MEDITERRANEAN CLIMATE OUTLOOK FORUM
MEDCOF-22 ONLINE SESSION

ANALYSIS AND VERIFICATION
OF THE MEDCOF-21 CLIMATE OUTLOOK
FOR THE 2023-24 WINTER SEASON
FOR THE MEDITERRANEAN REGION (MED)

Final version

Last update: 17 May 2024

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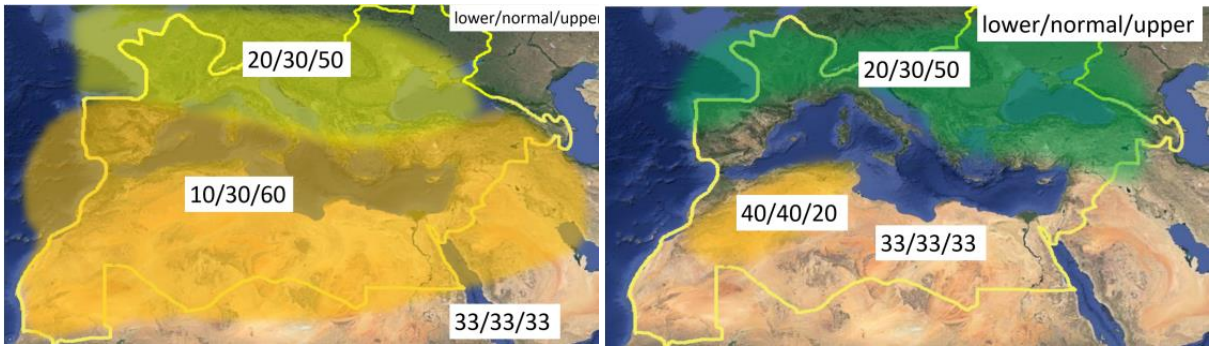
The following MedCOF verification report is based on

- the outcome of the consensus forecast of MedCOF 21,
- 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-31 verification report
- Data analyses of AEMET

1 MedCOF-21 Climate outlook for the 2023-24 winter season



(a) (b)

Figure 1: Graphical presentation of the climate outlook for the 2023-24 winter season for the Mediterranean region

(a) Temperature Outlook, (b) Precipitation Outlook

1.1 General circulation (ocean and atmosphere)

As stated in the MedCOF-21 consensus statement for the seasonal climate outlook for the 2023/24 winter season for the Mediterranean region, observed sea surface temperatures and forecast for the next three months showed moderate to intense El Niño conditions, a positive Indian Ocean Dipole and positive anomalies over most of Atlantic Ocean. In the atmosphere, models showed cyclonic anomalies over northwestern Europe, and anticyclonic anomalies over northwestern Africa and parts of Mediterranean Sea. Diagnostic of upper levels showed a tendency to a weaker-than-normal stratospheric polar vortex, which would favor a negative NAO phase for late winter, in agreement with El Niño impacts.

1.2 Temperature

With this general context, above-normal temperatures were expected over most of the domain, although the signal was weaker over the northern half of the domain (Fig. 1a).

1.3 Precipitation

Precipitation forecasts showed a wet signal over the north of the domain, and normal to dry conditions over parts of Northwestern Africa, with no clear signal over the rest of the domain (Fig. 1b).

2 Analysis of the 2023-24 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 2023/24:
  - 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

Sea surface temperature (SST) in the central and eastern equatorial Pacific were well above normal in winter 2023/24 with peak anomalies above +2 °C (Fig. 2), indicating a well-developed El Niño that time. Anomalies were positive over most of the Atlantic Ocean, especially in those parts close to the MedCOF domain at more than +1 °C. Over the Indian Ocean, a strong east-west gradient can be seen, pointing to a positive Indian Ocean Dipole. All this was forecasted by the MedCOF-21 outlook. The Mediterranean Sea and the Black Sea were both warmer than normal, mainly 0.5–1.0 °C in the west and 1–2 °C in the east.

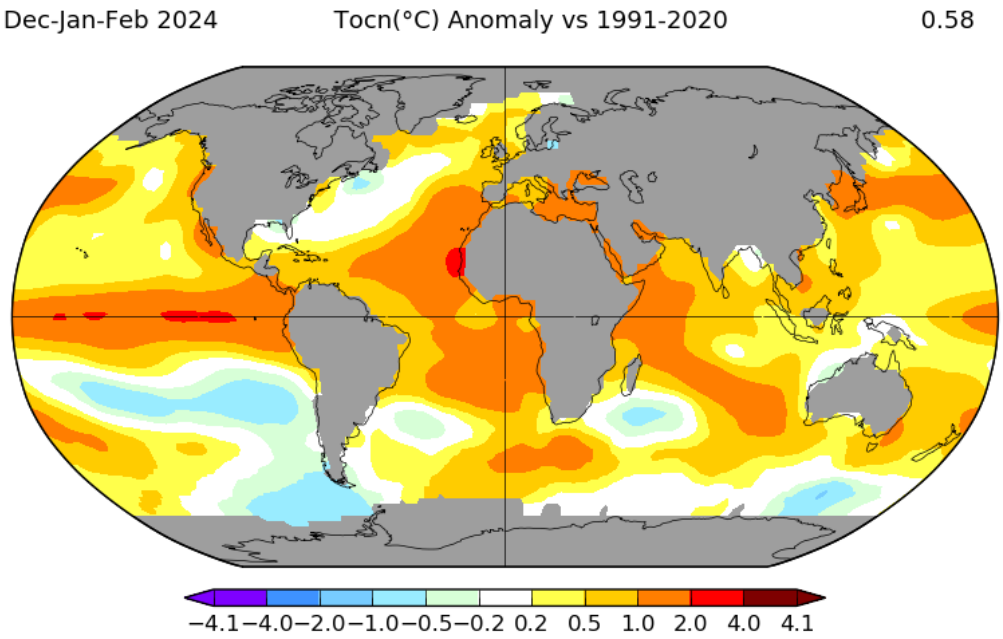


Figure 2: Sea surface temperature anomalies for boreal winter 2023-24 (December-February), 1991-2020 reference. Data from ERSSTv5 Ocean model analysis with 250km smoothing, source: NASA GISS, https://data.giss.nasa.gov/gistemp/maps/

ENSO

Looking at the standard Niño regions (Tab. 1, Fig. 3), anomalies were positive in all regions and all boreal winter months of the 2023/24 season. The highest anomalies in Niño 1+2 and Niño 3 regions occurred in December 2023, in the Niño 4 region in January 2024. Monthly anomalies in the Niño 3.4 region ranged between +1.5 K and 2.0 K, which can be interpreted as a moderate, nearly strong El Niño, as expected by the MedCOF-21 outlook.

Year	MON	NINO1+2	ANOM	NINO3	ANOM	NINO4	ANOM	NINO3.4	ANOM
2023	12	24.25	1.41	27.33	2.06	29.84	1.39	28.64	1.99
2024	1	25.35	0.83	27.55	1.87	29.67	1.45	28.34	1.78
2024	2	27.02	0.92	27.85	1.47	29.32	1.22	28.26	1.53

Table 1: Sea surface temperature and anomalies in °C for various Niño regions in boreal winter months 2023-24 (December-February), 1991-2020 reference. Data from ERSSTv5 Ocean model analysis, source: NOAA, https://www.cpc.ncep.noaa.gov/data/indices/sstoi.indices .

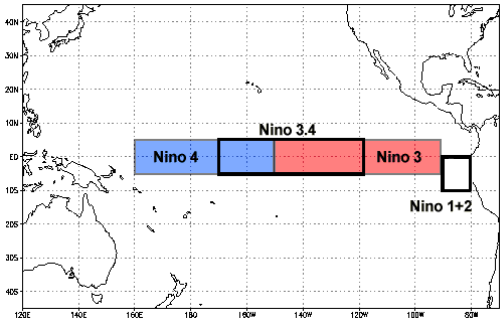


Figure 3: Definition of Niño regions, source: NOAA, https://www.ncei.noaa.gov/access/monitoring/enso/sst#oni

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). A negative PDO phase means warm SST anomalies in the interior of the North Pacific and cool SST anomalies along the North American coast, or above average sea level pressures over the North Pacific.

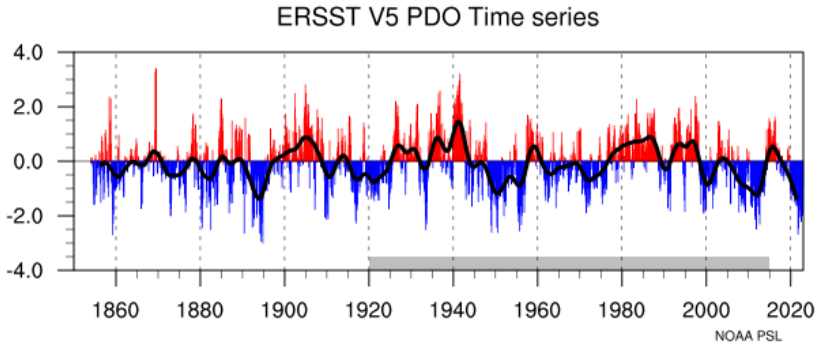


Figure 4: Time series of PDO from ERSST V5 satellite data and reconstructed to earlier years from January 1854 to April 2024. Source: NOAA, https://psl.noaa.gov/pdo/

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 an easterly phase in 30 hPa in boreal winter 2023/24 (Fig. 5).

