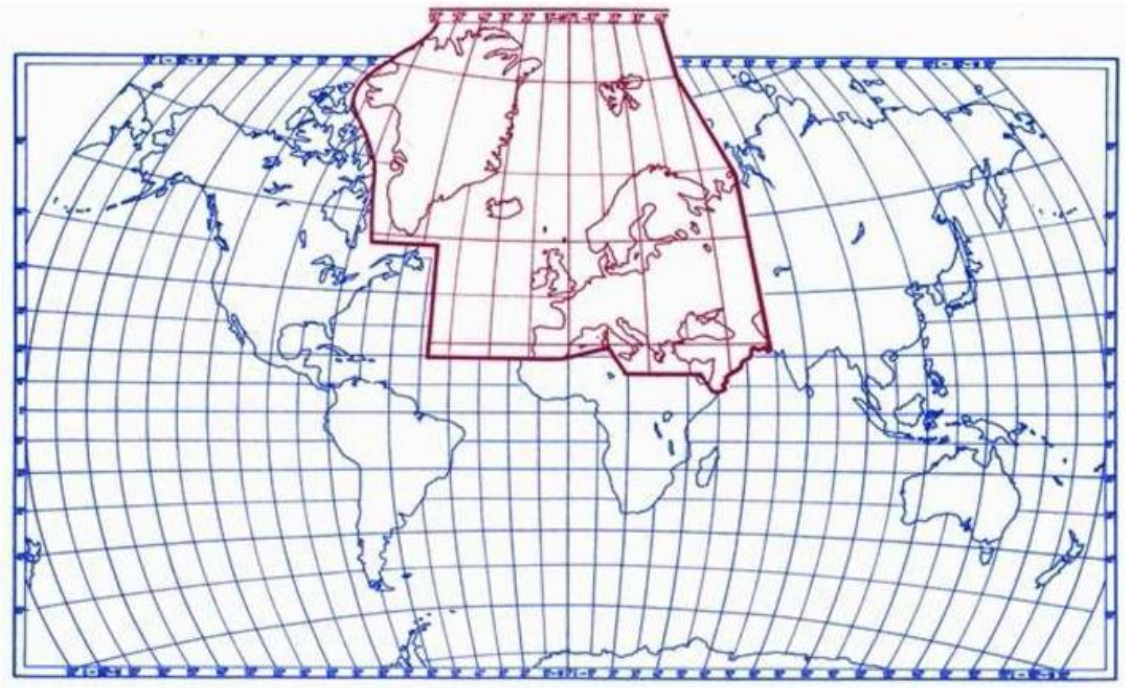
Annual Bulletin on the Climate in WMO Region VI

- Europe and Middle East -

2012



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Netherlands
Norway
Poland
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Romania
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Slovakia
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Introduction

The Annual Bulletin on the Climate in WMO Region VI (Europe and Middle East) provides an overview of climate characteristics and phenomena in Europe and the Middle East for the preceding year. It is mainly based on dedicated national reports from RA VI NMHSs as well as general climate monitoring information from their official Websites. Supported by the European Climate Support Network and WMO´s World Climate Data and Monitoring Programme the Bulletin provides an excellent example of international collaboration across cultural and political borders since its first publication in 1994. The Bulletin is seen as a regional contribution to WMOs climate system monitoring, complementing and detailing well-known regular global assessments, such as WMOs Annual Statement on the Status of the Climate and the State of the Climate Article published in the Bulletin of the American Meteorological Society (BAMS). The evolution of the RA VI Regional Climate Centre Network (RCC Network) allowed adding a couple of RA VI-wide maps in order to provide a certain degree of consistency across the information. Otherwise, basic methodologies for, and operations of, climate monitoring activities still differ amongst the various RA VI NMHSs. Maps and information compiled in this Bulletin are the result of a selection process. Websites of NMHSs as well as the Webpages of the RA VI RCC Network (http://www.rccra6.org) offer useful additional information and regularly produced maps etc. The Bulletin is intended to serve primarily NMHSs in the Region but it might also be interesting for public institutions, research institutes, universities and others.

Notes:

- Maps of the RA VI RCC Network are based on the following data sources:
  - Temperature: CLIMAT data and ship observations provided by the Global Collection Centre (GCC), run by Deutscher Wetterdienst
  - Precipitation: Global Precipitation Climatology Centre (GPCC), run by Deutscher Wetterdienst
  - Sunshine: CLIMAT data.
  - Anomaly maps of climate indices are provided by the RCC-CD (ECA&D)
- Subregional monthly maps are provided by the Eastern Mediterranean Climate Centre (EMCC) and the Southeast Drought Management Centre (DMCSEE)

The following subregions are used in the Bulletin:

Central and western Europe: *Austria, Belgium, Czech Republic, France, Germany, Hungary, Ireland, Luxemburg, Monaco, Netherlands, Poland, Slovakia, Switzerland, United Kingdom*
Nordic and Baltic Countries: *Denmark, Estonia, Finland, Greenland, Iceland, Latvia, Lithuania, Norway, Sweden*
Iberia: *Portugal, Spain*
Mediterranian, Italian and Balkan Peninsula: *Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Italy, Malta, Serbia, Slovenia, Republic of Macedonia, Montenegro, Turkey* ***Eastern Europe:*** *Belarus, European Russia, Moldova, Romania, Ukraine*
Middle East: *Armenia, Azerbaijan, Cyprus, Georgia, Israel, Jordan, Lebanon, Syria, western Kasakhstan*

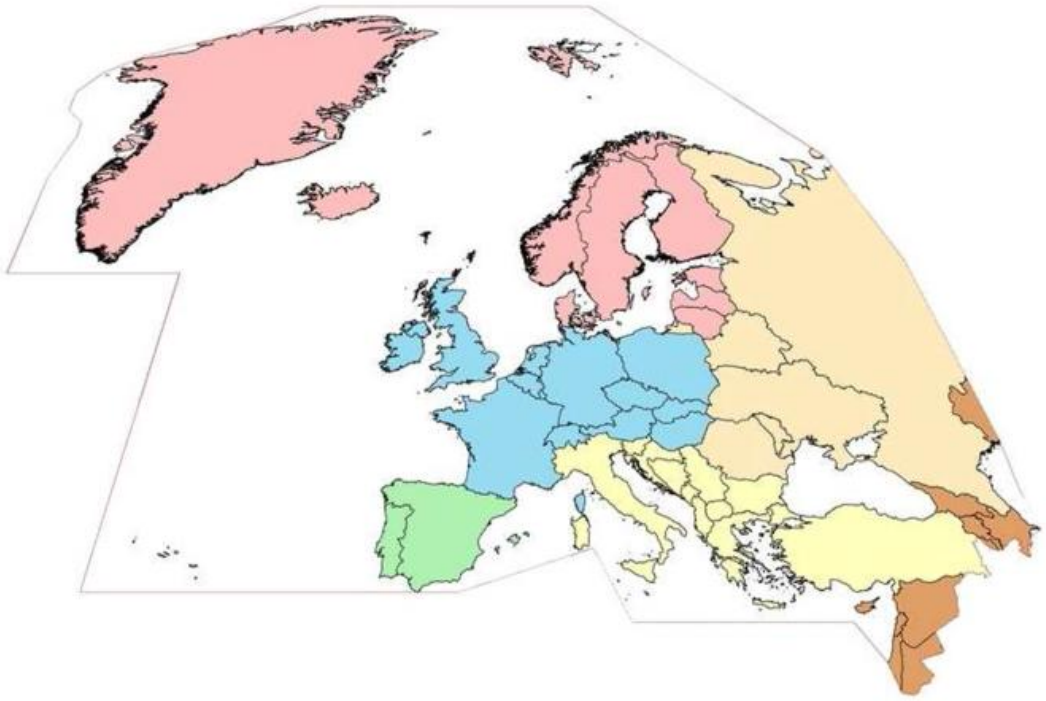

Fig. 1.1: *Definition of the 6 subregions within WMO RA VI*

References:

Note: *Primary information sources are the annual reports of RA VI Members, which are kindly provided by RA VI NMHSs. The names of Members, which contributed to the 2011 edition of the Bulletin are listed on page 3 above. Many contributions or also additional information may as well be found on the web, see below.*

National Reports 2012

Zentralanstalt für Meteorologie und Geodynamik (ZAMG), Wien, Austria
Wetterrückblick für 2012
http://www.zamg.ac.at/cms/de/klima/klima-aktuell/jahresrueckblick

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Meldungen zu Unwetter und witterungsbedingten Schäden in der Wirtschaft/Jahresübersicht 2012

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AVERAGE ANNUAL PRECIPITATION (mm)
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Royal Netherlands Meteorological Institute (KNMI), DeBilt, Netherlands
Jaaroverzicht van het weer in Nederland, 2012,
http://www.knmi.nl/klimatologie/mow/pdf/jow_2012.pdf

The Irish Meteorological Service (MET eireann), Ireland
Weather Summary of 2012,
http://www.met.ie/climate/monthly_summarys/annual_2012.pdf

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http://www.ipma.pt

Ilmateenistus 2012.aasta ilmaülevaade http://www.emhi.ee/

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Resumen anual climatologico 2012
http://www.aemet.es/documentos/es/serviciosclimaticos/vigilancia_clima/
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Météo-France, Toulouse, France
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http://climat.meteofrance.com/chgt_climat2/bilans_climatiques/archives/2012?page_id=15492

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Hydrological and Meteorological Service of Montenegro
Analiza temperature vazduha i kolièine padavina za 2012
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Turkish State Meteorological Service (TSMS),
2012 YILI YAÐIÞ DEÐERLENDÝRMESÝ
http://www.dmi.gov.tr/veridegerlendirme/yagis-raporu.aspx

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http://emcc.dmi.tr

Drought Management Centre for Southeastern Europe (DMCSEE)
http://www.dmcsee.org/en/drought_bulletin/Fstran=3

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http://climate.rutgers.edu/snowcover/files/Robinson_snowdata2012.pdf

van der Schrier, G. and van den Besselaar, E. J. M. and Klein Tank, A. M. G. and Verver, G. (2013)
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http://www.smhi.se/polopoly_fs/1.8963!Swedish_Sea_Level_Series_-_A_Climate_Indicator.pdf

WMO,2013, Assessment of the observed extreme conditions during late boreal winter 2011/2012,
WCDMP-No. 80

WMO, 2013, WMO statement on the status of the global climate in 2012
WMO-No. 1108

Outstanding events and anomalies

Temperature

- 2012 the 2nd highest mean temperature at Svalbard Airport since 1912, after 2006.
- 2012 was the second coldest year in Sweden.
- The warmest summer on record in Israel together with the summer of 2010.
- Unusually warm March in northern, western and central Europe.
- Highest mean May temperatures since 1891 in southern European Russia.
- Warmest July on record in Hungary as well as in parts of Israel

Precipitation

- One of the wettest years of the last 50 to 150 years in the Nordic and Baltic countries.
- The 3rd rainiest year since 1768 in UK. The wettest in England since 1910.
- The driest winter since 1931 in Portugal
- One of the driest March months in several countries of *Western and Central Europe*.
- The wettest April in the England and Wales precipitation series from 1766 (Alexander and Jones, 2001)
- One of the driest Aprils in the last 70 years in northern Israel.
- The wettest June on record in Stockholm (with precipitation measurements since 1786)
- Exceptional widespread rain in northeastern Israel and unusually high rain totals in southern Israel in June.
- The driest August since 1901 in Hungary.
- The rainiest October for some stations in northeastern parts of Sweden for more than 100 years
- The wettest December on record in Belgium and one of the wettest in the last 100 years in northern and western Scotland

Sunshine Duration

- Highest annual sunshine duration on record in Hungary.
- The sunniest March in England since 1929

Other Anomalies

- A new record of high surface level pressure for Moscow (1025 hPa in late January; previous value 1024 hPa in 1946).
- A new record of high surface level pressure for the month of February in Haparanda, Sweden (1058.0 hPa on 1 February)
- A new record of low surface level pressure for Moscow (958.7 hPa on 6 November)

Events

- January air temperature above 0°C on Kheis Island (Russian Arctic islands),for the first time on record (since 1957).
- 2012 the highest daily precipitation total of the Norwegian Arctic stations on 30 January at Ny Alesund: 98 mm. This has an estimated return period of 200 years.
- Severe cold wave in the 1st half of February in eastern, western, central and southwestern Europe
- New record for the highest official surface air temperature (SAT) of May ever recorded in Greenland in May 24.8°C at Ivittuut/Narsarsuaq on 29 May 2013.
- Rain and several days of thaw have been registered at the ice cap of Greenland with high temperatures late June and several days in a row in July above 0°C.

Annual Survey

Atmospheric Circulation

The chapter on the atmospheric circulation gives information on selected northern hemisphere teleconnection indices which are considered to be relevant for WMO RA VI and it discusses influences of circulation patterns upon anomalies and outstanding events. The information is based upon the Monthly Bulletins on the climate in WMO RA VI and the Global Climate Bulletin (MeteoFrance) and completed by reports of NMHSs. The discussion partly refers to atmospheric circulation patterns in the mid-/upper troposphere not shown here. See http://www.ncdc.noaa.gov/teleconnections/ and http://www.cpc.ncep.noaa.gov/products/CDB/index.shtml.

STANDARDIZED NORTHERN HEMISPHERE TELECONNECTION INDICES (1981-2010 Clim)

North Atlantic Oscillation (NAO)
East Atlantic Pattern (EA)
East Atlantic/West Russia Pattern (EA/WR)
Scandinavia Pattern (SCA)
Polar/ Eurasia Pattern (POL)
Arctic Oscillation (AO)

Year	Month	NAO	EA	EA/WR	SCA	POL	AO
2012	1	0.86	-1.76	-0.46	0.57	-2.34	-0.220
2012	2	0.03	-1.73	-0.64	0.34	0.19	-0.036
2012	3	0.93	-0.64	1.35	-0.47	-1.42	1.037
2012	4	0.37	-0.28	-1.59	-0.93	-0.97	-0.035
2012	5	-0.79	0.52	-0.47	-0.58	-0.11	0.168
2012	6	-2.25	-0.11	0.01	-1.42	-1.75	-0.672
2012	7	-1.29	1.02	-1.43	-0.56	1.01	0.168
2012	8	-1.39	1.36	1.15	0.85	0.98	0.014
2012	9	-0.43	0.38	-0.49	-0.93	-0.70	0.772
2012	10	-1.73	-0.32	-1.01	-0.28	-0.17	-1.514
2012	11	-0.74	1.15	-0.59	0.68	-0.19	-0.111
2012	12	0.07	0.68	-0.88	2.00	0.35	-1.749

Table 2.1: *Monthly values of selected northern hemisphere teleconnection indices standardized to the 1981-2010 reference and the AO, December 2011 to December 2012*

(Sources:ftp://ftp.cpc.ncep.noaa.gov/wd52dg/data/indices/tele_index.nh and http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/monthly.ao.index.b50.current.ascii.table Note that all values are standardized with the reference 1981 to 2010.

The influence of these teleconnection patterns differs with months or seasons. For Europe not only the best known NAO pattern is relevant but for individual months also one of the other teleconnection patterns may have an influence. The annual course of these selected teleconnection indices as well as the Southern Oscillation index (SOI) is as well illustrated in Fig 2.1. The Southern Oscillation (connected to ENSO) has usually little influence in Europe but may occasionally be of some importance. It is presented for completeness here. In Fig. 2.2 maps of the mean sea surface level air pressure are presented.

In **January 2012** high pressure centered close to the Azores as well as over Russia was well pronounced. Low pressure in the northwest was centered between Iceland and southern Greenland. Both pressure patterns - the Azores high and the Icelandic low were better developed than the mean and a distinct gradient zone

between both may be related to the storm events that occurred. The NAO index was positive with 0.86, EA and POL were strongly negative (-1.8 and -2.3). The western European negative precipitation anomaly was very consistent with the circulation pattern.

High pressure over western Europe as well as over Russia was the decisive feature in **February 2012**. The positive anomalies were highest west of the British Isles with more than 16 hPa. More than 12 hPa higher than normal was the sea level pressure on the North Atlantic between 40°N and 55°N, extending nearly to 30°W and including most of the British Isles and western and northern France. Similar anomalies occurred in northeastern Russia. The East Atlantic pattern (EA) was the strongest circulation mode (-1.7) while NAO was neutral.

Though the NAO was positive in **March 2012** (0.93) the distribution of the sea surface level pressure did not show the Icelandic low and the Azores high ideally. The center of the Icelandic low was situated between Iceland and southern Greenland. An extensive trough reached southward to nearly 40 N. A secondary but much weaker low laid over Russia. The latter had a negative anomaly of at least -12 hPa in its center. The anomalies of the Icelandic low were negative as well with at least 8 hPa it its center. The Azores high was shifted northeastward and was centered over northern France and the southerly British Isles. The positive anomalies of the Azores high exceeded 12 hPa. High pressure spread over western and central Europe, northern Africa, and westward on the North Atlantic between 20 N and 40 N. More influence than the NAO had the East Atlantic/West Russia pattern (EA/WR) and the Polar/Eurasia pattern (POL) with values of 1.35 and -1.42. The negative precipitation anomalies in western Europe were quite consistent with the pressure (and geopotential) fields and the induced blocked zonal circulation.

The surface level pressure was in **April 2012** characterized by positive anomalies on the Atlantic and negative anomalies on the European continent. The Azores High was weaker than normal and the Icelandic low was not developed. There was instead high pressure north of Iceland. The NAO index had a mean of 0.37. Also the AO was close to zero (-0.03) as the polar vortex was weak. The strongest circulation mode was EA/WR (-1.59) followed by POL (-0.97). There was no blocking over the region of interest. The positive temperature anomaly over most of the region is remarkable in this context. The negative or close to normal temperature anomalies over western Europe are related to the postive rainfall anomalies here.

In **May 2012** higher than normal sea surface level air pressure extended over the northern North Atlantic, western, central and southwestern Europe, while lower than normal sea level air pressure prevailed over the Azores and northeastern, eastern and southeastern Europe. The NAO index was negative with -0.91. Blocking was detected at the beginning and at the end of the month. The negative precipitation anomalies in Spain as well as the positive precipitation anomalies in southeastern Europe were consistently related to the pressure and geopotential anomalies.

In **June 2012** the Azores high was well developed and influenced the Iberian Peninsula, the western Mediterranean Sea and southern France. High pressure was also prevailant over Greenland while low pressure influenced most of the European continent with minima over the British Isles, Scandinavia and northern Russia as well as the Middle East. In terms of anomalies there were positive anomalies over Greenland and the northern North Atlantic, including Iceland. And there were negative anomalies mostly everywhere else with the minimum centered southwest of Ireland and spreading northeast to southern Sweden and southwest to the western North Atlantic. The NAO was negative and well below the normal (1961-1990) values minus 1 σ throughout the month. The monthly mean resulted to -2.25. The AO index was mostly negative during the first half of the month and close to normal during the second half. The monthly mean was -0.62. Strong were the Scandinavia pattern (SCAND) and the Polar/Eurasia pattern (POL) with -1.42 resp. -1.75. Like already in May the precipitation anomalies reflected the circulation patterns well whereas this is not so to the same extent for the temperature anomalies.

The surface level air pressure was generally close to normal in **July 2012**. There was a slight positive anomaly over the Azores, over Iceland and southern Greenland as well as in the east. The largest negative anomaly of -4 to -8 hPa occurred in a small area between Ireland and England as well as near Newfoundland. The NAO-index was negative with -1.29. Negative values had as well the relatively strong modes East Atlantic pattern (EA), the East Atlantic/West Russia pattern (EA/WR) and the Scandinavia pattern (SCAND) with -1.0 , -1.4 and -0.6. Positive was the Polar/Eurasia pattern (1.0). There was no blocking in July 2012. Again the precipitation anomalies reflected the circulation patterns well whereas the temperature anomalies did less.

The Icelandic low was centered further southward than normal in **August 2012** and the Azores high was weaker. The negative anomalies ranged between -4 and -8 hPa over Ireland and west and southwest of the British Isles. There was as well lower than normal sea level pressure in the eastern Mediterranean, southern Russia and Middle East with anomalies ranging up to -4 hPa. Northern, northeastern, central, southern and southwestern Europe had positive anomalies up to +4 hPa. The NAO index was negative with -1.4 and the East Atlantic mode (EA) was positive (1.4). Higher than normal 500 hPa Geopotential over northern Morocco and the central Mediterranean Sea to the Adriatic Sea were favourable conditions for heat waves over southeastern Europe. Positive anomalies of the heat content of the North Atlantic as well as in the Mediterranean Sea were as well noticeable.

The mean sea surface level air pressure of **September 2012** showsed a pronounced but tilted dipole of the Icelandic low and the Azores high. The Icelandic low was shifted eastward and stronger than normal while the Azores high is shifted westward and was only slightly stronger than normal in intensity or close to normal. The Azores high was extended far eastward but weak so that overall a negative anomaly prevailed. The gradient between both pressure systems was high in a zonal band from North America over the British Isles and the southern Baltic Sea to Russia, allowing low pressure systems to move eastward and bring first storms in the north and northwest. The most active circulation mode was the Scandinavia pattern (SCAND) with a value of -0.9. The strong gradient between the pressure patterns may explain the remarkable contrast in the precipitation anomalies between the highest northern latitudes (wet) and the southward latitudes (drier especially in central and southeastern Europe).

In **October 2012** the sea surface level pressure was lower than normal over most of the region with negative anomalies of -4 to -8 hPa from the central North Atlantic to eastern Europe, including southern Scandinavia and the Baltic Sea and the northwestern Black Sea as well as most of the Iberian Peninsula and the western Mediterranean Sea area. Iceland and Greenland had higher than normal pressure with anomalies of +8 to +12 hPa. The NAO and EA/WR were the most active modes in October with values of -1.7 resp. -1.0.

November 2012 was characterized by low pressure in the north, centered east of Iceland, and high pressure in the south with centers west of the Azores and east of the Caspian Sea. The negative anomalies were strongest with -8 to -12 hPa over the Faroer Islands and ranged between -4 and -8 hPa in a region from the Norwegian Sea and Iceland southward to the Iberian Peninsula. The northern, central, and southern European continent, the Mediterranean Sea and Middle East had negative anomalies between 0 and -4 hPa.EA was the most active mode (1.0) and NAO (-0.7) as well as SCAND (-0.7) show as well some influence.

December 2012 was characterized by low pressure centered on the Northern North Atlantic south of 60°N, high pressure centered southeast of the Azores as well as high pressure over Russia. The anomalies were negative on the North Atlantic with -8 to -12 hPa west of the British Isles and south of Iceland and positive over northern Russia and Scandinavia. The NAO index was close to zero but the AO index was negative with -1.7. The most active mode was SCAND (2.0). The next active modes for Europe were EA/WR (-0.9) and EA (0.7).

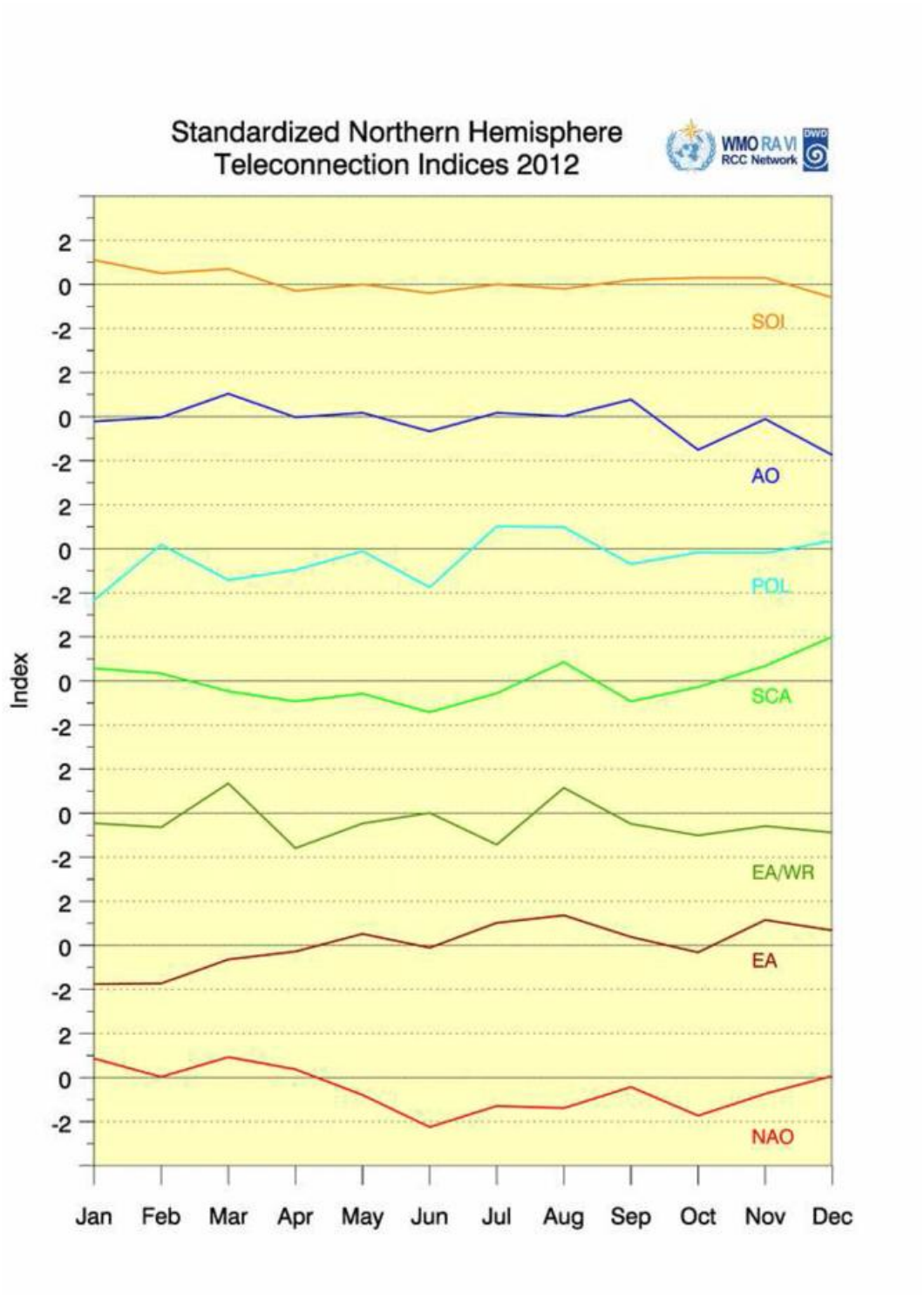
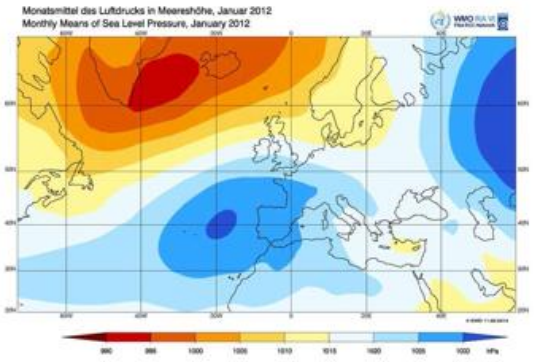
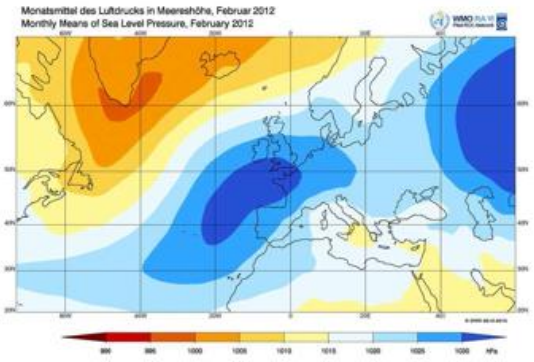
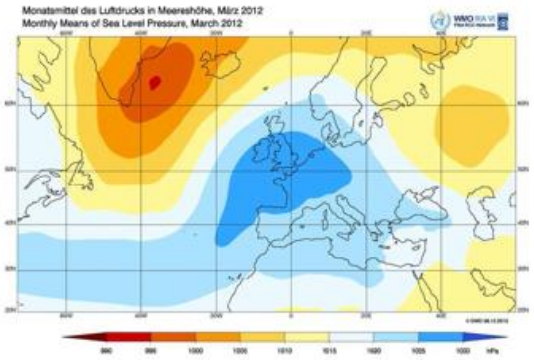
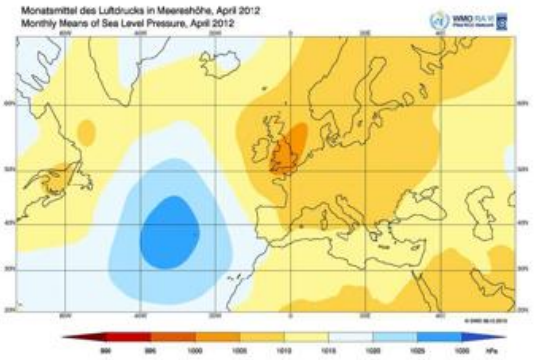


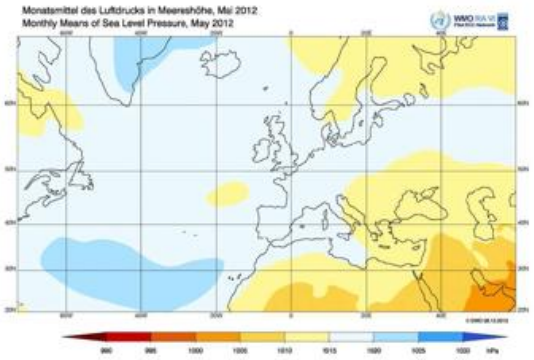
Fig. 2.1: *Annual course of relevant Teleconnection Indices 2012*
Source: ftp://ftp.cpc.ncep.noaa.gov/wd52dg/data/indices/tele_index.nh

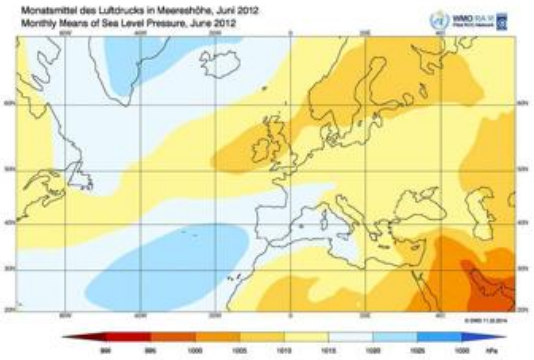

Monatsmittel des Luftdrucks in Meereshöhe, Januar 2012
Monthly Means of Sea Level Pressure, January 2012


Monatsmittel des Luftdrucks in Meereshöhe, Februar 2012
Monthly Means of Sea Level Pressure, February 2012


Monatsmittel des Luftdrucks in Meereshöhe, März 2012
Monthly Means of Sea Level Pressure, March 2012


Monatsmittel des Luftdrucks in Meereshöhe, April 2012
Monthly Means of Sea Level Pressure, April 2012


Monatsmittel des Luftdrucks in Meereshöhe, Mai 2012
Monthly Means of Sea Level Pressure, May 2012


Monatsmittel des Luftdrucks in Meereshöhe, Juni 2012
Monthly Means of Sea Level Pressure, June 2012

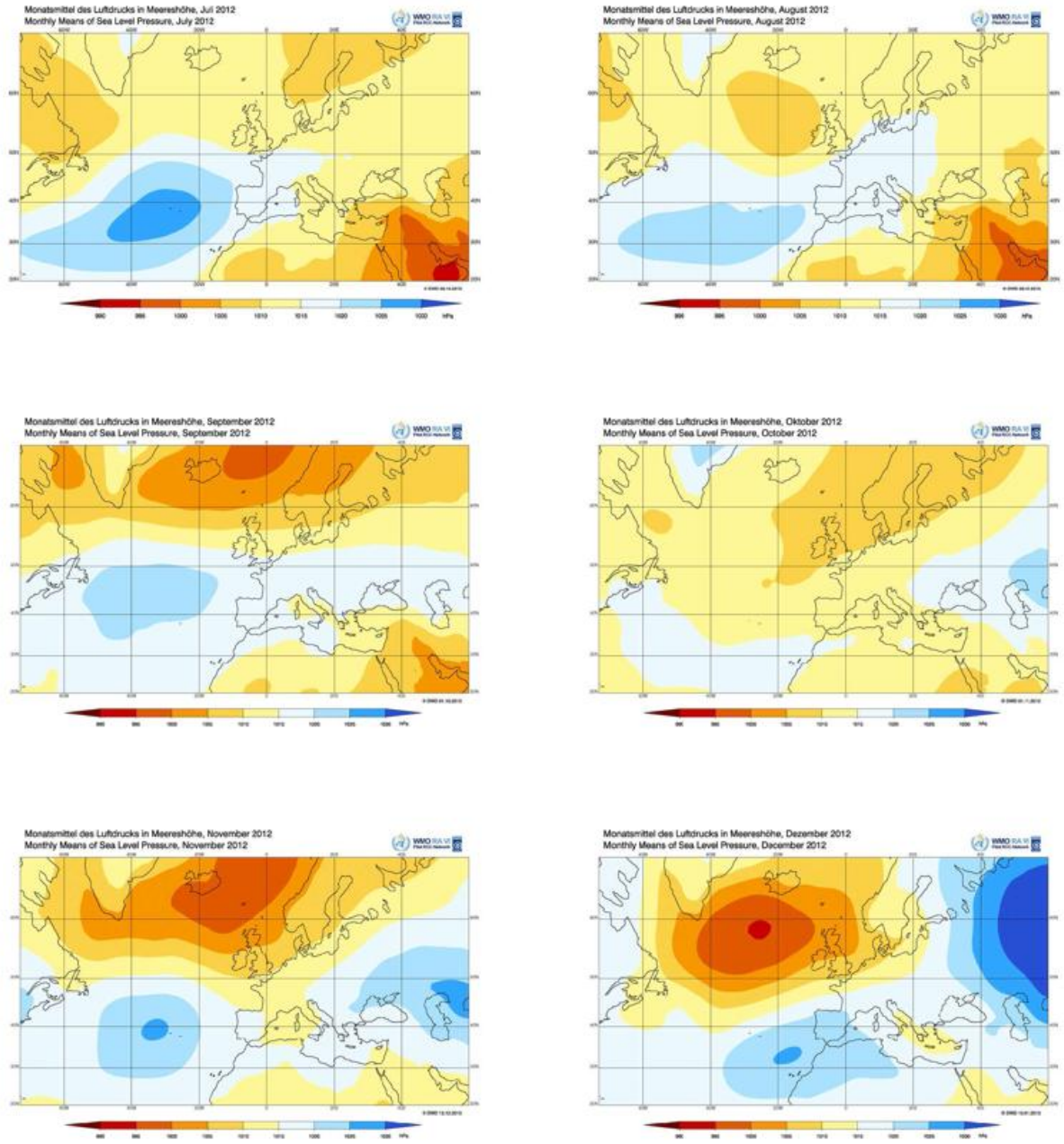


Fig. 2.2: *Mean monthly sea surface level air pressure 2012*

Temperature, Precipitation and Sunshine Duration

Annual Maps

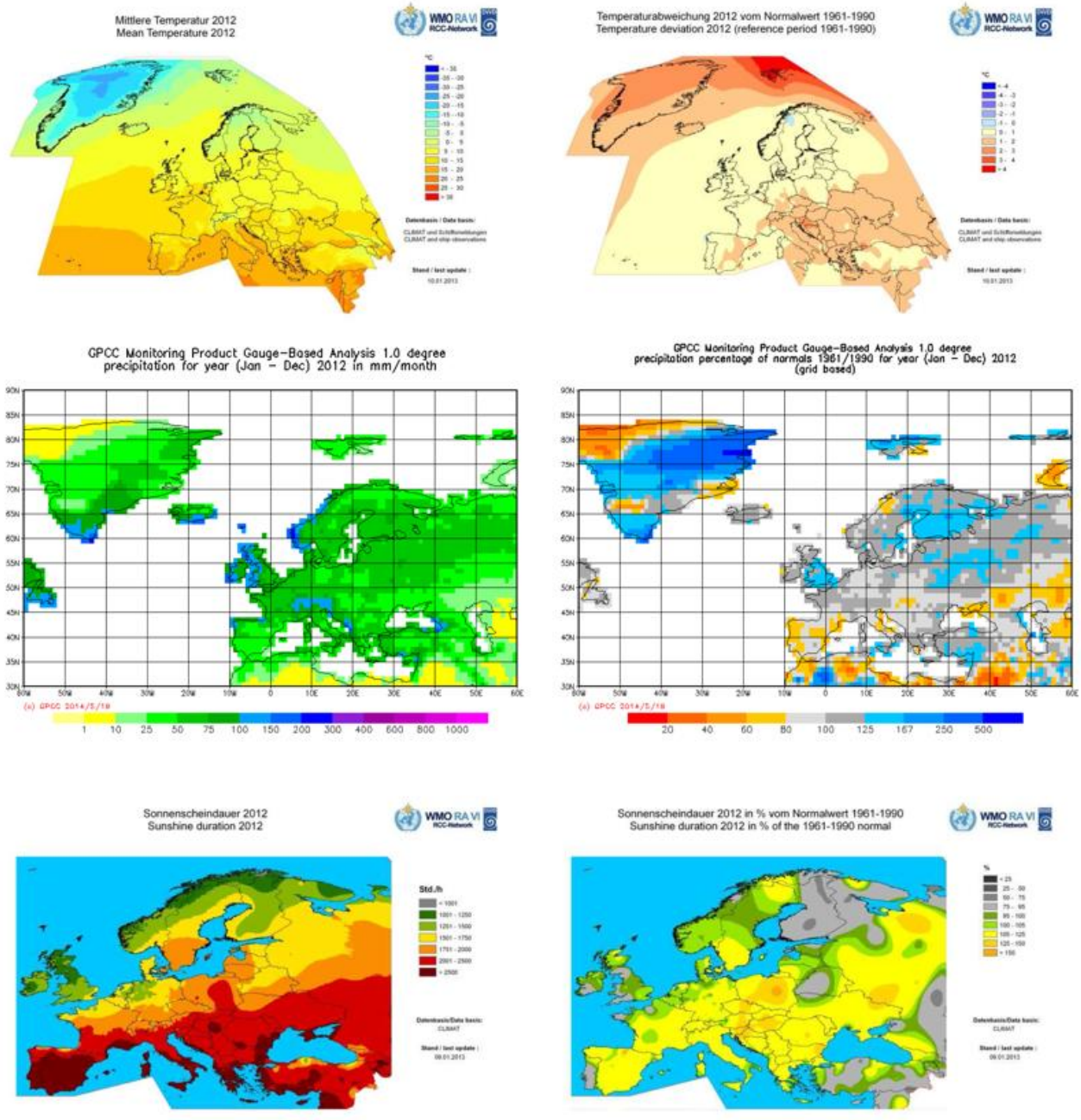


Fig. 2.3: *Means and anomalies (reference 1961-1990) of temperature, precipitation and sunshine duration in 2012*

Monthly and Annual Tables

Temperature and precipitation values and departures from their 1961-1990 means (CLIMAT Data)

WMO No.	Station	January 2012 Temp. (°C) mean	dev.	Prec. (mm) total	dev.	February 2012 Temp. (°C) mean	dev.	Prec. (mm) total	dev.
01001	Jan Mayen	0.5	6.2	64	4	-3.7	2.4	72	16
01008	Svalbard Airport	-3.4	12.0	53	39	-5.6	10.1	34	15
01025	Tromso	-3.1	0.9	12	-69	-2.5	1.2	93	7
01492	Oslo	-2.4	1.9	47	-2	-2.2	1.8	14	-22
02196	Haparanda	-9.2	2.9	55	11	-12.8	-1.5	62	30
02485	Stockholm	-1.0	1.8	42	3	-2.8	0.2	45	18
02836	Sodankyla	-12.5	2.6	33	2	-15.8	-2.2	44	19
02974	Helsinki	-5.0	1.9	84	43	-8.1	-1.3	52	21
03091	Aberdeen	3.9	1.2	48	-33	5.7	2.8	23	-28
03772	London	6.7	2.5	34	-18	4.9	0.4	17	-18
03967	Dublin Casement Aerodrome	6.0	1.6	63	-3	6.7	2.3	20	-31
04030	Reykjavik	0.4	0.9	145	69	2.6	2.2	135	63
04224	Egedesminde	-12.0	1.3	36	21	-13.1	2.4	23	8
06186	Copenhagen	2.6	2.1	80	29	0.1	-0.4	20	-11
06260	De Bilt	4.9	2.7	85	19	0.8	-1.7	20	-29
06447	Brussels	5.1	2.5	86	19	0.7	-2.8	30	-23
06590	Luxembourg	3.1	3.1	91	20	-1.5	-2.6	13	-49
06660	Zurich	2.0	2.5	87	20	-3.5	-4.4	10	-60
06700	Geneva	2.9	2.1	82	2	-2.1	-4.4	1	-80
07510	Bordeaux	7.1	1.3	53	-47	2.5	-4.6	6	-80
07650	Marseilles	7.8	1.1	14	-33	2.8	-5.1	2	-52
08222	Madrid	6.7	0.6	6	-40	6.2	-1.3	6	-38
08314	Mahon/Menorca	10.9	0.4	34	-32	7.7	-3.0	66	9
08495	Gibraltar	13.5	0.1	54	-67	12.3	-1.5	34	-66
08515	Santa Maria/Azores	15.3	0.9	57	-43	14.9	0.9	44	-42
08535	Lisbon	11.7	0.3	18	-92	11.0	-1.3	0	-111
10384	Berlin-Tempelhof	2.3	2.5	57	14	-1.3	-2.1	32	-2
11035	Vienna	2.6	3.6	91	53	-2.1	-3.1	27	-15
11518	Prague	1.0	3.4	37	14	-4.4	-3.6	8	-15
11903	Sliac	-2.4	1.5	57	13	-5.2	-4.1	18	-26
12375	Warsaw	-1.0	2.3	47	25	-6.1	-4.1	35	14
12843	Budapest	1.6	3.2	29	-3	-2.4	-3.5	20	-12
13274	Belgrade	2.2	1.8	87	38	-3.1	-5.8	62	18
14015	Ljubljana	1.6	2.7	28	-54	-0.8	-2.2	23	-57
14445	Split	7.5	0.1	27	-56	4.9	-3.2	36	-32
14654	Sarajevo	-1.3	-0.4	81	10	-4.9	-6.4	144	77
15420	Bucharest	-1.6	0.8	84	44	-6.5	-6.4	69	33
15614	Sofia	-2.2	-0.6	50	23	-3.8	-4.3	35	2
16158	Pisa	5.9	-0.2	15	-60	4.1	-3.0	14	-59
16597	Luqa	11.6	-0.6	67	-22	10.2	-2.2	133	72
16716	Athens	7.9	-2.3	31	-13	9.4	-1.2	82	39
17040	Rize	6.4	0.1	205	-18	4.2	-2.4	189	18
17062	Istanbul	5.0	-0.6	104	5	4.2	-1.7	93	26
17170	Van	-1.3	3.1	54	20	-3.4	0.4	44	11
17300	Antalya	8.7	-1.2	307	68	10.5	0.2	136	-60
17609	Larnaca	11.5	0.0	192	127	11.3	-0.4	39	-18
22113	Murmansk	-9.5	2.2	16	-17	-11.1	0.1	18	-4
26038	Tallinn	-4.7	0.8	72	27	-8.1	-2.4	39	10
26406	Liepaja	-1.1	1.9	92	46	-5.9	-2.9	61	30
26730	Vilnius	-3.9	2.2	63	22	-9.8	-5.0	41	3
26850	Minsk	-5.0	1.9	78	38	-10.5	-4.7	45	11
27612	Moscow	-6.8	2.5	58	13	-11.7	-4.0	36	-1
33345	Kiev	-4.0	1.6	57	10	-10.0	-5.8	33	-13
33815	Kishinev	-2.6	0.7	30	-10	-7.6	-5.9	42	4
34300	Kharkiv	-4.7	2.2	49	5	-10.5	-4.8	27	-5
34880	Astrakhan	-5.2	0.2	19	6	-11.9	-7.0	27	17
35108	Uralsk	-10.0	2.9	4	-21	-15.7	-3.2	7	-11
37545	Tiflis	2.7	1.0	2	-17	0.1	-2.8	23	-3
37789	Yerevan	0.5	3.7	13	-15	-3.7	-2.7	58	20
40080	Damascus	6.5	0.6	31	2	7.3	-0.6	20	-4
40103	Tripoli	12.0	-0.7	307	113	11.7	-1.5	183	56
40180	Tel Aviv	12.4	0.1	201	52	13.3	0.4	121	23
40199	Eilat	14.8	-0.4	1	-4	16.8	-0.1	0	-5
40265	Mafraq	6.9	-0.3	51	17	8.1	-0.6	39	8
60030	LasPalmas/Grand Canary	18.0	0.5	2	-15	17.0	-0.6	4	-18

WMO No.	Station	March 2012 Temp. (°C) mean	dev.	Prec. (mm) total	dev.	April 2012 Temp. (°C) mean	dev.	Prec. (mm) total	dev.
01001	Jan Mayen	-2.3	3.8	58	2	-4.5	-0.6	16	-25
01008	Svalbard Airport	-5.3	9.4	10	-11	-9.2	2.5	5	-7
01025	Tromso	-0.1	2.1	171	107	-0.1	-0.8	69	9
01492	Oslo	5.6	5.8	18	-28	4.9	0.3	73	31
02196	Haparanda	-2.5	4.3	28	-7	-0.6	-0.1	64	35
02485	Stockholm	4.4	4.3	18	-8	4.9	0.3	63	33
02836	Sodankyla	-5.4	3.1	30	5	-2.2	-0.1	51	27
02974	Helsinki	-0.3	2.6	37	3	3.8	0.9	58	21
03091	Aberdeen	8.6	4.1	15	-43	5.8	-0.5	122	69
03772	London	9.8	3.3	16	-31	9.1	0.2	98	53
03967	Dublin Casement Aerodrome	8.5	2.5	28	-21	6.6	-1.2	95	48
04030	Reykjavik	3.1	2.6	117	35	4.3	1.4	60	2
04224	Egedesminde	-17.3	-1.0	17	-1	-5.8	3.8	37	20
06186	Copenhagen	6.5	3.9	10	-32	7.2	0.6	26	-16
06260	De Bilt	8.3	3.3	20	-43	8.4	0.4	48	-4
06447	Brussels	8.9	3.4	33	-21	8.4	-0.4	104	47
06590	Luxembourg	8.5	4.5	19	-51	7.8	0.3	96	35
06660	Zurich	8.2	4.0	22	-47	9.0	1.2	59	-28
06700	Geneva	8.6	3.5	14	-65	10.2	1.4	112	47
07510	Bordeaux	11.4	2.6	31	-45	10.5	-0.8	179	107
07650	Marseilles	11.9	1.7	11	-33	14.2	1.0	51	3
08222	Madrid	11.9	1.9	22	-11	11.6	-0.6	61	7
08314	Mahon/Menorca	12.4	0.8	31	-24	14.8	1.5	35	-15
08495	Gibraltar	15.2	0.2	9	-66	15.9	-0.3	62	2
08515	Santa Maria/Azores	15.8	1.2	55	-24	15.9	0.7	23	-32
08535	Lisbon	15.5	1.8	59	-10	13.8	-1.3	62	-2
10384	Berlin-Tempelhof	8.0	3.8	9	-28	9.9	1.3	30	-11
11035	Vienna	8.5	3.5	30	-11	11.0	1.1	26	-25
11518	Prague	6.5	3.5	10	-18	8.8	1.1	46	8
11903	Sliac	5.4	2.4	2	-40	10.5	2.0	47	0
12375	Warsaw	4.7	2.7	21	-7	9.4	1.6	55	23
12843	Budapest	8.8	3.2	1	-28	12.5	1.4	20	-18
13274	Belgrade	9.9	2.7	2	-48	14.3	1.9	67	8
14015	Ljubljana	10.1	4.7	22	-76	11.4	1.5	128	19
14445	Split	13.7	3.3	1	-74	14.3	0.4	93	27
14654	Sarajevo	7.0	1.9	13	-57	10.3	0.9	117	43
15420	Bucharest	5.4	0.6	6	-32	13.7	2.4	44	-2
15614	Sofia	6.5	1.9	18	-20	11.9	2.0	60	10
16158	Pisa	10.9	1.4	18	-58	13.5	1.0	124	45
16597	Luqa	13.1	-0.3	58	17	16.2	0.7	22	-1
16716	Athens	12.7	0.1	13	-28	17.6	1.5	35	10
17040	Rize	5.5	-2.4	193	47	13.0	1.4	57	-45
17062	Istanbul	7.7	0.2	48	-14	15.2	3.2	82	33
17170	Van	-2.1	-3.0	78	36	9.2	1.9	42	-12
17300	Antalya	13.7	1.0	50	-53	17.2	1.1	44	-2
17609	Larnaca	13.0	-0.3	33	-16	17.7	0.3	9	-2
22113	Murmansk	-3.5	3.3	24	4	-0.3	1.6	29	8
26038	Tallinn	0.2	2.4	50	21	4.8	1.4	67	31
26406	Liepaja	1.9	2.1	20	-16	6.4	1.8	28	-7
26730	Vilnius	1.3	1.9	34	-5	7.7	2.0	68	22
26850	Minsk	1.0	2.4	39	-3	8.0	2.0	96	54
27612	Moscow	-3.1	-0.9	62	28	8.2	2.4	50	10
33345	Kiev	2.5	1.8	37	-2	11.8	3.1	82	33
33815	Kishinev	4.5	1.6	21	-14	13.3	3.1	15	-27
34300	Kharkiv	-0.5	-0.2	21	-6	13.7	4.8	10	-26
34880	Astrakhan	0.2	-1.1	22	8	16.3	5.2	<1	-18
35108	Uralsk	-5.7	-0.7	26	6	14.9	7.2	17	-2
37545	Tiflis	5.1	-1.8	9	-21	16.5	3.7	17	-34
37789	Yerevan	2.2	-2.9	8	-32	14.4	2.8	35	-15
40080	Damascus	10.2	-0.8	6	-11	18.6	3.1	2	-9
40103	Tripoli	13.0	-1.7	121	5	18.1	0.6	2	-54
40180	Tel Aviv	14.5	-0.4	78	16	19.7	1.5	0	-23
40199	Eilat	19.4	-0.6	<1	-4	25.9	1.7	0	-4
40265	Mafraq	10.2	-1.3	24	-5	17.9	2.1	<1	-10
60030	LasPalmas/Grand Canary	18.7	0.3	0	-10	18.7	0.0	6	0

WMO No.	Station	May 2012 Temp. (°C) mean	dev.	Prec. (mm) total	dev.	June 2012 Temp. (°C) mean	dev.	Prec. (mm) total	dev.
01001	Jan Mayen	-0.6	0.1	20	-20	2.4	0.6	7	-29
01008	Svalbard Airport	-2.4	1.3	17	11	3.9	1.7	7	-3
01025	Tromso	4.3	-0.6	118	70	8.8	-0.5	32	-21
01492	Oslo	12.3	1.5	58	6	13.7	-1.5	93	28
02196	Haparanda	6.4	0.3	59	28	11.8	-1.0	73	32
02485	Stockholm	12.2	1.5	20	-10	13.7	-1.9	160	115
02836	Sodankyla	5.9	0.9	31	-4	10.7	-0.9	72	16
02974	Helsinki	11.3	1.4	49	14	13.9	-1.0	100	56
03091	Aberdeen	8.9	-0.1	37	-22	10.8	-1.3	127	74
03772	London	13.9	1.4	25	-26	15.4	-0.3	111	60
03967	Dublin Casement Aerodrome	10.2	-0.3	64	6	13.1	-0.2	179	131
04030	Reykjavik	6.3	0.0	19	-25	10.7	1.7	14	-36
04224	Egedesminde	0.9	2.7	37	22	7.2	4.5	48	29
06186	Copenhagen	13.4	1.4	14	-29	14.1	-2.0	74	20
06260	De Bilt	14.5	2.2	84	23	14.9	-0.3	91	23
06447	Brussels	14.3	1.4	63	-8	15.4	-0.3	133	54
06590	Luxembourg	14.6	2.8	71	-10	15.2	0.3	116	34
06660	Zurich	14.2	2.1	111	8	17.5	2.3	197	73
06700	Geneva	15.1	2.1	76	-1	19.1	2.6	95	6
07510	Bordeaux	17.1	2.5	28	-49	19.4	1.6	65	9
07650	Marseilles	18.1	1.0	74	32	23.5	2.6	14	-14
08222	Madrid	19.2	3.2	34	-7	24.5	3.8	2	-24
08314	Mahon/Menorca	18.4	1.6	7	-30	23.6	2.8	<1	-14
08495	Gibraltar	19.2	0.7	12	-23	22.5	1.4	0	-11
08515	Santa Maria/Azores	17.6	0.9	139	109	19.9	1.2	43	21
08535	Lisbon	19.3	1.9	98	59	20.9	0.7	3	-18
10384	Berlin-Tempelhof	15.9	2.0	35	-21	16.8	-0.6	54	-21
11035	Vienna	17.0	2.4	38	-23	20.5	2.6	69	-5
11518	Prague	14.9	2.2	26	-51	17.0	1.1	37	-36
11903	Sliac	15.8	2.1	14	-50	19.0	2.4	100	15
12375	Warsaw	15.6	2.2	56	-3	17.3	0.7	63	-9
12843	Budapest	17.8	1.8	41	-14	21.7	2.6	52	-11
13274	Belgrade	17.7	0.5	128	57	24.5	4.4	16	-74
14015	Ljubljana	16.1	1.5	124	2	21.3	3.5	130	-25
14445	Split	19.2	0.8	58	2	26.1	3.9	26	-25
14654	Sarajevo	13.4	-0.7	145	63	21.6	4.7	12	-79
15420	Bucharest	17.4	0.7	233	163	22.7	2.5	26	-51
15614	Sofia	14.8	0.5	132	59	21.5	3.8	8	-64
16158	Pisa	15.8	-0.5	62	3	21.7	1.9	15	-29
16597	Luqa	20.3	1.2	<1	-7	25.6	2.6	0	-3
16716	Athens	21.8	1.2	22	6	28.6	3.5	0	-7
17040	Rize	18.5	2.7	50	-51	22.6	2.7	200	75
17062	Istanbul	18.2	1.7	53	22	24.7	3.6	7	-14
17170	Van	14.6	1.8	38	-12	18.6	1.0	8	-13
17300	Antalya	20.5	0.2	45	17	26.4	1.4	19	11
17609	Larnaca	21.4	0.5	30	23	26.0	1.7	<1	<1
22113	Murmansk	6.3	2.5	33	1	9.7	0.3	87	34
26038	Tallinn	10.8	1.1	53	16	12.6	-1.9	99	46
26406	Liepaja	11.2	0.9	55	15	13.6	-0.7	37	-9
26730	Vilnius	13.8	1.3	38	-24	14.9	-0.9	99	22
26850	Minsk	14.7	1.8	44	-18	15.5	-0.6	112	29
27612	Moscow	15.1	2.2	54	-4	17.1	0.5	91	15
33345	Kiev	18.1	3.0	42	-11	20.0	1.8	91	18
33815	Kishinev	19.1	3.0	65	14	23.3	3.9	20	-55
34300	Kharkiv	19.8	4.2	47	0	21.8	2.9	31	-27
34880	Astrakhan	21.8	3.5	2	-22	25.3	2.4	25	3
35108	Uralsk	18.7	2.6	17	-4	23.8	3.6	24	-13
37545	Tiflis	18.7	1.3	267	189	23.2	2.0	40	-36
37789	Yerevan	18.6	2.3	20	-39	23.6	3.0	19	-9
40080	Damascus	22.3	2.1	0	-4	27.5	3.1	0	0
40103	Tripoli	21.8	1.9	<1	-17	25.3	2.0	0	-1
40180	Tel Aviv	23.0	1.9	0	-3	25.9	1.9	0	0
40199	Eilat	30.0	1.6	0	-1	34.0	2.3	0	0
40265	Mafraq	21.1	1.3	0	-3	25.5	2.8	0	0
60030	LasPalmas/Grand Canary	21.8	1.9	0	-2	23.6	2.2	<1	<1

WMO No.	Station	July 2012 Temp. (°C) mean	dev.	Prec. (mm) total	dev.	August 2012 Temp. (°C) mean	dev.	Prec. (mm) total	dev.
01001	Jan Mayen	4.8	0.6	18	-29	5.9	0.9	32	-29
01008	Svalbard Airport	6.6	0.6	19	6	5.7	0.9	24	-1
01025	Tromso	10.8	-0.9	80	8	9.8	-1.1	29	-53
01492	Oslo	16.4	0.0	150	66	16.1	0.9	97	7
02196	Haparanda	15.1	-0.4	43	-7	13.4	0.1	47	-16
02485	Stockholm	17.8	0.6	61	-11	16.8	0.6	117	51
02836	Sodankyla	13.9	-0.2	53	-12	12.1	0.9	25	-38
02974	Helsinki	18.0	1.4	67	-6	15.5	0.5	71	-9
03091	Aberdeen	13.3	-0.5	97	37	14.3	0.7	86	11
03772	London	17.2	-0.6	72	26	18.9	1.5	36	-15
03967	Dublin Casement Aerodrome	14.3	-0.6	103	49	15.7	1.1	75	-3
04030	Reykjavik	12.4	1.8	36	-16	12.3	2.0	66	4
04224	Egedesminde	8.8	3.1	32	9	7.4	2.1	46	12
06186	Copenhagen	17.6	0.4	60	-9	18.2	1.2	32	-31
06260	De Bilt	17.3	0.5	91	16	18.5	1.8	92	21
06447	Brussels	17.3	-0.2	116	41	19.2	1.9	22	-41
06590	Luxembourg	17.0	0.1	140	72	19.2	2.8	40	-32
06660	Zurich	17.9	0.3	173	56	19.5	2.8	151	18
06700	Geneva	19.8	0.7	46	-21	20.7	2.5	82	3
07510	Bordeaux	19.8	-0.4	47	0	22.4	2.5	19	-35
07650	Marseilles	24.3	0.5	11	-3	25.6	2.4	9	-20
08222	Madrid	26.1	1.7	8	-5	26.9	3.0	<1	-9
08314	Mahon/Menorca	24.4	0.2	2	-2	26.6	2.1	<1	-26
08495	Gibraltar	25.0	1.3	1	0	25.2	1.0	0	-6
08515	Santa Maria/Azores	20.9	0.1	9	-16	22.0	-0.2	117	77
08535	Lisbon	21.9	-0.5	3	-2	22.8	0.0	10	4
10384	Berlin-Tempelhof	19.2	0.4	142	90	19.4	1.0	59	-2
11035	Vienna	21.5	1.8	130	67	21.6	2.7	41	-17
11518	Prague	18.6	1.1	112	46	19.4	2.4	63	-7
11903	Sliac	21.0	2.8	108	49	20.2	2.9	10	-59
12375	Warsaw	21.1	3.2	73	6	19.1	1.8	35	-28
12843	Budapest	24.1	3.2	83	31	23.7	3.4	3	-48
13274	Belgrade	26.7	5.0	39	-27	26.1	4.8	4	-48
14015	Ljubljana	22.7	2.8	113	-9	23.3	4.2	66	-78
14445	Split	29.2	3.8	6	-22	28.6	3.4	0	-50
14654	Sarajevo	23.2	4.3	37	-42	22.9	4.4	28	-43
15420	Bucharest	26.6	4.6	26	-38	23.2	2.0	51	-7
15614	Sofia	25.0	5.0	41	-15	22.8	3.4	45	-7
16158	Pisa	24.1	1.3	<1	-23	25.3	2.8	36	-21
16597	Luqa	28.5	2.6	<1	<1	28.6	2.3	<1	-7
16716	Athens	31.2	3.4	0	-5	30.5	2.9	0	-5
17040	Rize	25.2	3.0	105	-29	23.8	1.6	263	77
17062	Istanbul	27.4	4.2	2	-17	26.2	3.2	37	11
17170	Van	21.7	-0.2	3	-1	21.6	0.4	2	-2
17300	Antalya	30.2	2.1	0	-3	30.6	2.9	0	-1
17609	Larnaca	29.3	2.4	0	0	29.4	2.3	0	0
22113	Murmansk	12.3	-0.5	74	14	10.2	-0.8	23	-42
26038	Tallinn	17.7	1.4	121	42	15.2	-0.1	82	-2
26406	Liepaja	18.1	1.7	74	0	16.8	0.4	55	-25
26730	Vilnius	19.5	2.6	81	3	16.5	0.2	83	11
26850	Minsk	21.0	3.7	72	-16	17.5	1.0	94	22
27612	Moscow	20.9	2.8	52	-40	17.7	1.3	85	11
33345	Kiev	23.7	4.4	36	-52	20.4	1.8	115	46
33815	Kishinev	26.0	5.1	89	20	23.4	2.9	27	-18
34300	Kharkiv	24.7	4.4	19	-41	22.0	2.5	90	40
34880	Astrakhan	26.6	1.3	18	-5	26.8	3.5	3	-16
35108	Uralsk	24.6	2.1	35	-3	24.3	3.9	29	4
37545	Tiflis	24.6	0.2	100	55	25.9	2.2	9	-39
37789	Yerevan	24.8	0.2	36	22	26.9	3.0	0	-9
40080	Damascus	29.4	3.1	0	0	28.1	2.1	0	0
40103	Tripoli	28.5	3.5	0	0	28.8	3.2	0	-1
40180	Tel Aviv	28.7	3.0	0	0	28.9	2.8	0	0
40199	Eilat	35.5	2.6	0	0	34.7	1.9	0	0
40265	Mafraq	27.2	3.1	0	0	26.0	1.8	0	0
60030	LasPalmas/Grand Canary	24.5	1.2	0	0	25.6	1.5	0	0

