MEDITERRANEAN CLIMATE OUTLOOK FORUM
MEDCOF-18 ONLINE MEETING

ANALYSIS AND VERIFICATION
OF THE MEDCOF-17 CLIMATE OUTLOOK
FOR THE 2021-22 WINTER SEASON
FOR THE MEDITERRANEAN REGION (MED)

First Draft

Last update: 9 May 2022

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The following MedCOF verification report is based on

- the outcome of the consensus forecast of MedCOF 1/,
- 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-27 verification report
- Data analyses of AEMET

1 MedCOF-17 Climate outlook for the 2021-22 winter season

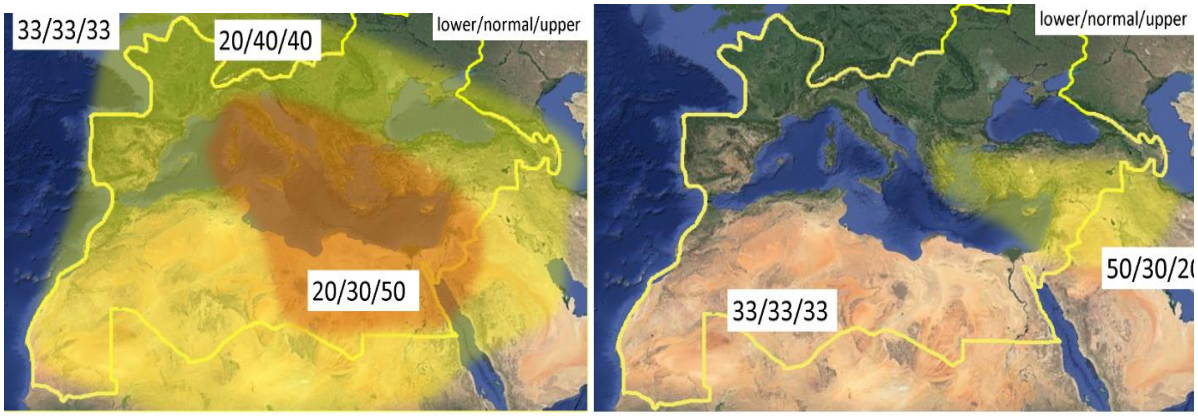


Figure 1: Graphical presentation of the climate outlook for the 2021-22 winter season for the Mediterranean region (a) Temperature Outlook, (b) Precipitation Outlook

1.1 General circulation

As stated in the MedCOF-17 consensus statement for the seasonal climate outlook for the 2021/22 winter season for the Mediterranean region, a moderate La Niña event was taking place with expected peak towards the end of the year 2021 and starting to decrease from February 2022 on. Some models suggested a slightly weaker than normal polar vortex during winter.

Models showed the typical atmospheric response to a La Niña event over the tropics and also over North America with a strong negative PNA. They were in less agreement in the response over the North Atlantic and over the MedCOF domain, with some models suggesting a dominant NAO+ circulation and others suggesting blocking as the most frequent regime. A tendency of higher than normal geopotential was suggested by most models over Central Europe and Mediterranean Sea, with areas of low surface pressures over the southern MedCOF domain.

1.2 Temperature

Within this general context, temperature should have been normal or warmer than normal over most of the domain (Fig. 1a). Probabilities for the warmest tercile were expected to be higher over central and eastern Mediterranean shores.

1.3 Precipitation

Precipitation forecasts showed drier than normal conditions over the eastern part of the domain. For the rest of the region no large-scale precipitation signal was present in the forecasts (see Fig. 1b). The climatological forecast (33, 33, 33) over the southern part of the domain also implied the fact that no meaningful forecast could be provided for these seasonally dry areas.

2 Analysis of the 2021-22 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 20201/22:
  - 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

Like in the previous winter, sea surface temperature (SST) anomalies in the tropical Pacific had a typical La Niña pattern in winter 2021/22; they were negative in the central and eastern tropical Pacific and close to the continent of South America. The subtropical North Atlantic and the sea region close to Europe were warmer than normal, while a colder-than-normal SST area could be detected around Iceland. SST over the Mediterranean was mostly close to normal (new reference period 1991-2020), in the eastern basin slightly above, and also the Black Sea was warmer than normal. The tropical Indian Ocean had close-to-normal temperatures in the west and was slightly warmer than normal in the east. The Indian Ocean Dipole (IOD) index was slightly negative, but still in the neutral range (see http://www.bom.gov.au/climate/enso/#tabs=Indian-Ocean).

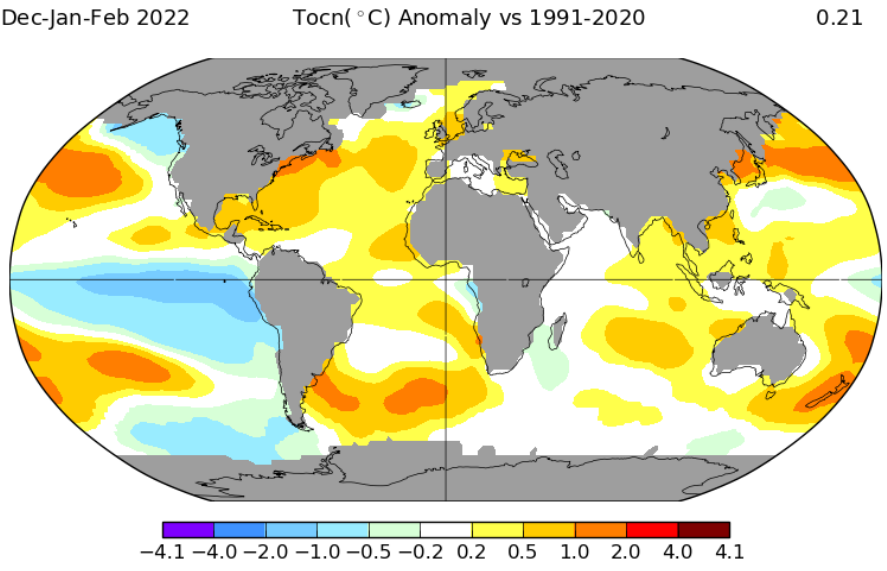


Figure 2: Sea surface temperature anomalies for boreal winter 2021-22 (December-February), 1991-2020 reference. Data from ERSSTv5 Ocean model analysis with 250km smoothing, source: NASA GISS, https://data.giss.nasa.gov/gistemp/maps/

ENSO

Looking at the standard Niño regions (Tab. 1, Fig. 3), anomalies were negative in all these regions and all larger than the La Niña threshold of -0.5°C except for the westernmost Niño 4 region. For all regions, the peak of the anomalies was in December 2021 as expected by the outlook, followed by a decrease of La Niña intensity until February 2022, but still with moderate anomalies not weaker than -0.71 for the Niño 3.4 region.

Year	MON	NINO1+2	ANOM	NINO3	ANOM	NINO4	ANOM	NINO3.4	ANOM
2021	12	21.31	-1.53	24.06	-1.21	27.68	-0.76	25.60	-1.05
2022	1	23.82	-0.70	24.50	-1.17	28.00	-0.22	25.73	-0.83
2022	2	24.66	-1.43	25.32	-1.06	27.87	-0.23	26.02	-0.71

Table 1: Sea surface temperature and anomalies in °C for various Niño regions in boreal winter months 2021-22 (December-February), 1981-2010 reference. Data from ERSSTv5 Ocean model analysis, source: NOAA, https://www.cpc.ncep.noaa.gov/data/indices/sstoi.indices .

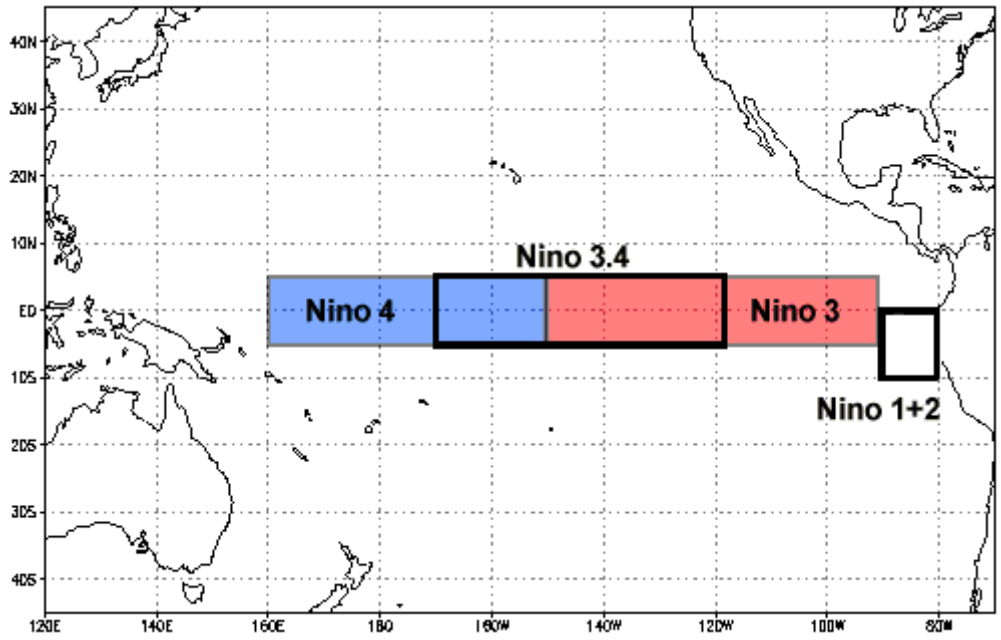


Figure 3: Definition of Niño regions, source: NOAA, https://www.ncei.noaa.gov/access/monitoring/enso/sst#oni

2.1.2 Atmosphere

Polar vortex

As shown in Fig. 4, the polar vortex in the stratosphere (30 hPa) was stronger than normal in winter 2021/22, in contrast to some model forecasts mentioned in the outlook. This is also revealed by the Arctic Oscillation Index, which was positive (meaning a strong vortex, little exchange of air masses between polar and middle latitudes) in all winter months of 2021/22, increasing from December to February. This is a main difference to the previous winter 2020/21, which was also a La Niña season, but with a negative AO index (Tab. 2).