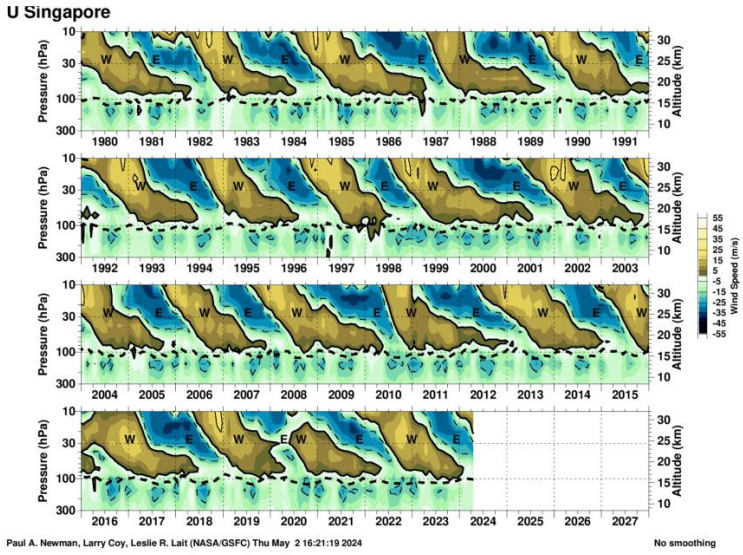


Figure 5: Zonal wind phase in the stratosphere, taken from a radiosonde in Singapore, time series from January 1980 to April 2024. W = westerly, E = easterly phase. Source: NASA, https://acd-ext.gsfc.nasa.gov/Data_services/met/qbo/qbo.html

Stratospheric Polar Vortex

The stratospheric polar vortex was generally stronger than normal over the European part of the Arctic region but showed a wave pattern over North America (Fig. 6). In fact, several stratospheric warming events with vortex breakdown were reported especially in later winter (January/February 2024, https://www.climate.gov/news-features/blogs/polar-vortex/and-thats-wrap-seasons-stratospheric-polar-vortex), as expected by the MedCOF-21 outlook.

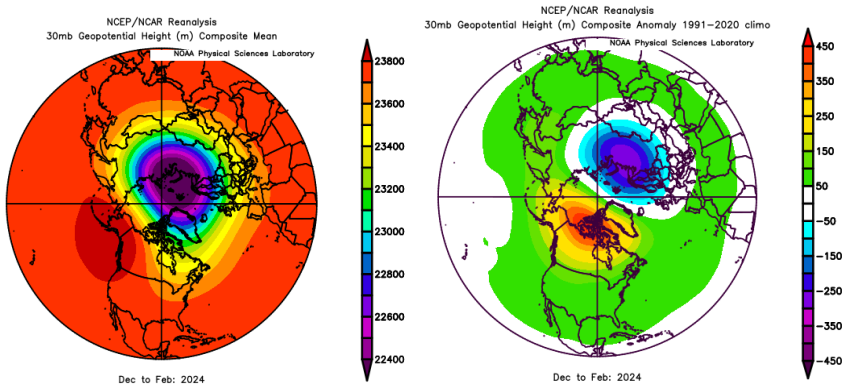


Figure 6: 30 hPa geopotential in the northern hemisphere on boreal winter 2023/24 average (left) and 1991-2020 anomalies (right). Source: NOAA Physical Sciences Laboratory, https://psl.noaa.gov/cgi-bin/data/composites/printpage.pl

North Atlantic Oscillation (NAO)

The NAO was mainly in a positive phase in boreal winter 2023/24, with a disruption at near-neutral conditions in January. This was in contrary to the MedCOF-21 outlook, which expected a negative NAO phase for late winter.

Month	December 2023	January 2024	February 2024
NAO	+1.94	+0.21	+1.09

Table 1: Monthly means for NAO for the boreal winter months 2023/24. Source: NOAA CPC, https://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/nao.shtml

500 hPa Geopotential

The circulation in 500 hPa showed cyclonic conditions over Northern Europe and anticyclonic conditions over the Mediterranean region and Northwestern Africa as expected by the MedCOF-21 outlook (Fig. 7). This pattern remained more or less stable during the three winter months.

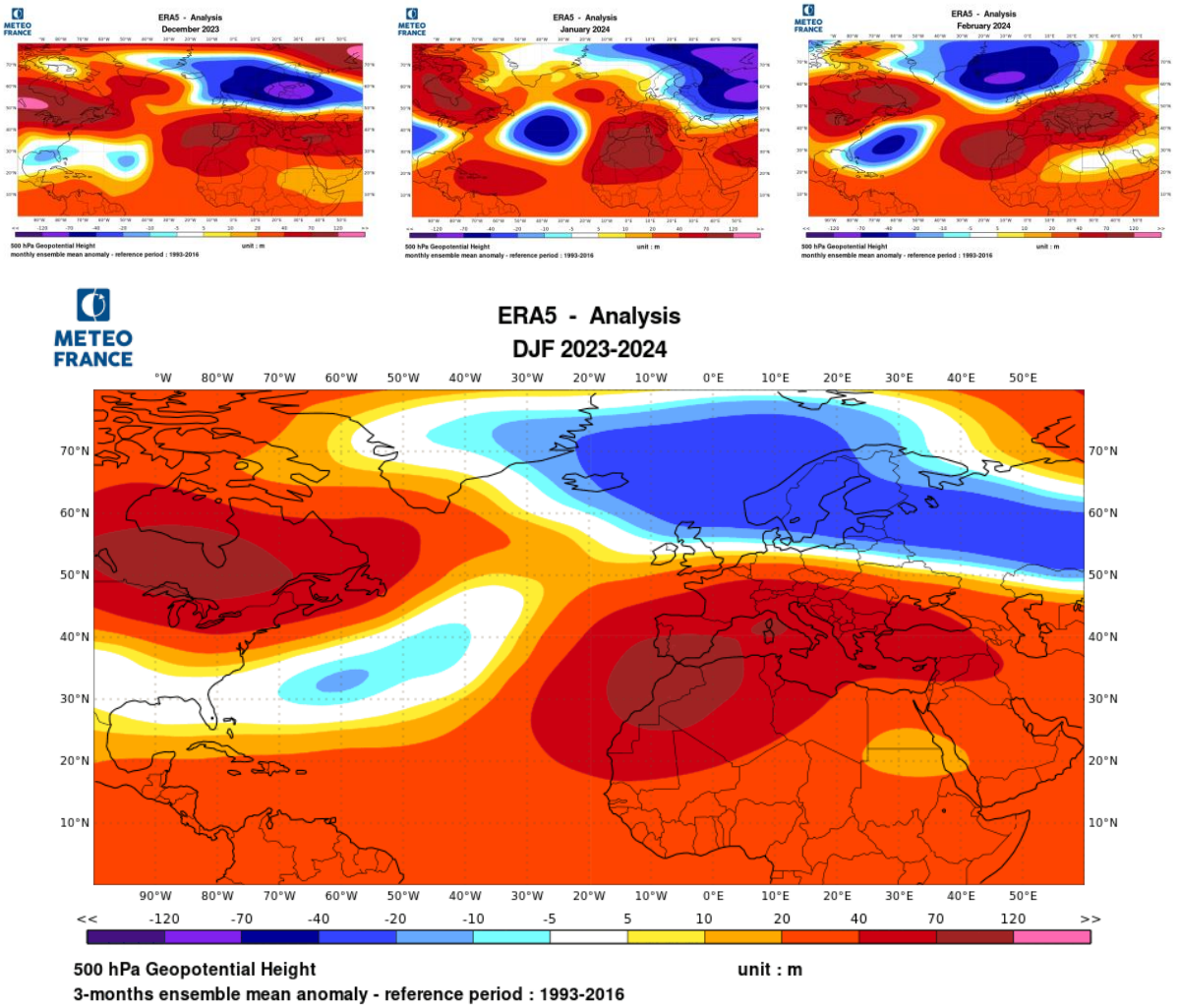


Figure 6: Geopotential height anomalies in 500 hPa, source: Meteo France, http://seasonal.meteo.fr/content/suivi-clim-cartes-ref93-16

Weather types

The distribution of weather types (Meteo France classification, Fig. 8) showed that very different types contributed during all winter months. The most frequent type was NAO+, but also a large number of NAO- types occurred, almost twice the normal and nearly equally frequent like NAO+. Otherwise, blocking types were less frequent than normal. The higher frequency of NAO- patterns is in line with the MedCOF-21 outlook and the stratospheric warming / polar vortex weakening events.

