet bulb thermometers).

The number of resolutions at Lusaka mounted to 43, in Hong Kong to 54. The last but one resolution brought the decision to entrust to a permanent sub-commission of not more than 7 members the task described as:

"appointed to deal in Region II with questions concerning the timetable of synoptic issues and questions affecting international meteorological communications. This Sub-Commission would act also in consultation with the Chairman of the Timetable Sub-Commission and of the Commission for Synoptic Weather Information."

The last resolution gave a sketch of a possible table of issues for the Far East for the weather messages of the early afternoon in local time.

In closing the meetings in Hong Kong as well in Lusaka remarkable predictions were made. The Hong Kong President mentioned the difficulties that would have to be conquered in executing the decisions. It would be necessary that, in notifying the authorities in charge of the execution of these recommendations and decisions, that it should be indicated as clearly as possible what were the purposes aimed at and what the several services arranged and what they must expect from the new plan and new trend without clinging the old customs.

The Lusaka meeting ended with cordial speeches of the President, of the attending member of the International Meteorological Committee and of the Representative of the French colonial Service. There was a unanimous recognition of the great success of the establishment of these Regional Commissions and of the great value of the unification of information and the division of work in large regions of the earth for aerial navigation and shipping, that could be expected for the colonial economy.

### **The Regional Commission III**

The plan for convening the Directors of the Meteorological services of South America at a regional meeting had already been considered by a Pan American Trade Conference at Buenos Aires in May 1935, long before the Conference of Directors in Warsaw had resolved to establish "Regional Commissions" for different parts of the world. The principal aim in this Conference was the meteorological protection of air traffic and it was resolved to hold a meeting for this named "Conférence Technique Internationale d'Aviation" at Lima.

As a meteorological organization was still lacking in South America it was considered useful to precede the Conference at Lima by a meeting of meteorologists and experts of Radiotelegraphy in the autumn of 1935 at Rio de Janeiro with the distinct programme:

*"procéder à l'organisation des services de concentration et diffusion des informations météorologiques pour les besoins synoptiques et de la navigation aérienne commerciale et d'adopter, en même temps, un système d'organisation des services radio-électriques pour l'échange de ces informations."*

This Conference had met some weeks after the Conference of Directors at Warsaw. The meeting had adopted a resolution tending to the establishment of a Regional Commission for South America in the sense of the Regional Commissions that had recently been established at Warsaw for Africa and for the Far East. This had led to a letter from the Government of Brazil to the International Meteorological Committee dated November 4<sup>th</sup> 1935 signed by all the Directors in the countries of South America requesting the establishment of a Regional Commission for this part of the world.

The Committee had agreed to this request by its decision by correspondence of 1 May 1936. The Commission received the title "Number III".

The meeting at Lima (210) was a complete success. Six members and ten guests attended, two of the latter from the United States. The agenda was composed of thirty items aimed exclusively to discuss the measure to be taken for introducing into South America the latest resolutions of Warsaw and also those of the Regional Commissions at Lusaka and Hong Kong, or, as the President expressed it at the opening of the meeting:

"apporter toute notre attention à l'étude des mesures qui, à notre avis, doivent être appliquées pour modifier de fond l'état actuel identique à une infériorité de notre côté abrégant ainsi le chemin qui nous sépare aujourd'hui du degré de capacité et de prospérité dont jouissent les services météorologiques des autres pays."

As the Lima meeting coincided with that at Salzburg mutual contact could only be made by long cables.

The Commission met anew at Montevideo (213) in the beginning of the year 1939. At that moment the complete reports of the meeting of the Commission for Meteorology for Air Navigation at Paris in June 1937, and that of the Committee meeting at Salzburg in September 1937 had been published and were both available for discussion. At the same time the invitations for attending the Committee meeting in Berlin in June 1939 had been circulated.

#### **The Regional Commission V (212)**

Three months after the meeting at Lima the meteorologists of the eastern hemisphere south of the equator came together for a meeting at Wellington in New Zealand, the city where many aerial communications in the Southern Hemisphere ended or had to start for long oceanic crossings. This meeting also was principally intended for the task of the organization and protection of air traffic in this distant part of the world. So it lacked the exclusively meteorological character of the Regional Commissions of the other parts of the world. Only half of the sixteen attending were meteorologists, the others were representatives of WT-services and of Air Traffic Companies.

#### **The Regional Commission VI (58)**

The newly established Regional Commission for Europe took this opportunity to discuss the special regulations for this part of the world and in how far the pre-war rules could be restored and complemented. In principle it concerned the re-institution of the regulations of the pre-war permanent sub-committees (C and T) of the old CSWI regarding the transmission of the synoptic reports by WT of land stations and ships at sea with adaptation for newly developed conditions. The agenda was composed of 8 items which were discussed in three sub-commissions, the first for special practical questions regarding the re-institution of collective synoptic weather reports in Europe and also the important question of the teleprinter connections; the second for the organization of the WT transmission from the ships on the Atlantic Ocean in view of a considerable extension of the number of observations from the ships at sea. The third sub-commissions discussed some questions of an administrative and scientific character.

The President reported to the Committee meeting at Paris (57) the results of the discussions summarized in 14 resolutions regarding the instructions for the re-establishment of the pre-war collective reports for the European territory and the intercontinental exchange of messages with USA.

The Commission supported strongly the extended collaboration of the ships for reports for the Atlantic and urged strongly plans for the stationing of weather-ships on the Ocean. The establishment of teleprinter connections nationally and internationally was strongly recommended in view of the possibility of their extension to a system for transmission of meteorological information for Europe from one single centre.

After the experiences of the war with the stationary ships on the Oceans it was generally agreed that a distinct plan for a number of 14 with a full programme of daily synoptic and aerological observations at 4 standard hours with 6 hours' intervals was strongly recommended. The valuable help of the PICAQ (see Appendix Q) for aviation was absolutely necessary for this, and also that of the CSWI.

Proposals for the desirability of an intensification of the contact between the pure scientists by creating an International Meteorological Institute for scientific research were treated by the third sub-committee. As there was no unanimity of thought regarding this difficult and complicated question the further treatment was entrusted to a sub-commission of scientists with the instruction "to consider the conditions which could enable the establishment of an International Meteorological Institute in Europe".

This would be the realization of an old dream, as had been mentioned more than once in Part 1.

## Appendix O

### The Commission on Projection of Meteorological Charts

#### Introduction

During the 19<sup>th</sup> century the weather maps drawn daily extended over small regions on the globe and so the question of scales and projections could be left to the services themselves without international arrangements.

It was the extension of the charts to larger regions by the studies of Hildebrandsson and the work of the Commission for the Réseau Mondial that caused the need for international agreement concerning scales and projections for mutual comparison and for superposing and juxtaposing for large parts of the globe on suitable planes. This happened in the first decennia of the 20<sup>th</sup> century and in 1919 the Norwegian Prof. V. Bjerknes of Bergen sent a proposal to the Extraordinary Conference of Directors in Paris in that year for a system of unification of projection and scales based on general principles.

This proposal was adopted as resolution No. 34 at the London meeting of the International Meteorological Committee 1921 (214). This resolution reads as follows:

"(I) Principes généraux: Les projections des cartes météorologiques dynamiques doivent satisfaire aux conditions suivantes

- A. Avoir des méridiens rectilignes.
- B. Etre conformes.
- C. Avoir des défauts d'échelle aussi petits que possible relativement à l'étendue des régions représentées.

(II) Projections spéciales: — Prenant pour base ces principes généraux, on recommande les trois projections suivantes

- A. Pour les régions polaires: projection sur un plan qui coupe le long du parallèle de 75°.
- B. Pour les latitudes moyennes: projection sur un cône qui coupe le long des parallèles de 30° et 60°.
- C. Pour les régions équatoriales: projection sur un cylindre qui coupe le long des parallèles de 15°.

(III) Echelles: — On recommande d'employer autant que possible l'échelle de 1 : 10 000 000.

Pour les travaux sommaires, on peut appliquer aussi l'échelle de 1 : 20 000 000, pour les travaux détaillés les échelles 1 : 5 000 000 et de 1 : 2 500 000.

On recommande aux Instituts Météorologiques de prendre en considération ces principes à toute occasion où l'on introduira de nouveaux arrangements concernant les cartes."

The question on projection and scale was discussed anew in the Conference of Directors at Copenhagen 1929 as proposals had been submitted in connection with circumpolar charts for the North Atlantic. The proposals concerned a change of the limits in (II) A from 75° to 60°.

These proposals were adopted as resolution 22. It was recommended to appoint a joint sub-commission to find the best system of charts on the principles laid down in London 1921 (Copenhagen Res. 97) (45).

The sub-commission was nominated in May 1935 at the Conference of Directors in Warsaw. It consisted of six members, one for each of the Commissions interested, namely: Dr. Ahlgrim for Maritime Meteorology, Dr. Hesselberg for Synoptic Weather Information, Dr. Keil for Investigation of the Upper Air, Capt. Heck for Terrestrial Magnetism, Dr. Norman for Réseau Mondial, Prof. van Everdingen for Climatology.

The sub-commission met in Warsaw September 1935 under the leadership of Dr. Hesselberg as Chairman. It altered the plane of the polar charts cut to  $50^\circ$  instead of  $75^\circ$ , and for the equatorial zone the cylinder to cut at  $25^\circ$  instead of  $15^\circ$ . It expressed further the hope that continued study of the problem would lead to the adoption of 2 or 3 types of world charts suitable for general use. This became resolution No. 109 of Warsaw (88) replacing No. 34 of London 1921.

In resolution No. 114 of Warsaw the sub-commission on chart projections was changed to an independent Commission. It reads as follows:

Resolution No. 114. "La Conférence décide de prolonger les mandats de la Sous-Commission des Projections des Cartes et de la changer en une Commission indépendante."

Dr. W. Gregg (Washington) was invited to accept the Presidency (88).

#### **The meeting at Salzburg 1937**

The resolution No. 109 of Warsaw was discussed in the Regional Commissions I and II (Res. XXV Lusaka and XVII Hong Kong) which were particularly interested in it. It concerned projections for climatological maps in both regions.

The President had convened the members for a meeting during the Committee meeting at Salzburg September 1937 (215). The Commission met on September 16<sup>th</sup> and the President opened the meeting with a long address stressing the need of standardization in projections and the desirability that standard charts be used by all, otherwise "our most carefully laid plans for synoptic meteorology on an international basis will fail in some instances because some special projections on special scales will not admit of the successful application of standard methods".

These standard methods are described in a set of nine resolutions, which were all adopted by the Committee meeting (No. 74—82) (216). In the first the name of the Commission was changed to "Commission on Projections of Meteorological charts". The number of members, being 13, was extended to 20.

The Commission lost its President by the sudden decease of Dr. Gregg on September 14<sup>th</sup> 1938. His place in the Presidents' Chair was ad interim taken by Mr. I. R. Tannehill (Washington) who presented the report on the activity of the Commission to the Committee meeting in Berlin 1939 (55).

He reported the success of the resolutions of Salzburg concerning a survey of the synoptic charts in use by national services to ascertain which projection and scales were in use. He mentioned a letter of March 1938 to the President of the Commission for Synoptic Weather Information with regard to colours for use in printing outline charts for synoptic weathermaps. He reported that as sequel to the recommendation made in resolution IX that "whenever a Meteorological Service changes the projection or scale of any of its existing charts or adopts an addition chart, the Director of the Service shall send to the President of the Com-

mission on Projections for Meteorological Charts 30 copies of the chart in order that the members of the Commission may be informed regarding all charts in regular use".

