MEDITERRANEAN CLIMATE OUTLOOK FORUM
MEDCOF-20 ONLINE MEETING

ANALYSIS AND VERIFICATION
OF THE MEDCOF-19 CLIMATE OUTLOOK
FOR THE 2022-23 WINTER SEASON
FOR THE MEDITERRANEAN REGION (MED)

Final version

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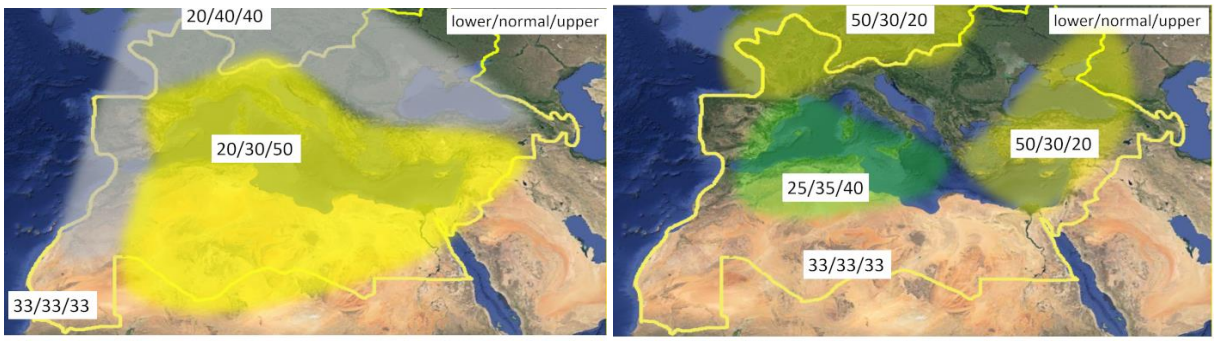
The following MedCOF verification report is based on

- the outcome of the consensus forecast of MedCOF 19,
- climate monitoring results of RA I NA RCC and RA VI RCC networks,
- national verification reports received from NMHSs or posted in RCOF forums of MedCOF, SEECOF or PRESANORD,
- SEECOF-29 verification report
- Data analyses of AEMET

1 MedCOF-19 Climate outlook for the 2022-23 winter season



(a) (b)

Figure 1: Graphical presentation of the climate outlook for the 2022-23 winter season for the Mediterranean region (a) Temperature Outlook, (b) Precipitation Outlook

1.1 General circulation

As stated in the MedCOF-19 consensus statement for the seasonal climate outlook for the 2022/23 winter season for the Mediterranean region, observed sea surface temperatures and forecasts for the next three months showed moderate La Niña conditions and a negative Pacific Decadal Oscillation (PDO). These drivers, together with a westerly phase of the Quasi Biennial Oscillation (QBO), tend to favour a positive phase of the North Atlantic Oscillation (NAO). Models suggested higher than normal odds for blocking over Central Europe and the Scandinavian Peninsula.

1.2 Temperature

Within this general context, MedCOF-19 predicted normal to above normal temperatures for the west and north of the MedCOF domain, and warmer than normal temperatures over the Mediterranean Sea and the rest of Northern Africa (Fig. 1a).

1.3 Precipitation

MedCOF-19 predicted a signal for below normal precipitation over France, northern Italy, Türkiye, the Eastern Mediterranean Coast, and the Black Sea, and above normal precipitation over the Western Mediterranean, northern Algeria and Tunisia (Fig. 1b). For the rest of the area, no predictive signal was given.

2 Analysis of the 2022-23 winter season

Analysis of the winter season temperature and precipitation anomalies and general circulation are based on

- maps and seasonal bulletins on the climate in the WMO region I – NA and VI for the winter 2022/23:
    - WMO RA I RCC Node on Climate Monitoring: https://www.meteo.tn/en/climate-monitoring-watch
    - WMO RA VI RCC Offenbach Node on Climate Monitoring: http://www.dwd.de/rcc-cm),
- contributions from Météo France (http://seasonal.meteo.fr/),
- the Regional Climate Outlook Forum
    - for Southeastern Europe (SEECOF, http://www.seevccc.rs),
    - for North Africa (PRESANORD, http://acmad.net/rcc/presanord.php),
- national verification reports from MedCOF participants.

2.1 General circulation

2.1.1 Ocean

For a third time in a row of successive winters, sea surface temperature (SST) anomalies in the tropical Pacific had a typical La Niña pattern again in winter 2022/23 (Fig. 2); they were negative in the central and eastern tropical Pacific and close to the continent of South America. The negative anomalies over the eastern tropical Pacific together with the warm anomaly over the western and central parts of the North Pacific characterize a negative PDO phase. The subtropical North Atlantic and the East Atlantic sea region close to Europe were warmer than normal, while a slight colder-than-normal SST area can be seen on the central North Atlantic. The Mediterranean was warmer than normal, particularly the eastern basin, the same for the Black Sea. The tropical Indian Ocean had close-to-normal temperatures in the north and was slightly colder than normal in the south. The Indian Ocean Dipole (IOD) index was neutral in winter 2022/23 (see http://www.bom.gov.au/climate/enso/#tabs=Indian-Ocean).

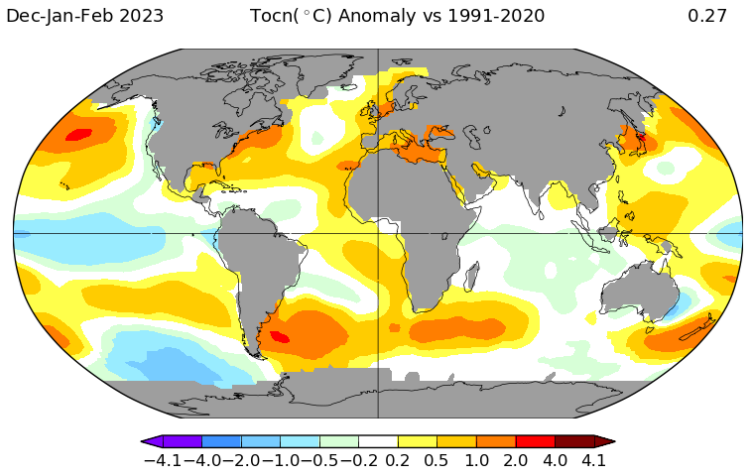


Figure 2: Sea surface temperature anomalies for boreal winter 2022-23 (December-February), 1991-2020 reference. Data from ERSSTv5 Ocean model analysis with 250km smoothing, source: NASA GISS, https://data.giss.nasa.gov/gistemp/maps/

ENSO

Looking at the standard Niño regions (Tab. 1, Fig. 3), anomalies were negative in Niño 3 and Niño 4 regions, while for the easternmost Niño 1+2 region, there was a switch to positive anomalies in February 2023. Generally, negative anomalies became weaker from December 2022 to February 2023, which is quite usual. Anomalies were larger than the La Niña threshold of −0.5°C in all months for the westernmost Niño 4 region only, for December 2022 and January 2023 also in Niño 3.4. On average we can say that La Niña conditions were present in winter 2022/23 as predicted.

Year	MON	NINO1+2	ANOM	NINO3	ANOM	NINO4	ANOM	NINO3.4	ANOM
2022	12	22.54	-0.30	24.48	-0.78	27.71	-0.73	25.81	-0.84
2023	1	24.27	-0.24	25.17	-0.50	27.62	-0.60	25.88	-0.69
2023	2	26.80	0.71	26.25	-0.13	27.58	-0.52	26.29	-0.44

Table 1: Sea surface temperature and anomalies in °C for various Niño regions in boreal winter months 2022-23 (December-February), 1991-2020 reference. Data from ERSSTv5 Ocean model analysis, source: NOAA, https://www.cpc.ncep.noaa.gov/data/indices/sstoi.indices .

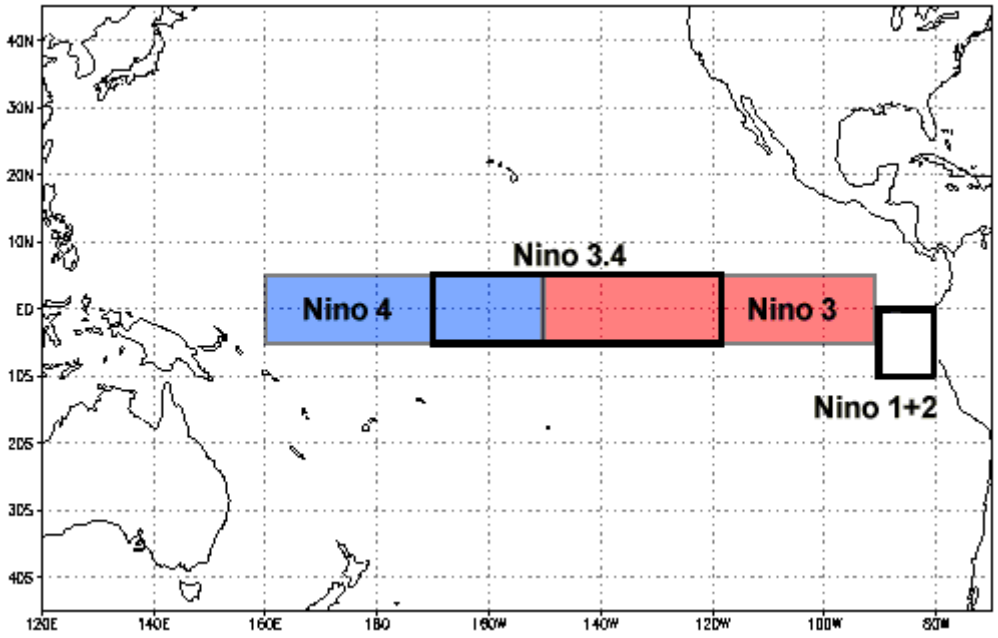


Figure 3: Definition of Niño regions, source: NOAA, https://www.ncei.noaa.gov/access/monitoring/enso/sst#oni

PDO

The Pacific Decadal Oscillation (PDO) is a long-term ocean fluctuation of the Pacific Ocean with a period of several years to decades. The change in location of the cold and warm water masses alters the path of the jet stream. PDO data can differ among various data sets, but newest satellite data agree that a negative PDO phase clearly exists since 2020 (Fig. 4).