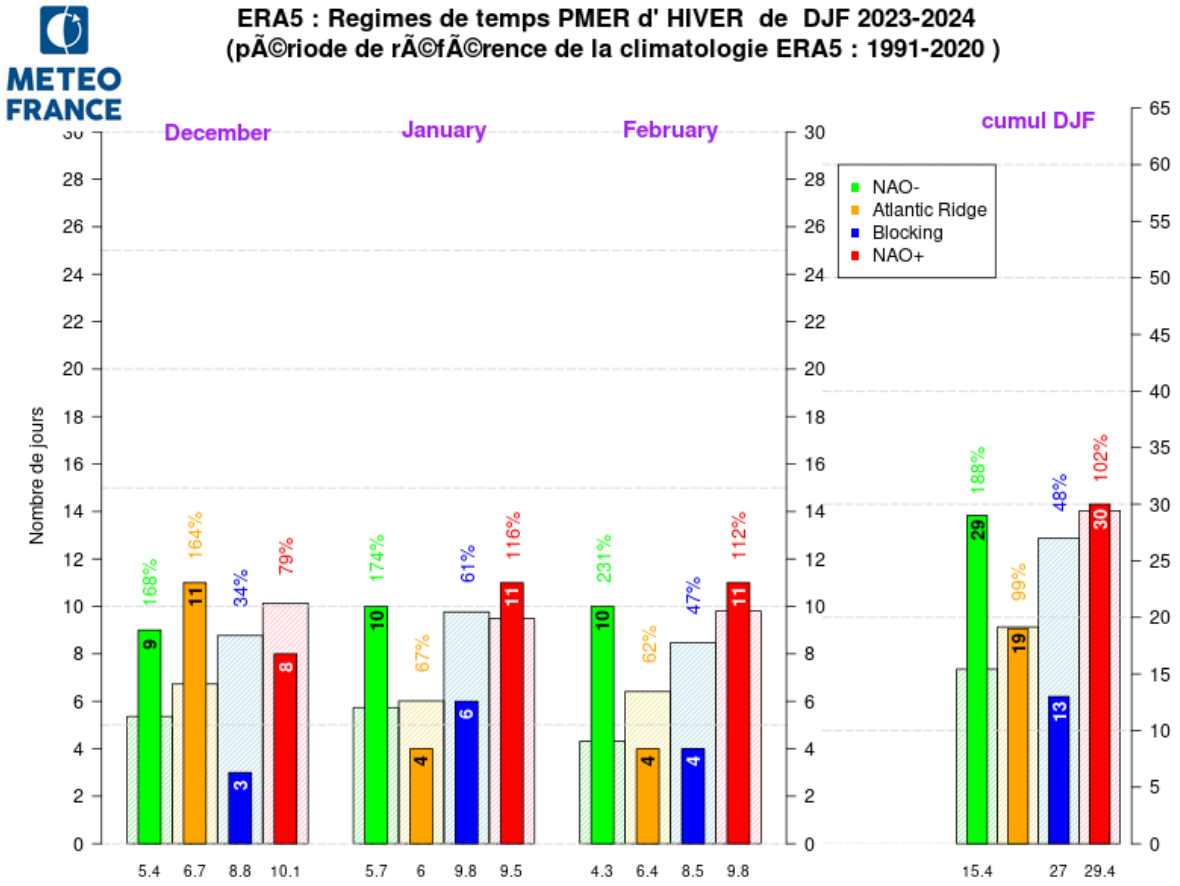


Figure 8: Number of days with circulation types of the Météo France classification for each month of the winter 2023/24 season and for the whole season (right), and in percent of the climatological frequency distribution 1991-2020. Source: Météo France, http://seasonal.meteo.fr/content/suivi-clim-regimes-trim?language=en

Teleconnection patterns

Among the teleconnection pattern after NOAA CPC, the most significant one relevant for Europe was the East Atlantic pattern (EA), which was in a strong positive phase throughout winter 2023/24.

MONTH	NAO	EA	WP	EP-NP	PNA	TNH	EATL/WRUS	SCAND	POLEUR
FEB 24	0.8	1.7	1.6	-0.5	-0.2	-0.3	-0.2	-0.5	-1.8
JAN 24	-0.3	2.6	0.7	0.1	-0.1	-0.3	0.5	-1.2	-0.9
DEC 23	1.7	1.5	1.2	---	0.9	-1.1	0.1	0.7	-0.5

Table 3: Circulation indices of NOAA CPC patterns for the winter months 2023/24. Source: https://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/table3.shtml

Sea level pressure

Seasonal mean sea level pressure in winter 2023/24 is displayed in Fig. 9. A zonal flow can be seen over the North Atlantic. The Icelandic Low was slightly weaker than normal, the Azores High around normal. While the pattern was more cyclonic than normal in the middle latitudes, the Mediterranean Sea area and North Africa were more anticyclonic. The Russian High was slightly weaker than normal.

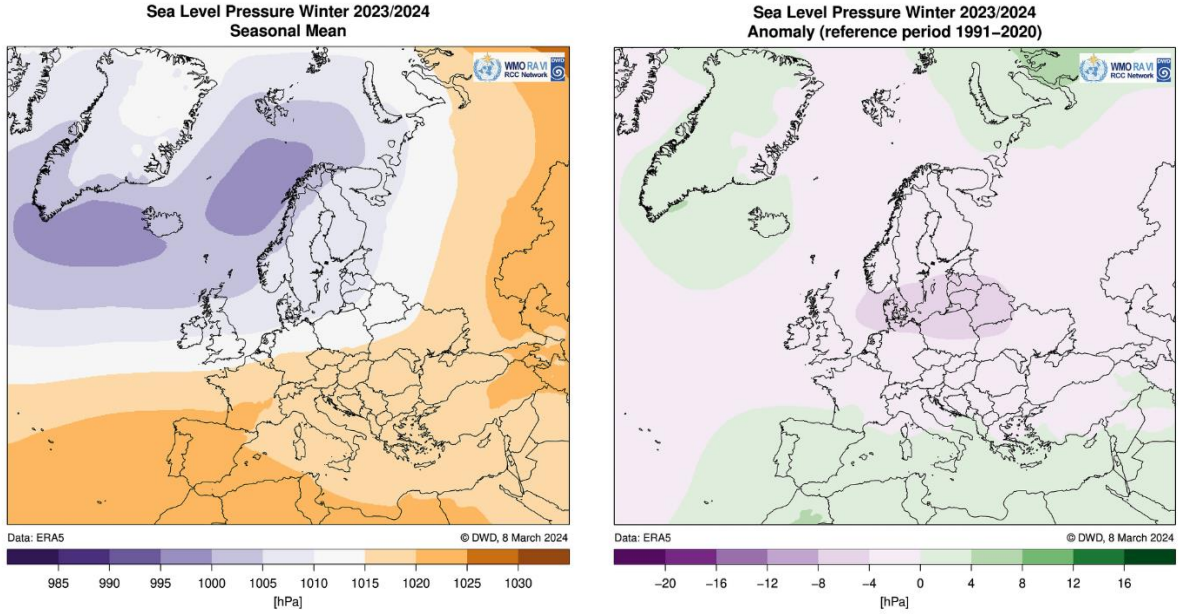


Figure 9: Seasonal mean sea level pressure and its anomalies for winter 2023/24 (1991-2020 reference). Source: Deutscher Wetterdienst (DWD), https://www.dwd.de/EN/ourservices/rcccm/int/rcccm_int_ppp.html, data source: ERA5 reanalysis, https://www.ecmwf.int/en/forecasts/dataset/ecmwf-reanalysis-v5

Sea level pressure distributions for single months are shown in the following figures (Fig. 10). The main pattern (westerly flow over the middle latitudes, anticyclonic conditions in the Mediterranean region) can be identified in all months, but with some variability. The Russian High became more intense from December to February and anomalies changed from negative in December to positive in February.

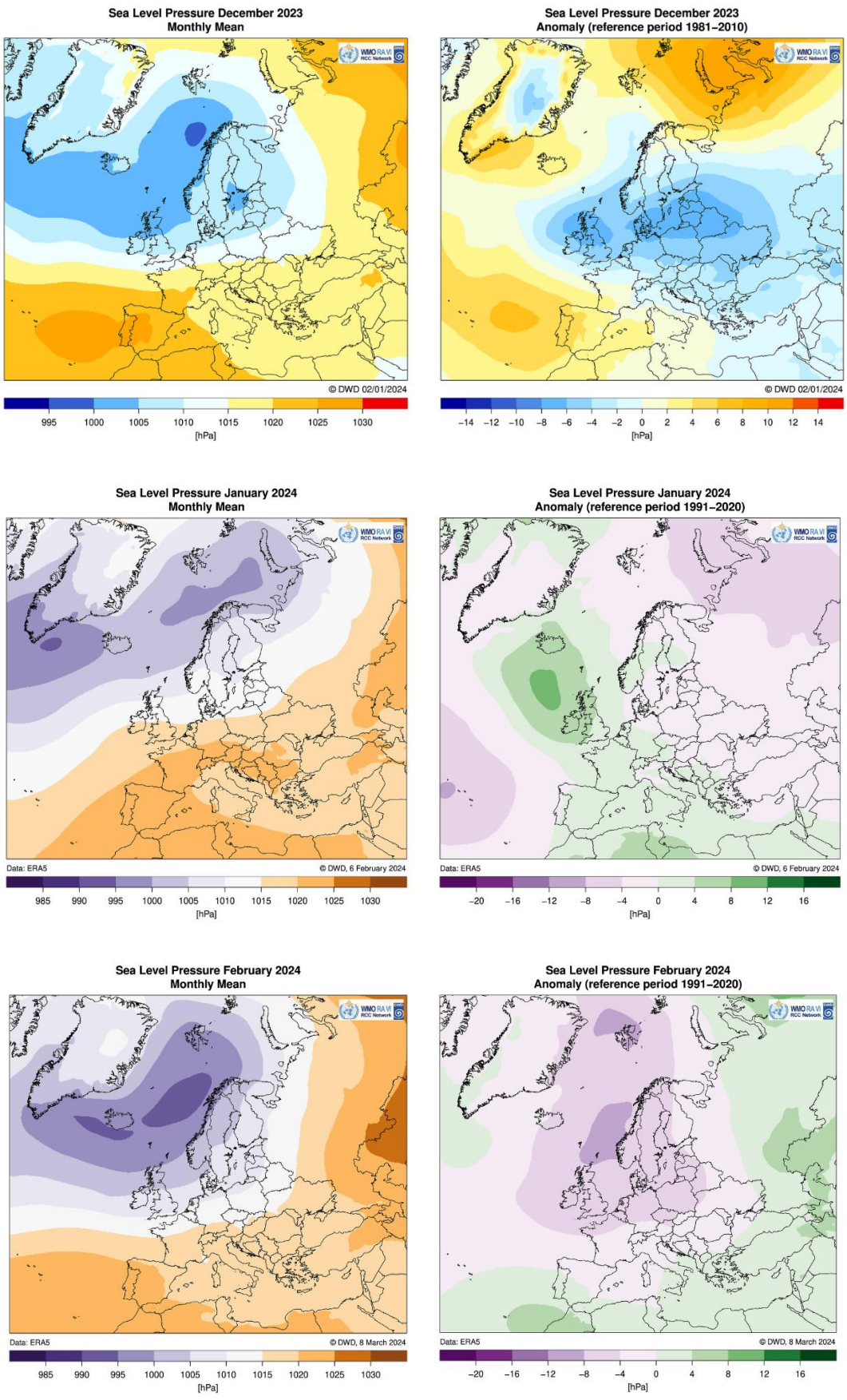


Figure 10: Same as Figure 9, but for the individual months December 2023 – February 2024. (Data source for December 2023 is the DWD ICON model, for the other months ERA5.)