WMO No.	Station	September 2012 Temp. (°C) mean	dev.	Prec. (mm) total	dev.	October 2012 Temp. (°C) mean	dev.	Prec. (mm) total	dev.
01001	Jan Mayen	3.3	0.4	77	-5	1.0	0.9	35	-48
01008	Svalbard Airport	3.0	2.5	25	2	-2.7	2.8	15	0
01025	Tromso	7.4	0.6	69	-25	2.9	0.0	78	-47
01492	Oslo	11.1	0.3	90	0	5.2	-1.2	129	45
02196	Haparanda	8.7	0.8	119	56	1.8	-0.7	80	16
02485	Stockholm	12.2	1.0	58	3	6.8	-0.7	72	22
02836	Sodankyla	6.9	1.0	98	43	-0.1	0.2	71	20
02974	Helsinki	11.7	1.7	150	77	5.7	0.3	85	12
03091	Aberdeen	12.3	0.6	55	-13	7.4	-2.5	105	28
03772	London	15.1	0.1	41	-10	11.2	-0.5	88	30
03967	Dublin Casement Aerodrome	11.9	-1.1	90	21	8.6	-1.7	84	16
04030	Reykjavik	7.3	-0.1	102	36	4.4	0.0	76	-10
04224	Egedesminde	4.6	2.2	61	27	0.5	2.7	72	46
06186	Copenhagen	14.2	0.6	56	-6	9.2	-0.7	53	-6
06260	De Bilt	14.2	0.2	57	-10	10.5	0.0	103	31
06447	Brussels	14.5	0.0	52	-7	11.1	0.2	119	49
06590	Luxembourg	13.9	0.5	62	-8	9.5	0.4	90	15
06660	Zurich	14.2	0.4	104	12	9.7	0.4	126	57
06700	Geneva	15.5	0.6	78	-3	11.2	1.1	50	-27
07510	Bordeaux	18.7	0.8	59	-15	14.5	0.5	116	28
07650	Marseilles	20.7	0.4	28	-19	17.3	1.2	118	40
08222	Madrid	21.2	0.7	76	46	15.0	0.2	44	-1
08314	Mahon/Menorca	22.6	0.4	28	-26	19.9	1.4	79	-5
08495	Gibraltar	23.0	0.2	129	114	19.3	-0.2	172	108
08515	Santa Maria/Azores	21.2	-0.2	120	63	19.2	-0.1	122	38
08535	Lisbon	22.6	0.9	58	32	18.0	-0.5	145	65
10384	Berlin-Tempelhof	15.5	0.9	26	-20	9.8	-0.2	30	-6
11035	Vienna	16.7	1.6	45	0	10.2	0.3	45	4
11518	Prague	14.1	0.8	55	15	7.6	-0.7	39	9
11903	Sliac	15.9	2.5	35	-21	9.3	1.0	134	84
12375	Warsaw	14.7	1.5	28	-15	8.2	-0.1	58	20
12843	Budapest	19.0	2.6	28	-12	11.5	0.6	65	31
13274	Belgrade	21.5	3.8	31	-20	14.5	2.1	45	5
14015	Ljubljana	17.0	1.5	227	97	11.7	1.3	223	108
14445	Split	22.9	1.5	109	48	18.3	1.4	144	65
14654	Sarajevo	18.0	2.9	90	20	12.0	1.6	91	3
15420	Bucharest	18.7	1.8	54	12	12.9	2.1	25	-7
15614	Sofia	18.9	3.1	48	9	13.8	3.4	40	3
16158	Pisa	20.9	1.4	60	-29	16.8	1.5	167	47
16597	Luqa	25.1	1.0	85	45	23.0	2.3	47	-43
16716	Athens	26.2	2.0	4	-6	22.7	3.4	12	-40
17040	Rize	21.8	2.4	111	-112	19.1	3.7	182	-91
17062	Istanbul	22.9	3.2	18	-23	20.0	4.7	38	-33
17170	Van	18.0	1.2	11	1	12.4	2.3	40	-8
17300	Antalya	26.1	1.6	<1	-11	22.3	2.7	105	35
17609	Larnaca	26.3	1.2	<1	<1	23.3	2.0	27	8
22113	Murmansk	7.9	1.2	73	21	1.9	0.9	80	38
26038	Tallinn	12.3	1.5	132	50	6.2	-0.1	101	31
26406	Liepaja	14.3	1.4	99	21	8.5	0.0	145	71
26730	Vilnius	12.9	1.3	45	-20	6.5	-0.1	78	25
26850	Minsk	13.6	1.9	31	-29	6.9	0.6	70	21
27612	Moscow	12.9	2.0	47	-17	6.5	1.5	138	80
33345	Kiev	16.2	2.3	32	-15	10.1	2.0	51	16
33815	Kishinev	19.2	3.0	39	-9	12.8	2.7	47	20
34300	Kharkiv	16.6	2.5	9	-32	11.0	3.7	117	82
34880	Astrakhan	18.4	1.1	26	0	13.3	4.2	16	-1
35108	Uralsk	14.5	0.4	19	-8	9.2	4.1	18	-12
37545	Tiflis	20.5	0.9	36	0	16.8	3.3	60	22
37789	Yerevan	22.0	2.2	7	-2	16.6	3.8	6	-25
40080	Damascus	25.4	2.2	0	-1	21.0	2.9	6	-6
40103	Tripoli	27.0	2.2	0	-4	23.4	1.2	78	7
40180	Tel Aviv	27.3	2.5	0	0	24.8	2.8	1	-25
40199	Eilat	32.3	1.9	0	0	29.0	2.3	7	3
40265	Mafraq	24.6	1.9	0	-1	21.7	2.6	4	-3
60030	LasPalmas/Grand Canary	24.4	0.6	8	0	23.6	1.1	37	27

WMO No.	Station	November 2012 Temp. (°C) mean	dev.	Prec. (mm) total	dev.	December 2012 Temp. (°C) mean	dev.	Prec. (mm) total	dev.
01001	Jan Mayen	-1.1	2.1	93	27	-2.1	3.1	42	-23
01008	Svalbard Airport	-6.4	4.1	13	0	-7.9	5.4	48	36
01025	Tromso	1.0	1.8	79	-25	-3.7	-0.7	7	-97
01492	Oslo	3.2	2.5	131	56	-5.1	-2.3	70	14
02196	Haparanda	-0.4	3.7	85	27	-11.8	-2.3	57	15
02485	Stockholm	4.6	2.0	58	5	-3.0	-2.0	66	20
02836	Sodankyla	-4.1	3.3	70	31	-14.5	-1.4	50	19
02974	Helsinki	3.2	3.1	63	-9	-6.7	-2.6	63	5
03091	Aberdeen	5.6	0.6	48	-27	3.4	-0.1	184	111
03772	London	7.8	0.6	72	17	6.0	0.9	96	39
03967	Dublin Casement Aerodrome	6.2	-0.5	80	10	5.2	-0.1	47	-30
04030	Reykjavik	1.5	0.4	86	14	1.2	1.4	112	33
04224	Egedesminde	-4.7	1.2	53	20	-6.6	3.2	25	1
06186	Copenhagen	6.8	1.3	46	-16	1.0	-1.2	57	-1
06260	De Bilt	6.8	0.9	41	-40	5.0	1.8	147	68
06447	Brussels	7.1	1.0	45	-31	5.1	1.6	173	97
06590	Luxembourg	5.4	1.6	69	-14	2.9	1.9	146	66
06660	Zurich	5.8	1.9	100	18	2.0	1.4	154	81
06700	Geneva	7.0	2.0	181	89	3.0	1.2	155	68
07510	Bordeaux	9.9	0.8	74	-20	8.4	2.0	170	71
07650	Marseilles	12.5	1.8	102	44	7.9	0.6	8	-48
08222	Madrid	9.9	0.5	63	-1	6.8	0.4	10	-41
08314	Mahon/Menorca	15.9	1.5	74	-3	12.3	0.5	11	-63
08495	Gibraltar	16.5	0.4	254	113	14.5	0.4	27	-119
08515	Santa Maria/Azores	15.9	-1.5	31	-71	15.9	0.5	73	-22
08535	Lisbon	13.6	-0.9	174	60	12.6	0.8	114	6
10384	Berlin-Tempelhof	5.9	1.0	51	2	1.1	-0.3	40	-13
11035	Vienna	6.9	2.3	21	-29	0.8	-0.1	52	9
11518	Prague	4.7	1.9	43	11	-0.4	0.2	47	21
11903	Sliac	6.2	3.2	53	-16	-3.9	-2.2	49	-8
12375	Warsaw	5.8	2.6	29	-13	-3.1	-2.2	31	-1
12843	Budapest	7.5	2.7	13	-39	-0.6	-1.0	55	15
13274	Belgrade	10.5	3.5	28	-26	1.9	-0.4	55	-3
14015	Ljubljana	8.8	4.2	156	21	0.8	0.8	98	-3
14445	Split	15.7	3.5	43	-65	8.5	-0.2	197	97
14654	Sarajevo	9.1	4.3	36	-55	0.2	0.4	135	71
15420	Bucharest	6.7	1.5	11	-38	-1.4	-1.6	104	61
15614	Sofia	7.6	2.6	10	-37	-0.8	-1.3	46	7
16158	Pisa	12.6	2.2	200	76	6.7	-0.1	134	49
16597	Luqa	19.4	2.4	62	-18	14.2	0.4	46	-66
16716	Athens	17.3	1.8	60	10	11.5	-0.7	99	28
17040	Rize	14.2	2.6	199	-51	9.5	1.2	298	60
17062	Istanbul	14.8	3.2	48	-41	8.4	0.3	158	36
17170	Van	7.2	3.2	26	-18	1.5	2.6	60	26
17300	Antalya	16.7	1.9	25	-109	12.9	1.5	545	318
17609	Larnaca	19.1	2.7	56	12	14.5	1.3	173	97
22113	Murmansk	-2.3	2.8	45	5	-12.1	-2.8	19	-19
26038	Tallinn	3.3	2.1	67	-1	-6.7	-3.8	53	-2
26406	Liepaja	5.8	2.1	71	-12	-3.1	-2.8	92	25
26730	Vilnius	4.1	2.9	74	17	-5.1	-2.2	61	6
26850	Minsk	3.6	2.8	61	9	-6.1	-2.3	65	12
27612	Moscow	1.6	2.7	89	31	-8.6	-2.5	49	-3
33345	Kiev	4.7	2.6	36	-15	-4.9	-2.6	133	81
33815	Kishinev	5.9	1.5	26	-13	-2.9	-2.6	102	64
34300	Kharkiv	3.6	2.3	14	-30	-5.1	-1.7	57	12
34880	Astrakhan	4.5	1.2	33	14	-3.8	-1.9	26	11
35108	Uralsk	1.5	3.6	31	-4	-8.6	-0.2	23	-6
37545	Tiflis	10.9	2.8	13	-17	4.2	0.4	31	10
37789	Yerevan	9.8	3.2	9	-21	1.6	1.1	59	33
40080	Damascus	14.3	2.5	13	-9	9.5	2.3	26	0
40103	Tripoli	18.1	-0.2	114	1	14.5	0.4	248	68
40180	Tel Aviv	20.5	2.5	122	54	15.7	1.9	104	-34
40199	Eilat	23.4	1.9	18	15	18.0	1.4	0	-6
40265	Mafraq	15.6	2.1	25	8	10.2	1.4	9	-19
60030	LasPalmas/Grand Canary	21.9	1.5	19	-2	19.4	1.1	3	-18

WMO No.	Station	Year 2012 Temp. (°C) mean	dev.	Prec. (mm) total	dev.
01001	Jan Mayen	0.0	1.0	534	-159
01008	Svalbard Airport	-2.0	4.0	270	87
01025	Tromso	3.0	0.0	837	-136
01492	Oslo	6.0	0.0	970	201
02196	Haparanda	1.0	0.0	772	220
02485	Stockholm	7.0	0.0	780	241
02836	Sodankyla	-0.0	0.0	628	128
02974	Helsinki	5.0	0.0	879	228
03091	Aberdeen	8.0	0.0	947	164
03772	London	11.0	0.0	706	107
03967	Dublin Casement Aerodrome	9.0	0.0	928	193
04030	Reykjavik	5.0	1.0	968	170
04224	Egedesminde	-2.0	2.0	488	214
06186	Copenhagen	9.0	0.0	528	-108
06260	De Bilt	10.0	1.0	879	74
06447	Brussels	10.0	0.0	976	176
06590	Luxembourg	9.0	1.0	953	78
06660	Zurich	9.0	1.0	1294	208
06700	Geneva	10.0	1.0	972	18
07510	Bordeaux	13.0	0.0	847	-76
07650	Marseilles	15.0	0.0	442	-103
08222	Madrid	15.0	1.0	333	-124
08314	Mahon/Menorca	17.0	0.0	368	-230
08495	Gibraltar	18.0	0.0	754	-21
08515	Santa Maria/Azores	17.0	0.0	833	58
08535	Lisbon	17.0	0.0	744	-9
10384	Berlin-Tempelhof	10.0	0.0	565	-19
11035	Vienna	11.0	1.0	615	8
11518	Prague	9.0	1.0	523	-3
11903	Sliac	9.0	1.0	627	-59
12375	Warsaw	8.0	1.0	531	12
12843	Budapest	12.0	1.0	410	-108
13274	Belgrade	13.0	2.0	564	-120
14015	Ljubljana	12.0	2.0	1338	-55
14445	Split	17.0	1.0	740	-85
14654	Sarajevo	11.0	1.0	929	11
15420	Bucharest	11.0	0.0	733	138
15614	Sofia	11.0	1.0	533	-30
16158	Pisa	14.0	0.0	846	-58
16597	Luqa	19.0	1.0	522	-32
16716	Athens	19.0	1.0	358	-11
17040	Rize	15.0	1.0	2052	-120
17062	Istanbul	16.0	2.0	688	-9
17170	Van	9.0	1.0	406	28
17300	Antalya	19.0	1.0	1277	211
17609	Larnaca	20.0	1.0	560	231
22113	Murmansk	0.0	0.0	521	43
26038	Tallinn	5.0	0.0	936	269
26406	Liepaja	7.0	0.0	829	139
26730	Vilnius	6.0	0.0	765	82
26850	Minsk	6.0	0.0	807	130
27612	Moscow	5.0	0.0	811	123
33345	Kiev	9.0	1.0	745	96
33815	Kishinev	11.0	1.0	523	-24
34300	Kharkiv	9.0	1.0	491	-28
34880	Astrakhan	11.0	1.0	218	-3
35108	Uralsk	7.0	2.0	250	-74
37545	Tiflis	14.0	1.0	607	109
37789	Yerevan	13.0	1.0	274	-93
40080	Damascus	18.0	1.0	104	-42
40103	Tripoli	20.0	0.0	1054	174
40180	Tel Aviv	21.0	1.0	627	60
40199	Eilat	26.0	1.0	27	-6
40265	Mafraq	17.0	1.0	153	-7
60030	LasPalmas/Grand Canary	21.0	0.0	80	-38

Seasonal and Annual Areal Means of Temperature Anomalies for each country (Reference: 1961-1990)

from gridded data (result of spatial analysis of CLIMAT and SHIP data)

Country	Winter 2011/2012	Spring 2012	Summer 2012	Autumn 2012	Year 2012
Albania	-0.9	1.2	3.1	2.1	1.2
Andorra	-0.8	1.5	2.0	0.6	0.8
Armenia	-0.4	1.1	1.5	2.1	1.2
Austria	0.3	2.3	2.3	1.2	1.4
Azerbaijan	-0.5	2.0	2.0	2.2	1.5
Belarus	0.5	2.0	1.4	1.8	0.8
Belgium	0.9	1.7	0.7	0.4	0.8
Bosnia and Herzegovina	-0.7	1.6	4.3	2.7	1.8
Bulgaria	-1.1	1.5	3.6	2.7	1.5
Croatia	0.3	2.0	3.9	2.3	1.9
Cyprus	-0.1	0.3	2.2	2.1	1.2
Czech Republic	0.6	2.3	1.9	1.0	1.2
Denmark	1.6	2.0	0.2	0.6	0.7
Estonia	1.3	1.6	0.1	1.4	0.4
Faroer Islands	0.9	0.4	-0.4	-0.1	0.2
Finland	2.7	1.4	-0.1	1.5	0.4
France	0.2	1.5	1.0	0.5	0.7
Georgia	-0.9	1.0	1.8	2.5	1.2
Germany	0.9	2.2	0.9	0.4	0.9
Greece	-1.1	1.1	3.2	2.3	1.3
Greenland	1.7	1.3	2.0	2.5	2.1
Hungary	0.2	1.9	3.1	2.0	1.5
Iceland	1.1	1.4	1.1	-0.1	1.1
Ireland	1.5	0.7	-0.1	-0.9	0.3
Israel	-0.2	0.8	2.4	2.1	1.5
Italy	-0.3	1.5	2.8	1.5	1.3
Jordan	-0.7	0.7	2.2	1.7	1.2
Kazakhstan	-1.4	3.0	2.6	2.3	1.5
Latvia	0.8	1.6	0.3	1.5	0.5
Lebanon	-0.3	1.0	3.0	2.2	1.6
Liechtenstein	-0.7	2.5	2.6	1.0	1.3
Lithuania	0.5	1.7	0.7	1.5	0.6
Luxembourg	1.1	2.3	1.0	0.7	1.2
Macedonia	-1.1	1.3	3.6	2.6	1.5
Malta	-0.8	0.6	2.5	1.9	1.1
Moldova	-0.8	2.5	3.9	2.4	1.5
Montenegro	-1.2	1.1	4.2	2.7	1.6
Netherlands	1.1	1.8	0.6	0.2	0.8
Norway	3.8	2.0	0.1	1.2	1.4
Poland	0.4	2.0	1.5	1.1	0.8
Portugal	-0.3	0.8	0.6	0.1	0.4
Romania	-0.6	1.4	3.8	2.2	1.4
Russia	1.6	1.7	1.3	2.2	1.0
Serbia	-0.8	1.5	4.2	2.8	1.7
Slovakia	-0.1	2.0	2.5	1.9	1.3
Slovenia	0.8	2.2	3.2	2.1	1.9
Spain	-0.4	1.3	1.8	0.5	0.8
Svalbard	8.5	4.0	0.8	3.4	4.1
Sweden	2.1	1.6	-0.5	0.6	0.4
Switzerland	0.1	2.3	2.2	1.2	1.4
Syria	-0.7	0.8	2.3	1.9	1.3
Turkey	-1.2	0.3	1.9	2.3	0.9
Ukraine	0.0	2.5	3.0	2.5	1.5
United Kingdom	1.3	1.0	0.1	-0.4	0.4

Seasonal and Annual Areal Means of Temperature Anomalies for each subregion (Reference: 1961-1990)

from gridded data (result of spatial analysis of CLIMAT and SHIP data)

Region	Winter 2011/2012	Spring 2012	Summer 2012	Autumn 2012	Year 2012
Central and western Europe	*-0.9*	*1.2*	*3.1*	*2.1*	*1.2*
Nordic and Baltic countries	*-0.8*	*1.5*	*2.0*	*0.6*	*0.8*
Iberia	*-0.4*	*1.1*	*1.5*	*2.1*	*1.2*
Mediterranean. Italian and Balkan Peninsula	*0.3*	*2.3*	*2.3*	*1.2*	*1.4*
Eastern Europe	*-0.5*	*2.0*	*2.0*	*2.2*	*1.5*
Middle East	*0.5*	*2.0*	*1.4*	*1.8*	*0.8*

Annual Extreme Values

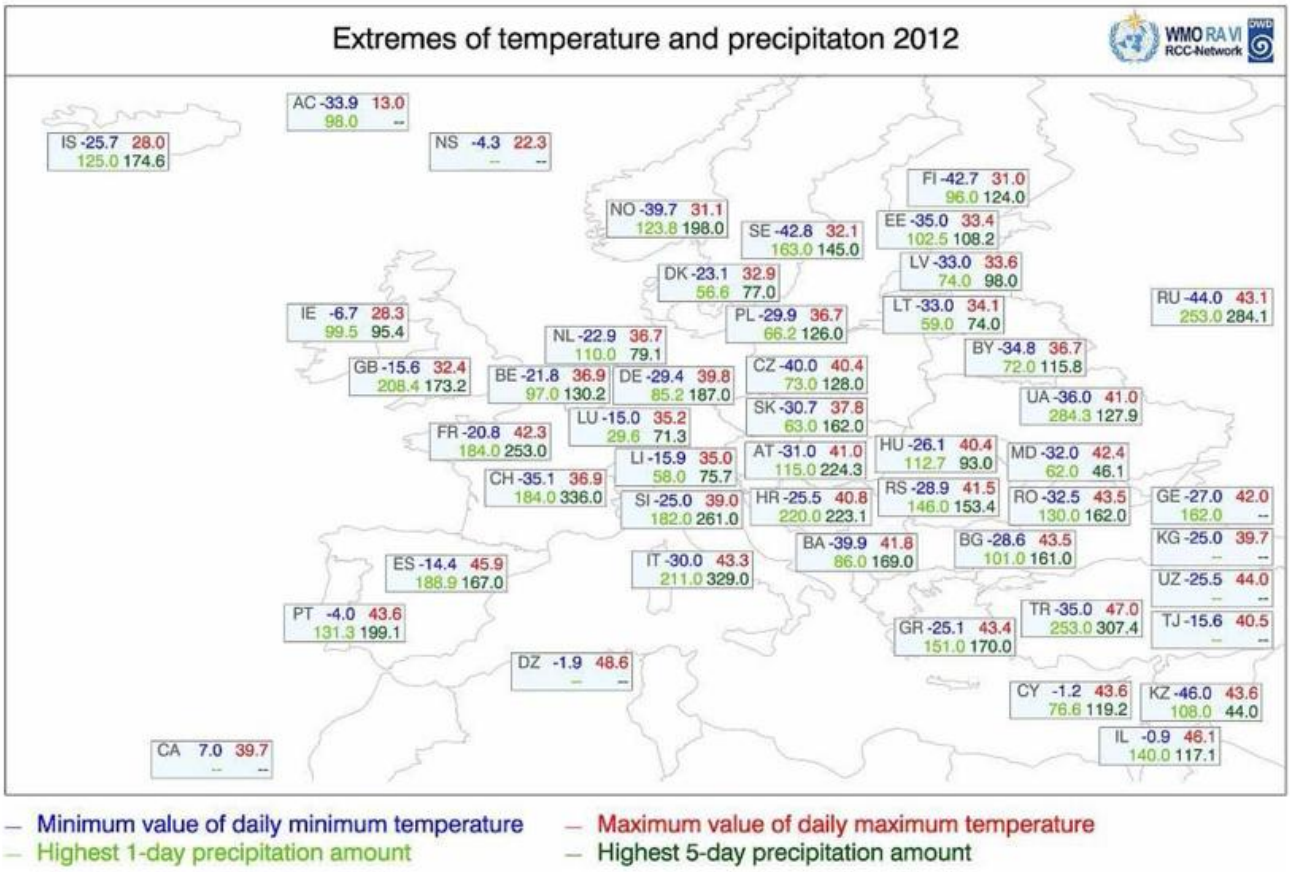


Fig. 2.4: *Annual extreme values for each country: highest daily precipitation total (mm), highest 5-daily precipitation total (mm), highest daily maximum temperature (°C) and lowest daily minimum temperature (°C) 2012*
Data (by order or priority) from reports of NMHSs, GPCC, ECA&D or SYNOP

In Fig. 2.4 the absolute annual extremes for 2012 of temperature (minimum and maximum), daily precipitation total and 5-day precipitation total for each country are given. Sources of this map are by order of priority:

- the reported values by NMHSs
- ECA&D data
- SYNOP data

.

The countries are represented by their Internet country codes.

In 2012 some new records were observed.

Temperature:

The year 2012 was in Europe overall warmer than the normal. Remarkable is the positive anomaly in the Arctic with anomalies of +3 K around Spitzbergen and north of it. But also the southern central Europe, the eastern Iberian Peninsula, the Balkan Peninsua, the central and the eastern Mediterranean Sea, Middle East, southern Russia and the Caucasus region had positive anomalies of 1 to 2 K. The European annual mean of the daily temperature 2012 was 10.6°C +/-0.91 compared to the mean over the normal period 1961-1990 of 9.8°C. Thus 2012 became the rank of 11 for the time series since 1950. The mean daily mmaximum temperature was on rank 12 with 15.5°C +/- 0.87 and the mean daily minimum was on rank 9 with 6.0°C +/-0.91. So for 2012 the night temperatures on the average were relatively warmer than the normal than the daytime temperatures and the daily means. These values are the result of the E-OBS dataset where 'Europe' is defined as the land area within 35°N - 75°N and 25°W - 45°E (van der Schrier, G., 2013; see also: Climate Indicator Bulletin: European Temperature). This area does not completely cover the WMO RA VI area. The highest mean annual anomaly is calculated for the subregion 'Eastern Europe' with + 1.5 K, closely followed by the subregion 'Mediterranean, Italian and Balkan Peninsula' with + 1.4 K. 'Iberia' and 'Central and western Europe' had a positive anomaly of 1.2 K and 'The Nordic and Baltic countries' as well as 'Middle East' had a positive anomaly of +0.8 K (see table of seasonal and annual means of anomalies of temperature).

Note: *Small differences between the areal temperature anomalies in the tables on pages 21 and 22 and according values given by individual countries may occur due to the calculation method. The anomalies result from the temperature analysis (see RCC-CM: Products - Monitoring Europe - Temperature).*

Details for individual countries or stations are as following:

- In the capital Nuuk on Greenland, the annual mean temperature was 0.1°C, which is 1.5°C warmer than normal (normal -1.4°C), but only 0.2°C warmer than the 2001-2010 average. The highest temperature 20.3°C occurred in July and the lowest temperature -22.3°C in March.
- 2012 the 2nd highest mean temperature at Svalbart Airport since 1912, after 2006.
- In Germany 2012 reached rank 16 of the warm years since 1881.
- In Switzerland 2012 was on rank 9 of warm years since 1864.
- In Austria the year 2012 was the seventh warmest since the start of low land temperature measuring in the year 1767.
- In Hungary on the base of the homogenized, interpolated data this year has been the 4th warmest since 1901 (behind years 2007, 2000 and 2008).
- For the first time excess of the mean annual temperature by 2 C° was recorded in southern Ukraine.
- According to the Meteorological Station of Chisinau (observation period 118 years), the average temperature for the year was +11,2°C (1,7°C to above normal) and took fourth place in the ranked list of high average annual temperatures.
- The year 2012 has been the 13th warmest year in Spain since 1961.
- Also in Slovenia 2012 ranked among the few warmest years ever.
- In Israel 2012 was one of the warmest in the last 60 years, yet it lagged far behind 2010.
- 2012 was the 10th warmest year over Armenia since 1929.
- In Sweden the national averaged mean temperature was slightly above the reference value for 1961-90, but still it was the second coldest year so far this century.
- In the 21st century year 2012 was the second coolest in Latvia.
- In Denmark out of the last 25 years in Denmark, 22 years including 2012 have been warmer than normal (1961-90).

Precipitation:

The annual precipitation totals of 2012 were overall close to normal. The existing positive or negative anomalies were small. They show generally a zonal pattern with positive anomalies north of 50°N on Greenland and the Arctic, in England and Wales, southern Sweden, Finland, the Baltic states, Belarus and partly Russia and negative anomalies on the Iberian Peninsula and southern France, Italy, Hungary and the northeastern Black Sea region and Middle East.. The southeastern Mediterranean region had partly positive anomalies. Absolute positive as well as negative anomalies did not ecxeed 30 mm generally, with a spatially limited exception in northern Portugal. But on shorter timescales of with respect to special aspects some noteworthy peculiarities occurred:

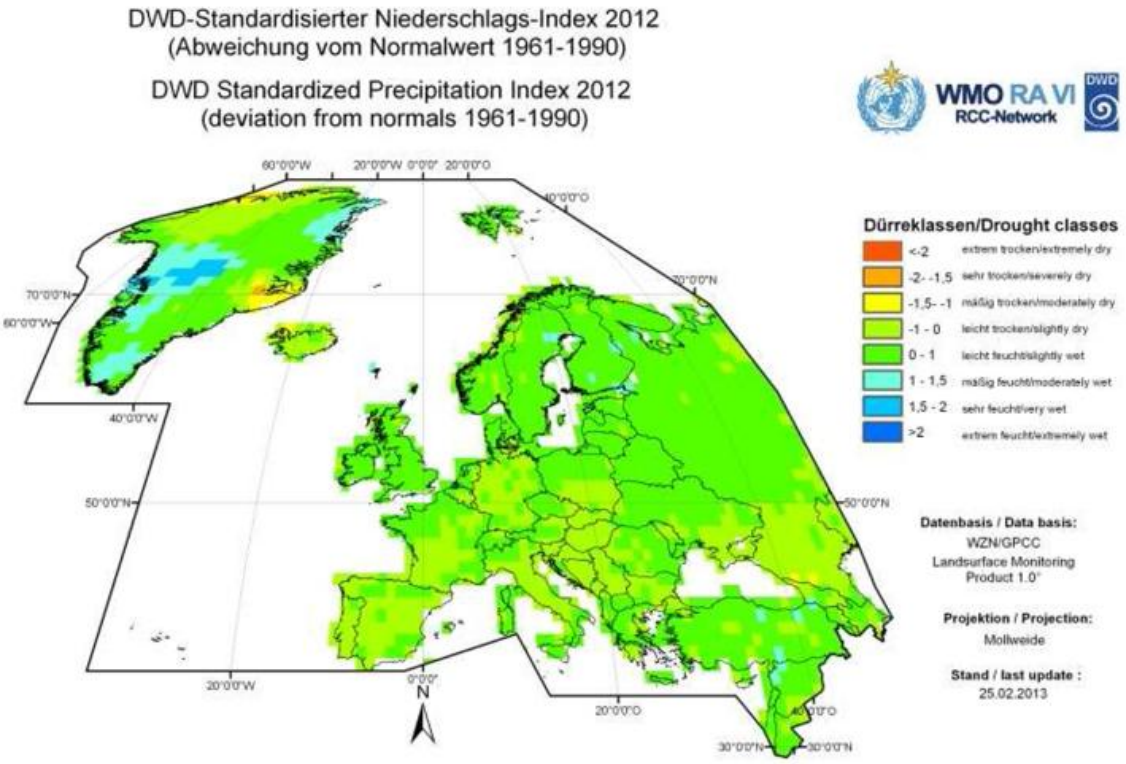
- It was the second wettest year since measurements started in 1890 in Nuuk on Greenland. Precipitation in Nuuk was 1.211 mm against the normal 752 mm, 459 mm or 61% above normal. The wettest year was 2005 with 1.221 mm.
- Year 2012 was the third rainiest in Sweden during the last 150 years. Some stations in central and northern Sweden with more than 150 years of measurements reported new all-time records for highest annual precipitation amount.
- The national average precipitation in 2012 is the highest in Finland since the start of the gridded precipitation data set in 1961, this means since at least 50 years.
- With a yearly precipitation amount of 832 mm (127% of normal) the year 2012 was the 4th wettest in the last 90 years and the second wettest in the 21st century in Latvia.In 2012, in ten months of twelve, the precipitation amount was above normal. The precipitation from December 2011 to July 2012 was continuously above normal (Fig.4). Such a long precipitation-rich period (8 months) was recorded for the first time in Latvia's precipitation measurement history .
- The year 2012 in Estonia was the wettest in 50 years.
- UK annual rainfall total of 2012 was 1331mm (121% of average), the second highest in the series, narrowly beaten by 2000 (1337mm).
- With an excess of 11 % to the average of 1961-1990 the year 2012 was one of the wettest since the last 35 years (stdev 9%) in Austria. In the alpine regions the deviation to the long term mean was 22%. So the year 2012 was here the wettest year since 1966.
- 2012 was again a very dry year in Hungary, the ninth-driest since records began in 1901.
- Moldova had a significant insufficient precipitation in June - September
- The rainfall amount was the highest ever recorded for a calendar year since 1902 in Cyprus.

Sunshine:

2012 was a sunny year in most of the European continent. The sunniest region was eastern Poland where locally a surplus of more than 150 % was achieved. Absolutely in the southeast the anomalies exceeded 400 hours. Dull were Finland and northern Russia, Belarus, southern Russia and Middle East as well as partly England, Ireland and Portugal. The following noteworthy peculiarities were reported:

- Hungary experienced its highest annual sunshine duration. Both the national average record (2404 hours) and the station record (2645 hours) were broken in 2012.
- The year 2012 was the sixth sunniest year in Austria since the beginning of the Austrian sunshine series in 1884.
- It was the 14th sunniest year in Germany since 1951.
- In Ljubljana, Slovenia, 2012 was the sunniest year ever.

Drought



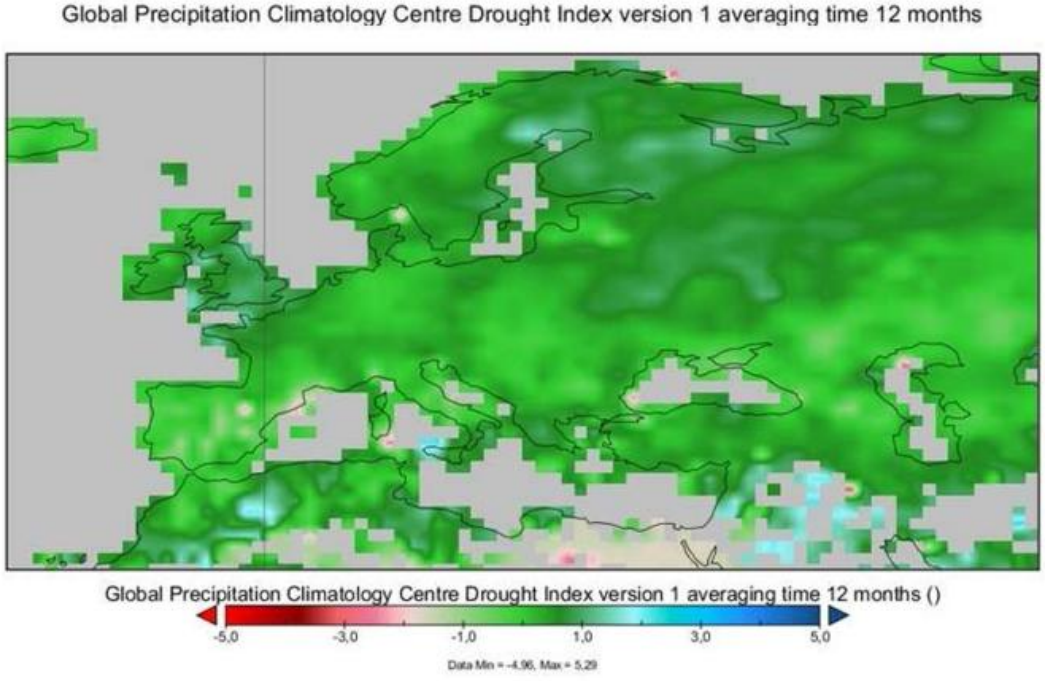


Fig. 2.5: *Annual anomalies of the modified Standardized Precipitation Index (DWD-SPI) and 12-month GPCC-Drought-Index 2012*

Drought Situation:

Over the year 2012 the anomalies of the mean 1-month DWD drought index shows slightly higher dryness than normal on the Iberian Peninsula and southwestern France, Germany, Italy, the northern Balkan Peninsula and southeastern central Europe as well as southern Russia and southeastern Ukraine. The 12-month GPCC drought index shows a very similar pattern with some higher dryness for the Iberian Peninsula.

Reports on longer lasting dry periods from the countries:

- Overall ist was the 8th driest year since 82 years in Portugal. In 2012 mainland Portugal was characterized by a drought situation, that started in the end of 2011 and remained for almost the entire year of 2012. The period with the highest drought intensity was in late winter and early spring (months of February and March), with almost the whole territory in the most intense classes of PDSI index, severe and extreme classification. For instance Portugal had precipitation totals for the period October 2011 to February 2012 mostly below 75 percent of the 1971-2000 reference (Boletim climatologico mensal - fevereiro 2012)
- Spain had well below 100 percent, mostly below 75 percent and partly below 50 percent of the normal precipitation for the period 01 September 2011 to 10 April 2012 (http://www.aemet.es/es/serviciosclimaticos/vigilancia_clima/balancehidrico).Spain reported the lowest precipitation total since 1947 for the 3-month period January to March and the driest summer season since 60 years.
- 2012 was also a very dry year in Hungary, the ninth-driest since records began in 1901. November 2011, March and August 2012 were the driest November, March and August on record. Furthermore the eleven-month period ended in September 2012 was the driest November-September period ever.
- Lack of precipitation was observed in the first 3 months of the year in Slovenia. On the coast drought persisted also during spring. Severe drought was observed in summer, it was the most pronounced on the coast.
- In the Ukraine in May, June and July the southeastern part of the country experienced long periods (up to 3 months) without rain against a background of high-temperature. Such conditions led to fierce drought.
- In Moldova precipitation deficits during June - September 2012 on the whole territory of the Republic of Moldova, contributed to the preservation during a long period of atmospheric and soil drought, attributing it to the category of very strong, as noted in an average of once in 20 years. Taking into account the affected area, the drought of 2012 is classified as a catastrophic one. This coincides well with the anomalies of the 6-month SPI and the anomalies of the maximum number of consecutive dry days (with RR < 1 mm) by ECA&D for 2012.
- In Armenia during a 4-month period (from August till November) the country experienced a severe shortage of rainfall which varied within the range of 30 to 60% of normal values.

Snow Cover

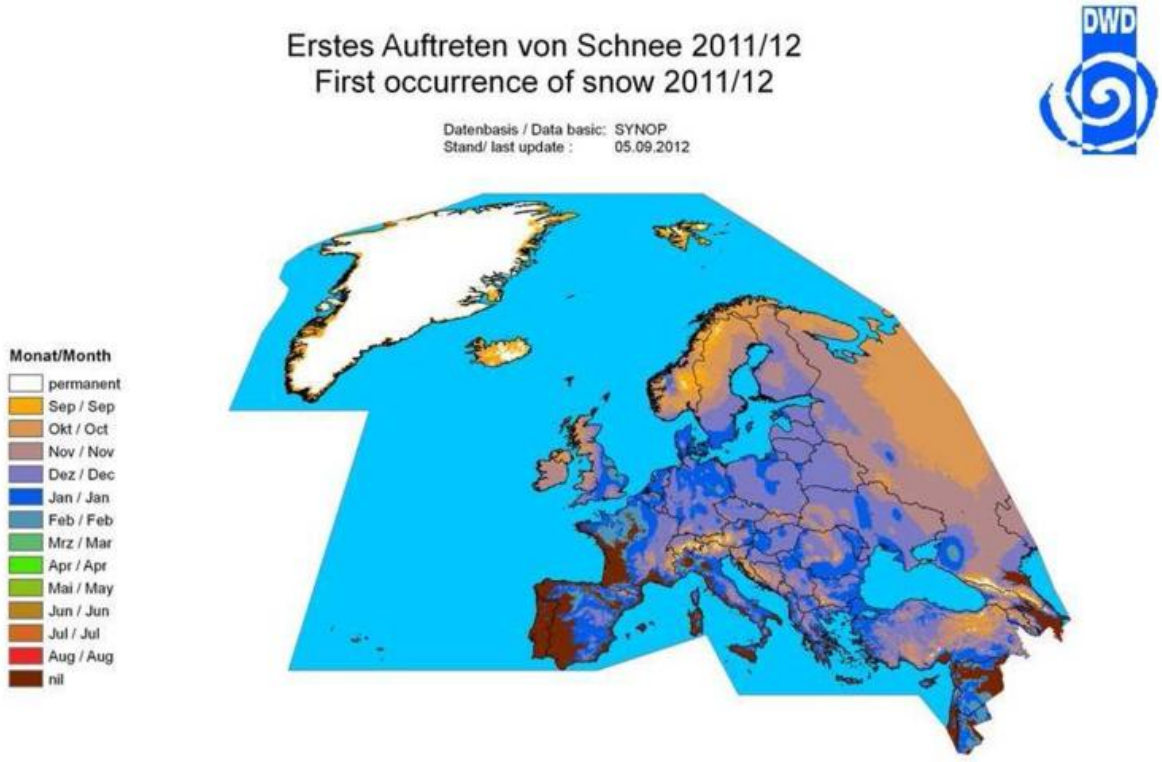
Fig.2.6 to 2.8 show the maps of first occurrence of snow, last occurrence of snow and duration in the snow period for Europe September 2011 to August 2012 on the basis of SYNOP reports and their anomaly referring to the last 30 years (1981/82-2011/12). Snow fell earlier than on average on most of the continent except the British Isles and northern France and parts of the Mediterranean region, southeastern Sweden and southeastern European Russia and Middle East. The snow season ended on the other hand earlier than on average in eastern central Europe, southeastern Sweden, parts of the Italian and Balkan Peninsula, Middle East and southern Russia. Over most of European Russia as well as in the higher mountains of Georgia the snow continues until the first decade of April. So overall the snowseason 2011/2012 was shorter than on average in most of Europe.

The snow cover extent for the entire Northern Hemisphere is operationally evaluated from satellite images by Rutger's Laboratory (see: 2012 Annual Report). The time series for annual snow extent covers 43 years, on a monthly basis up to 47 years. The annual snow cover extent over the Northern Hemisphere ranked 2012 as having the 12th least extensive cover on record (for 43 years). For Eurasia it was on rank 15 of the largest snow covered area resp. rank 29 of the least extensive cover. February 2012 on rank 3 of the most extensive snow covered area of 46 February months and December 2012 on rank 2 of the most extensive snow covered area of 47 December months were the most remarkable months of the year 2012.

More information about snow conditions may be found on the RCC-CM-Webside (RCC-CM).

Peculiarities as reported by the countries:

- In Russia Yekaterinburg received as little as 14mm of precipitation in February for the entire winter. This is the second time, when such low-snow winter is recorded for 120-year observations.
- In Latvia on 27th October snow height in some parts of Eastern Latvia was up to 35 cm. Such thick snow in October in Latvia is rare - on average once every 20 years.
- In Georgia the unprecedented maximum snow depth (354sm) was recorded in Khulo (Ajara) in March.
- In Slovenia it was snowing in most of the lowland already in the last third of October, but in December it was snowing also on the coast, where the snow cover depth reached 11 cm, which is a quite rare phenomenon on the coast.



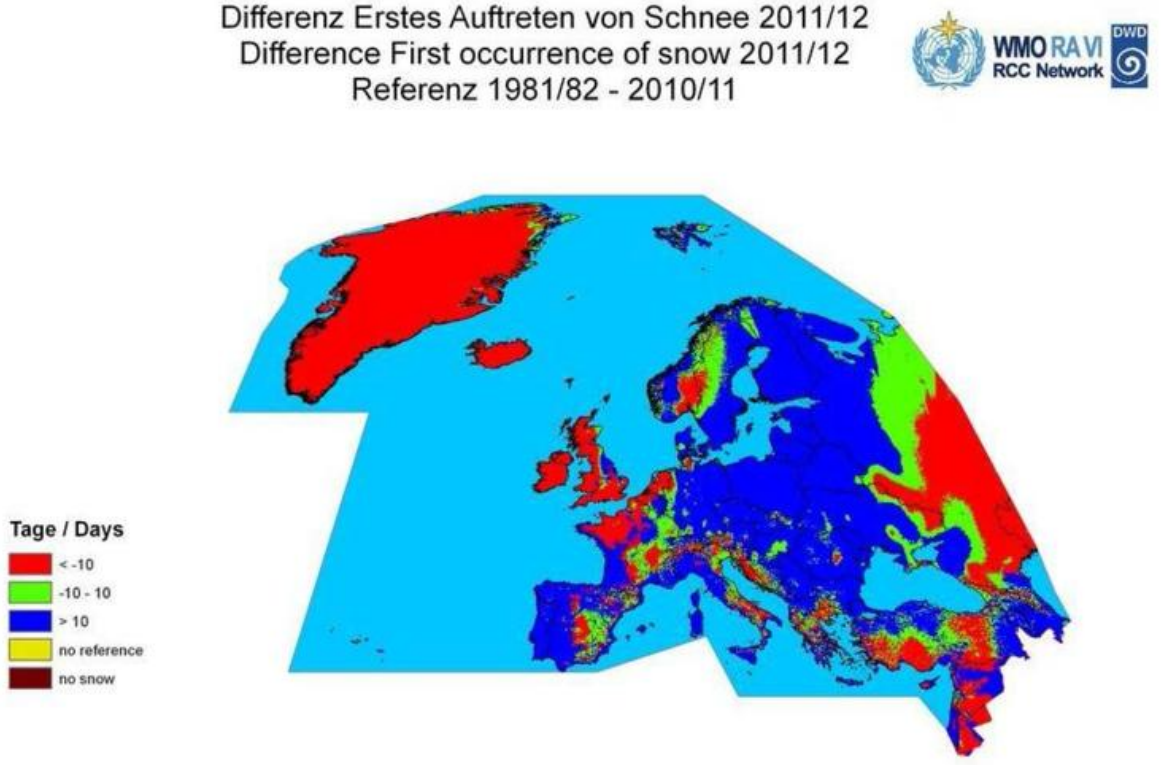


***Fig. 2.6**: Upper Figure: Map of first occurrence of snow during the snow-season 2011/2012*
Lower Figure: Map of anomaly of first occurrence of snow (reference 1981/1982 - 2010/2011)

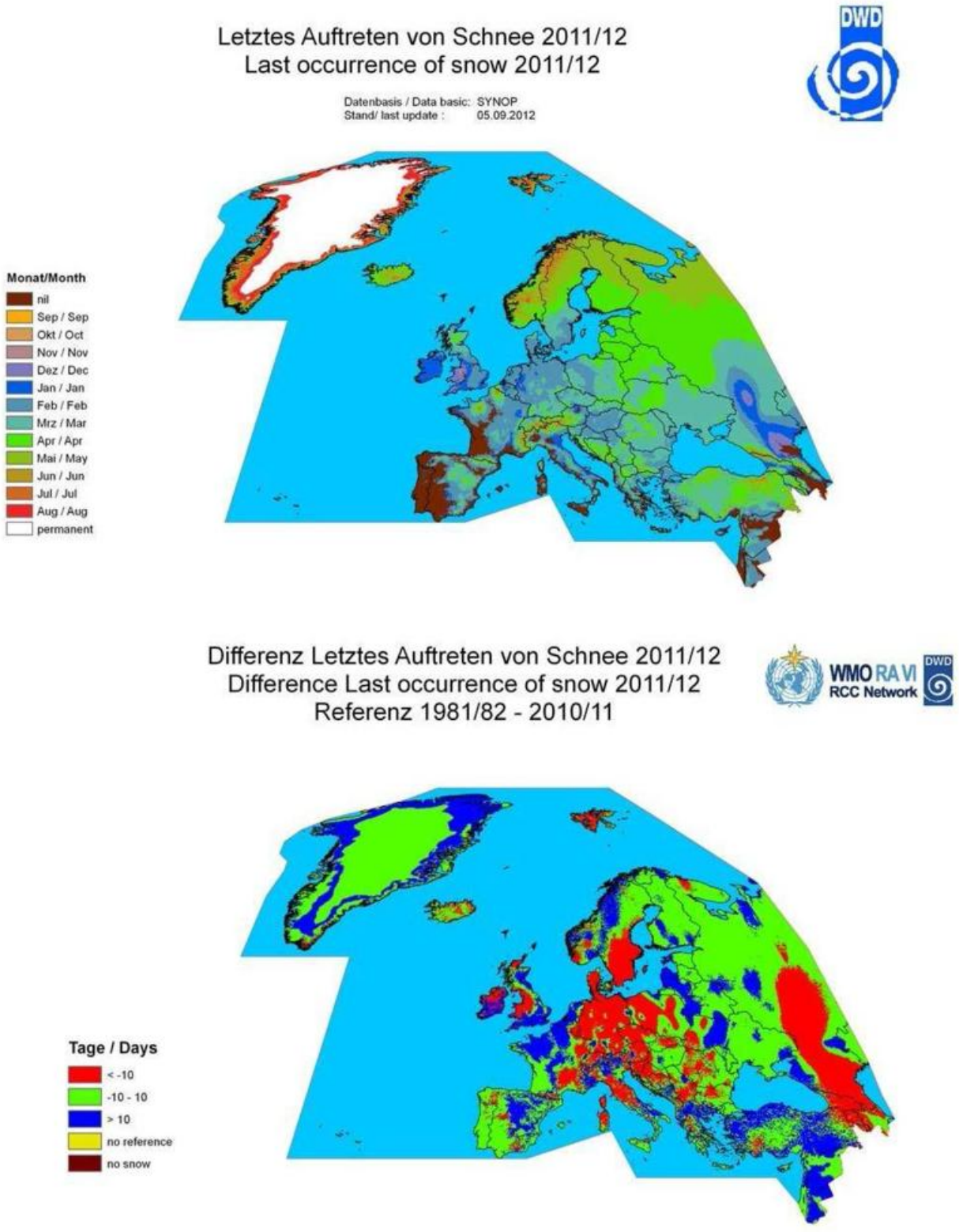


Fig. 2.7: *Upper Figure: Map of last occurrence of snow during the snow-season 2011/2012*
Lower Figure: Map of anomaly of last occurrence of snow (reference 1981/1982 - 2010/2011)

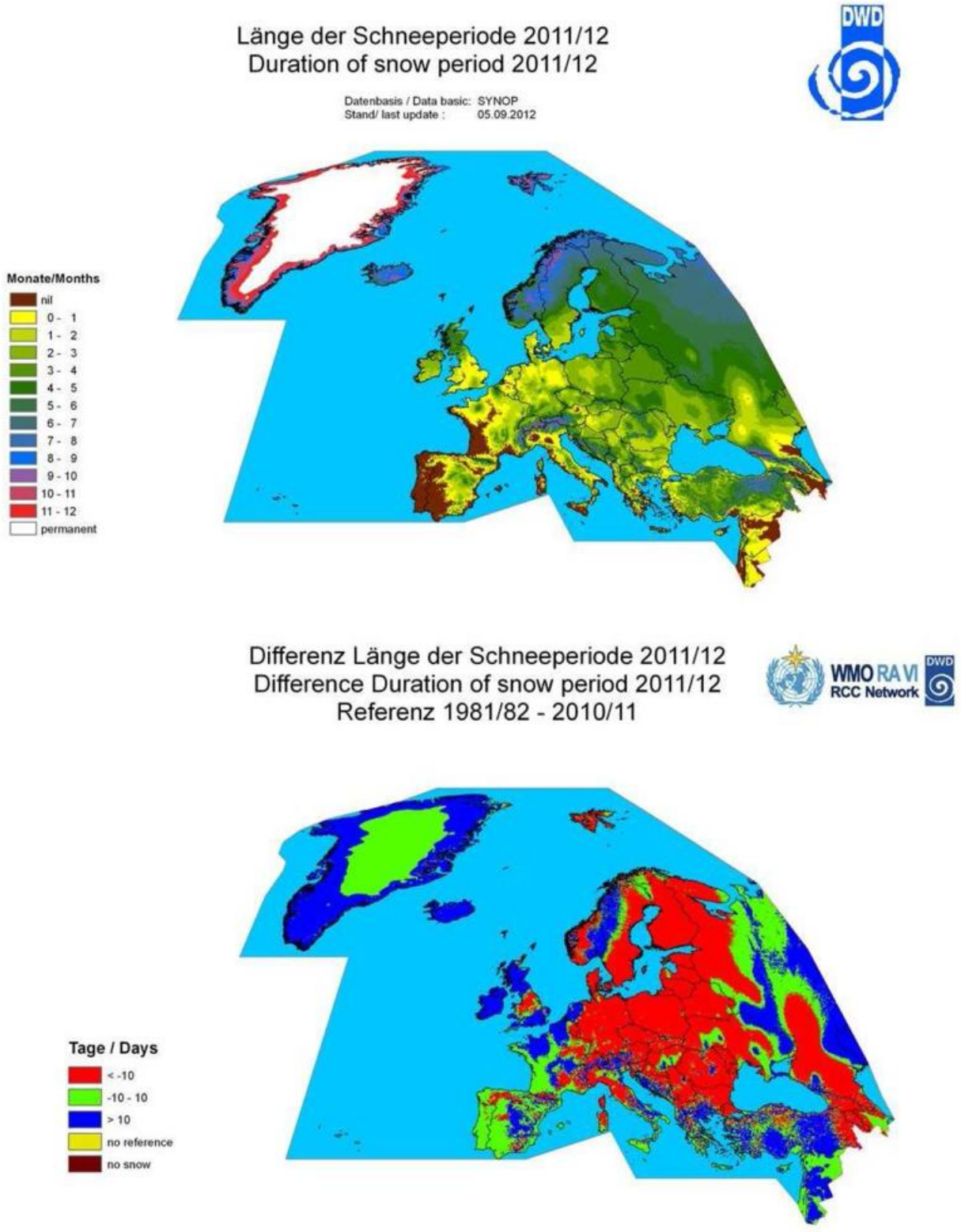


Fig. 2.8: *Upper Figure: Map of duration of snow cover in the snow-season 2011/2012*
Lower Figure:Map of anomaly duration of snow season (reference 1981/1982 - 2010/2011)

Temporal Evolution of Climate Elements

On the following pages graphs of long time series of temperature, precipitation and sunshine duration as provided by the NMHSs are presented to give an overview of the temporal development of the basic climate elements. The graphs are grouped with respect to the 6 subregions defined above (Fig. 1.1). The table below informs about the lengths of the time series shown as well as whether they refer to spatial means of the country or single stations. Most time series are temperature time series. Each subregion is at least represented by one country. Time series of precipitation totals are fewer but including a time series of the maximum daily precipitation total for the Upper Galilee in Israel there is as well each subregion represented with at least one time series for precipitation. Diagrams of long-term annual sums of sunshine duration are provided by 4 countries and they belong to the 4 subregions 'Central and western Europe' and 'Nordic and Baltic countries' Mediterranean, Italian and Balkan Peninsula and Eastern Europe. Some countries contributed time series which were not available in 2011. Other time series that were available in 2011 are not available in 2012 on the other hand. So for Iceland a series of annual mean temperature since 1798 is now available for the station Stykkisholmur.

Following this section, trend maps representative for the elements temperature and precipitation are shown. As reference period for these trend maps 1951-2012 was chosen. After this, we present examples of the temporal developent of other temperature related phenomena,such as the sea surface temperature in the North Sea and sea level anomalies at the Polish station Wladyslawowo.

Start of long-term time series of Temperature, Precipitation and Sunshine Duration

	Temperature		Precipitation		Sunshine Duration	
Country	Spatial Mean[1]	Single Station	Spatial Mean	Single Station	Spatial Mean	Single Station
Armenia	1929					
Belgium		1833				
Denmark	1873		1873		1920	
Finland	1900					
Faroe		1873				
Georgia	1961		1961			
Germany	1900		1900		1951	
Greenland		1873				
Iceland		1798				
Italy	1961		1951			
Israel	1951		1949			
Latvia	1924		1924			
Lithuania	1961	1778				
Norway	1900		1900			
Poland	1951					
Portugal	1931		1931			
Russia	1939		1966		1961	
Slovakia	1901		1901		1934	
Slovenia		1951		1951		1951
Spain	1961					
Switzerland	1864		1869			
Turkey	1940		1940			

1 evtl. for a subregion

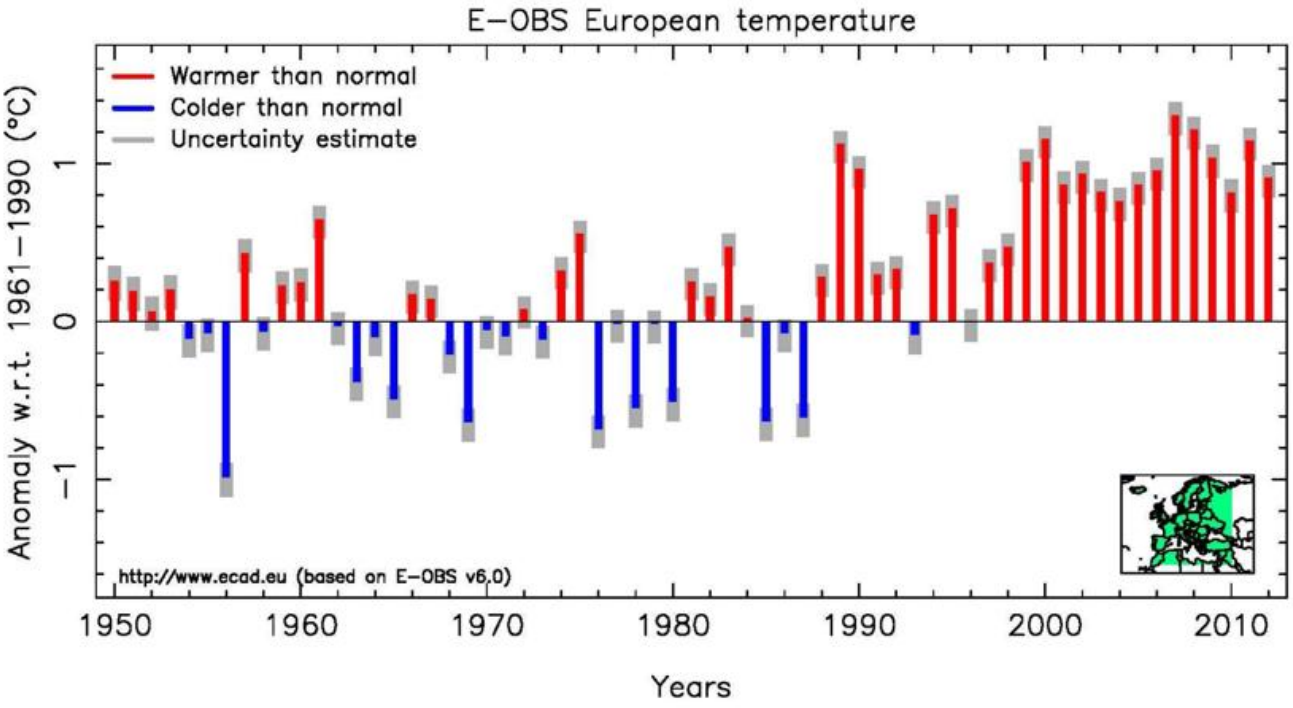


Fig. 2.9: *Time series of mean annual temperature anomalies for Europe (land area; 30 °W - 30 ° E; 30 ° N - 80 ° N) after Verver et. al. 2013*

Temperature

Note:

Long time series of the mean annual temperature are available for each of the 6 subregions. The number of countries which provided information differs as well as the length of the series and the kind of presentation. The longest time series for areal means were provided by Switzerland (1864) and Denmark (1873). Most graphs are diagrams of the mean annual temperature over the years. Usually the mean annual temperature is given as a mean for the whole country. In a few cases the diagram refers to one station only. The longest station series presented here has Stykkisholmur on Iceland, starting 1798.(Similarly long or even longer time series for stations exist as wll for more countries but the main focus here lies upon areal means.) Some countries present the time series in form of anomalies from a reference (mostly the standard WMO reference period 1961-1990, except Poland, Portugal, Spain and Turkey (all 1971-2000)). In this context this must be reflected when for instance the number of years with annual means above the reference is compared. Taking into account that the temperature is growing with time, the year from which onward the annual mean lies above the reference will be later when the reference is 1971-2000 than compared with the standard normal period 1961-1990. Some countries provide further statistics in their diagrams like a running mean or a trend line. Generally all time series document the rising temperatures with time and the increase of the rise during the last 15 years. Some special aspects will be discussed in the following.

In most series of all subregions 2012 was warmer than normal though the positive anomalies were smaller than in 2011. Exceptions were Italy and southern Slovakia. Extremes indices (number of hot days, number of tropical nights) may differ in behavior from the mean annual temperature (Turkey, Slovenia).