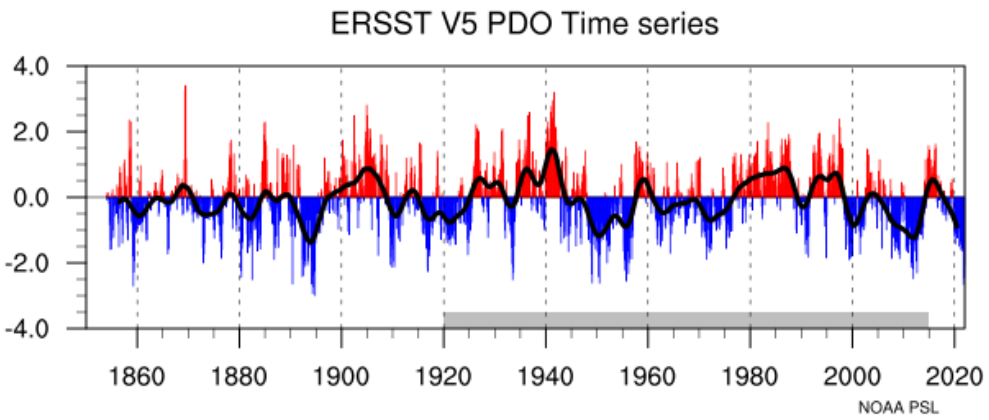


Figure 4: Time series of PDO from ERSST V5 satellite data and reconstructed to earlier years from January 1854 to April 2023. Source: NOAA, https://psl.noaa.gov/pdo/

2.1.2 Atmosphere

QBO

The Quasi-biennial Oscillation (QBO) is a tropical, lower stratospheric, downward propagating zonal wind variation, with an average period of ~28 months. The importance of the QBO is that it dominates the variability of the tropical lower stratospheric meteorology (taken from https://acd-ext.gsfc.nasa.gov/Data_services/met/qbo/qbo.html). Both radiosonde and satellite data showed that the QBO was in a westerly phase in winter 2022/23 as assumed by MedCOF-19 (Fig. 5).

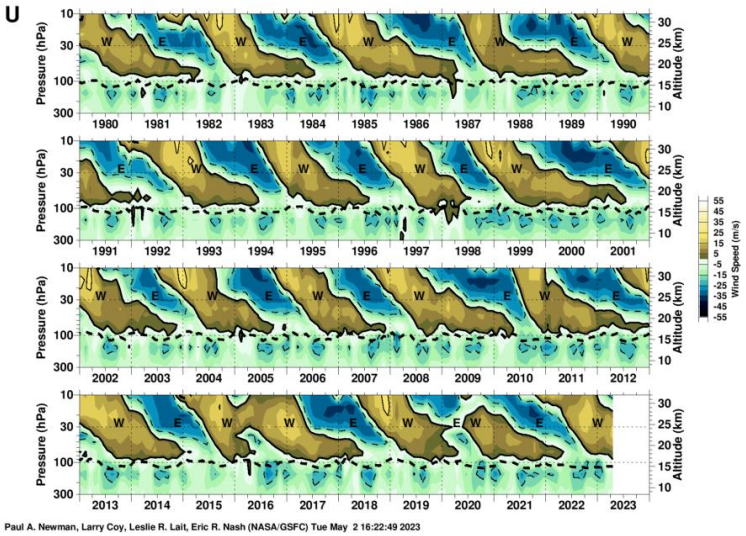


Figure 5: Zonal wind phase in the stratosphere, taken from a radiosonde in Singapore, time series from January 1980 to April 2023. W = westerly, E = easterly phase. Source: NASA, https://acd-ext.gsfc.nasa.gov/Data_services/met/qbo/qbo.html

NAO

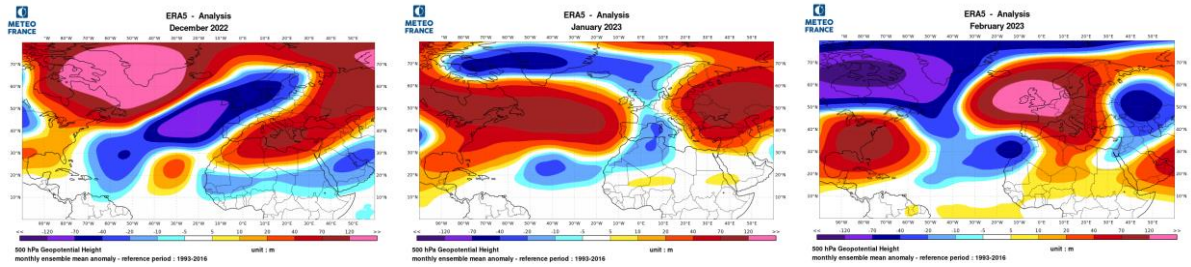
The NAO was close to neutral in December 2022 and in a positive phase in January and February 2023 as expected by MedCOF-19 (Table 2).

Month	December 2022	January 2023	February 2023
NAO	-0.15	1.25	0.92

Table 1: Monthly means for NAO for the boreal winter months 2022/23. Source: NOAA CPC, https://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/nao.shtml

500 hPa Geopotential

The circulation in 500 hPa was quite different from month to month during winter 2022/23 (Fig. 6). In December 2022, anticyclonic conditions occurred over the Mediterranean region, while western Iberia and France were affected by low geopotential. In January 2023, low geopotential was to be found over the western Mediterranean and western parts of North Africa, while anticyclonic conditions occurred over both the North Atlantic and the eastern parts of the MedCOF region. In February, it was particularly Morocco and the eastern parts of the MedCOF region, which were affected cyclonically, while the western Mediterranean became anticyclonic. Averaged over the whole winter season, anticyclonic conditions prevailed for much of the MedCOF region except for Morocco.



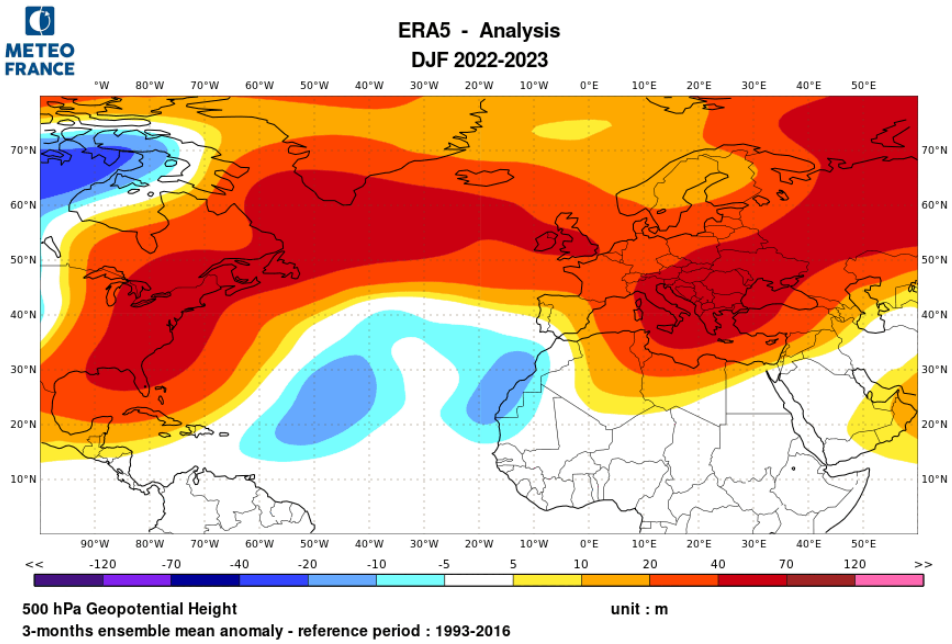


Figure 6: Geopotential height anomalies in 500 hPa, source: Meteo France, http://seasonal.meteo.fr/content/suivi-clim-cartes-ref93-16

Weather types

The distribution of weather types (Meteo France classification, Fig. 7) also was very different from month to month that winter. In December 2022, NAO- was the prevailing weather type, which was absolutely missing in January 2023. Instead, Atlantic Ridge patterns were much more frequent than normal in January. The most frequent type in February 2023 was by far Blocking. Over the whole season, Blocking was also the most frequent type, which was in line with the MedCOF-19 outlook.