2.2 Temperature

Europe and Middle East (RA VI)

Seasonal means and anomalies

Seasonal mean temperature in winter 2023/24 ranged from below 0 °C in high mountain areas and the northeastern Ukraine to above 15 °C in Israel (Fig. 11). In most lowland parts of the domain, seasonal mean temperature ranged between 5 °C and 10 °C, in some northern parts below, in some southern parts above.

Temperature was above the 1991-2020 normal in the entire RA VI MedCOF domain. Anomalies ranged from around +1 °C locally in Spain and southern Italy up to +5 °C in northeastern Türkiye. Much of the eastern parts of the domain was more than +3 °C warmer than normal.

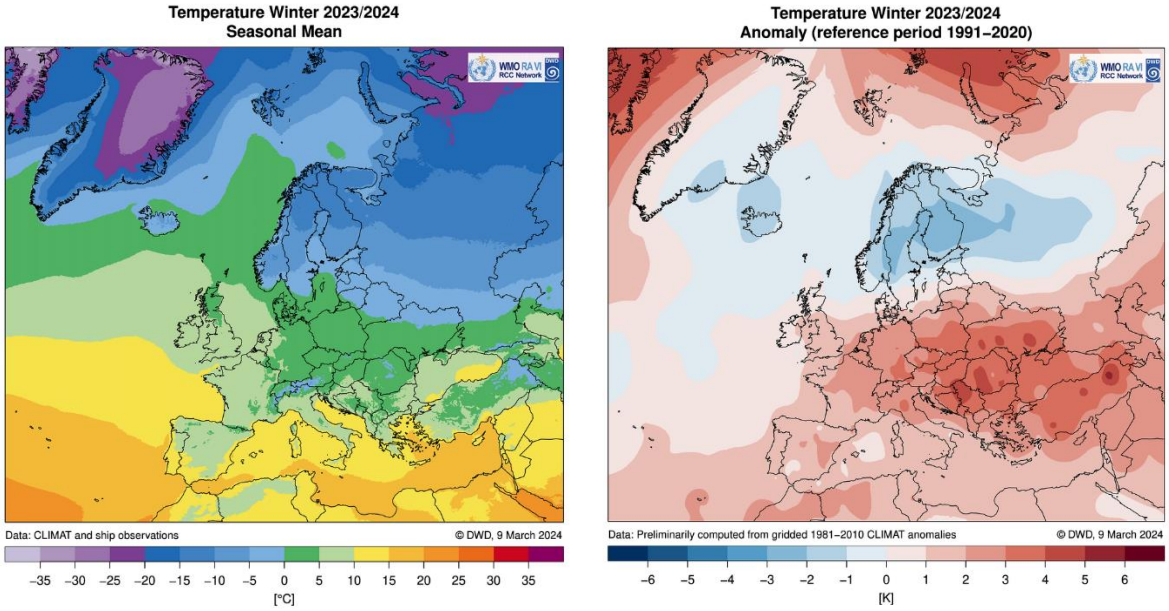


Figure 11: Surface air temperature for winter 2023/24. Left: seasonal mean, right: anomalies, 1991-2020 reference, source of both maps: WMO RAVI RCC, based on interpolated CLIMAT data, www.dwd.de/rcc-cm

Terciles

In terms of terciles, the entire RA VI MedCOF domain had temperatures in the upper tercile range in winter 2023/24, according to all datasets (ERA5, E-OBS, ECA&D, Fig. 12-14).

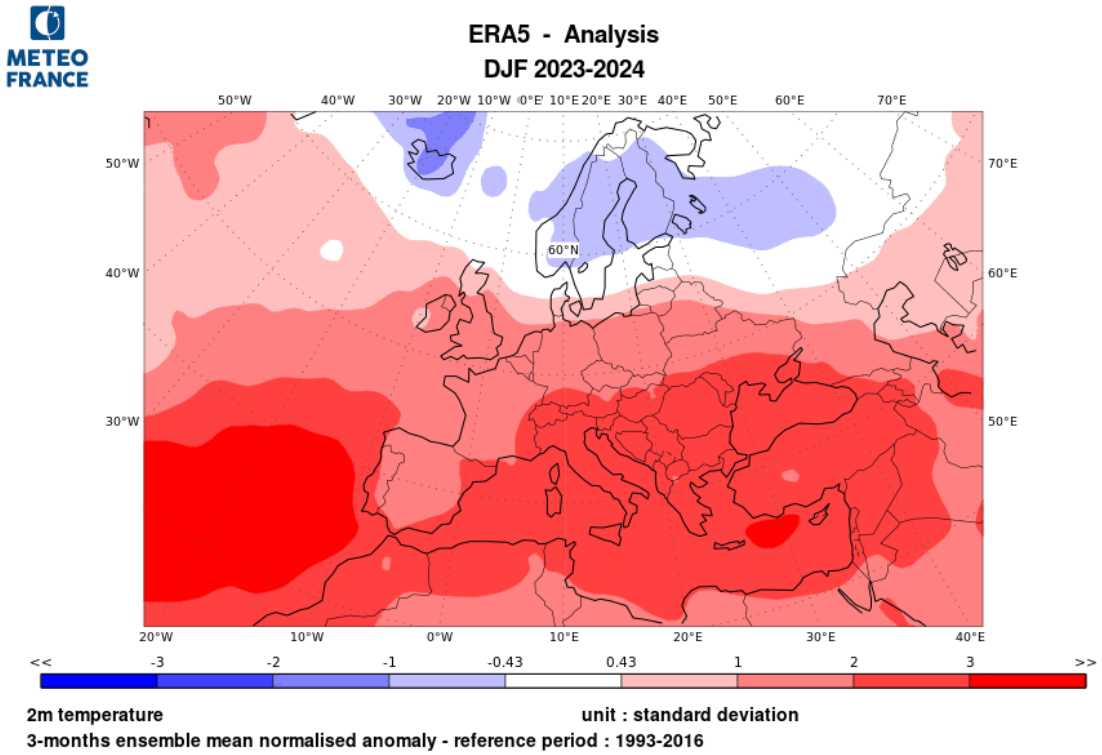


Figure 12: Seasonal normalized anomalies of winter 2023/24 2m air temperature based on ECMWF-ERA5 grid data, 1993-2016 reference. The data range between -0.43 and +0.43 represents the middle tercile range, below -0.43 the lower tercile range and above +0.43 the upper tercile range. Source: Météo France, http://seasonal.meteo.fr/content/suivi-clim-cartes-ref93-16

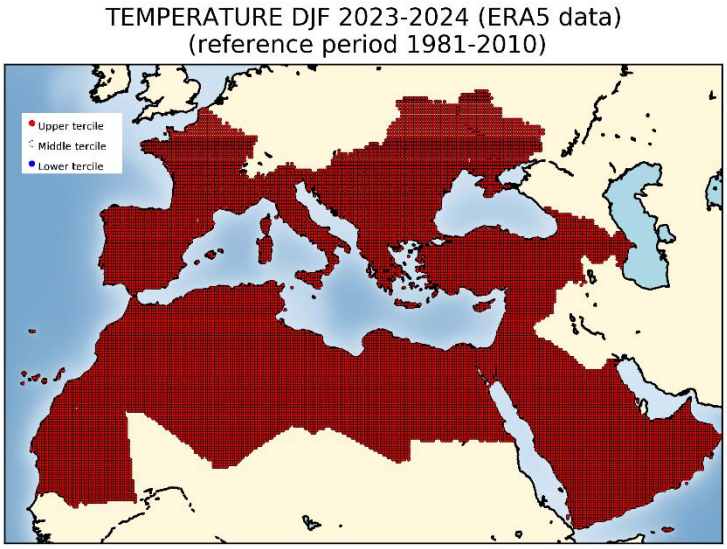
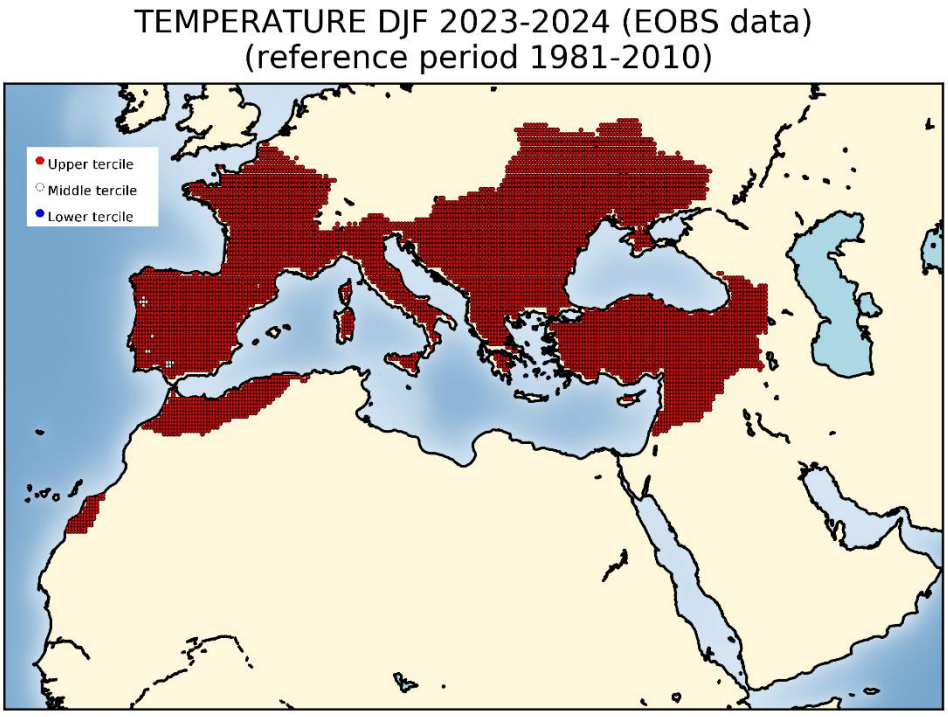