Central and Western Europe:

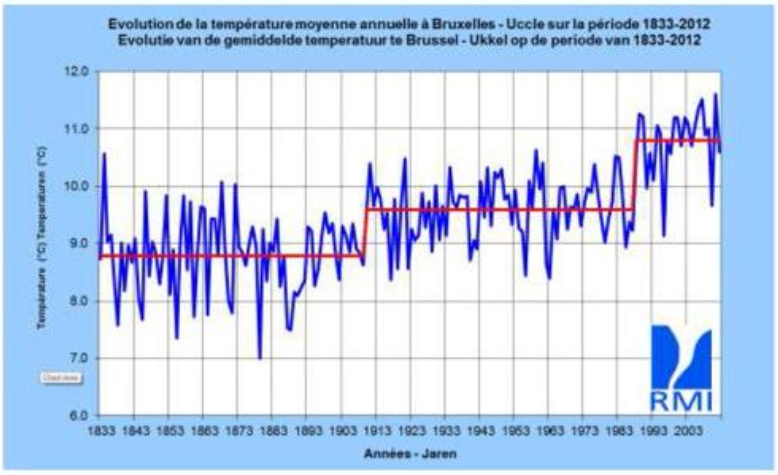


***Fig. 2.10** : Time series of annual temperature anomalies Ukkle (Belgium)*
(Diagrams as provided by the NHMSs)

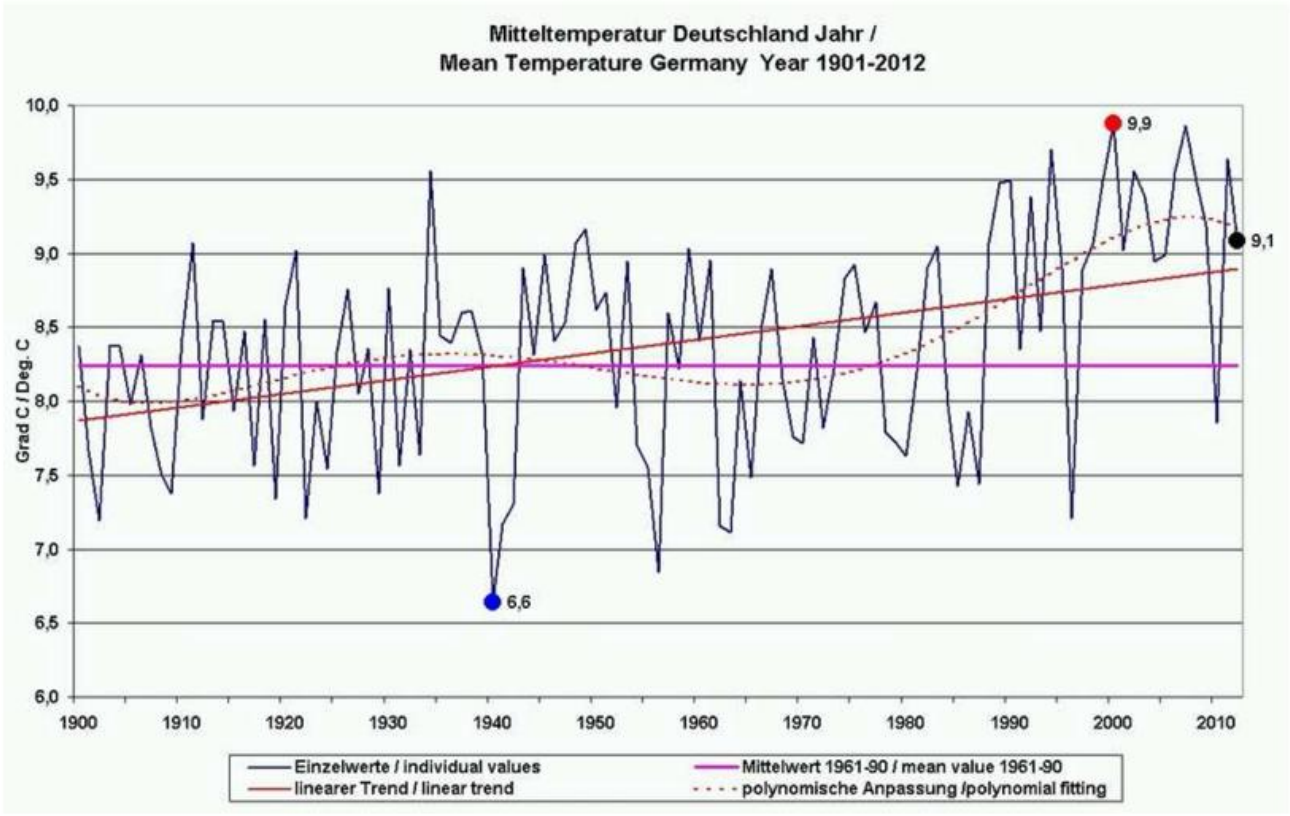


***Fig. 2.11** : Time series of annual temperature anomalies Germany*
(Diagrams as provided by the NHMSs)

Central and Western Europe:

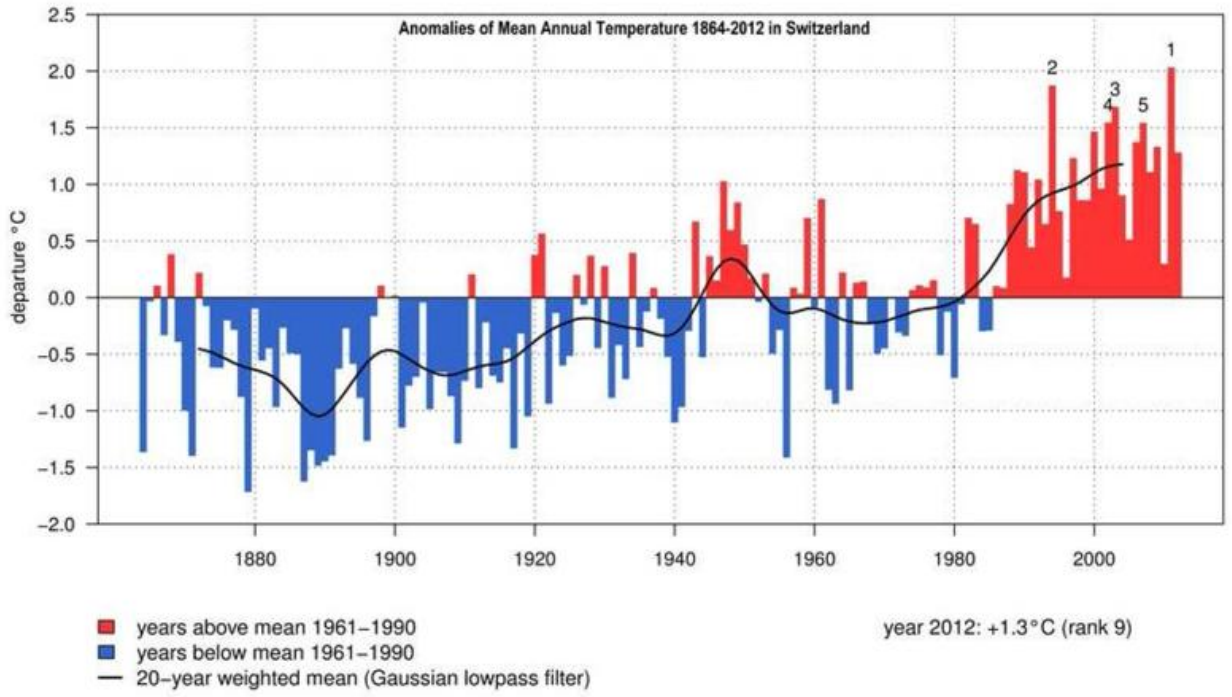


***Fig. 2.12** : Time series of annual temperature anomalies Switzerland*
(Diagrams as provided by the NHMSs)

Central and Western Europe:

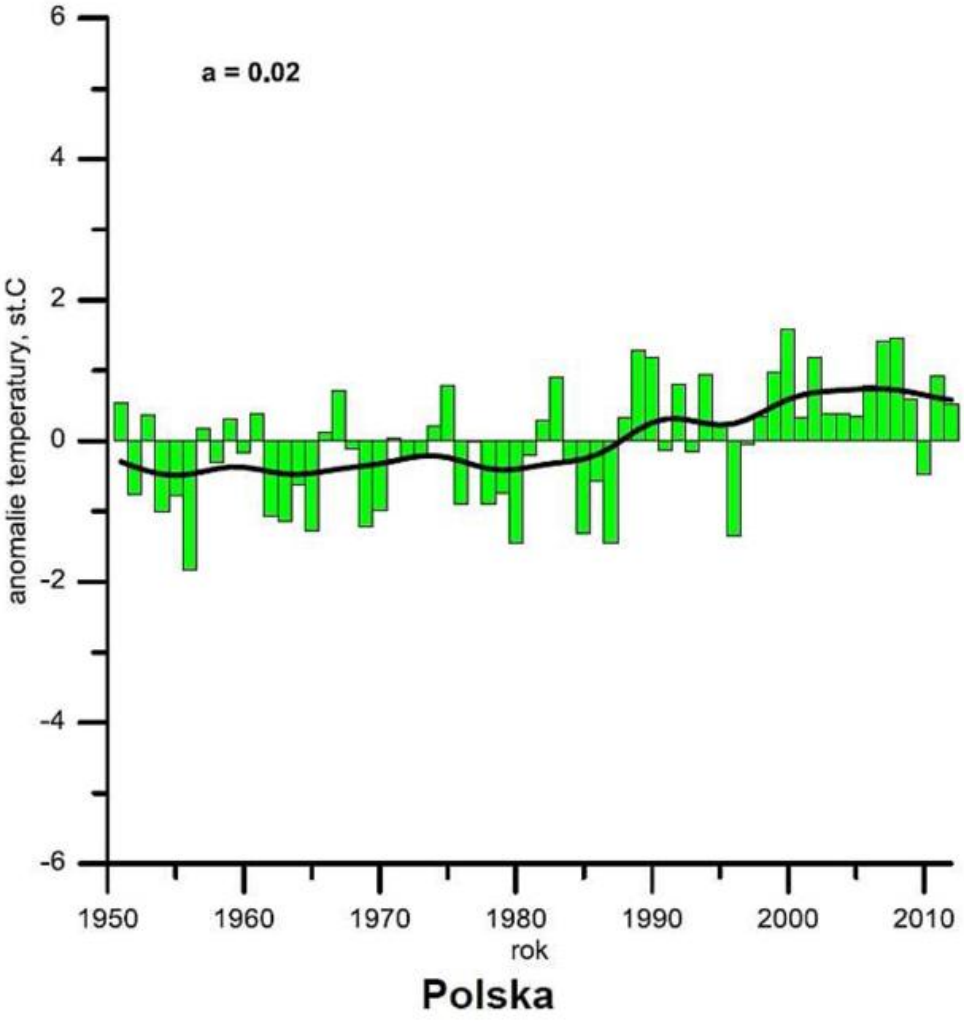


***Fig. 2.13** : Time series of annual temperature anomalies Poland*
(Diagrams as provided by the NHMSs)

Central and Western Europe:

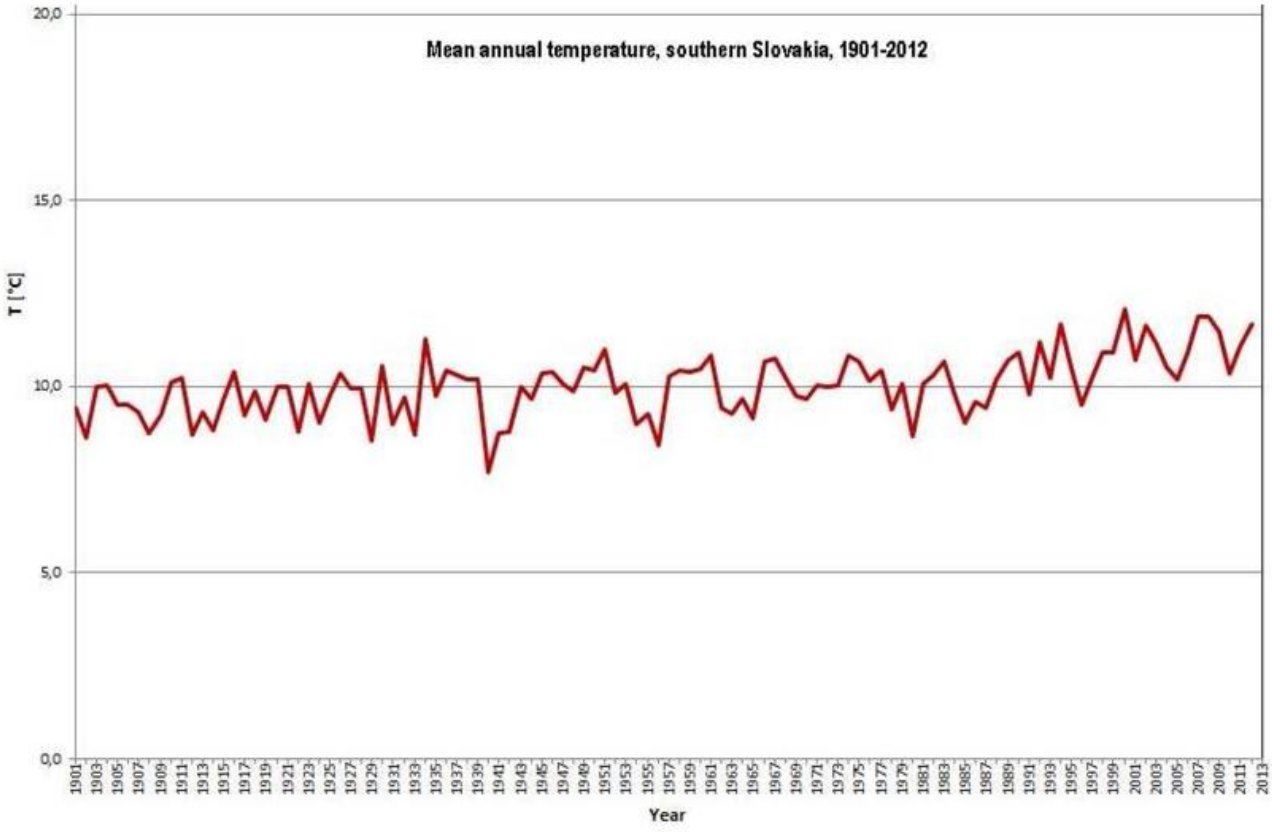


Fig. 2.14 *: Time series of mean annual temperature or anomalies for southern Slovakia (Diagrams as provided by the NHMSs)*

Nordic and Baltic Countries:

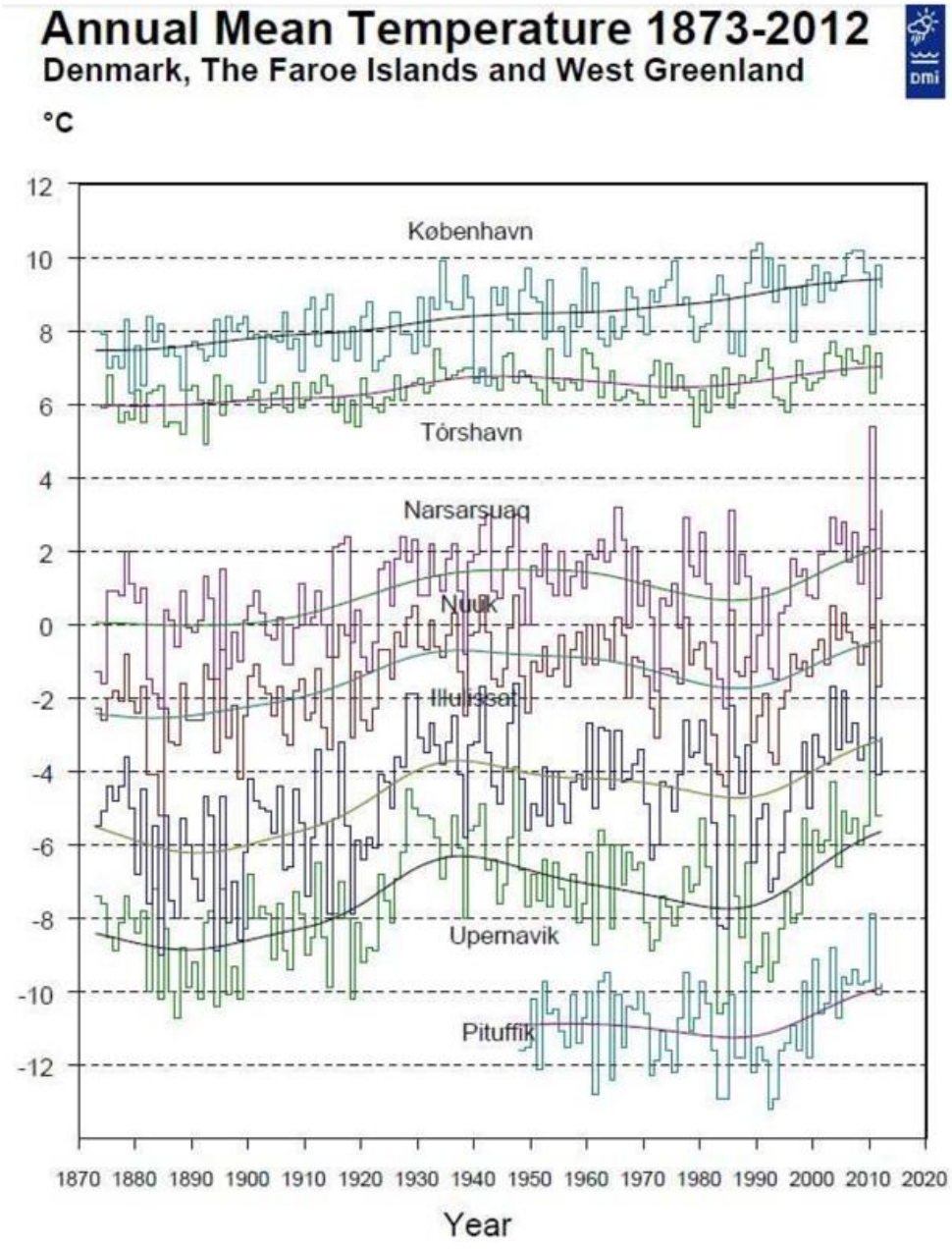


***Fig. 2.15** : Time series of anual mean temperatures for the Faroe Island and West Greenland compared to Kopenhagen (Diagrams as provided by the NHMSs)*

Nordic and Baltic Countries:

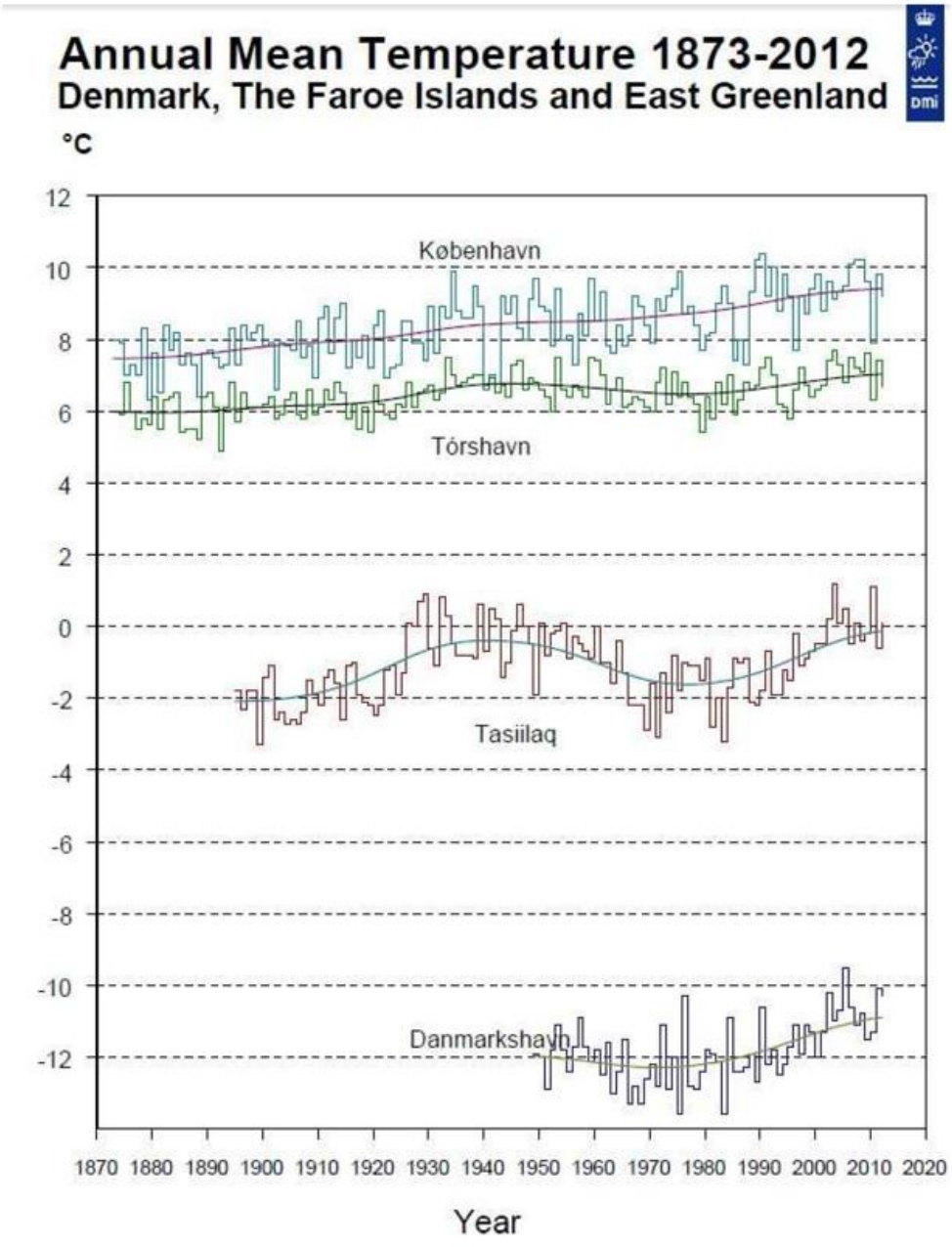


***Fig. 2.16** : Time series of anual mean temperatures for the Faroe Island and East Greenland compared to Kopenhagen (Diagrams as provided by the NHMSs)*

Nordic and Baltic Countries:

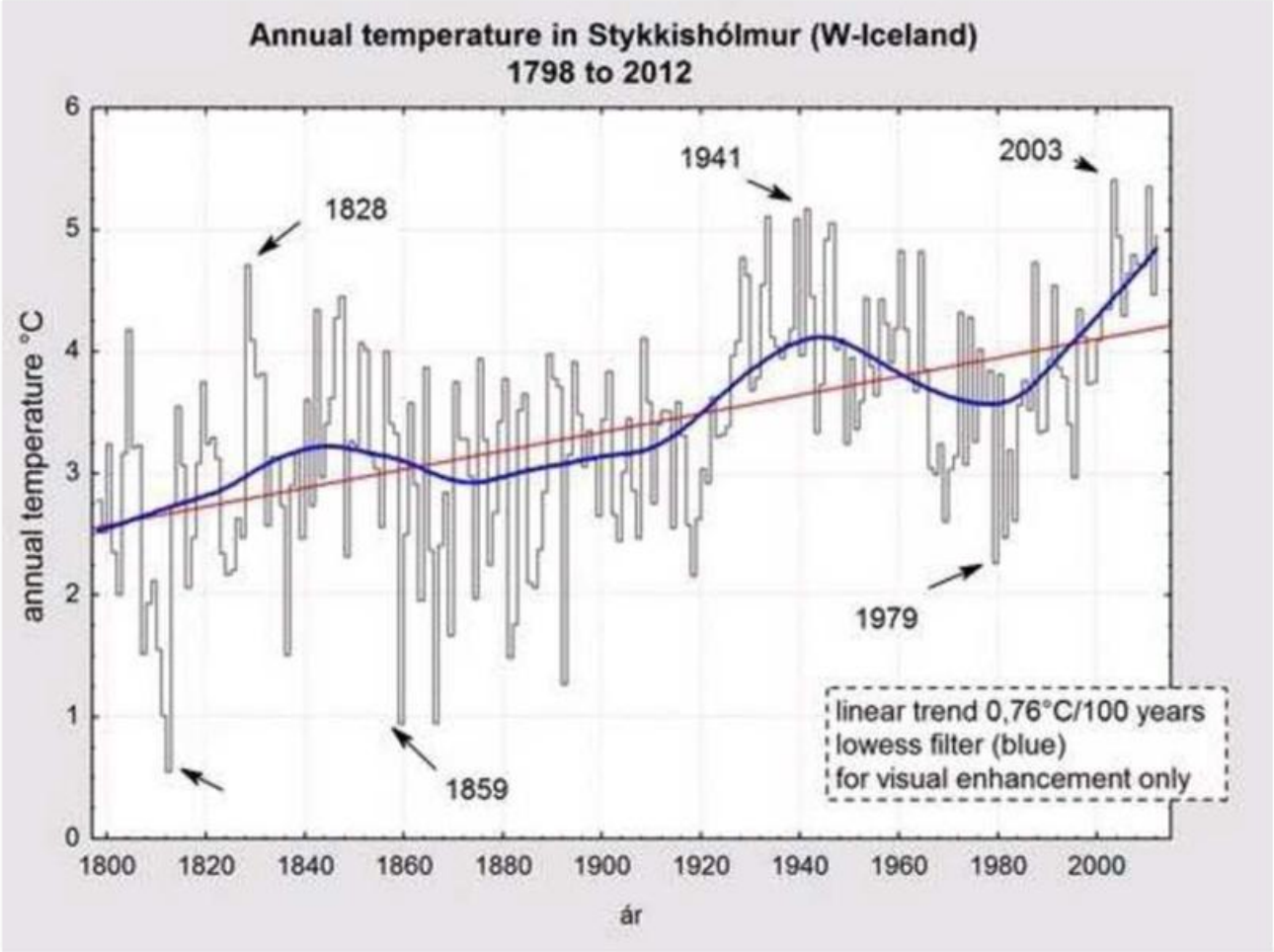


***Fig. 2.17** : Time series of annual mean temperature Stykkisholmur, western Iceland (Diagrams as provided by the NHMSs)*

Nordic and Baltic Countries:

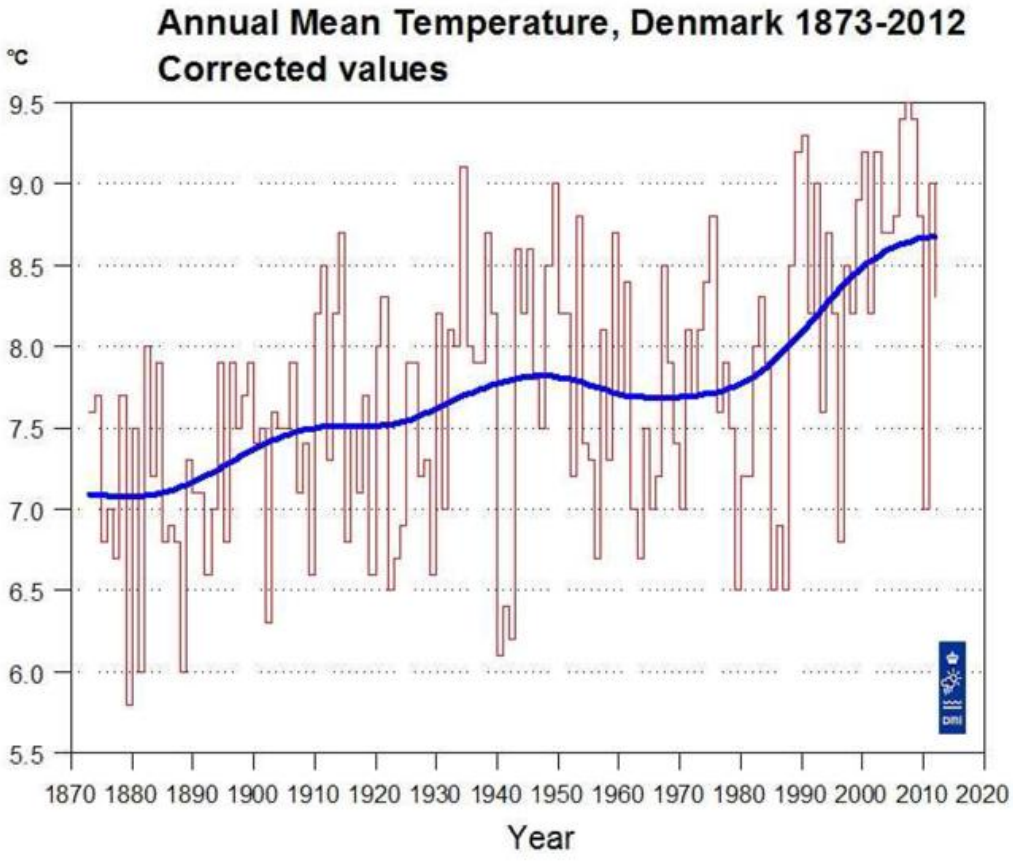


***Fig. 2.18** : Time series of annual mean temperature Denmark*
(Diagrams as provided by the NHMSs)

Nordic and Baltic Countries:

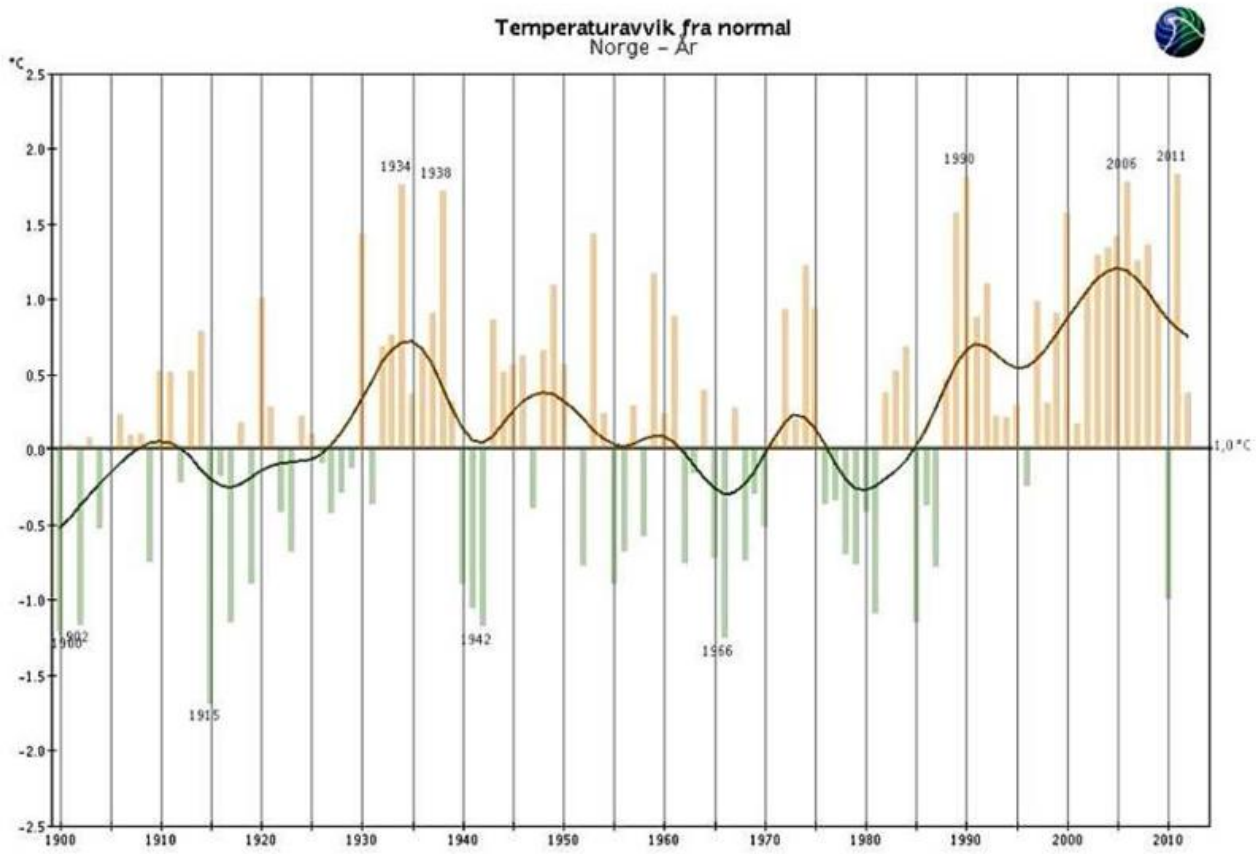


***Fig. 2.19** : Time series of annual mean temperature Norway*
(Diagrams as provided by the NHMSs)

Nordic and Baltic Countries:

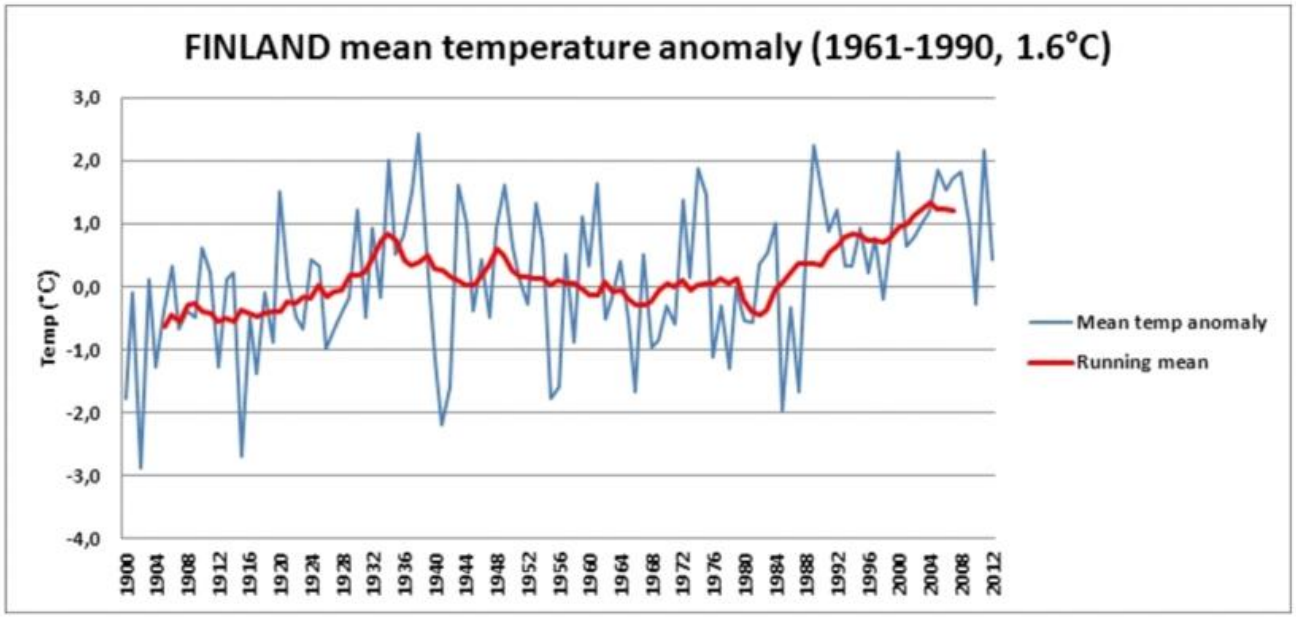


***Fig. 2.20** : Time series of annual mean temperature Finland*
(Diagrams as provided by the NHMSs)

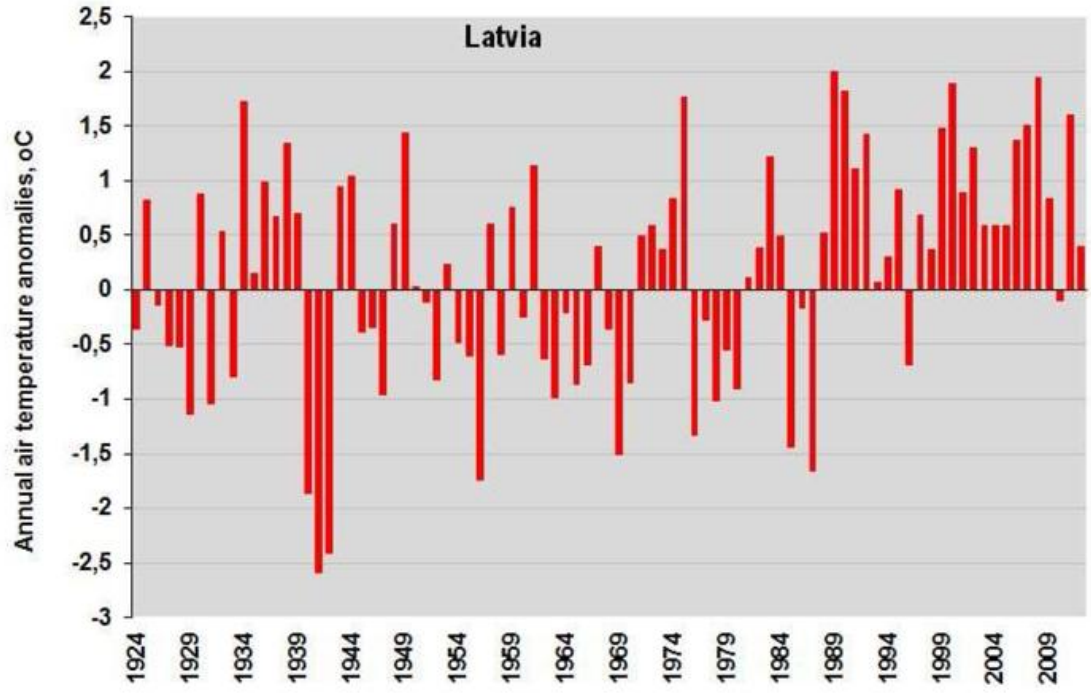


***Fig. 2.21** : Time series of annual mean temperature Latvia*
(Diagrams as provided by the NHMSs)

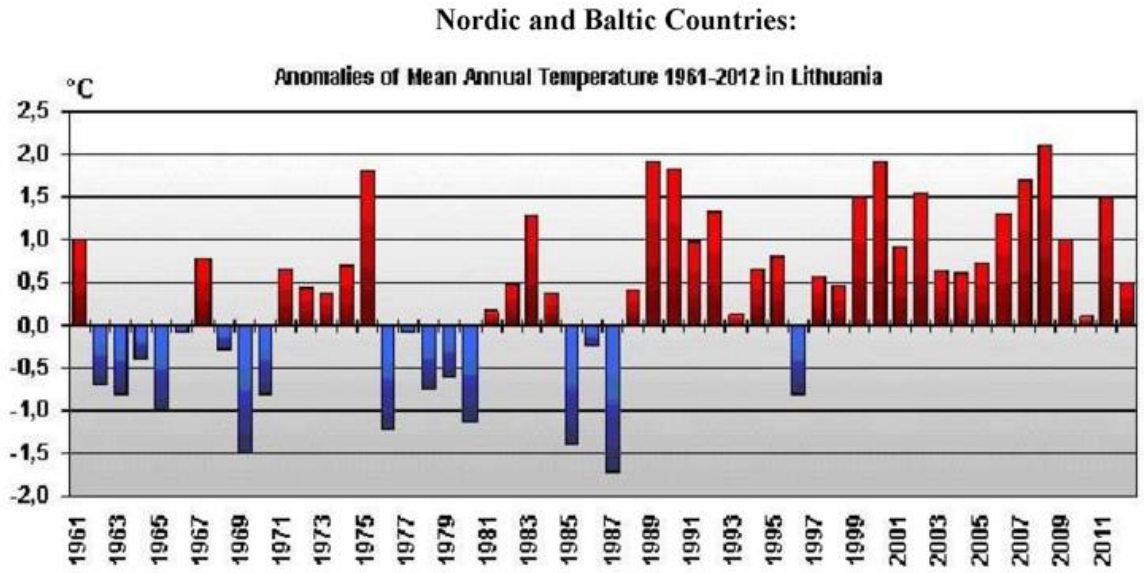


***Fig. 2.22** : Time series of annual mean temperature Lithuania*
(Diagrams as provided by the NHMSs)

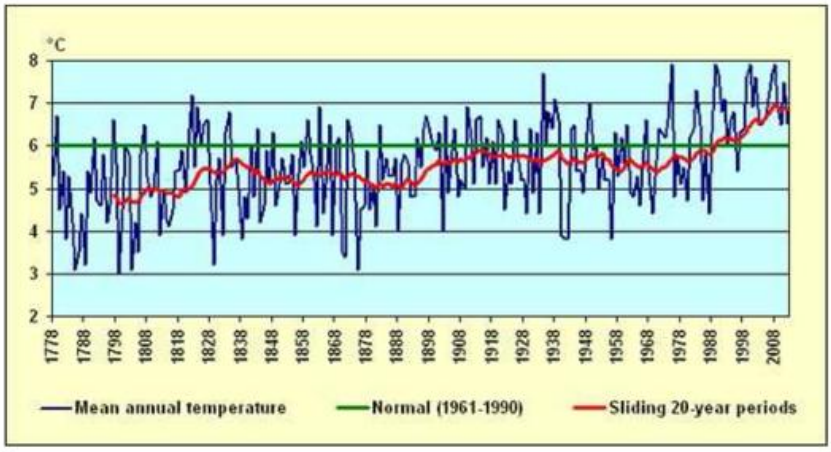


***Fig. 2.23** : Time series of annual mean temperature Lithuania (Vilnius)*
(Diagrams as provided by the NHMSs)

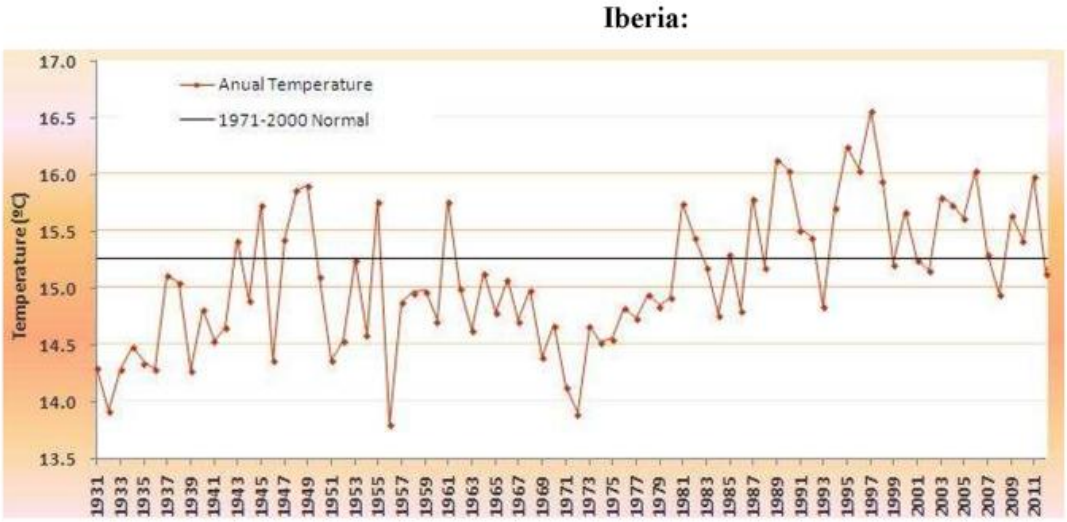


Fig. 2.24 *: Time series of mean annual temperature or anomalies for Portugal (Diagrams as provided by the NHMSs)*

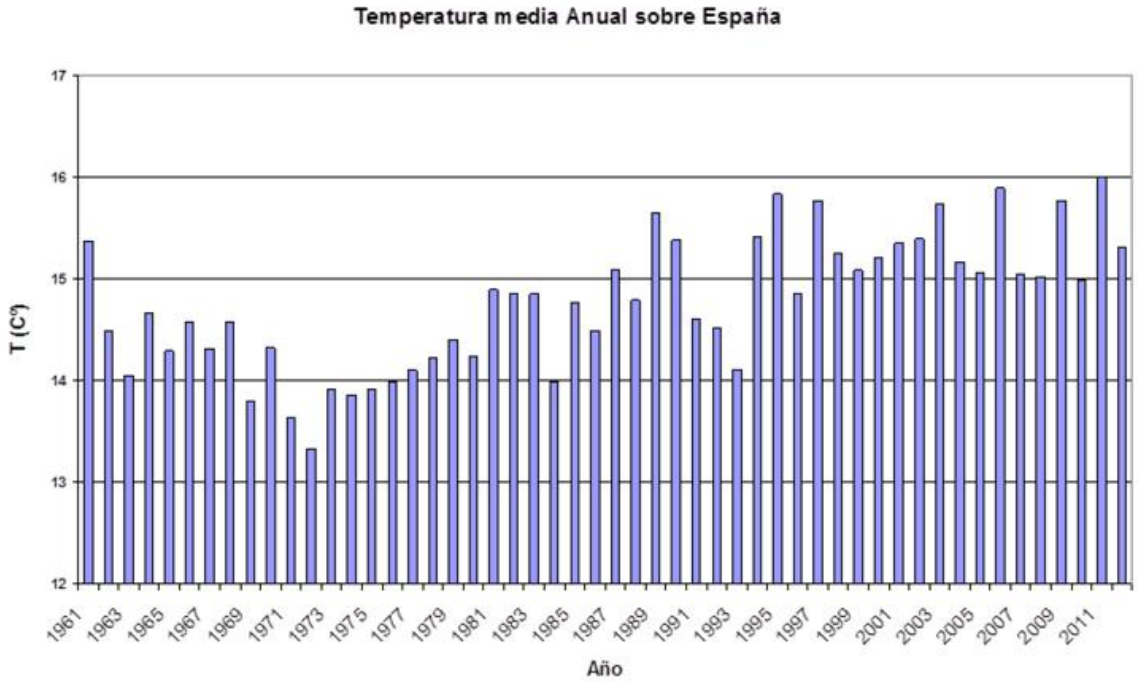


Fig. 2.25 *: Time series of mean annual temperature or anomalies for Espania (Diagrams as provided by the NHMSs)*

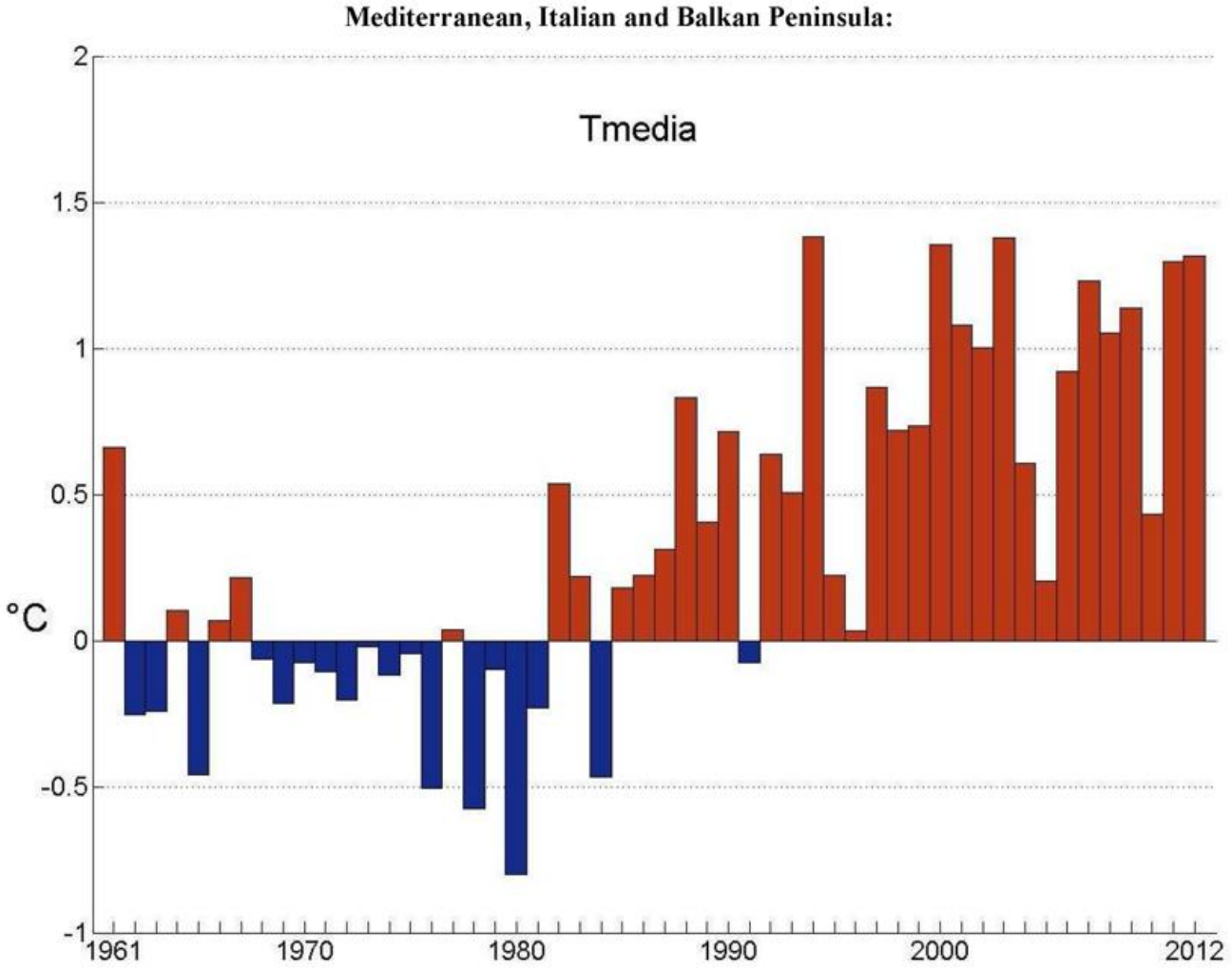


***Fig. 2.26** : Time series of mean annual temperature or anomalies for Italy*
(Diagrams as provided by the NHMSs)

Mediterranean, Italian and Balkan Peninsula:

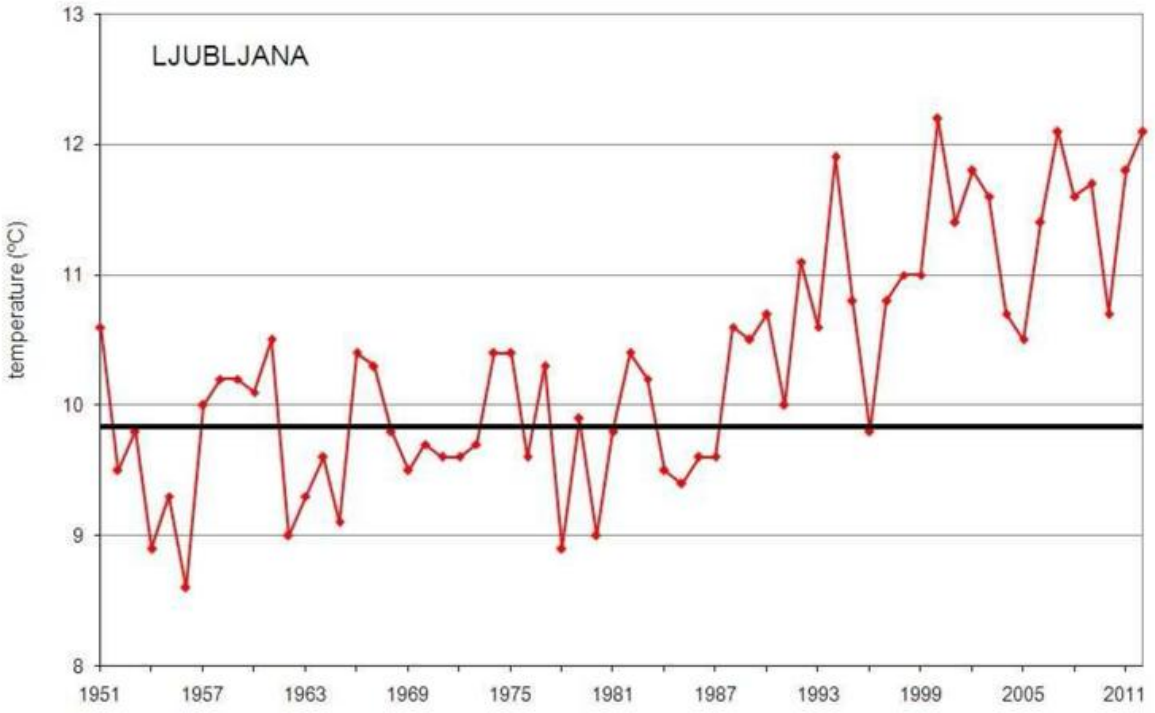


***Fig. 2.27** : Time series of annual mean temperature at Ljubljana Slovenia (Diagrams as provided by the NHMSs)*

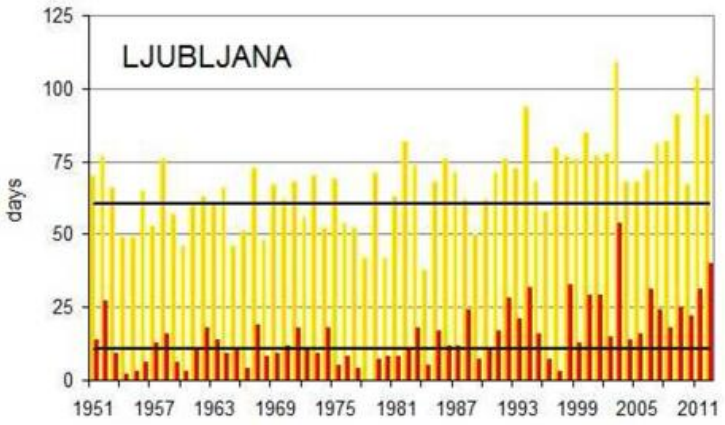


***Fig. 2.28** : Time series of annual number of summer days and hot days at Ljubljana Slovenia (Diagrams as provided by the NHMSs)*

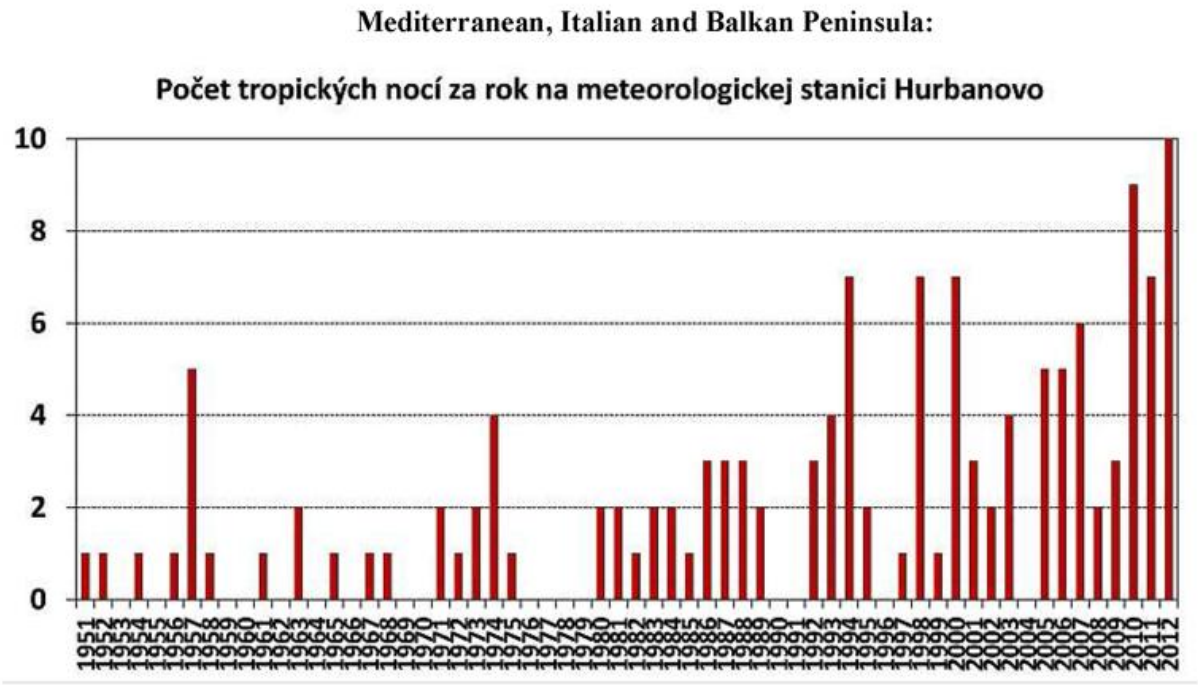


***Fig. 2.29** : Time series of annual number of tropical nights at Hurbanovo Slovenia (Diagrams as provided by the NHMSs)*

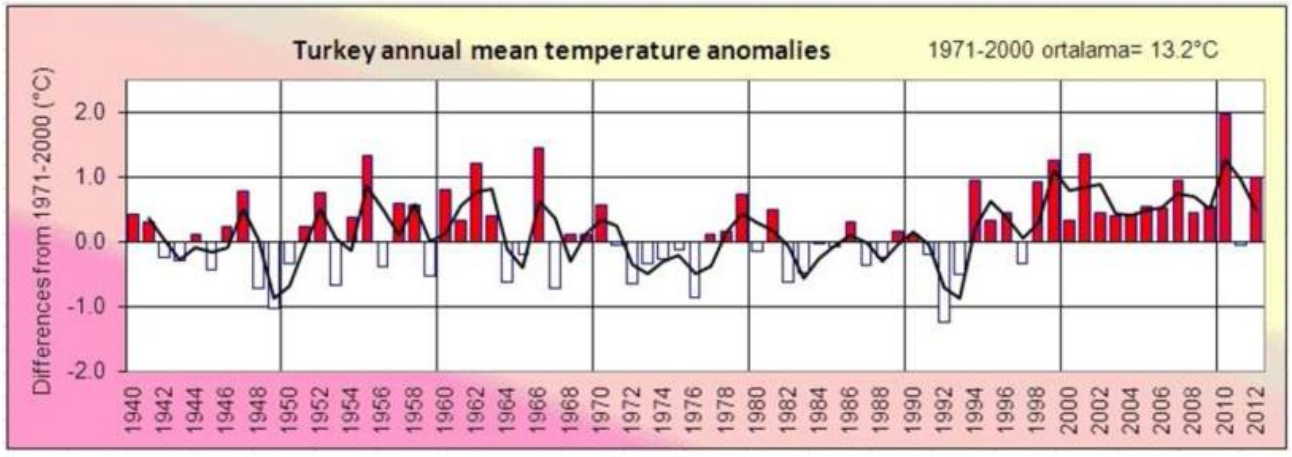


***Fig. 2.30** : Time series of mean annual temperature or anomalies for Turkey (Diagrams as provided by the NHMSs)*

Eastern Europe:

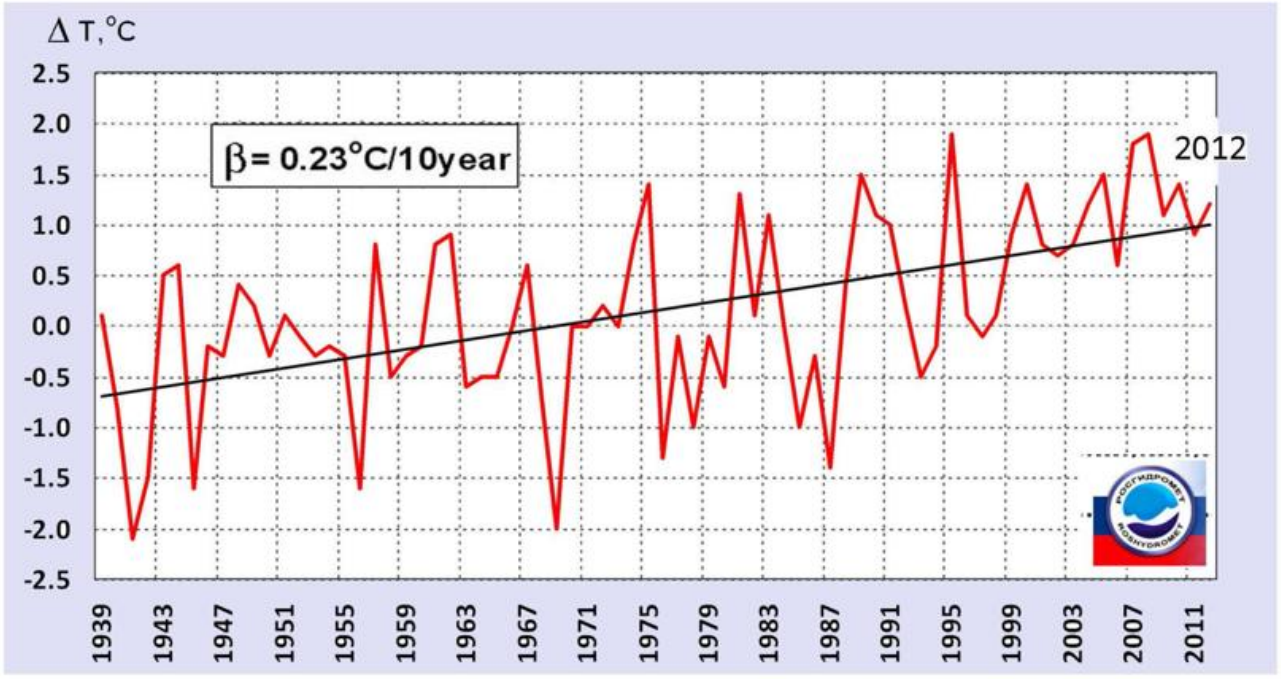


***Fig. 2.31** : Time series of annual mean temperature European Russia (Diagrams as provided by the NHMSs)*

Middle East:

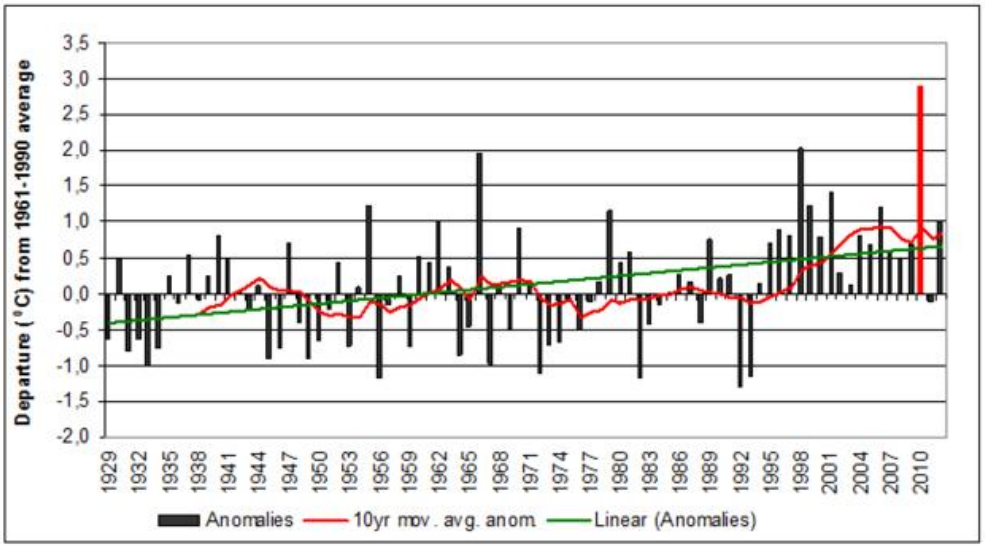


***Fig. 2.32** : Time series of annual mean temperature or anomalies Armenia*
(Diagrams as provided by the NHMSs)

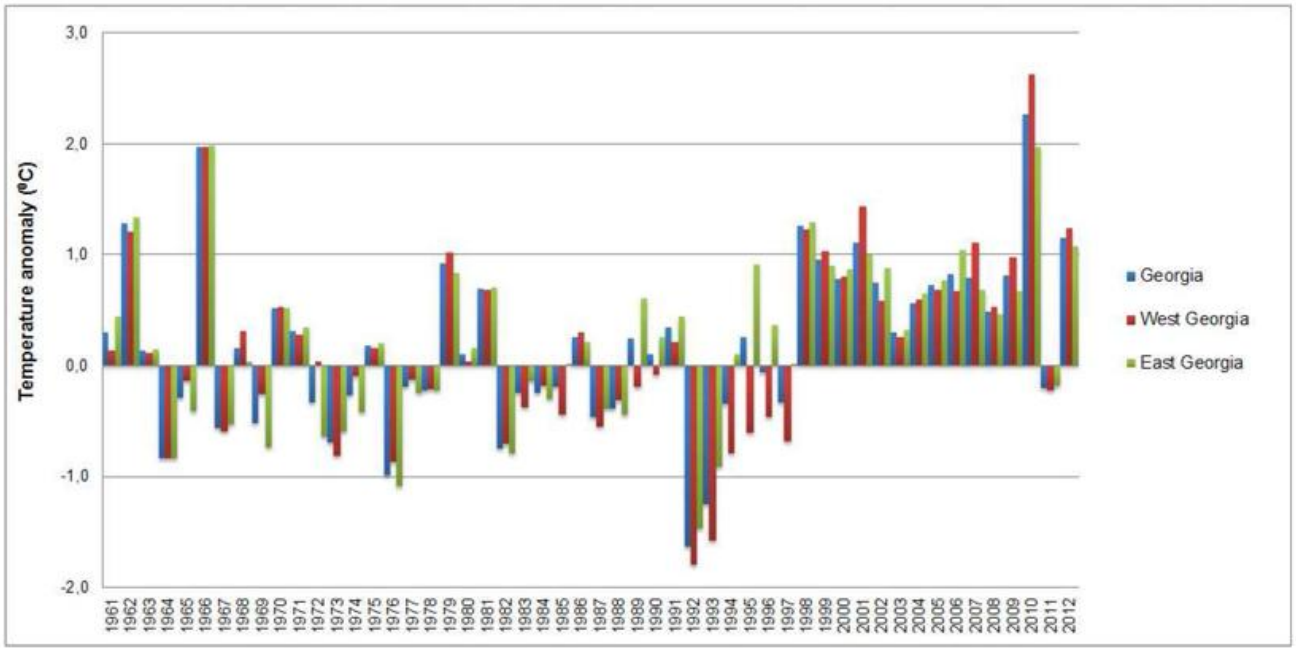


***Fig. 2.33** : Time series of annual mean temperature or anomalies Georgia*
(Diagrams as provided by the NHMSs)

Middle East:

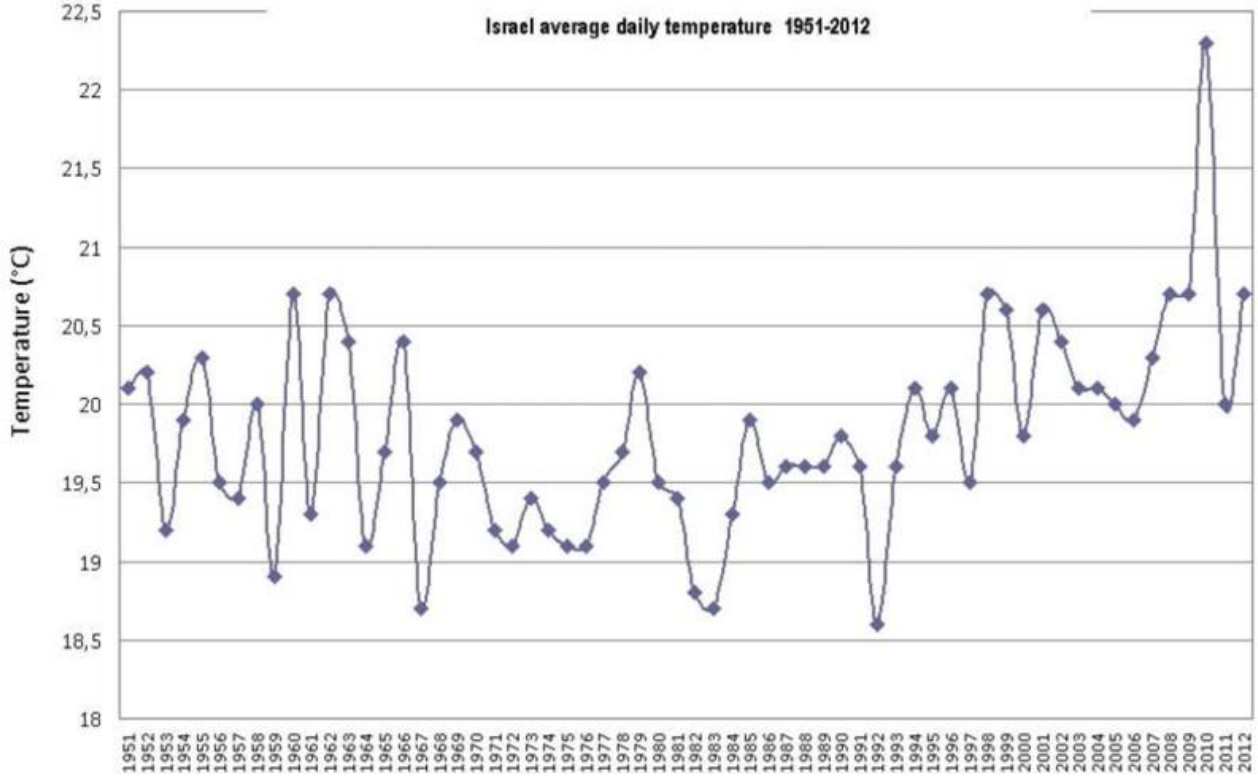


***Fig. 2.34** : Time series of annual mean temperature or anomalies Israel*
(Diagrams as provided by the NHMSs)

Precipitation

Note: *Denmark, Germany and Slovakia present annual precipitation totals while the other countries present anomalies from a reference period. Most countries refer to the period 1971-2000 for precipitation anomalies or the line of normal precipitation except Germany (1961-1990).*

For precipitation Fig 2.35 to 2.48 show the available time series for the 6 subregions.