Meteorological Services in several instances had complied by providing these charts as requested by this recommendation, which was adopted by the Committee at Salzburg as resolution No. 82.

He mentioned as the most recent activities a correspondence with the President of Regional Commission III regarding a new synoptic chart for South America and that future activities of the Commission were awaiting the appointment of a successor to the late Dr. W. R. Gregg as President of the Commission.

#### **The re-appointment of the Commission 1946**

The first post-war meeting of the International Meteorological Organization was an extraordinary Conference of Directors in London February-March 1946. This re-appointed the Commission and nominated Mr. Tannehill as President with nineteen members (56).

The Commission met at Toronto in 1947 in the days preceding the Conference of Directors at Washington. The old resolutions were revised and a set of eight newly adopted (26—33).

The President read a report in the seventh session of the Conference of Directors at Washington (27). The one but last paragraph noted that:

"the Commission came to the conclusion that it had fulfilled in large measure, the responsibilities originally assigned and unless there is new work to be undertaken, it is believed advisable to discontinue the Commission and refer any future work to a sub-commission of one of the other Commissions."

This statement of the Commission, which formed the contents of the resolution IX of the Commission, was recognized by the Conference of Directors. With the adoption of this resolution the Commission on Projections of Meteorological Charts was dissolved.

## Appendix P

### The Commission on the Classification of Meteorological Literature

#### Introduction

When the preparations for the Conference of Directors in Copenhagen 1929 were made at the newly created Secretariat of the Organization at De Bilt, Dr. G. C. Simpson, Director of the British Meteorological Office in London forwarded a memorandum on "The classification of Meteorological Literature by Subjects", in which he noted the different systems employed in different libraries, and the need for a system prepared by international collaboration. The classification to be effectual, should embody collective experience and would present fewer defects than the individual effort. The system of classification should fulfil the requirements of simplicity and flexibility to allow the catalogue to grow naturally with the growth of meteorology.

The discussions concerning the questions raised in this memorandum led the Conference of Directors to adoption of the following resolution (45):

Res. 107. "En raison de l'accroissement rapide des travaux météorologiques et de l'obligation de faciliter les recherches bibliographiques aux météorologistes, la Conférence décide de créer une Sous-Commission, rattachée à la Commission du Réseau Mondial et chargée d'étudier un système de classification à l'usage des publications internationales météorologiques et des bibliothèques des Instituts.

La Conférence adopte la composition suivante: MM. G. C. Simpson, President, J. Lugeon. Un représentant de l'Allemagne (Dr. K. Knoch). Un fonctionnaire de la bibliothèque royale de Bruxelles, faisant partie de l'Institut international de Bibliographie de Bruxelles et à désigner par M. Jaumotte.

The President of the International Meteorological Committee stated in his opening presidential address at the meeting of the Committee in Locarno 1931, that the Sub-Commission on Meteorological Bibliography had been established and had started its work. The question of the existing classifications and a thorough revision was put on the agenda of the Committee meeting in De Bilt October 1933. It had been studied thoroughly in London and Oslo by Dr. Brooks, librarian of the Meteorological Office London and by Prof. Pollard of the Brussels Institute of Bibliography and by Dr. Hesselberg at Oslo. The latter had consulted the International Institute on Bibliography at Brussels for the examination of his draft by correspondence.

A correspondence between the President of the Committee with the representative of the Brussels Institute in Holland, Mr. Donker Duyvis at The Hague had also not advanced the question. So after a prolonged discussion the Committee agreed to a proposal of Dr. Simpson to charge the question to a special "Commission for Bibliography", particularly devoted to technical affairs of bibliography, composed of: Dr. Simpson, President, Dr. Hesselberg Prof. Knoch, Mr. Wehrlé.

Dr. Simpson suggested convening the Commission in May 1934 at De Bilt as the Executive Council would meet there. Those who had particular remarks concerning the draft classification were requested to send these to Dr. Simpson before this meeting of the Commission.

It may be noted, that the English draft of the classification was based on the meteorological section in the latest edition of "Universal Classification" issued by the Institute for Documentation.

#### **The meeting at De Bilt 1934**

The preparations for a proposed meeting in May 1934 had not advanced sufficiently to come to any decision. A meeting of the Commission for Climatology at Wiesbaden in May 1934 immediately following the meeting at De Bilt, was attended by the two experts Dr. Brooks and Dr. Hesselberg. This gave the opportunity for preparing jointly a new draft combining the best features of the two proposals which had been submitted to the meeting at De Bilt.

In September 1934 a meeting had been arranged at short notice at The Hague between Prof. van Everdingen, Dr. Hesselberg, Dr. Brooks and Mr. Donker Duyvis, as Secretary of the International Institute for Documentation. The draft prepared at Wiesbaden was here recast in a form which was acceptable both to the meteorologists present and to Mr. Donker Duyvis. Prof. Knoch and Mr. Wehrlé had made helpful suggestions and the classification was amended in accordance with the suggestions made.

#### **The report to the Conference at Warsaw 1935**

The report of the Commission to the Conference of Directors at Warsaw 1935 contained a complete sketch of the principles followed in composing the last draft. It was discussed in a sub-commission ad hoc for the Physics of the Earth and the Réseau Mondial at Warsaw September 1935 (218). Two resolutions were presented, for adoption by the Conference. The first (IV, res. 101 of the Conference) stated that the draft proposed by Dr. Simpson should be accepted for all the Bibliographies of the countries and Institutes, the second (V) recommended: V. Die Kommission für Bibliographie soll:

- a) als zentrale Stelle für alle Fragen der internationalen meteorologischen Bibliographie wirken;
- b) Wege finden, um die Herstellung internationaler Bibliographien zu fördern und die zu bearbeitenden Stoffgebiete in rationeller Weise zu verteilen.

The difficult work accomplished by Sir George Simpson, Dr. Hesselberg and Dr. Brooks found general appreciation in the International Meteorological Organization.

#### **The reports to the meetings at Salzburg 1937 (219) and Berlin 1939 (220)**

The report of the President of the Commission to the Committee meeting at Salzburg 1937 was very short. There had been no meetings of the Commission since the Conference of Directors at Warsaw two years ago.

Dr. Simpson could report, that the Universal Decimal Classification had been adopted in the libraries of a large number of Meteorological Services in all parts of the world.

The member Mr. Wehrlé would represent the Commission at a World Congress of Universal Documentation in Paris after having presented to the Congress a report on the work of the Organization in the international documentation of meteorology.

The report of Dr. Simpson at the next Committee meeting in Berlin 1939 was more interesting. It mentioned a meeting of the Bibliography Commission at Utrecht on May 22<sup>nd</sup> 1938. The minutes of this meeting were annexed to the report. The presence of some members in Holland was used for a meeting of the Commission\*) at Utrecht for discussing an agenda with four items. The numbers 1, 2, and 3 concerned technical questions, number 4 was an arrangement to send a representative (Dr. Brooks) to the International Conference of Documentation at Oxford September 1938, and to accept the offer of Dr. Habermehl to assist the Commission in connexion with a Conference to be held in Berlin 1940.

The questions to be considered at the present meeting were

- 1° The form and method of preparation of the International Bibliography,
- 2° The co-ordination of the bibliographies now prepared by the Aerological Commission and the Commission for Agricultural Meteorology,
- 3° Changes made in the Classification approved at Warsaw, by the International Federation for Documentation.

After discussion of these three items three resolutions were passed all for technical arrangements concerned:

- I. the form for bibliographic entries in catalogues or on cards,
- II. the standard size of cards (125 × 75 mm.),
- III. that the Aerological Commission and the Reichsamt für Wetterdienst will use cards of standard size and format for Bibliographies of Aerology and Agricultural Meteorology.

The first of the three resolutions was adopted by the Committee e. g. the part containing a list of new numbers to the Decimal Classification for Meteorology in the range 551.5.

A second question to report was "Joining of the Commission for Bibliography to the International Federation for the Documentation as a member (221)".

This was proposed by Sir George Simpson to the Executive Council May 1938. The President of the Committee had authorized the Commission to join this Federation so that Dr. Brooks could be delegated to attend the Federation meetings mentioned above (Oxford 1938, Zürich 1939 and Berlin 1940).

The Committee approved this authorization, which had been given provisionally by the President by correspondence, as definitive.

#### **The Commission dissolved and re-established 1946**

The first post-war extraordinary Conference of Directors in London 1946 dissolved the old Commissions, but re-established the pre-war Commission on Bibliography.

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\*) Members present: Sir George C. Simpson (President), Messr. Brooks, Hesselberg, Wehrlé, Dr. Habermehl representing Dr. K. Knoch, Dr. C. Braak on behalf of the Commission for Agricultural Meteorology.

## **Appendix Q**

### **The International Commission for Aeronautical Meteorology**

#### **Introduction**

It was to satisfy the need for meteorological information for aviation in its first stage of development that the extraordinary Conference of Directors in Paris in 1919 instituted a special "Commission for the application of meteorology in Aerial Navigation". It was intended to assemble the military and civil experts to collaborate in building up a new branch of meteorology especially for aerial navigation.

The Commission met in Paris in 1919 and in London in 1921. The results of these meetings are indicated in Appendix A. But it was soon shown that its tasks were taken over by regular and frequent regional conferences of limited numbers of countries and applied to the quickly changing needs of the development of civil aviation.

So the Commission led a dormant existence. It was re-established by the Conference of Directors in 1923 and 1929.

But in the years before the Conference of 1935 new ideas led to a new way. It seemed necessary to create a quite new Commission embracing the peculiar needs of aerial navigation in limited regions in a world system. This Commission had to compose a rule to be followed everywhere in all parts of the world and in international traffic as well over the oceans and also to the most distant countries of the globe.

This task partly overlapped that of the International Conference for Air Navigation (ICAN) based on the Convention for Air Navigation of 1919, with its wellknown Annex G. But the regulations of this Annex were only binding for the about forty countries which were affiliated to this ICAN. On the other hand the structure of the IMO warranted that the regulation should have a world-wide application to be followed by all countries represented in the IMO to a number of about seventy-three distributed all over the globe.

The first proposals for a change in the structure of the IMO came from Italy. They were sustained by France, Belgium and USSR and intended to ensure the IMO a political official status next to the mighty ICAN, and in future equally to be based on a convention. The result of many thorough discussion in a sub-commission was a proposal to create a new Commission composed of delegates from the authorities for aerial navigation in the different countries with a special autonomic character. Its character had to be stated in a special article of the Statutes of the OMI.

This Commission was to collaborate narrowly with the other IMO Commissions as well as with the official "Sub-Commission for Meteorology" of the ICAN and with the regional Conferences all over the world. This collaboration was warranted by nominating some officers of this bodies ex officio as members among them the Secretary General of the ICAN (Mr. A. R o p e r , Paris), the President of

the Commission for Synoptic Weather Information (Col. E. Gold, London), the President of the Commission for the Research of the Upper Atmosphere (Prof. L. Weickmann, Leipzig) and the President of the Sub-Commission for Meteorology of the ICAN.

The Conference of Directors at Warsaw adopted this important change of the Statutes unanimously. It established the new Commission and nominated as its President the man who had given all his energy to aeronautical meteorology for many years Dr. R. Bureau. This nomination was accepted with lively applause by the Conference.

Dr. Bureau thanked the meeting for honouring him by entrusting him with the great task of organizing the general collaboration in order to secure the safety of aerial traffic on the transoceanic lines and on the aerial connections all over the world; a system to be followed really internationally and embracing arrangements of regional and local validity.