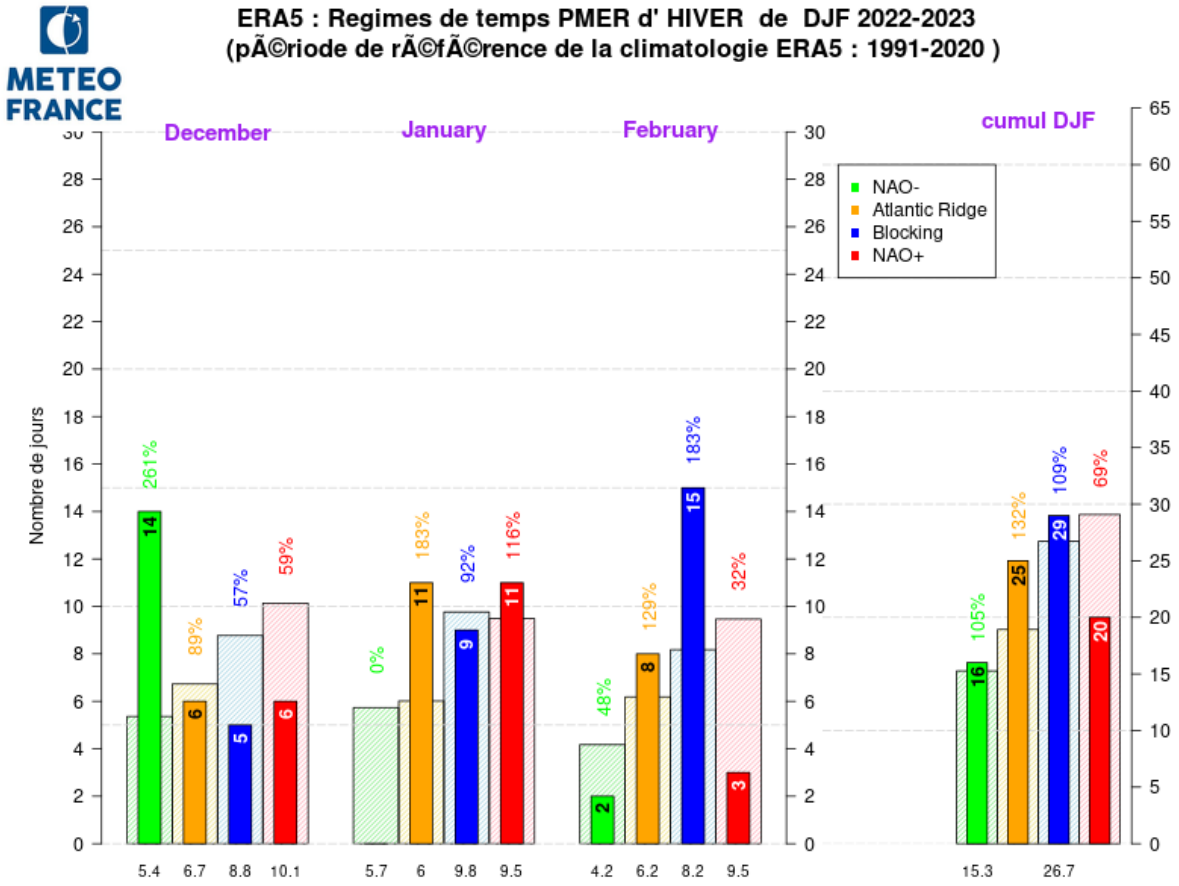


Figure 7: Number of days with circulation types of the Météo France classification for each month of the winter 2022/23 season and for the whole season (right), and in percent of the climatological frequency distribution 1991-2020. Source: Météo France, http://seasonal.meteo.fr/content/suivi-clim-regimes-trim?language=en

Teleconnection patterns

Teleconnection pattern after NOAA CPC were also different from month to month (Table 3). The winter started with a negative East Atlantic – West Russia pattern and a positive Scandinavian pattern, but in February, these patterns became reversed and a NAO+ and EA- situation came up.

MONTH	NAO	EA	WP	EP-NP	PNA	TNH	EATL/WRUS	SCAND	POLEUR
FEB 23	0.6	-0.8	2.5	-0.5	-1.2	1.7	1.5	-0.7	-0.9
JAN 23	0.9	-1.0	2.0	1.4	-0.4	-0.4	-0.6	0.7	-1.1
DEC 22	-0.2	0.0	0.0	---	-1.0	-0.7	-1.2	0.9	-1.2

Table 3: Circulation indices of NOAA CPC patterns for the winter months 2022/23. Source: https://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/table3.shtml

Sea level pressure

Seasonal mean sea level pressure in winter 2022/23 is displayed in Fig. 8. A zonal flow can be seen over the North Atlantic, but quite far located in the north and with a relatively weak Icelandic low. The Russian high over Europe was more intense than normal. Over the Mediterranean region however, there was not much deviation from normal that winter.

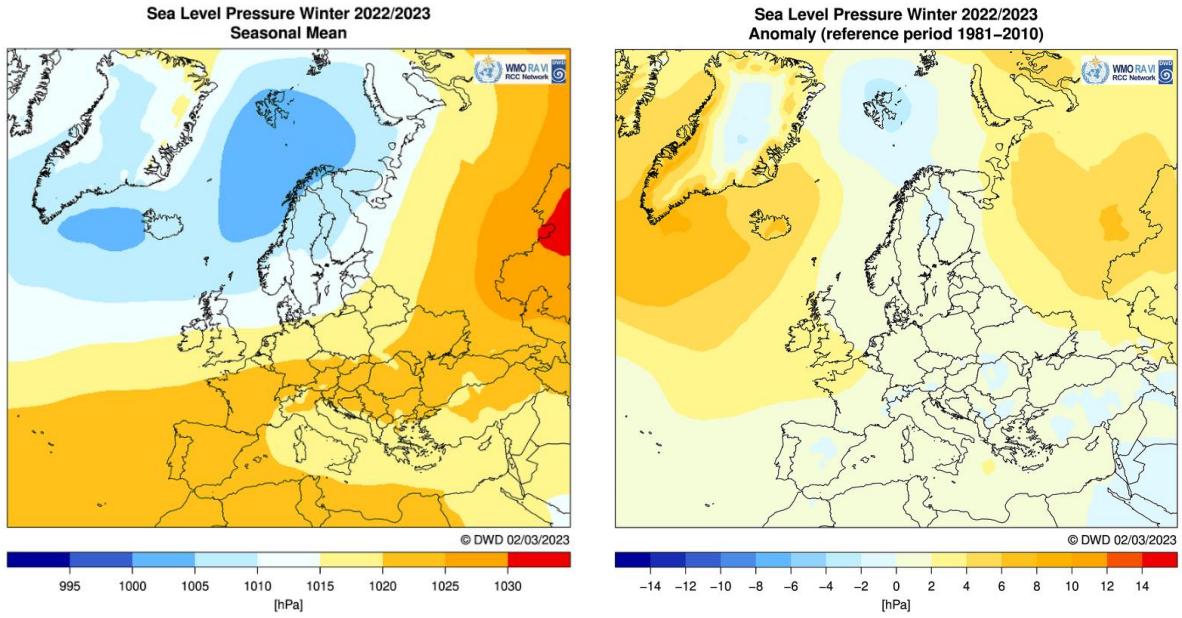


Figure 8: Seasonal mean sea level pressure and its anomalies for winter 2022/23 (1981-2010 reference). Source: Deutscher Wetterdienst (DWD), https://www.dwd.de/EN/ourservices/rcccm/int/rcccm_int_ppp.html, data source: DWD numerical ICON model analysis, http://www.dwd.de/EN/research/weatherforecasting/num_modelling/01_num_weather_prediction_modells/icon_description.html?nn=484268

Sea level pressure distributions for single months are shown in the following figures (Fig. 9). The change from a meridional pattern in December 2022 to a zonal pattern over the North Atlantic in January 2023 was fundamental. In February 2023, the Azores high expanded to the north and east, while the Russian high became weaker.

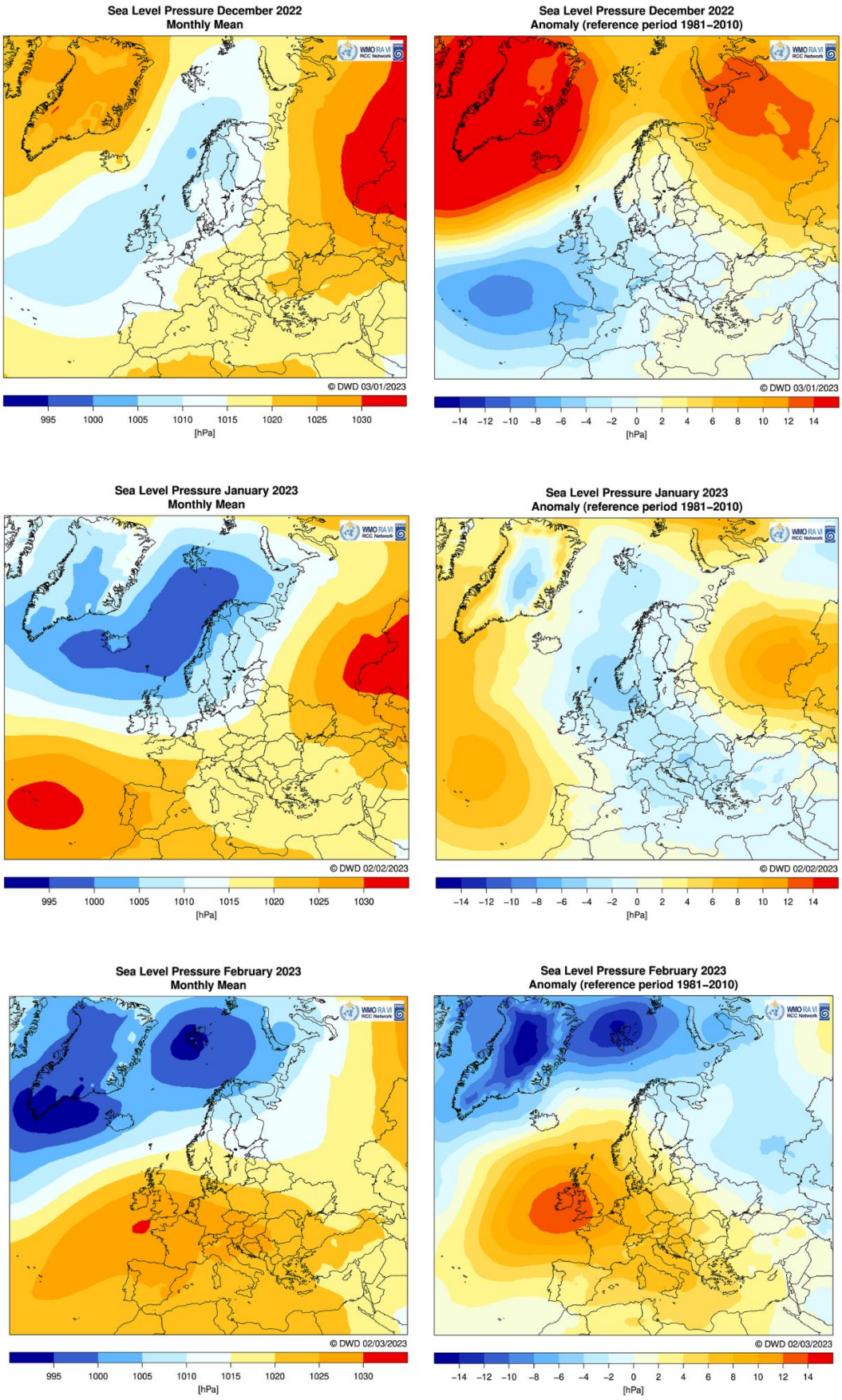


Figure 9: Same as Figure 8, but for the individual months December 2022 – February 2023.