Figure 13: Terciles of winter 2023/24 surface air temperature based on ERA5 Reanalysis, 1981-2010 reference. Source: AEMET, data source https://www.ecmwf.int/en/forecasts/dataset/ecmwf-reanalysis-v5



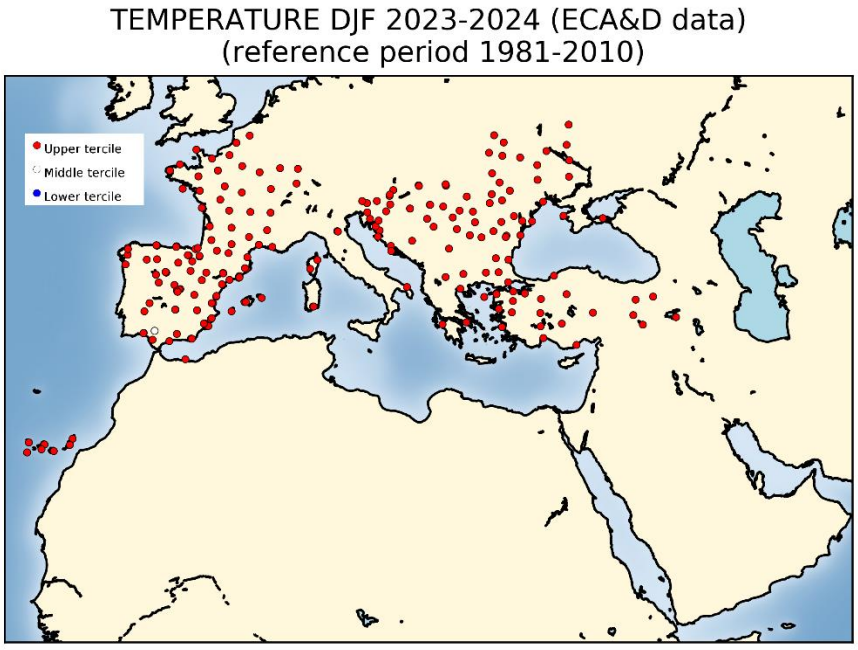
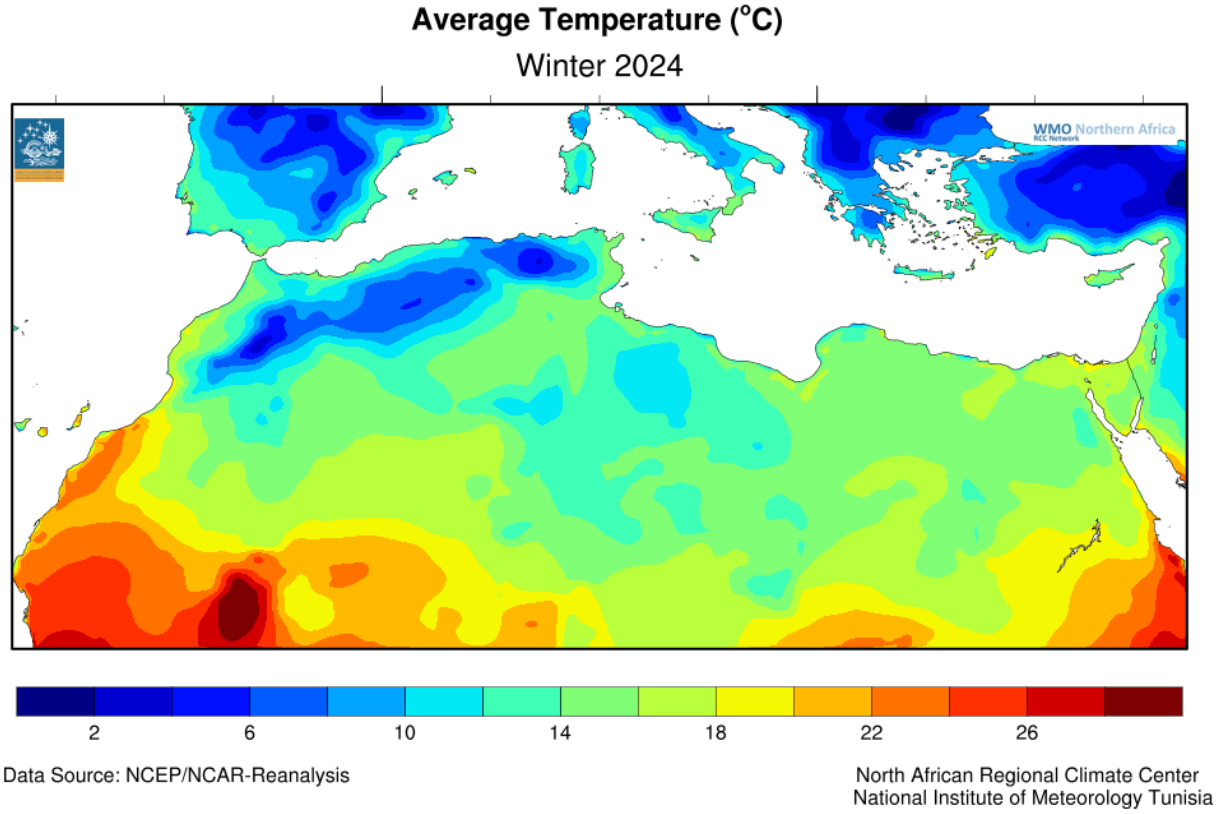


Figure 14: Terciles of winter 2023/24 surface air temperature based on interpolated E-OBS grid data (upper graph) and individual ECA&D station data (lower graph), 1981-2010 reference. Source: AEMET, data source: http://www.ecad.eu/

North Africa (RA I)

Seasonal mean temperatures ranged between 8 °C and 18 °C (Fig. 15). The lowest seasonal means were over the northeast of Algeria and the eastern part of Morocco.



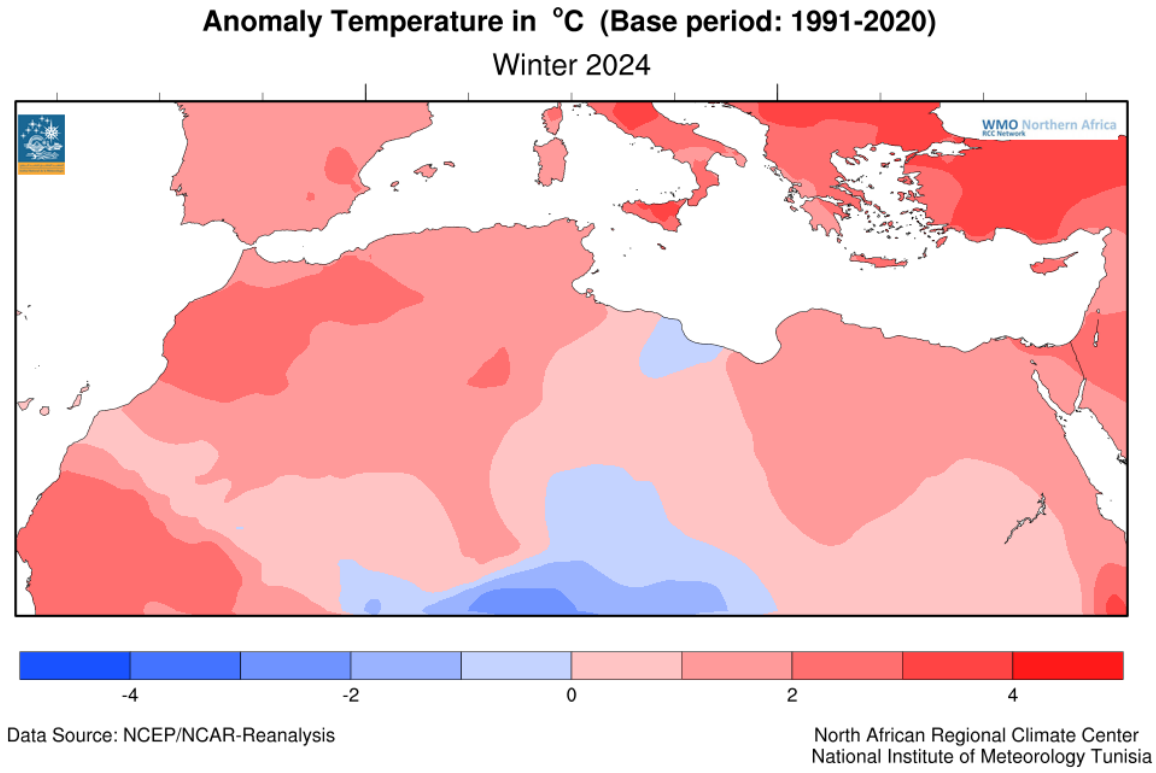


Figure 15: Winter (DJF 2023/24) mean temperatures and 1991-2020 anomalies in North Africa (in °C). Source: North African Regional Climate Center, National Institute of Meteorology Tunisia

In Tunisia, the winter season 2023-2024 was above normal over all of the country. The average seasonal temperature reached 8.4°C in the western center (station of Thala) and 16.0 °C in the south (station of Tataouine). The seasonal anomalies (1991-2020 normal) varied between −0.4 °C in the extreme northwest (station of Jendouba) and +2.5 °C in the south of the country (station of Tataouine).