With some caution the graphs give the information that precipitation has a rising trend in northern, western, central and eastern Europe but not in the Baltic states and not in the Mediterranean region and Middle East. The graphs for Iberia and the Italian Peninsula show a falling trend. The annual rainfall for Denmark has risen about 100 mm since 1870s. The lowest annual precipitation for the country as a whole was 464 mm in 1947, and the highest was 905 mm in 1999 For Switzerland 2 graphs are presented to show the differences between the north and the south. For northern Switzerland the annual precipitation is rising at least since 1940 while the graph of southern Switzerland undulates around the reference line. Israel contributed a time series of the annual maximum daily total in the Upper Galilee region which shows the highest value of 140 mm in 2012 in a series since 1949. This is related to the rain event in June .

Central and Western Europe:

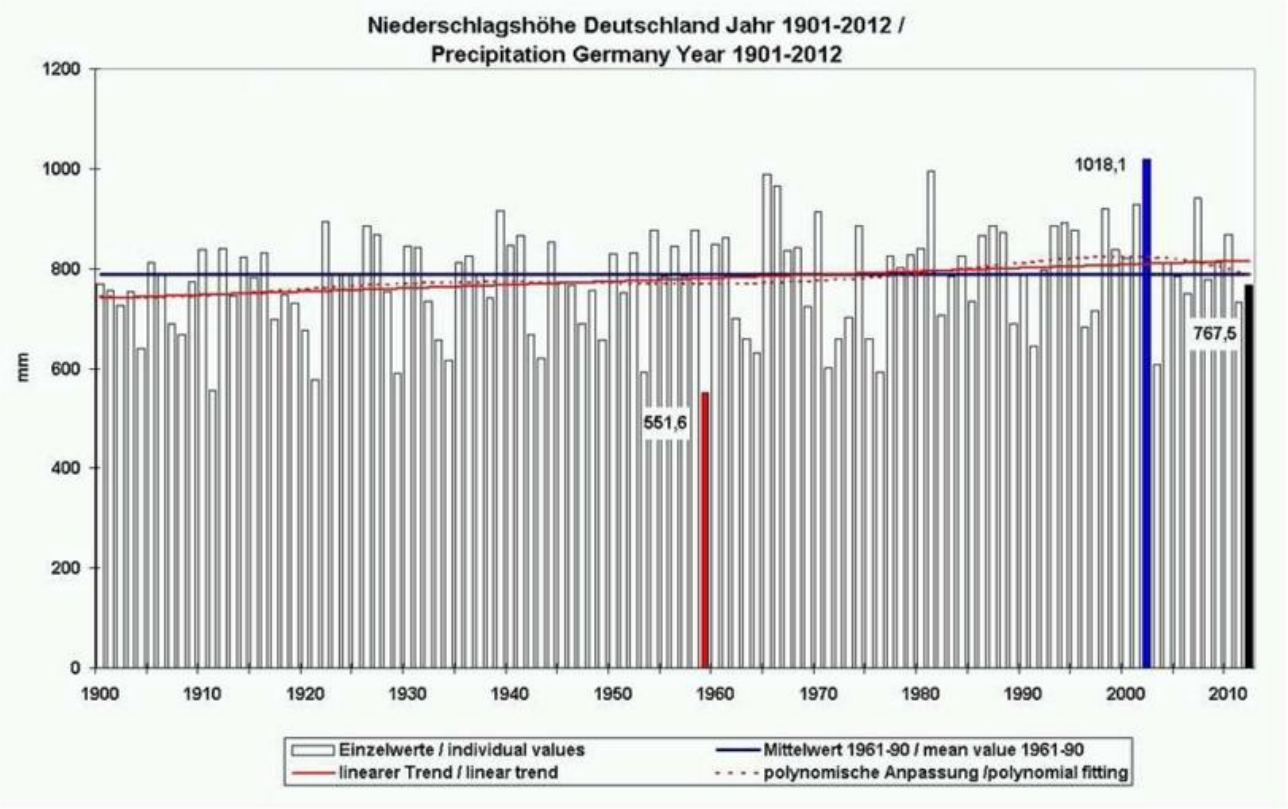


***Fig. 2.35** : Time series of annual precipitation totals Germany*
(Diagrams as provided by the NHMSs)

Central and Western Europe:

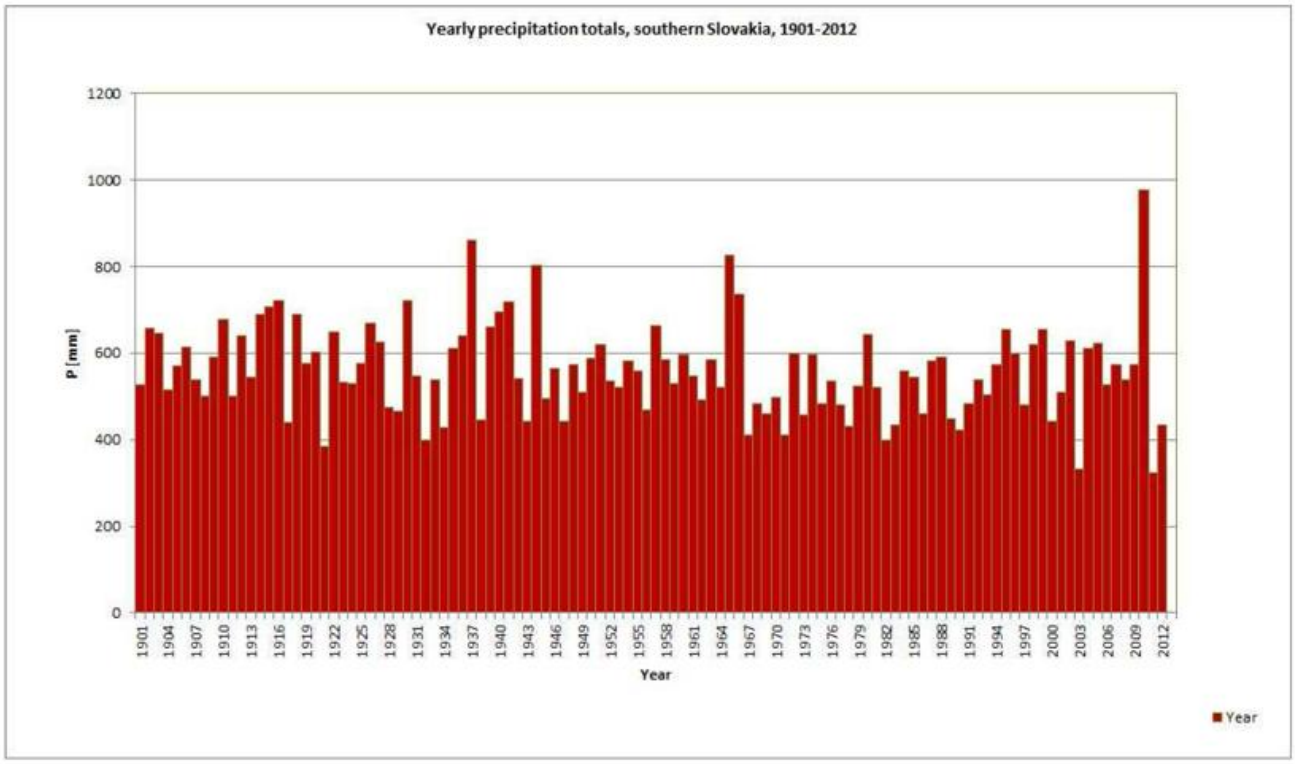


***Fig. 2.36** : Time series of annual precipitation totals or anomalies for southern Slovakia (Diagrams as provided by the NHMSs)*

Central and Western Europe:

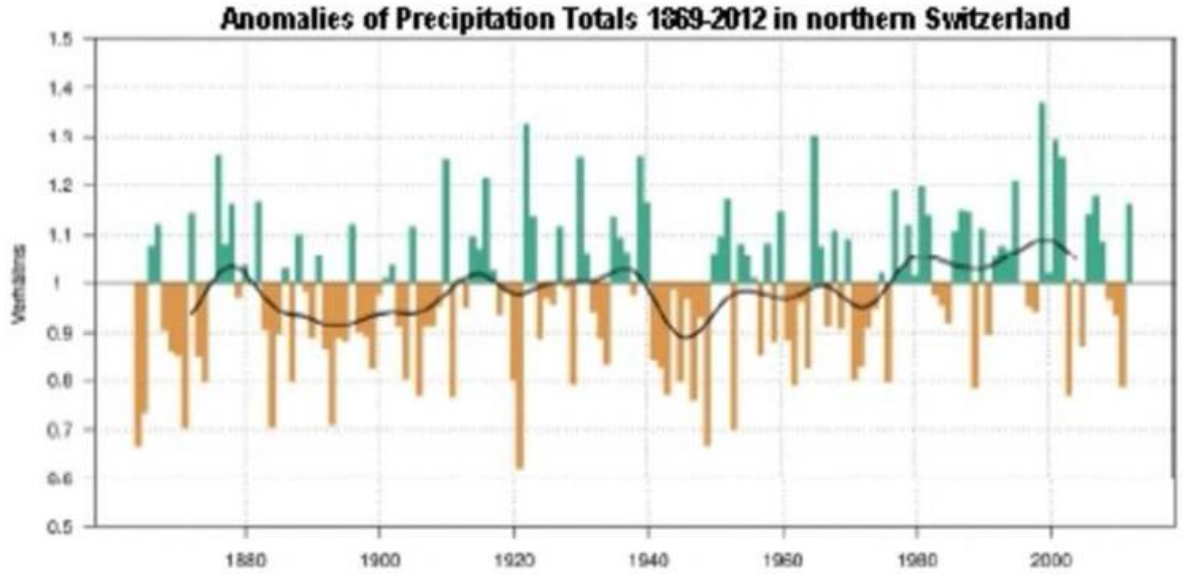


***Fig. 2.37** : Time series of annual precipitation totals northern Switzerland (Diagrams as provided by the NHMSs)*

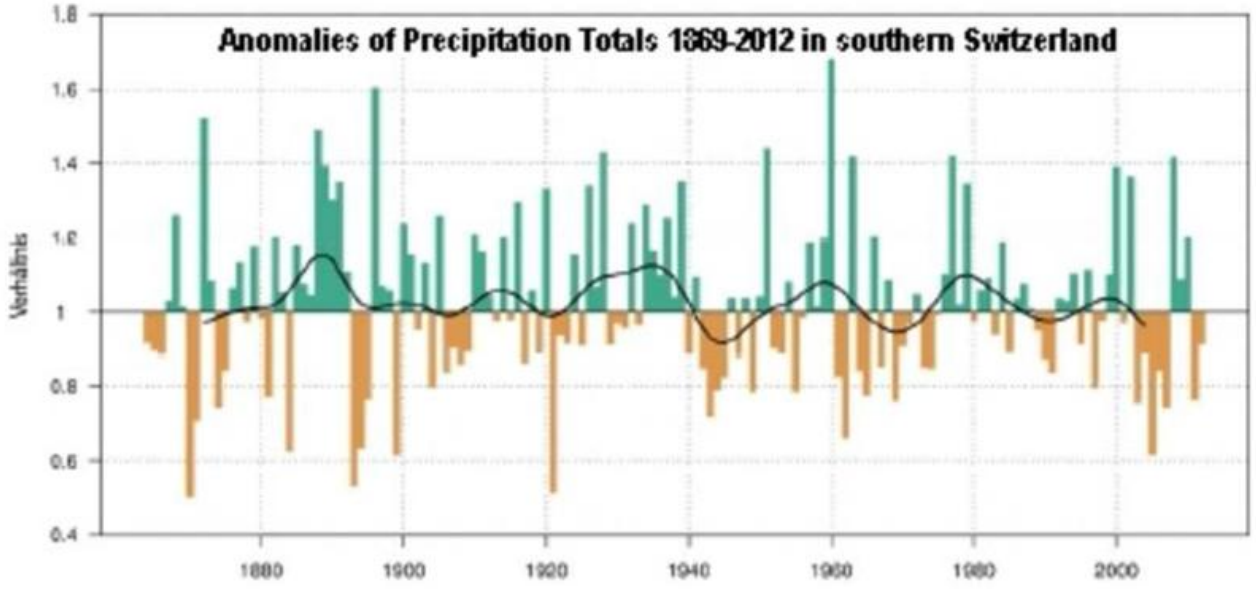


***Fig. 2.38** : Time series of annual precipitation totals southern Switzerland (Diagrams as provided by the NHMSs)*

Nordic and Baltic Countries:

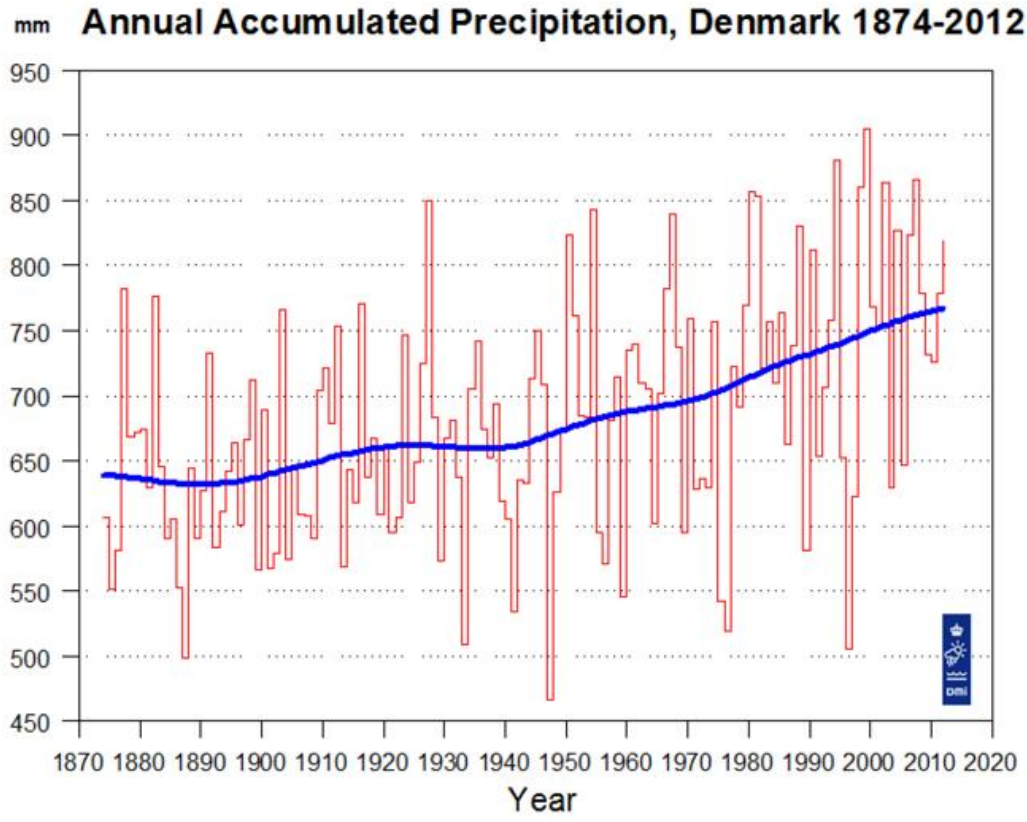


***Fig. 2.39** : Time series of annual precipitation totals Denmark*
(Diagrams as provided by the NHMSs)

Nordic and Baltic Countries:

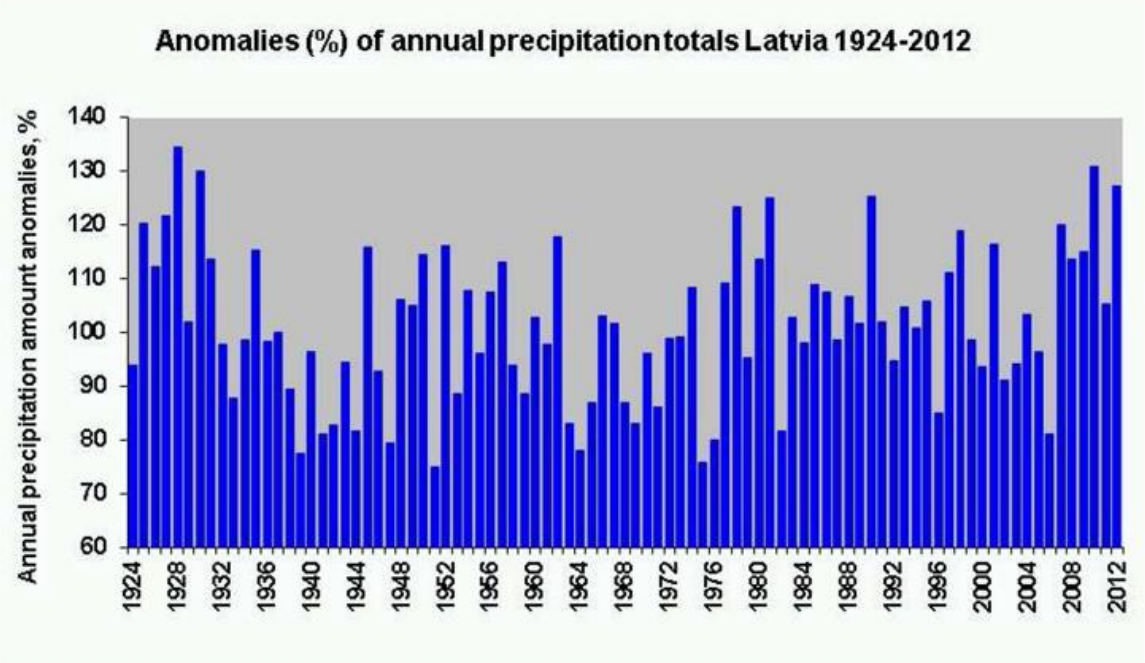


***Fig. 2.40** : Time series of annual precipitation totals Latvia*
(Diagrams as provided by the NHMSs)

Nordic and Baltic Countries:

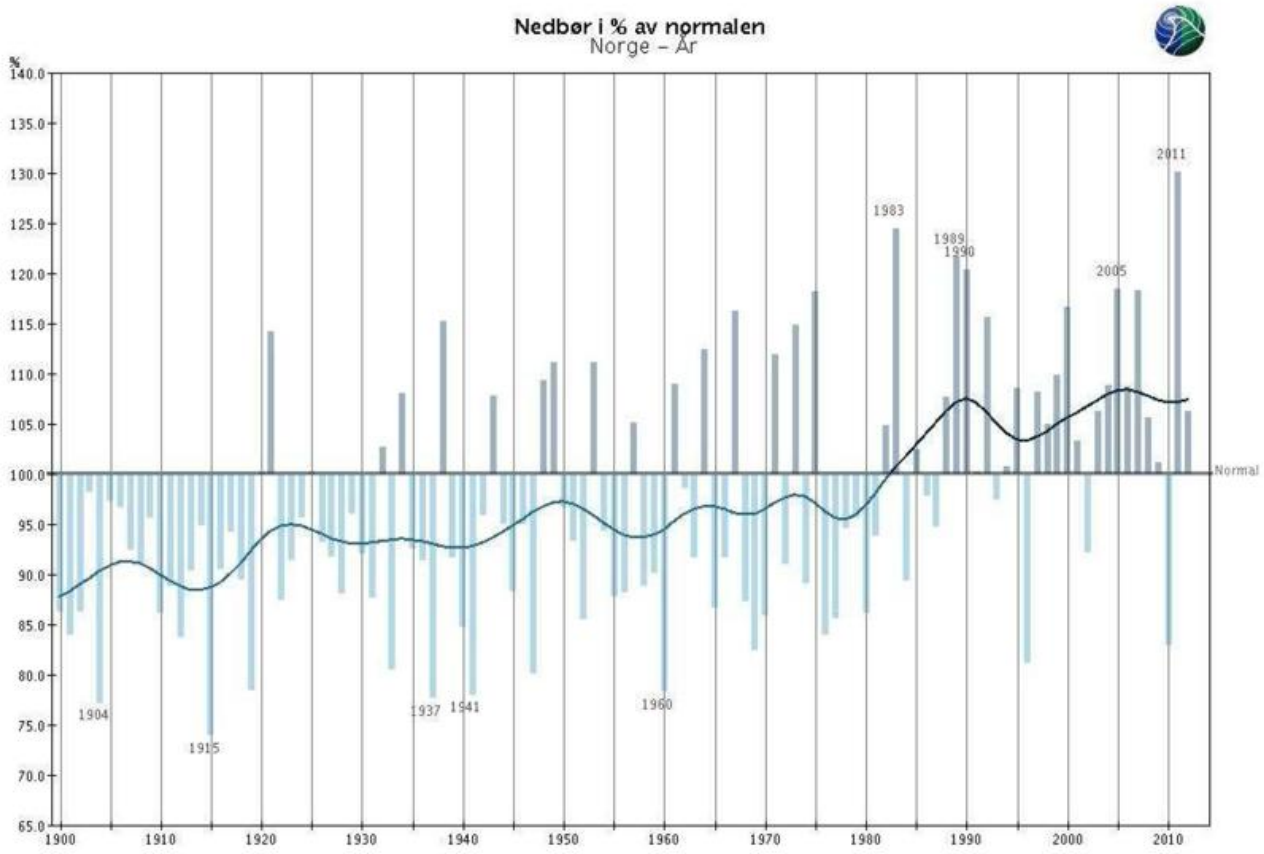


***Fig. 2.41** : Time series of annual precipitation totals Norway*
(Diagrams as provided by the NHMSs)

Iberia:

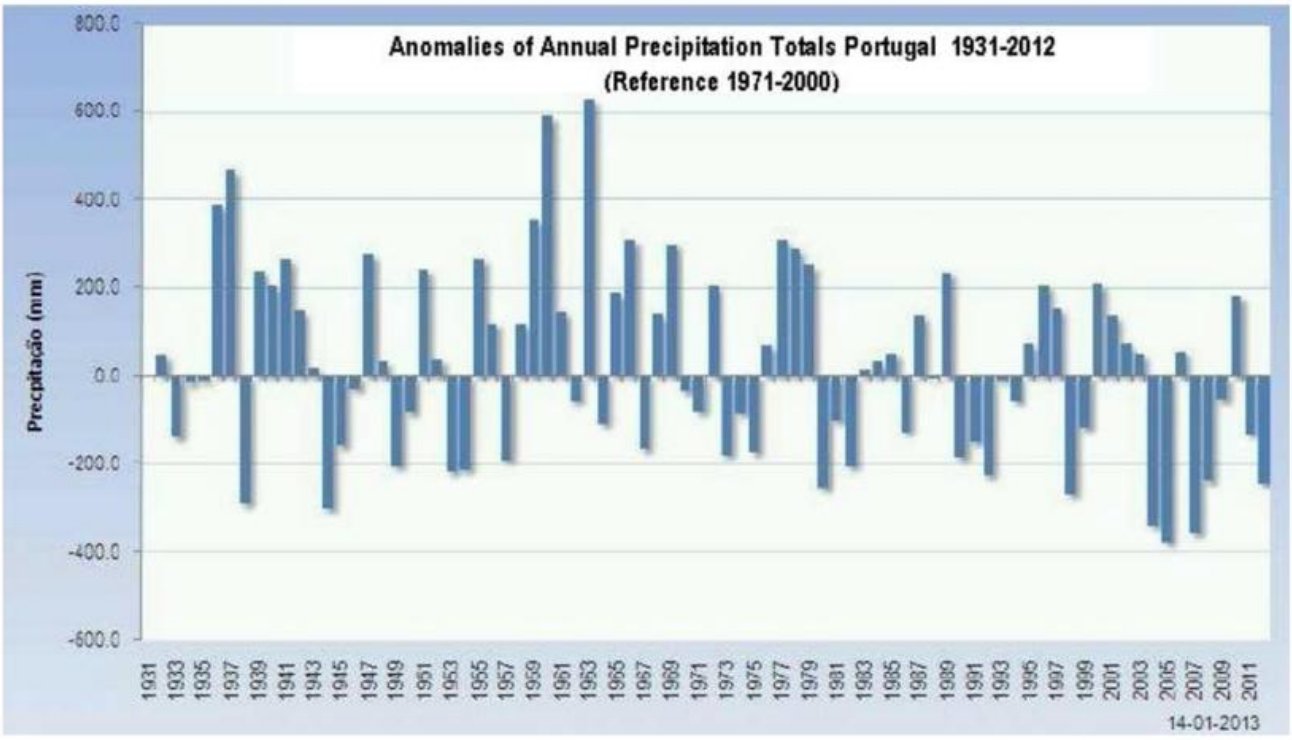


***Fig. 2.42** : Time series of annual precipitation totals or anomalies for Portugal (Diagrams as provided by the NHMSs)*

Mediterranean, Italian and Balkan Peninsula:

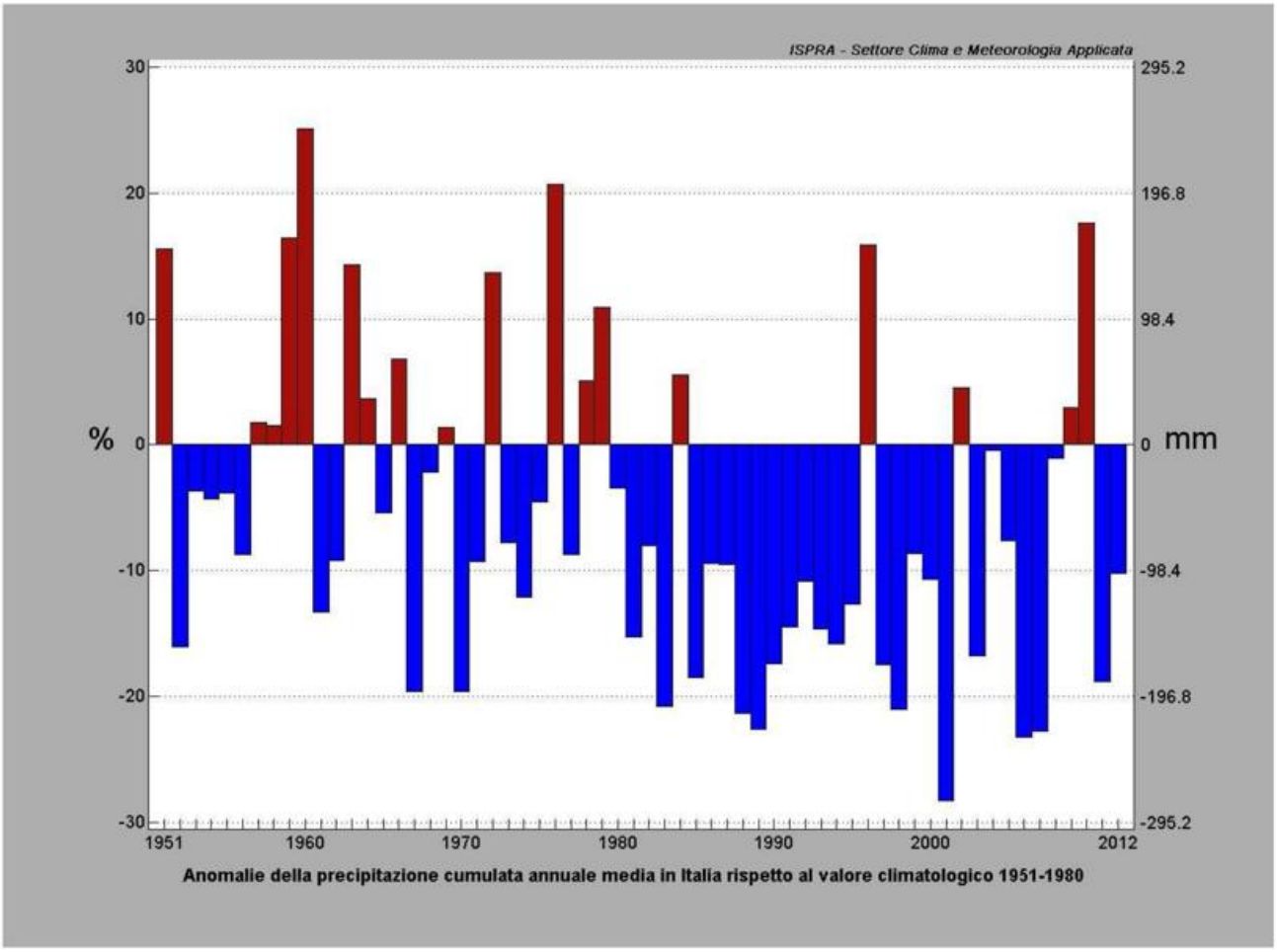


Fig. 2.43 *: Time series of annual precipitation totals or anomalies for Italy (Diagrams as provided by the NHMSs)*

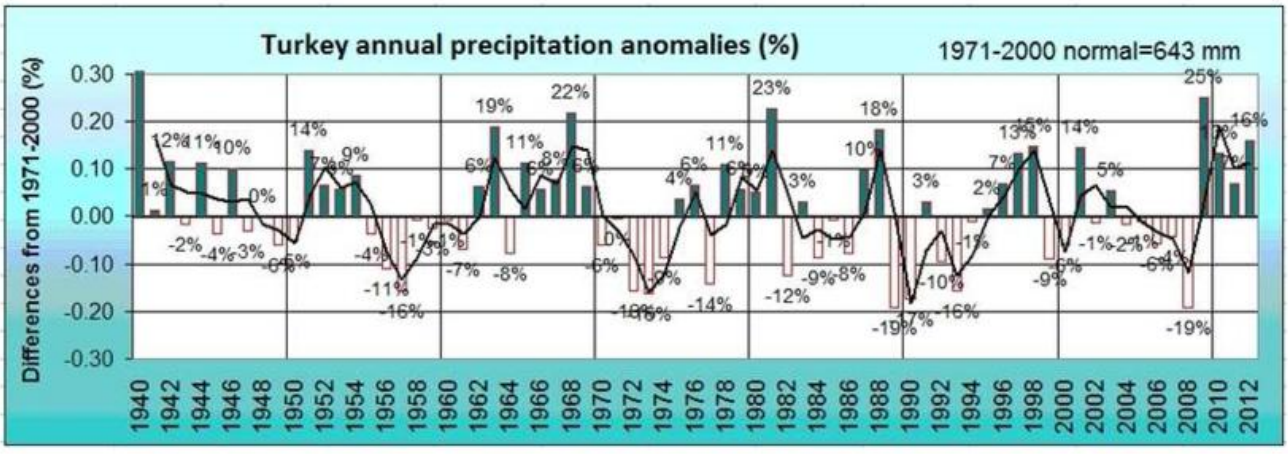


Fig. 2.44 *: Time series of annual precipitation totals or anomalies for Turkey (Diagrams as provided by the NHMSs)*

Mediterranean, Italian and Balkan Peninsula:

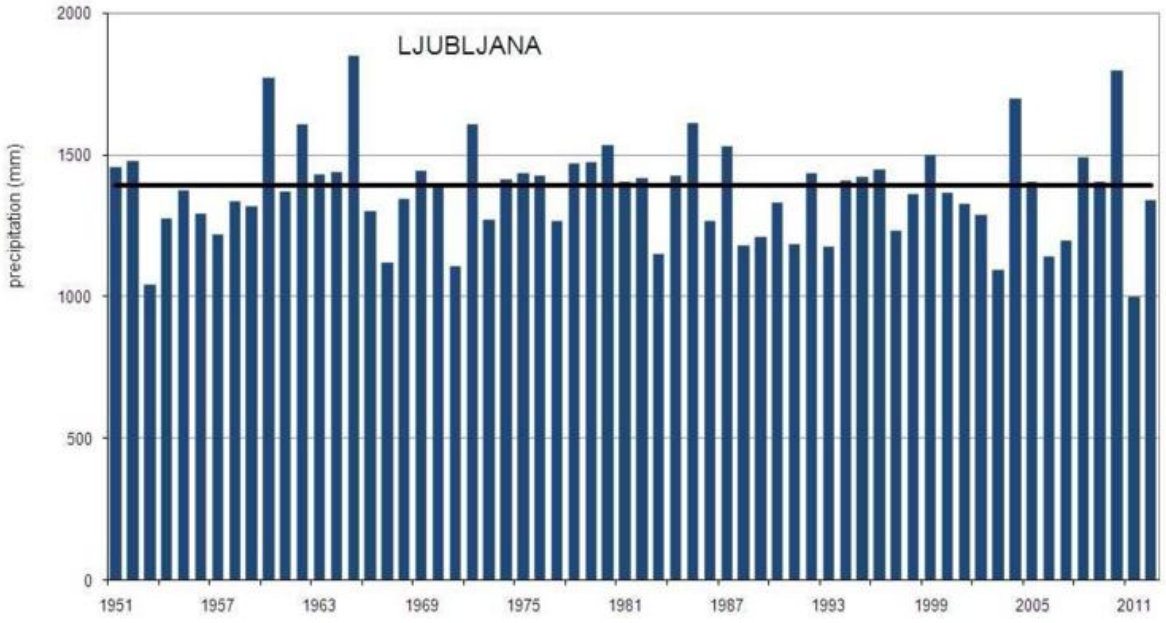


***Fig. 2.45** : Time series of annual precipitation totals for Ljubljana, Slovenia (Diagrams as provided by the NHMSs)*

Eastern Europe:

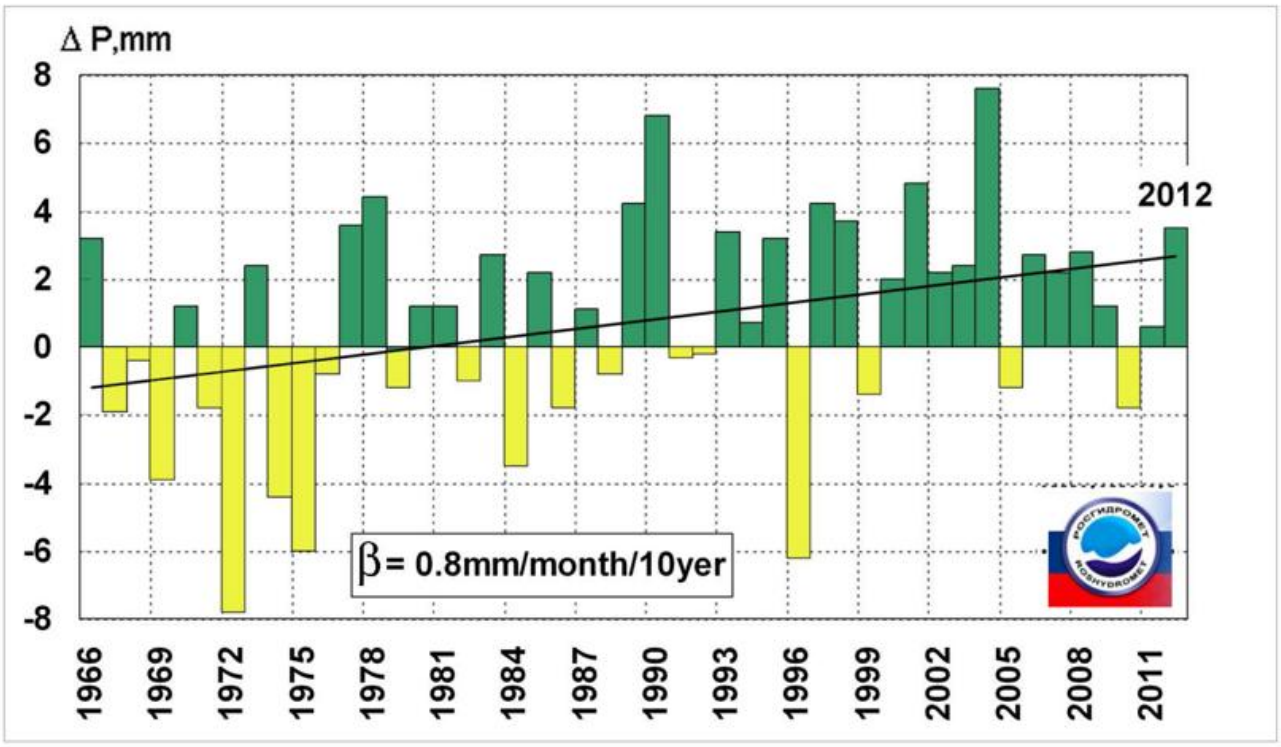


***Fig. 2.46** : Time series of annual precipitation totals European Russia (Diagrams as provided by the NHMSs)*

Middle East:

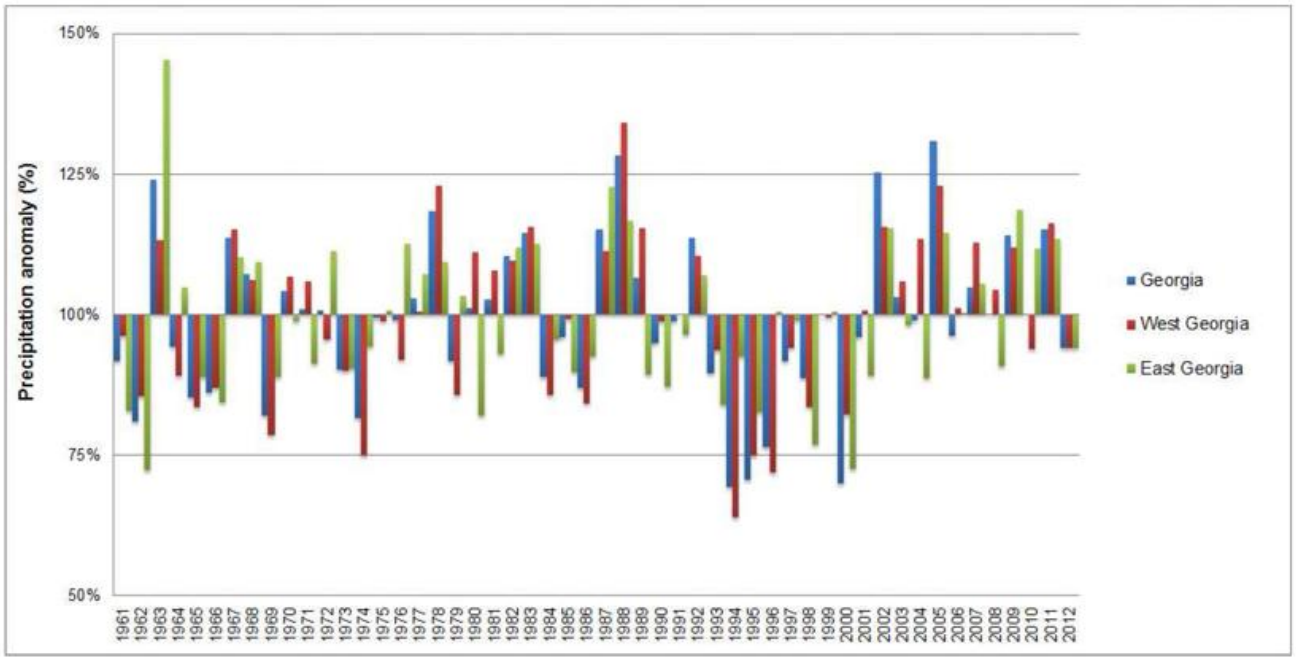


***Fig. 2.47** : Time series of precipitation totals or anomalies Georgia*
(Diagrams as provided by the NHMSs)

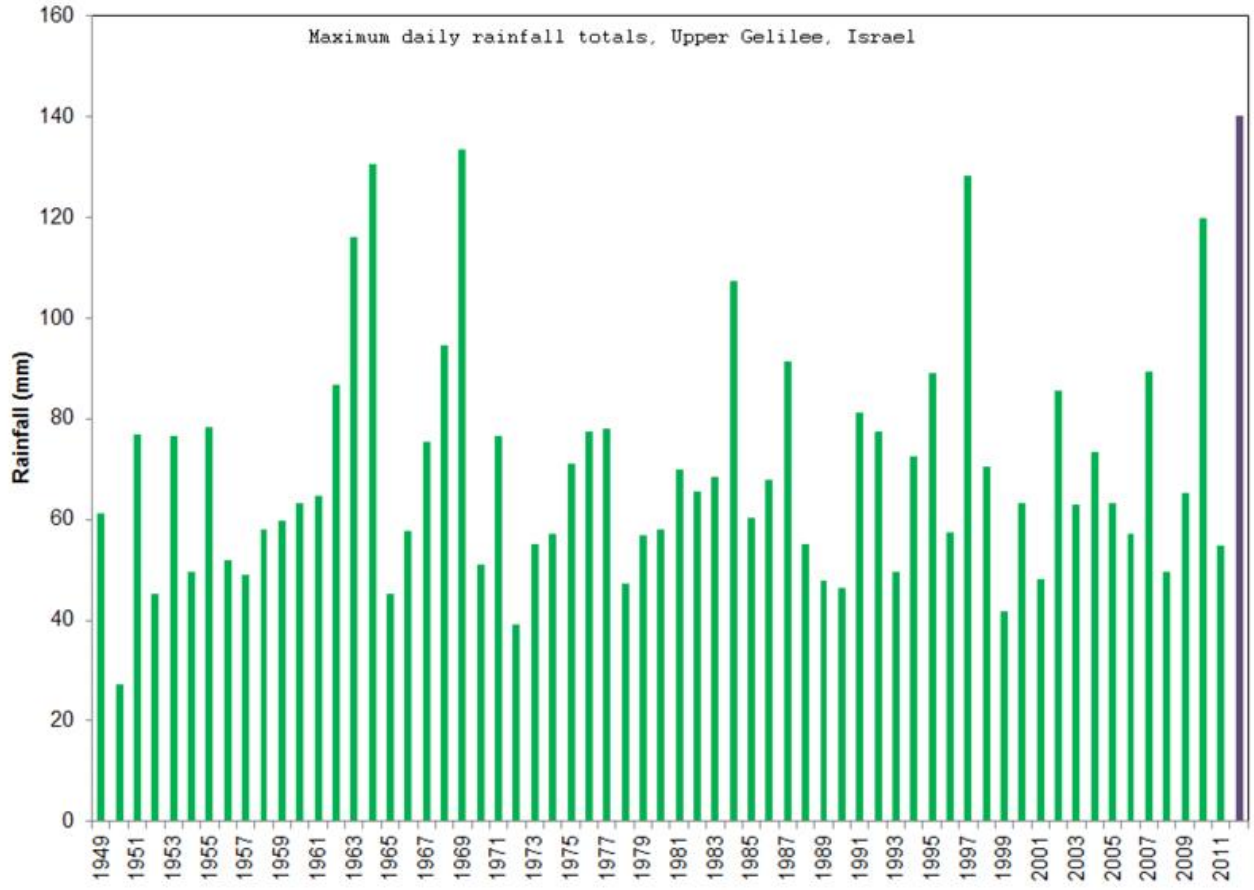


***Fig. 2.48** : Time series of maximum daily precipitation totals for Upper Galilee, Israel*
(Diagrams as provided by the NHMSs)

Sunshine

Note:*The sunshine duration time series (Fig 2.49 to 2.53) are generally shorter than those for temperature or precipitation. Germany, Denmark and Slovakia provide annual totals of the sunshine duration while Russia provided anomalies from the normal period 1961-1990.*

All graphs show a rising trend of the sunshine duration at least since 1980, partly longer. Denmark has the longest time series starting 1920 which shows the strong possible variability. The sunniest year was 1947, with 1.878 hours, and the least sunny was 1987, with 1.287 hours. Since 1980, the trend has been towards more hours of sunshine and on the other hand less cloud cover. Considering time series of sunshine duration changes in observing techniques may cause some problems in comparing older and newer observations as is stated by Denmark with the following remark: "DMI has since 2002 observed the hours of bright sunshine using measurements of global radiation instead of measurements from a traditional Campbell-Stokes sunshine recorder. For that reason "new" and "old" hours of bright sunshine cannot directly be compared. It should also be noted that all values before 2002 are adjusted as best as possible ensuring comparability to the new level. For details on that, see DMI Technical 02-25: Ellen Vaarby Laursen, Stig Rosenørn: New hours of bright sunshine normals for Denmark, 1961-1990.
http://www.dmi.dk/fileadmin/user_upload/Rapporter/TR/2002/tr02-25.pdf"

Central and Western Europe:

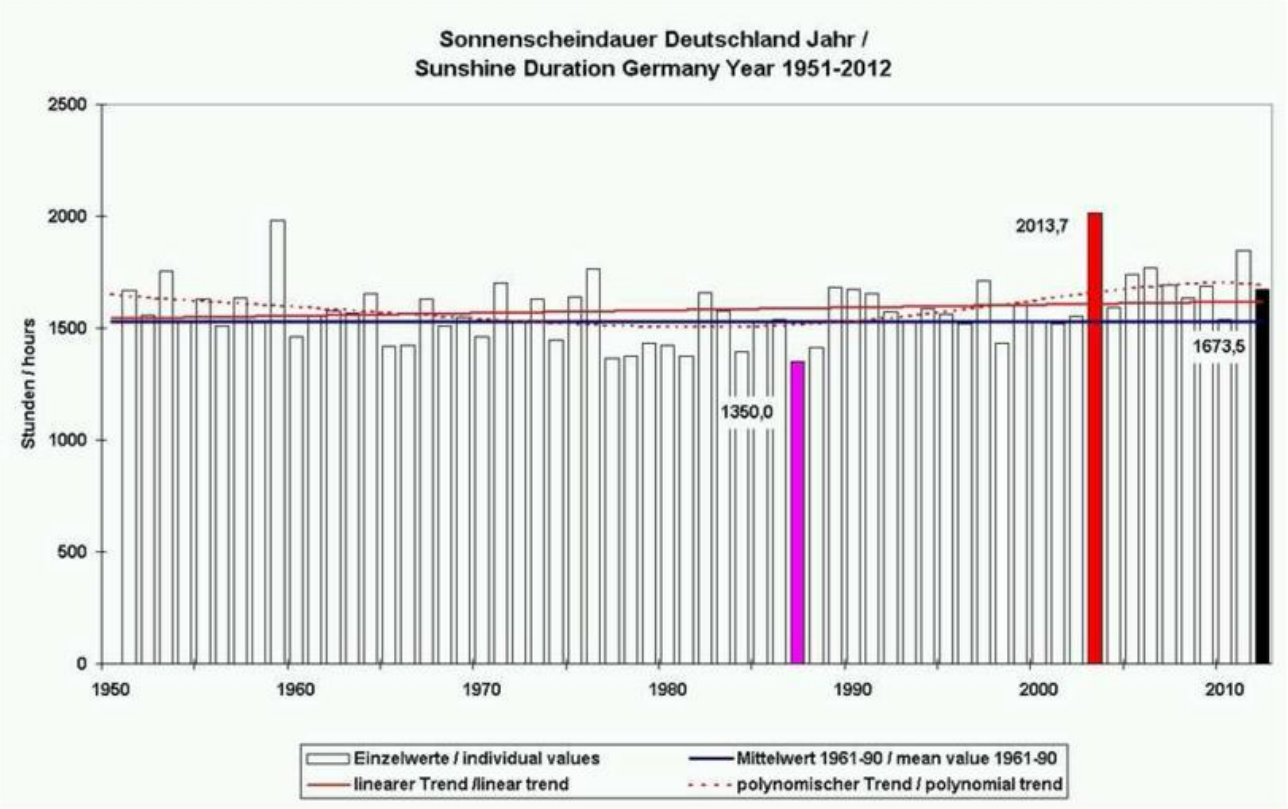


***Fig. 2.49** : Time series of annual sunshine duration totals Germany*
(Diagrams as provided by the NHMSs)

Central and Western Europe:

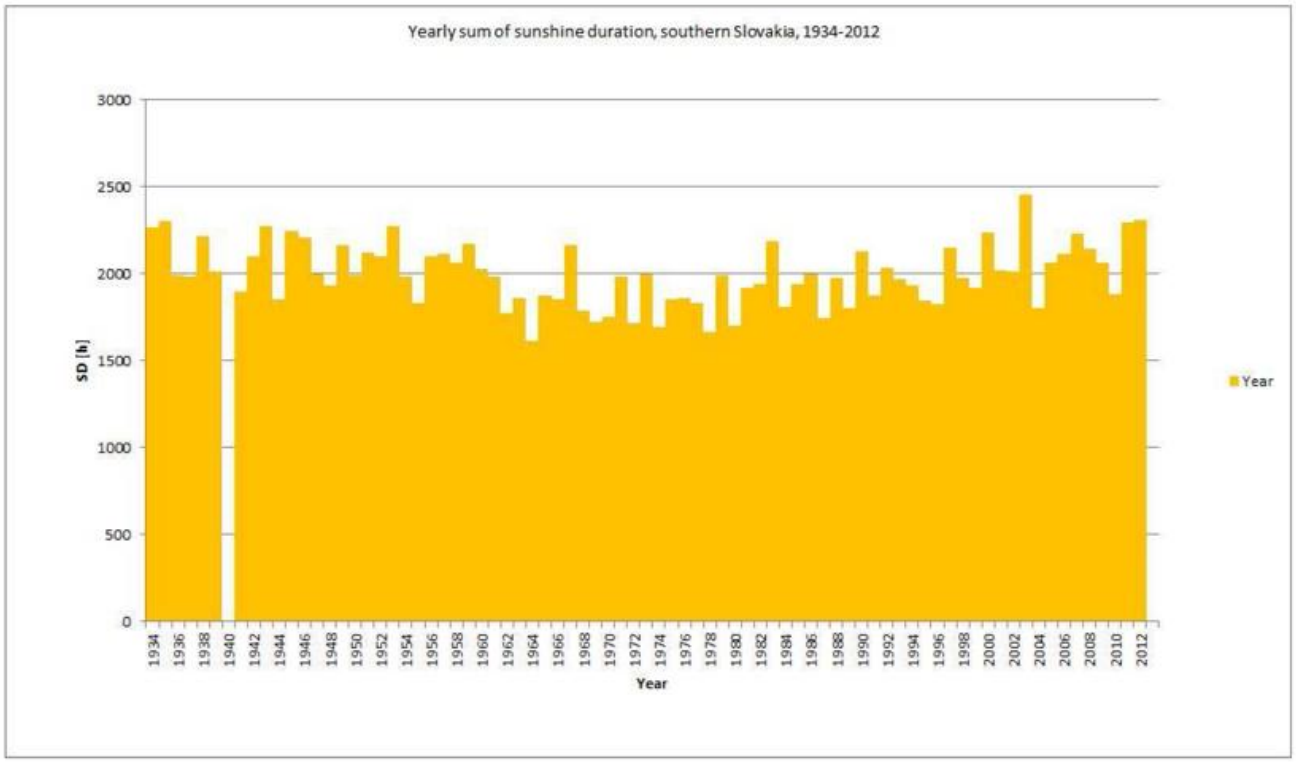


***Fig. 2.50** : Time series of annual sunshine duration or anomalies for southern Slovakia (Diagrams as provided by the NHMSs)*

Nordic and Baltic Countries:

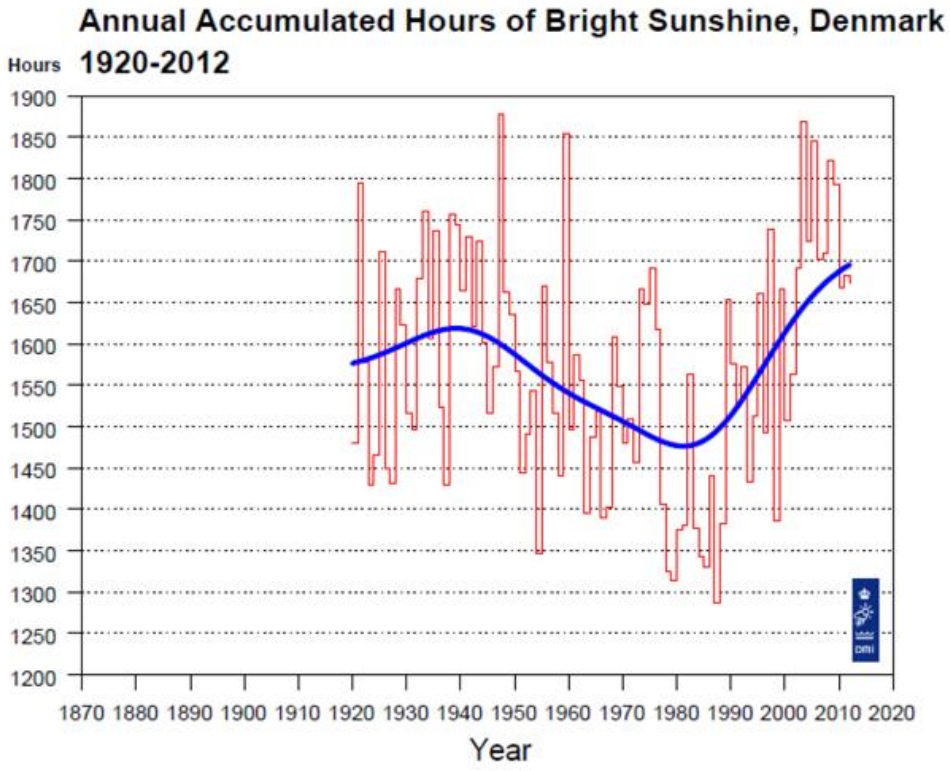


***Fig. 2.51** : Time series of annual sunshine duration Denmark*
(Diagrams as provided by the NHMSs)

Mediterranean, Italian and Balkan Peninsula:

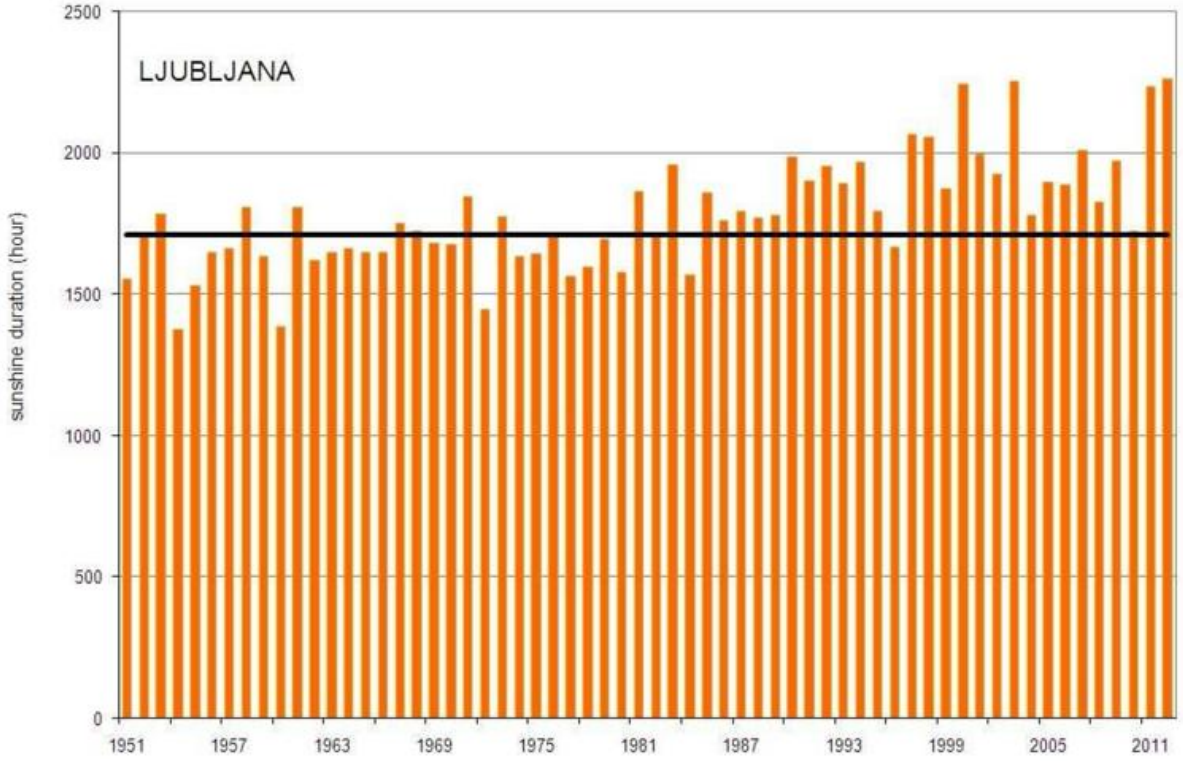


***Fig. 2.52** : Time series of annual sunshine duration for Ljubljana, Slovenia*
(Diagrams as provided by the NHMSs)

Eastern Europe:

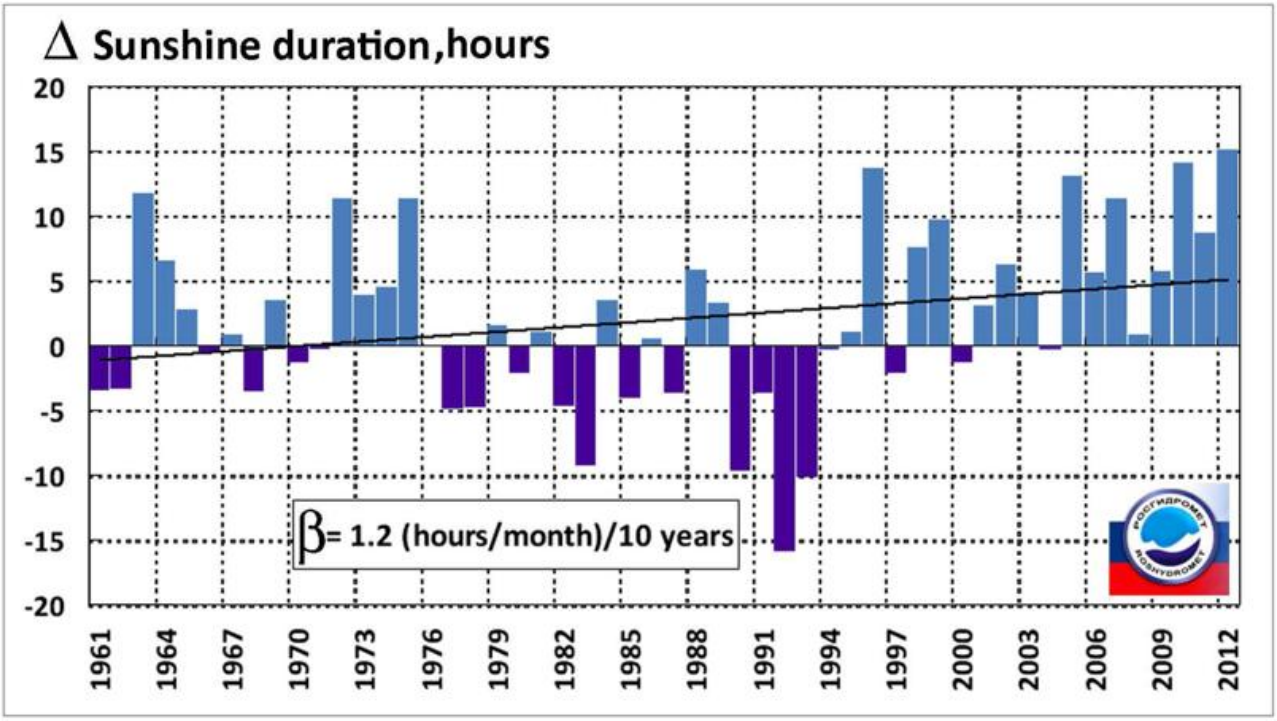


***Fig. 2.53** : Time series of annual sunshine duration totals European Russia (Diagrams as provided by the NHMSs)*

Trends of temperature and precipitation

Figure 2.54 shows the spatial distribution of trends for the mean annual temperature and the annual precipitation total as well as the cold spell duration index and very wet days for the time series 1951 - 2012 for stations in Europe contributing to the ECA&D data set. Less stations than in 2011 are presented but the result ist not different. A warming trend for most of Europe can clearly be seen for the mean annual temperature. Corresponding to this warming trend the trend of the cold spell duration index (CSDI) is negative for many stations on the continent.

For the annual totals of precipitation we can state roughly a different behavior between the south (often unsignificant but partly cearly negative) and the north (more positive values) and the regions especially influenced by the North Atlantic seem to show clearer positive trends. This feature may eventually be explained by the influence of a warming North Atlantic. The distribution of trends for extremely wet days shows a generally similar pattern with differences at single stations.

Trends of Climate Indices for Temperature and Precipitation (ECA&D)

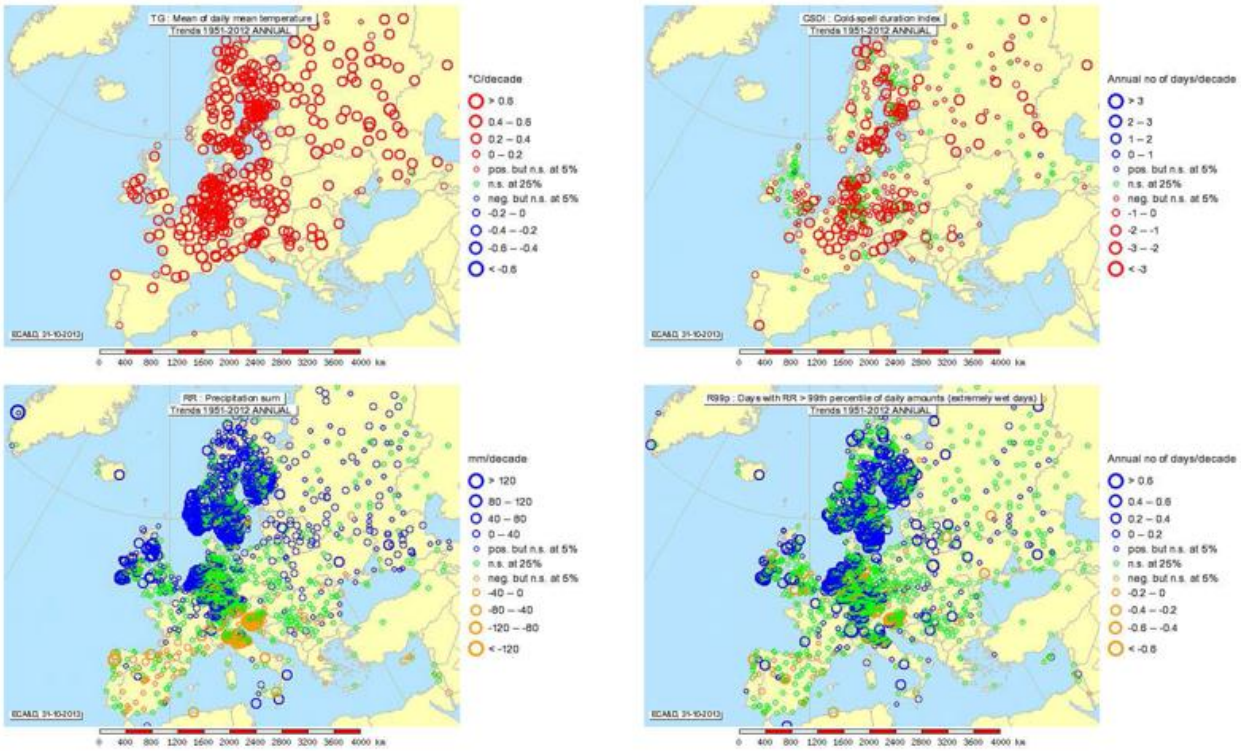


Fig. 2.54: *Trends of Selected Climate Indices 1951 to 2012 (Source: ECA&D, http://www.ecad.eu):*
Upper left: TG (Mean of daily temperature),
Upper right: CSDI (Cold spell duration index),
Lower left: RR (Precipitation sum),
Lower right: RR99p (Days with RR>99th percentile of daily amounts (extremely wet days)

Long-term temporal development of related phenomena

Fig. 2.55 and 2.57 illustrate phenomena that are closely related to the temporal development of the air temperature.