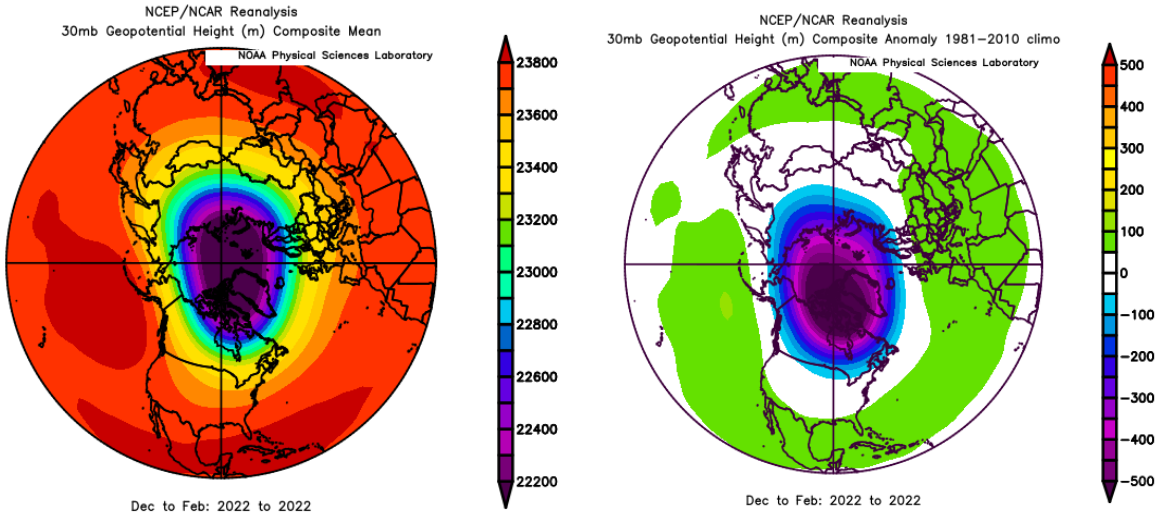


Figure 4: Geopotential height in 30 hPa (stratosphere) (left) and 1981-2020 anomalies (right), source: NOAA, https://psl.noaa.gov/cgi-bin/data/composites/printpage.pl

Month	2020/21	2021/22
December	-1.7	+0.2
January	-2.5	+0.9
February	-1.2	+1.6

Table 2: Arctic Oscillation (AO) Index (standardized), source: NOAA, https://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/ao.shtml

Pacific-North American pattern (PNA)

Anomalies of 500-hPa geopotential (Fig. 5) show a typical negative PNA pattern (quadrupole) with positive anomalies over the North Pacific and the southeastern United States and negative anomalies over Canada and the subtropical Pacific (see https://www.climate.gov/news-features/blogs/enso/pacific-north-american-pattern-stomach-sleeper-atmosphere?msclkid=a5db13facd6611ec82bff0b207c279d0 for explanation of PNA). ENSO is correlated with PNA, with La Niña being associated with a negative PNA. This shows that the mid-tropospheric circulation in the Northern hemisphere has responded to La Niña as expected from model results as mentioned in the outlook. A very similar quadrupole can also be seen over the Eurasian continent including the Mediterranean region.

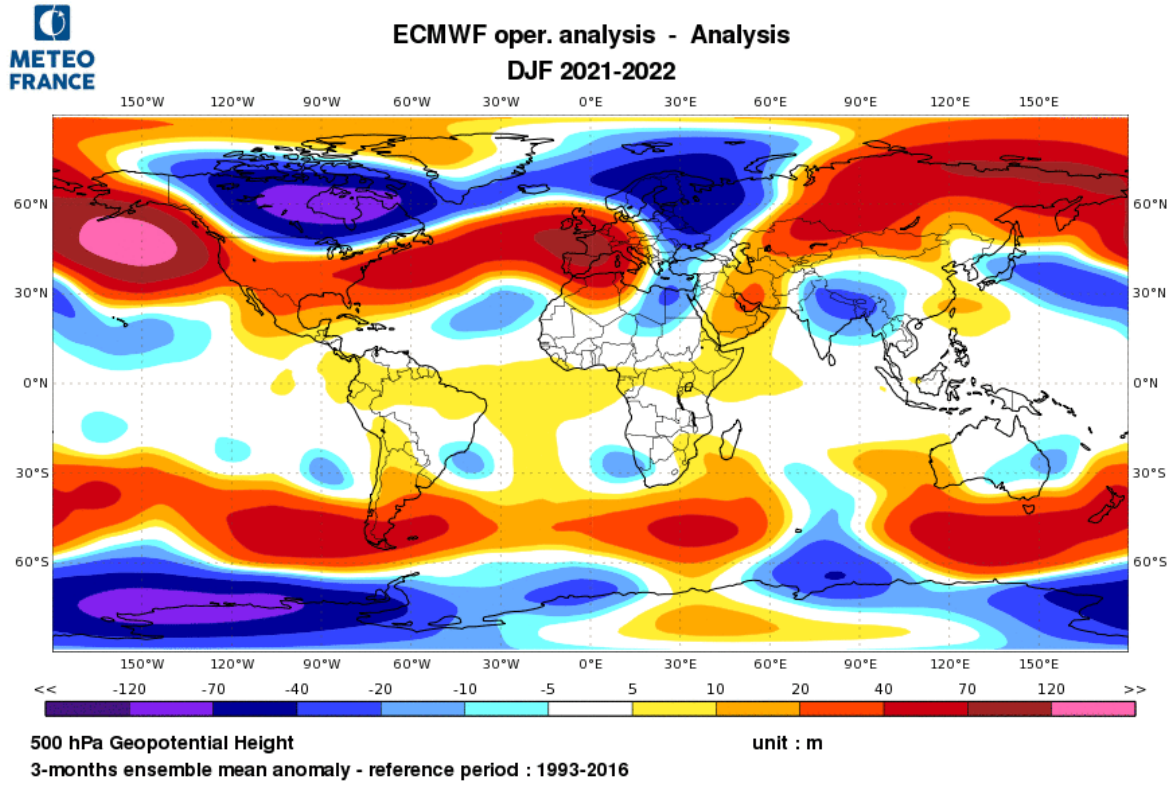


Figure 5: Geopotential height anomalies in 500 hPa, source: Meteo France, http://seasonal.meteo.fr/content/suivi-clim-cartes-ref93-16

Weather types

According to the weather type classification of Météo France, the most frequent weather types were NAO+ (as suggested by some models as mentioned in the outlook) and Atlantic Ridge (Fig. 6). NAO- and Blocking occurred less frequent than normal. However, the frequencies were very different from month to month: While NAO- was the most frequent type in December 2021, Atlantic Ridge was most frequent in January 2022 and NAO+ most frequent in February 2022. This is also reflected by very different geopotential patterns from month to month (Fig. 7). Nevertheless, in spite of these large monthly variations, higher-than-normal geopotential can be found in all three months over western parts of the MedCOF domain, and negative anomalies at least for December and January over the eastern Mediterranean.