2.2 Temperature

Europe and Middle East (RA VI)

Seasonal means and anomalies

Seasonal mean temperature in winter 2022/23 ranged from below -10 °C in high mountain areas to above 15 °C over the southern Mediterranean (Fig. 10). In the western parts of the domain, seasonal means in the lowlands mostly were between 5 °C and 10 °C, in southwestern Iberia above. The Balkan Peninsula, inland Türkiye and the South Caucasus mostly were colder with 0-5 °C in the lowlands. Seasonal means in the Ukraine were mainly around 0 °C. Greece and coastal part of Türkiye had mostly 5-10 °C, the Middle East around 10 °C.

Temperature was above the 1991-2020 normal almost in the entire RA VI MedCOF domain, except for westernmost parts of France (Britany) and eastern parts of Azerbaijan. Highest anomalies were over the central and eastern Balkan Peninsula with above +3 °C.

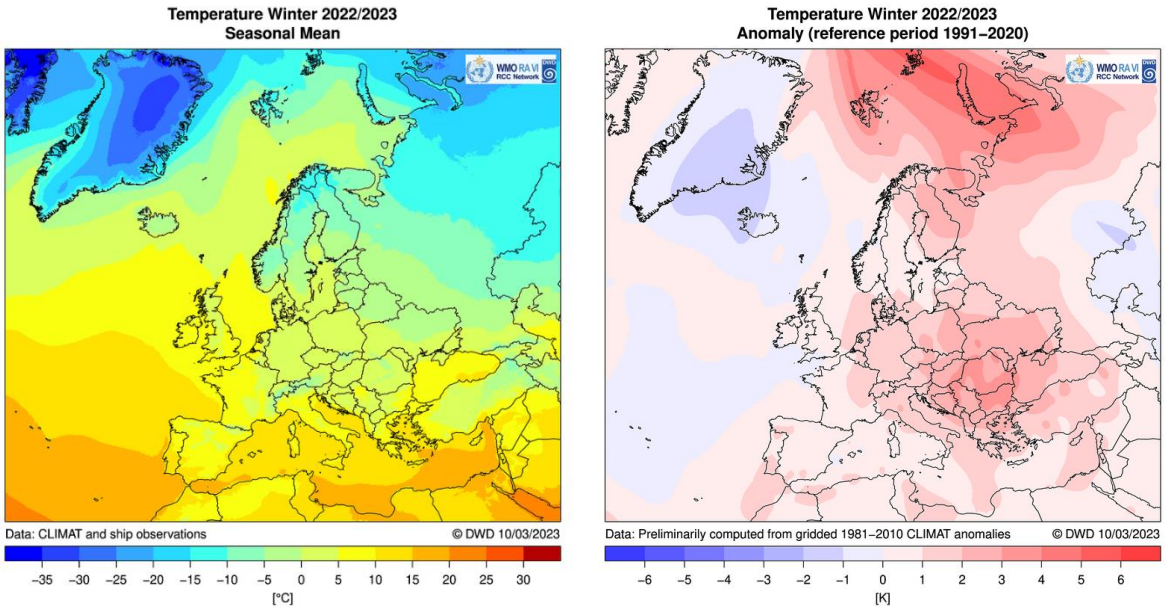


Figure 10: Surface air temperature for winter 2022/23. Left: seasonal mean, right: anomalies, 1991-2020 reference, source of both maps: WMO RAVI RCC, based on interpolated CLIMAT data, www.dwd.de/rcc-cm

Terciles

In terms of terciles, almost the entire RA VI MedCOF domain had temperatures in the upper tercile (Fig. 11-13). Exceptions were western France, northeastern Spain, eastern Georgia and Azerbaijan, and places in Türkiye, which had temperatures in the middle tercile. According to E-OBS data, there were also some places in Italy with temperatures in the middle tercile, and according to ECAD, also places in coastal areas of Spain.

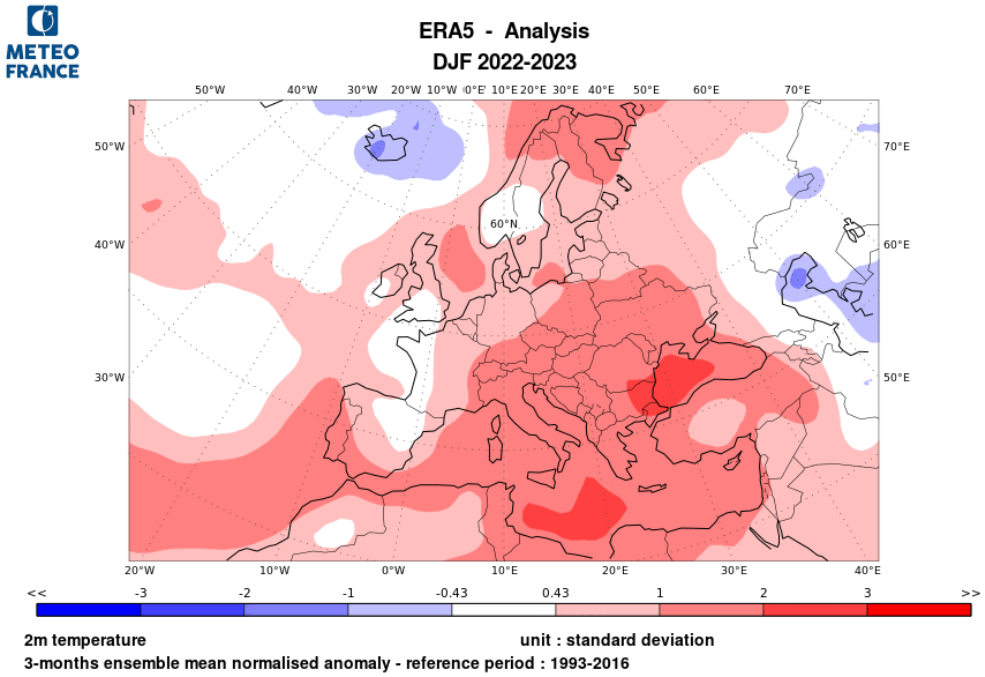


Figure 11: Seasonal normalized anomalies of winter 2022/23 2m air temperature based on ECMWF-ERA5 grid data, 1993-2016 reference. The data range between -0.43 and +0.43 represents the middle tercile, below -0.43 the lower tercile and above +0.43 the upper tercile. Source: Météo France, http://seasonal.meteo.fr/content/suivi-clim-cartes-ref93-16

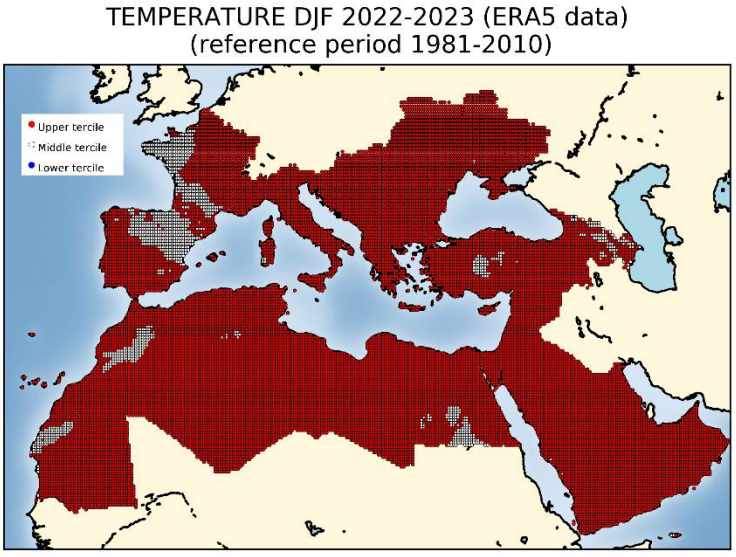
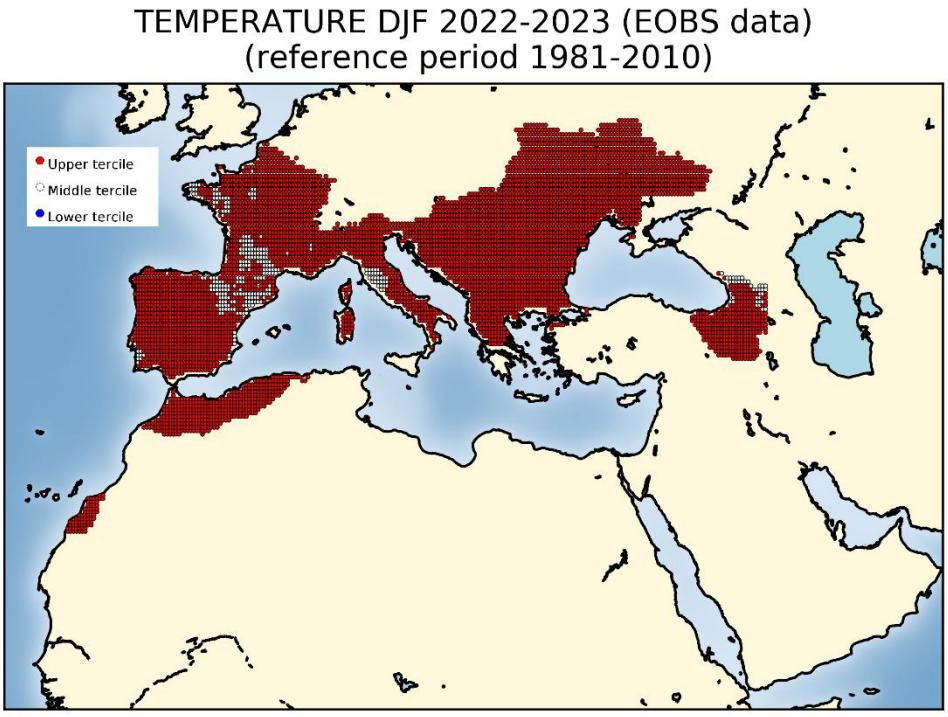