In Fig 2.55 a ranking of the North Sea surface temperature since 1969 is shown. Note that the 'year' in this case refers to December to November. Presented are the ranks of the years 1969 to 2012. From 1988 until now most (all except 5 years) values are warmer than the median while before 1988 most values were colder. 2012 was on the warm side and warmer than 2011..

In Fig 2.56 the anomalies (reference 1971-2000) of the mean sea level at the station Wladyslawowo in Poland is shown. A positive trend of 0.22 cm per year results from this time series. The rising mean sea level is a climate indicator for global warming. The sea level increase is caused by melted ice and warmer water. Sea level is observed in many countries with coastal stations. For instance Sweden has 23 stations for observation and the longest series is Stockholm with measurements since 1774. Though a graph is not available for 2012 consistent results are for instance presented on the Web (http://www.smhi.se/polopoly_fs/1.8963!Swedish_Sea_Level_Series_-_A_Climate_Indicator.pdf).

DMI has observed the surface air temperature (SAT) at Summit in the middle of the Greenland ice cap in 3.2 km altitude since 1991 (Fig 2.57). DMI's observations show that the temperatures typically range from -60 to -50°C in winter and from -10 to 0°C in summer. It is not unusual to observe positive temperatures on a few days during a year. It is a fact in 10 different years out the 18 years of observations. Observations from July 2012 (Fig. 3.29 in the monthly survey) showed that temperature for several days in a row exceeded 0°C, not seen before. In the days of 11 - 14 and 16th July the temperatures were above 0 °C. The observations confirm the NASA satellite observations of melting in these days.

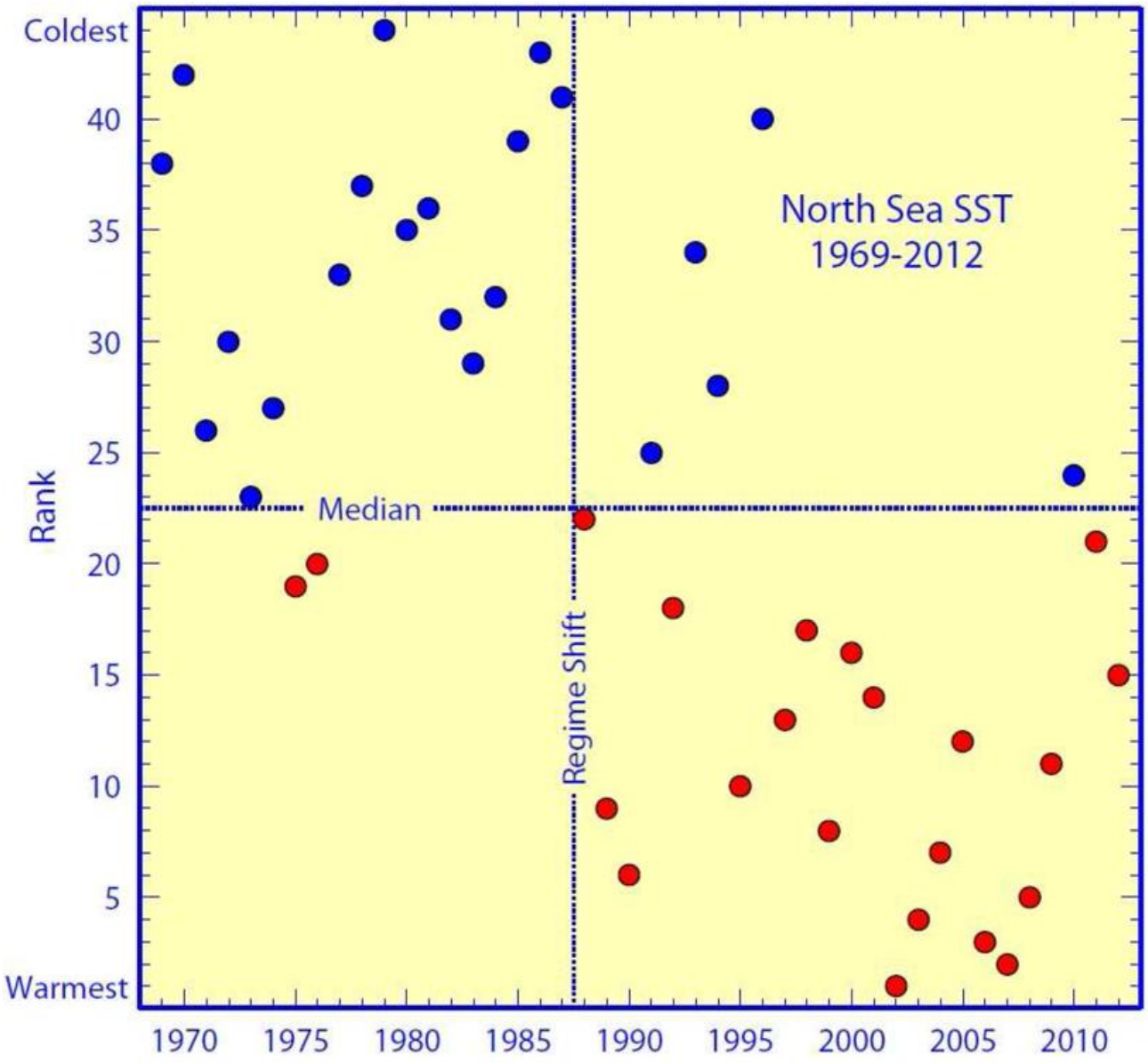


Fig. 2.55: *Rank statistics of the North Sea SST form 1969 to 2012*
(Source: Bundesamt für Seeschiffahrt und Hydrographie BSH)
(year2012 means December 2011 to November2012)

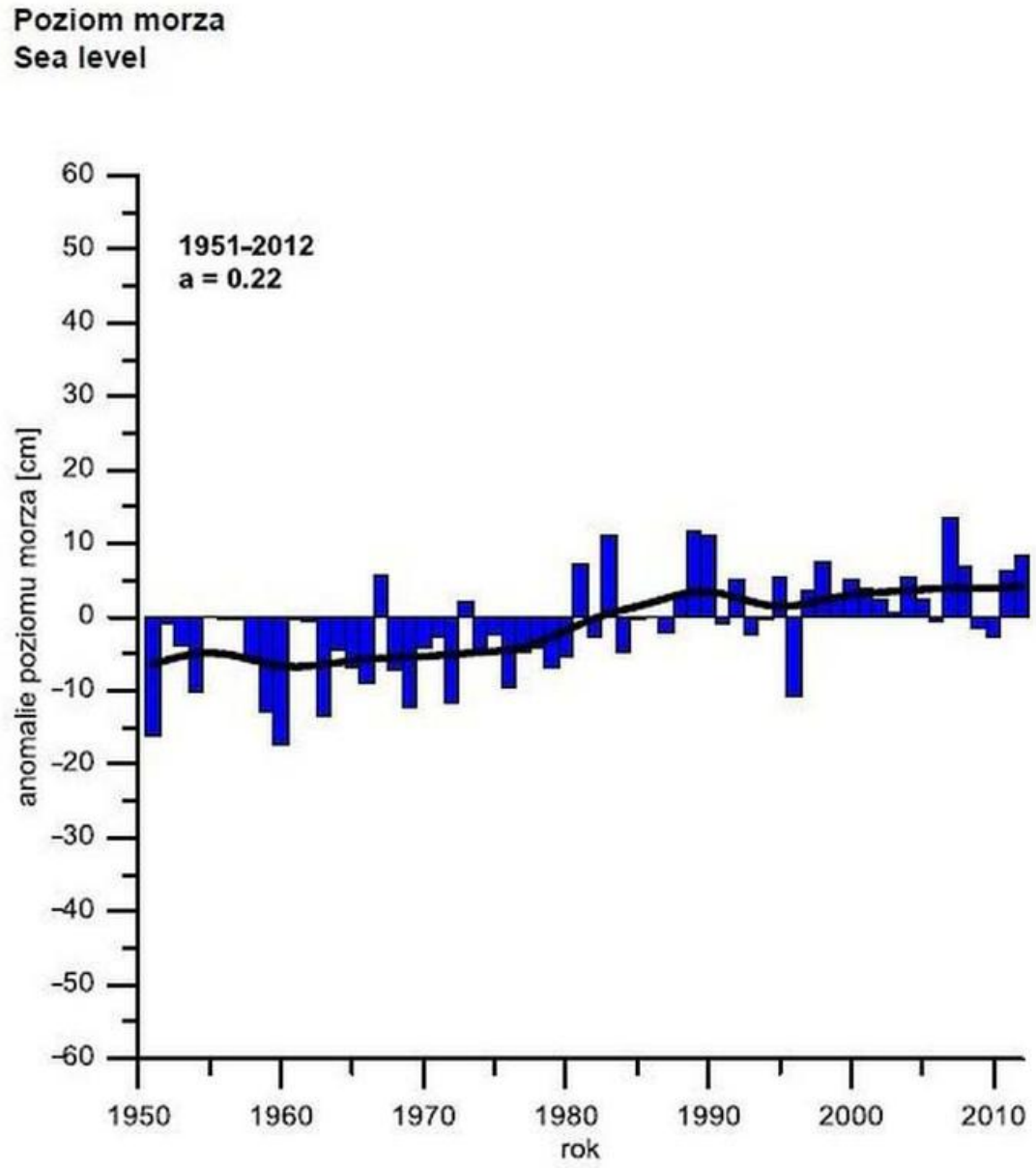


Fig. 2.56: *Mean annual sea level anomalies in Wladyslawowo (1951-2012) in relation to normal values 1971-2000 smoothed by 10-years Gaussian fileter (black line) and the value of linear trend (cm/year)*

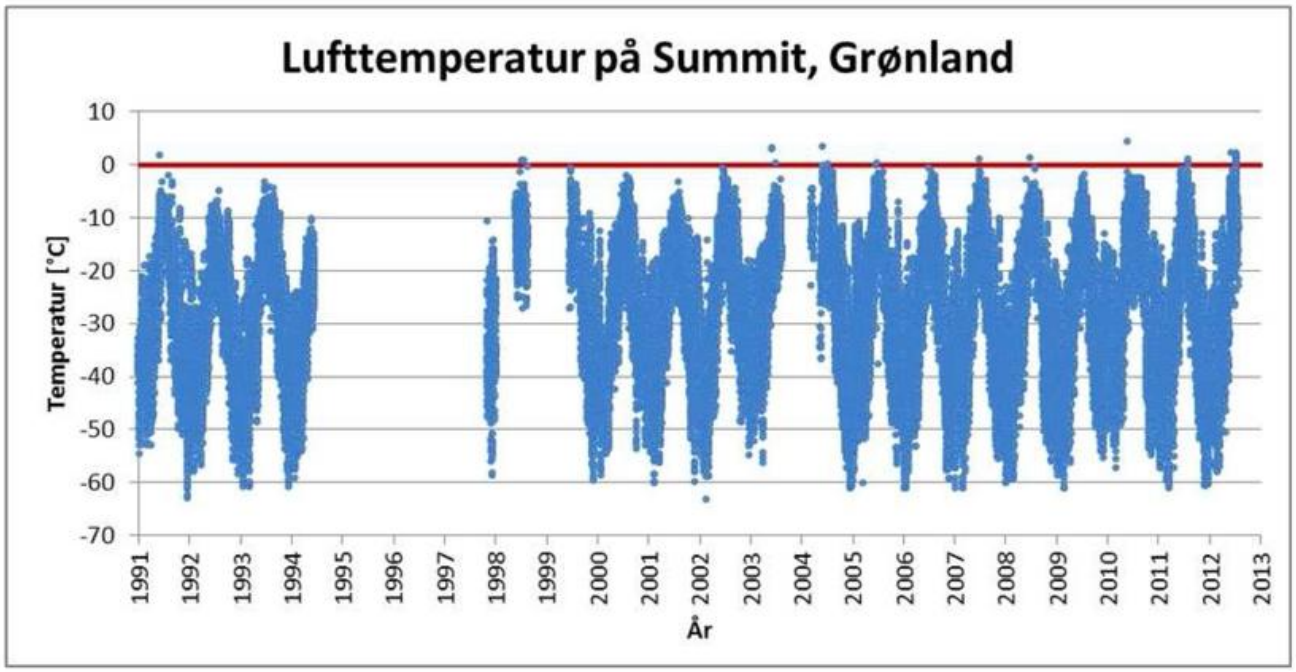


Fig. 2.57: *Surface air temperature (SAT) at Summit in the middle of the Greenland ice cap in 3.2 km altitude since 1991, by DMI (see also Fig 3.29).*

Socio-economical Impacts of Extreme Climate or Weather Events:

Countries have reported socioeconomic impacts of climate extremes or weather events. This was done partly in a given structure (WMO guiding table for country submission of information on extreme climate events) or the information is part of the regular monthly reports on the internet or it was seperately reported. Still this information is heterogeneous and does by far not give a complete overview. Not only do the administrative structures differ so that the information cannot easily be gathered but also many kinds of impact is difficult to be estimated. In the following only a short extract will be given.

Figure 2.58 shows the percentages of casualties (fatalities or injured persons) due to 6 kinds of events. Numbers of casualties were the only numbers that can be presented in form of a diagram. Conclusions should be drawn only with caution. The total number of cases for the figure was 511 which will be certainly underestimated. Moreover the reported numbers were in some cases not fix but like 'hundreds' or 'few'. In this case '100' resp. 'zzz' was taken to produce the graph. The economic damage was estimated as well by some countries but the information is not sufficient to be presented with any reliability of representativeness. The figures of economic damages will be summarized individually below.

The largest portion in Figure 2.58 is 'Flood'. This includes floods by all kinds of causes as precipitation of longer duration, influence of snow melt or extreme precipitation with high intensity. The report of Russia contributed the largest number here. The next large portion is 'Cold'. Reports came from Bosnia and Herzegovina, Poland, Czech Republic, Germany, Austria and Romania. This was mainly the intense and spatially extended cold spell in January/February and had probably in 2012 a much greater portion than in other years but the reports do certainly not cover all victims. 'Heat' on the other hand is surely underestimated in the graph because only one country reported a vague number. 'Lightning' was relatively often reported by several countries (Germany, Georgia, Turkey). 'Storm' includes storm depressions of synoptic scale as well as tornadoes. Two severe tornadoes (Portugal and Poland) make most of this number in 2012. 'Snow' includes snowload and snowdrift. The report came from Bulgaria.

Much economic damage is usually connected with floods, storm, cold spells (all kinds of frost, snow or ice), hail, drought or extreme heat. There are some figures which are summarized in the following but much of this kind of damage cannot be estimated.

- Thunderstorms with hail or lightnings caused nearly 100 Mio Euro damage in Georgia and Austria, most of it in Georgia (90 Mio).
- Flooding caused about 12 Mio Euro together in Finland (6 Mio), Austria and Bulgaria
- Economic damage by drought was estimated by Hungary to 1.8 Mio Euro.
- Economic damage due to forest fires was reported by Bosnia-Herzegovina with 65 Mio Euro.
- Economic damage due to snow was estimated by Austria to 32 Mio Euro.
- Economic damage due to local storm was estimated by Cyprus with 40 000 Euro.

The economic damage especially of drought cannot be given in reliable figures. The only figure stems from Hungary. But many other countries reported of unfigured damage on the agricultural sector. Beside the agricultural sector drought as well caused water shortages for households, hampered shipping on rivers or affected live in rivers or lakes due to lack of oxygen. Also in the case of forest fires there are other kinds of descriptions of the impact that cannot easily be transformed into Euro: Bulgaria reported a burned area of 63 Mio km² and Greece reported a burned area of 18 Mio km².

No figures are available for instance for the economic impact caused by snow and ice upon the sector of traffic (on railway, roads or in the air).

Turkey is the only country that gives graphs of percentages of the occurrence of types of extreme climate or weather events in 2012 (Fig. 2.60) as well as a time series of the development of weather related damages starting in 1940 (Fig. 2.59). 'Weather related damages' is here given in number of cases not in a monetary value.

RCC-CM has developed a 'Knowledge database on euROpeaN climatE extRemes' (KRONER) which integrates information from several already existing and well-known databases and completes them. Figure 2.61 shows the relation of the four kinds of reported events 'Cold', 'Flood', 'Heat' and 'Drought' in 2012 as extracted from this database. 60 country-specific events (mainly taken from EM-DAT) build the collective. Cold spells (37 countries) have the greatest relative part in 2012 followed by floods (14 countries), heat (6 countries) and drought (3 countries).

KRONER gives also numbers for fatalities for 'Cold' (855) and 'Flood' (33). This makes the uncertainty of figures for socioeconomic impacts obvious: the figures based upon the reports of NMHSs were 144 resp. 198.

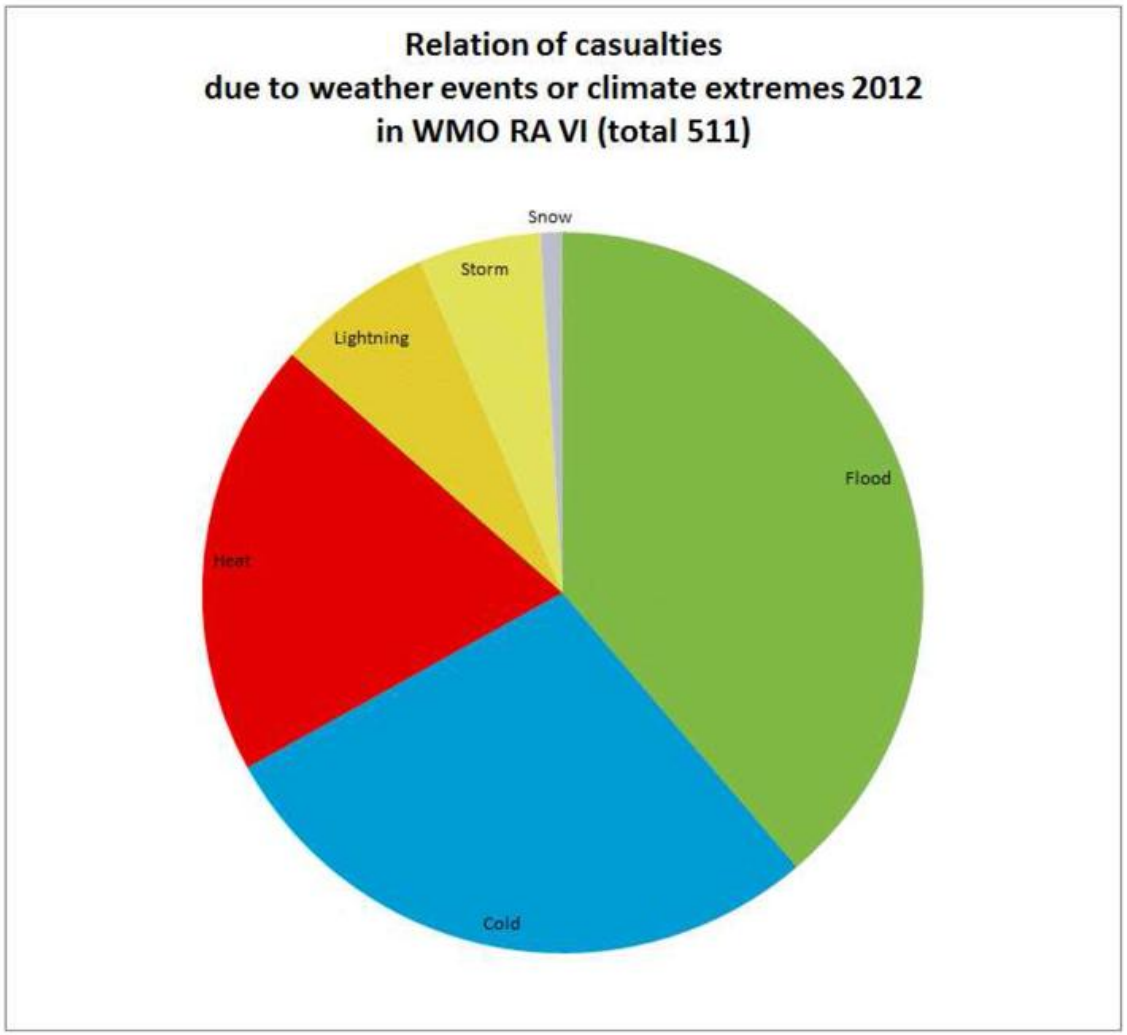


Fig. 2.58: *Relation of casualties due to extreme events based on NMHSs reports 2012*

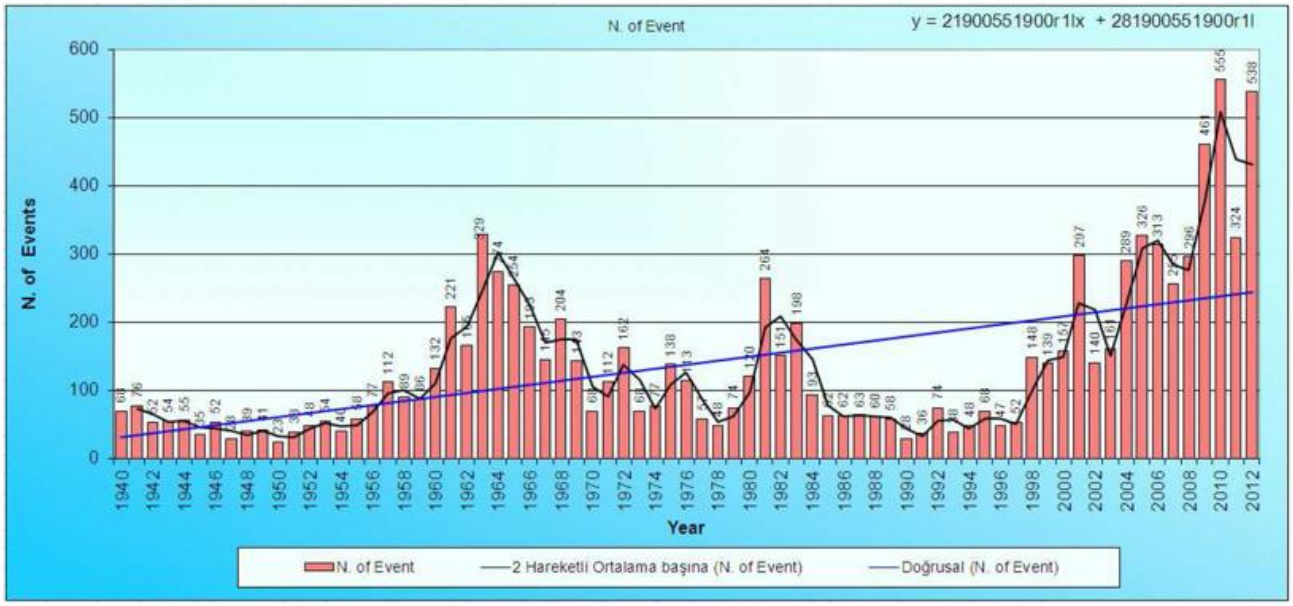


Fig. 2.59: *Temporal Development of the occurrence of weather-related damages in Turkey 2012*
(Source: Turkey http://www.dmi.gov.tr)

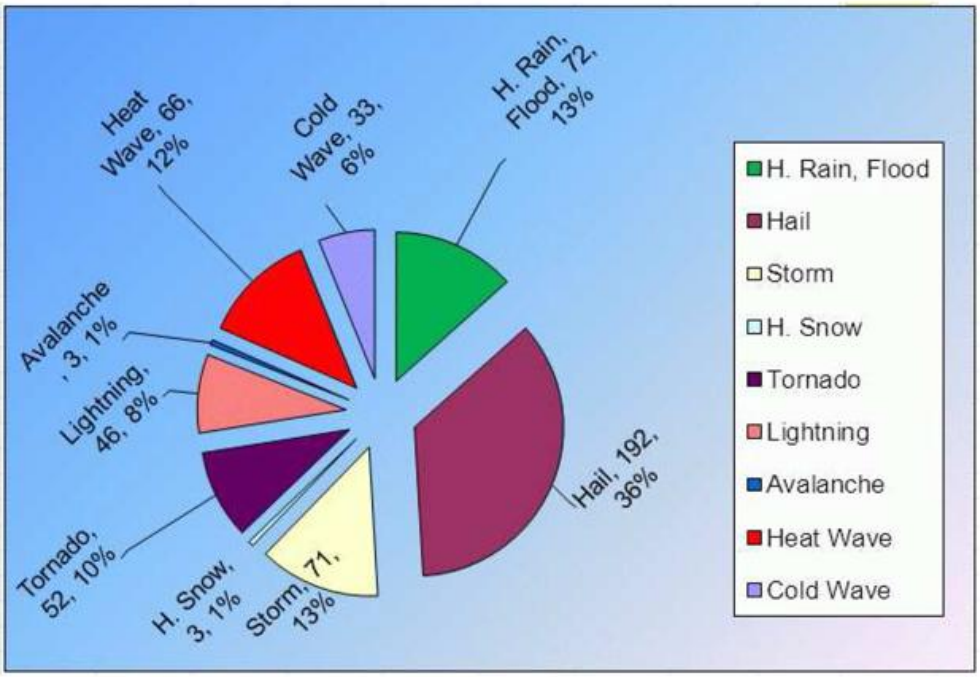


Fig. 2.60: *Percentages of the occurrence of extreme climate or weather events 2012*
(Source: Turkish State Meteorological Service)

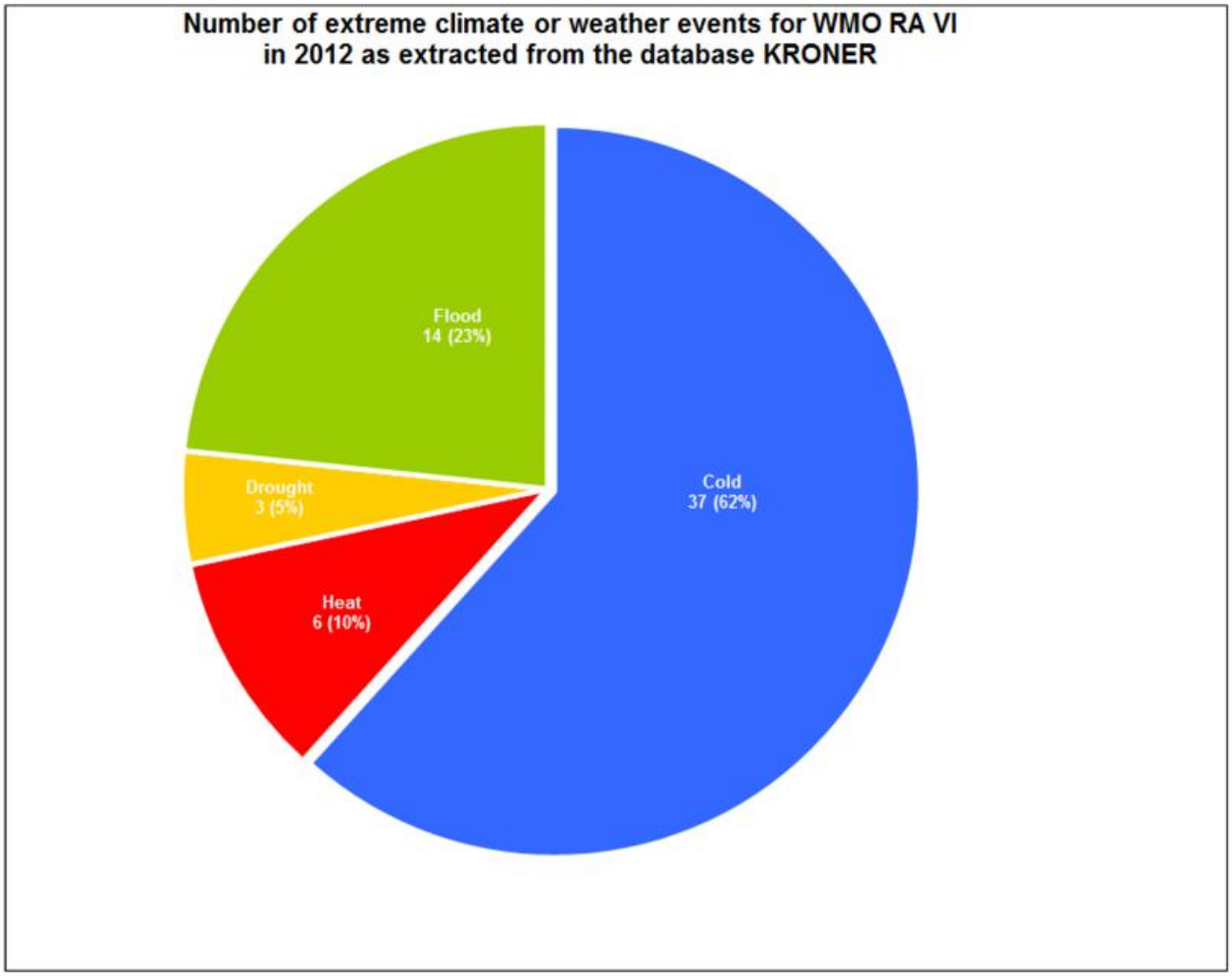


Fig. 2.61: *Percentages of selected climate-related extreme Events in WMO RA VI 2012 (Source: RCC-CM)*

Seasonal Survey

Winter

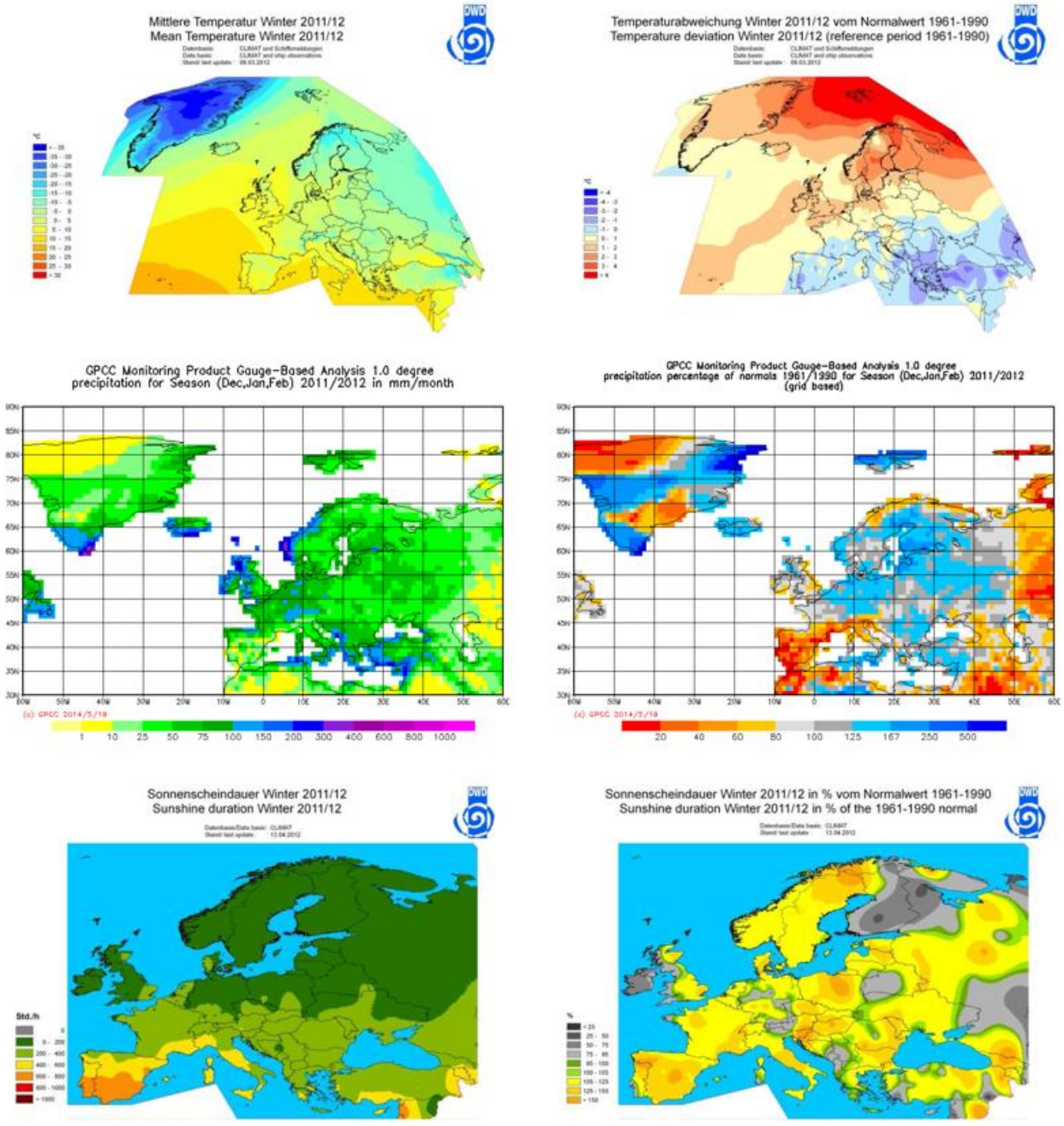


Fig. 2.62: *Means and anomalies (reference 1961-1990) of temperature, precipitation and sunshine duration in winter 2012*
Source: http://www.dwd.de/rcc-cm

Temperature:

Winter was warmer than normal as a mean over Europe according to the analysis from E-OBS data but only on rank 32 in the time series from 1951 to 2012 for the mean daily mean of the temperature. With respect to the daily maximum and minimum temperature winter 2011/2012 was on rank 36 resp. 26. The spatial mean of the daily mean temperature was 0.7°C +/- 0.54. With respect to the defined subregions 'Central and western Europe' had the greatest negative anomaly with -0.9 K followed by 'Nordic and Baltic countries' with -0.8 K. The subregion 'Middle East' had the highest positive anomaly of +0.5 K and the 'Mediterranean, Italian and Balkan Peninsula had a mean positive anomaly of +0.3 K. The anomaly fields for the temperature changed completely during winter 2012. In December 2011 there were positive anomalies over Russia, continental Europe, Scandinavia and the Arctic. In January 2012 there were mostly everywhere positive anomalies, especially in the Arctic, except in the Mediterranean Sea area. And in February there was an extent area of negative anomalies covering Russia, continental Europe and the Mediterranean. Again it was very warm in the Arctic and warm over the North Atlantic. The winter mean shows negative anomalies in southern Europe and the Middle East and warm anomalies northward with values of >= 4 K in the Arctic region. From the last decade of January 2012 to mid of February lasted a severe and extended cold spell which cost about 600 people their lives. The anomaly of the cold spell index for the complete winter shows impressively the surplus of cold spell days. But during the 2nd half of February it became very warm so that winter 2012 is characterized by a great temperature range. In UK for instance between 11 February (-15.6 °C) and 23 February (+17.7 °C) the rather unusul difference of 33.3 K was recorded at Lincolnshire. Austria reported an even larger range of -23.5 °C for the minimum temperaturea on 8 February to +20.9 °C for the maximum temperature on 24 February (a difference of 44.4 K) at the station Güssing. In some parts of eastern Spain it was the most important cold wave since February 1956.

Precipitation:

The winter season had drought conditions especially on the Iberian Peninsula, southern England and the western Mediterranean Sea region. For instance Portugal had precipitation totals for the period October 2011 to February 2012 mostly below 75 percent of the 1971-2000 reference (Boletim climatologico mensal - fevereiro 2012), February 2012 was the driest February since 1931 and winter 2011/2012 was the driest since 1931 in Portugal as well. As well in southern and eastern UK the winter precipitation totals were below 70 % of the norm.(http://www.metoffice.gov.uk/climate/uk/2012/winter.html). Under influence of the North Atlantic Ireland and Scotland as well as the westcoast of Scandinavia received much precipitation as well as the central and the eastern Mediterranean Sea. Also central Europe, eastern Europe and the Balkan Peninsula were wetter than normal. In Latvia winter 2011/2012 in total was the wettest in the last 90 years.

Sunshine Duration:

Winter 2011/2012 was sunny to very sunny in most of Europe with exception of Finland and northern Russia, parts of Belarus, parts of Germany, the western Alps and the southern Adriatic Sea, Ireland and western UK, and the Middle East and southern Russia. Eastern England and the British Midlands had one of their sunniest winters on record, while Ireland had one of its dullest. In the Netherlands the 1st decade of February was the sunniest in more than 100 years. Sunshine duration in Denmark was nearly 50 % above normal making winter 2011/2012 the sunniest in 49 years and the 2nd sunniest since 1920.

Drought

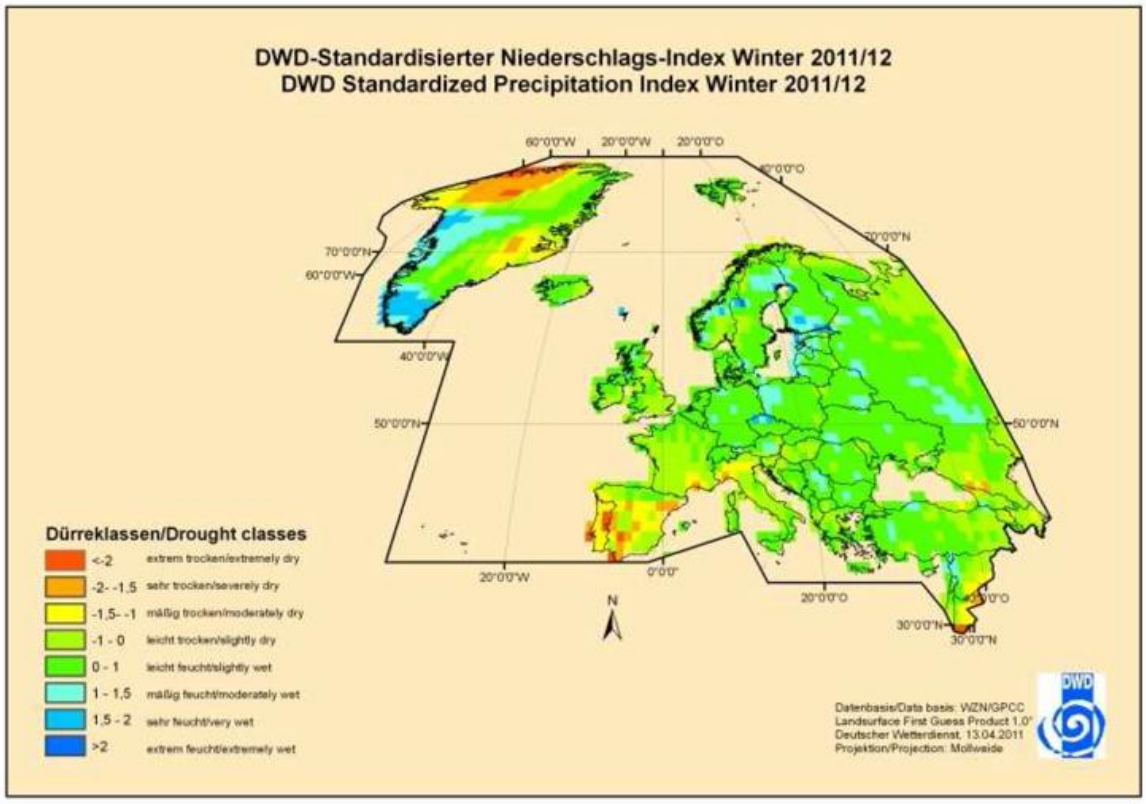


Fig. 2.63: Means of the modified Standardized Precipitation Index (DWD-SPI), winter 2012

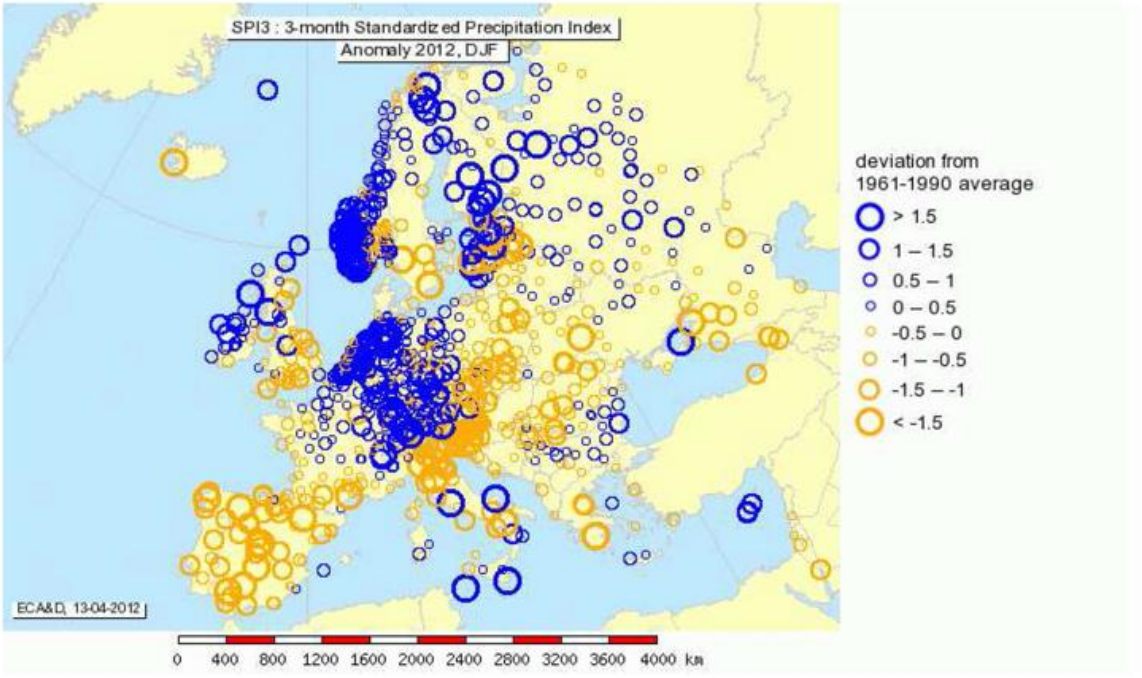


Fig. 2.64: Anomalies of the 3-month SPI (ECA&D) in Winter 2012

The winter season had moderate to partly extreme drought conditions especially on the Iberian Peninsula, southern France,Middle East and southern Eastern Europe.

- Portugal reported the driest February since 1931 and the driest winter since 30 to 70 years for some stations.
- In European Russia the vast area, from the White Sea to the southern Ural, received below-normal precipitation. Substantial precipitation deficit (5-30% of monthly normal) was recorded in the Ural region in February.Yekaterinburg received as little as 14mm of precipitation for the entire winter. This is the second time, when such low-snow winter is recorded for 120-year observations.

On the Iberian Peninsula the drought is mostly anomulous (Fig. 2.63, 2.64).

Spring

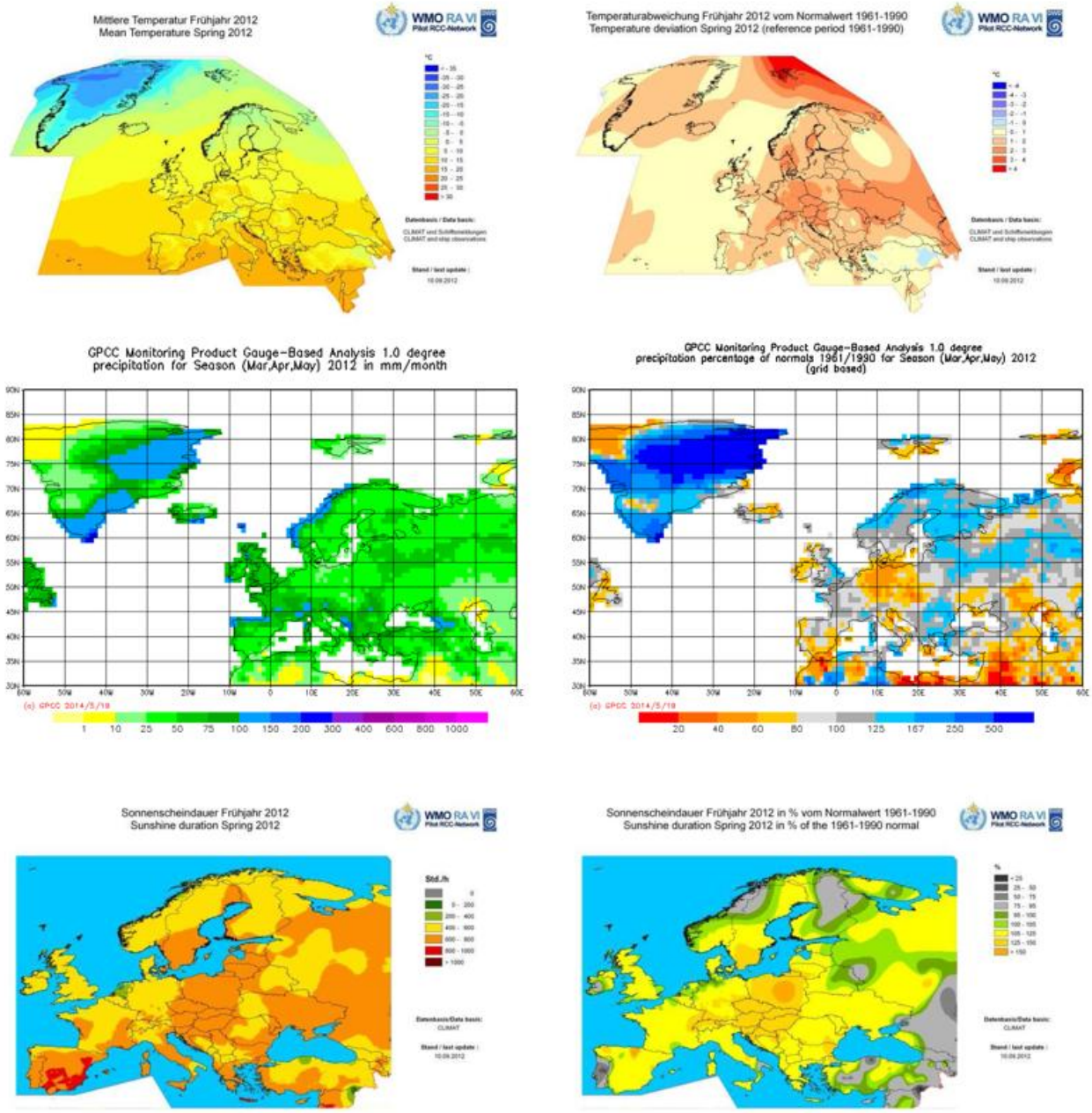


Fig. 2.65: *Means and anomalies (reference 1961-1990) of temperature, precipitation and sunshine duration in spring 2012*
Source: http://www.dwd.de/rcc-cm

Temperature:

Spring 2012 was warmer than normal over the whole RA VI area.According to the E-OBS analysis spring 2012 was on rank 6 of the spring daily mean temperature since 1950. The mean daily maximum temperature as well as the mean daily minimum temperature were on rank 5. The anomalies ranged from 0.3 K to 4 K for the individual countries (result of the DWD temperature analysis). According to the DWD temperature analysis the highest positive mean anomaly for spring 2012 was computed for the region 'Mediterranean, Italian and Balkan Peninsula' with +2.3 K. With +2.0 K the positive anomalies of the regions 'Middle East' and 'Eastern Europe' were the next warmest. The 'Nordic and Baltic countries' were relatively slightly warmer than 'Central and western Europe' with anomalies of +1.5 K resp. +1.2 K. The smallest positive anomaly is computed for 'Iberia' (+1.0 K).

In Norway spring 2012 was the 15th warmest spring since 1900. Warm days occurred remarkably more often than normal . Much less frostdays than normal were registered in Denmark. Extraordinarily warm was **March 2012** in many countries. In Lithuania March was remarkable by its higher warmth (2.3° warmer than normal), and especially in the middle, when daily temperature rose to a record high. Sporadic high temperature records were observed also in April and May. The coldest nights of spring in Lithuania, as appropriate, were observed in early March (locally to -17 °C). In the end of April the absolute maximum temperature record of Lithuania was exceeded (31 °C measured in Alytus). Switzerland reported summer temperatures with locally record-breaking values in **April 2012** while **May 2012** on the other hand brought low temperatures and snow even in 600 m asl. Southern Russia had the warmest May since 1891 and new records for the daily maximum temperature at stations were reported by Sweden and Romania.

Precipitation:

Spring 2012 was drier than normal in central, northwestern and southwestern Europe and the Middle East. Wetter than normal were the Balkan Peninsula, Norway, the Baltic region, parts of Russia as well as partly the western Mediterranean Sea region, UK and France.

Spring was the second wettest in Estonia since 1961.

March 2012 was drier than normal in most of the Region except in Norway as well as the Baltic States, European Russia and the Caucasus region. In several countries March 2012 was one of the driest March months for many years. In UK it was provisionally the driest March since 1953 and the fifth driest since 1910. In Germany March 2012 was on rank 4 of dry March months since 1881. Central Europe, the Balkan Peninsula and the Middle East as well as much of Norway were drier than normal also in **April 2012** when the other parts of the region were wetter than normal, especially western and southern Europe. In **May 2012** again central Europe but also southwestern, western and eastern Europe were drier than normal while southeastern Europe, especially the Balkan Peninsula was wetter than normal. Thus central Europe remained drier than normal troughout the whole season.

Sunshine Duration:

Spring 2012 was a sunny season in most of the RA VI area except the Middle East and some regions in the northwest, north and northeast. The map of sunshine duration and the maps of the number of fair or dull days correspond nicely. The sunshine surplus of the season was mostly determined by March and May. **March 2012** was unusually sunny especially in UK, southern Scandinavia, France, Germany, Austria, Switzerland, Italy, Poland, the Czech Republic, Slovakia, Hungary, Croatia and the Balkan Peninsula. Shannon Airport in Ireland recorded the highest spring sunshine duration since 1938 (when the station opened) and on **25 May 2012** its highest daily sunshine duration of 15.6 hours.

Drought

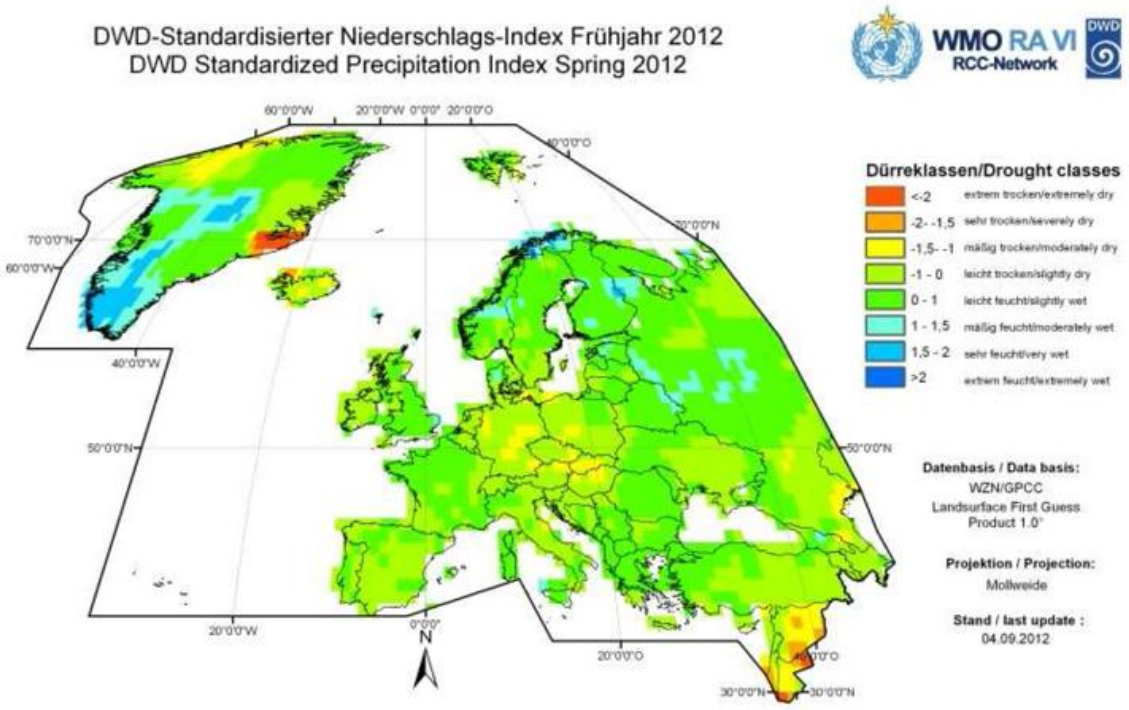


Fig. 2.66: *Means of the modified Standardized Precipitation Index (DWD-SPI), spring 2012*

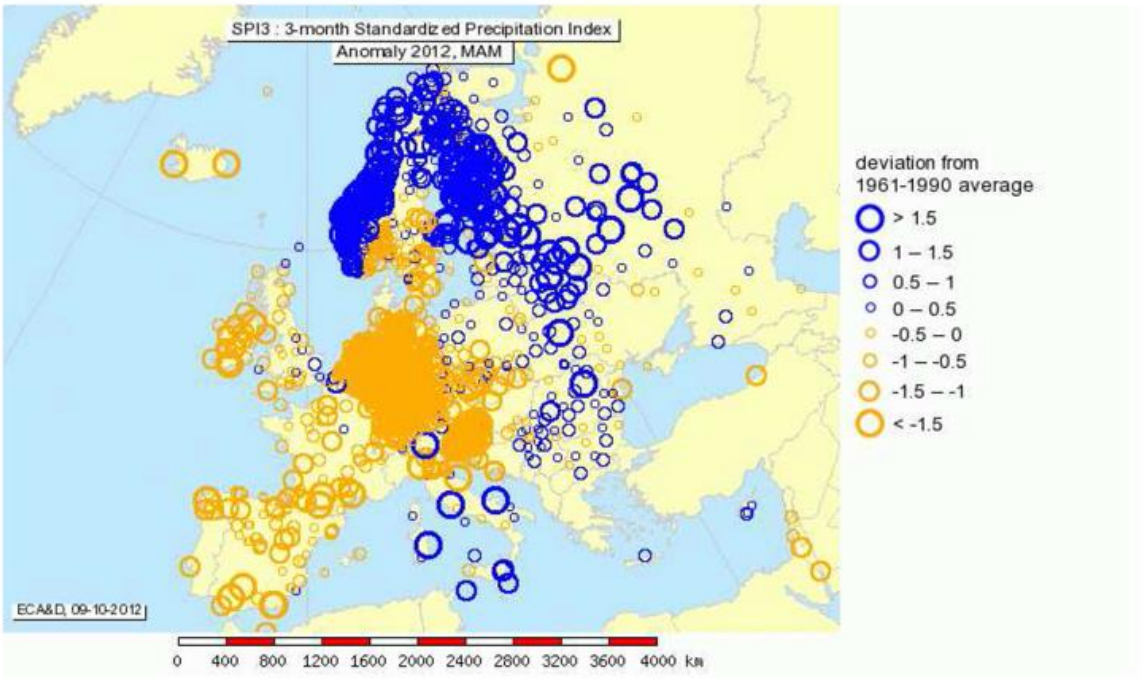


Fig. 2.67: *Anomalies of the 3-month SPI (ECA&D) in Spring 2012*

Spring 2012 was slightly to moderately dry in parts of Central Europe and southern Eastern Europe as well as on Iceland and slightly dry on the Iberian Penisula and on Ireland. It was moderately to severely dry in Middle East (Fig.2.66). Overall western, southwestern and central Europe and southern Scandinavia were anomalously dry in spring 2012 (Fig. 2.67).

Summer

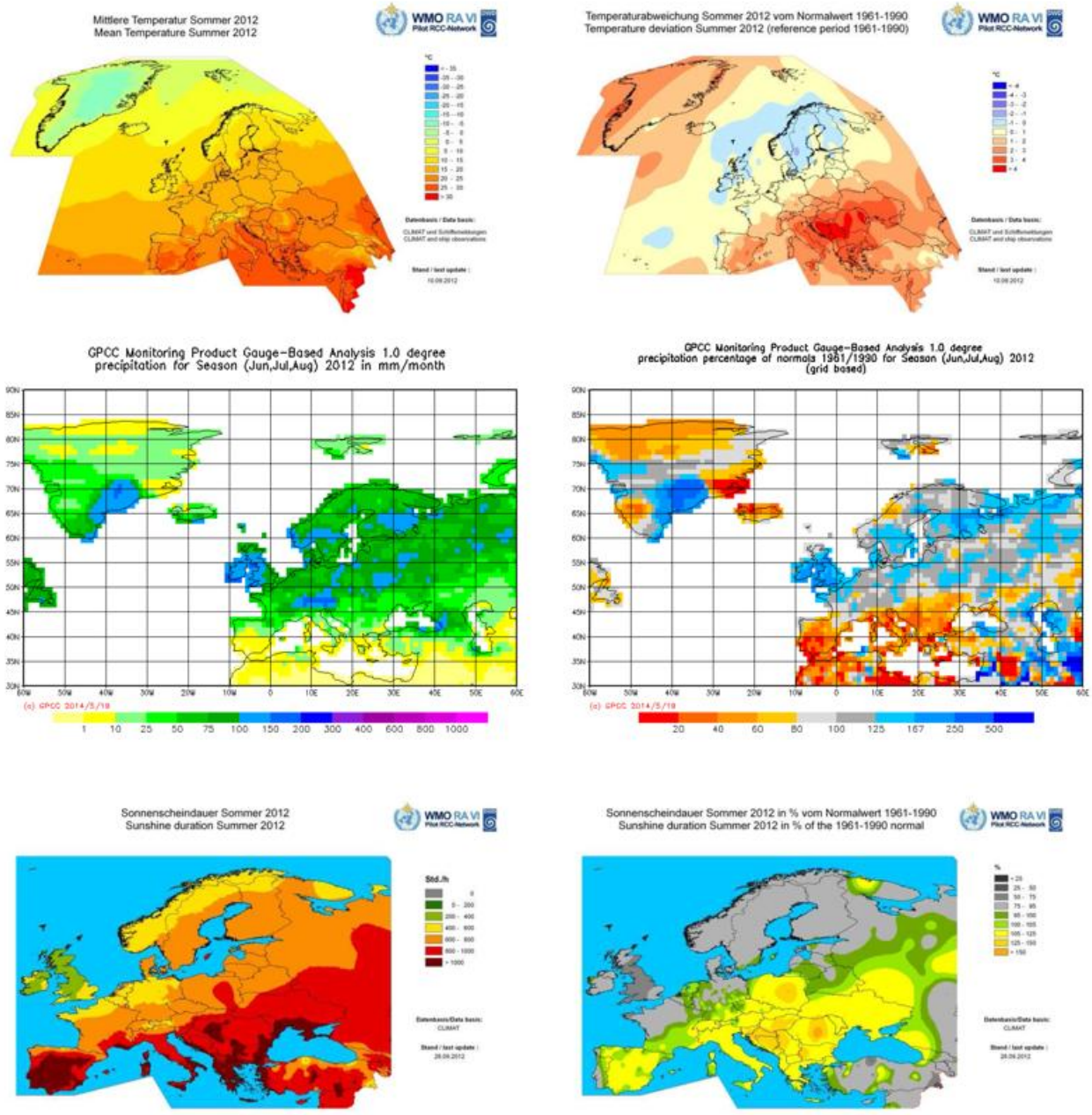


Fig. 2.68: *Means and anomalies (reference 1961-1990) of temperature, precipitation and sunshine duration in summer 2012*
Source: http://www.dwd.de/rcc-cm

Temperature:

Summer 2012 was warmer than normal in southern, southeastern Europe and Middle East as well as on Greenland and the northwestern North Atlantic. The positive anomalies were highest in Italy, the Balkan Peninsula and the Ukraine. According to the E-OBS analysis summer 2012 was on rank 3 since 1950 for rthe daily mean temperature as well as for the mean minimum teperature. For the mean maximum temperature it was on rank 6. According to the DWD analysis the mean anomalies of summer 2012 for the subregions were highest for 'Central and western Europe' (+3.1 K) and lowest for 'Middle East (+1.4 K). The positive seasonal anomalies were mostly determined by June and August. Summer 2012 was especially unusual warm in Greenland. Record breaking and near to record breaking summer and single months occurred in many places (in Upernavik (20.3°C) and Ittoqqortoormiit (18.6°C) in July), but also a single record breaking cold June 2012 at Tasiilaq at the east coast were seen! In August it became really hot in Switzerland when hot days were recorded in locations up to 500 m asl during a heat wave. Moldova was characterized by an abnormally hot summer. On August 7, on 50% of the area was recorded the highest maximum temperature of +37,2°C to 42,4°C for the entire observation period in the summer season which is 0,2-0,9°C higher than the former absolute highest values.

In Turkey 31 stations had broken their extreme maximum temperature record in summer 2012. Tropical days have occurred (Tmax >30°C) in 122 stations. Moreover in 40 cities, maximum temperatures exceeded 40°C. The summer 2012 was the warmest on record together with the summer of 2010 in Israel. Slightly colder than normal were large parts of Scandinavia and the northern British Isles, the northern North Atlantic and northern central Europe where June and July were relatively cold and only August was warmer.

Precipitation:

Summer 2012 was drier than normal in the Mediterranean region including the Iberian Peninsula as well as the Balkan Peninsula. It was as well dry on Iceland and the northern part of Greenland. A significant lack of precipitation during summer 2012 in south-east Greenland was also observed (e.g. 0 mm at Tasiilaq, 0.7 mm at Narsarsuaq and 21.6 mm at Qaqortoq in June 2012, and only 1.4 mm at Tasiilaq in July 2012). In Tasiilaq the summer precipitation was the third lowest on record (since 1895). In Danmarkshavn in north-east the summer precipitation was 8.2 mm, the second lowest on record (since 1949) together with summer 2003. It was on the other hand wetter than normal or close to normal in western, central, northern and eastern Europe and much of the Middle East. 5-daily precipitation totals fairly above the normal values occurred in the north around the Baltic Sea as well as in the drier Mediterranean region (Northern Italy and the Alps as well as on the Balkan Peninsula.

Sunshine duration:

Summer 2012 was sunnier than normal on the Iberian, the Italian and Balkan Peninsulas as well as eastern central Europe and the southwestern parts of eastern Europe. Northern and northwestern Europe and the Middle East on the other hand had less sunshine than normal. The dullest region was the United Kingdom except the northernmost and southeasternmost areas. More sunshine than normal was registered in southern Europe through all 3 months. The Balkan Peninsula received more sunshine than normal especially in June and July. On the British Isles and in central Europe especially June 2012 was the month with a high deficit of sunshine.