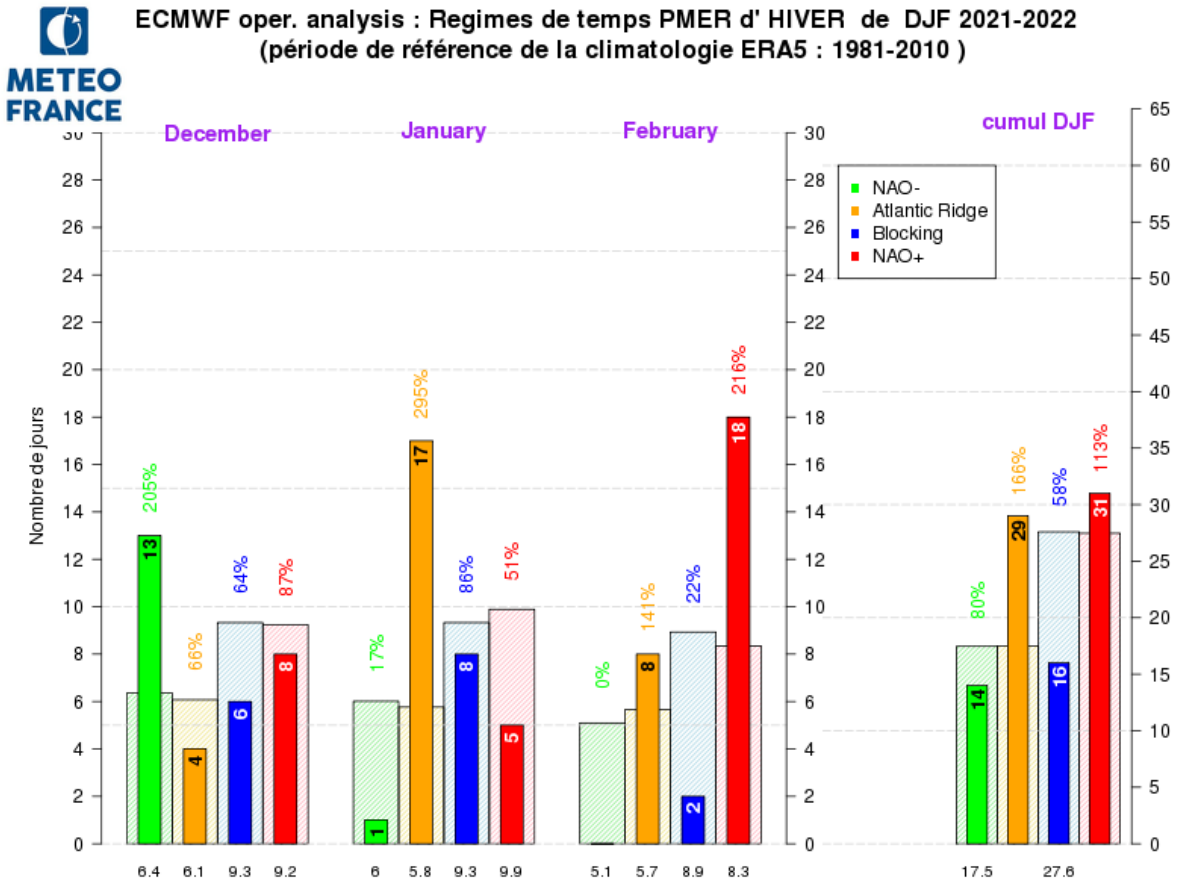


Figure 6: Number of days with circulation types of the Météo France classification for each month of the winter 2021/22 season and for the whole season (right), and in percent of the climatological frequency distribution 1981-2010. Source: Météo France, http://seasonal.meteo.fr/content/suivi-clim-regimes-trim?language=en

Teleconnection patterns

MONTH	NAO	EA	WP	EP-NP	PNA	TNH	EATL/WRUS	SCAND	POLEUR
FEB 22	1.5	0.2	-0.4	-0.9	0.6	1.8	-0.9	-2.1	-1.6
JAN 22	0.7	-1.4	-1.4	0.5	0.6	0.7	1.1	-0.9	-0.3
DEC 21	0.2	-0.1	0.5	---	-2.9	-0.3	0.0	0.3	-0.5

Table 3: Circulation indices of NOAA CPC patterns for the winter months 2021/22. Source: https://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/table3.shtml

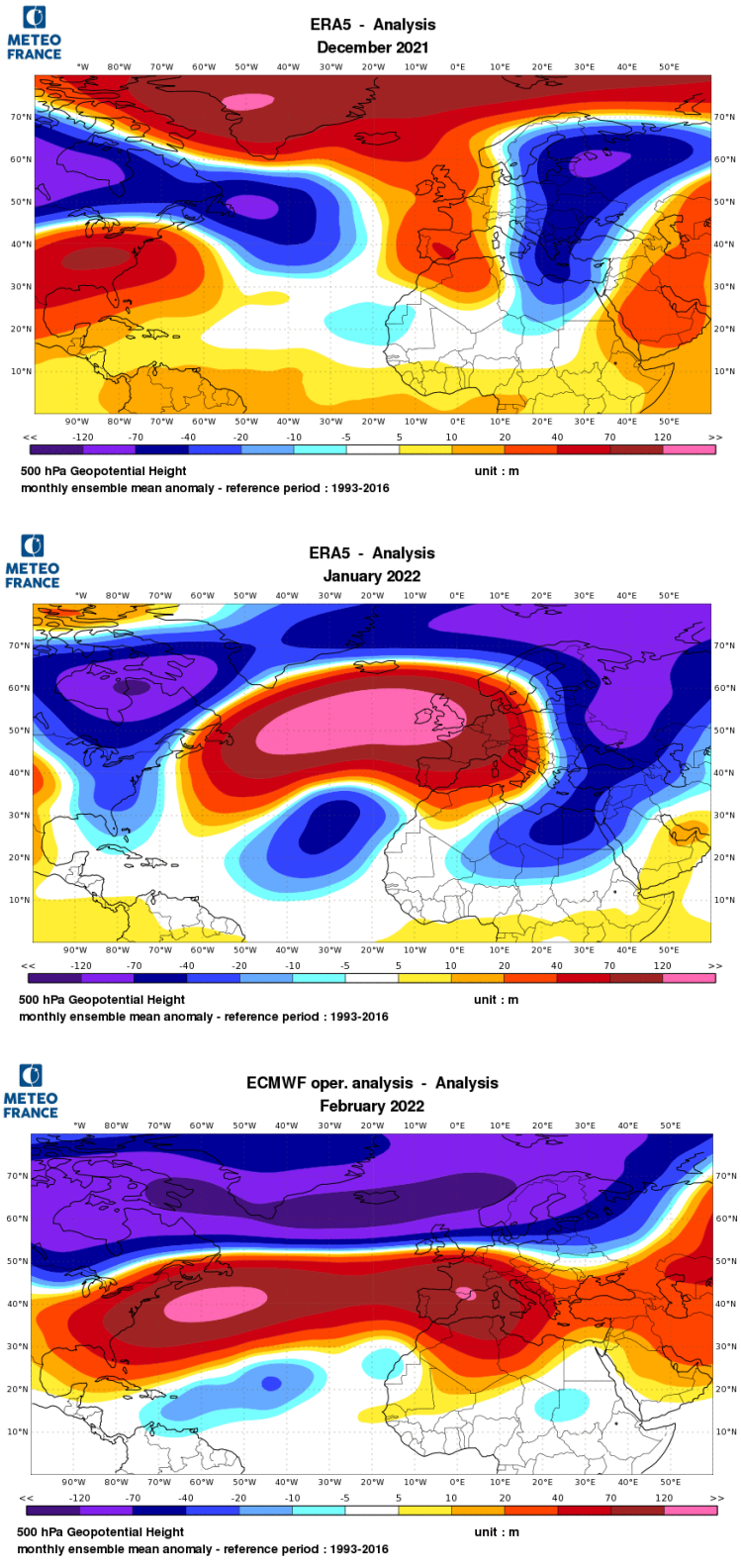


Figure 7: Monthly anomalies of 500-hPa geopotential for the months of winter 2021/22 (1993-2016 reference). Source: Météo France, data source: ECMWF / ERA5 reanalysis, http://seasonal.meteo.fr/content/suivi-clim-cartes-ref93-16. Lower maps: same for individual months.

Sea level pressure

Seasonal mean sea level pressure in winter 2021/22 is displayed in Fig. 8. A strong zonal flow can be seen over the North Atlantic. Both the Icelandic Low and the Azores High were more intense than normal, reflecting NAO+. The Azores High was also expanded to the north (corresponding to Atlantic Ridge), shifting the frontal zone further to the north, which is a typical feature for La Niña. Furthermore, an anomalous expansion of high pressure to the western MedCOF domain (France, Iberia, western parts of North Africa and the western Mediterranean basin) took place. The Russian High was weaker than normal over Europe. Therefore, westerly flows could advance quite far to the east, and low-pressure situations over eastern Europe occurred more frequently. Sea level pressure was also lower than normal over the eastern Mediterranean region and the eastern Balkan Peninsula.

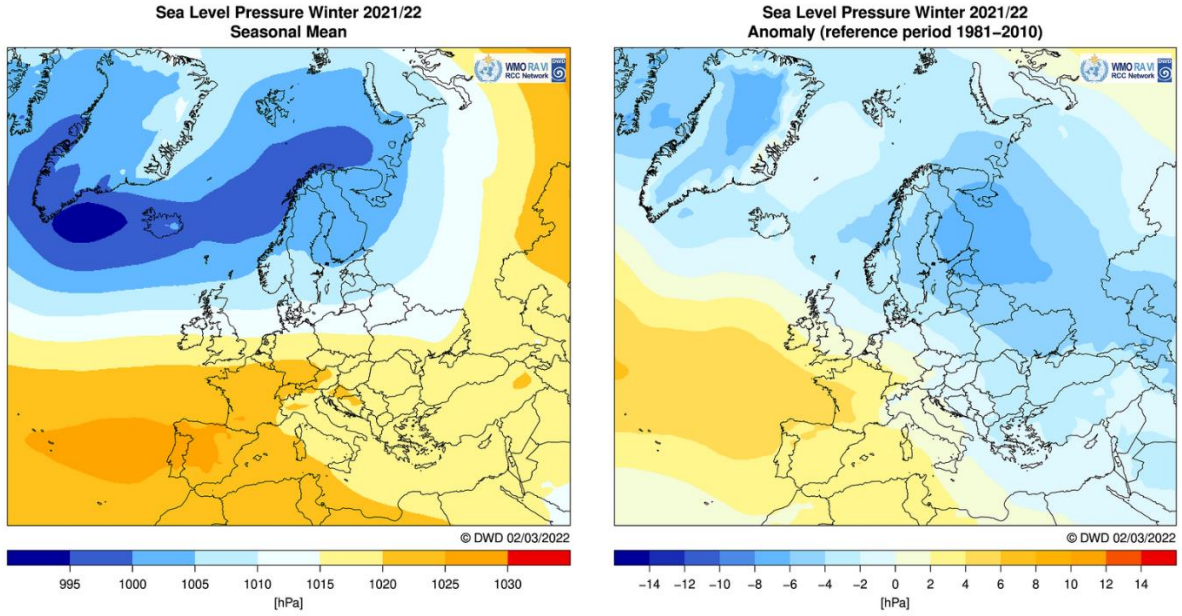


Figure 8: Seasonal mean sea level pressure and its anomalies for winter 2021/22 (1981-2010 reference). Source: Deutscher Wetterdienst (DWD), https://www.dwd.de/EN/ourservices/rcccm/int/rcccm_int_ppp.html, data source: DWD numerical ICON model analysis, http://www.dwd.de/EN/research/weatherforecasting/num_modelling/01_num_weather_prediction_modells/icon_description.html?nn=484268

Sea level pressure distributions for single months are shown in the following figures (Fig. 9). Most outstanding were the large expansion of the Azores High, particularly to the north, in January 2022 and the NAO+ pattern in February 2022, similar to the 500-hPa anomalies.