Winter 2023/2024 in Egypt was warmer than normal in the most parts of the country. Mean temperatures were between 11.8 °C in (DAKHLA and FARAFRA) and 20.5 °C in the south of Egypt (RAS-BENAS). The anomalies (with respect to 1981-2010 normal) reached between +0.8 °C in (DAKHLA and FARAFRA) and +1.9°C in the north of Egypt (HURGHADA).

Over the rest of the North African region, compared with the normal seasonal temperatures, the mean temperatures during the winter season (DJF 2023-2024) were above normal for most parts of the domain. However, some areas in the western part of Libya and the south of Algeria experienced below-normal temperatures.

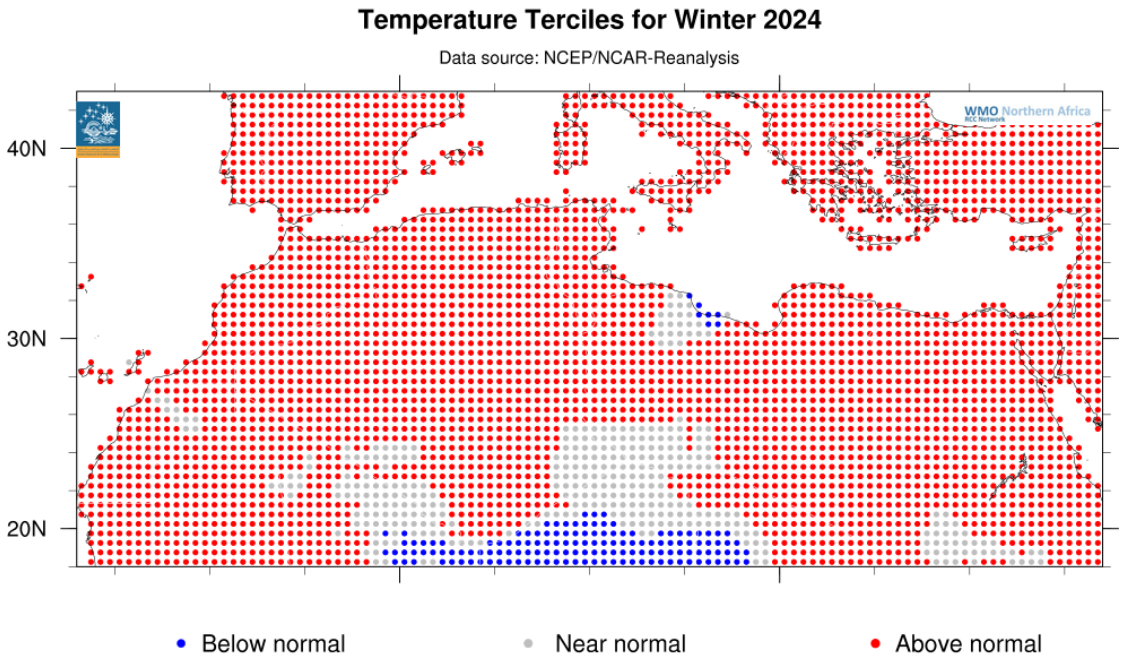


Figure 16: Temperature terciles for the 2023-2024 winter season in North Africa (Reference period 1991-2020)

To quantify the observed seasonal temperatures in winter 2023-2024 in terms of cold, warm, and normal conditions, the percentile method was applied. According to percentile ranks, a warm tercile range was predominant over most parts of the North African domain. A near-cold tercile range was locally observed in some parts of northwest and southwest Libya, as well as in the western and southeastern regions of Algeria.

2.3 Precipitation

Europe and Middle East (RA VI)

Seasonal means and anomalies

Seasonal precipitation totals in winter 2023/24 in the European MedCOF domain ranged from below 30 mm in eastern Spain, southern Syria and eastern Jordan to above 450 mm in places in the northwestern Iberian Peninsula, Montenegro, and western Georgia (Fig. 17).

Precipitation was at least 25% above normal particularly in northern areas of the domain, from southeastern France over northern Italy, Slovenia, northern Hungary, northern Romania, the western and northern Ukraine to the South Caucasus countries, locally also further south. Large areas in southern parts were drier than normal with less than 80% of precipitation, such as parts of Spain, especially near the coasts, parts of southern France, places in Italy, most of the Balkan Peninsula and the western Black Sea region, most of western and central Türkiye, most of Syria and eastern Jordan. Particularly dry were eastern Spain and Sicily with less than 40% of the normal in large parts.

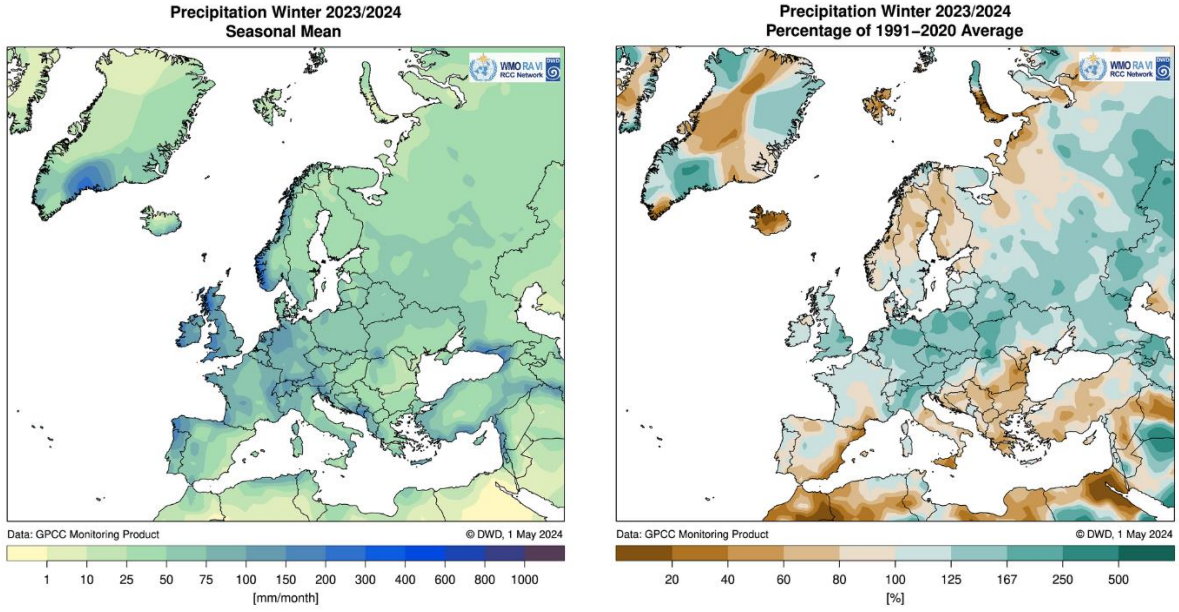


Figure 17: Precipitation for winter 2023/24 in Europe/RA VI. Left: seasonal total in mm/month, right: percentage of 1991-2020 average, source: WMO RAVI RCC, www.dwd.de/rcc-cm, data source: GPCC, http://gpcc.dwd.de

Terciles

In terms of terciles (Fig. 18), according to the ERA5 reanalysis, winter precipitation over the RA VI MedCOF domain was in the upper tercile range in northern parts of the domain, which included most of France, northern Italy, Slovenia, Hungary, and most of the Ukraine, but also in the South Caucasus, eastern Türkiye, and northern and western parts of the Middle East. Some other large parts received precipitation in the lower tercile range; these were eastern Spain, central and southern Italy, most of the Balkan Peninsula and the western Black Sea region, much of western and central Türkiye, and eastern Jordan. GPCC data showed similar results. The most outstanding difference between ERA5 and GPCC was in southwestern France, where precipitation was in the upper tercile range after ERA5, but in the middle range after GPCC.