Drought

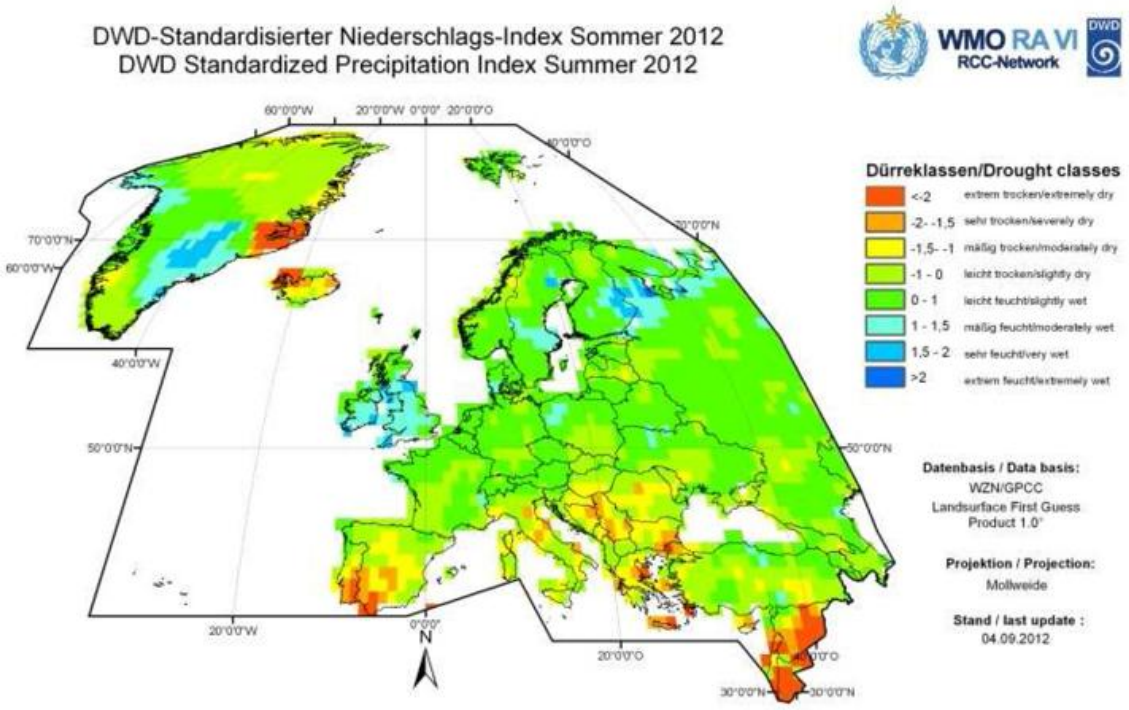


Fig. 2.69: *Means of the modified Standardized Precipitation Index (DWD-SPI), summer 2012*

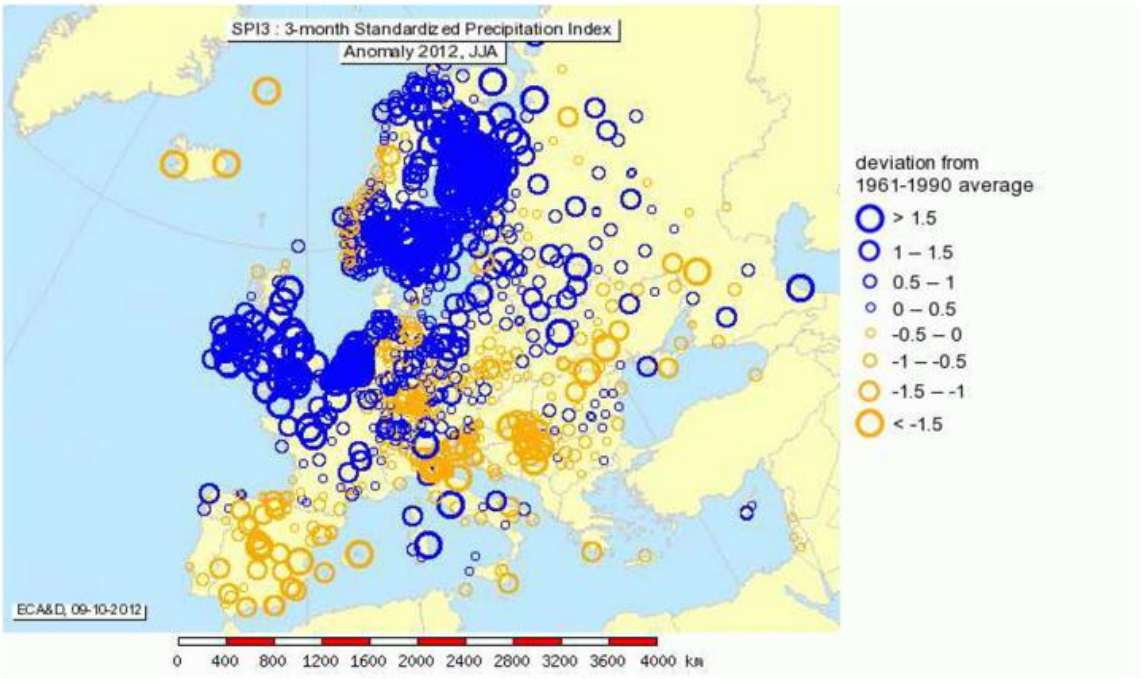


Fig. 2.70: *Anomalies of the 3-month SPI (ECA&D) in Summer 2012*

Summer 2012 was severely to extremely dry on Iceland, the southern Iberian Peninsula, partly the Italian and the Balkan Peninsula and in Middle East (Fig 2.69). It was overall on the Iberian Peninsula, on most of the Italian and Balkan Peninsula and also in parts of central and eastern Europe as well as on Iceland and the western coast of Scandinavia drier than normal. The anomalies of the 3-month SPI in the dry regions showed considerable dry deviations from the normal (<-1.5) on the Iberian Peninsula and the Mediterranean Sea region, the Alpine region, the Balkan Peninsula and southeastern Europe but also partially in central Europe.(Fig.2.70). In Moldova the total duration of rainless days per season reached 60 days, and the longest duration of continuous rainless days 26 days.

Autumn

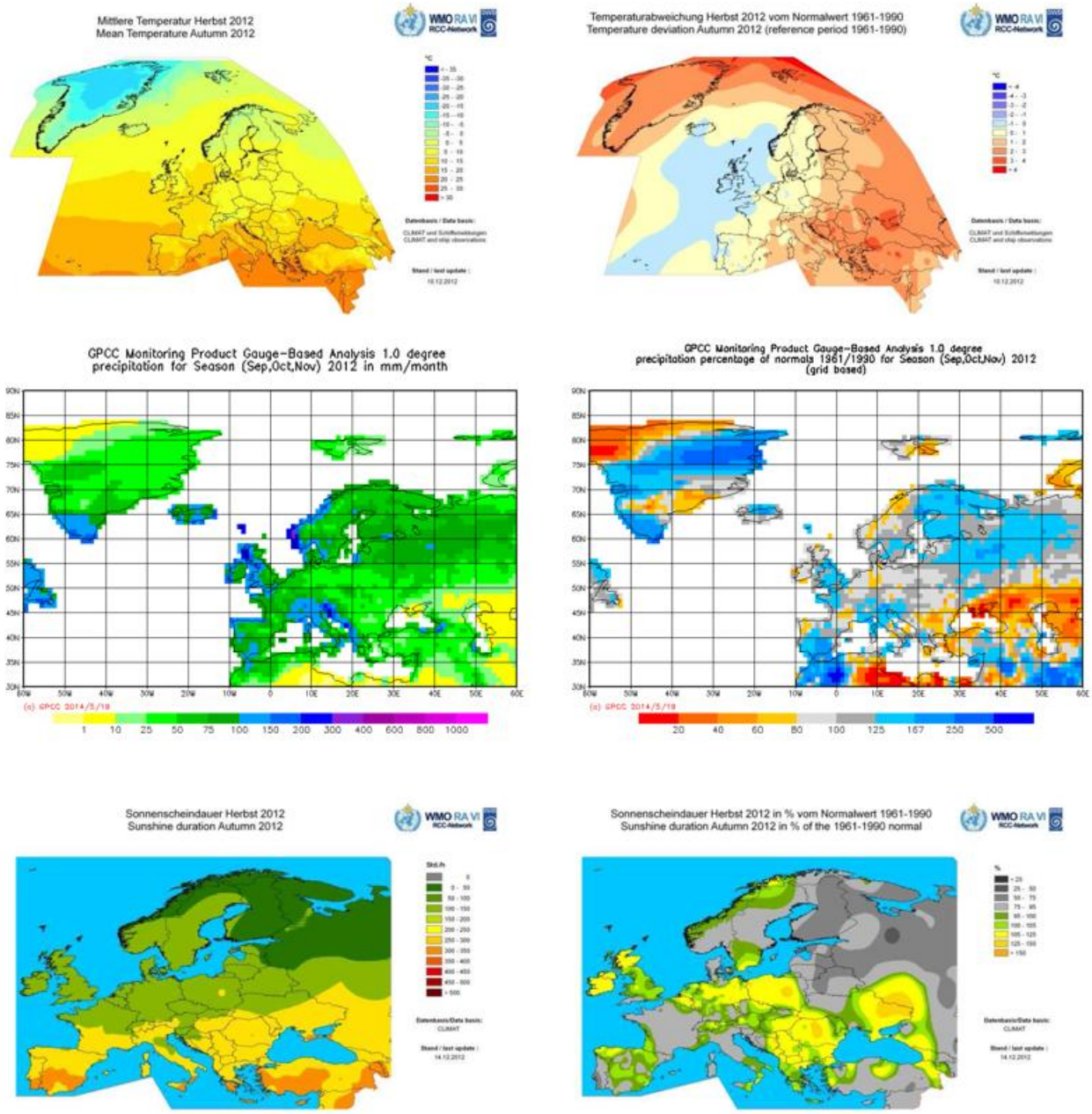


Fig. 2.71: *Means and anomalies (reference 1961-1990) of temperature, precipitation and sunshine duration in autumn 2012*
Source: http://www.dwd.de/rcc-cm

Temperature:

In **autumn 2012** Greenland, the Arctic and most of continental Europe except the westernmost parts were warmer than normal while only the eastern North Atlantic with the British Isles and Iceland was colder. All 3 months were not very different concerning the anomaly pattern.

According to the E-OBS analysis autumn 2012 was on rank 2 since 1950 for the mean daily temperature, the mean maximum temperature and the mean minimum temperature as well.In Armenia autumn 2012 ranked 3rd warmest autumn on record. The highest positive anomaly was computed from the DWD analysis for the subregion 'Eastern Europe' (+2.2 K) closely followed by 'Central and western Europe' and 'Iberia' with +2.1 K. The smallest positive anomaly was computed for the subregion 'Nordic and Baltic countries' with +0.6 K.

September 2012 brought high maximum temperatures of more than 30 °C for instance in Austria, Poland and Moldavia. UK reported the provisionally coldest October since 2003.

Precipitation:

Autumn 2012 brought more precipitation than normal to the southeastern British Isles as well as to the southern Iberian Peninsula, the central and partly the eastern Mediterranean Sea area and to northern Europe as well as the Middle East. This surplus was caused to a good part by extremely wet days, resp. extreme precipitation events as the "map of anomalies of the precipitation fraction due to extremely wet days" shows. There is a special report on the extreme events in the Mediterranean Sea area for autumn 2012 available (see the list of links below). This coincides with the distribution of the mean sea level air pressure that shows low pressure centered over the Norwegian Sea reaching far southward over central Europe and only weak high pressure over the central North Atlantic and over southeastern Europe. Thus the dipole of the Icelandic low and the Azores high is poorly developed and nearly the whole European area had less than normal pressure. Relatively dry conditions occurred mainly in southern Russia, the Carpathian region and on the Balkan Peninsula and western Turkey.
Autumn was the wettest since 2001 in Denmark.

In **September 2012** especially in the Mediterranean Sea area some places received heavy to extremely heavy precipitation for 2 or 3 consecutive days so that large precipitation totals amounted within relative short time. In the Alps September brought early snowfall. **October 2012** in the northernmost part of the Swedish east coast the month of October was the rainiest on record with some local flooding.In the Mediterranean Sea region several phases with extremely heavy precipitation occurred in connection with low pressure systems. Switzerland reported that in mid-October the eastern slopes of the Alps had an uninterrrupted snow cover above 800 m asl and end of October snow height at some stations reached new October records. In **November 2012** many extremes of precipitation totals occurred in several episodes on different time scales from high several-day totals to extremely high daily totals especially in the Mediterranean Sea area and on Madeira but also for instance in England, were one week in November was the wettest since 50 years. Austria reported on 11 November 2012 125 mm in 24 hours at the station Loiblpass which is more than half of the month's normal. Switzerland reported heavy snowfall end of November so that the winterseason 2013 started with rather deep snow cover even at southern places.

Sunshine Duration:

Autumn 2012 was sunnier than normal for the British Isles, partly the Iberian Peninsula, central, eastern and southeastern Europe eastern Ukraine and southwestern Russia. For Poland the station Warszawa reported the highest seasonal total of 424.2 hours. elsewhere it was dull or close to normal. Autumn 2012 was the least sunniest autumn in Denmark since 2001.

Drought

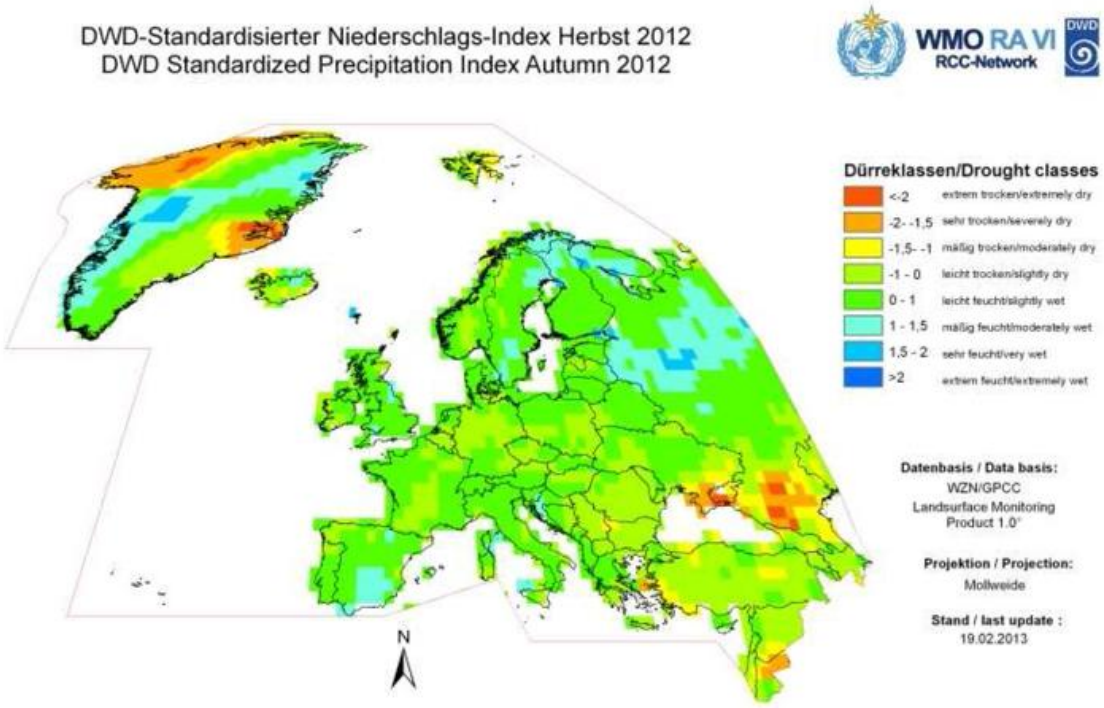


Fig. 2.72: *Means of the modified Standardized Precipitation Index (DWD-SPI), autumn 2012*

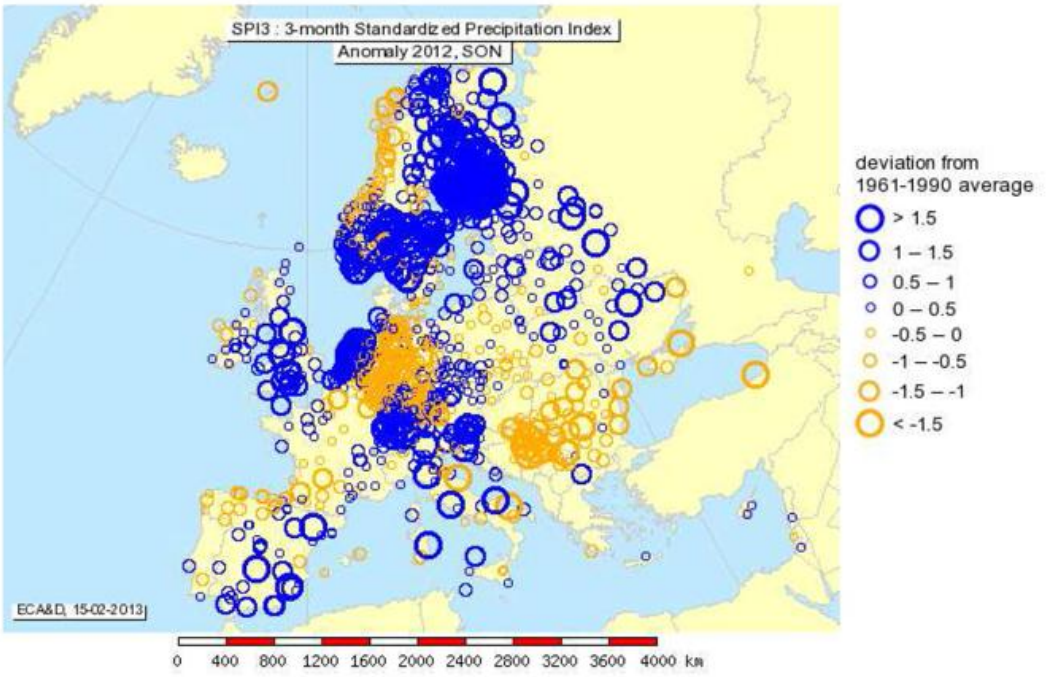


Fig. 2.73: *Anomalies of the 3-month SPI (ECA&D) in Autumn 2012*

Autumn 2012 was severely to extremely dry in the south of Eastern Europe and partly in Middle East (Fig. 2.72). This is severely drier than normal according to Fig. 2.73. Autumn 2012 was also slightly dry - and clearly drier than normal - in central Europe and on the Balkan Peninsula.

Monthly Survey

The following monthly survey integrates relevant information from the Monthly Bulletins 2012 on the Climate in WMO Region VI - Europe and Middle East - which are available on Internet under http://www.dwd.de/rcc-cm.

January

Highlights:

- ***In the Arctic Sea region, western Greenland and northern Russia positive temperature anomalies exceeded 4 K. In southeastern Europe the negative temperature anomalies were partly below -3 K.***
- ***Very wet January 2012 in Israel. Outstanding daily precipitation total at Ny Alesund.***
- ***Positive sunshine duration anomaly for much of the European area***

Overview:

Temperature:

January 2012 was warmer than normal mostly except in the southeast and partly in the southwest. In the Arctic Sea region, western Greenland and northern Russia it was particularly warm. Anomalies here exceeded 4 K. On the other hand it was colder than normal in southeastern Europe. The anomalies were partly below -3 K.Very low temperatures occurred on the eastern Balkan Peninsula and the eastern Mediterranean Region.

Precipitation:

January 2012 was wetter than normal in central, eastern and southeastern as well as much of northern Europe but drier than normal in the west and southwest, in the south and in the north and northeast. It was particularly wet in eastern Central Europe parts of the Baltic states and western Central Russia, on the Balkan Peninsula and in Turkey. It was on the other hand drier than normal in western and southwestern Europe inclusively the western Mediterranean region, in the Middle East in the east and at the northwesterly coasts of Scandinavia though anomalously many very wet days also occurred here as well as in southern Norway. Portugal reported for Madeira the driest December and January in the series since 1950 and a comparable dry total for October to January like 1983.

Sunshine:

The sunshine duration anomaly was in January 2012 positive for much of the European area though this seems partly surprising in central and northern Europe compared to the areas of precipitation surplus. But is has to be considered that these areas do not have much sunshine in wintertime generally so that a small absolute surplus makes a high positive anomaly expressed in percentages.

Events:

- In late January the air pressure in Moscow attained 1025 hPa. The former record of 1024 hPa occurred in January 1946.
- The highest daily precipitation total of the Norwegian Arctic stations occurred on 30 January at Ny Alesund with 98 mm. This event has an estmated return period of 200 years.
- Storm depression ULLI on the British Isles, Germany and Denmark
- Storm depression ANDREA from the British Isles over central Europe to the Balkan Peninsula
- Cold wave in Europe at the end of the month (continuing in February)
- In northwestern Israel 27 consecutive rainfall days occurred (4 to 31 January)

Monthly Means or Totals and Anomalies :

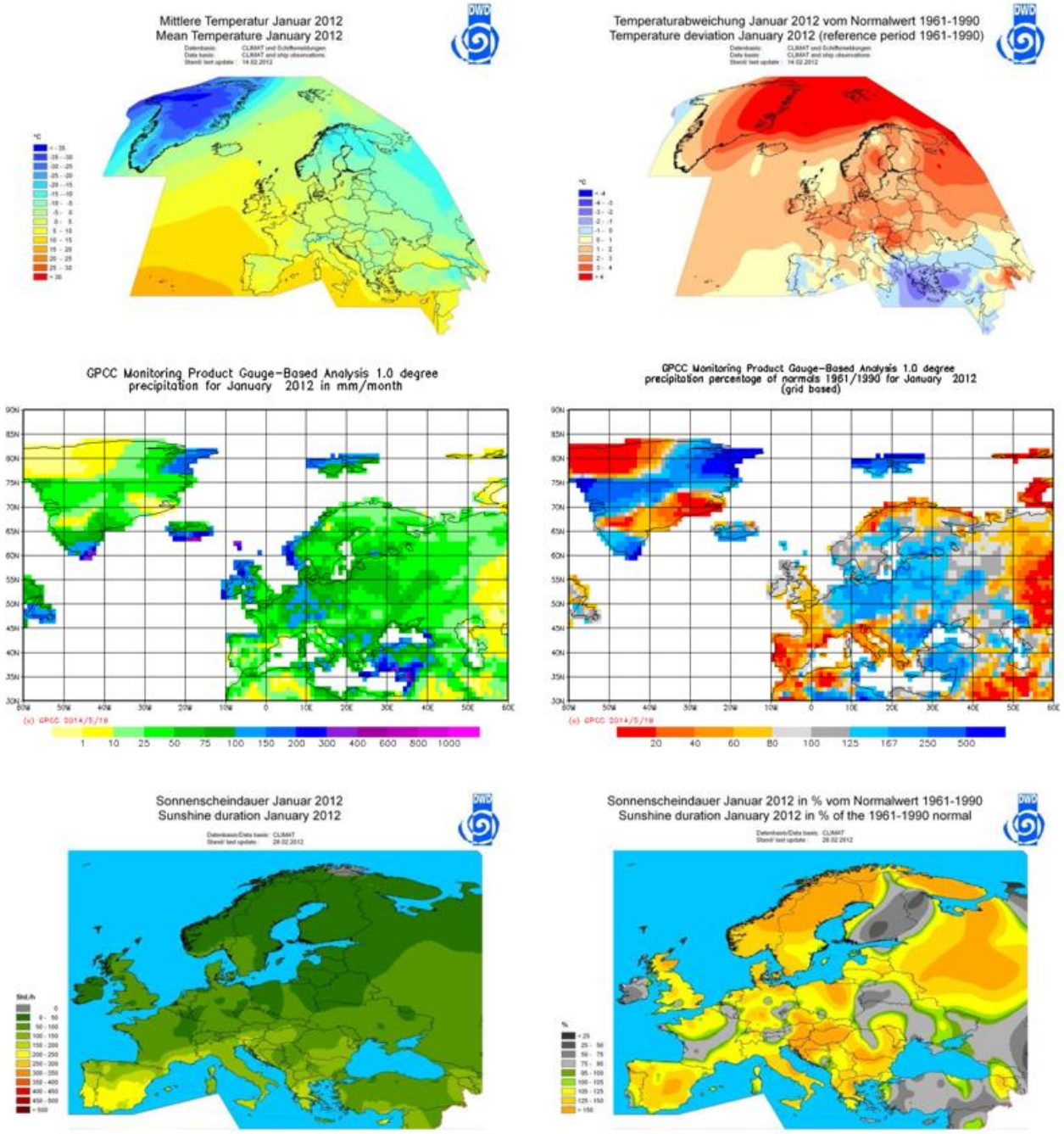


Fig. 3.1: Means and anomalies (reference 1961-1990) of temperature, precipitation and sunshine duration in January 2012

Monthly Climate Extremes and Events:

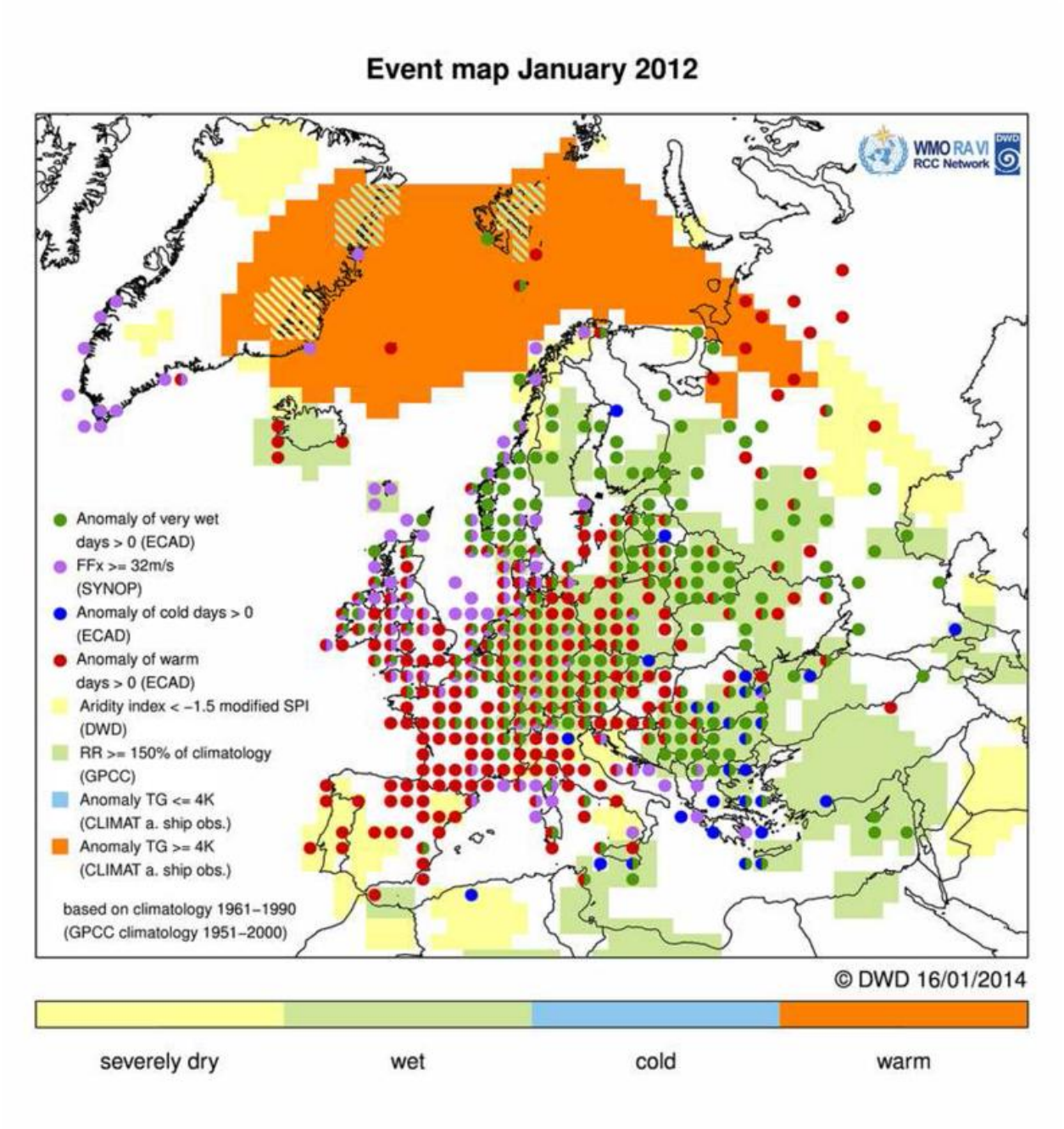


***Fig. 3.2** : Monthly Map of Climate Extremes and Events January 2012*

Monthly Temperature and Precipitation in the Eastern Mediterranean Subregion:

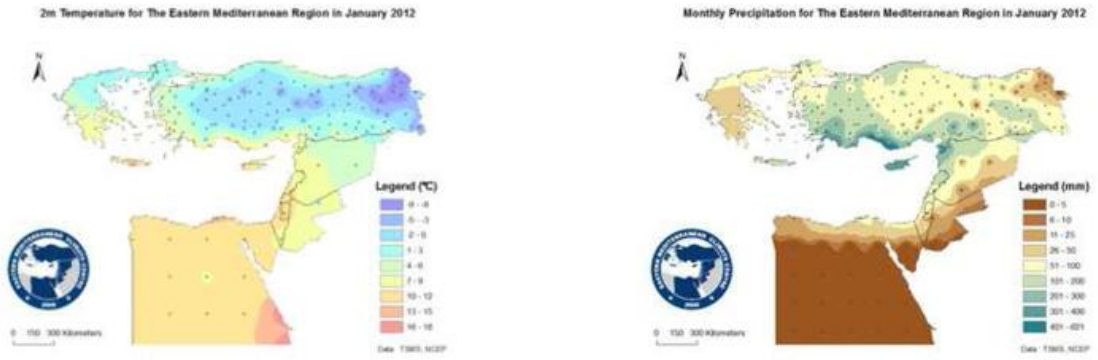


***Fig. 3.3** : Monthly mean temperature (°C) and monthly precipitation totals (mm) January 2012 as provided by the Eastern Mediterranean Climate Center (EMCC)*

Drought Indices for the Southern European Subregion as provided by the Drought Management Centre for Southeastern Europe (DMCSEE):

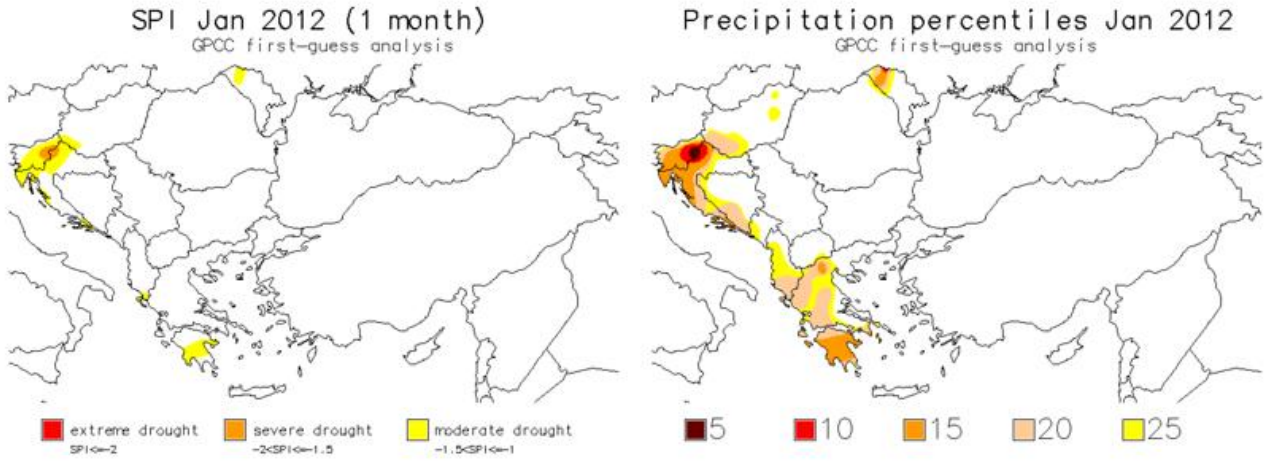


***Fig. 3.4** : Monthly Drought Indices (1-month SPI and low precipitation percentiles) as provided by the Drought Management Centre for Southeastern Europe (DMCSEE)*
January 2012

February

Highlights:

- ***A severe cold spell during the first half of the month over central, western, eastern and southwestern Europe placed February 2012 among the 15 coldest February months of the last 130 to 150 years in central Europe.***
- ***Below 30 % of normal February precipitation in the Ural region caused the 2nd lowest snow winter since 120 years there.***
- ***The 1st decade of February was the sunniest in more than 100 years in the Netherlands with more than half of the normal monthly total.***

Overview:

Temperature:

February 2012 was a cold month in most of continental Europe, Russia and the Middle East.Negative anomalies of -4 K or more occurred in France, the Alpine region, Poland, the Baltic states, Belarus, Ukraine, the Balkan states, parts of Russia and in Turkey. It was for instance on rank 10 of coldest February months since 150 years in Switzerland and on rank 15 of coldest February months since 1881 in Germany. Only the British Isles and southern Scandinavia were on the warm side. The Arctic Sea region had the highest positive anomalies of +4 K and more.

Precipitation:

In February 2012 it was dry in western, southwestern, and most of central Europe as well as southern Scandinavia. But the Scandinavian west coast as well as the central and eastern Mediterranean coast received partly remarkable precipitation surplus.

Sunshine:

Sunshine duration in February 2012 was nearly everywhere over the normal except most of the British Isles, the western Balkan Peninsula and southern Italy.

Events:

- Severe cold spell continuing until mid of February (see Fig. 3.7 and 3.8)
- On 1 February Haparanda reported a surface pressure of 1058.0 hPa which is a new Swedish record for February
- In the Netherlands the 1st decade of February 2012 was the sunniest since more than 100 years with more than half the monthly total
- Severe Aegean depression JULIA 6 to 8 February with storm, snow and floodings

Monthly Means or Totals and Anomalies :

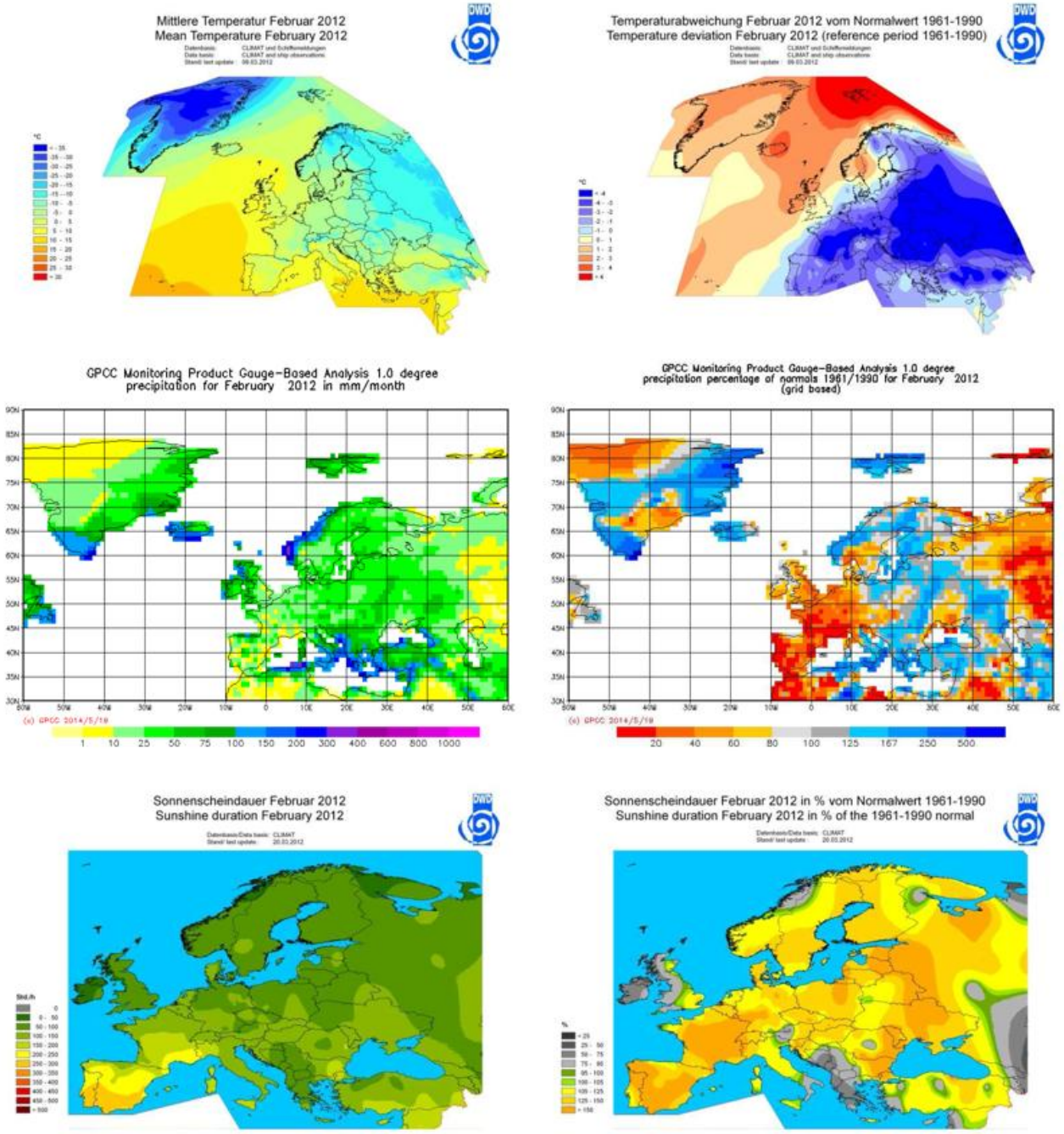


Fig. 3.5: Means and anomalies (reference 1961-1990) of temperature, precipitation and sunshine duration in February 2012

Monthly Climate Extremes and Events:

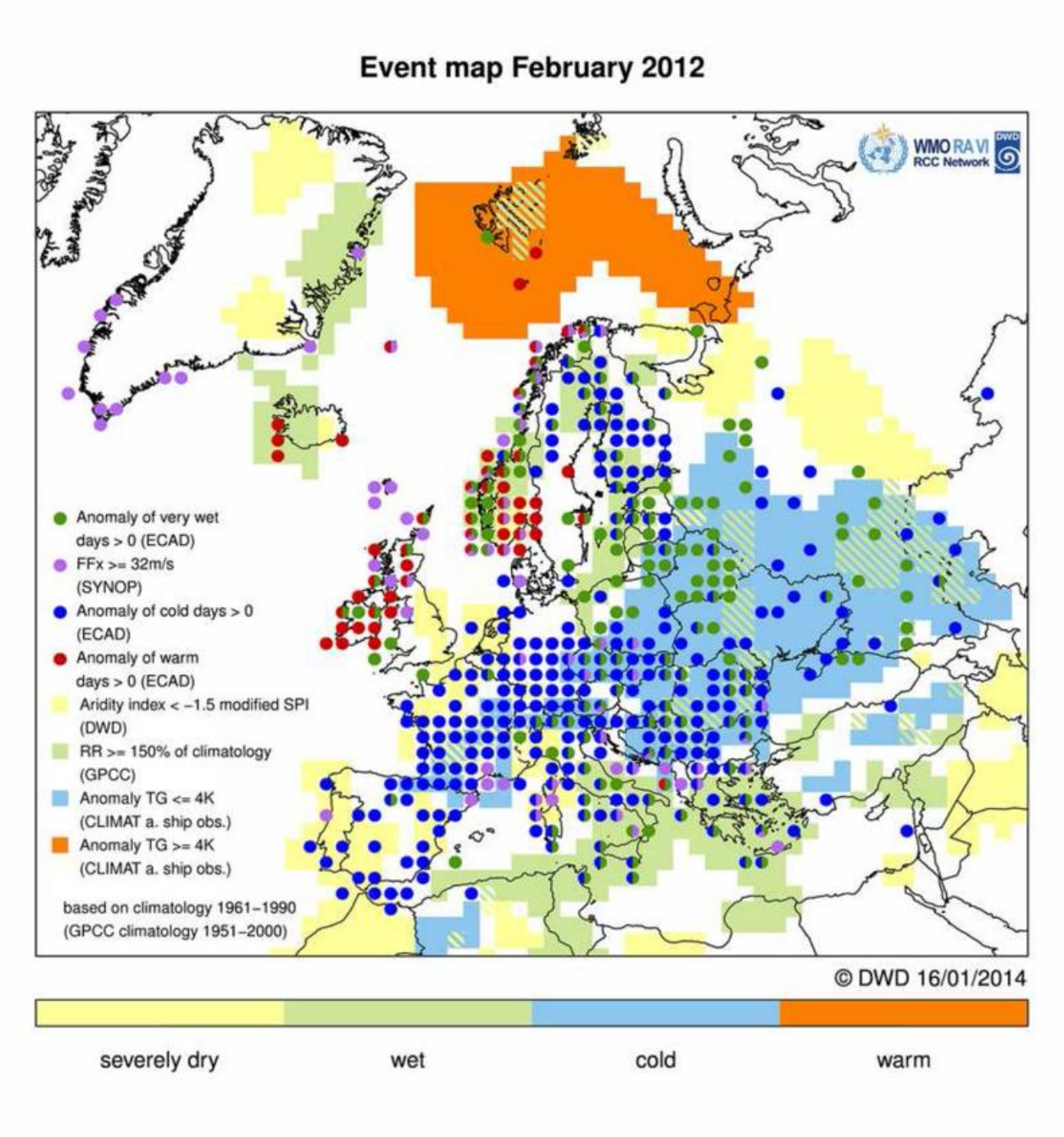


***Fig. 3.6** : Monthly Map of Climate Extremes and Events February 2012*

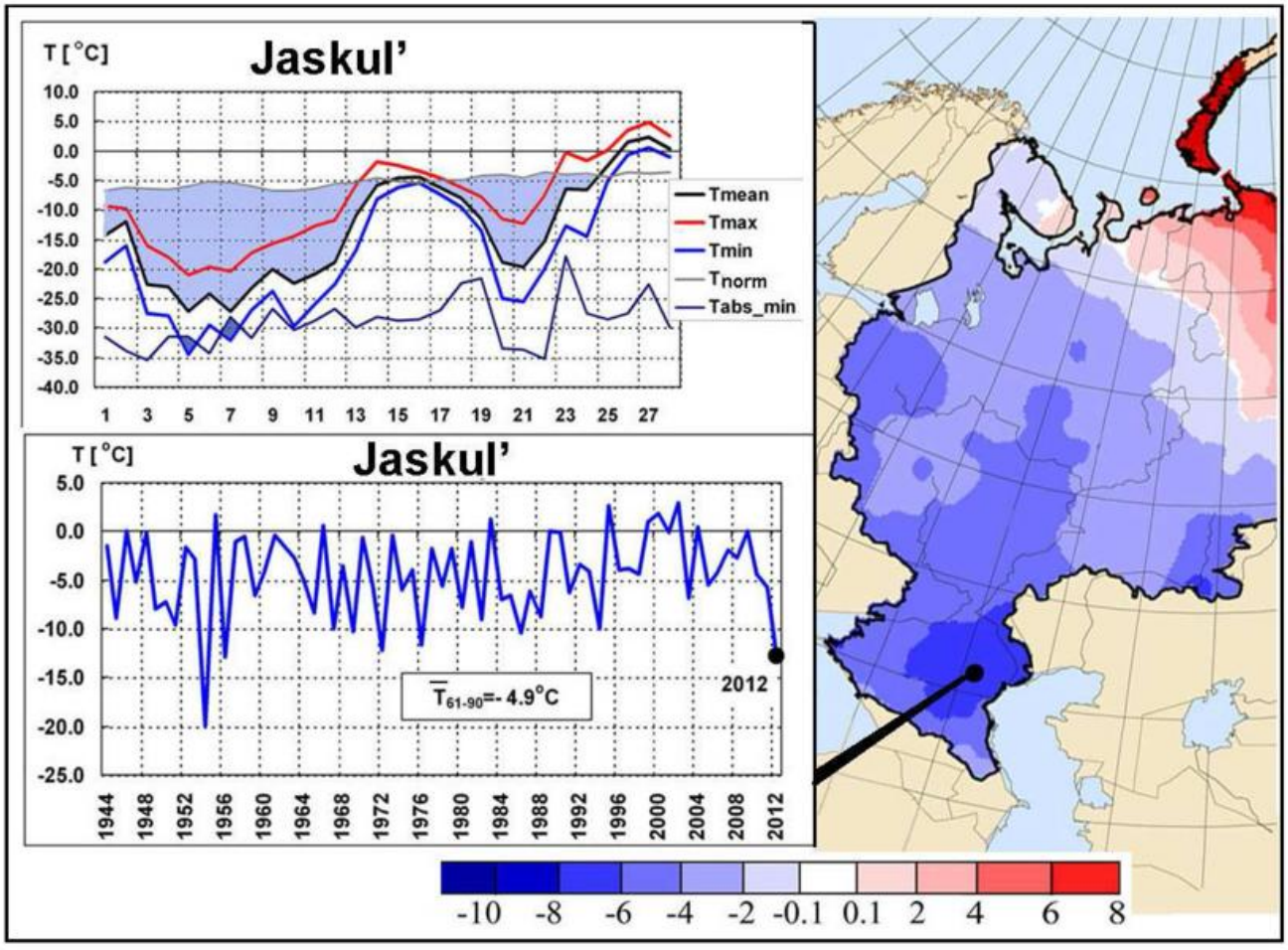


Fig. 3.7 : Character of the severe cold wave in Russia February 2012

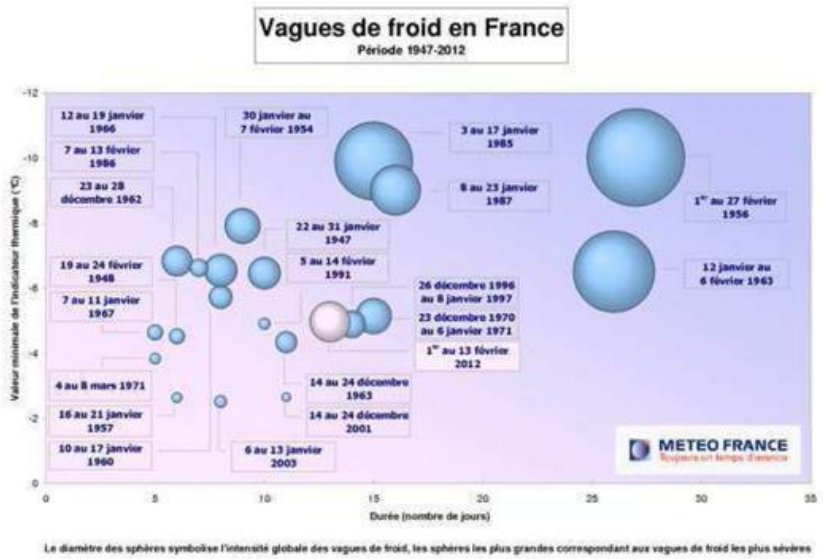


Fig. 3.8 : The cold wave in comparison to other cold waves in France February 2012

Monthly Temperature and Precipitation in the Eastern Mediterranean Subregion:

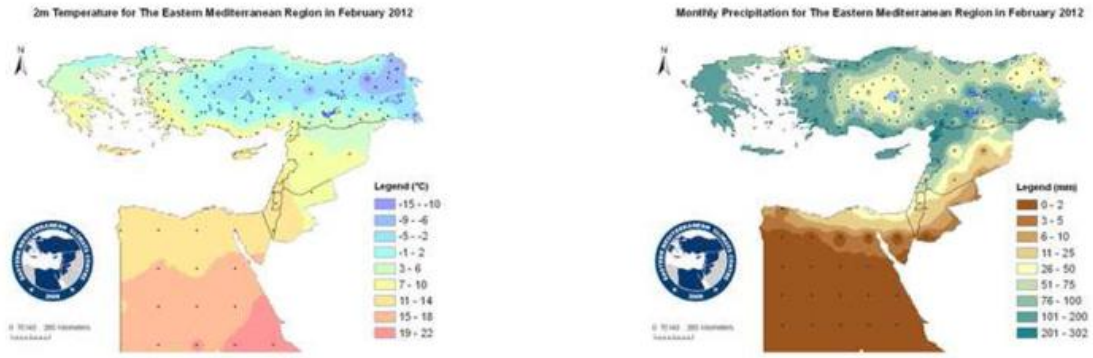


***Fig. 3.9** : Monthly mean temperature (°C) and monthly precipitation totals (mm) February 2012 as provided by the Eastern Mediterranean Climate Center (EMCC)*

Drought Indices for the Southern European Subregion as provided by the Drought Management Centre for Southeastern Europe (DMCSEE):

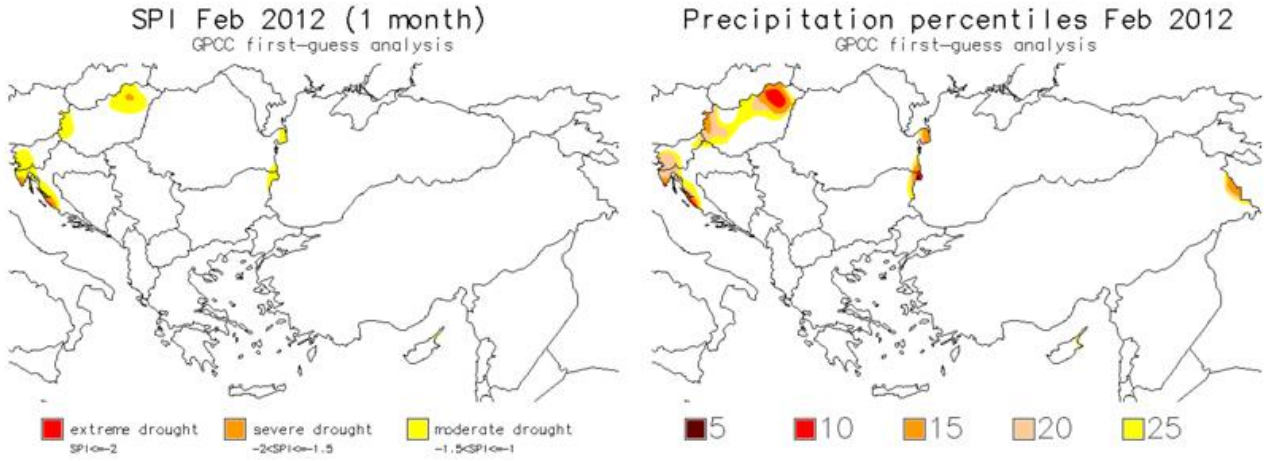


***Fig. 3.10** : Monthly Drought Indices (1-month SPI and low precipitation percentiles) as provided by the Drought Management Centre for Southeastern Europe (DMCSEE)*
February 2012

March

Highlights:

- ***March 2012 one of the 3 warmest March months on record in many European countries***
- ***One of the 5 driest March months since about 100 years or more in western and central Europe.***
- ***One of the 5 sunniest March months in western and central Europe since 60 to 130 years.***

Overview:

Temperature:

Compared to the situation in February March 2012 was warmer than normal over most of Europe, Scandinavia, the northern North Atlantic inclusively eastern Greeland and in the Arctic Sea. Only the Middle East and European Russia were colder. In many European countries March 2012 was one of the 3 warmest March months since their timeseries started. In Norway it was the warmest March since 1900:

```
Norway:          rank 1  since 1900
United Kingdom:  rank 3  since 1910
France:          rank 3  since 1900
Germany:         rank 3  since 1881
Austria:         rank 3  since 1767
Denmark:         rank 4  since 1874
Netherlands:     rank 3  since 1900 (together with March 1957)
Switzerland:     rank 1  since 1864 in the southern parts
Sweden:          rank 1 on record in the central parts
```

Precipitation:

Most of western, southern, southeastern and central Europe as well as southern Scandinavia were dry. For UK it was the driest March since 1953, resp. the 5th of the dry March months since 1910. In Portugal March 2012 was on rank 6 of dry March monts since 1931 and in Spain it was the driest March since 1997. Also in Austria it was one of the driest March months since the records started. In Carinthia water shortage occurred. In Germany March 2012 was on rank 3 of dry March months since 1881. This precipitation deficit prolonged the drought situation for the UK (where water shortage was reported) as well as on the Iberian Peninsula and the western Mediterranean. More precipitation than normal fell on the other hand in Norway as well as the Baltic States, European Russia and the Caucasus region.

Sunshine:

March 2012 was also unusually sunny especially in UK, southern Scandinavia, France, Germany, Austria, Switzerland, Italy,Poland, the Czech Republic, Slovakia, Hungary,Croatia and the Balkan Peninsula. Some ranks of sunny March months are listed below.

```
United Kingdom: rank 1  since 1929
Austria:        rank 3  since 1880
Denmark:        rank 9  since 1920
Germany:        rank 5  since 1951
France:         rank 3  since 1950 (together with 1961 and 1953)
```

Events:

- High temperatures and low precipitation promoted wildfires in Bulgaria and in Austria as well
- High temperatures caused mud flows by snowmelting as well as avalanches in Austria
- A new record for daily maximum temperature for March occurred on 22 March in Uppsala, Sweden (19°C). The old record was of 1840.

Monthly Means or Totals and Anomalies :

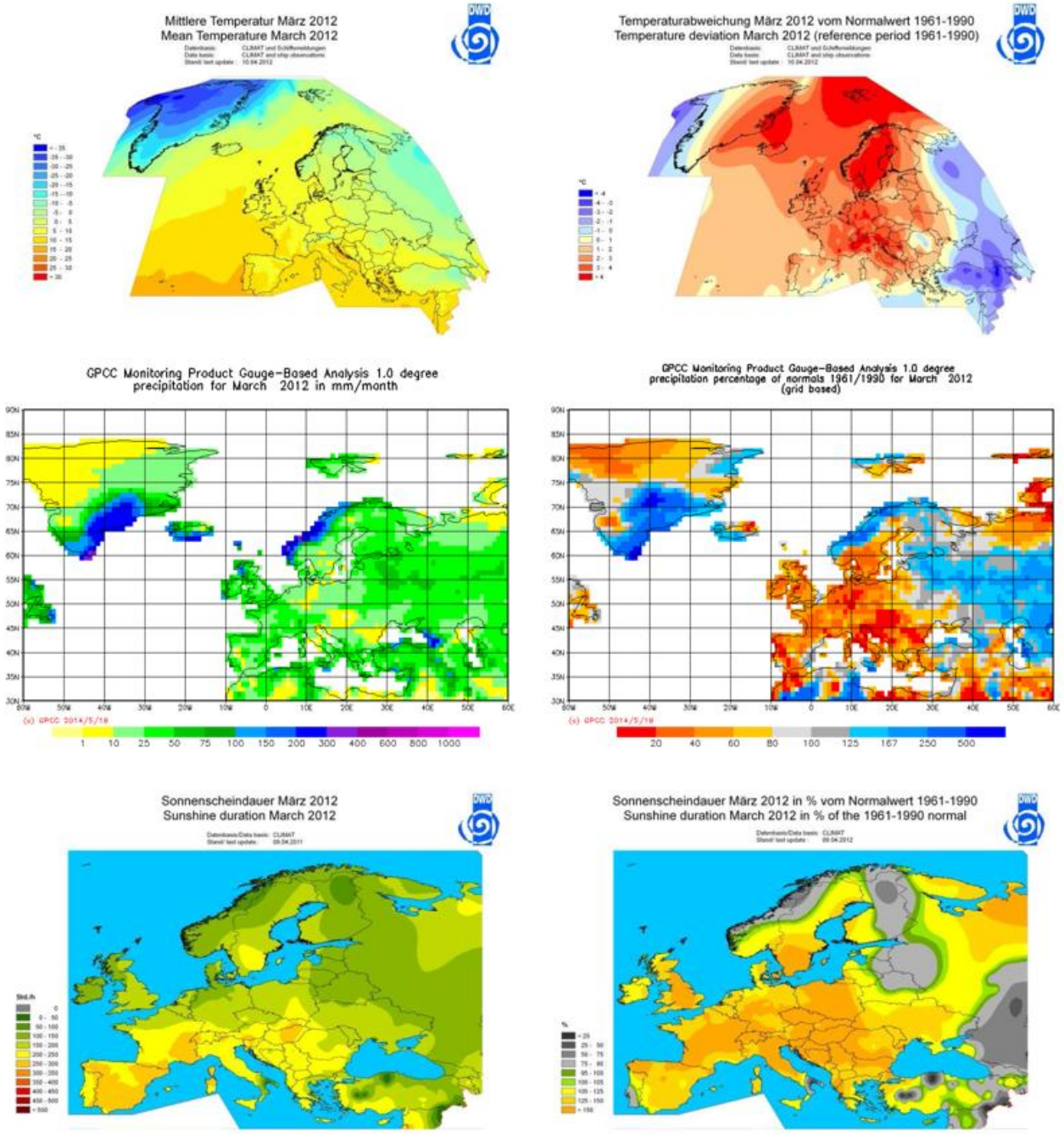


Fig. 3.11: *Means and anomalies (reference 1961-1990) of temperature, precipitation and sunshine duration in March 2012*

Monthly Climate Extremes and Events:

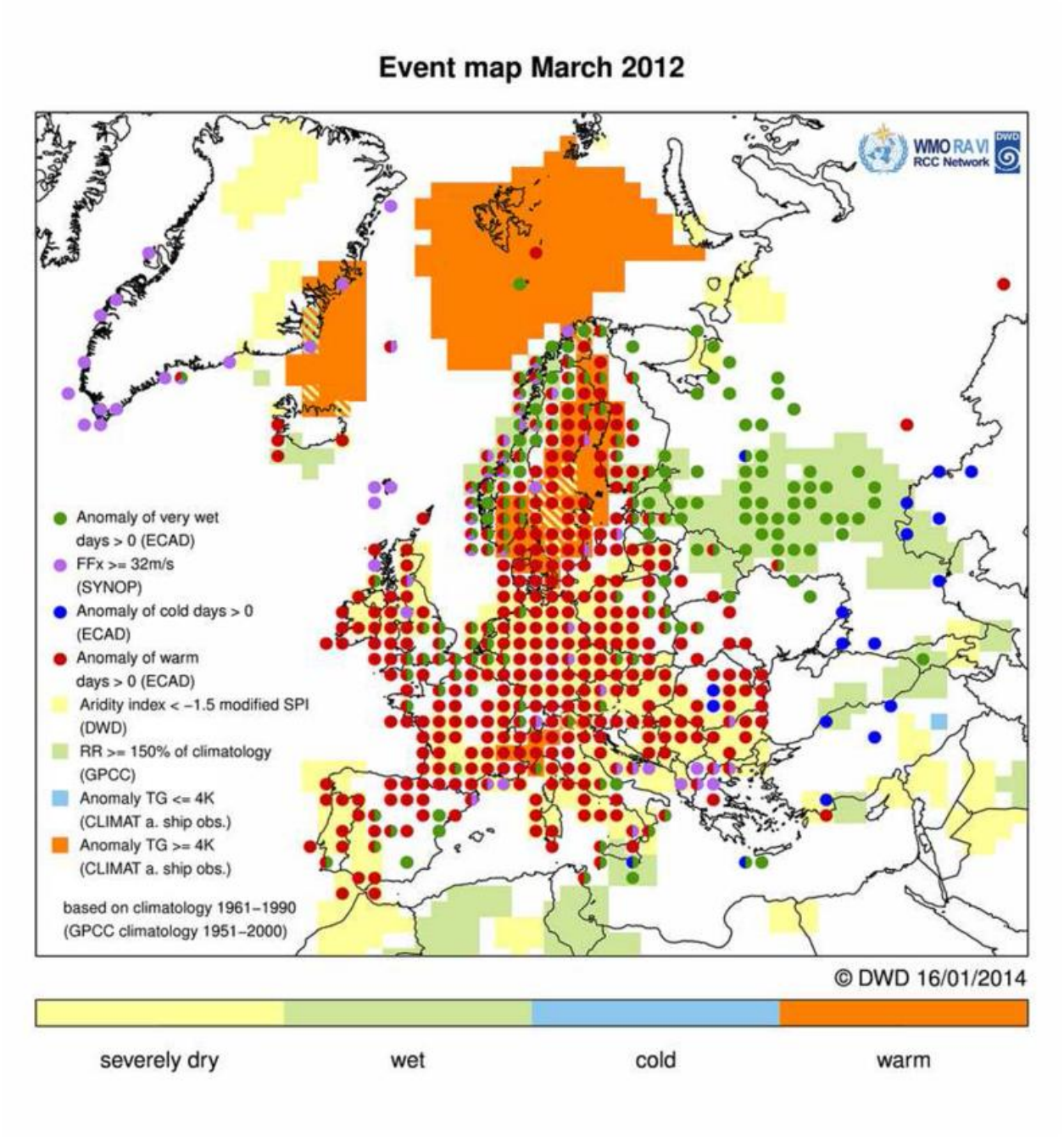


Fig. 3.12 : Monthly Map of Climate Extremes and Events March 2012

Monthly Temperature and Precipitation in the Eastern Mediterranean Subregion:

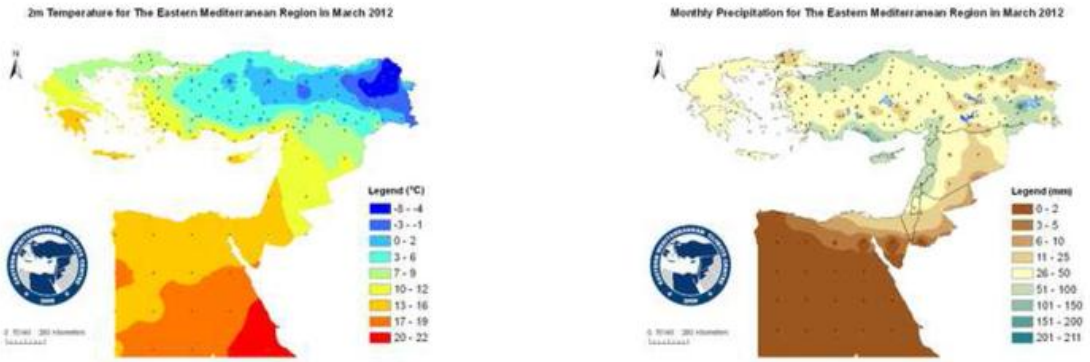


***Fig. 3.13** : Monthly mean temperature (°C) and monthly precipitation totals (mm) March 2012 as provided by the Eastern Mediterranean Climate Center (EMCC)*

Drought Indices for the Southern European Subregion as provided by the Drought Management Centre for Southeastern Europe (DMCSEE):

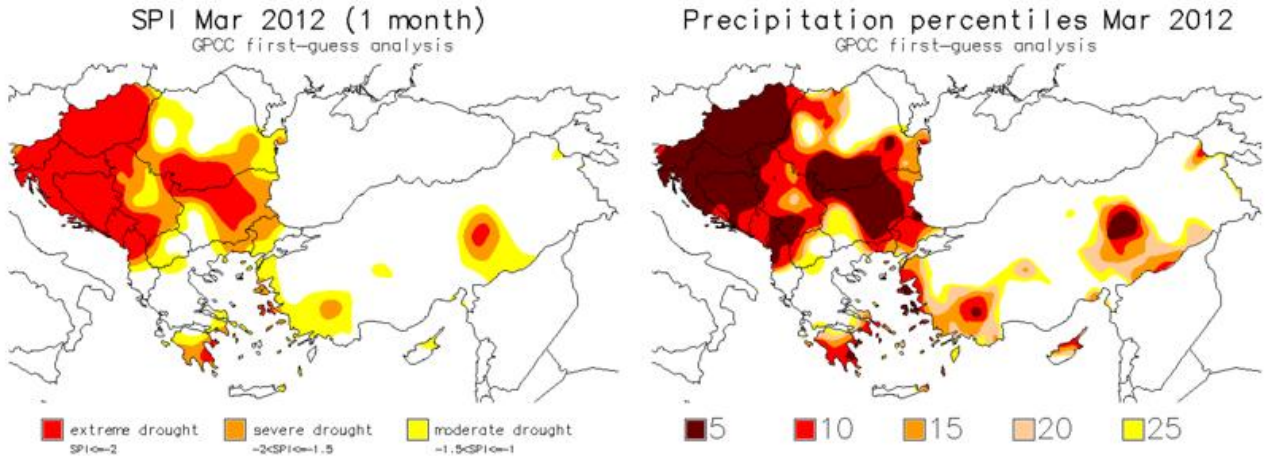


***Fig. 3.14** : Monthly Drought Indices (1-month SPI and low precipitation percentiles) as provided by the Drought Management Centre for Southeastern Europe (DMCSEE)*
March 2012

April

Highlights:

- ***Western Europe colder than normal but new records of the daily maximum temperature at many single stations in European Russia, Lithuania, Romania and Austria.***
- ***Wettest April since 1766 in England and Wales but one of the driest April months since 70 years in northern Israel.***

Overview:

Temperature:

In April 2012 the northern and eastern North Atlantic and the western parts of Europe including much of Norway, the British Isles, western France and the western Iberian Peninsula were colder than normal. Eastern Europe, the Middle East and the Mediterranean were warmer than normal. The positive anomalies exceeded 4 K in southern Russia and the eastern Caucasus. The negative anomalies were regionally between -2 and -1 K in Portugal and Spain.