It was proposed to forward copies of the Procès-verbaux of the Conference to all governments and to all administrations interested in the IMO and also to all the Directors of Meteorological Services for general information. As soon as the President of the International Meteorological Committee had circulated the new Statutes to the Governments of the collaborating countries by diplomatic channels, the President of the newly established Commission would address himself to the Government Authorities for Aeronautics requesting them to designate the delegates as members of the Commission as their representatives. After receipt of their replies the list of members would be composed and the convocations for the first meeting would be circulated.

This first meeting was convened in Paris on June 3<sup>rd</sup> 1937.

#### **The meeting at Paris 1937 (222)**

The first meeting of the International Commission for Aeronautical Meteorology was held in Paris 3—10 June 1937. There was a very large attendance. The list of participants mentioned thirty-four members from twenty-six countries, six of them from out of Europe. The number of members present was twenty-two besides three Presidents of Commissions and the Secretary-General of the ICAN.

The Secretary-General of the ICAN Mr. A. Roper had put the accommodation of his Bureau at the disposal of the Conference for the meetings of the Commission. Nine members had notified their inability to be present.

The President again mentioned in his opening speech the peculiar status of this Commission as expressed in its composition and its aims. The members were assembled here as delegates of the administrations for air navigation of their countries charged with composing a more extended plan for the co-ordination of the newly adopted regulations for the Meteorological Services, urged by the Aerial Navigation. It would be especially the task of those who had, year after year, been instituting the regional regulations from country to country in the international organizations for air navigation to ensure the regular functioning of civil aviation, and to ensure its safety to promote the daily needs of aerial navigation. They would be charged with the responsibility for establishing the necessary co-ordinations.

The President mentioned as a first task for the members of the Commission to maintain harmony in the general arrangements by the IMO for scientific research of the atmosphere with the peculiar measures proceeding from practice and urged by aerial navigation. In continuation of his important speech he indicated as a second task of the Commission the general co-ordination of science and practice.

At last he read the agenda with fifteen items. He grouped them together in three groups to be considered by sub-commissions nominated for the duration of the meeting. After these introductory activities the general discussions in the plenary sessions could begin and the sub-commissions could begin their meetings for fulfilling their charges.

The report of the deliberations had a different character from that formerly followed in the ordinary Commission reports. The members had in many cases notified their particular standpoints concerning the items on the agenda by correspondence. The practice actually followed was, in principle, to transform the arrangements with a regional tendency that had led to decisions for the whole world and so to fit them for general adoption by the Commissions of the IMO and by the managers of Aerial Navigation over the whole world in all climates. Firstly the Annex G to the ICAN Convention and secondly a "Règlement"\*) that had been prepared for use regionally in Western Europe by a regularly meeting "Conférence Aéronautique Internationale" could be used as models in coordinating the 25 Resolutions and recommendations in a new Draft of a Règlement coordinating all prescriptions for the Meteorological Services all over the world. This Règlement would be named:

"Règlement général pour la protection internationale du Vol"  
and have the meaning indicated by the words:

"Ce Règlement doit être aussi général que possible et pouvoir être appliqué dans tous les pays du monde."

This item formed the first to be discussed in the first working session. It formed the content of the first resolution, of which the above-mentioned quotations form part. The following Resolution indicated the further directives for composing this règlement.

During this meeting the member for the United Kingdom described the organization and the arrangements for the meteorological protection of aviation in the British colonies in the tropics. The member for the United States did the same for the organization in North America. One of the members of the Russian Delegation sketched the organization of the meteorological research of the North polar regions and the adaptations based on this research for possible aerial navigation and shipping in the arctic regions.

The meeting was closed by a monumental speech of the Presidents expressing his satisfaction regarding the mutual agreement which had proved that it had been shown possible to reach agreement concerning the general directives to be followed internationally putting aside personal aspirations.

After three months the President was able to report to the International Meteorological Committee on the results reached in the first two years of the

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\*) Règlement du Services météorologique international de l'Aéronautique. The first draft was composed by a Regional Conference for Western Europe in Prague in 1930. In 1935 this draft was amended became the decisive règlement. It had been adopted also by the "Conférence Aéronautique Méditerranéenne" and by the "Conférence Baltico-Balkanique".

existence of the Commission (51). This report mentioned extensively the course of the meeting in Paris. Also here he again enjoyed the spirit of co-operation in the co-ordinating work of his Commission in organizing the world traffic by air and mentioned how, apart from their particular regulating work, the regional and the continental Conferences had kept their full power as regards the regulations intended to be followed in and outside Europe.

#### **The meeting at Berlin 1939 (223)**

The principal task for this meeting was to compose decisively the "Règlement général pour la Protection météorologique internationale de l'Aéronautique" as had been decided on in Paris two years ago. The draft for this document was now ready. In composing it there had been a narrow contact with the content of the Annex G of the Air Convention of 1919, which was only binding in the countries affiliated to the ICAN. It was intended that the new règlement to be composed should replace this annex in order to ensure that it should be adopted everywhere in the same way: on long sections of routes partly across oceans as well as regionally on short routes from country to country.

At the same time there ought to be freedom for regional regulations inside the frontiers of larger and smaller territories.

The règlement had been divided into six chapters treating respectively:  
the general organization,  
the meteorological networks and the concentration and transmitting of the observations,  
the means for meteorological protection a) before starting, b) during the flight, c) at landing.  
the transmission of information,  
the climatological information,  
the study of recent measures.

The règlement contained also a number of "Appendices" with regulations, that originally had been in force regionally but now became of universal force for the IMO as well as for the ICAN. These were the frequency-tables for a number of elements of peculiar interest to aviation and the chapter for meteorology of the so-called Q-code for the correspondence between aircraft in flight and the ground-service at the aerodromes.

The règlement had been presented to the Committee meeting for discussion and was adopted after some small corrections (55). After that the President strongly recommended declaring it of force as soon as possible. He stated that this could be considered as an historical fact. The relevant resolution was adopted in the following wording: "Le Comité recommande la mise en vigueur du règlement général pour la Protection météorologique internationale de l'Aéronautique dès sa réception par les administrations intéressées."

#### **The meeting at Paris 1946 (59)**

Simultaneously with two other commissions the members of the Commission came together. Twenty-nine members and nineteen guests took part in the discussions, the PICAQ was officially represented. The agenda was not long but it contained as the principal item the close co-operation between the old IMO and the newly established Provisional International Civil Aeronautical Organization (PICAQ). The basis for the discussions had been laid by a resolution of the extra-

ordinary Conference of Directors in London recommending the change of the old CIMAé of Warsaw to a new Commission of Aéronautical Meteorology, with an extended instruction, in order to facilitate the collaboration in the creation of a new set of "Regulations for meteorology for aviation" adapted to modern principles and needs.

This important item had given rise to 14 memoranda from the side of the Governments represented in the CIMAé. The first and main question to be discussed was exclusively "to formulate a draft agreement between the IMO and the PICA0".

The instruction to prepare this draft was given to a sub-commission (B). The main Commission was instructed to discuss the recommendations concerning its peculiar aims in relation to those of its successor. It concerned recommendations that had to be discussed in a joint meeting with the Meteorological Section of the PICA0 to convene in November 1946. Up to that moment the "Regulations for the Protection of Meteorology for Aviation" of the IMO as adopted at Berlin 1939 should remain in force.

The conclusions of the sub-commission were summarized in two draft resolutions of considerable length divided into several paragraphs. The first mentioned (I) the form of co-operation between the IMO and the PICA0, the second (II) the standpoint of the new "Commission for Meteorology for Aviation" to be established against the Meteorological Section of the PICA0. Both resolutions gave rise to endless discussions and six of the eleven meetings of the session of the Commission were necessary before agreement on behalf of the report of the Commission to the next Committee meeting could be reached.

The session of the Meteorological Section of the PICA0 planned for November 1946 would give the opportunity to discuss its standpoint regarding these two resolutions and whether it could agree, that the final redaction of the suggested "Draft Regulations for Meteorological Protection for Aviation" to replace the "Règlement pour la Protection Météorologique pour l'Aéronautique Internationale" adopted in Berlin 1939 by the CIMAé, should be newly composed by the IMO.

The 4<sup>th</sup> resolution concerned the composition of vocabularies of words and terms in use in aeronautical terminology, by the PICA0. This charge was given for study to a permanent sub-commission with representatives of the great nations of the world in view of the condition, that it ought to be executed in 5 languages (English, French, Russian, Spanish, German).

Some further resolutions regarded the purpose to obtain a greater accuracy of some meteorological elements in the codes for weather messages and for information for aviation with 2-figure codes instead of 1-figure codes.

The Commission brought homage to the excellent and skilful President Dr. Bureau, who had taken the initiative in 1935 in Warsaw for the establishment of this Commission with its peculiar political status. Unfortunately the state of his health compelled him to resign. He was nominated Honorary President.

His successor was Mr. A. H. Nagle of Dublin, Ireland, The bureau was formed by him with Mr. D. M. Little (Washington) Vice-President and Mr. J. R. Rivet, Secretary.

The new edition of the Règlement Général pour le protection météorologique de l'aéronautique appeared in 1948 (63).

## **Annex I**

### **Reglements and Statutes**

#### **The congress at Vienna 1873**

"The Congress of Meteorologists at Leipzig elected a Permanent Committee" for organizing an International Meteorological Congress at Vienna 1873. To this Committee the following instructions were entrusted:

1. Das bei der Meteorologen Conferenz zu Leipzig gewählte Permanente Comité eröffnet die erste Sitzung des Congresses und beantragt die Wahl des Bureaus, bestehend aus dem Ehrenpräsidenten, den Vicepräsidenten und den Schriftführern. Bei den betreffenden Wahlen entscheidet die absolute Majorität.

2. Das Permanente Comité theilt einen Bericht über die Zusammensetzung des Congresses mit und legt die Schriften und Abhandlungen vor, welche seit der Leipziger Versammlung eingegangen sind.

3. Das Permanente Comité legt ein Programm über die zu berathenden Fragen vor, welches Programm in der zweiten Sitzung discutirt und festgestellt wird. Jedes Mitglied des Congresses hat das Recht, Anträge in Betreff neuer zur Verhandlung zu bringender Gegenstände zu stellen; diese Anträge können jedoch erst in einer der folgenden Sitzungen zur Discussion gelangen. Anträge von Nicht-Mitgliedern müssen durch Delegirte unterstützt werden, wenn sie zur Verhandlung zugelassen werden sollen.

4. Der Congress hält seine Plenarsitzungen in den Stunden 10—1 Uhr ab; die Sitzungstage werden von dem Bureau bestimmt.

5. Die Tagesordnung für die Plenarsitzungen der einzelnen Tage werden von den Vicepräsidenten festgestellt, und wenn möglich am Schlusse der vorherigen, spätestens aber bei Eröffnung der betreffenden Sitzung mitgetheilt.

6. Bei Abstimmungen in den Plenarsitzungen entscheidet in der Regel die absolute Majorität der anwesenden Delegirten. Bei Stimmgleichheit entscheidet die Stimme des geschäftsführenden Vicepräsidenten. Es steht jedoch jedem Delegirten frei, eine Abstimmung nach Staaten zu verlangen. Bei einer solchen Abstimmung haben die Delegirten eines und desselben Staates nach vorangegangener Verständigung nur eine Staatsstimme abzugeben, welche für Staaten unter 10 Millionen Einwohnern einfach, für Staaten zwischen 10 und 30 Millionen Einwohnern zweifach, für Staaten über 30 Millionen Einwohnern dreifach gezählt wird.

7. Für einzelne Punkte des Programms werden Commissionen eingesetzt, deren Mitglieder vom Bureau bestimmt und vom Congress bestätigt werden.