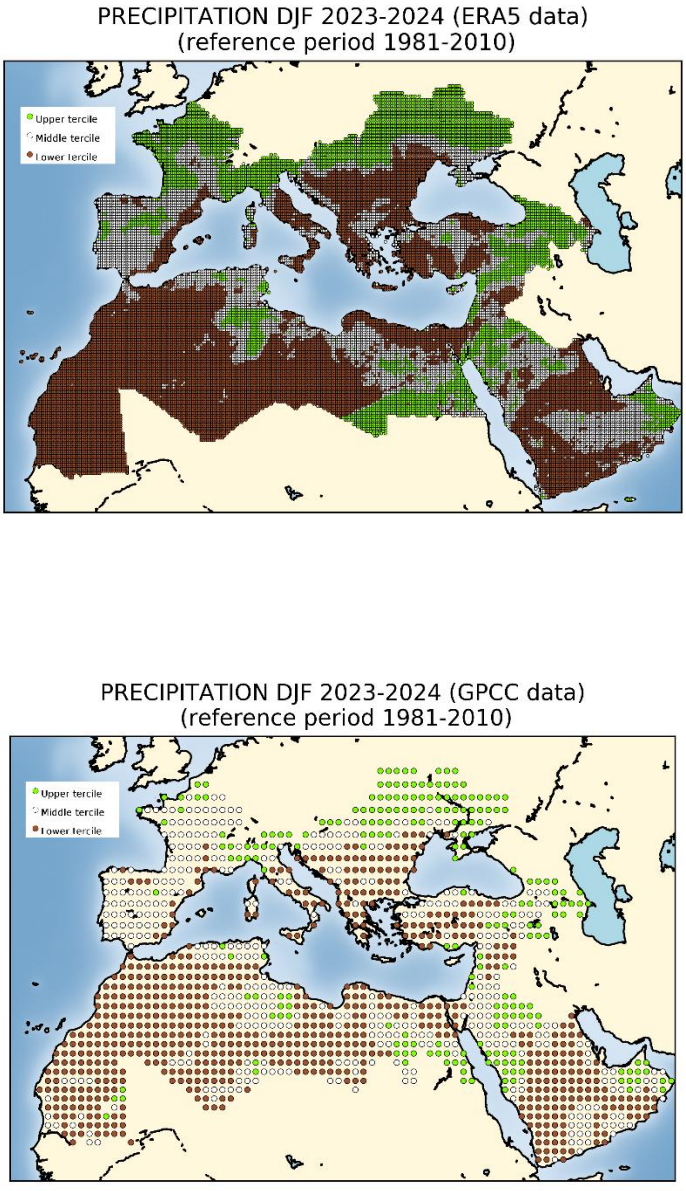


Figure 18: Terciles of winter 2023/24 precipitation based on ERA5 reanalysis (upper graph) and GPCC (lower graph) grid data, 1981-2010 reference. Source: AEMET, data reference: ERA5: https://www.ecmwf.int/en/forecasts/dataset/ecmwf-reanalysis-v5 , GPCC: http://gpcc.dwd.de

ECA&D and E-OBS data showed mainly similar results as far as data were available (Fig. 19). E-OBS showed differences to the other datasets especially for southern Italy and the western Balkans, where precipitation in the upper tercile range was displayed. However, no confirmation for this can be detected in the public ECA&D data.

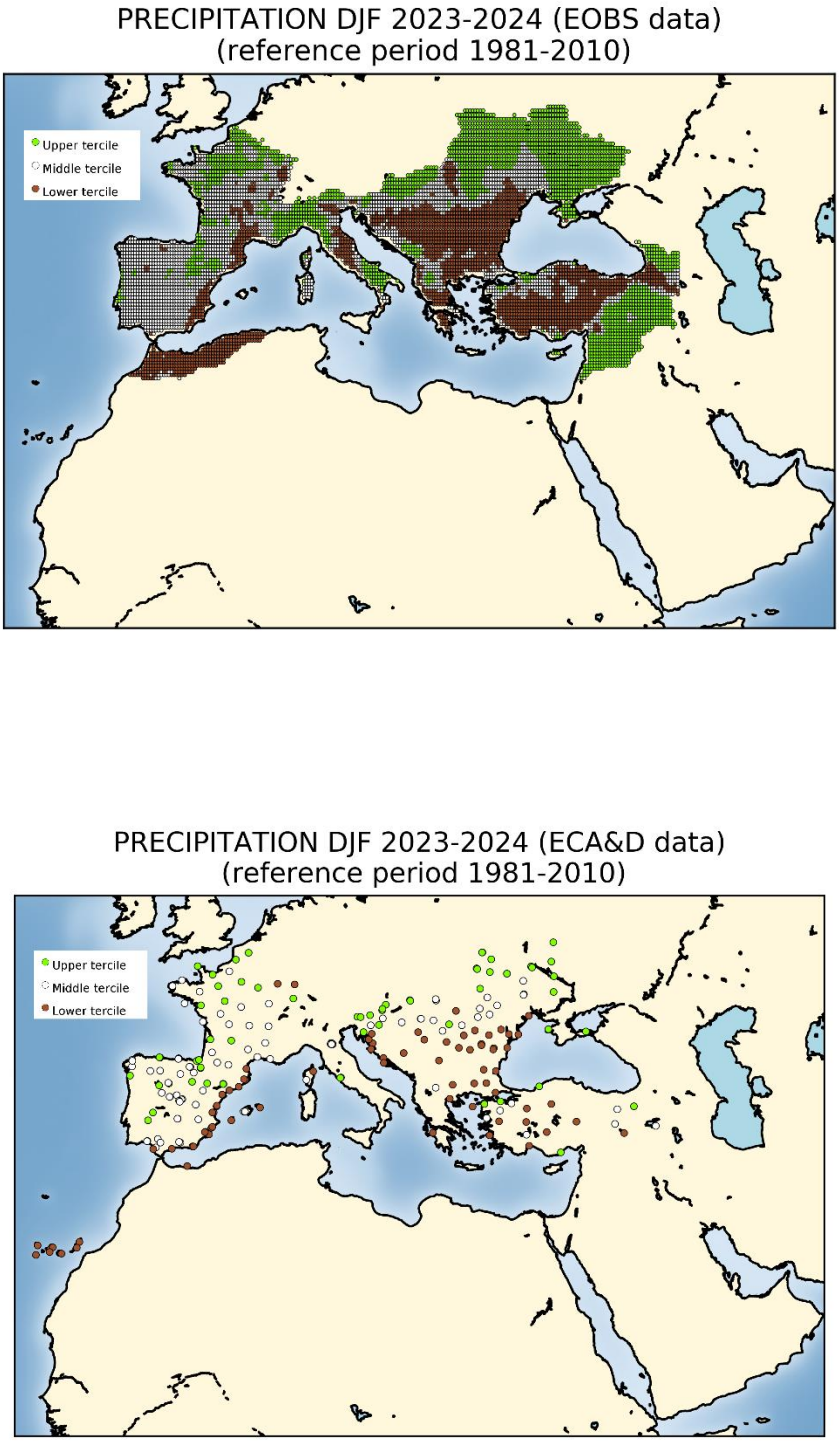


Figure 19: Terciles of winter 2023/24 precipitation based on interpolated E-OBS grid data (upper graph) and individual ECA&D station data (lower graph), 1981-2010 reference. Source: AEMET, data source: http://www.ecad.eu/

North Africa (RA I)

The seasonal precipitation was very low over North Africa during winter season (Fig. 20). Precipitation registered over the Mediterranean coastline of the domain ranged between 20 mm and 350 mm. Winter 2023-2024 precipitation was below normal over most of the region.

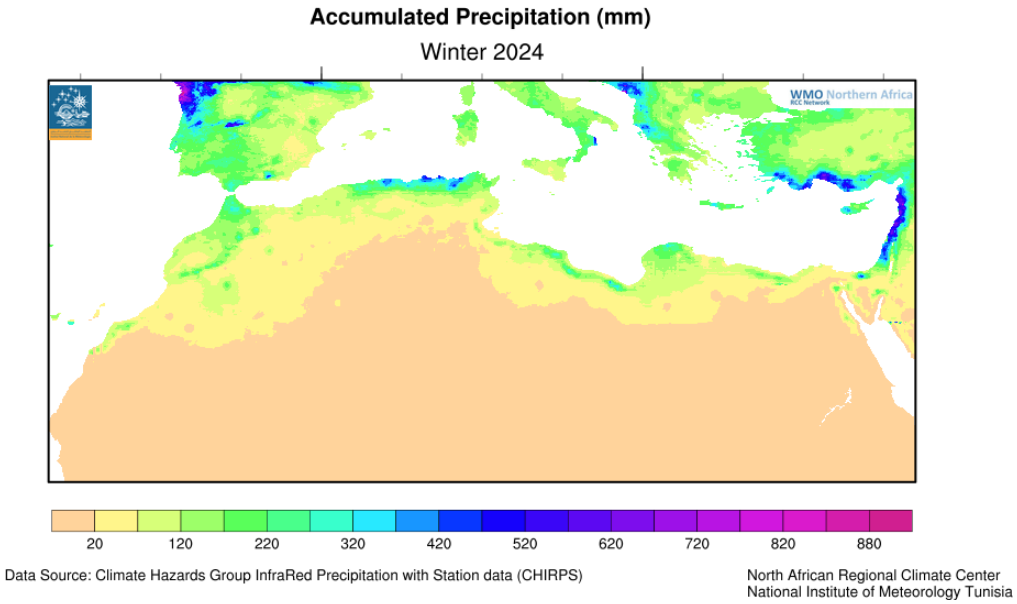


Figure 20: Winter (DJF 2023/24) precipitation totals (in mm) in North Africa. Source: North African Regional Climate Center, National Institute of Meteorology Tunisia

In *Tunisia*, the total seasonal rainfall accumulation from the 27 main stations reached 3264.5 mm, slightly above the normal accumulation for all stations (3170 mm).

In the central, some parts of the south and the northwestern regions of Tunisia, the winter of 2023-24 was characterized by humid conditions, with precipitation sometimes exceeding the seasonal normal. However, the north remained drier, not reaching the normal seasonal precipitation levels.

The winter season (DJF2023-2024) 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 2023/2024, near-below normal conditions were observed over the most parts of the country.

In general, *Egypt* was marked by a dry winter season over the western north of the country, and wet over the eastern and center parts. During the 2023/2024 winter season, the accumulated precipitation in Egypt was characterized by below normal conditions in the northwest of Egypt and the maximum precipitation was 33.6 mm over ALEXANDRIA.

Over *Libya*, the precipitation was above normal in the north, elsewhere precipitation was below normal.