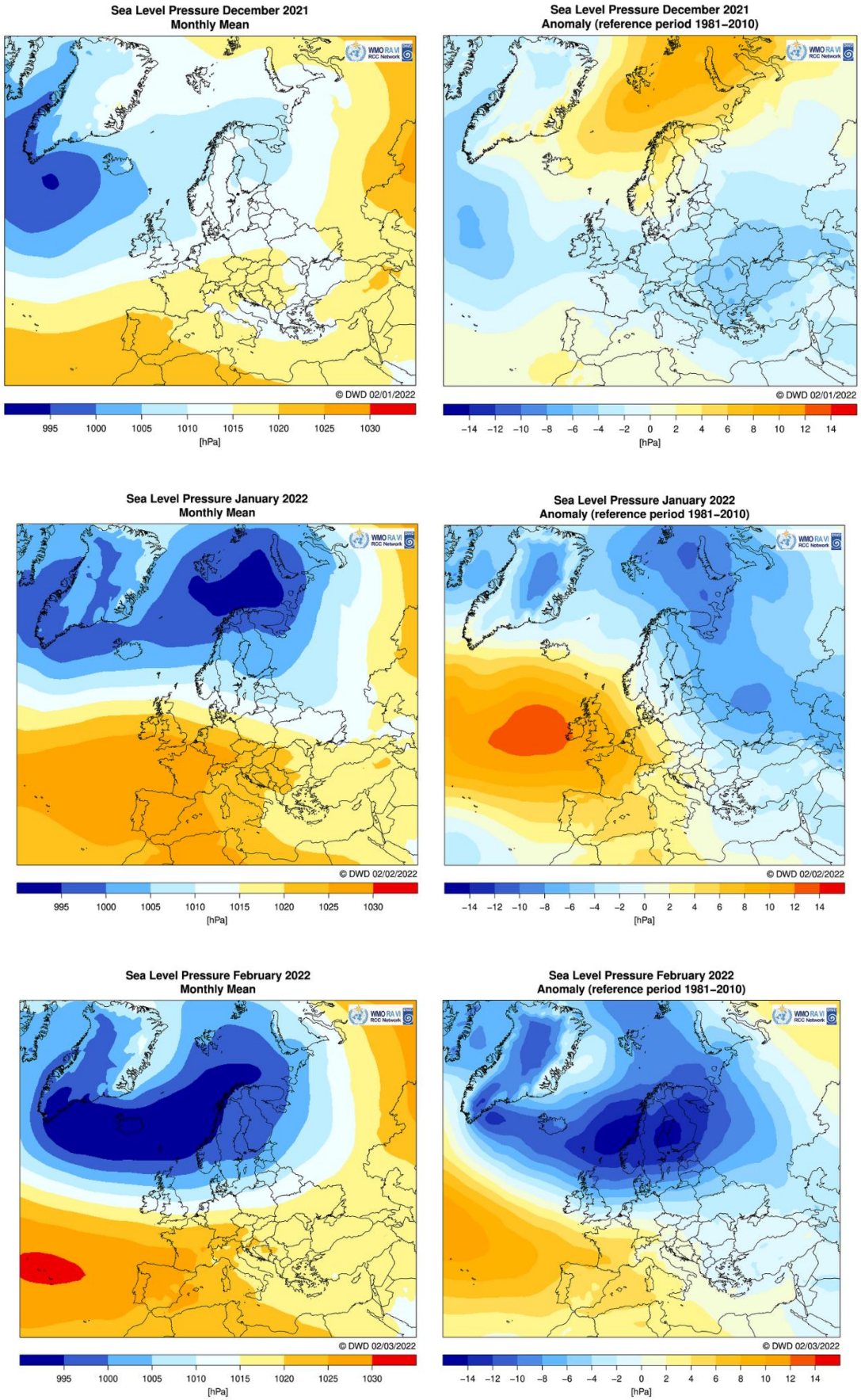


Figure 9: Same as Figure 8, but for the individual months December 2021 – February 2022.

2.2 Temperature

Europe and Middle East (RA VI)

Seasonal means and anomalies

Seasonal mean temperature in winter 2021/22 ranged from below -10°C in high mountain areas to around 15°C near Gibraltar (Fig. 10). In most northern lowland parts of the RA VI MedCOF domain, the seasonal means ranged between 0 and 5°C, lower in the northern Ukraine. In southern parts of that domain, seasonal means were mostly between 5 and 10°C, partly higher, especially in southwestern Iberia, southern and eastern parts of the Middle East.

Temperature was above the 1991-2020 normal (the modern reference period!) almost in the entire RA VI MedCOF domain. There were slightly below normal just in southern Israel.

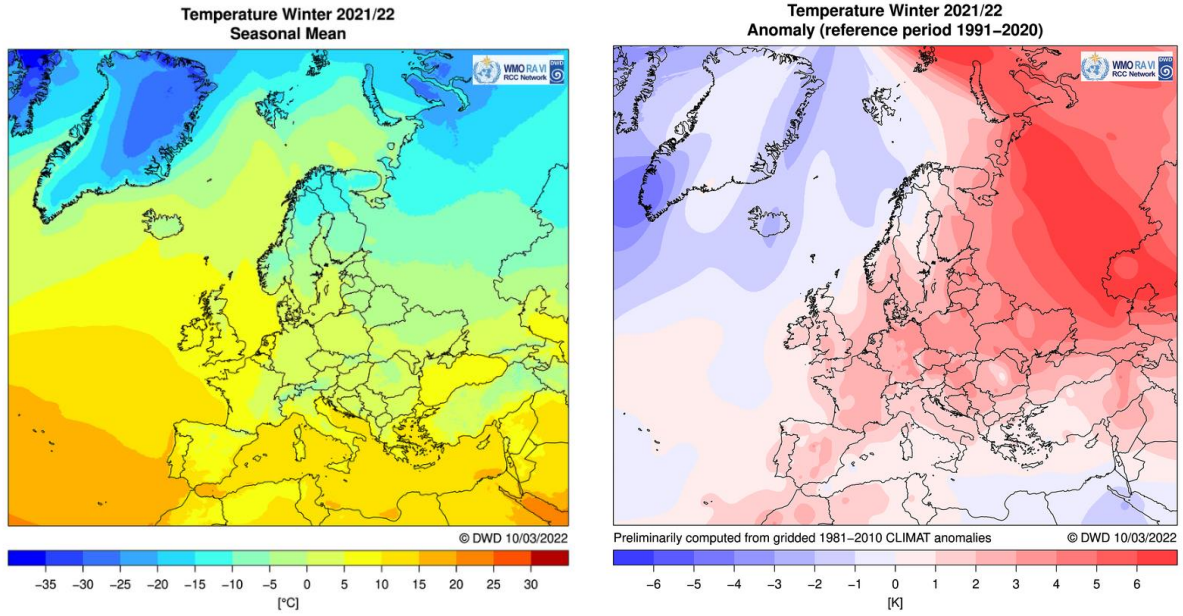


Figure 10: Surface air temperature for winter 2021/22. Left: seasonal mean, right: anomalies, 1991-2020 reference, source of both maps: WMO RAVI RCC, based on interpolated CLIMAT data, www.dwd.de/rcc-cm

Terciles

In terms of terciles, most of the RA VI MedCOF domain had temperatures in the upper tercile (Fig. 11-13). Only a few places or smaller areas had anomalies in the middle tercile, particularly in France and Italy. According to ECMWF-ERA 5 (1993-2016 reference) numerical analysis data only southwestern Turkey had temperatures locally also in the lower tercile. ECA&D and E-OBS have no data to support this. The national report from the Turkish State Meteorological Service (available from SEECOF) does not show any values in the lowest tercile range for Turkey.