8. Die Redaction der Verhandlungen des Congresses wird einem besonderen Comité übergeben, welches für den Druck und die Vertheilung der Protokolle zu sorgen hat.

This Reglement was adopted in the 2<sup>nd</sup> session of the Congress 3 September 1873 (7). Besides the Permanent Committee adopted in its first meeting at Vienna an "Internes Programm" in 17 paragraphs presented by the President (10).

#### **The congress at Rome 1879**

During its meeting at Utrecht 1878 the Permanent Committee adopted by-laws for the International Meteorological Congress at Rome 1879 (224) as follows:

Section 1. The Congress consists of the delegates appointed by the Governments.

\*) Members see Annex IV.

If one of the members of the Congress makes such a proposal and the meeting adopts it, visitors may be allowed to be present at the sittings, but they can only take part in the discussions without the right of voting.

#### Section 2. The Opening of the Congress and the Election of the Bureau.

The President of the Permanent Committee appointed at the Congress of Vienna, or if the President is prevented, one of its Members who is present, and is selected by the Permanent Committee, shall open the first meeting of the Congress, shall submit the Byelaws for approval and shall propose the election of a Bureau, consisting of a President, two Vice-Presidents and two Secretaries. These elections shall be made by the absolute majority of the Members of the Congress, delegated by the Governments, who are present at the meeting.

#### Section 3. The Functions of the President.

The President shall fix the day and the hour of the General Meetings. With the concurrence of the Bureau, he shall determine the agenda for each meeting. The President shall direct the debates and provide for the maintenance of order at the general Meetings. The President shall propose the Congress the names of the Members of Committees to which is referred the preparation of the different subjects of the Programm (section 6).

#### Section 4. The Programme of the Deliberations.

The Programme prepared by the Permanent Committee, in accordance with the instructions of the Congress of Vienna, shall serve as a basis for the deliberations. Each Member of the Congress is free to make proposals. With reference to new subjects which are to be brought under discussion, such proposals are to be referred to a Committee, which is to report at one of the subsequent meetings (section 6).

#### Section 5. The Report of the Permanent Committee.

The President will request the Permanent Committee appointed by the Congress of Vienna to present a Report on its actions, and to submit to the Congress all the manuscript and printed communications which it has received. As soon as this is done, the function of the Permanent Committee ceases, and its powers are replaced in the hands of the Congress.

#### Section 6. The Sub-Committees and their Formation.

The various questions of the Programme will be referred to special Committees. The members of the different Committees are appointed by the Congress on the proposal of the President,

Each Member of the Congress (sect. 7) is entitled to attend any of the Committee-meetings, but without the power of Voting.

#### Section 7. The Constitution of the Committees.

At the close of each General Meeting the Committees which have been nominated at the Meeting shall constitute themselves by proceeding to the election of a President, a Reporter and a Secretary.

The President of each Committee shall immediately fix the hour and place of the next Meeting of the Committee.

#### Section 8. The Method of Voting.

In divisions at the General Meetings the absolute majority of the delegates present shall decide. In the case of equality, the vote of the President shall decide

If however, any delegate demands it, a division may take place according to countries. The countries which have less than 10 millions of inhabitants shall have one vote; the countries which have from 10 to 30 millions of inhabitants shall have two votes; the countries that have more than 30 millions of inhabitants shall have three votes. The delegates of each country must come to an understanding among themselves to decide which of them shall be charged with giving the vote of their country.

#### Section 9. The Protocols of the General Meetings and the Report of the Proceedings of the Congress.

The Protocols of every General Meeting should be read and confirmed either at the end of the Meeting or at the commencement of the next.

The publication of the Report of the Proceedings, as well as the printing and distribution of the Protocols, should be entrusted to the Permanent Committee (sect. 10), or to a special Committee.

Section 10. The election of the Permanent Committee.

For the interval between the present Congress and the next, the Congress shall elect by ballot the Members of a Permanent Committee, which shall constitute itself by the election of a President and a Secretary.

It was decided to nominate a new International Meteorological Committee as mentioned in Section 10 of the by-laws of Utrecht (225).

### The meeting at Paris 1906

For the Congress at Munich these by-laws were out of order and a shortened Reglement followed (226). No mention is made of new Statutes at Paris 1896. The Conference of Directors at Innsbruck (1905) instructed the International Meteorological Committee to draw new Statutes adapted to the existing conditions (227). They were adopted at the meeting of the International Meteorological Committee at Paris (1906) in the following form:

Règlement de l'organisation météorologique internationale.

L'organisation météorologique internationale comprend:

- 1° Les Conférences des Directeurs,
- 2° Le Comité météorologique international,
- 3° Les Commissions.

1° Les Conférences des Directeurs ont pour fonction principale de "discuter des questions concrètes, de se mettre d'accord sur les méthodes d'observation et de calcul, ou bien d'entreprendre des travaux communs" (18). Les questions purement théoriques ne peuvent pas être comprises dans le Programme des Conférences.

Les Conférences sont convoquées par le Comité international.

Sont invités par le Bureau du Comité tous les Directeurs des réseaux ou des observatoires météorologiques officiels et indépendants les uns des autres, de chaque pays. Le Bureau s'entendra en outre avec les Directeurs des services officiels des différents pays pour savoir s'il y a lieu d'inviter les Directeurs de certaines institutions privées ou les représentants des Sociétés météorologiques.

2° Comité météorologique international. — La Conférence des Directeurs nomme un Comité dont les pouvoirs prennent fin à la Conférence suivante. Le Comité se compose des membres choisis par la Conférence. Tous les membres doivent appartenir à des Etats différents et être directeurs d'un établissement météorologique indépendant.

Le Comité a la faculté de se compléter en cas de démission ou de décès de quelqu'un de ses membres. Il peut aussi éventuellement s'adjoindre, à titre consultatif, des savants distingués dont les conseils paraîtraient utiles.

Le Bureau, composé d'un président et d'un secrétaire, est nommé par le Comité.

Le Comité surveille l'exécution des décisions des Conférences, propose toute mesure utile au développement de la science, à l'uniformité de vues, à l'entretien de bonnes relations entre les services des différents pays et prépare les questions à soumettre aux Conférences. Suivant les besoins, il organise des Commissions chargées d'étudier des questions spéciales.

3° Commissions. — Un des objets de l'organisation météorologique internationale est «d'entreprendre des travaux communs». Depuis 1891, le Comité international a, dans ce but, institué plusieurs commissions. La création de ces commissions a été de la plus grande utilité pour le développement de notre science. On a pu, de cette manière, organiser et mener à bonne fin des travaux qui seraient

restés inabordables à des savants isolés. Il est très désirable que tous ceux qui s'occupent d'un même problème ou de problèmes analogues, soient réunis d'une manière périodique, qui permette de fixer les idées et de coordonner les efforts isolés, sans que l'initiative personnelle en éprouve aucune entrave.

Pour les Commissions nouvellement organisées le président est nommé par le Comité.

Les Commissions ont la faculté de se compléter et organisent leurs travaux à leur gré.

Les présidents, qui ne seraient pas membres du Comité, sont invités à assister aux séances du Comité et à prendre part aux discussions avec voix consultative. Au commencement de chaque session du Comité, ils présentent un rapport sur les travaux de leur Commission.

La Conférence des Directeurs est convoquée par le Comité international quand il y a des questions importantes à lui soumettre.

Le Comité et les Commissions se réunissent en général tous les trois ans.

Le Bureau du Comité informe par circulaire, une année d'avance, les membres du Comité et les présidents des Commissions, de la réunion du Comité et leur fait désigner par un vote l'époque exacte et le lieu de la réunion.

La désignation de la date et du lieu des réunions des Commissions sera faite après entente préalable entre le président du Comité et celui de la Commission.

Il est très désirable que les personnes qui veulent proposer une question à la délibération d'une Conférence du Comité ou d'une Commission, distribuent aux membres respectifs, deux mois avant la réunion, un court rapport imprimé sur cette question (228).

#### **The conference at Paris 1919**

The Conference of Directors at Paris after the war 1914—1918 was held at a quite new situation in the whole world and only a limited number of Directors could be invited. This caused decisive deviations in the wording of some of the Articles and Paragraphs.

So the new Statutes were issued in the following form (the deviations from the last texts are pointed out by italics):

Règlement de l'organisation météorologique internationale.

L'organisation météorologique internationale comprend:

- 1° Les Conférences des Directeurs,
- 2° Le Comité Météorologique International,
- 3° Les Commissions.

#### **I. Conférences des Directeurs.**

Les Conférences des Directeurs ont pour fonction principale de discuter les questions *administratives et les moyens d'exécution*, de se mettre d'accord sur les méthodes d'observation et de calcul, *de décider les travaux communs qui doivent être entrepris et de créer éventuellement les Commissions nécessaires*. Les questions purement théoriques ne peuvent pas être comprises dans le programme des Conférences.

Les Conférences sont convoquées par le Comité international; *elles doivent avoir lieu au moins tous les six ans: elles peuvent être convoquées extraordinairement par le Comité quand il se présente des questions urgentes à leur soumettre. La convocation est de droit quand elle est réclamée par le quart des membres.*

Le Bureau du Comité international invite directement aux Conférences, dans chaque pays, tous les directeurs des réseaux ou des observatoires météorologiques officiels et indépendants les uns des autres. Le Bureau s'entend en outre avec les directeurs des services officiels des différents pays pour savoir s'il y a lieu d'inviter les directeurs de certaines institutions privées ou des représentants des

sociétés météorologiques. *Le Bureau du Comité établit la liste des membres des Conférences et publie cette liste révisée chaque année.*

*Les décisions sont prises à la majorité des voix des membres présents, sauf dans le cas le vote par pays\*) serait réclamé.*

## II. Comité Météorologique International.

La Conférence des directeurs nomme le *Comité Météorologique International* dont les pouvoirs prennent fin à la Conférence *ordinaire* suivante. Tous les membres du Comité doivent appartenir à des pays différents et être directeurs d'une *institution* météorologique indépendante.

*Le nombre des membres du Comité est fixé par la Conférence des directeurs.*

Le Comité a le droit de se compléter en cas de décès ou de démission de quelqu'un de ses membres. Il peut aussi éventuellement s'adjoindre, à titre consultatif, des savants dont les conseils paraîtraient utiles. Il nomme son Bureau composé d'un Président, d'un vice-président et d'un secrétaire.

Le Comité surveille l'exécution des décisions des Conférences, propose toute mesure utile au développement de la science, à l'uniformité de vues, à l'entretien des bonnes relations entre les services des différents pays et prépare les questions à soumettre aux Conférences. Suivant les besoins, il organise des Commissions chargées d'étudier des questions spéciales.

*Le Comité se tient en rapport avec le Conseil international de recherches et avec l'Union géophysique créés à Bruxelles en 1919, de façon à assurer la coordination des travaux de ces institutions et des commissions émanant du Comité*

*Le Comité se réunit tous les trois ans au moins en séance plénière. Le bureau du Comité informe par circulaire une année d'avance les membres du Comité et des présidents des Commissions de la réunion du Comité et leur fait désigner par un vote l'époque exacte et le lieu de la réunion.*

*Pour l'étude des questions qui ne présentent pas un intérêt mondial, le Comité tient, quand il en est besoin, des réunions partielles où sont convoqués seulement les membres appartenant aux régions directement intéressés. A ces réunions peuvent être invités, à titre consultatif, les directeurs des services météorologiques de ces régions qui ne feraient pas partie du Comité.*

## III. Commissions.

Un des objets de l'organisation météorologique internationale est d'entreprendre des travaux communs, sans que l'initiative personnelle en éprouve aucune entrave.