Figure 12: Terciles of winter 2022/23 surface air temperature based on ERA5 Reanalysis, 1981-2010 reference. Source: AEMET, data source https://www.ecmwf.int/en/forecasts/dataset/ecmwf-reanalysis-v5



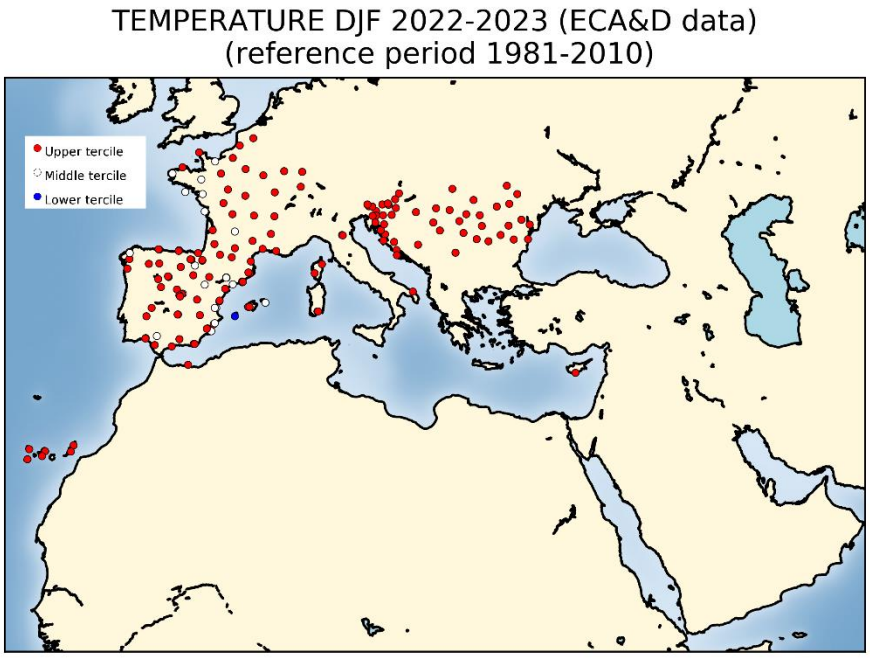


Figure 13: Terciles of winter 2022/23 surface air temperature based on interpolated E-OBS grid data (upper graph) and individual ECA&D station data (lower graph), 1981-2010 reference. Source: AEMET, data source: http://www.ecad.eu/

North Africa (RA I)

Winter 2022-23 was warmer than normal over the most regions of the North African domain. Mean temperatures ranged between 8 °C and 23 °C. Winter season mean temperature was at its minimum over the northwest of Tunisia, the north of Algeria and the eastern part of Morocco (Fig. 14a).

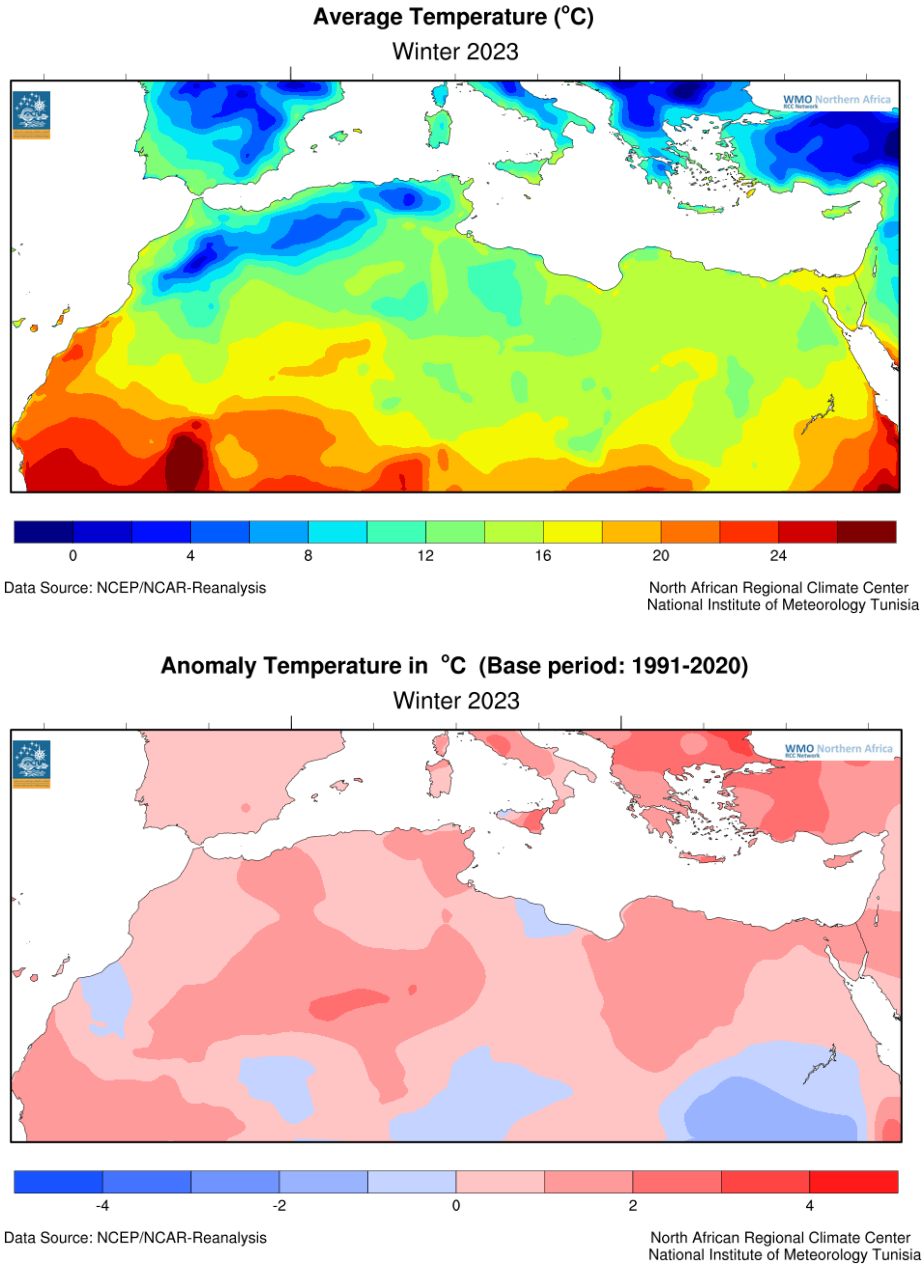


Figure 14a: Winter (DJF 2022/23) mean temperatures and 1991-2020 anomalies in North Africa (in °C). Source: North African Regional Climate Center, National Institute of Meteorology Tunisia

In Tunisia, the winter season 2022-2023 was above normal over all of the country. The average seasonal temperature reached 13.2 °C and exceeded the normal (11.8 °C) by +1.4 °C, which ranks this winter as the fifth warmest winter. The seasonal anomalies varied between +0.3 °C in the extreme northwest (station of Tabarka) and +2.4 °C in the center of the country (station of Thala). The seasonal averages of the maximum temperature exceeded the normal with positive anomalies ranging from +1 °C in Tabarka to +3.3 °C in Siliana. The seasonal averages of the minimum temperature of different regions

varied between 3.3 °C in Kef and 11 °C in Jerba and the deviations from normal varied from -0.7 °C in Beja to 1.7 °C in Mahdia, Thala and Tataouine.

Over the rest of the North African region, comparing with the normal of the season, the mean temperatures of winter season (DJF 2022-2023) were above normal over the most parts of the region with anomalies between 0 °C and +3 °C. The seasonal temperature was below normal over the southwest of Morocco, the south of Algeria, the northeastern part of Libya and the south of Egypt.