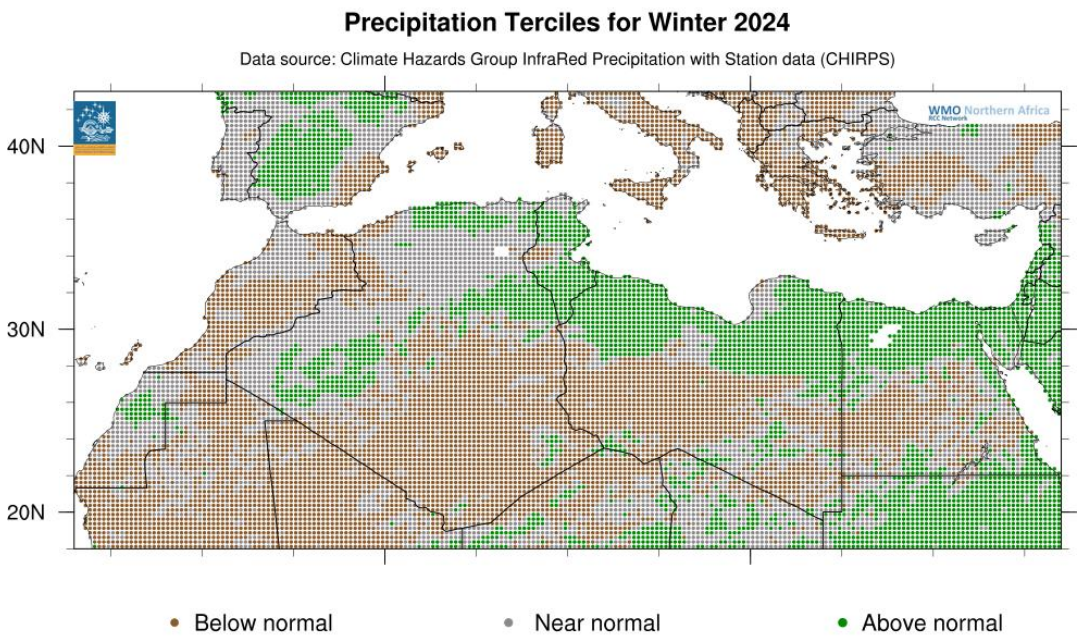


Figure 21: Precipitation terciles for 2023/2024 winter season in North Africa (Reference period 1991-2020)

3 Verification of the MedCOF-21 climate outlook (2023-24 winter season)

3.1 Temperature

Europe/RA VI

The MedCOF-21 outlook favored the upper tercile range for almost the entire domain (except for the northeastern Ukraine) with higher probability in the south (60%) than in the north (50%). For the northeastern Ukraine, no privileged scenario was given.

The outlook was correct for almost the whole domain, since all available datasets showed temperature in the upper tercile range throughout the area, including the northeastern Ukraine.

North Africa (RAI)

The MedCOF-21 climate outlook for the 2023-2024 winter season favored an above-normal temperature over most of the North African domain.
In fact, temperature anomalies were above normal over the most parts of the North African domain. This indicates that the MedCOF-21 climate outlook for the winter season temperature was able to predict positive temperature anomalies registered except for a small part of the south of Algeria and some parts of the west of Libya.

3.2 Precipitation

Europe/RA VI

The MedCOF-21 outlook favored the wet scenario (upper tercile range) for much of the RA VI domain with 50% probability, and no privileged scenario for some southern parts.

The outlook was correct in most of the northern parts, the wet scenario was well predicted. Otherwise the outlook did not capture the dry areas in the south, especially in eastern Spain, central and southern Italy, the Balkan Peninsula and western and central Türkiye.

North Africa

Over the North African region, the MedCOF-21 climate outlook favored the lower tercile with probability of 40% over the northern Algeria and Tunisia and the northern half of Morocco. For the rest of the domain, no preference for any climate defined categories was given. The winter 2023-2024 was wetter than normal over the north of both Algeria and Tunisia and over the east and the center of Egypt 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.

North Africa

No feedback was given from users.

Appendix A: Contributors to MEDCOF-22, 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:

- Agencia Estatal de Meteorología (AEMET), Spain
- others via SEECOF-31

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:

- Egyptian Meteorological Authority (EMA)
- National Institute of Meteorology, Tunisia

APPENDIX B: **Analysis and verification of the MedCOF-21 climate outlook for the winter season 2023/2024:**

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-22.

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-21 climate outlook for temperature	Observed	MedCOF-21 climate outlook for precipitation	
France*	Above normal	Above normal (20/30/50)	Mostly normal or above normal, in the south partly below normal	Above normal (20/30/50)	No events reported
Italy*	Above normal	North and central: Above normal (20/30/50) South: Above normal (10/30/60)	Above normal in the north Below normal or normal in the centre and south	North: above normal (20/30/50) Centre and south: no privileged scenario (33/33/33)	No events reported
Lebanon *	Above normal	Above normal (10/30/60)	Above normal	No signal (33/33/33)	No events reported

Country	Seasonal temperature (DJF)		Seasonal precipitation (DJF)		High Impact Events
	Observed	MedCOF-21 climate outlook for temperature	Observed	MedCOF-21 climate outlook for precipitation	
Portugal *	Above normal	Above normal (10/30/60)	normal	North: above normal (20/30/50) South: no signal (33/33/33)	No events reported
Spain (1)	Above normal	Above normal (10/30/60)	Mostly normal, locally above normal Below normal in the east	Northwest: above normal (20/30/50) elsewhere: no signal (33/33/33)	Based on the current data available, there were five warm episodes. The highest winter temperatures among the main stations were the following values: 30.8°C (Gran Canaria/airport, 16 January), 29.9°C (Fuerteventura/airport, 16 January), 29.5°C (Tenerife Sur/airport, 9 February), and 29.4°C (Málaga/airport, 12 December). In relation to low temperatures, there were six cold, although none of them can be considered a cold wave. The lowest winter temperatures among the main stations were: -9.2°C (Soria, 21 January), -8.9 °C (Molina de Aragón, 27 December), -8.0 °C (Burgos, 20 January), -7.4°C, (Puerto de Navacerrada, 12 January). The highest daily rainfall recorded at main observatories were in winter: 57.2 mm (La Palma/airport, 2 December), 56.8 mm (A Coruña, 27 December), 46.8 mm (Vigo, 7 December), 45.4 mm (Santiago de Compostela, 7 December), 67.1 mm (Hondarribia, 5 January), 52.5 mm (Santiago de Compostela/airport, 17 January) 48.6 mm (Donostia/Igueldo, 5 January), 39.8 mm (Puerto de Navacerrada, 16 January), 66.2 mm (Pontevedra, 8 February), 51.6 mm (Vigo/airport 8 February), 58.4 mm (Foronda-Txokiza, 26 February), 50.0 mm (Puerto de Navacerrada, 8 February) and 49.2 mm (Santiago de Compostela/airport, 8 February).
Syria *	Above normal	Above normal (20/30/50)	Above normal at the coast Mostly below elsewhere	North: above normal (20/30/50) Centre and south: no signal (33/33/33)	No events reported

Note:

1 – Basic climatological period (1991-2020)

*Data base: ERA5 1991-2020 for temperature, GPCC 1981-2010 for precipitation

North Africa (RA I):

Country	Seasonal temperature (DJF)		Seasonal precipitation (DJF)		High impacts events
	Observed	MedCOF-21 climate outlook for temperature	Observed	MedCOF-21 climate outlook for precipitation	
Algeria*	Above normal over most parts Near below normal over some parts of the south	Above normal (10%, 30%, 60%)	Normal to above normal in the north and the center west Below normal elsewhere	Below normal or normal in the north (40%,40%,20%) No clear signal elsewhere (33/33/33)	No comment
Egypt(1)	Above normal	Above normal (10%, 30%, 60%)	Above normal over the east and the center Below normal over the NW	No clear signal (33/33/33)	No comment
Libya*	Above normal over most parts Near normal over some parts of the west	Above normal (10%, 30%, 60%)	Normal to above normal over the north Below normal elsewhere	No clear signal (33/33/33)	No comment
Morocco*	Above normal	Above normal (10%, 30%, 60%)	Normal to below normal over most parts Above normal in a small part of the south	Below normal or normal in the north (40%,40%,20%) No clear signal elsewhere (33/ 33/33)	No comments

Country	Seasonal temperature (DJF)		Seasonal precipitation (DJF)		High impacts events
	Observed	MedCOF-21 climate outlook for temperature	Observed	MedCOF-21 climate outlook for precipitation	
Tunisia (2)	Above normal	Above normal (10%, 30%, 60%)	Above normal over the NW centre and some parts of the south Near to below normal elsewhere.	Below normal or normal (40%,40%,20%)	**Precipitation:** **December 2023** was ranked the **5th rainiest December since 1950**. The rainfall amounts recorded during this month reached 184.1.8% of the normal for the month of December (total cumulative rainfall for the 27 main stations for the month was 2084.4 mm, while the normal was 1132.4 mm). **Temperature:** **December 2023** ranks as the 6th warmest December since 1950. The mean temperature reached 13.8°C surpassing the reference average of 12.5°C by +1.3°C. J**anuary 2024** was ranked the warmest January since 1950 with a significant anomaly of **+2.3°C compared to the 1990-2020 reference period** .

Note:

(1) Basic climatological period (1981-2010)

(2) Basic climatological period (1991-2020)

* Data source: The National Climatic Data Center (NCDC)

References:

MedCOF-21 Outlook: http://medcof.aemet.es/images/doc_events/medcof21/step3/docStep3/Consensus-Statement-MedCOF21_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

MedCOF Online Forum: http://medcoforum.aemet.es/index.php

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

PRESANORD: https://www.acmad.net/rcc/presanord.php

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

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

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

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