*Les Commissions instituées dans ce but par la Conférence ou le Comité doivent comprendre au moins un membre du Comité. Pour les Commissions nouvelles dont la création aura été décidée, le président est nommé par la Conférence ou le Comité.*

*Une fois constituées, les Commissions ont la faculté de se compléter elles-mêmes; elles organisent leurs travaux à leur gré.*

Les présidents de Commissions, qui ne seraient pas membres du Comité, sont invités à assister aux séances de *celui-ci* et à prendre part aux discussions avec voix consultative. Au commencement de chaque session du Comité, ils présentent un rapport sur les travaux de leur Commission.

Les Commissions se réunissent au moins tous les trois ans. La désignation du lieu et de la date des réunions *est* faite après entente préalable entre le président du Comité et celui de la Commission.

Les personnes qui veulent proposer une question à la délibération d'une Conférence, du Comité ou d'une Commission, *devront préalablement demander au président que cette question soit mise à l'ordre du jour et distribuer aux membres respectifs, deux mois avant la réunion, un court rapport sur cette question.* (38a and b).

\*) On entend par ce mot tout pays qui se gouverne lui-même (exemple: Dominion du Canada).

As sequel to a discussion regarding the status of meteorological services in relation to the IGGU and the CINA some minor changes made in the Conference of Directors at Utrecht 1923 are mentioned here:

a) Paragraph 3 in Section I

to be replaced by the following:

»Le bureau du Comité International invite directement aux Conférences tous les directeurs des réseaux météorologiques *d'Etat* et indépendants les uns des autres, de chaque nation. Le bureau du comité établit la liste des membres des Conférences et publie cette liste chaque année, *après l'avoir mis à jour*«.

b) Paragraph 1 in Section III and the words: "*dans ce but*" in the first line of the following to be deleted.

c) The following words to be added as an extra paragraph under Section III.

»*Les décisions sont prises à la majorité des voix des membres présents, sauf dans la cas où le vote par pays serait réclamé*«.

### The conference at Copenhagen 1929

At Copenhagen the Statutes were revised anew and a new article has been added concerning the Secretariat. The new redaction was as follows (changes in italics):

#### Statuts de l'Organisation Météorologique Internationale Article I.

L'Organisation Météorologique Internationale *actuelle, créée à Utrecht en 1878, révisée à Paris en 1919, à Utrecht en 1923 et à Copenhague en 1929, comprend:*

1. Les Conférences des Directeurs.
2. Le Comité Météorologique International.
3. *Le Secrétariat de l'Organisation.*
4. Les Commissions *de l'Organisation.*

#### Article II.

##### Conférence des Directeurs.

§ 1. Les Conférences des Directeurs ont pour fonction principale de discuter les questions administratives et les moyens d'exécution, de se mettre d'accord sur les méthodes d'observation et de calcul, de décider les travaux communs qui doivent être entrepris et de créer éventuellement les Commissions nécessaires; les questions purement théoriques ne sont pas du ressort des Conférences.

§ 2. *Les Conférences se composent des Directeurs des réseaux indépendants météorologiques d'Etat de toutes les nations.*

§ 3. Les Conférences sont convoquées par le Comité Météorologique International: elles doivent avoir lieu au moins tous les six ans. Elles peuvent être convoquées *aussi* extraordinairement par le Comité quand il se présente des questions urgentes à leur soumettre. La convocation est de droit quand elle est réclamée par le quart des membres de la Conférence.

§ 4. Le Président du Comité avise de la réunion, par circulaire, une année d'avance les membres de la Conférence (et les Présidents des Commissions) et fait désigner par un vote *du Comité la date et le lieu précis de la réunion.*

§ 5. Le Président du Comité International convoque directement tous les membres aux Conférences; le *Secrétariat* en établit la liste et la *publie chaque année après l'avoir mise à jour.*

§ 6. *Les membres de la Conférence ont le droit de se faire représenter, s'ils ne peuvent pas prendre personnellement part à la Conférence. Le suppléant doit appartenir au service représenté ou être ancien directeur de ce service; il ne doit pas être membre de la Conférence à un autre titre.*

§ 7. *Les décisions sont prises à la majorité des voix des membres présents, sauf dans le cas, où le vote par pays\*) serait réclamé, même par un seul membre.*

§ 8. *La Conférence des Directeurs nomme le Comité Météorologique International, dont les pouvoirs prennent fin à la Conférence ordinaire suivante.*

§ 9. *La Conférence choisit son Président, qui garde ses fonctions pendant toute la durée de la session.*

### Article III.

#### Comité Météorologique International.

§ 1. *Les membres du Comité doivent appartenir à des pays différents et être membres de la Conférence.*

§ 2. *Le nombre des membres du Comité est fixé par la Conférence des Directeurs.*

§ 3. *Le Comité a le droit de remplacer un de ses membres décédé ou démissionnaire.*

§ 4. *Lorsqu'un membre du Comité cesse d'être Directeur, il est maintenu au Comité jusqu'à la prochaine réunion du Comité.*

§ 5. *Le Comité peut s'adjoindre, à titre consultatif, des personnes dont les conseils lui paraissent utiles.*

§ 6. *Le Comité nomme un Conseil Exécutif composé du Président et de quatre autres membres choisis dans son sein. Un règlement intérieur, approuvé par le Comité, règle le fonctionnement du Conseil Exécutif.*

§ 7. *Le Comité surveille l'exécution des décisions de la Conférence dans l'intervalle des réunions de celle-ci; il reçoit et peut approuver les rapports des Commissions; il prend toutes mesures nécessaires pour le développement de la météorologie internationale.*

§ 8. *Le Président du Comité est élu par le Comité et garde ses fonctions jusqu'à la prochaine session ordinaire de la Conférence.*

§ 9. *Le Président sortant au cas où il est élu depuis plus de quatre années, n'est pas immédiatement rééligible. Cette clause ne sera applicable qu'à partir de 1935.*

§ 10. (101) *Le Comité se tient en rapport avec les Organisations internationales qui se rapportent à la géophysique, notamment avec l'Union géodésique et géophysique internationale, de façon à assurer la coordination des travaux de ces institutions et du Comité.*

§ 11. *Le Comité se réunit tous les trois ans au moins en séance plénière. Le bureau du Comité informe par circulaire une année d'avance les membres du Comité et les Présidents des Commissions de la réunion du Comité et leur fait désigner par une vote l'époque et le lieu de la réunion.*

### Article IV\*\*)

#### Secrétariat de l'Organisation Météorologique Internationale.

§ 1. *Un Secrétariat, fonctionnant sous la Direction du Président du Comité Météorologique International, est chargé de l'organisation des réunions de la Conférence, du Comité et des Commissions ainsi que de la publication des procès-verbaux. Il constitue également un centre de documentation relatif aux services météorologiques du monde entier et il aide, dans toute la mesure de ses moyens, le Président du Comité et les Présidents des Commissions, dans l'exécution de leurs travaux.*

\*) On entend par ce mot tout pays qui se gouverne lui-même (exemple: Dominion du Canada).  
\*\*) New article.

§ 2. Les frais du Secrétariat sont couverts par les subventions facultatives des différents services nationaux dans la proportion de 4000 francs-or pour un grand Etat, 2000 francs-or pour un Etat moyenne grandeur, 1000 francs-or ou une somme inférieure pour les autres Etats.

§ 3. Le Conseil Exécutif du Comité gère le budget du Secrétariat, dont la comptabilité est communiquée, chaque année, aux membres de la Conférence.

§ 4. Le siège définitif du Secrétariat est fixé en Suisse.

§ 5. La composition du Secrétariat et les attributions de son personnel seront fixées par le Conseil Exécutif du Comité.

#### Article V. Commissions.

§ 1. Les Commissions, instituées par la Conférence ou par le Comité, doivent comprendre au moins un membre du Comité. *Dans les Commissions de création nouvelle* le premier Président est nommé par la Conférence ou par le Comité.

§ 2. Une fois constituées, les Commissions ont la faculté de se compléter elles-mêmes et d'organiser leurs travaux à leur gré.

§ 3. Les Présidents des Commissions, qui ne sont pas membres du Comité, sont invités à assister aux séances de celui-ci et de prendre part aux discussions avec voix consultative. *Les Présidents fournissent*, au commencement de chaque session du Comité ou de la Conférence, un rapport sur les travaux de leurs Commissions.

§ 4. Les Commissions se réunissent au moins une fois tous les trois ans. La désignation du lieu et de la date des réunions est faite après entente préalable entre le Président du Comité et celui de la Commission. *Les décisions sont prises à la majorité des voix des membres présents, sauf dans le cas où le vote par pays est réclamé.*

§ 5. Les personnes qui veulent proposer une question à la délibération d'une Conférence, du Comité ou d'une Commission, devront préalablement demander aux *Présidents intéressés* que cette question soit mise à l'ordre du jour et envoyer, au plus tard deux mois avant la réunion, un court rapport sur cette question *au Secrétariat, qui en distribuera des exemplaires aux membres de la Conférence qui en expriment le désir, aux membres du Comité ou de la Commission intéressée.*

In resolution 23 had been expressed: "qu'il est désirable d'obtenir l'adhésion des Gouvernements à l'Organisation Météorologique Internationale" (45).

As sequel to this desire the Statutes had been forwarded to the Governments represented by the Directors of their stations-networks in the Organization by diplomatic channels (15 January 1930). The numbers of contributions to the Secretariat increasing from year to year proves the recognition of the Governments toward the Organization.

#### The meeting at Locarno 1931

The following Reglement for the Executive Council has been adopted at Locarno in the Committee meeting of 1931 (101).

#### Règlement intérieur du Conseil Exécutif.

Par. 1. Chaque année avant le 1<sup>er</sup> avril le Président soumet aux membres du Conseil Exécutif le projet de budget du Secrétariat pour l'année commençant le 1<sup>er</sup> juillet suivant. Ce budget est discuté dans une réunion du Conseil Exécutif, tenue avant le 1<sup>er</sup> juillet, de préférence au siège du Secrétariat. La présence de trois membres est nécessaire pour rendre possible une réunion.

Par. 2. Dans le cas où une proposition n'aurait pas réuni au moins trois voix, elle serait soumise par écrit à tous les membres du Conseil. Tout membre qui n'aurait pas répondu dans le délai d'un mois, serait considéré comme ayant donné son approbation.

Par. 3. La comptabilité des finances du Secrétariat de l'année budgétaire écoulée est arrêtée par le Chef du Secrétariat avant le 1<sup>er</sup> septembre et est soumise au contrôle d'un spécialiste accrédité auprès du Conseil. Ce spécialiste fournira un certificat de contrôle des comptes et des réserves qui sera joint aux comptes fournis par le Chef du Secrétariat. La comptabilité accompagnée du certificat du spécialiste, est envoyée avec tous les documents à deux membres du Conseil Exécutif, désignés par le Conseil sur la proposition du Président. Ceux-ci les examineront pour constater que les dépenses sont en harmonie avec le budget, tel qu'il a été arrêté par le Conseil. Après le contrôle de ces deux membres, la comptabilité est envoyée à tous les Directeurs, membres de la Conférence des Directeurs.

Par. 4. Le solde annuel est employé à la constitution d'un fonds de réserve dont l'emploi sera décidé par le Conseil sous la réserve indiquée dans le paragraphe 5.

Par. 5. A l'exception des dépenses nécessaires au fonctionnement du Secrétariat, tout projet qui comporterait à un engagement de dépenses intéressant plusieurs exercices, doit être approuvé par la Conférence ou le Comité.