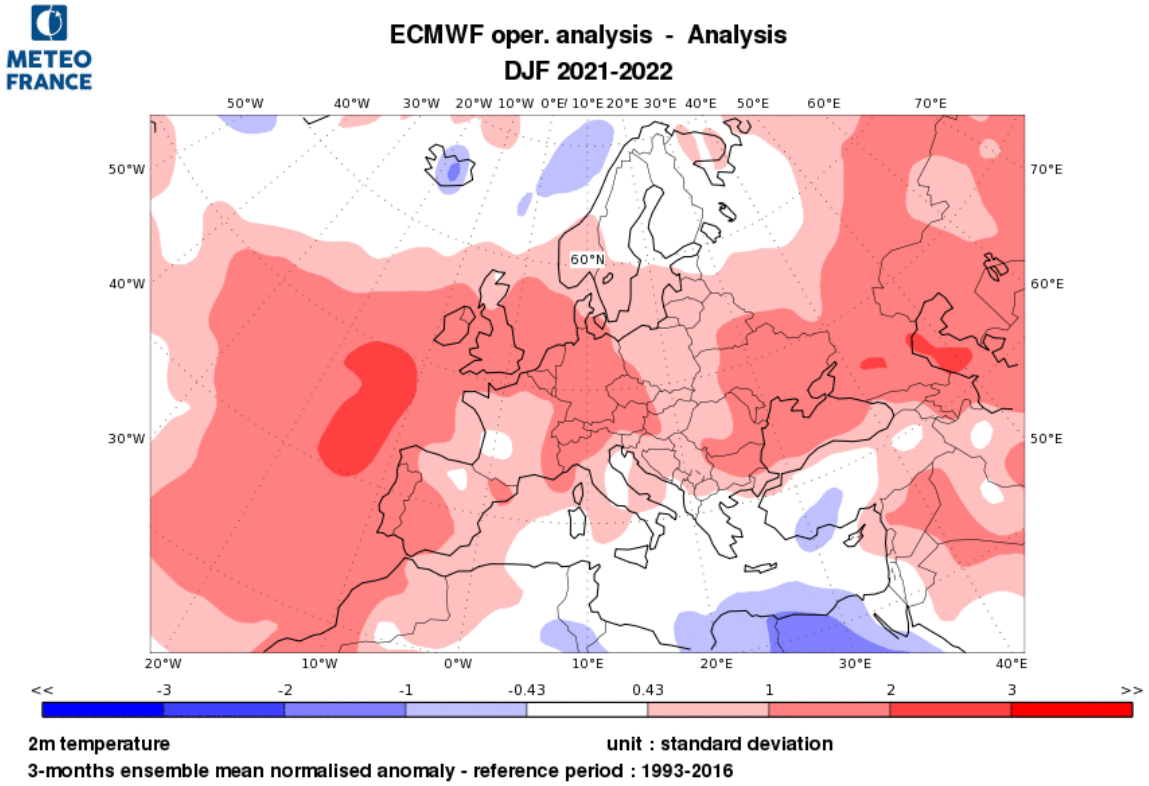
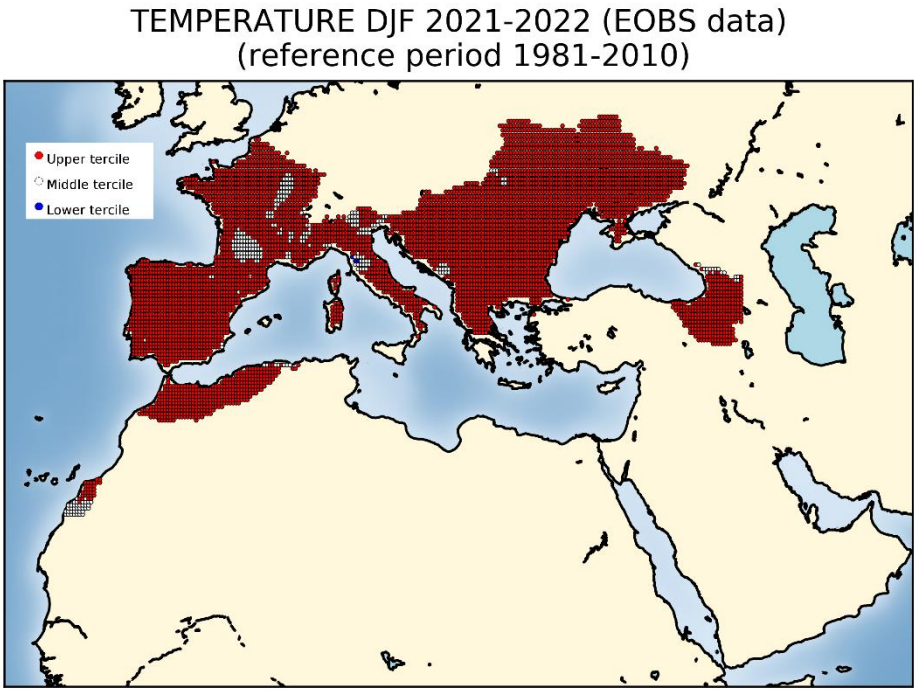


Figure 11: Seasonal normalized anomalies of winter 2021/22 2m air temperature based on ECMWF-ERA5 grid data, 1993-2016 reference. The data range between -0.43 and +0.43 represents the middle tercile, below -0.43 the lower tercile and above +0.43 the upper tercile. Source: Météo France, http://seasonal.meteo.fr/content/suivi-clim-cartes-ref93-16

Will be provided later.

Figure 12: Terciles of winter 2021/22 surface air temperature based on ERA5 Reanalysis, 1981-2010 reference. Source: AEMET, data source https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5



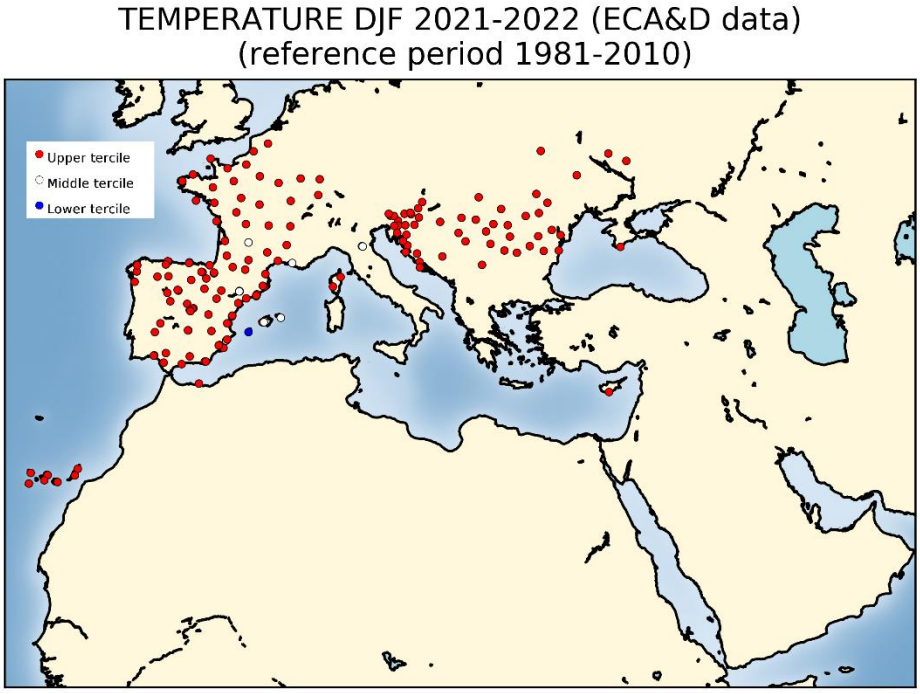


Figure 13: Terciles of winter 2021/22 surface air temperature based on interpolated E-OBS grid data (upper graph) and individual ECA&D station data (lower graph), 1981-2010 reference. Source: AEMET, data source: http://www.ecad.eu/

North Africa (RA I)

Winter 2021-22 temperature was below normal over almost all of Egypt and Libya, the southeast of Algeria and the southwest of Tunisia. Elsewhere, especially over the western part of the North African domain the temperature was above normal.

Mean temperatures were ranging between 0°C and 22°C. Winter season mean temperature was at its minimum over the northwest north of Tunisia, the north of Algeria and the eastern part of Morocco.

More national details are given in the RA I verification report, available in the MedCOF forum.