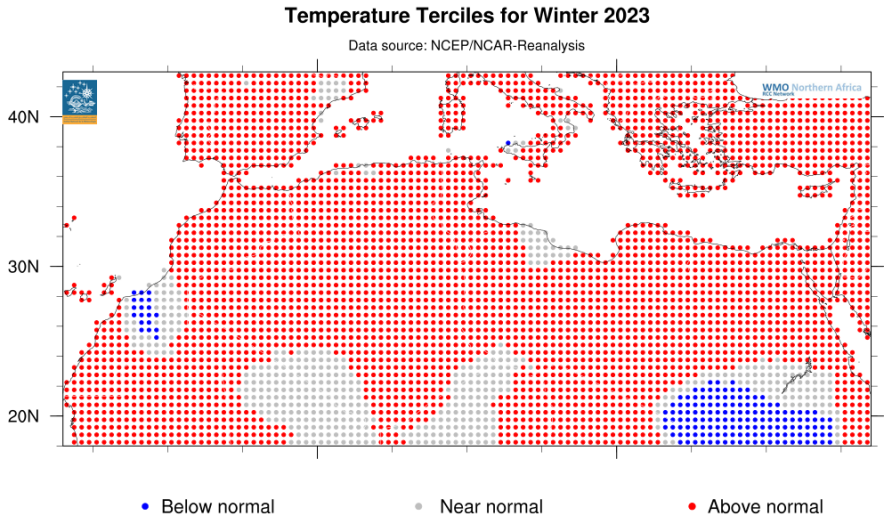


Figure 14b: Temperature terciles for the 2022-2023 winter season in North Africa (Reference period 1991-2020)

In order to quantify the observed seasonal temperatures in winter 2022-23 in terms of cold, warm and normal, the percentile method was applied (Fig. 14b). According to percentile ranks, a warm tercile was registered in Tunisia, most parts of Algeria, Morocco, Libya and Egypt. A cold tercile was presented in the south of Egypt and Morocco. In the south of Algeria and locally in the northeast of Libya the temperature was in the middle tercile.

2.3 Precipitation

Europe and Middle East (RA VI)

Seasonal means and anomalies

Seasonal precipitation totals in winter 2022/23 in the European MedCOF domain ranged from below 30 mm in eastern Syria and eastern Jordan to above 600 mm in places in northwestern Iberia and Montenegro (Fig. 15).

Precipitation was above normal in western and central Iberia, over the western Mediterranean, in much of Italy, northern parts of the Balkan Peninsula, western Ukraine, eastern parts of the South Caucasus, and places in southern Jordan. Below-normal precipitation was recorded especially in France, eastern Spain, northern and southern Italy, areas around the Black Sea, Greece, Türkiye, Cyprus and much of the Middle East. Many coastal areas at the western and eastern Mediterranean and at the Black Sea received less than 60 % of the normal seasonal precipitation, places in Türkiye and Syria even less than 20 %. Highest percentages were recorded in the western Ukraine and Romania and in Azerbaijan and eastern Armenia with above 150 %.

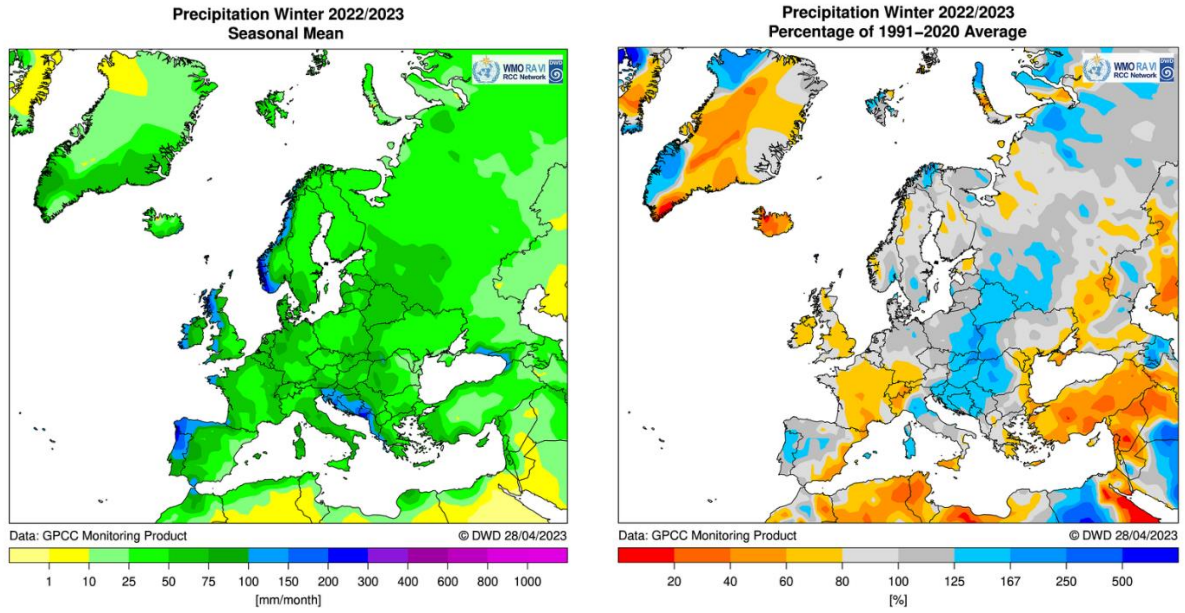


Figure 15: Precipitation for winter 2022/23 in Europe/RA VI. Left: seasonal total in mm/month, right: percentage of 1991-2020 average, source: WMO RAVI RCC, www.dwd.de/rcc-cm, data source: GPCC, http://gpcc.dwd.de

Terciles

In terms of terciles (Fig. 16-17), winter precipitation over the RA VI MedCOF domain was in the lowest tercile range in southeastern Iberia, much of France, the Alps, southern Italy, Greece, the Black Sea region, parts of the South Caucasus, Türkiye, and most of the Middle East. Precipitation was in the upper tercile range in western and northern Iberia, much of Italy, the western and northern Balkan Peninsula, and the western and northern Ukraine. The other parts had precipitation in the middle tercile. A few areas have discrepancies among different data sets, e.g. in Azerbaijan (lower tercile for ERA 5 data, upper tercile for GPCC data) and in Iberia (the area with precipitation in the upper tercile is larger for ERA 5 than for GPCC).

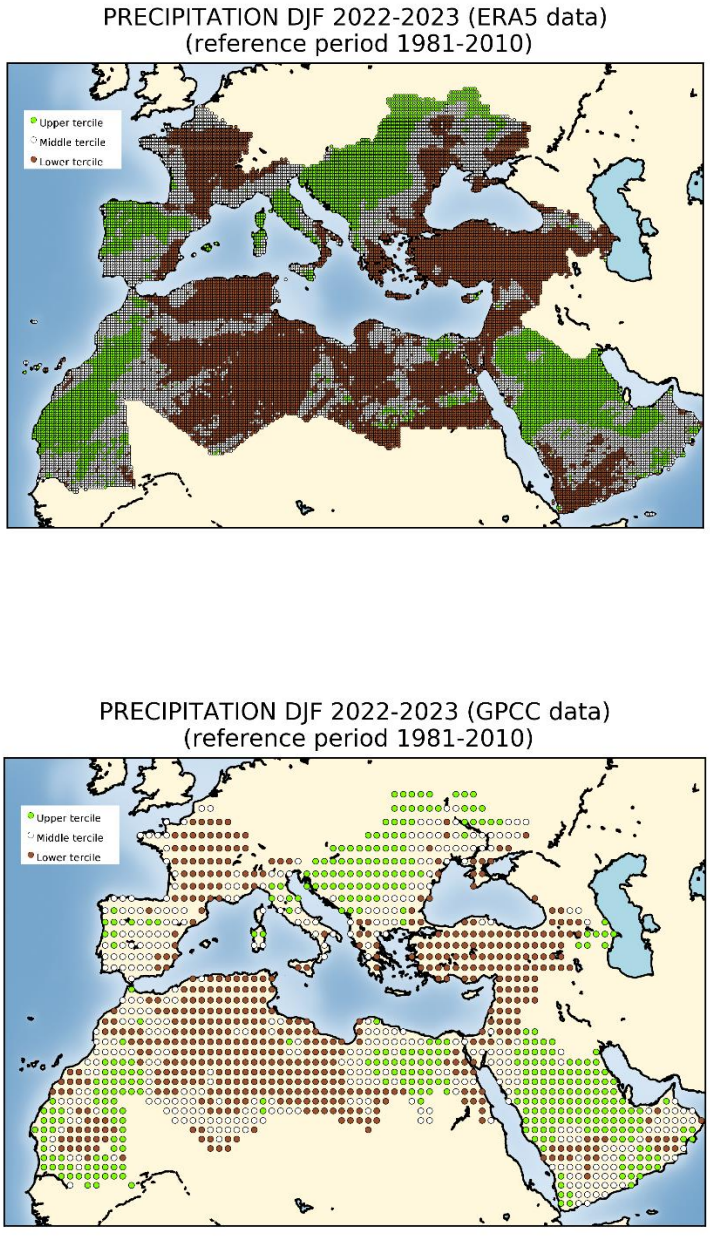
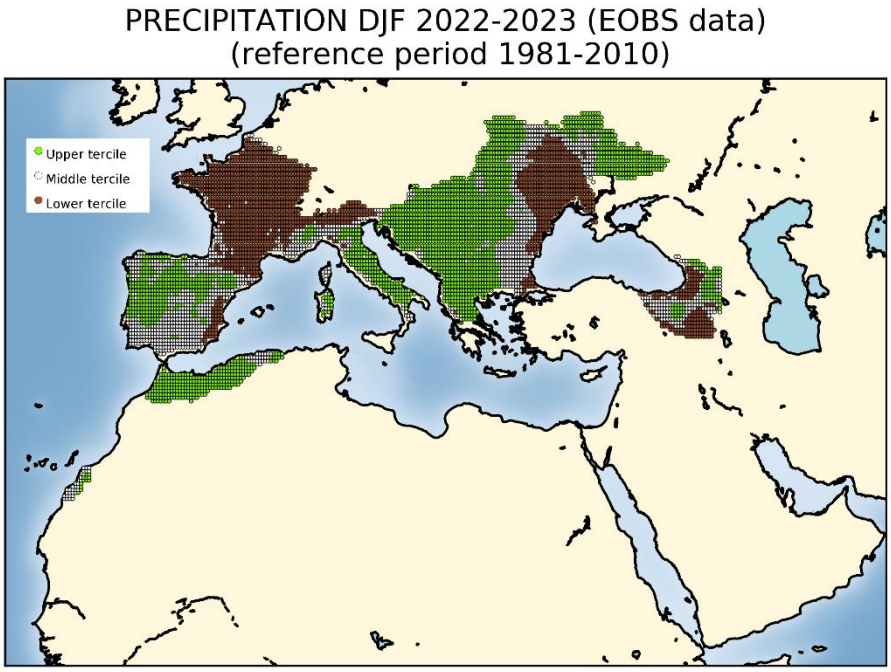