Par. 6. Le personnel du Secrétariat est recruté par le Président sur la proposition du Chef du Secrétariat. Le Chef du Secrétariat pourra engager du personnel temporaire avec l'autorisation du Président. Le Chef du Secrétariat sera choisi par le Conseil Exécutif parmi trois candidats, proposés par le Président après consultation des autres membres du Comité.

Par. 7. Les pouvoirs du Conseil Exécutif prennent fin en même temps que ceux du Comité qui l'a élu.

In the Committee meeting at Salzburg 1937 the following revision has been adopted:

Par. 2. ... du Conseil. *La décision est prise à la majorité des voix reçues dans un délai de deux mois.*

Par. 7. ... du Comité qui l'a élu, *Quand une vacance se produit au Conseil, le Comité désigne des candidats dans sa plus prochaine réunion, puis élit un nouveau membre par correspondance. Mais si le nombre de membres du Conseil tombe au-dessous de cinq le Président est autorisé à désigner les candidats.*

Par. 8. *Le Conseil Exécutif désigne un de ses membres pour suppléer le Président, en cas d'empêchement, dans la direction du Secrétariat.*

#### The conference at Warsaw 1935

At Warsaw the Conference of Directors amended the Statutes anew (88) and added a new Article in relation to the particular status applied to the new "Commission for Aeronautical Meteorology". The Statutes were issued in the following form (changes in italics):

#### Statuts de l'Organisation Météorologique Internationale.

##### Article I.

L'Organisation Météorologique Internationale actuelle, créée à Utrecht en 1878, révisée à Paris en 1919, à Utrecht en 1923, à Copenhague en 1929, à *Locarno en 1931 et à Varsovie en 1935*, comprend:

1. Les Conférences des Directeurs.
2. Le Comité Météorologique International.
3. Le Secrétariat de l'Organisation.
4. *La Commission de Météorologie aéronautique.*
5. Les autres Commissions de l'Organisation.

##### Article II.

##### Conférence des Directeurs.

§ 1. Les Conférences des Directeurs ont pour fonction principale de discuter les questions administratives et les moyens d'exécution, de se mettre d'accord sur

les méthodes d'observation et de calcul, de décider les travaux communs qui doivent être entrepris et de créer éventuellement les Commissions nécessaires; les questions purement théoriques ne sont pas du ressort des Conférences.

§ 2. Les Conférences se composent des Directeurs des réseaux indépendants météorologiques d'Etat de toutes les nations et des *Directeurs des réseaux météorologiques dont l'intérêt international a été reconnu par les Conférences ou par le Comité après avoir pris l'avis des autorités compétentes.*

§ 3. Les Conférences sont convoquées par le Comité Météorologique International; elles doivent avoir lieu au moins tous les six ans. Elles peuvent être convoquées aussi extraordinairement par le Comité quand il se présente des questions urgentes à leur soumettre. La convocation est de droit quand elle est réclamée par le quart des membres de la Conférence.

§ 4. Le Président du Comité *notifie, une année à l'avance, aux administrations gouvernementales compétentes de chaque pays la convocation d'une réunion de la Conférence et leur demande d'autoriser à participer à cette réunion les Directeurs qui sont membres de la Conférence en vertu du § 2. Quand plusieurs membres de la Conférence appartiennent au même pays, ces Administrations sont invitées à décider quel sera celui des membres qui votera au nom de ce pays.*

§ 5. La date et le lieu de la réunion sont fixés par un vote du Comité.

§ 6. Les membres de la Conférence ont le droit de se faire représenter, s'ils ne peuvent pas prendre personnellement part à la Conférence. Le suppléant doit, *par son activité normale, être en liaison étroite avec le Service qu'il représente; il ne doit pas être membre de la Conférence à un autre titre.*

§ 7. Les décisions sont prises à la majorité des voix des membres présents, sauf dans le cas où le vote par pays\*) serait réclamé même par un seul membre.

§ 8. La Conférence choisit son Président, qui garde ses fonctions pendant toute la durée de la session.

### Article III.

#### Comité Météorologique International.

§ 1. La Conférence des Directeurs nomme le Comité Météorologique International, dont les pouvoirs prennent fin à la Conférence ordinaire suivante\*\*).

Les membres du Comité doivent appartenir à des pays différents: *ils sont choisis parmi les membres de la Conférence qui ont le pouvoir de voter au nom de leur pays.*

§ 2. Le nombre des membres du Comité est fixé par la Conférence des Directeurs.

§ 3. *Quand une vacance se produit dans le Comité par suite du décès ou de la démission d'un de ses membres, le Comité après avoir pris l'avis de l'Administration compétente, élit un membre appartenant au même pays pour occuper la place vacante jusqu'à la première réunion ordinaire de la Conférence.*

§ 4. Lorsqu'un membre du Comité cesse d'être Directeur, il est maintenu au Comité jusqu'à la prochaine réunion du Comité, *si l'Administration compétente le désire.*

§ 5. Le Comité peut s'adjoindre, à titre consultatif, des personnes dont les conseils lui paraissent utiles.

§ 6. Le Comité nomme un Conseil Exécutif composé du Président et de six autres membres choisis dans son sein. Un Règlement intérieur, approuvé par le Comité, règle le fonctionnement du Conseil Exécutif.

§ 7. Le Comité surveille l'exécution des décisions de la Conférence dans l'intervalle des réunions de celle-ci; il reçoit et peut approuver les rapports des Commissions; il prend toutes mesures nécessaires pour le développement de la météorologie internationale.

§ 8. Le Président du Comité est élu par le Comité et garde ses fonctions jusqu'à la prochaine session ordinaire de la Conférence.

\*) On entend par ce mot tout pays qui se gouverne lui-même (exemple: Dominion du Canada).

\*\*) Ancien § 8 de l'Article II.

§ 9. Le Président sortant au cas où il est élu depuis plus de quatre années, n'est pas immédiatement rééligible.

§ 10. Le Comité se tient en rapport avec les Organisations internationales qui se rapportent à la géophysique, notamment avec l'Union Géodésique et Géophysique Internationale, de façon à assurer la coordination des travaux de ces institutions et du Comité.

§ 11. Le Comité se réunit tous les trois ans au moins en séance plénière. Le bureau du Comité informe par circulaire une année à l'avance les membres du Comité et les Présidents des Commissions de la réunion du Comité et leur fait désigner par un vote l'époque et le lieu de la réunion.

#### Article IV.

##### Secrétariat de l'Organisation Météorologique Internationale.

§ 1. Un Secrétariat, fonctionnant sous la direction du Président du Comité Météorologique International, est chargé de l'organisations des réunions de la Conférence, du Comité et des Commissions ainsi que de la publication des Procès-verbaux. Il constitue également un centre de documentation relatif aux services météorologiques du monde entier et il aide, dans toute la mesure de ses moyens, le Président du Comité et les Présidents des Commissions dans l'exécution de leurs travaux.

§ 2. Les frais du Secrétariat sont couverts par les subventions des différents Services nationaux dans la proportion de 4000 francs-or pour un grand état, 2000 francs-or pour un Etat de moyenne grandeur, 1000 francs-or ou une somme inférieure pour les autres Etats.

§ 3. Le Conseil Exécutif du Comité gère le budget du Secrétariat, dont la comptabilité est communiquée, chaque année, aux membres de la Conférence.

§ 4. Le siège définitif du Secrétariat est fixé en Suisse.

§ 5. La composition du Secrétariat et les attributions de son personnel seront fixées par le Conseil Exécutif du Comité.

#### Article V.\*)

##### Commission de Météorologie aéronautique.

§ 1. La Commission de Météorologie aéronautique a pour attributions principales la coordination du travail de l'Organisation Météorologique Internationale et du travail météorologique des Conférences aéronautiques régionales\*\*) et en général l'examen des problèmes météorologiques qui concernent l'aéronautique.

§ 2. La Commission est composée comme suit:

- a. des personnes envoyées par les Administrations aéronautiques d'Etat comme experts de questions météorologiques aux Conférences aéronautiques régionales\*\*);
- b. des personnes désignées par les Administrations aéronautiques d'Etat des pays qui n'ont pas envoyé d'experts météorologiques à une Conférence aéronautique régionale;

et à titre consultatif:

- c. du Président de la Commission des Renseignements synoptiques du Temps,  
du Président de la Commission aérologique,  
du Président de la Sous-Commission pour l'Organisation radio-météorologique des Océans,  
du Président de la Sous-Commission pour l'Aéologie des Océans,  
du Secrétaire Général de la Commission Internationale de Navigation Aérienne,  
du Président de la Sous-Commission de Météorologie de la Commission Internationale de Navigation Aérienne.

\*) New article.

\*\*) C'est à dire: réunissant plusieurs pays.

§ 3. La Commission élit son Président et son Secrétaire et établit ses règlements de travail. Elle se réunit au même lieu que les Conférences et immédiatement avant chacune des réunions ordinaires de celle-ci; elle se réunit à d'autres dates s'il est nécessaire. L'intervalle entre deux réunions ne doit pas dépasser trois ans.

§ 4. Les membres présents prennent seule part aux votes: chaque pays ne peut disposer que d'une voix.

§ 5. Le Président de la Commission est invité à assister aux séances de la Conférence ou du Comité avec droit de vote sur toutes les questions présentées par sa Commission. Ce vote n'est pas considéré comme le vote d'un pays en ce qui concerne l'application de l'article II, § 7.

§ 6. Toutes les Résolutions de la Commission doivent recevoir le visa du Président du Comité Météorologique International avant de devenir exécutoires.

Le Président du Comité a le droit de soumettre une Résolution à la Conférence ou au Comité avant de donner un visa. Une décision doit en tout cas être prise dans un délai maximum de six mois.

§ 7. Le Président de la Commission fournit, au commencement de chaque session de la Conférence ou du Comité, un Rapport sur les travaux de la Commission.

#### Article VI.

##### *Autres Commissions.*

§ 1. Les Commissions, instituées par la Conférence ou par le Comité, doivent comprendre au moins un membre du Comité. Dans les Commissions de création nouvelle le premier Président est nommé par la Conférence ou par le Comité.

§ 2. Une fois constituées, les Commissions ont la faculté de se compléter elles-mêmes et d'organiser leurs travaux à leur gré.

§ 3. Les Présidents des Commissions, qui ne sont pas membres de la Conférence ou du Comité, sont invités à assister aux séances respectivement de la Conférence ou du Comité avec droit de vote sur toutes les questions présentées par leurs Commissions, et à prendre part aux discussions avec voix consultative. Les Présidents fournissent, au commencement de chaque session de la Conférence ou du Comité, un Rapport sur les travaux de leurs Commissions.

§ 4. Les Commissions se réunissent au moins une fois tous les trois ans. La désignation du lieu et de la date des réunions est faite après entente préalable entre le Président du Comité et celui de la Commission. Les décisions sont prises à la majorité des voix des membres présents, sauf dans le cas où le vote par pays est réclamé.

#### Article VII.

Les personnes qui veulent proposer une question à la délibération d'une Conférence, du Comité ou d'une Commission, devront préalablement demander aux Présidents intéressés que cette question soit mise à l'ordre du jour et envoyer, au plus tard deux mois avant la réunion, un court Rapport sur cette question au Secrétariat, qui en distribuera des exemplaires aux membres de la Conférence qui en expriment le désir, aux membres du Comité ou de la Commission intéressée.

These Statutes has been circulated to the Directors of Aeronautical Administrations with the request to indicate the members for the new Commission as mentioned in Article V, and also to the ICAN and the International Regional Conferences for Aeronautics.