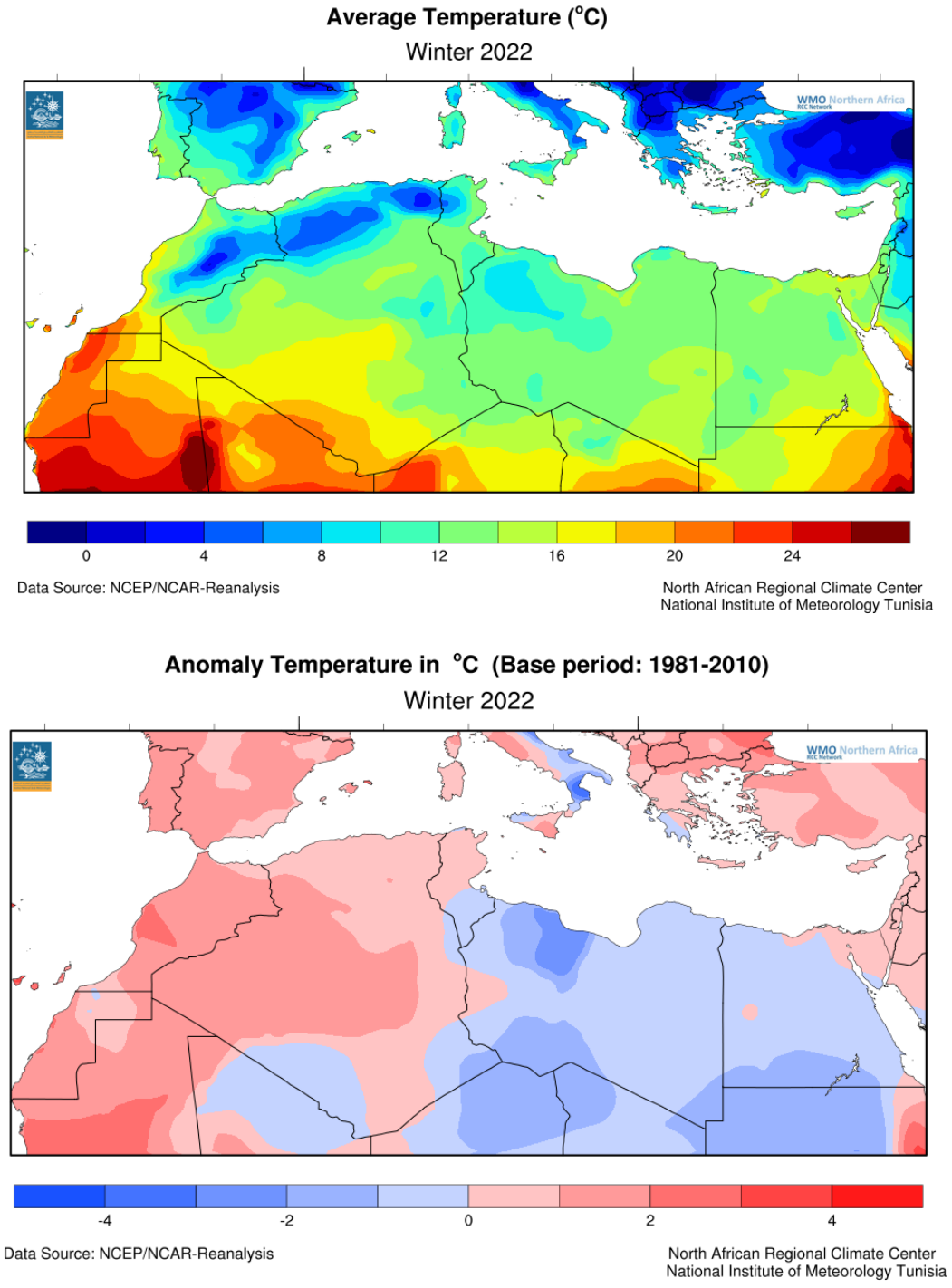


Figure 14: Winter (DJF 2021/22) mean temperatures and anomalies. Source: National Institute of Meteorology, Tunisia, https://www.meteo.tn/en/climate-monitoring-watch

In order to quantify the observed seasonal temperatures in winter 2021/22 in terms of cold, warm and normal, the percentile method was applied (Fig. 15). According to percentile ranks, warm conditions were registered in Morocco and most parts of Algeria. A cold tercile was presented in the south of the two countries Egypt and Libya, in northwestern Libya and the border between Libya and Egypt. In the rest of the domain including Tunisia the normal tercile was the dominant tercile.

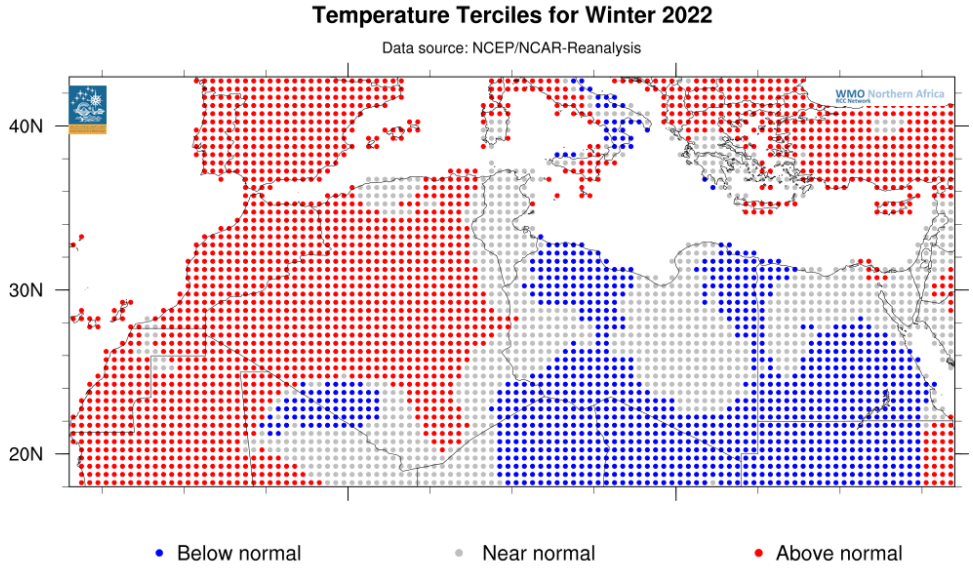


Figure 15: Temperature terciles for the 2021/2022 winter season in North Africa (Reference period 1981-2010). Source: National Institute of Meteorology, Tunisia

2.3 Precipitation

Europe and Middle East (RA VI)

Seasonal means and anomalies

Seasonal precipitation totals in winter 2021/22 in the European MedCOF domain ranged from below 30mm in eastern Syria, eastern Jordan, eastern Spain and eastern Georgia to above 600mm in places in southwestern Turkey (Fig. 16).

Precipitation was above normal in central Italy, most of the Balkan Peninsula, Moldova, Ukraine, western Turkey, southern Israel and southern Jordan. Below-normal precipitation was recorded especially in western parts (Iberia, France, northern and southern Italy) and easternmost areas (Syria, north-eastern Jordan, Lebanon, eastern Turkey, parts of South Caucasus). Particularly dry were eastern Spain and Syria with locally less than 20% of the seasonal normal.

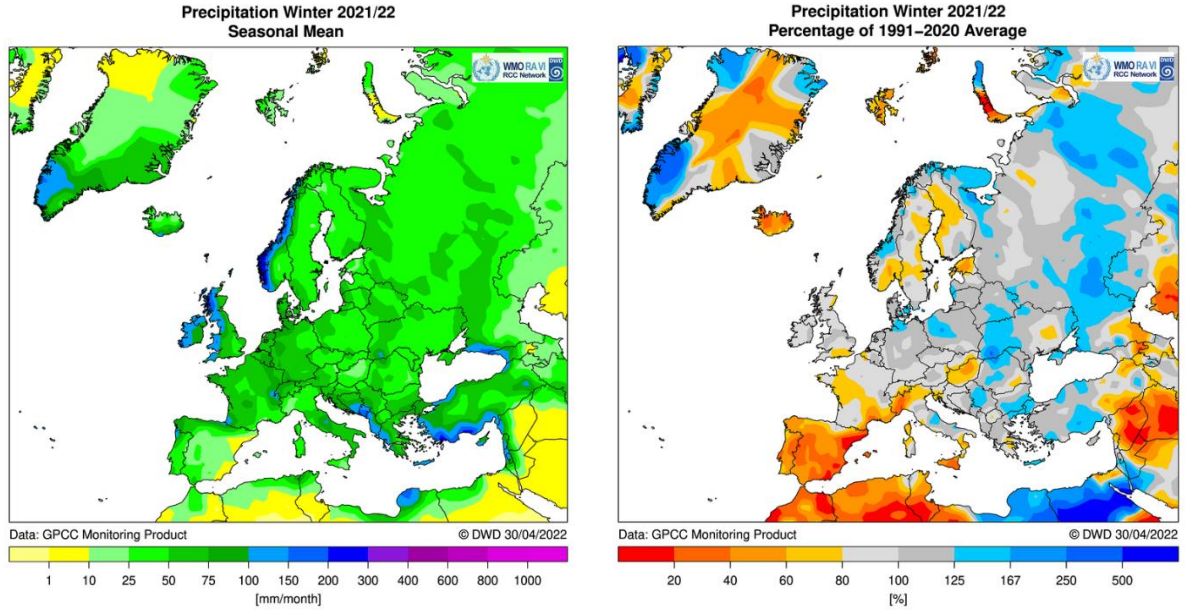


Figure 16: Precipitation for winter 2021/22 in Europe/RA VI. Left: seasonal total in mm/month, right: percentage of 1991-2020 average, source: WMO RAVI RCC, www.dwd.de/rcc-cm, data source: GPCC, http://gpcc.dwd.de

Terciles

In terms of terciles (Fig. 17-18), winter precipitation over the RA VI MedCOF domain was in the lowest tercile range in almost entire Iberia, in parts of France, Italy, Hungary and Greece, much of the South Caucasus, southeastern Turkey and most of the Middle East. Precipitation was in the middle and upper tercile range particularly in central Italy, on the Balkan Peninsula, in the Ukraine, most of Turkey and in coastal regions of the Middle East. Large parts of France also had precipitation in the middle tercile range. E-OBS data show some larger areas of the lower tercile range on the Balkan Peninsula compared to GPCC; particularly there is a discrepancy in Bulgaria. The national assessment of Bulgaria states near or above-normal precipitation, which is more in line with GPCC data.