Figure 16: Terciles of winter 2022/23 precipitation based on ERA5 reanalysis (upper graph) and GPCC (lower graph) grid data, 1981-2010 reference. Source: AEMET, data reference: ERA5: https://www.ecmwf.int/en/forecasts/dataset/ecmwf-reanalysis-v5 , GPCC: http://gpcc.dwd.de



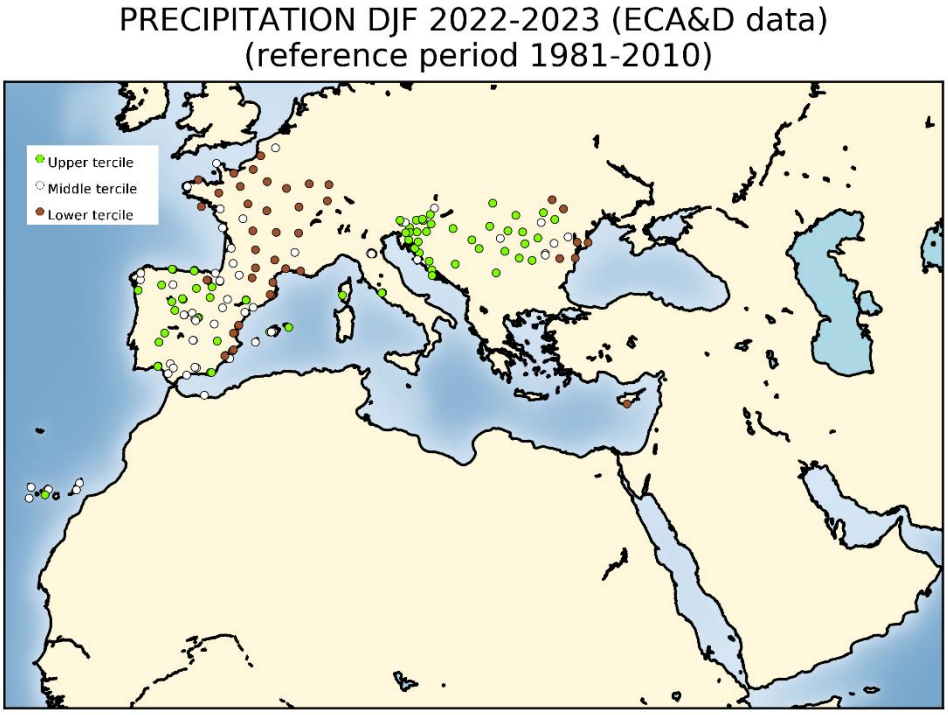


Figure 17: Terciles of winter 2022/23 precipitation based on interpolated E-OBS grid data (upper graph) and individual ECA&D station data (lower graph), 1981-2010 reference. Source: AEMET, data source: http://www.ecad.eu/

North Africa (RA I)

The seasonal precipitation was very low over North Africa during winter season (Fig. 18a). Precipitation registered over the Mediterranean coastline of the domain ranged between 20 mm and 350 mm. Winter 2022-23 precipitation was below normal over most of the region.

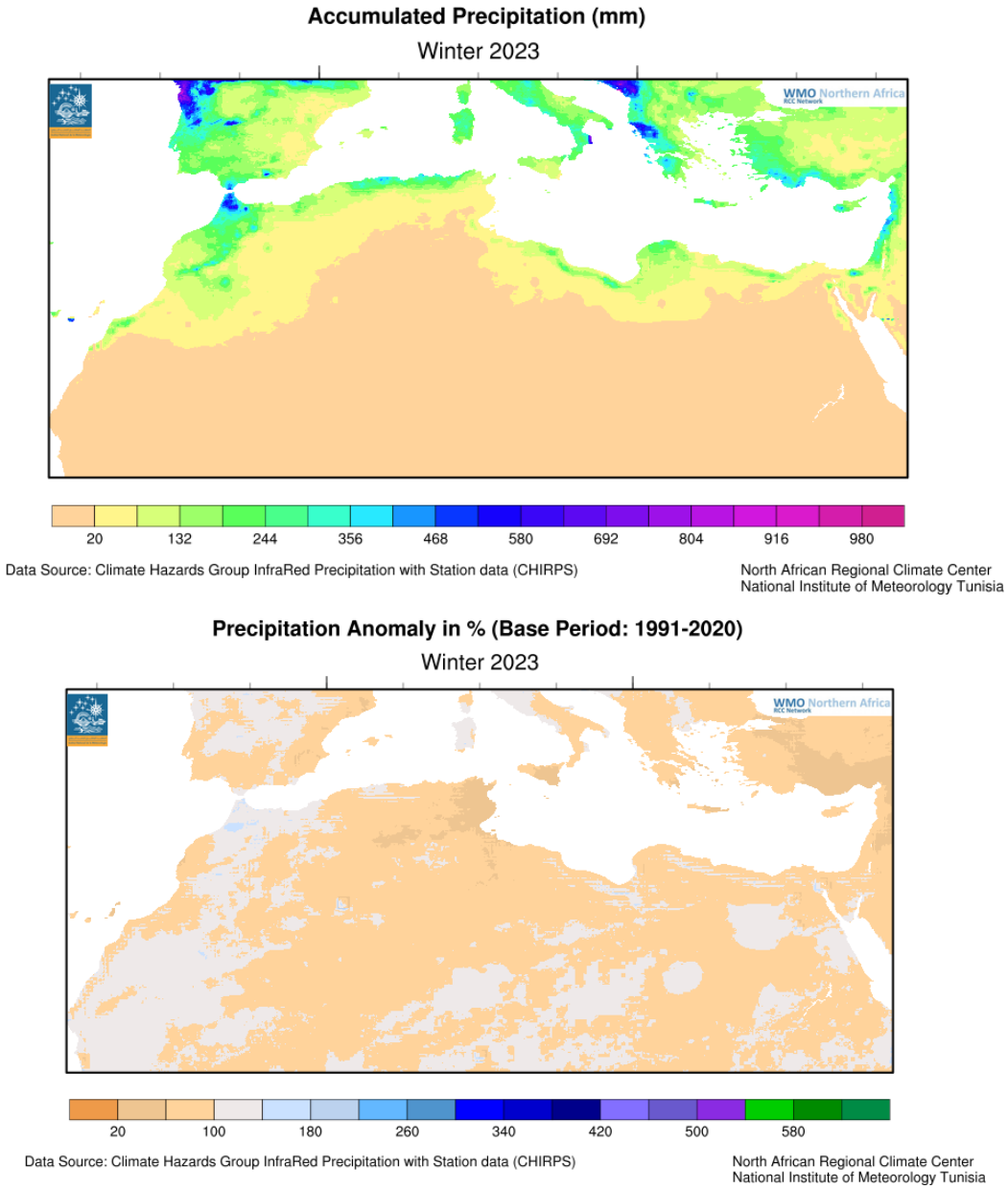


Figure 18a: Winter (DJF 2022/23) precipitation totals (in mm) and 1991-2020 anomalies (in %) in North Africa. Source: North African Regional Climate Center, National Institute of Meteorology Tunisia

In *Tunisia*, the total seasonal accumulation of rains from the 27 main stations reached 1553.4 mm and represented only half of the reference seasonal accumulation of the same stations (3109.7 mm), the deficit affected almost all of our regions.

The winter season (DJF 2022-2023) was generally characterized by above-normal conditions in the western and southeastern part of *Algeria* and below normal elsewhere.

Over *Morocco*, regarding precipitation during winter 2022/2023, above-normal conditions were observed over the whole country according to observation reanalysis.

In general, in *Egypt*, winter season precipitation was marked by above-normal conditions in the western part and by a strong regional disparity in the eastern part.

Over *Libya*, the precipitation was above normal in the south and locally in the west; elsewhere precipitation was below normal.

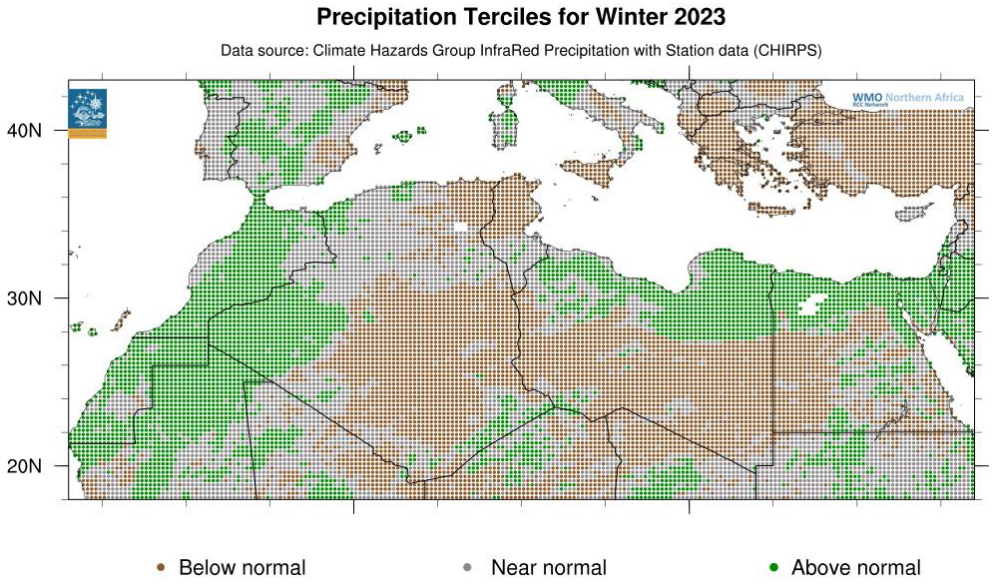


Figure 18b: Precipitation terciles for 2022/2023 winter season in North Africa (Reference period 1991-2020)

In order to quantify the observed seasonal precipitation in winter 2022/23 in terms of wet, dry and normal, the percentile method was applied (Fig. 18b). According to percentile ranks, wet conditions were registered in western Algeria, northern Libya and Egypt, and most parts of Morocco, elsewhere the dry tercile was the dominant tercile.