#### **The new Convention (116)**

The meeting of the International Meteorological Committee at Berlin 1939 discussed the question to replace the Statutes by a Convention and prepared a first draft for a Convention. This draft has been completed in the years 1940—1945 and discussed in the first Conference of Directors in 1946 after the interruption by world-war. The Convention has been signed in Washington 1947 and came into force in 1951.

## Annex II

### International Meteorological Meetings

1872	Leipzig,	Conference of Meteorologists
1873	Vienna,	Congress of Official Delegates
1874		Utrecht, First Meeting of the Permanent Meteorological Committee
1876		London, Second Meeting of the Permanent Meteorological Committee
1878	Utrecht,	Third Meeting of the Permanent Meteorological Committee
1879	Rome,	Congress of Official Delegates
1880		Berne, First Meeting of the International Meteorological Committee
1882		Copenhagen, Second Meeting of the International Meteorological Committee
1885		Paris, Third Meeting of the International Meteorological Committee
1888		Zürich, Fourth Meeting of the International Meteorological Committee
1889*)		
1891	Munich,	First Ordinary Conference of Directors of Offices and Observatories
1894		Uppsala, Fifth Meeting of the International Meteorological Committee
1896	Paris,	Second Ordinary Conference of Directors of Offices and Observatories
1899		St. Petersburg, Sixth Meeting of the International Meteorological Committee
1900**)		
1903		Southport, Seventh Meeting of the International Meteorological Committee
1905	Innsbruck,	Third Ordinary Conference of Directors of Offices and Observatories
1907		Paris, Eighth Meeting of the International Meteorological Committee
1910		Berlin, Ninth Meeting of the International Meteorological Committee
1913		Rome, Tenth Meeting of the International Meteorological Committee
1919		London, Eleventh Meeting of the International Meteorological Committee
1919	Paris,	Fourth Extraordinary Conference of Directors of Offices

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\*) Paris, open International Meteorological Congress.

\*\*) Paris, meeting of the Committee in connexion with another open Congress of Meteorologists.

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|------|--------------------|---|
| 1921 |                    | London, Twelfth Meeting of the International Meteorological Committee             |
| 1923 | Utrecht,           | Fifth Ordinary Conference of Directors of Offices and Observatories               |
| 1926 |                    | Vienna, Thirteenth Meeting of the International Meteorological Committee          |
| 1929 | Copenhagen,        | Sixth Ordinary Conference of Directors of Offices and Observatories               |
| 1931 |                    | Locarno, Fourteenth Meeting of the International Meteorological Committee         |
| 1933 |                    | De Bilt, Fifteenth Meeting of the International Meteorological Committee          |
| 1935 | Warsaw,            | Seventh Ordinary Conference of Directors of Offices and Observatories             |
| 1937 |                    | Salzburg, Sixteenth Meeting of the International Meteorological Committee         |
| 1939 |                    | Berlin, Seventeenth Meeting of the International Meteorological Committee         |
| 1946 | London,            | Eighth Extraordinary Conference of Directors of Meteorological Services           |
| 1946 |                    | Paris, Eighteenth Meeting of the International Meteorological Committee           |
| 1947 | Washington, D. C., | Conference of Directors and Meeting of the International Meteorological Committee |
| 1951 | Paris              | Extraordinary Conference of Directors of Meteorological Services                  |

### Annex III

## The Commissions of the International Meteorological Organization

#### Commission for the Polar Year 1882—1883

E\*): Rome 1879

P: G. B. von Neumayer

M: Hamburg 1879; Bern 1880, St. Petersburg 1881, Copenhagen 1882, Vienna 1884

D: 1884

#### Commission for the Polar Year 1932—1933

E: Copenhagen 1929

P: Dr. D. la Cour

M: Copenhagen 1929, Leningrad 1930, Innsbruck 1931, Copenhagen 1932

D: 1946

#### Commission for Terrestrial Magnetism and Atmospheric Electricity

E: Munich 1891

P: Dr. Wild (1891—1896), A. Rückert (1896—1905), Gen. Rykatscheff (1905—1913),  
A. Angot (1919—1923), Dr. C. Chree (1923—1928), Prof. Maurain (1929—1946)

M: Paris 1896, Bristol 1898, Paris 1900, Southport 1903, Innsbruck 1905, Berlin 1910,  
Utrecht 1923, Zürich 1926, Copenhagen 1929, Innsbruck 1931, Warsaw 1935

D: 1946

#### Commission for Clouds

E: Uppsala 1894

P: Prof. H. Hildebrandsson

M: Uppsala 1894, Paris 1896

D: 1910

#### Commission for the Study of Clouds

E: London 1921

P: Sir Napier Shaw (1921—1923), Gen. E. Delcambre (1923—1935)

M: London 1921, Utrecht 1923, Zürich 1926, Copenhagen 1929

D: 1935

#### Commission for Aeronautics (1896—1902)

#### Commission for Scientific Aeronautics (1902—1919)

#### Commission for the Investigation of the Upper Air (1919—1935)

#### Aerological Commission (1935—1951)

E: Paris 1896

P: Prof. H. Hergesell (1896—1919), Prof. V. Bjerknes (1919—1921), Sir Napier  
Shaw (1921—1927), Prof. Dr. H. Hergesell (1927—1935), Prof. Dr. L. Weickmann  
(1935—1945), Dr. Sv. Pettersen (1946)

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\*) E = established at ... in ...

P = President

M = meetings at ... in ...

D = dissolved in ...

M: Paris 1896, Paris 1900, Berlin 1902, St. Petersburg 1904, Milano 1906, Monaco 1909, Vienna 1912, Bergen 1921, Utrecht 1923, London 1925, Leipzig 1927, Copenhagen 1929, Madrid 1931, Friedrichshafen 1934, Warsaw 1935, Salzburg 1937, Berlin 1939, Toronto 1947

**Commission for Radiation and Insolation (1896—1919)**

**Commission for Solar Radiation (1919—1939)**

E: Paris 1896

P: Mr. Violle (1896—1905), Mr. K. Ångström (1905—1907), Dr. J. Maurer (1908 to 1932), Dr. A. Ångström (1935—1946)

M: Rapperswyl 1912, Utrecht 1923, Davos 1926, Copenhagen 1929, Potsdam 1931, Frankfurt a. M. 1932, Oxford 1936

D: 1946

**Commission for Solar Physics and Meteorology**

E: Paris 1896

P: Sir Norman Lockyer

M: Cambridge 1904, Innsbruck 1905, Paris 1907\*), Monaco 1909\*), London 1909

**Commission for Weather Telegraphy (1899—1923)**

**Commission for Synoptic Weather Information (1923—1951)**

E: St. Petersburg 1899

P: J. M. Pernter (1899—1907), W. N. Shaw (1907—1919), E. Gold (1919—1947), J. R. Tannehill (1947—1951)

M: Innsbruck 1905, Paris 1907, London 1909, London 1912, London 1920, London 1921, Utrecht 1923, Zürich 1926, London 1928, Copenhagen 1929, De Bilt 1934, Warsaw 1935, Salzburg 1937, Paris 1946, Toronto 1947

**Commission for Storm Warnings and Maritime Meteorology (1907—1919)**

**Commission for Maritime Meteorology (1919—1951)**

E: Paris 1907

P: W. N. Shaw (1907—1919), Prof. Dr. E. van Everdingen (1919—1946), Com. C. E. N. Franckom (1946)

M: London 1909, London 1912, Paris 1919, London 1921, Utrecht 1923, Zürich 1926, Copenhagen 1929, Hamburg 1932, De Bilt 1934, Warsaw 1935, De Bilt 1938, Berlin 1939, Toronto 1947

**Commission for Agricultural Meteorology**

E: Rome 1913

P: A. Angot (1913—1921), Dr. A. Wallén (1921—1932), Prof. Dr. W. Schmidt (1932 to 1935), Dr. C. Braak (1935—1946), Sinelschikow (1946—1951)

M: London 1921, Utrecht 1923, Copenhagen 1929, Munich 1932, Zoppot-Danzig 1935, Salzburg 1937, Toronto 1947

**Commission for the Réseau Mondial and Polar Meteorology**

E: Paris 1907

P: L. Ph. Teisserenc de Bort (1907—1913), Sir Napier Shaw (1913—1921), Dr. G. C. Simpson (1921—1946)

M: Monaco 1909, London 1921, Zürich 1926, Copenhagen 1929

D: 1946

**Commission for the Application of Meteorology to Aerial Navigation**

E: Paris 1919

P: Comm. Saconney (1919—1921), Comm. J. Jaumotte (1921—1935)

M: Paris 1921

D: 1935

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\*) Joint meetings with the Commission for the Réseau Mondial and Polar Meteorology.

**Commission for Aeronautical Meteorology**

E: Warsaw 1935  
P: R. Bureau  
M: Paris 1937, Berlin 1939, Paris 1946  
D: 1946

**Commission for Aviation Meteorology**

E: London 1946  
P: A. H. Nagle  
M: Paris 1946, Toronto 1947

**Commission for Radiotelegraphy on the Oceans**

E: Utrecht 1923  
P: Gen. E. Delcambre  
M: Zürich 1926, Paris 1928, Locarno 1931, Warsaw 1935  
D: 1946

**Commission for the Establishment of an International Meteorological Bureau**

E: Utrecht 1923  
P: Gen. E. Delcambre  
M: Paris 1926, Zürich 1926  
D: 1929

**Commission for Climatology**

E: Copenhagen 1929  
P: Prof. H. von Ficker  
M: Innsbruck 1931, Wiesbaden 1934, Zoppot-Danzig 1935, Salzburg 1937  
D: 1946

**Climatological Commission**

E: London 1946  
P: Ing. S. de Souza  
M: Toronto 1947

**Commission for Bibliography**

E: De Bilt 1933  
P: Sir George C. Simpson  
M: Utrecht 1938  
D: 1946

**Commission for Bibliography and Publication**

E: London 1946  
P: M. Mézin  
M: Toronto 1947

**Commission on Projection of Meteorological Charts**

E: Salzburg 1937  
P: Dr. W. Gregg (1937—1938), Dr. F. W. Reichelderfer (1939—1946), I. R. Tannehill (1946—1951)  
M: Salzburg 1937, Toronto 1947

**Commission for the Study of the Draft of the Convention**

E: Berlin 1939  
P: Ph. Wehrlé  
M: Berlin 1939  
D: 1946

**Commission for Instruments and Methods of Observation**

E: London 1946  
P: W. E. K. Middleton  
M: Toronto 1947

**Hydrological Commission**

E: London 1946  
P: Krivajev  
M: Toronto 1947

**Regional Commissions**

**I. Africa**

E: Warsaw 1935  
P: A. Walter (1935—1945), N. Sellick (1946—1951)  
M: Lusaka 1936, Salisbury 1947

**II. Far East Asia**

E: Warsaw 1935  
P: E. Bruzon (1935—1946), Dr. John Lee (1946—1948), S. K. Banerji (1948—1950),  
Prof. Dr. H. P. Berlage (1950—1951)  
M: Hong Kong 1937, New Delhi 1948

**III. South America**

E: Salzburg 1937  
P: A. G. Galmarini  
M: Lima 1937, Montevideo 1939, Toronto 1947, Buenos Aires 1948

**IV. North and Central America**

E: Salzburg 1937  
P: Dr. W. Gregg (1937—1938), Dr. F. W. Reichelderfer (1946—1951)  
M: Toronto 1947