Precipitation:

Most of Europe received more precipitation than normal in April 2012. Exceptions were the Middle East, southern Russia, the Caucasus and the Black Sea Region, which were rather dry, as well as central Europe and the west of Norway and southern Spain. The surplus of precipitation was highest on the southern British Isles and western France, northern Spain, southeastern France and around the southern Adria.

Sunshine Duration

Sunshine duration anomalies in April 2012 were mostly negative in western Europe, positive in eastern central Europe, the Baltic states, the Balkan Peninsula, Turkey, the Ukraine and the Caucasus and slighly negative in the east and northeast.

Events:

- At the end of April several new records of the daily maximum temperature occurred: in Moscow, Russia: 28.9°C; in Alytus, Lithuania: 31°C; at Waidhofen/Ybbs in lower Austria; 32°C and as well at 52 Romanian stations

Monthly Means or Totals and Anomalies :

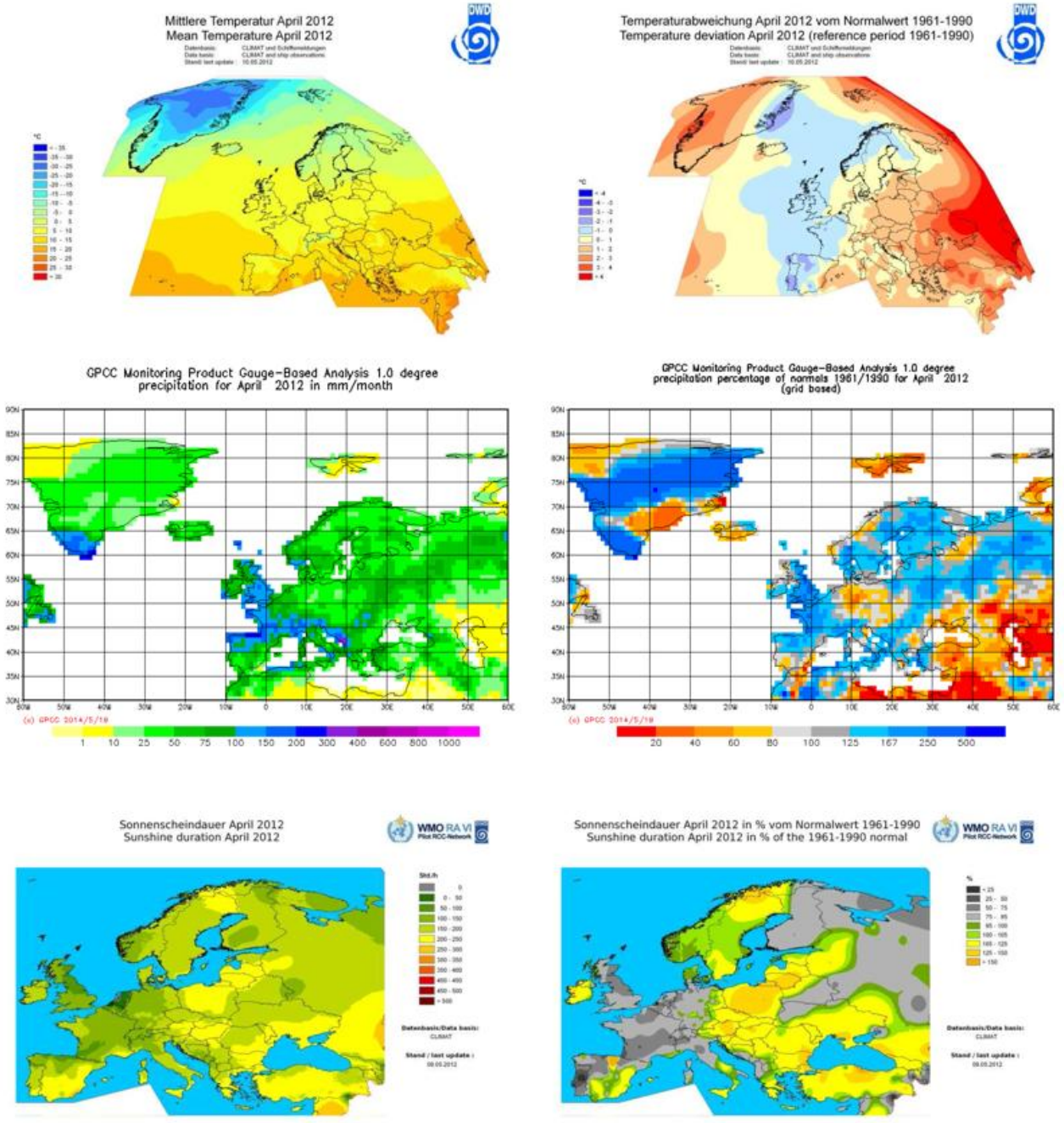


Fig. 3.15: Means and anomalies (reference 1961-1990) of temperature, precipitation and sunshine duration in April 2012

Monthly Climate Extremes and Events:

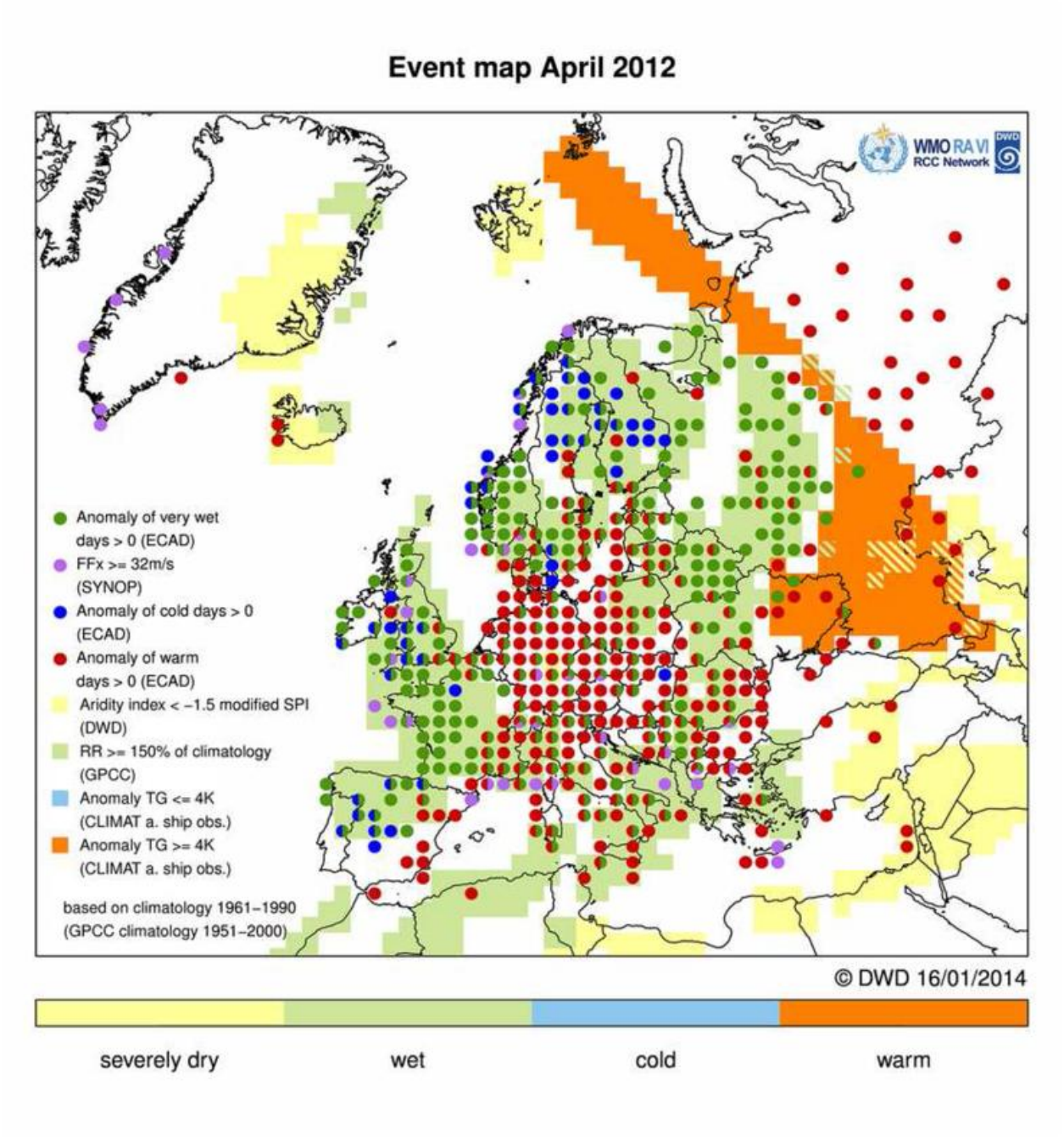


***Fig. 3.16** : Monthly Map of Climate Extremes and Events April 2012*

Monthly Temperature and Precipitation in the Eastern Mediterranean Subregion:

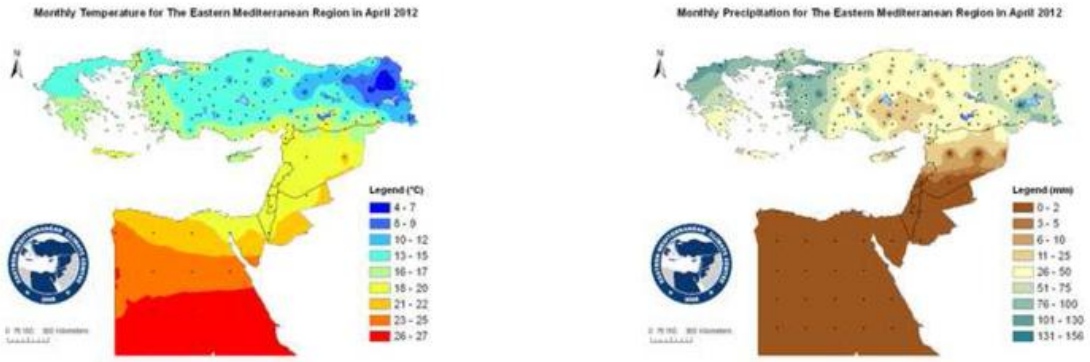


***Fig. 3.17** : Monthly mean temperature (°C) and monthly precipitation totals (mm) April 2012 as provided by the Eastern Mediterranean Climate Center (EMCC)*

Drought Indices for the Southern European Subregion as provided by the Drought Management Centre for Southeastern Europe (DMCSEE):

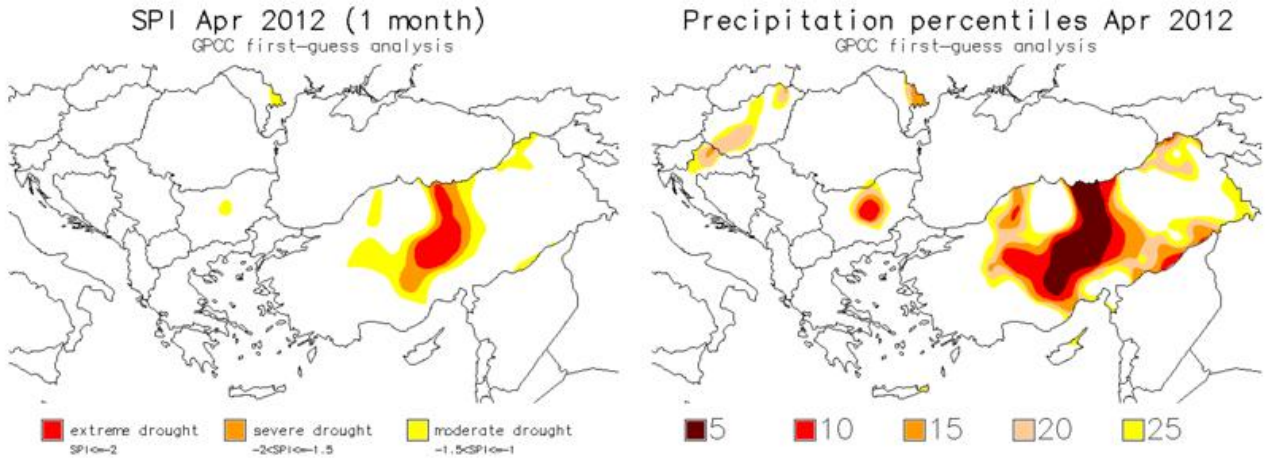


***Fig. 3.18** : Monthly Drought Indices (1-month SPI and low precipitation percentiles) as provided by the Drought Management Centre for Southeastern Europe (DMCSEE)*
April 2012

May

Highlights:

- ***Highest mean May temperature since 1891 in southern European Russia and new records of daily maximum temperatures for May at stations in Romania and Sweden.***

Overview:

Temperature:

In May 2012 it was warmer than normal with few exceptions over the North Atlantic (especially the Northern North Atlantic with the greatest negative anomaly of -1 to -2 K at the northern Norwegian coast,Faroer Islands: anomaly of -0.9 K), western Turkey and locally Italy and Bosnia and Herzegovina. The positive anomalies were highest in the southern Ukraine (+3 to +4 K). Southern Russia had the warmest May since 1891. A secondary maximum (+2 to +3 K) is located in Spain. Portugal reported record-braking maximum temperatures for several stations and night temperatures well above 20°C during 14-16 May. The warm anomalies of May 2012 were not only restricted to Europe but extended globally. Norway, Sweden and Romania reported new records of the maximum temperatures for May at stations. Denmark reported 3 consecutive summerdays during the 3rd decade of the month. Ireland recorded the highest maximum temperature of 27.8 °C since 1938 on 25 May at Shannon Airport .In the Netherlands on 22 May the first summer day of 2012 was registered at De Bilt and on 23 May even a hot day was registered in eastern parts of the country.

Precipitation:

Higher than normal precipitation totals were registered on the Balkan Peninsula, western Turkey and the Caucasus region as well as partly in Scandinavia and in northern Russia. Much of this precipitation fell as heavy rain. With local exceptions it was drier than normal or close to normal elsewhere.

Sunshine Duration:

May 2012 was mostly sunnier than normal with a surplus up to >150% in central Poland and southern Russia. Less sunshine than normal occurred mainly on the Balkan Peninsula, Turkey and the Caucasus region as well as parts of Sweden, Norway, southern UK and Ireland and Portugal.

Events:

- On 29 May 2012 a new record for the highest temperature ever recorded on Greenland occurred at Ivittuut/Narsarsuaq: 24.8°C.

Monthly Means or Totals and Anomalies :

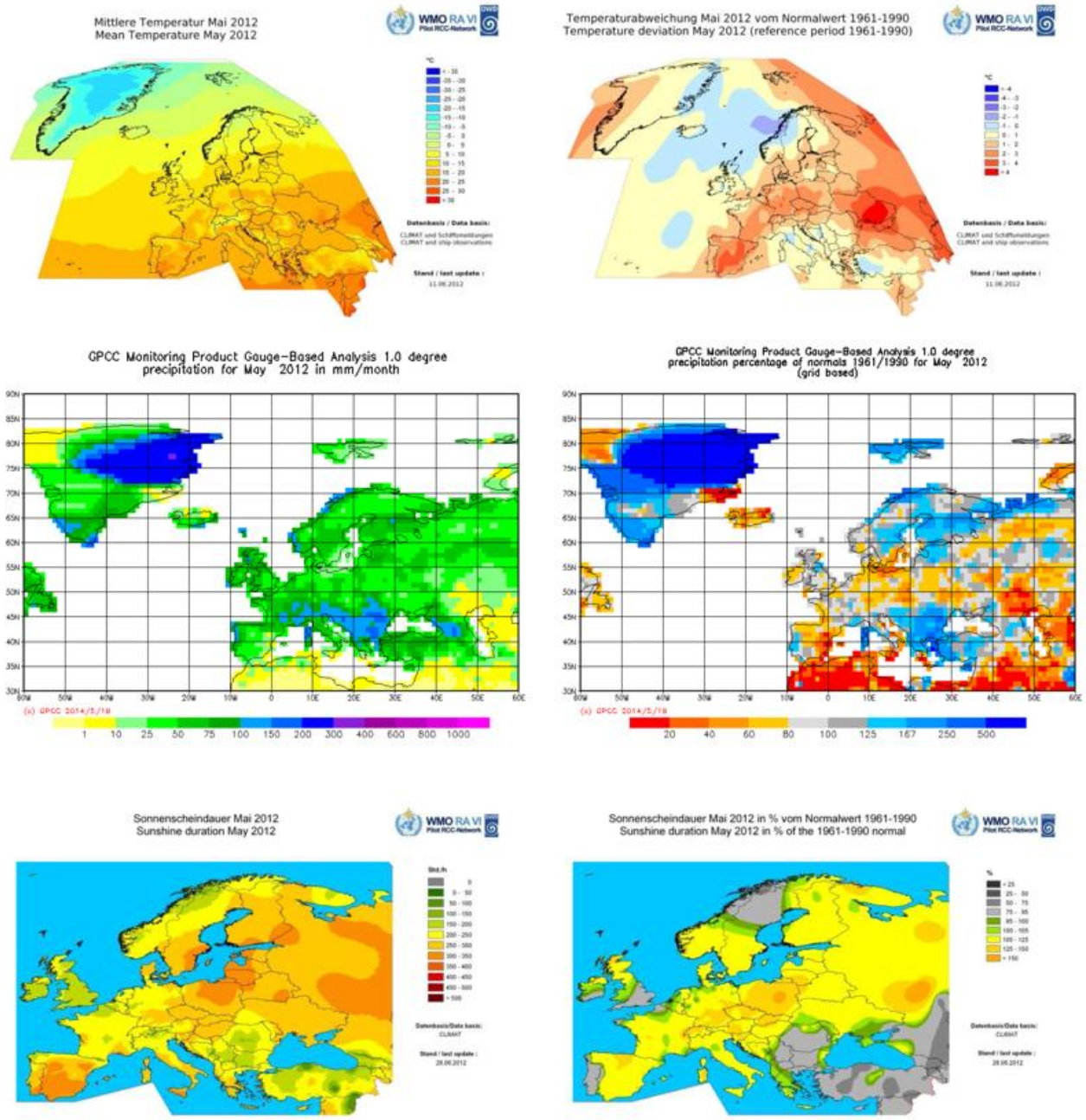


Fig. 3.19: *Means and anomalies (reference 1961-1990) of temperature, precipitation and sunshine duration in May 2012*

Monthly Climate Extremes and Events:

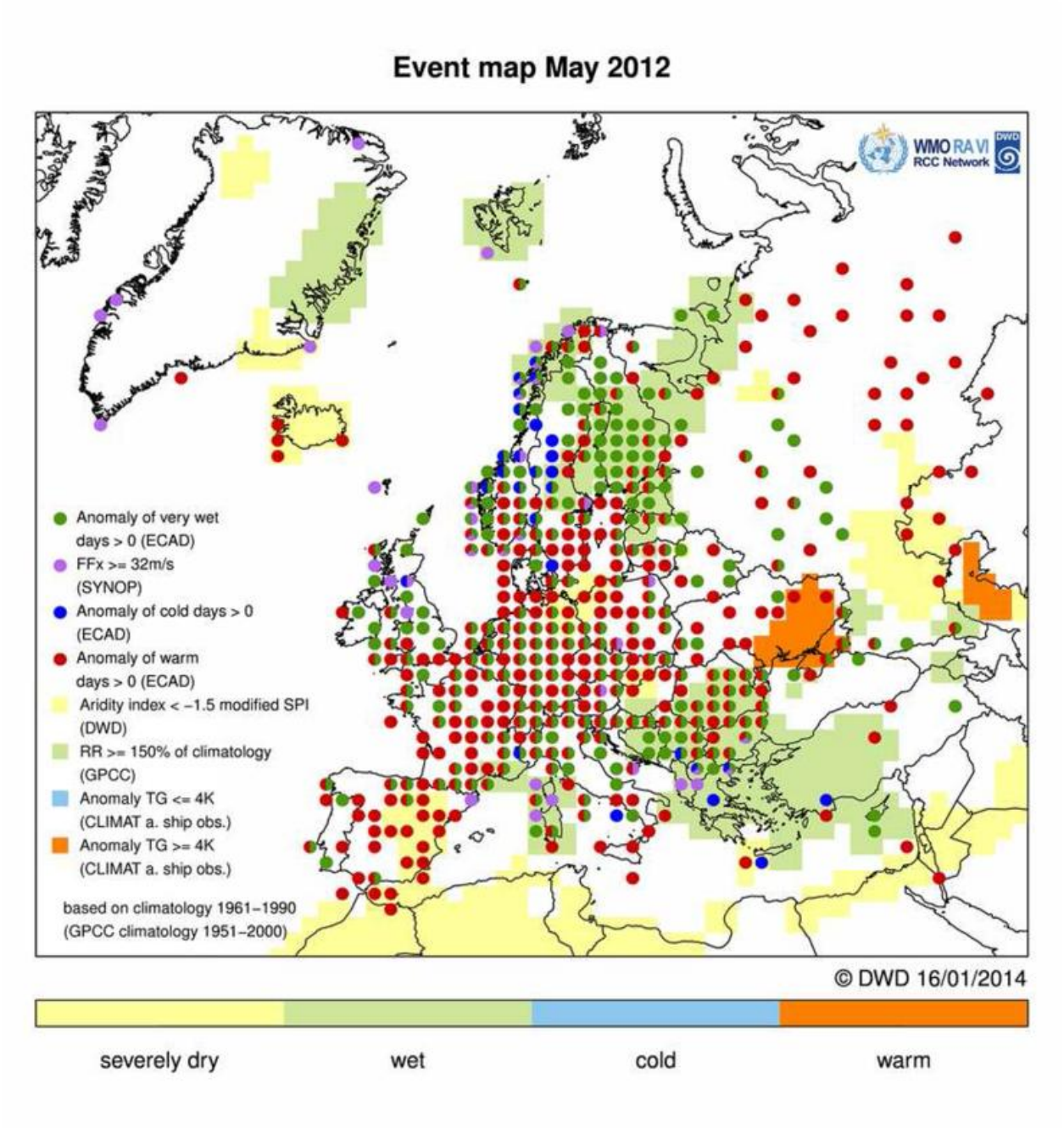


Fig. 3.20 *: Monthly Map of Climate Extremes and Events May 2012*

Monthly Temperature and Precipitation in the Eastern Mediterranean Subregion:

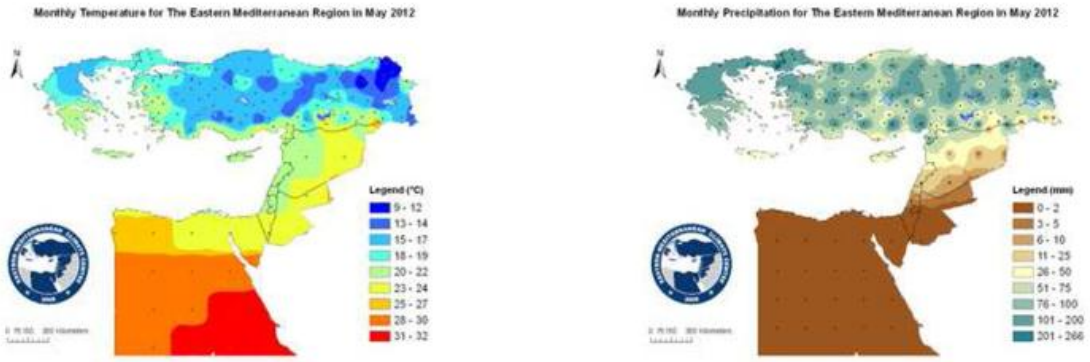


***Fig. 3.21** : Monthly mean temperature (°C) and monthly precipitation totals (mm) May 2012 as provided by the Eastern Mediterranean Climate Center (EMCC)*

Drought Indices for the Southern European Subregion as provided by the Drought Management Centre for Southeastern Europe (DMCSEE):

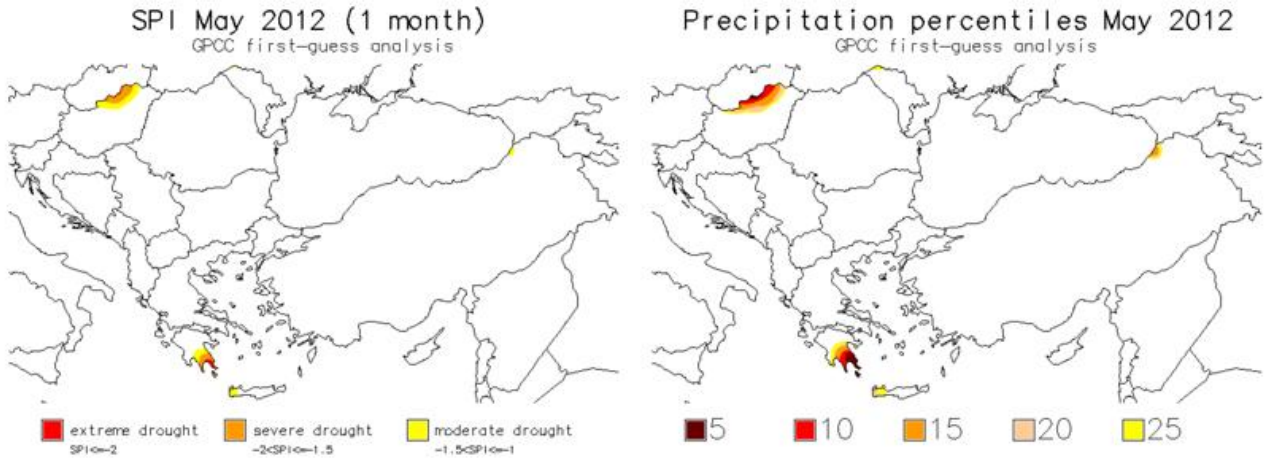


***Fig. 3.22** : Monthly Drought Indices (1-month SPI and low precipitation percentiles) as provided by the Drought Management Centre for Southeastern Europe (DMCSEE)*
May 2012

June

Highlights:

- ***Unusually hot in Israel in mid of the month with maximum temperature up to 45°C in the Jordan valley and minimum teperatures around 30°C at the Dead Sea.***
- ***Wettest June since 1766 in England and Wales and widespread rainfall with unusually high totals in southern Israel.***
- ***Dullest June since 1929 in UK but up to more than 150 percent of the normal in Romania.***

Temperature

June 2012 was colder than normal in the northwest, north and northeast, warmer than normal in the south, southeast and east and in the Arctic region. The highest maximum temperatures were mostly below the normals in Scandinavia, Ireland, UK, Denmark and Germany. It was the coolest June since 1991 in UK and in Denmark as well as for 2 stations in Ireland. Stockholm registered its coolest June weekend in 84 years at the beginning of the month. Denmark reported rimfrost with a minimum temperature of 1.1°C near Aarhus on 15 June. On the other hand on the Iberian Peninsula, in the Mediterranean Sea region, partly on the Balkan Peninsula and around the Black Sea many stations had more tropical nights (minimum temperature above 20°C), and there were clearly more summer days (maximum temperature above 25°C) than normal. Maximum temperatures of 40°C occurred often.

Precipitation

June 2012 was wetter than normal in the west, north and northeast with exception of the coastal regions of the northern North Atlantic, Norwegian Sea and Arctic Sea. It was drier than normal around the Mediterranean Sea and the Black Sea region. Locally the Middle East was wetter than normal. It was by far the rainiest June on record since 1786 in Stockholm, Sweden. It was the wettest June across the UK in the series from 1910 (wetter than June 2007), and the equal-wettest June in the England and Wales series from 1766 (shared with June 1860). In Ireland the majority of stations across the country reported their wettest June on record. More days with very heavy rain (>=20 mm) than normal were recorded at many stations on Ireland and northern England, in Sweden, in the Alpine region and Belarus and western Russia. Highest 1-day precipitation amounts were partly remarkably above the normal values. On the other hand in the Mediterranean Sea region, the Iberian Peninsula, the Balkan Peninsula and most of the Black Sea area and southern Russia the monthly precipitation totals were often below 25 mm, on the southern Iberian Peninsula and the Mediterranean Sea and Middle East below 10 mm or partly even below 1 mm.

Sunshine Duration

June 2012 was sunnier than normal mainly around the western Mediterranean Sea, on the Balkan Peninsula and the southern Ukraine. Romania with partly more than 150 % of the normal was sunniest, but overall also the Balkan Peninsula was very sunny. Elsewhere it was close to normal or dull. In UK it was provisionally the second dullest June in the series from 1929. The far north-west of Scotland was the sunnier exception. Germany for instance had the 12th dullest June since 1951.

Events

- On 8 June hail with diameters between golf ball to tennis ball at Wieselburg (district Scheibbs) in Austria caused estimated economic damage of 3 millions Euro.
- A heat wave from 14 to 18 June in Israel brought maximum temperatures of 43°C to 45°C around the Dead Sea and Arava region, 40°C to 42°C in the Jordan Valley and 38°C to 40°C in the Negev and 35°C to 37°C in the mountains. On 17 to 18 June minimum temperatures fell only to 26°C to 28°C and around the Dead Sea and Eilat to 30°C to 32°C. Only 3 times during the last 60 years higher night-time minima occurred.
- On 16 June cloudbursts occurred in the southeast of the Moscow region. The places Kolomna and Kashra received 116 mm and 89 mm within 12 hours.
- On 22 June it rained in northeastern Israel, around the Dead Sea and in the Negev. Precipitation totals of 10-20 mm were recorded widely and the higest daily total was 35mm
- On 28 June severe thunderstorms brought locally torrential rain, large hailstones and flooding to parts of the Midlands and northern England with 40 to 50 mm within 2 to 3 hours at some places

Monthly Means or Totals and Anomalies :

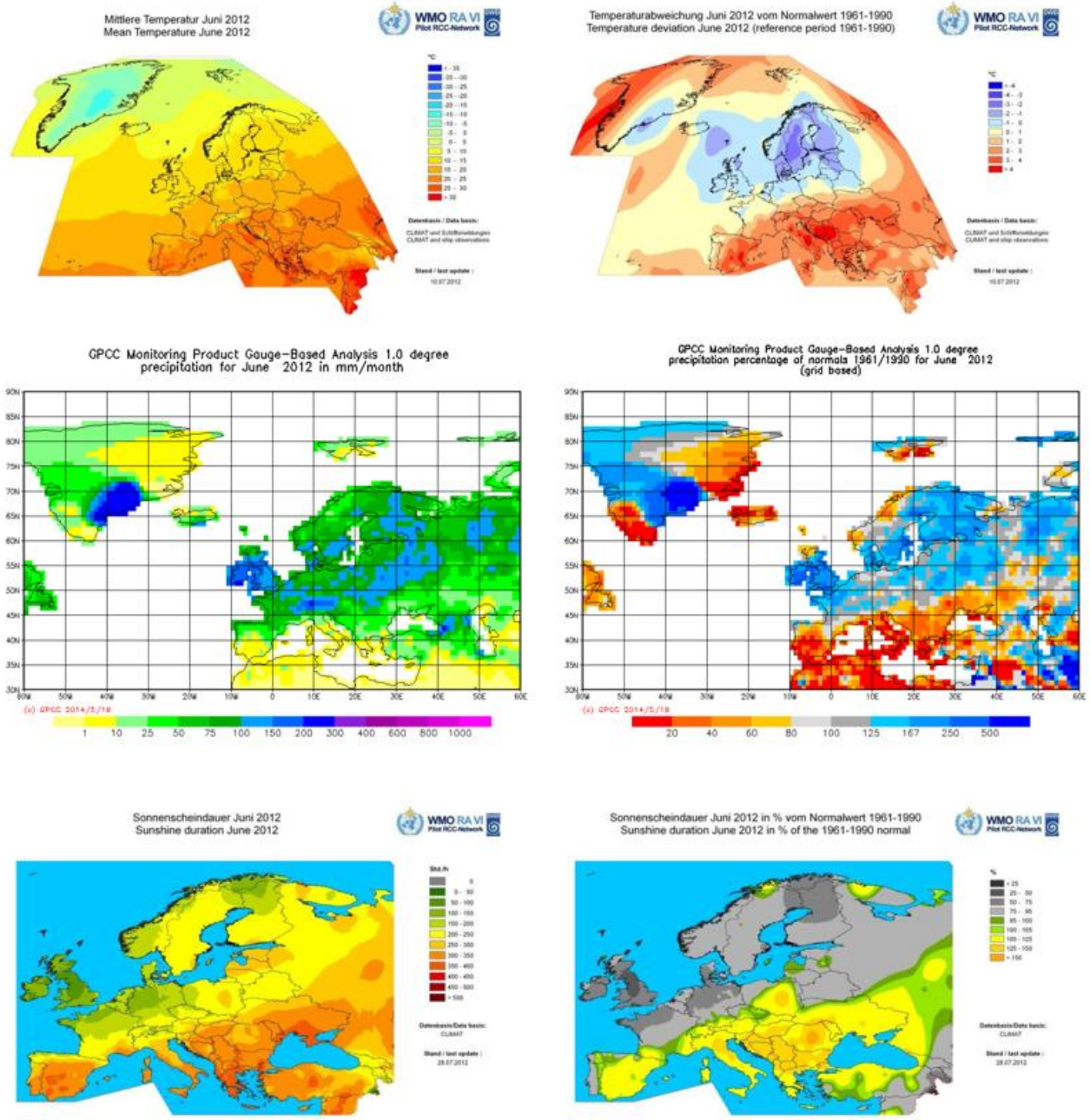


Fig. 3.23: *Means and anomalies (reference 1961-1990) of temperature, precipitation and sunshine duration in June 2012*

Monthly Climate Extremes and Events:

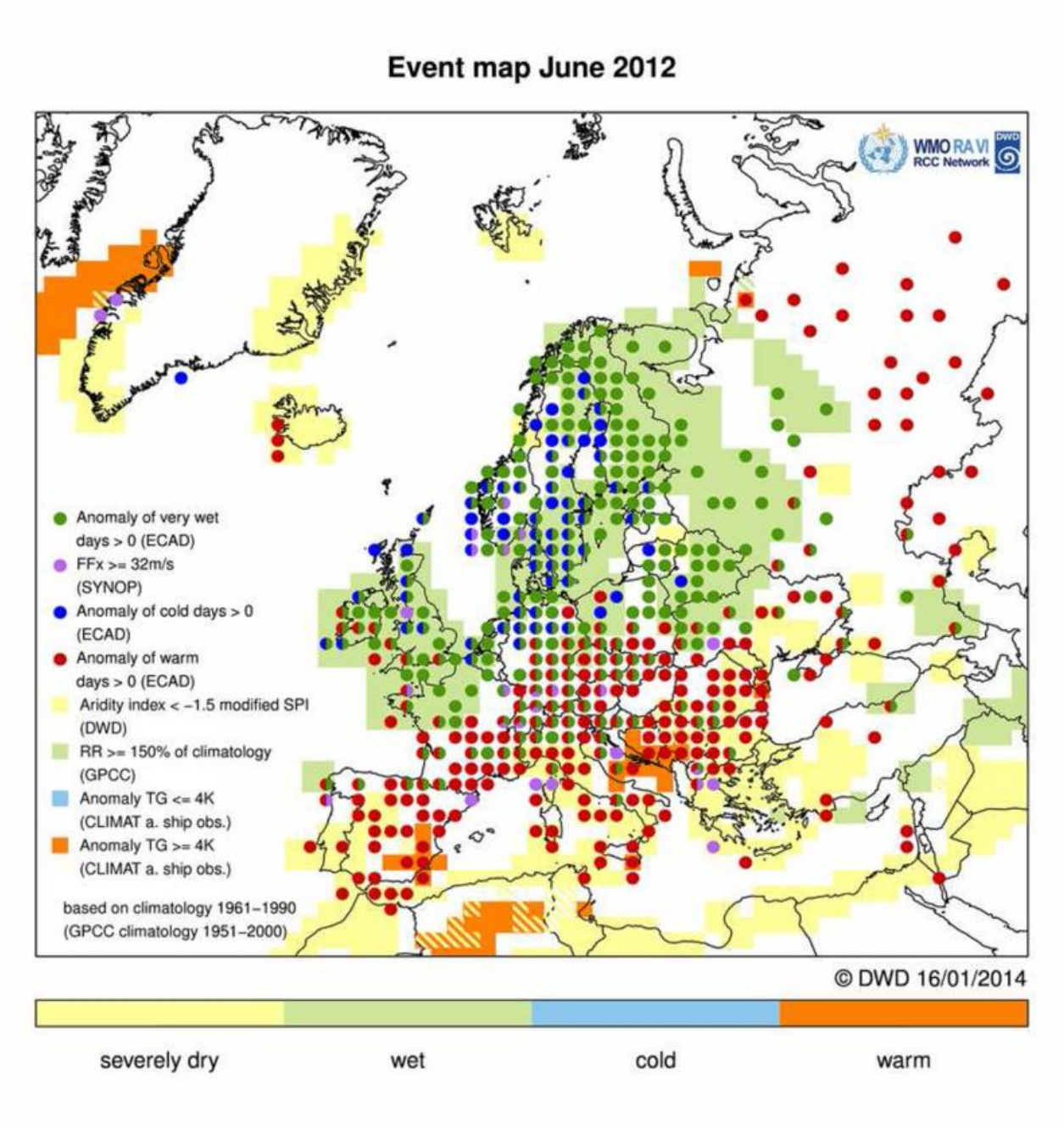


***Fig. 3.24** : Monthly Map of Climate Extremes and Events June 2012*

Monthly Temperature and Precipitation in the Eastern Mediterranean Subregion:

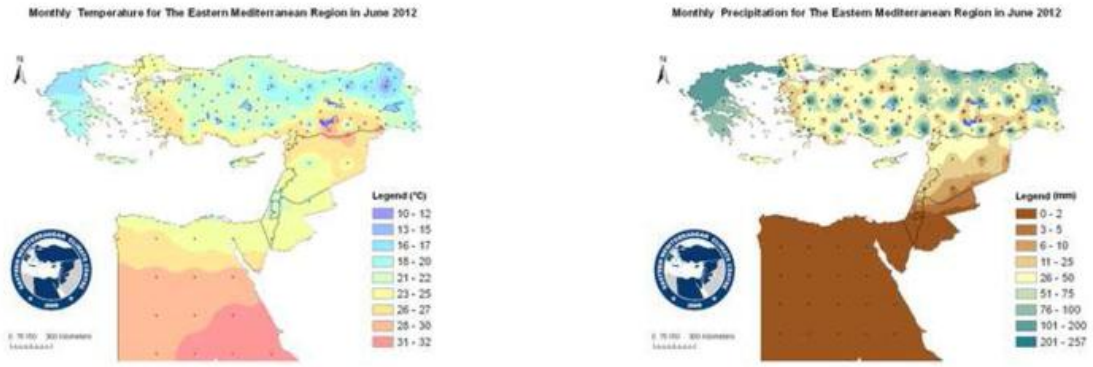


***Fig. 3.25** : Monthly mean temperature (°C) and monthly precipitation totals (mm) June 2012 as provided by the Eastern Mediterranean Climate Center (EMCC)*

Drought Indices for the Southern European Subregion as provided by the Drought Management Centre for Southeastern Europe (DMCSEE):

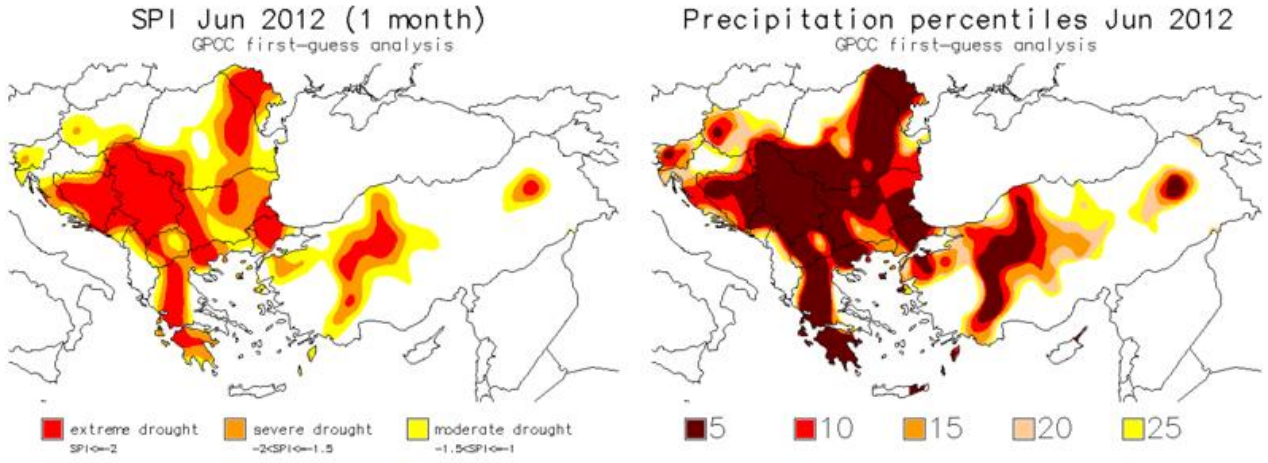


***Fig. 3.26** : Monthly Drought Indices (1-month SPI and low precipitation percentiles) as provided by the Drought Management Centre for Southeastern Europe (DMCSEE)*
June 2012

July

Highlights:

- ***Several days with temperatures above 0°C in Kangerlussac on Greenland.***
- ***Unusually extreme rainfall events in Sweden, in Austria and in southern European Russia.***

Temperature

On the whole Northern Hemisphere most of the land area and the western North Atlantic were warmer than normal.

Warmer than normal conditions were prevailing except in the west and north of Europe under the influence of the North Atlantic. Most striking was the positive anomaly of more than 4 K on the Balkan Peninsula and Ukraine. Also where the positive anomalies were less or it was overall colder than normal, partially more warm days than normal occurred. Many hot days and days with more than 40°C occurred in southern and southeastern Europe.It was the warmest July on record in Hungary as well as in parts of Israel. Several days with temperatures above 0°C occurred on Greenland (Kangerlussaq).

Precipitation

It was wetter than normal in western, central, northern and northeastern Europe as well as the Middle East and drier in the southwest, south, east and southeast. The relatively wettest areas are on the British Isles, northern and eastern parts of Central Europe and the eastern Alps, northern parts of Russia, the central Mediterranean and partly the Middle East. It was the 3rd wettest July since 1858 in Austria. At many Austrian stations, predominantly in the south and southeast new records for the July precipitation totals were achieved. In Mallnitz (Carinthia) July 2012 brought 325 mm, 82 mm more than in 2005. The series started 1895. Much of the surplus was caused by more than usual wet days. It was on the other hand very dry especially around the Mediterranean Sea except the region around southern Italy and the Thyrranean Sea.

Sunshine Duration

Sunshine duration was above normal in southern and southeastern Europe. The greatest positive anomalies occurred on the Balkan Peninsula and in Poland. This corresponds to the low number of dull days and in the Mediterranean Sea and on the Iberian Peninsula to the high number of fair days. This of course supported the high temperatures in the area.

Events

- Rain and several days of thaw have been registered at the Arctic ice cap with high temperatures late June and several days in a row in July above 0°C. mm (see Fig. 3.29).
- 20 of 31 days with weather-related damages in Austria with one of the most intense hailstorms (hailstones of up to 8 cm in diameter) in recent years in Austria on 8 July
- On 20 July large parts of the district Lietzen (in Styria, Austria) were a desaster area after long-lasting heavy rainfall. A mudslide buried 70 houses of St. Lorenzen in the Paltental. Vehicles piled up to 10 meters high. The entire infrastructure, drinking water and electrcity supply was detroyed. The cleaning and rebuilding work lasted until the end of the year.
- Torrential melting waters destroyed a bridge in Kangerlussac, Greenland
- 163 mm daily precipitation total on 7 July in Hinshult, southeastern Sweden; the 5th highest daily amount ever recorded in Sweden.

- Destructive flooding in the Krasnodar territory with daily totals of the order of six-month totals for the region. On 6 July 2012 Gelendzhik received 253 mm. Novorossisk and Krymsk received 187 resp. 156 mm.
- In Romania the Thermal Heat Index (THI) reached or exceeded a critical value almost every day.

Monthly Means or Totals and Anomalies :

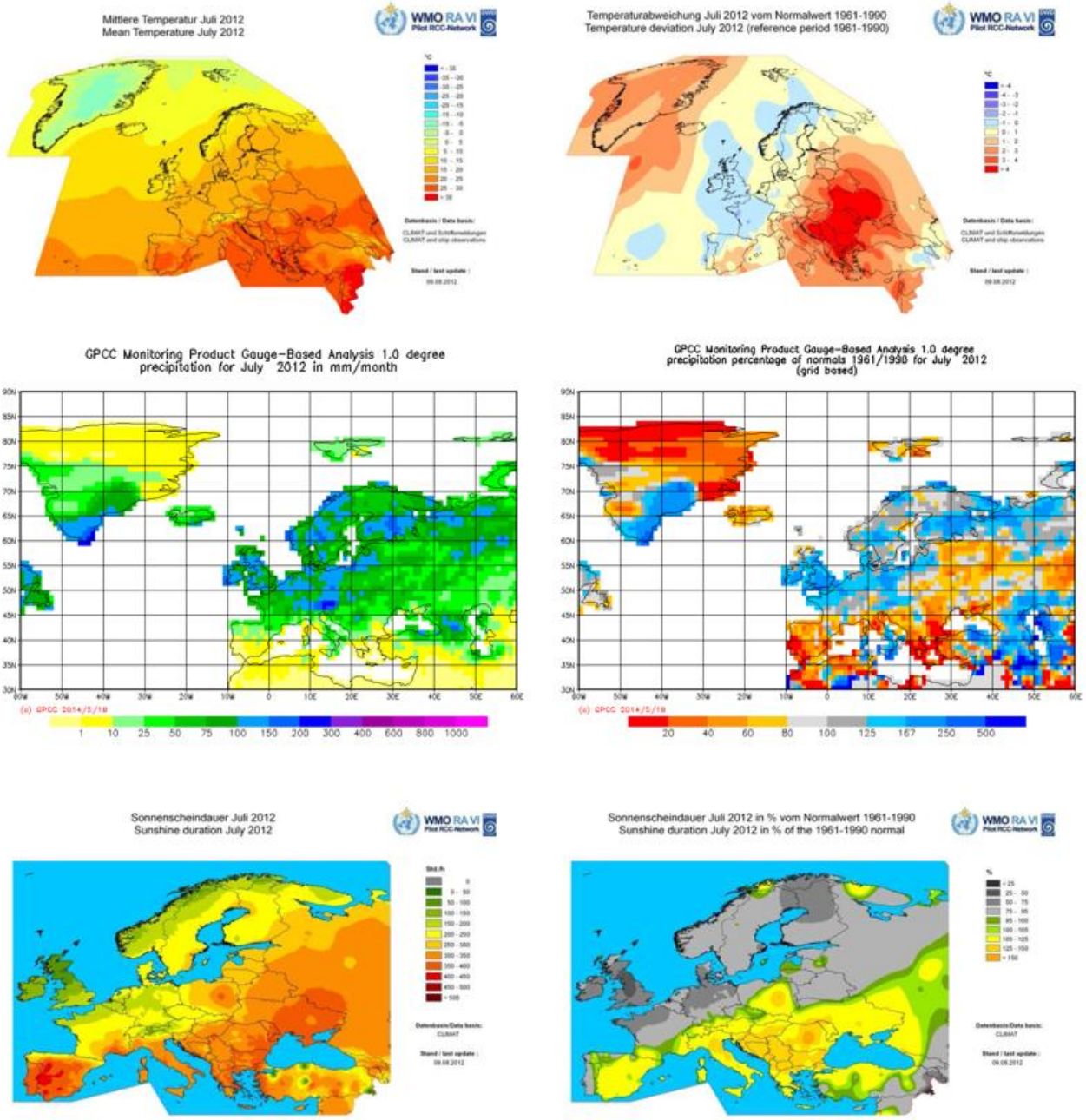


Fig. 3.27: *Means and anomalies (reference 1961-1990) of temperature, precipitation and sunshine duration in July 2012*

Monthly Climate Extremes and Events:

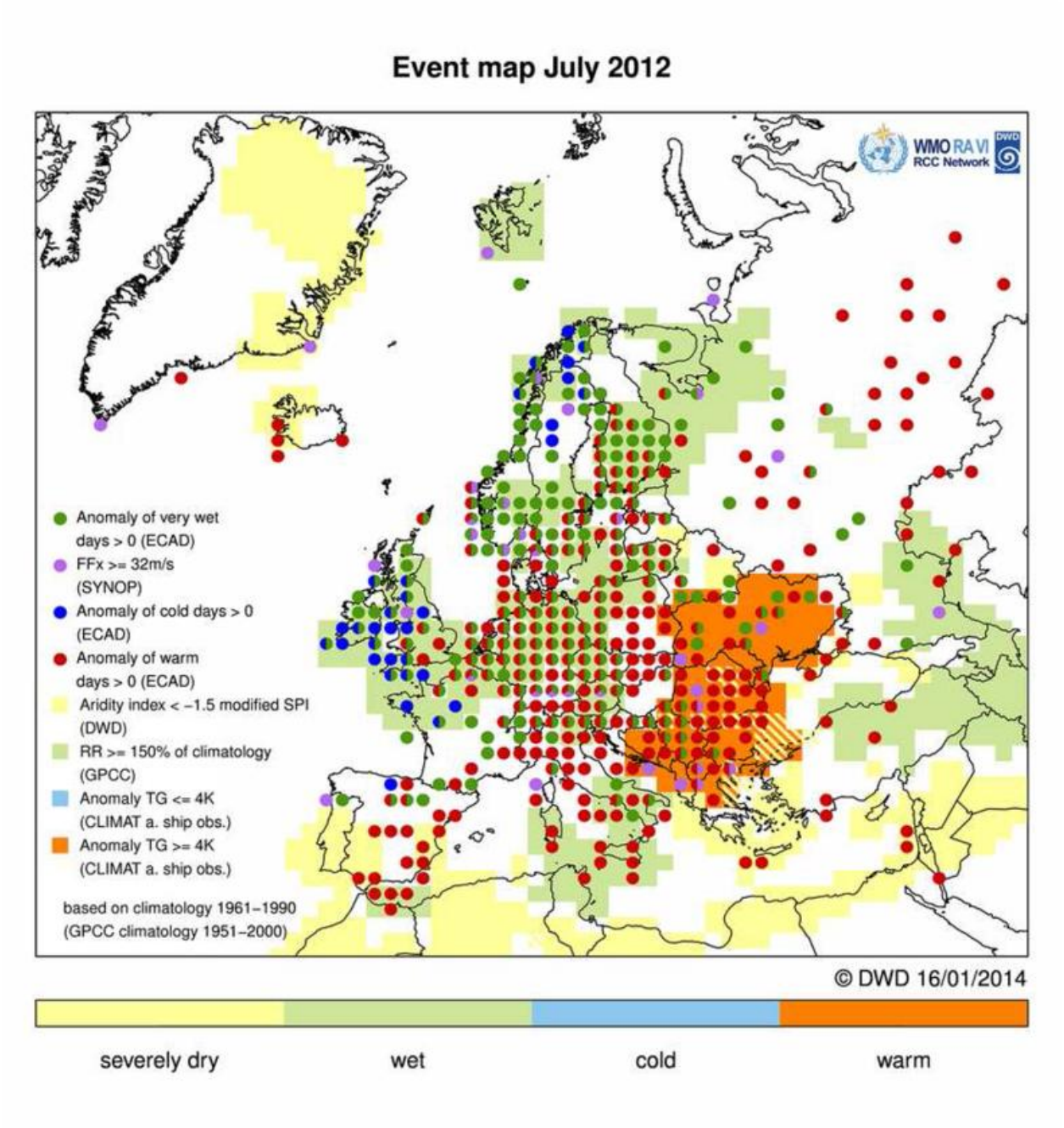


***Fig. 3.28** : Monthly Map of Climate Extremes and Events July 2012*

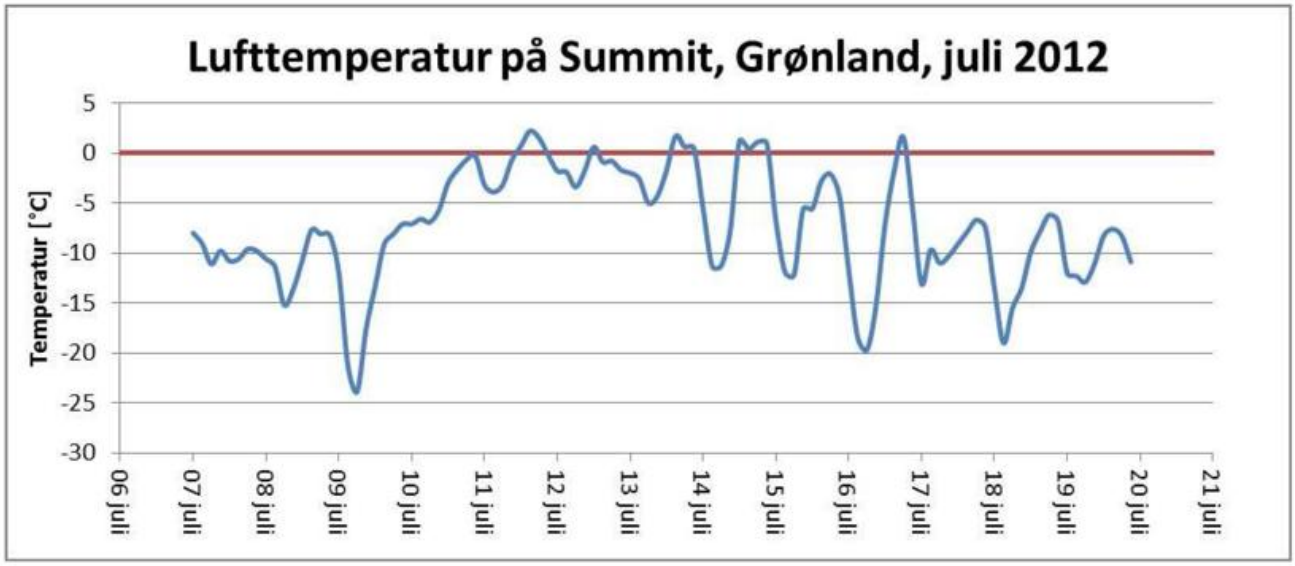


Fig. 3.29 *: DMI has observed the surface air temperature (SAT) at Summit in the middle of the Greenland ice cap in 3.2 km altitude since 1991. DMI's observations show that the temperatures typically range from -60 to -50°C in winter and from -10 to 0°C in summer. It is not unusual to observe positive temperatures on a few days during a year. It is a fact in 10 different years out the 18 years of observations. Observations from July 2012 (lower figure) showed that temperature for several days in a row exceeded 0°C, not seen before. In the days of 11 - 14 and 16th July the temperatures were above 0 °C. The observations confirm the NASA satellite observations of melting in these days. July 2012*

Monthly Temperature and Precipitation in the Eastern Mediterranean Subregion:

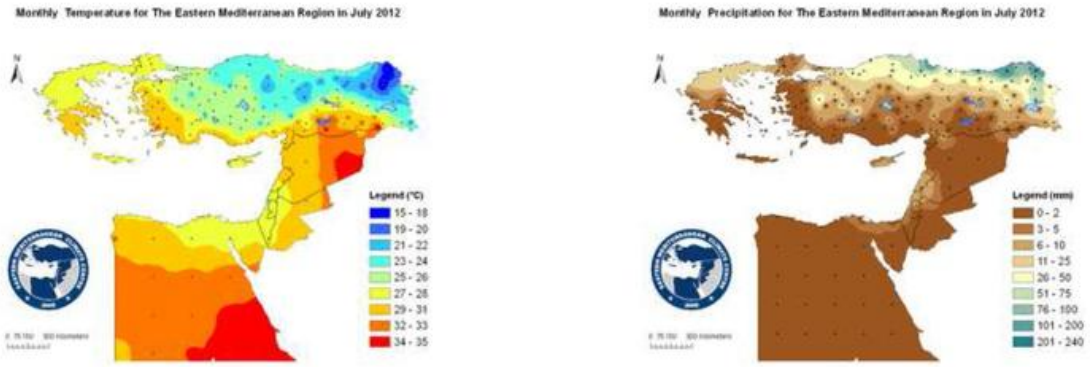


Fig. 3.30 *: Monthly mean temperature (°C) and monthly precipitation totals (mm) July 2012 as provided by the Eastern Mediterranean Climate Center (EMCC)*

Drought Indices for the Southern European Subregion as provided by the Drought Management Centre for Southeastern Europe (DMCSEE):

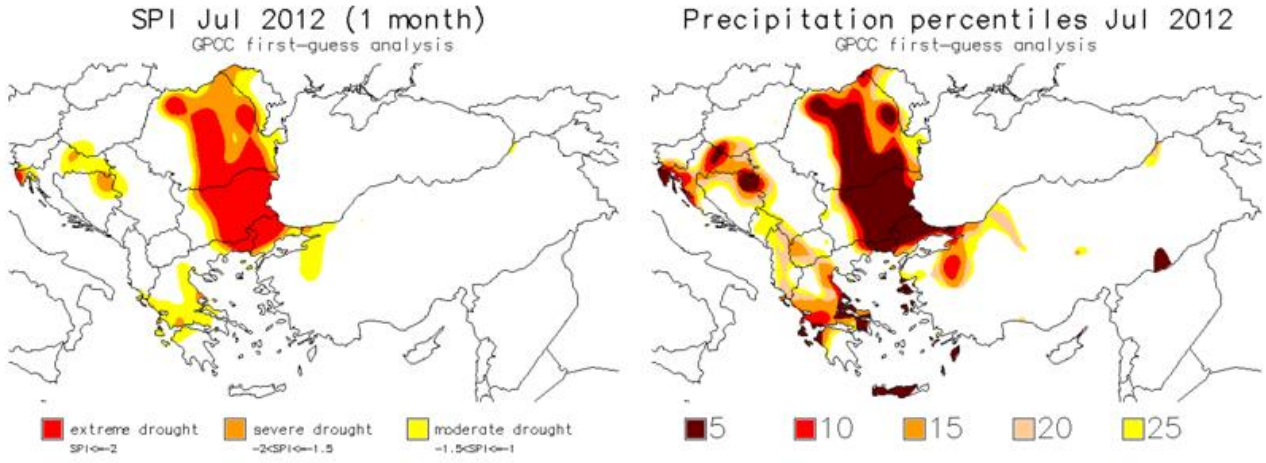


Fig. 3.31 *: Monthly Drought Indices (1-month SPI and low precipitation percentiles) as provided by the Drought Management Centre for Southeastern Europe (DMCSEE)*
July 2012

August

Highlights:

- ***In 24 countries in the region daily maximum temperatures of 40°C or more were reached or exceeded, highest maximum of 45.9°C in Spain.***
- ***Lowest rainfall total for July since 1901 in Hungary***

Overview:

Temperature

August 2012 was warmer than normal nearly in the whole area with exception of slightly colder areas on the North Atlantic, the Norwegian Sea, the Baltic countries and parts of northern Russia and Finland. The positive anomalies reached or exceeded 4 K on the Balkan Peninsula and the Adriatic Sea and in Italy as well as parts of eastern Spain. In many countries (24 in the region) on the Iberian Penisula, the Balkan Peninsula, in the eastern Mediterranean region as well as in Italy and in France daily maximum temperatures of 40°C or more were reached or exceeded (see Fig 3.34 for the heat wave in France). Most of the other countries had at least one station with a hot day (30 °C or more) with exception of Ireland, the Faroer Islands, Greenland, Iceland, Norway, Finland, Estonia and Latvia.

Precipitation

In August 2012 it was very dry on the Balkan Peninsula, in Italy, southeastern France and northwestern France, most of the Iberian Peninsula except the west coast, parts of the eastern Mediterranean and Middle East. Precipitation totals were below 20 percent of the normal in the driest areas especially on the Balkan Peninsula, much of Italy and the Iberian Peninsula. It was the driest August since 1901 in Hungary. Less than normal precipitation was as well observed in central Europe, northern Norway and Finland, partly around the Baltic Sea and in northern Russsia. Also Iceland and southern Greenland were very dry. Wetter than normal were western and northern parts of the British Isles, Netherlands and Denmark, southern Scandinavia, the Alps, Poland, and much of Russia as well as some areas in Greece and Turkey.

Sunshine

In August 2012 it was sunnier than normal in most of the western, central and southern European continent and in northern Scandinavia. It was on the other hand very dull in parts of the Turkish Black Sea area and rather dull in southwestern UK.

Events

- Spain reported the highest maximum temperature of 45.9°C.