3 Verification of the MedCOF-19 climate outlook (2022-23 winter season)

3.1 Temperature

Europe/RA VI

The MedCOF-19 outlook favored the upper or middle tercile range with equal probability (40%) for western and central Iberia, most of France and the northeastern parts of the domain from Hungary to the South Caucasus, and the upper tercile for the Mediterranean Sea area and its coasts. For the northeastern Ukraine, no privileged scenario was given.

The outlook was correct for almost the whole domain. Only a few coastal areas, especially in northeastern Spain and southern France, had temperatures in the middle tercile range instead in the upper tercile range as forecasted by the outlook.

North Africa (RAI)

The MedCOF-19 climate outlook for the 2022-23 winter season favored an above-normal temperature for most of the entire domain except of Morocco where normal to above-normal temperatures were forecasted.

In fact, temperature anomalies were above normal over the most parts of the North African domain.

This indicates that the MedCOF-19 climate outlook for the winter season temperature was able to predict the positive temperature anomalies registered except for a small part of southern Egypt.

3.2 Precipitation

Europe/RA VI

The MedCOF-19 outlook favored the dry scenario (lower tercile range) for France and the Black Sea and eastern Mediterranean region, and the wet scenario (upper tercile range) for the western Mediterranean region. For the rest of the domain, no privileged scenario was given.

The outlook was correct for both the dry areas over France, the Black Sea and eastern Mediterranean and the wet areas over the western Mediterranean (excluding eastern Spain). However, large other parts of the domain with above-normal precipitation (much of Iberia, the Balkan Peninsula and the Ukraine) had not been captured by the outlook.

North Africa

Over the North African region, the MedCOF-19 climate outlook favored the upper tercile for northern Algeria and Tunisia. For the rest of the domain, no preference for any climate-defined category was given. The winter 2022-23 was drier than normal over northern Algeria and Tunisia, in contrary to the outlook. For the other anomalies in the domain, no prediction was given.

4 Users' perceptions of the MedCOF-19 outlook

Europe/RA VI:

No feedback from users was reported or no national seasonal outlooks were provided for operational purposes.

North Africa

No feedback was given from users.

Appendix A: Contributors to MEDCOF-20, Verification

- World Meteorological Organization

Europe and Middle East (RA VI)

- Climate Centres:

- WMO RA VI RCC Offenbach Node on Climate Monitoring, Deutscher Wetterdienst, Germany
- South East European Virtual Climate Change Center hosted by Republic Hydrometeorological Service of Serbia, Republic of Serbia

- National Meteorological and Hydrological Services:

- Hellenic National Meteorological Service, Greece
- Agencia Estatal de Meteorología (AEMET), Spain

- others via SEECOF-29

North Africa (RA VI)

- Climate Centres:

- WMO RA I North African RCC Tunisia Node on Climate Monitoring, National Institute on Meteorology, Tunisia

- National Meteorological and Hydrological Services:

- National Meteorology Office, Algeria.
- National Institute of Meteorology, Tunisia

APPENDIX B: **Analysis and verification of the MedCOF-19 climate outlook for the winter season 2022/2023:**

National verification results are mainly given in the verification reports of SEECOF and PRESANORD. Only for those countries, which do not participate in any of these two RCOFs, the results are presented here in the following table, as agreed in the MedCOF Management Group.

This verification summary is based on the national reports and contributions of participants of MedCOF-20.

In brackets: probabilities in % (lower, middle, upper tercile range) for the country concerned, as stated by the MedCOF outlook.

Europe (RA VI)

Country	Seasonal temperature (DJF)		Seasonal precipitation (DJF)		High Impact Events
	Observed	MedCOF-19 climate outlook for temperature	Observed	MedCOF-19 climate outlook for precipitation	
France*	Normal in the west, above normal in the east	Normal or above normal (20/40/40), in the south above normal (20/30/50)	Mostly below normal, at the coast normal	Below normal (50/30/20)	No events reported
Italy*	Above normal	Above normal (20/30/50)	Below normal to normal in the north and south Normal or above normal in central Italy	West: above normal (25/35/40) East: no privileged scenario (33/33/33)	No events reported
Lebanon *	Above normal	Above normal (20/30/50)	Below normal	Below normal (50/30/20)	No events reported

Country	Seasonal temperature (DJF)		Seasonal precipitation (DJF)		High Impact Events
	Observed	MedCOF-19 climate outlook for temperature	Observed	MedCOF-19 climate outlook for precipitation	
Portugal *	Above normal	Normal or above normal (20/40/40)	Above normal in the north Normal in the south	no signal (33/33/33)	No events reported
Spain (1)	Mostly above normal, in the northeast normal	West and centre: Normal or above normal (20/40/40) East: above normal (20/30/50)	Mostly above normal in the west and centre Below normal to normal in the east	Mostly no signal (33/33/33) East: above normal (25/35/40)	In winter there were two intense cold episodes and two intense warm episodes. The lowest winter temperatures among the main stations were the following main stations: 15.8 °C (Molina de Aragón, 28 February), −11.6 °C (Puerto de Navacerrada, 28 February), −9.6 °C (Soria, 24 February) and −9.0 °C (Teruel, 30 January). The highest temperatures among the main stations were the following main stations: 28.7 °C (Tenerife Sur/airport, 13 December), 27.2 °C (Tenerife Sur/airport, 5 December) and 26.8 °C (Lanzarote and Fuerteventura/ airport, 14 December). The highest values of daily winter precipitation in the main observatories were: 118 mm (Vigo airport, 19 December), 102 mm (Pontevedra, 19 December), 83 mm (Santiago de Compostela, 19 December), 79 mm (Huelva, 7 December), 72.8 mm (A Coruña, 23 December), 94.6 mm (Bilbao airport, 16 January), 91.4 mm (Santander airport, 16 January), 86.1 mm (Hondarribia, 16 January), 82.4 mm (Vigo airport, 16 January), 75.6 mm (Donostia, 16 January), 78.8 mm (Pontevedra, 7 January) and 66.2 mm (Gijon, 16 January), 52.1 mm (Santander airport, 27 February), 51.7 mm (Menorca, 27 February) and 48.7 mm (Palma de Mallorca, 27 February).
Syria *	Above normal	Above normal (20/30/50)	Below normal	Below normal (50/30/20)	No events reported

Note:

1 – Basic climatological period (1991-2020)

*Data base: ERA5 1981-2010 for temperature, GPCC 1981-2010 for precipitation

North Africa (RA I):

Country	Seasonal temperature (DJF)		Seasonal precipitation (DJF)		High impacts events
	Observed	MedCOF-19 climate outlook for temperature	Observed	MedCOF-19 climate outlook for precipitation	
Algeria (1)	Above normal	Above normal (20/30/50)	Below normal	North: above normal (25/35/40) Other parts: no clear signal (33/33/33)	No events recorded
Egypt*	Mostly above normal, near to below normal in the south	Above normal (20/30/50)	Above normal over the north Elsewhere near to above normal	No clear signal (33/33/33)	No events recorded
Libya*	Near normal over the northeast Above normal elsewhere	Above normal (20/30/50)	Above normal over the north Near to below normal elsewhere	No clear signal (33/33/33)	No events recorded
Morocco *	Mostly above normal Below normal over the SW	North and centre: near normal or above normal (20/ 40/40) South: no special scenario (33/33/33)	Near to above normal conditions	No signal (33/33/33)	No events recorded
Tunisia (1)	Above normal	Above normal (20/30/50)	Below normal	Above normal over the north (25/35/40) No clear signal elsewhere (33/33/33)	No events recorded

Note:
(1) Basic climatological period (1981-2010)
* Data source: The National Climatic Data Center (NCDC)

References:

MedCOF-19 Outlook: http://medcof.aemet.es/images/doc_events/medcof19/step3/docStep3/Consensus%20Statement%20MedCOF19_final.pdf

WMO RA I RCC Node on Climate Monitoring Website with monitoring results: https://www.meteo.tn/en/climate-monitoring-watch

WMO RA VI RCC Node-CM Website with monitoring results: http://www.dwd.de/rcc-cm

SEECOF Online Forum: http://www.seevccc.rs/forum/

PRESANORD: http://nwp.gov.eg/index.php/rcof/presanord

Météo France climate monitoring products: http://seasonal.meteo.fr

ECMWF ERA5 reanalysis: https://www.ecmwf.int/en/forecasts/dataset/ecmwf-reanalysis-v5

NOAA-NCEP-CPC northern hemisphere teleconnection patterns: http://www.cpc.ncep.noaa.gov/data/teledoc/telecontents.shtml

ECA&D, E-OBS: http://www.ecad.eu

GPCC: http://gpcc.dwd.de