ERA5 maps will be provided later

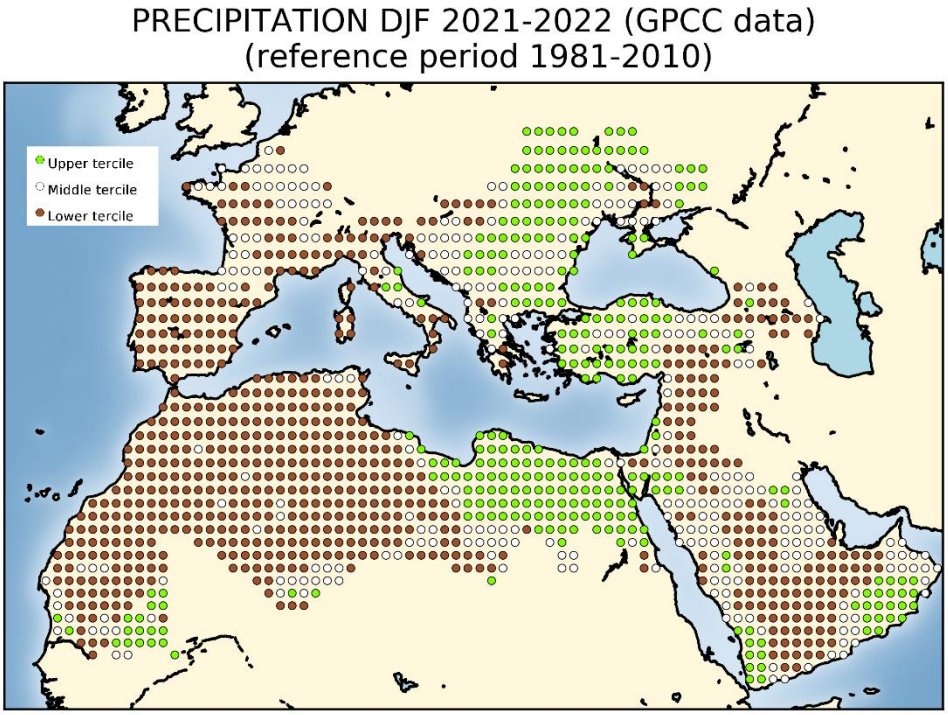
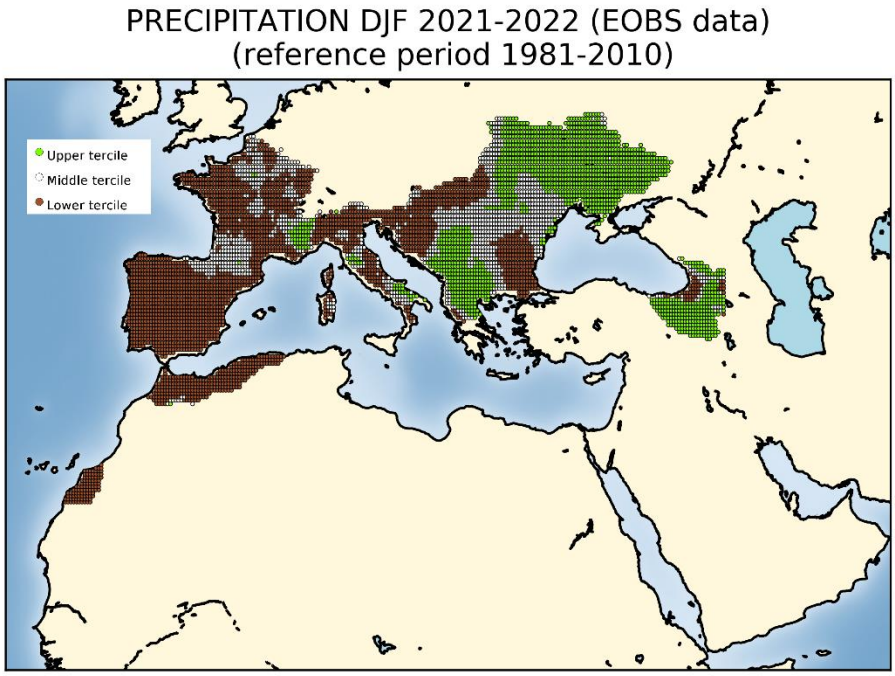


Figure 17: Terciles of winter 2021/22 precipitation based on ERA5 reanalysis (upper graph) and GPCC (lower graph) grid data, 1981-2010 reference. Source: AEMET, data reference: ERA5: https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5 , GPCC: http://gpcc.dwd.de



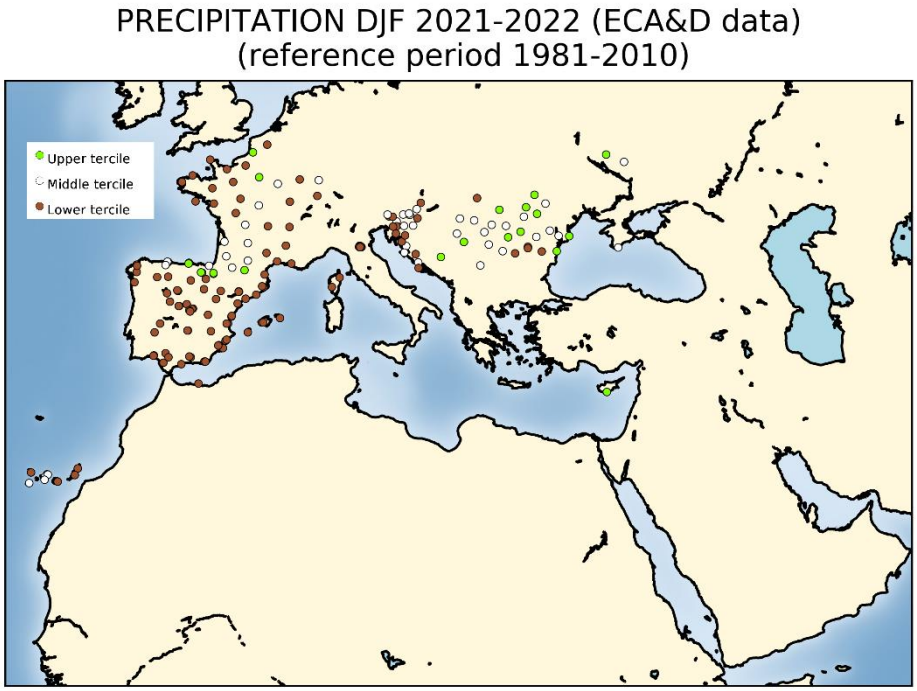


Figure 18: Terciles of winter 2021/22 precipitation based on interpolated E-OBS grid data (upper graph) and individual ECA&D station data (lower graph), 1981-2010 reference. Source: AEMET, data source: http://www.ecad.eu/

North Africa (RA I)

The seasonal precipitation was very low over North Africa during winter season. Precipitation registered over the Mediterranean coastline of the domain ranged between 20 mm and 400 mm. Winter 2021-22 precipitation was below normal over most of the region.
National details are given in the RA I verification report.

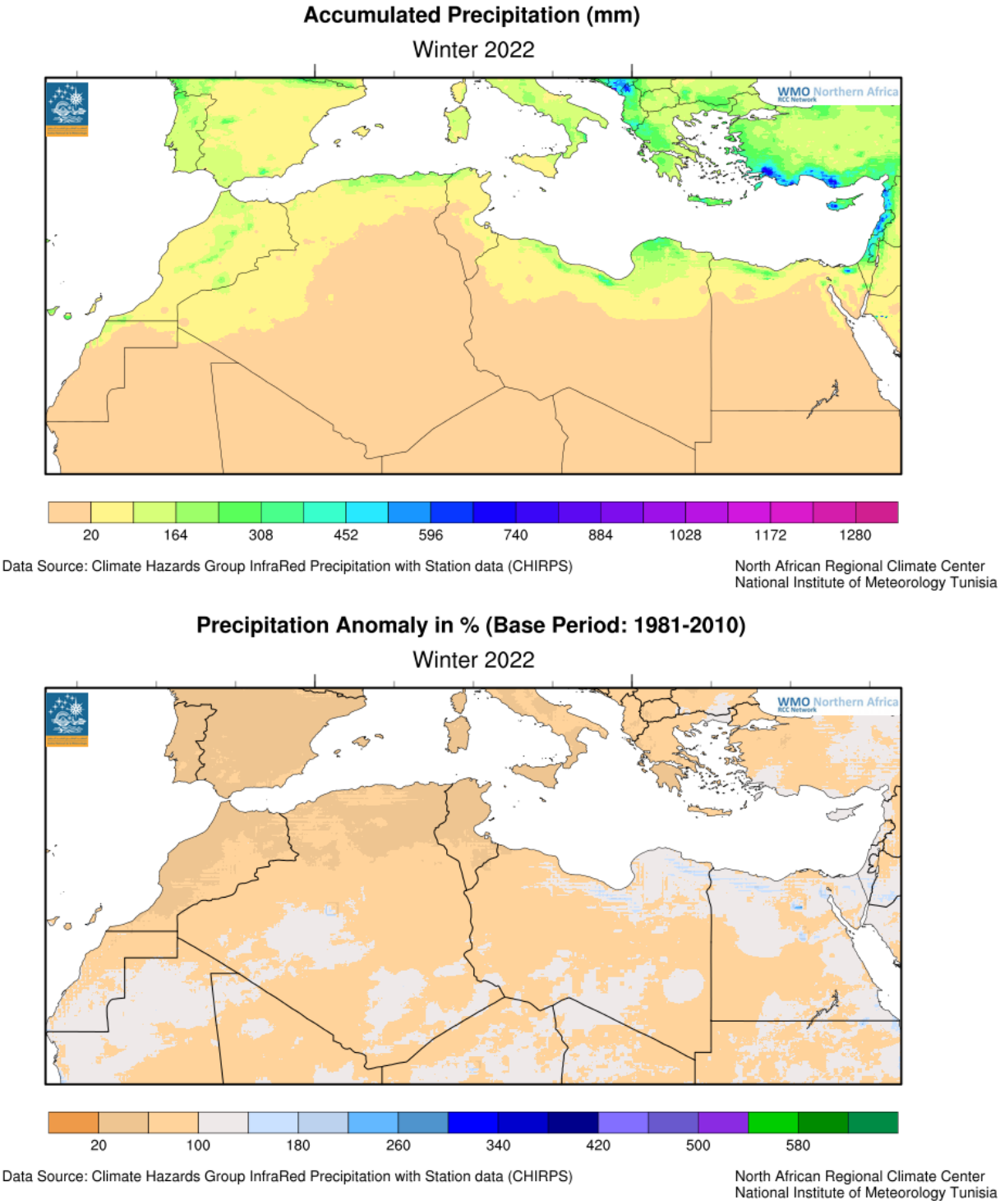


Figure 19: Winter (DJF 2021/22) precipitation totals and anomalies. Source: National Institute of Meteorology, Tunisia, https://www.meteo.tn/en/climate-monitoring-watch

In order to quantify the observed seasonal precipitation in winter 2021/22 in terms of wet, dry and normal, the percentile method was applied. According to percentile ranks, wet conditions were registered over the southwest of Algeria, locally in the centre of Morocco, the north of Libya and the most parts of Egypt, elsewhere the dry tercile was the dominant tercile.