Monthly Means or Totals and Anomalies :

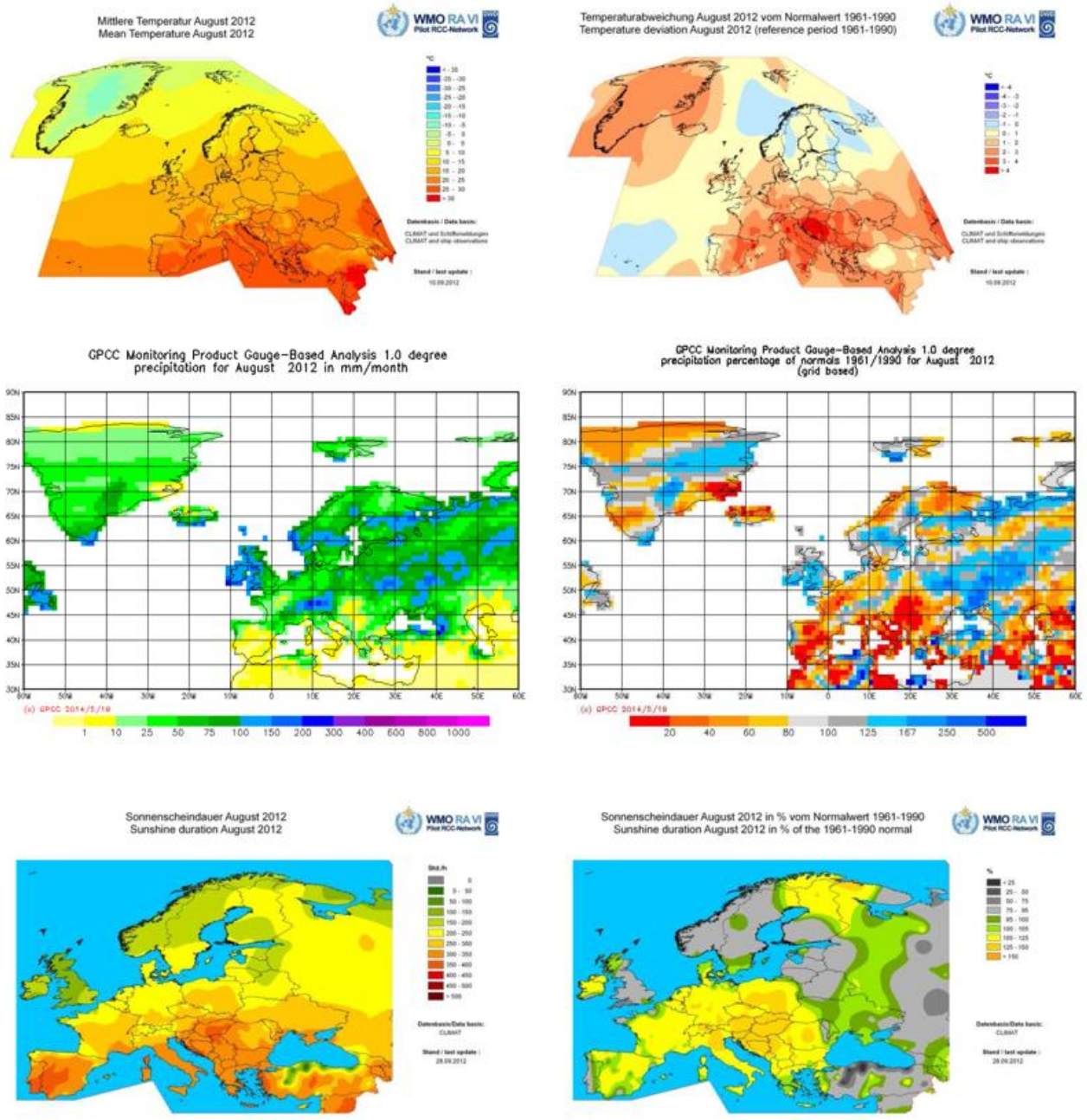


Fig. 3.32: *Means and anomalies (reference 1961-1990) of temperature, precipitation and sunshine duration in August 2012*

Monthly Climate Extremes and Events:

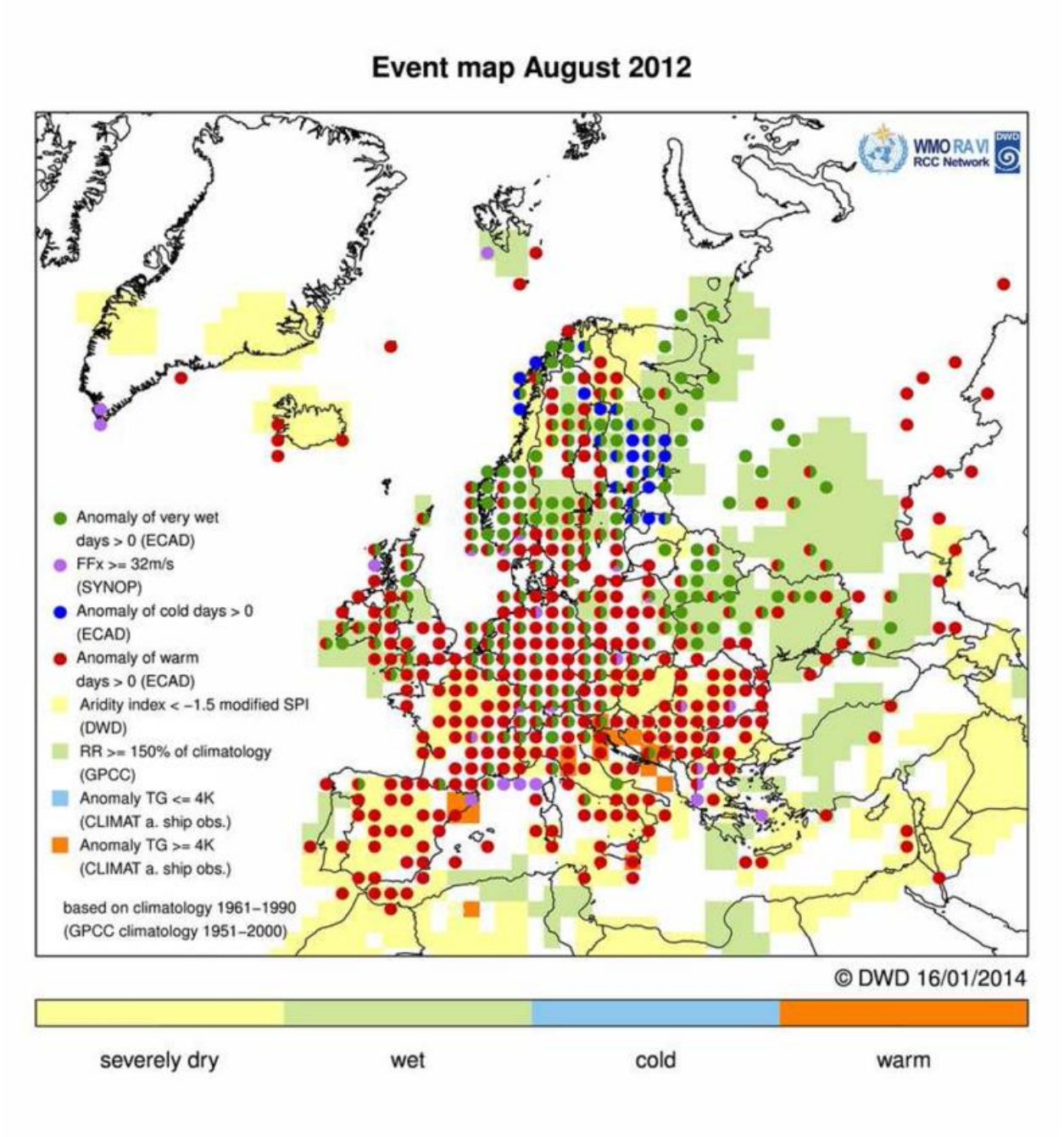


Fig. 3.33 *: Monthly Map of Climate Extremes and Events August 2012*

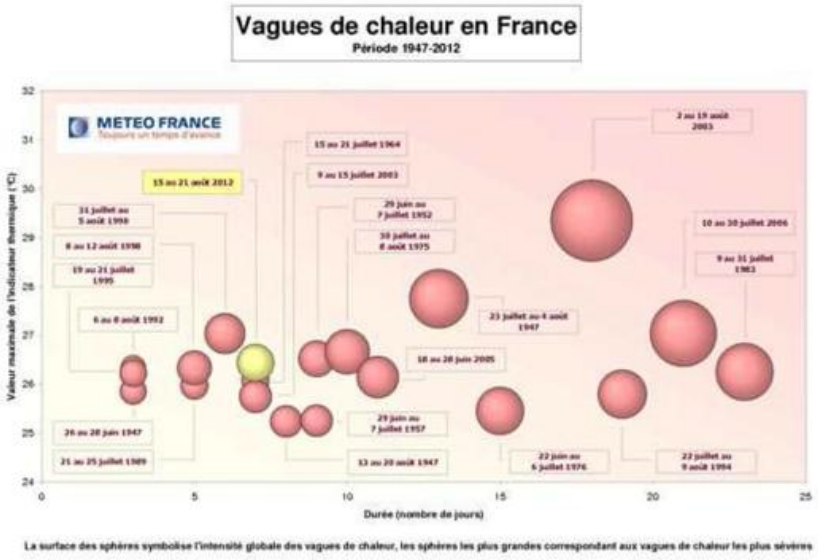


Fig. 3.34 *: The heat wave in August in comparison to earlier heat waves in France August 2012*

Monthly Temperature and Precipitation in the Eastern Mediterranean Subregion:

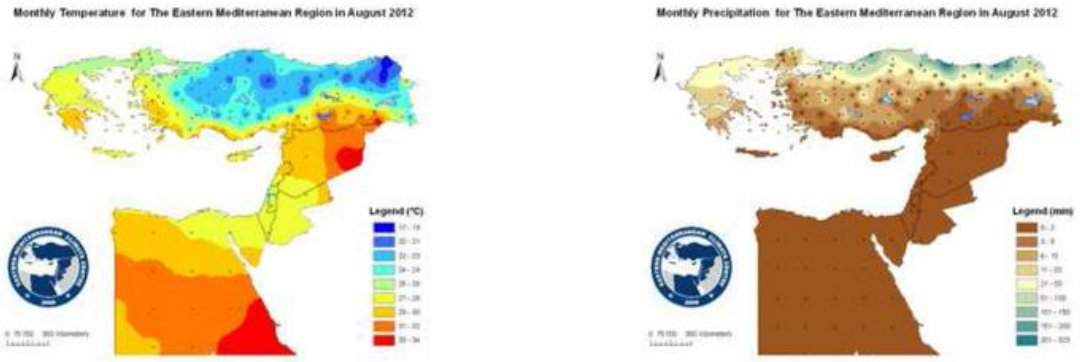


Fig. 3.35 *: Monthly mean temperature (°C) and monthly precipitation totals (mm) August 2012 as provided by the Eastern Mediterranean Climate Center (EMCC)*

Drought Indices for the Southern European Subregion as provided by the Drought Management Centre for Southeastern Europe (DMCSEE):

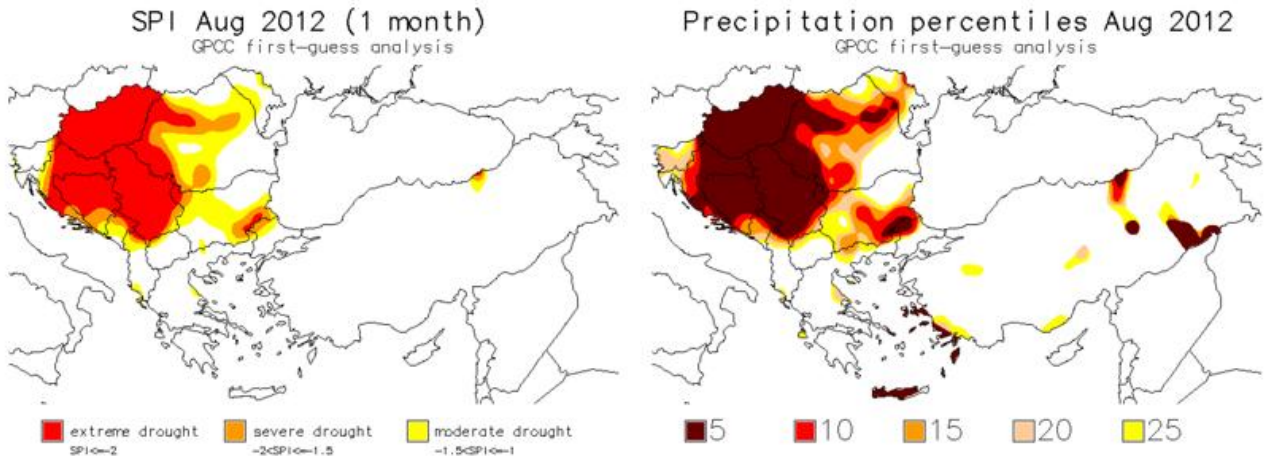


Fig. 3.36 *: Monthly Drought Indices (1-month SPI and low precipitation percentiles) as provided by the Drought Management Centre for Southeastern Europe (DMCSEE)*
August 2012

September

Highlights:

- ***Extremely heavy precipitation in southern Spain and Italy***

Overview:

Temperature

Most of the region was warmer than normal except the North Atlantic and the adjacent countries: northwestern France, the British Isles and southwestern Scandinavia. The Balkan Peninsula in the southwest and the Arctic region and Greenland in the north had the highest positive anomalies of +2 to +3, partly over +3 K.

Precipitation

Much of central, eastern and southeastern Europe and the Middle East were drier than normal. The Mediterranean Sea area especially in its central part as well as the southern Iberian Peninsula and northern and northwestern Europe partly received more precipitation than normal. This surplus was often caused by extremely heavy precipitation. Especially in the Mediterranean Sea area some places received heavy to extremely heavy precipitation for 2 or 3 consecutive days so that large precipitation totals amounted within relative short time.

Sunshine Duration

It was sunnier than normal mostly in central, western, southeastern and southern Europe except the central Mediterranean Sea region. It was less sunny on the other hand in most of the north: northern Germany, Scandinavia except southern and central Sweden and northern Russia. The sunniest country was Poland with positive anomalies up to more than 150 percent of the normal.

Events

- Valencia in Spain recorded a daily total of 188.9 mm on 28 September.
- Extremely heavy rain events in Tuscany, Italy on 19 and 30 September 2012

Monthly Means or Totals and Anomalies :

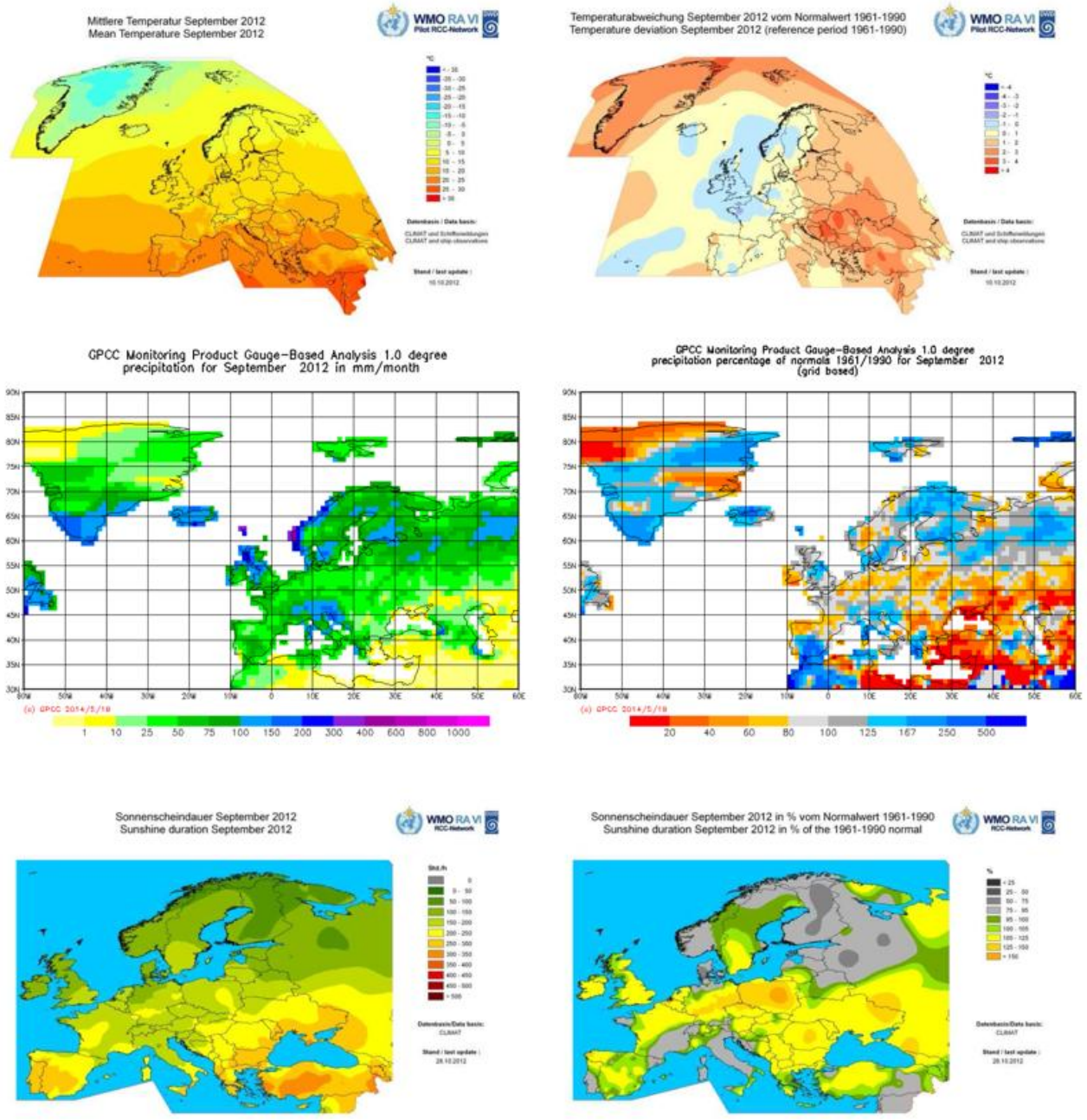


Fig. 3.37: *Means and anomalies (reference 1961-1990) of temperature, precipitation and sunshine duration in September 2012*

Monthly Climate Extremes and Events:

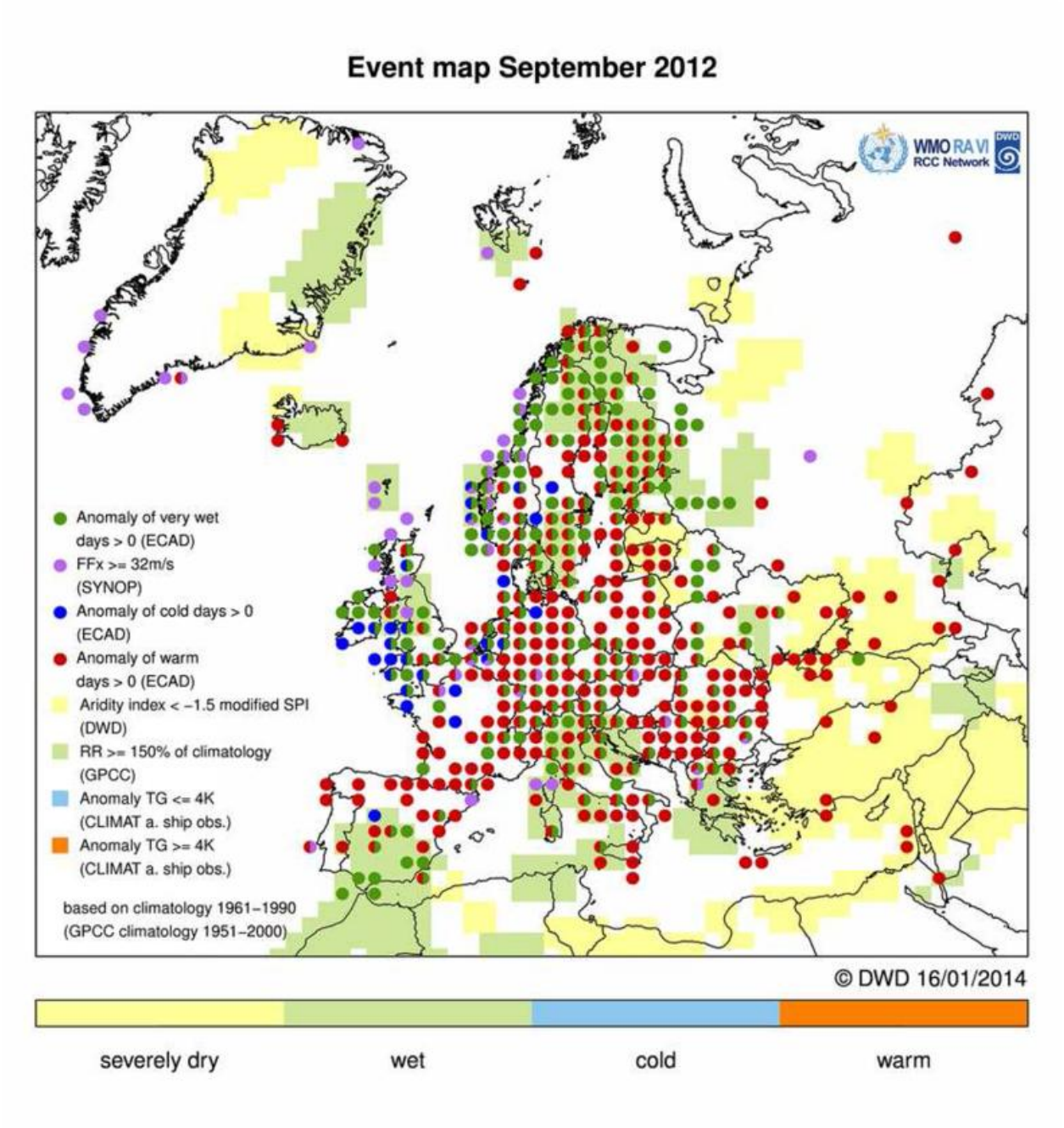


***Fig. 3.38** : Monthly Map of Climate Extremes and Events September 2012*

Monthly Temperature and Precipitation in the Eastern Mediterranean Subregion:

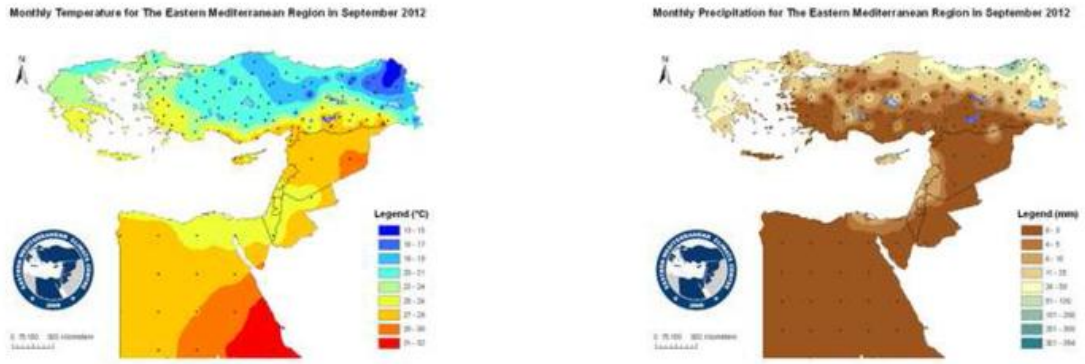


***Fig. 3.39** : Monthly mean temperature (°C) and monthly precipitation totals (mm) September 2012 as provided by the Eastern Mediterranean Climate Center (EMCC)*

Drought Indices for the Southern European Subregion as provided by the Drought Management Centre for Southeastern Europe (DMCSEE):

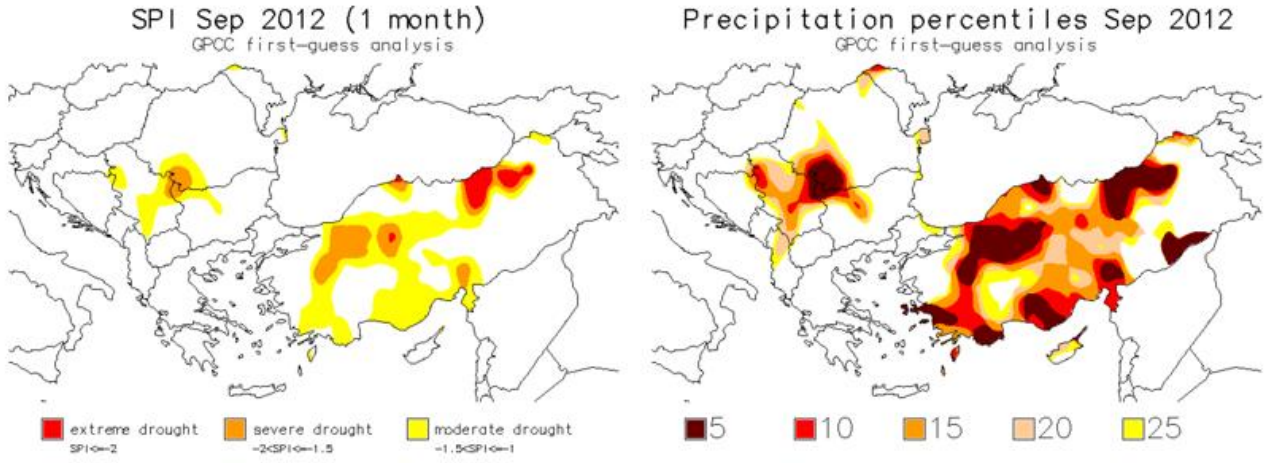


***Fig. 3.40** : Monthly Drought Indices (1-month SPI and low precipitation percentiles) as provided by the Drought Management Centre for Southeastern Europe (DMCSEE)*
September 2012

October

Highlights:

- ***New records of October maximum temperatures at stations in Sweden, Latvia, Austria, Romania and European Russia***
- ***For some stations in northeastern Sweden the rainiest October on record for more than 100 years.***

Overview:

Temperature

In October 2012 it was mostly colder than normal or close to normal on the eastern North Atlantic, the British Isles, the western Iberian Peninsula, Norway and Sweden except the farest north, Netherlands, Denmark, Germany, Poland and much of the Baltic Sea area. Ireland and northern UK as well as large parts of Norway and western Sweden were coldest with anomalies up to -3 K. UK reported the provisionally coldest October since 2003. It was on the other hand warmer than normal in the south, southeast, east, north and northwest with the highest positive anomalies above 4 K in the Black Sea area and above 3 K from the Aegean Sea northeastwards to southern Russia, southern Ukraine and the Caucasus region as well as in the Barents Sea and northern Greenland.

Precipitation

October 2012 was wetter than normal on most of the western, southern, northern and eastern to northeastern continent, except the eastern Black Sea, the Caucasus region and the Caspian Sea region, the Atlantic region, parts of the Mediterranean Sea region and central Europe (mostly Germany), which were drier. Much more precipitation than normal fell in western France, on the southern Iberian Peninsula, at the Adriatic coast, in the northern Baltic Sea region and in the eastern parts of European Russia as well as in southwestern Greenland. Sweden reported that "in the northernmost part of the Swedish east coast the month of October was the rainiest on record (since more than 100 years) with some local flooding". Especially in the Mediterranean Sea region several phases with extremely heavy precipitation occurred in connection with low pressure systems. Heavy to very heavy precipitation also occurred in the north.

Sunshine Duration

October 2012 was sunnier than normal on the British Isles, the southern Iberian Peninsula, central and eastern central Europe, partly southern and western Scandinavia and on the Italian and Balkan Peninsulas. Elsewhere it was close to normal or dull. Lesser sunshine than normal was especially observed in northwestern France and southeastern UK, partly in Portugal, in northeastern Russia as well as in Finland, the eastern Baltic Sea region and Belarus.

Events

- New records of October maximum temperatures occurred on 1-2 October in Romania, on 20 October in Sweden, Latvia and Austria and end of October in European Russia.
- Heavy rain led to exceptional autumn flooding in western parts of Finland
- During 10 to 13 October heavy to extremely heavy rain in the Adriatic Sea and western Balkan Peninsula accumulated to 3-day totals between 50 and 200 mm.
- On 20 October the cave of Lourdes in France became flooded after heavy rain
- During a storm a maximum windgust of 43.9 m/s was recorded on 30 October 2012 in Izaña (Teneriffa).

Monthly Means or Totals and Anomalies :

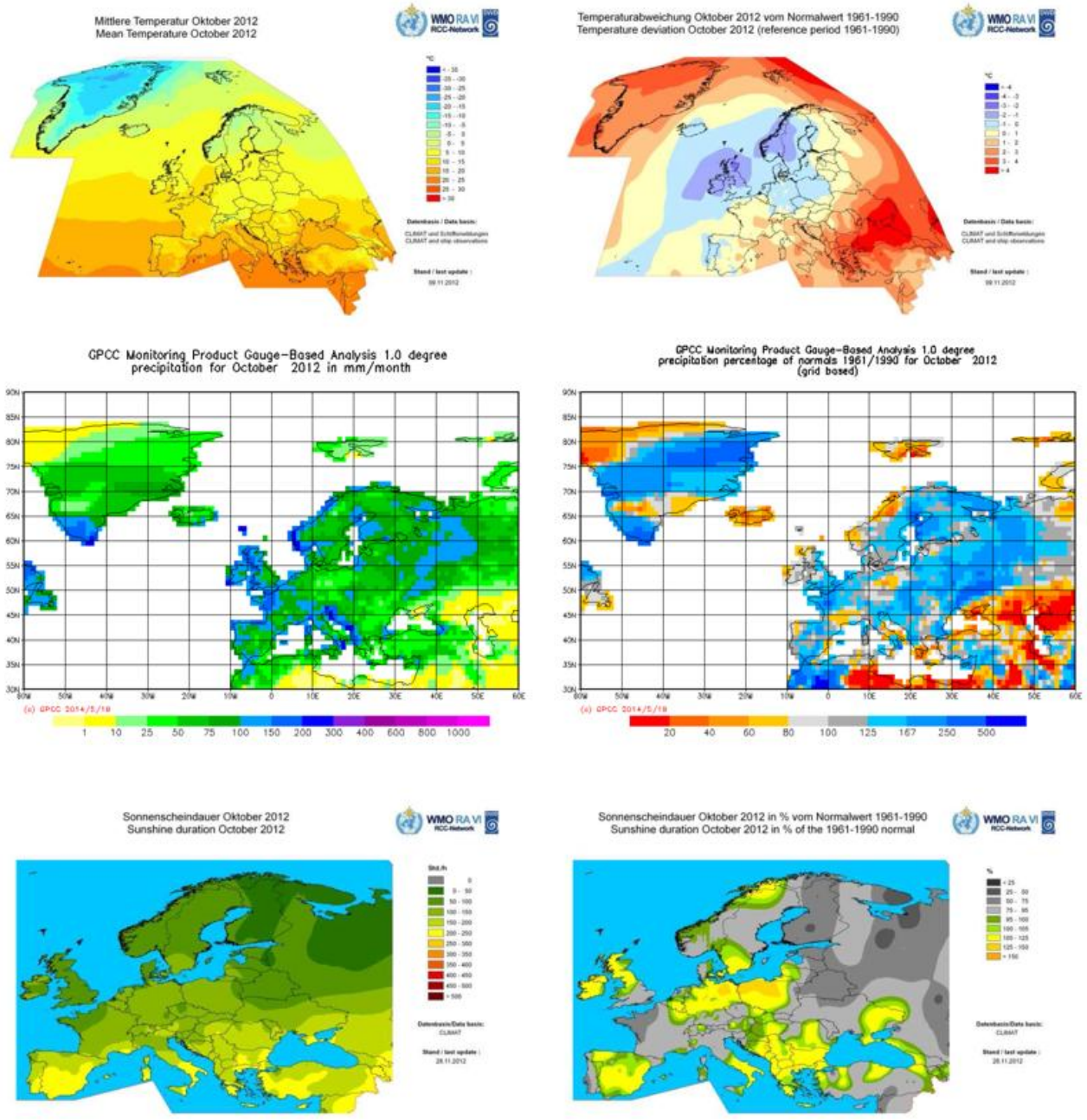


Fig. 3.41: *Means and anomalies (reference 1961-1990) of temperature, precipitation and sunshine duration in October 2012*

Monthly Climate Extremes and Events:

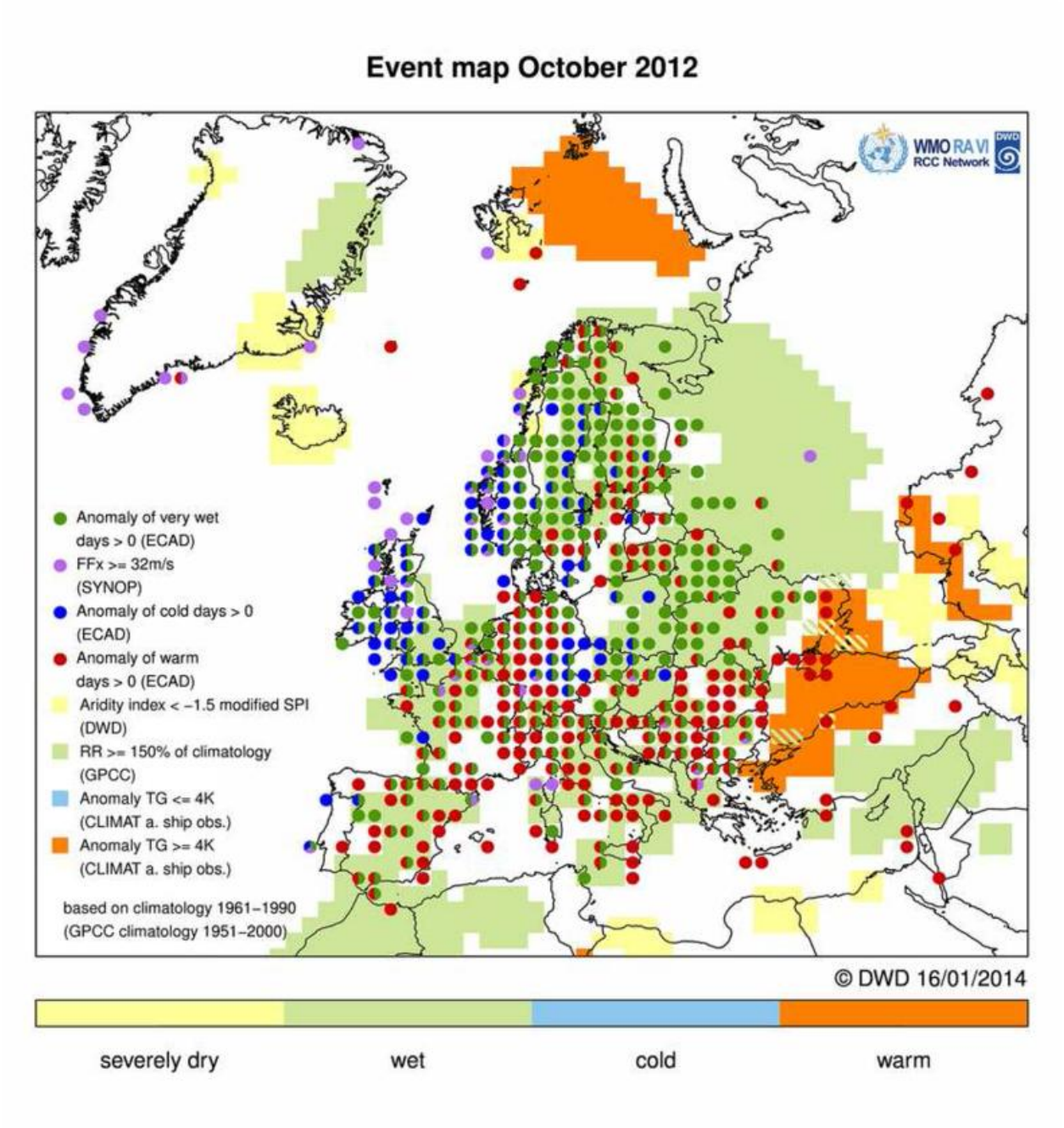


Fig. 3.42 : Monthly Map of Climate Extremes and Events October 2012

Monthly Temperature and Precipitation in the Eastern Mediterranean Subregion:

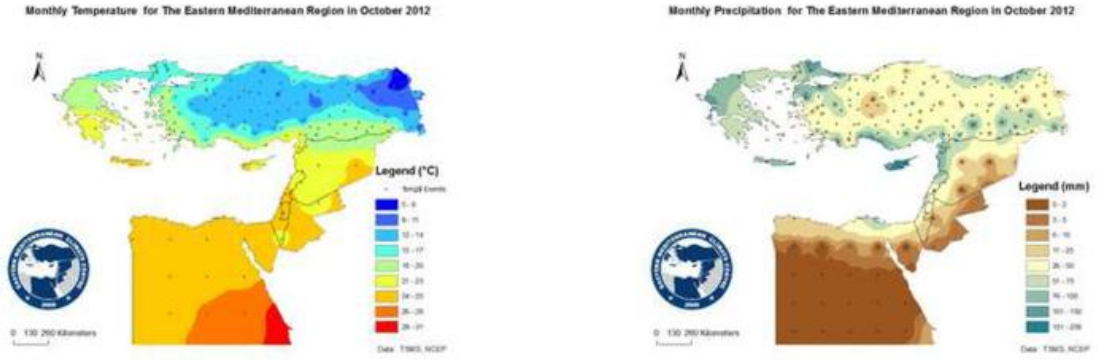


Fig. 3.43 *: Monthly mean temperature (°C) and monthly precipitation totals (mm) October 2012 as provided by the Eastern Mediterranean Climate Center (EMCC)*

Drought Indices for the Southern European Subregion as provided by the Drought Management Centre for Southeastern Europe (DMCSEE):

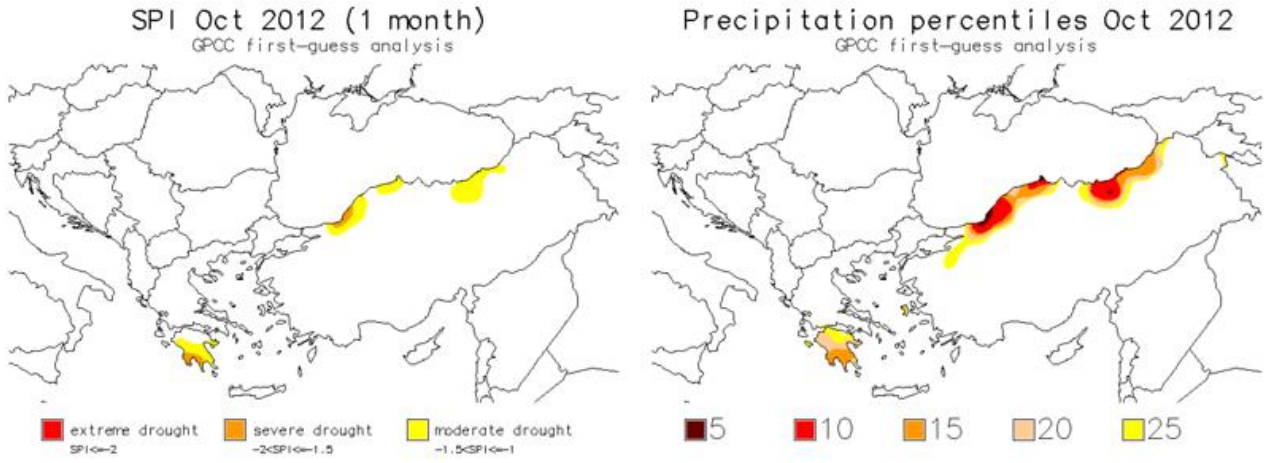


Fig. 3.44 *: Monthly Drought Indices (1-month SPI and low precipitation percentiles) as provided by the Drought Management Centre for Southeastern Europe (DMCSEE)*
October 2012

November

Highlights:

- ***Previous records of November maximum temperature were broken at stations in European Russia (9°C in Ufa on 8 November) and in Romania (Calimani on 12 November).***
- ***Many events of extreme heavy precipitation***

Overview:

Temperature

November 2012 was warmer than normal in the Arctic region and on most of the continent except the westernmost parts of the British Isles, France and the Iberian Peninsula. It was colder than normal on the Atlantic. The positive anomalies were higher than +4 K in the Arctic region and at many stations above +3 K in Slovakia.

Precipitation

It was wetter than normal on the southern Iberian Peninsula, the Middle East, northern Italy and the Alpes, northern parts of European Russia and Finland as well as southern Scandinavia and the southern British Isles. Drier than normal on the Balkan Peninsula around the Black Sea and in southern Russia as well as on the northwestern European continent and parts of Scandinavia. Many extremes of precipitation totals occurred in several episodes on different time scales from high several-day totals to extremely high daily totals especially in the Mediterranean Sea area and on Madeira but also for instance in England, were one week in November was the wettest since 50 years.

Sunshine Duration

November 2012 was sunnier than normal on the northern part of the Balkan Peninsula and north of the Black Sea (partly more than 150 percent of the normal) as well as over the Alpes, parts of Germany and the Netherlands, the westernmost parts of the continent and southeastern and northern UK and Ireland and as well parts of western Scandinavia. It was mostly dull elsewhere with less than 50 percent of the normal in the east.

Events

- A strong blizzard in the southern parts of Finland and the Gulf of Finland with significant wave heights of 5.2 meters which was above the previous record.
- A F3/T6 tornado in the Algarve region in Portugal (at Lagoa, Silves) with wind in the range 256-295 km/h resp. 71.1-81.9 m/s.
- Extensive flooding in Slovenia on 5 to 6 November.
- On 6 November an extremely low air pressure (728 mm Hg resp. 970.6 hPa) was recorded in Moscow.
- A '100-year' flooding of the river Drau on 11 November in Austria, district Wolfsberg. The water stood 2 m high in the city of Lavamünd.
- Flooding in Tuscany and northern Italy, with precipitation totals of 320 mm during 6 to 13 November (compared to a mean monthly total of 80 mm) in the area of Florence. the 6th highest water level in Venice since 1872.
- Extremely heavy precipitation with a daily total of 200 mm (170 mm within 3 hours) in Carrara, Italy, on 27 November

Monthly Means or Totals and Anomalies :

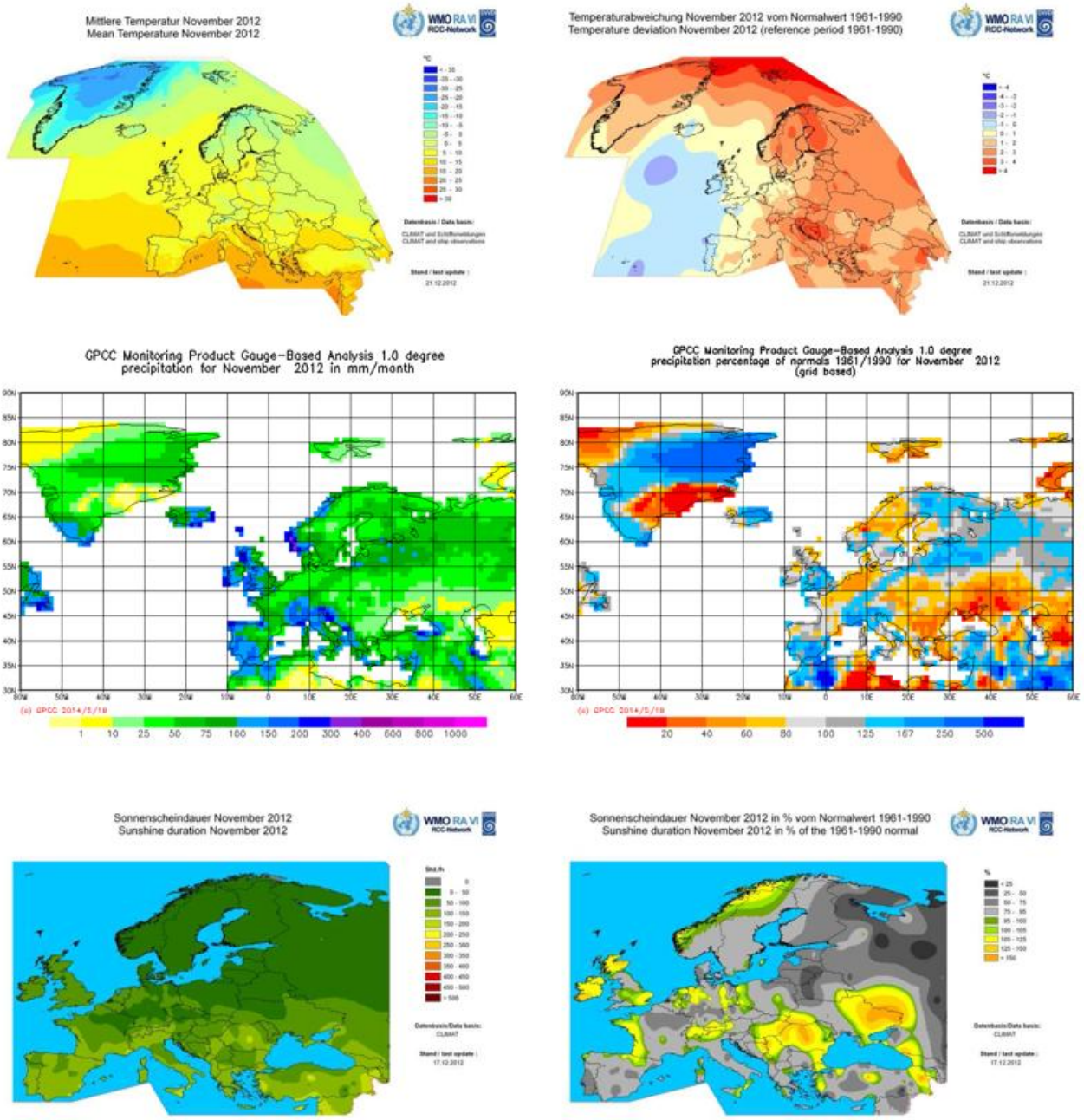


Fig. 3.45: *Means and anomalies (reference 1961-1990) of temperature, precipitation and sunshine duration in November 2012*

Monthly Climate Extremes and Events:

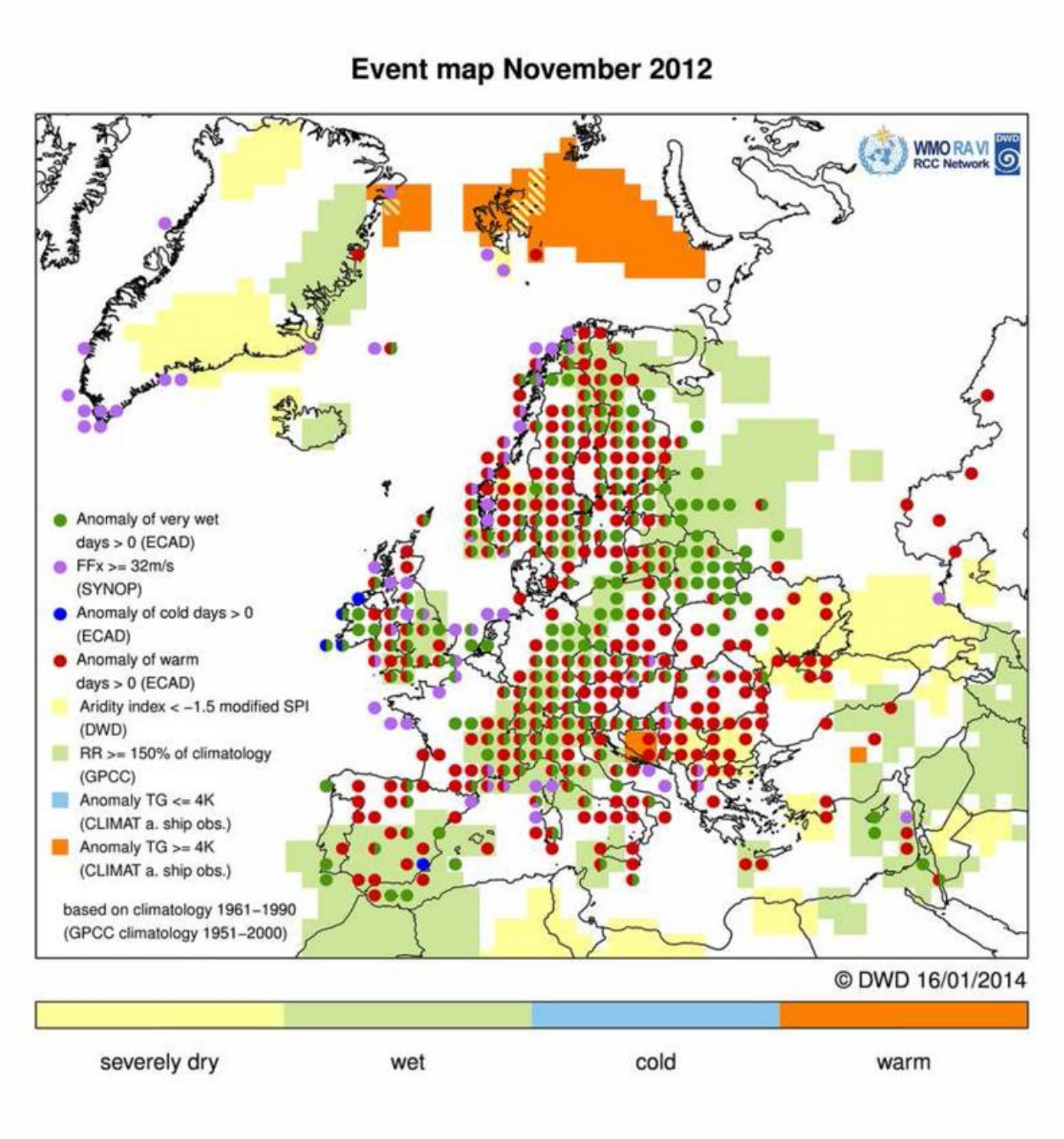


***Fig. 3.46** : Monthly Map of Climate Extremes and Events November 2012*

Monthly Temperature and Precipitation in the Eastern Mediterranean Subregion:

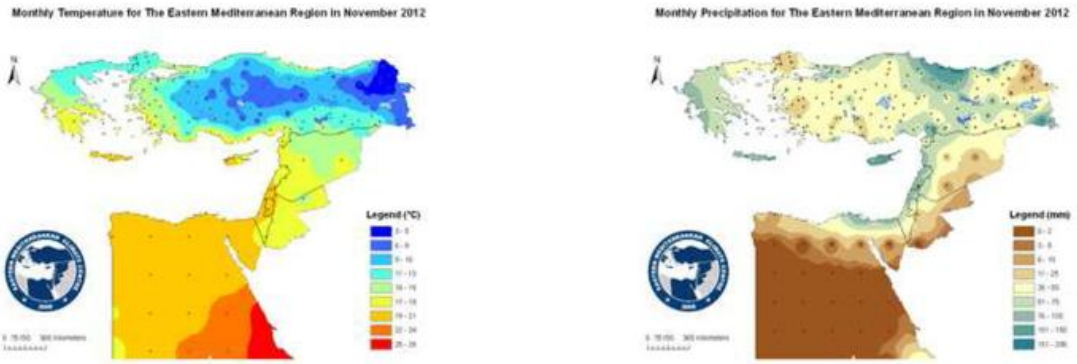


***Fig. 3.47** : Monthly mean temperature (°C) and monthly precipitation totals (mm) November 2012 as provided by the Eastern Mediterranean Climate Center (EMCC)*

Drought Indices for the Southern European Subregion as provided by the Drought Management Centre for Southeastern Europe (DMCSEE):

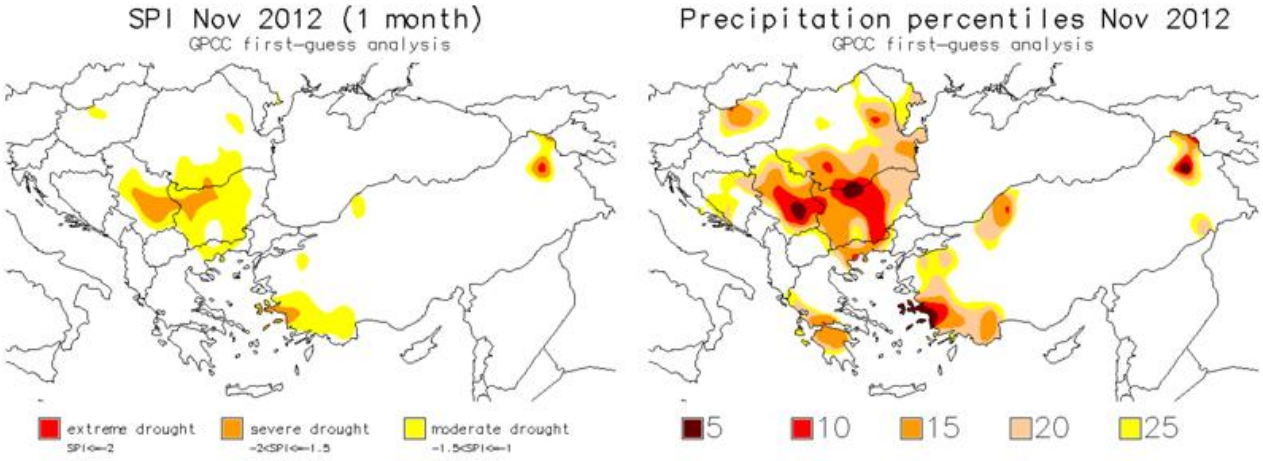


***Fig. 3.48** : Monthly Drought Indices (1-month SPI and low precipitation percentiles) as provided by the Drought Management Centre for Southeastern Europe (DMCSEE)*
November 2012

December

Highlights:

- ***A severe cold spell in eastern Europe and the warmest Christmas since 60 years in Austria.***
- ***Wettest December in Belgium, December the wettest month of the year in the Netherlands and new records of daily rainfall totals at stations in Western Galilee, Israel***

Overview:

Temperature

December 2012 was warmer than normal in the Arctic, the North Atlantic, the western, central and southwestern European continent and the Middle East. It was colder than normal in Scandinavia, Russia, the eastern central European continent, the Balkan Peninsula and Italy. The warm anomalies in the Arctic exceeded +4 K and the cold anomalies in Russia exceeded -4 K. In eastern Europe the cold came unexpectedly early and strong.

Precipitation

While December 2012 was drier than normal in northern and western Scandinavia, northern Russia, the Baltic states and the Caucasus, the Iberian Peninsula and western Mediterranean, it was partly remarkably wetter than normal elsewhere. In eastern UK, northern France, Belgium and the Netherlands it was about twice of the normal and in eastern Romania and southern Ukraine as well as in parts of the Middle East more than 250% of the normal were observed.This was the wettest December so far in the records of Belgium. In the Netherlands December 2012 was the wettest month during the year.

Sunshine

Sunshine duration was clearly higher than normal for Poland, the Czech Republic and partly the eastern Alps as well as in Russia while most of central Europe, te western Iberian Peninsula, moste of Scandinavia, the western Balkan Penisula, the baltic states, Belarus, Ukraine and the Middle East were dull.

Events

- On 20 December stations in Western Galilee, Israel received daily rainfall totals of 135-140 mm. These were the highest daily totals ever recorded.

Monthly Means or Totals and Anomalies :

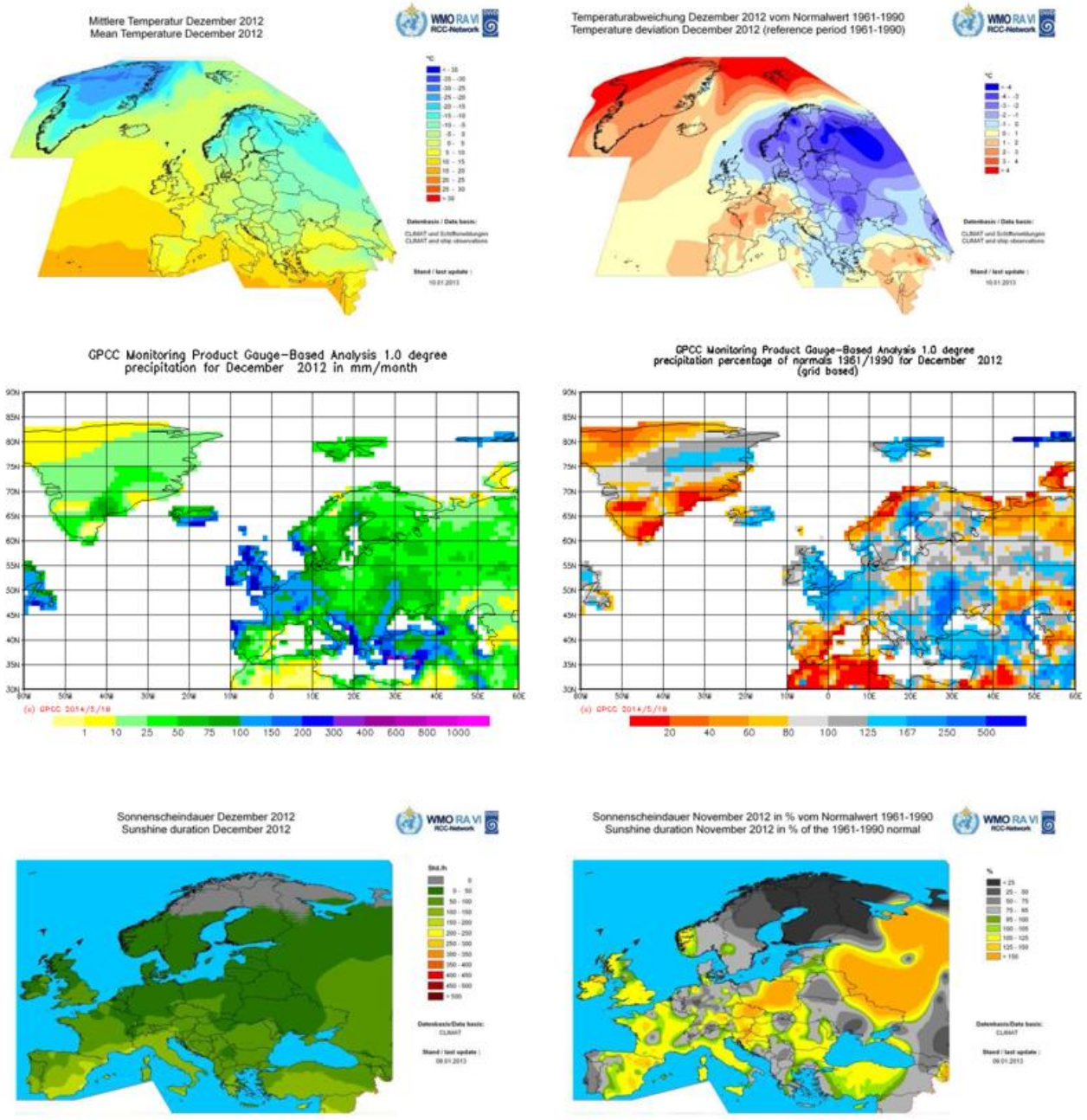


Fig. 3.49: *Means and anomalies (reference 1961-1990) of temperature, precipitation and sunshine duration in December 2012*

Monthly Climate Extremes and Events:

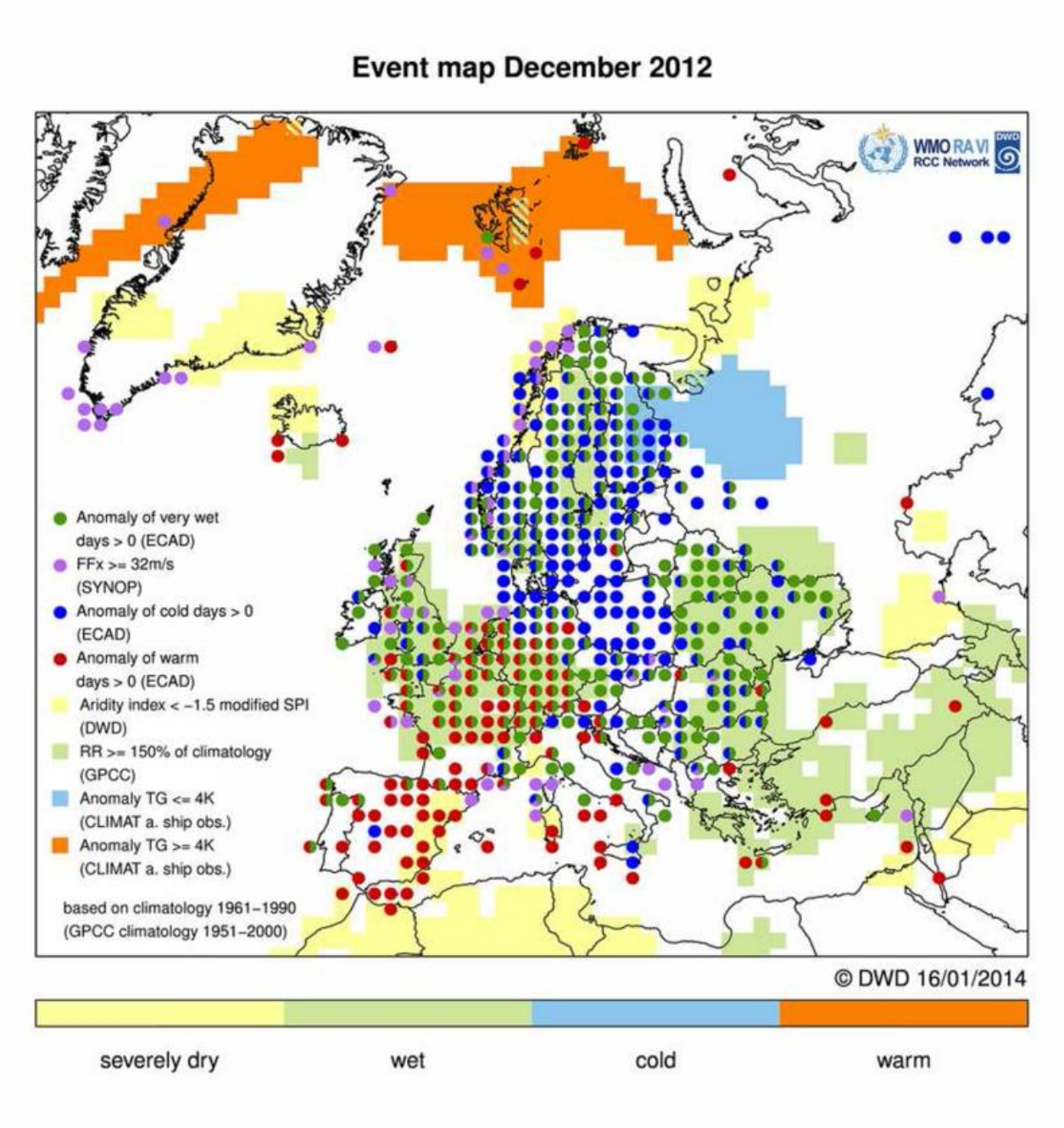


Fig. 3.50 *: Monthly Map of Climate Extremes and Events December 2012*

Monthly Temperature and Precipitation in the Eastern Mediterranean Subregion:

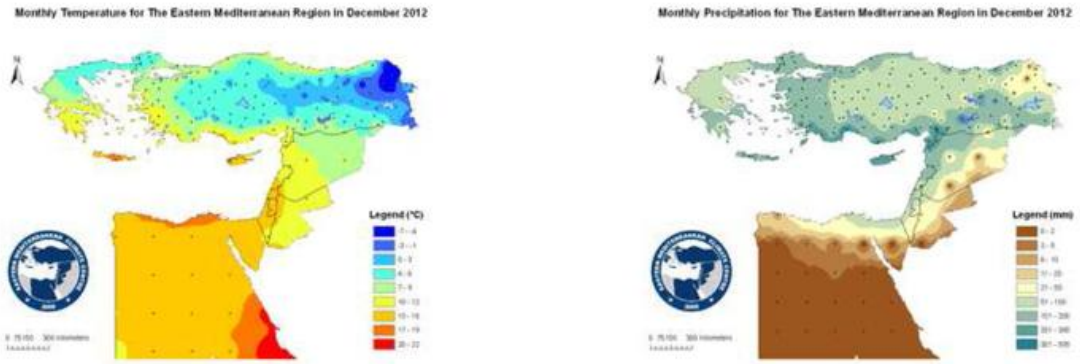


***Fig. 3.51** : Monthly mean temperature (°C) and monthly precipitation totals (mm) December 2012 as provided by the Eastern Mediterranean Climate Center (EMCC)*

Drought Indices for the Southern European Subregion as provided by the Drought Management Centre for Southeastern Europe (DMCSEE):

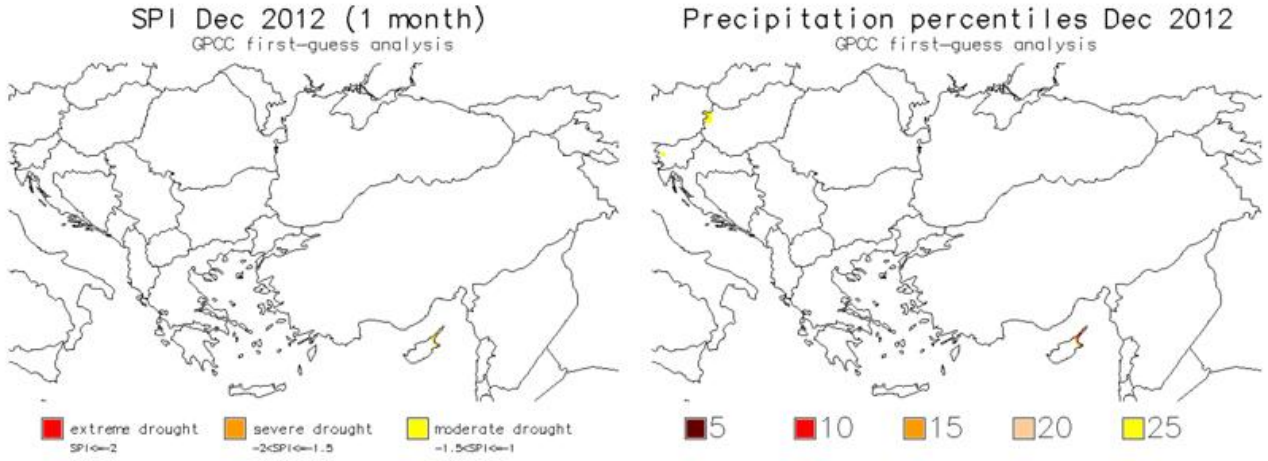


***Fig. 3.52** : Monthly Drought Indices (1-month SPI and low precipitation percentiles) as provided by the Drought Management Centre for Southeastern Europe (DMCSEE)*
December 2012