**V. Southwest Pacific**

E: Salzburg 1937  
P: Dr. M. A. Barnett (1937—1946), H. N. Warren (1946—1950), Dr. M. A. Barnett  
(1950—1951)  
M: Wellington 1937, Melbourne 1947, Wellington 1948

**VI. Europe**

E: London 1946  
P: A. Viaut (1946—1951)  
M: Paris 1946, 1947, 1948, London 1949

### Annex IV

## The members of the Permanent Meteorological Committee and of the International Meteorological Committee

#### Permanent Meteorological Committee 1873—1879

Prof. Dr. C. H. D. Buys Ballot	the Netherlands	President
R. H. Scott	England	Secretary
Prof. Dr. C. Bruhns	Germany	
Prof. G. Cantoni	Italy	
Prof. C. Jelinek	Austria	
Prof. H. Mohn	Norway	
Prof. H. Wild	Russia	

#### International Meteorological Committee 1879—1888

Prof. H. Wild	Russia	President
R. H. Scott	England	Secretary
Prof. Dr. C. H. D. Buys Ballot	the Netherlands	
Capt. J. C. de Brito Capello	Portugal	
Prof. G. Cantoni	Italy	
Dr. J. Hann	Austria	
Prof. H. Mohn	Norway	
Prof. H. Mascart	France	
G. von Neumayer	Germany	

#### International Meteorological Committee 1891—1914

Prof. H. Wild	Russia	President	1891—1896
R. H. Scott	England	Secretary	1891—1900
Vice-Adm. J. C. de Brito Capello	Portugal		1891—1893
Prof. Dr. J. Hann	Austria		1891—1898
Prof. H. Mohn	Norway		1891—1913
Prof. E. Mascart	France		1891—1907
		President	1896—1907
Prof. Tachini	Italy		1891—1900
Prof. Dr. W. von Bezold	Germany		1891—1907
Dr. R. Billwiller	Switzerland		1891—1905
Prof. Harrington	USA		1891—1895
St. Hepites	Rumania		1891—1907
Dr. C. Lang	Germany		1891—1894
Dr. H. Hildebrandsson	Sweden		1891—1907
		Secretary	1900—1907
Dr. M. Snellen	the Netherlands		1891—1903
N. Paulsen	Denmark		1891—1907
R. F. J. Ellery	Australia		1891—1896
I. Eliot	India		1891—1910
G. G. Davis	Argentina		1891—1914
Prof. W. L. Moore	USA		1896—1913
Gen. M. Rykatscheff	Russia		1896—1913
R. C. Russell	Australia		1896—1907
Prof. Dr. L. Pernter	Austria		1898—1910

Prof. Dr. L. Palazzo	Italy	1900—1914
Prof. D. G. Hellmann	Germany	1903—1914
	Secretary	1907—1914
Col. F. S. Chaves	Portugal, Azores	1903—1914
Dr. W. N. Shaw	England	1900—1914
	President	1907—1914
K. Nakamura	Japan	1905—1914
A. Lancaster	Belgium	1903—1910
Prof. Dr. A. Angot	France	1907—1914
Dr. H. E. Hamberg	Sweden	1907—1913
F. Stupart	Canada	1907—1914
Prof. Dr. J. Maurer	Switzerland	1907—1914
Prof. Dr. E. van Everdingen	the Netherlands	1910—1914
Capt. C. H. Ryder	Denmark	1910—1914
Prof. Dr. W. Trabert	Austria	1910—1914
Dr. G. T. Walker	India	1910—1914

**International Meteorological Committee 1919—1946**

Sir Napier Shaw	Great Britain	(1903)	1919—1923
		President	1919—1923
		Honorary Member	1923—1945
Prof. Dr. E. van Everdingen	the Netherlands	(1910)	1919—1939
		Secretary	1919—1921
		Vice-President	1923—1929
		President	1923—1935
		Honorary Member	1939—1945
Dr. Th. Hesselberg	Norway		1919—1946
		Secretary	1923—1935
		President	1935—1946
Sir Frederic Stupart	Canada	(1907)	1919—1929
		Vice-President	1923—1929
Prof. L. Palazzo	Italy	(1900)	1919—1934
Col. F. A. Chaves	Portugal	(1901)	1919—1926
A. Angot	France	(1907)	1919—1921
Prof. J. Maurer	Switzerland	(1907)	1919—1935
Capt. C. H. Ryder	Denmark	(1910)	1919—1921
Sir Gilbert T. Walker	India	(1910)	1919—1926
Nakamura	Japan		1919—1921
Dr. C. F. Marvin	USA		1919—1935
Comm. J. Jaumotte	Belgium		1919—1940
Prof. D. Eginitis	Greece		1919—1934
H. A. Hunt	Australia		1919—1931
Gen. E. Delcambre	France		1921—1935
Sir George C. Simpson	Great Britain		1921—1939
		Honorary Member	1939—1946
Prof. T. Okada	Japan		1921—1944
Dr. A. Wallén	Sweden		1921—1935
Dr. D. la Cour	Denmark		1923—1943
Prof. Dr. F. Exner	Austria		1923—1931
Prof. Dr. H. Hergesell	Germany		1923—1933
Dr. Melander	Finland		1923—1929
J. de Sampaio Ferraz	Argentina		1926—1931
J. H. Field	India		1926—1929
Comm. A. Carvalho Brandão	Portugal		1926—1929
Prof. A. F. Wangenheim	USSR		1929—1935

Col. E. Meseguer	Spain	1929—1933
Comm. Alvaro Morua	Portugal	1929—1937
Dr. C. W. B. Normand	India	1929—1940
J. Patterson	Canada	1929—1946
Dr. E. Kidson	New Zealand	1931—1939
Prof. Dr. W. Schmidt	Austria	1931—1935
Prof. F. Eredia	Italy	1933—1935
Dr. N. Sama	Spain	1933—1938
L. J. Sutton	Egypt	1933—1937
Prof. Dr. H. von Ficker	Germany	1933—1935
Dr. W. R. Gregg	USA	1935—1938
Ing. A. G. Galmarini	Argentina	1935—1946
Dr. T. E. W. Schumann	South Africa	1935—1940
E. Bruzon	Indochine	1935—1946
A. Romer	Indochine	1935—1946
C. D. Stewart	Malaya	1935—1946
H. B. Moorhead	Malaya	1935—1946
Comm. L. J. Djuric	Yougoslavia	1935—1943
Prof. J. Keränen	Finland	1935—1946
Ing. Ph. Wehrlé	France	1935—1946
Gen. M. Infante	Italy	1935—1942
Prof. L. Weickmann	Germany	1935—1937
Prof. L. G. Fainstein	USSR	1935—1937
Ing. Dr. J. Lugeon	Poland	1935—1937
Prof. Dr. H. von Ficker	Austria	1937—1938
Prof. Dr. J. Blaton	Poland	1937—1940
G. Ouchakoff	USSR	1937—1941
Dr. R. Habermehl	Germany	1937—1945
Comm. J. Correira Pereira	Portugal	1937—1939
M. A. Walter	British East-Africa	1937—1946
Comm. J. Alvaro Morna	Portugal	1939—1946
Dr. H. G. Cannegieter	the Netherlands	1939—1946
Sir Nelson K. Johnson	Great Britain	1939—1946
Dr. M. A. F. Barnett	New Zealand	1939—1946
N. P. Sellick	Rhodesia	1939—1946
Ing. Fr. Souza	Brazil	1939—1946
H. N. Warren	Australia	1940—1946
Dr. F. W. Reichelderfer	USA	1939—1946
Dr. Ing. L. A. Perez Caballero	Spain	1940—1946
Gen. Dr. E. Fedorov	USSR	1941—1946
Gen. Cebrelli	Italy	1942—1946
Prof. Dr. A. van den Broeck	Belgium	1943—1946
Prof. S. Fujiwhara	Japan	1944—1946

**International Meteorological Committee 1946—1951**

Sir Nelson K. Johnson	Great Britain	President	1946—1951
Prof. Dr. E. van Everdingen	the Netherlands		
		Honorary Member	1939—1951
Sir George C. Simpson	Great Britain		
		Honorary Member	1939—1951
Dr. Th. Hesselberg	Norway	Vice-President	1946—1951
Dr. F. W. Reichelderfer	USA	Vice-President	1946—1951
A. Viaut	France	Vice-President	1946—1951
Adm. Shuleykin	USSR		1947—1950
Dr. J. K. Banerji	India		1947—1950

V. V. Sohoni	India	1950—1951
Dr. M. A. Barnett	New Zealand	1946—1951
Dr. A. G. Galmarini	Argentina	1946—1951
H. N. Warren	Australia	1946—1950
N. P. Sellick	Rhodesia	1946—1951
Ing. F. X. R. de Souza	Brazil	1946—1951
Prof. H. Amorim Ferreira	Portugal	1947—1951
Ing. Dr. J. Lugeon	Switzerland	1947—1951
Dr. A. Gregor	Czechoslovakia	1946—1951
Dr. G. Slettenmark	Sweden	1947—1950
Dr. A. Ångström	Sweden	1950—1951
Prof. J. Keränen	Finland	1947—1951
Dr. Doporto	Ireland	1948—1951
Dr. J. Lee	China	1947—1950
Prof. Dr. H. P. Berlage	Indonesia	1947—1951
Dr. Andrew Thomson	Canada	1946—1951
N. van der Elst	Belgian Congo	1947—1951
R. Feige	Israel	1947—1950
Gen. G. Barbu	Italy	1947—1950
Dr. Helge Petersen	Denmark	1947—1951
Prof. Dr. A. van den Broeck	Belgium	1946—1950

members ex officio:

The President of the Meteorological Committee of the Interallied Commission of Control in Germany

The Chief Meteorologist of the Supreme Interallied Command in Japan

## Annex V

### The members of the Executive Council 1929—1951

- 1929 President: Prof. Dr. E. van Everdingen  
Members: Gen. E. Delcambre  
Dr. Th. Hesselberg  
Dr. C. T. Marvin  
Sir George C. Simpson  
Chief of the Secretariat: Dr. H. G. Cannegieter, De Bilt
- 1935 President: Dr. Th. Hesselberg  
Members: Dr. D. la Cour  
Prof. Dr. E. van Everdingen  
Dr. W. R. Gregg (1935—1938)  
Sir George C. Simpson  
Ing. Ph. Wehrlé  
Prof. Dr. L. Weickmann (1935—1937)  
Dr. R. Habermehl (1937—1939)  
Chief of the Secretariat:  
Dr. H. G. Cannegieter,  
De Bilt (1935—1938)  
Dr. G. Swoboda,  
De Bilt (1938—1939)
- 1939 President: Dr. Th. Hesselberg  
Members: Dr. H. G. Cannegieter  
Dr. D. la Cour (1939—1943)  
Dr. R. Habermehl (1939—1945)  
Sir Nelson K. Johnson  
Dr. F. W. Reichelderfer  
Ing. Ph. Wehrlé  
Chief of the Secretariat: Dr. G. Swoboda, Lausanne
- 1946 President: Sir Nelson K. Johnson  
Members: Jt. General E. K. Fedorov  
Ing. A. G. Galmarini  
Dr. Th. Hesselberg  
Dr. J. Lee  
Dr. F. W. Reichelderfer  
A. Viaut  
Chief of the Secretariat: Dr. G. Swoboda, Geneva
- 1947 (Transition period till 1951)  
President: Sir Nelson K. Johnson  
Vice-Presidents: Dr. F. W. Reichelderfer  
Dr. Th. Hesselberg  
A. Viaut

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Report of the International Meteorological Committee. Meeting at Berne 1880. London 1881.
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- (72) see (67) App. XIV.
- (73) see (37) p. 90.
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