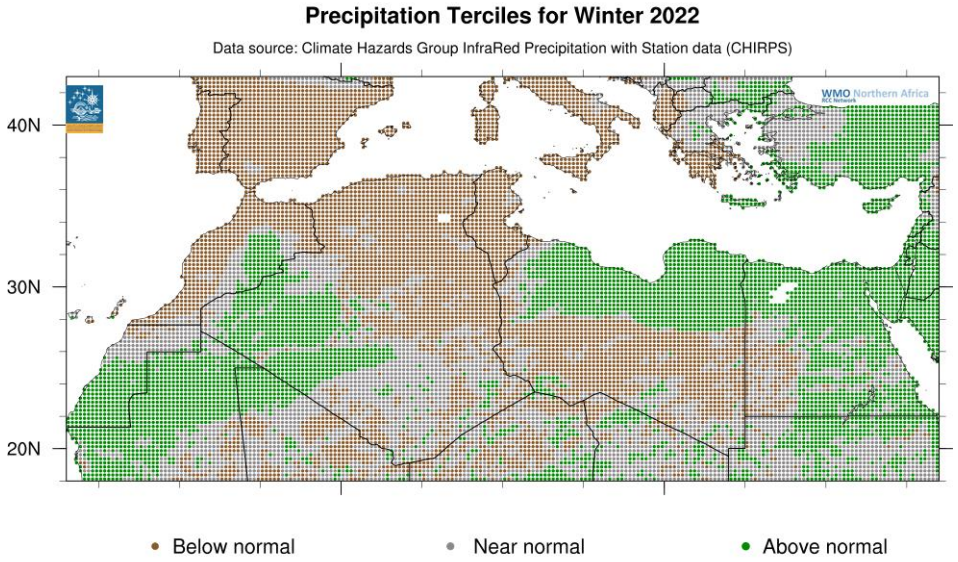


Figure 20: Precipitation terciles for 2021/2022 winter season in North Africa (Reference period 1981-2010). Source: National Institute of Meteorology, Tunisia

3 Verification of the MedCOF-17 climate outlook (2021-22 winter season)

3.1 Temperature

Europe/RA VI

The MedCOF-17 outlook favored the upper or middle tercile range with equal probability (40%) for most of the domain and the upper tercile range with 50% probability for the central and eastern Mediterranean. For the northeastern Ukraine, no privileged scenario was given.

The outlook was correct for almost all land areas of RA VI, where the temperature was mostly in the upper tercile range, partly in the middle tercile range. For the northeastern Ukraine, the upper tercile range was not predicted.

North Africa (RAI)

The MedCOF-17 climate outlook for the 2021-22 winter season favored an above-normal temperature over the eastern part of the domain with probability of 50% and near or above normal temperature over the western part of the domain (20/40/40).
In fact, temperature anomalies were above normal over Morocco, the western highlands and the southwest of Algeria. These anomalies were below normal over the south of Egypt and Libya, the north west of Libya and the border between Libya and Egypt. Over the rest regions of the domain including Tunisia, temperature anomalies were near normal conditions.
This indicates that the MedCOF-17 climate outlook for the winter season temperature was able to predict positive and normal temperature anomalies registered over the west part of the domain but it wasn't able to predict the negative anomalies over the eastern part of the North African domain.

3.2 Precipitation

Europe/RA VI

The MedCOF-17 outlook favored the dry scenario (lower tercile range) over Greece, Turkey, Cyprus and the Middle East. For the rest of the domain, no privileged scenario was given.

The outlook was correct for parts of Greece, southeastern Turkey and most of the Middle East. Above-normal precipitation particularly over western and central Turkey and in Israel was not forecasted by the outlook. Furthermore, the mostly dry pattern in the western part of the domain and the partly above normal precipitation over most of the Balkan Peninsula and the Ukraine was not captured by the outlook.

North Africa

Over the North African region, there was no preference for any climate defined categories expected.
Winter 2021-22 was drier than normal over Tunisia, Morocco and Algeria, near to above normal over the north of Libya and the most parts of Egypt.

The MedCOF-17 climate outlook for the winter season precipitation wasn't able to predict the anomalies over the entire North African domain.

4 Users' perceptions of the MedCOF-17 outlook

Europe/RA VI:

Israel: The seasonal forecast skill is still too low in order to provide it to decision makers in the government or to public services. As there are other professional and unprofessional seasonal forecasts in the air, we provide only the wide public with the seasonal forecast to show our efforts to deal with this tough issue. The most important forecast is for precipitation. The IMS gave no signal for the DJF precipitation, therefore the end users were not satisfied as they could not use the forecast.

North Africa

Algeria: feedback from civil protection

Other countries: No feedbacks were given by users.

Appendix A: Contributors to MEDCOF-18, 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:

- State Hydrometeorological Service, Republic of Armenia
- Federal Hydrometeorological Institute, Bosnia and Herzegovina
- National Institute of Meteorology and Hydrology, Republic of Bulgaria
- Deutscher Wetterdienst, Federal Republic of Germany
- Israel Meteorological Service, Israel
- Agencia Estatal de Meteorología (AEMET), Spain

- others via SEECOF-27

North Africa (RA VI)

- Climate Centres and National Meteorological and Hydrological Services:

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

APPENDIX B: **Analysis and verification of the MedCOF-17 climate outlook for the winter season 2021/2022:**

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-18.

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-17 climate outlook for temperature	Observed	MedCOF-17 climate outlook for precipitation	
France*	Mostly above normal	Normal or above normal (20/40/40)	Normal or below normal	no signal (33/33/33)	No events
Italy*	Normal or above normal	Above normal (20/30/50)	Below normal in the north and south Normal or above normal in central Italy	no signal (33/33/33)	No events
Lebanon *	Above normal	Above normal (20/30/50)	Below normal in the north, above normal in the south	Below normal (50/30/20)	No events
Portugal *	Above normal	Normal or above normal (20/40/40)	Below normal	no signal (33/33/33)	No events

Spain (1)	Overall, winter 2021-2022 was very warm. Mean temperature over mainland Spain was 7.9 °C, 1.5 °C above the seasonal average. It has been the fourth warmest winter since the beginning of the series in 1961, and the third warmest of the 21st century. Winter was extremely warm in some parts of the southwest quadrant and the central Pyrenees. It was normal in areas of the Ebro Valley, and between normal and cold in parts of the Ebro Valley and parts of the Andalusian Mediterranean Coast. On	Normal or above normal (20/40/40)	Overall, winter has been extremely dry with an average rainfall over mainland Spain of 89 mm, a value that is 45% of the normal value of the quarter in the reference period 1981- 2010. It has been the second driest winter since the start of the series in 1961. In the Balearic Islands, winter was the driest winter since the beginning of the series. Winter has been very dry in IP, reaching extremely dry conditions in the southern half of the Valencian Community and the north of Murcia, a part of Aragon, the north of Castilla-La Mancha, Girona and of Tarragona. In the Balearic Islands, winter was	no signal (33/33/33)	In winter, cold episodes were rare and of low intensity. There were three low intensity cold episodes that took place between 1- 5 December, 5-8 January and 13-24 January. There was a remarkable warm episode during 20 December–4 January, with extraordinarily high temperatures. Other warm episodes of shorter duration occurred between 10-16 December, 9-11 January, 1-5 February and 16-18 February. The lowest winter temperatures among the main stations were the following values: -11.5°C (Molina de Aragón, 29 January), -9.1 °C (Teruel, 14 January), -9.1 °C (Soria, 22 January) and -8.3 °C, (Puerto de Navacerrada, 6 January). The highest values of daily winter precipitation in the main observatories were: 98 mm (Hondarribia, 9 December), 47 mm (Hondarribia, 9 January), 65 mm (Santander, 8 December), 65 mm (Donostia/Igueldo, 9 December), 58 mm (Donostia/Igueldo, 17 January), 51mm (Pamplona/airport, 9 January), 46 mm (Pamplona/airport, 9 December), 73 mm (Cádiz, 23 December), 21.5 mm (Santiago de Compostela, 13 February) and 20.6 mm (Pontevedra, 13 February).

Country	Seasonal temperature (DJF)		Seasonal precipitation (DJF)		High Impact Events
	Observed	**MedCOF-17 climate outlook for temperature**	**Observed**	**MedCOF-17 climate outlook for precipitation**	
	the Balearic Islands, winter was warm or normal.		extremely dry. On the Cantabrian coast and the western Pyrenees winter has been between normal and very dry.		
Syria *	Above normal	Above normal (20/30/50)	Below normal	Below normal (50/30/20)	No events

Note:

1 – Basic climatological period (1981-2010)

*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-17 climate outlook for temperature**	**Observed**	**MedCOF-17 climate outlook for precipitation**	
Algeria (1)	- Normal over almost all of the country - Above normal over western highlands and the southwest - Below normal over some stations in the northeast and the southeast.	Near or above normal (20/40/40)	Below Normal	No clear signal	• Strong winds recorded • Snow falls accumulation were also recorded • intense rainfall event
Egypt*	Below normal over the south. near normal to below normal over the north	Above normal (20/30/50)	Above normal over the north. Elsewhere near to above normal	No clear signal	No comment ***
Libya*	Near to below normal	Above normal over the most part Near or above normal over the extreme west regions	Above normal over the north. Near to below elsewhere	No clear signal	No comment ****
Morocco *	Above normal conditions	Near or above normal conditions over	Below normal conditions over Morocco	Below normal	No comment

	over almost all the country	most of Morocco (20/ 40/40). No special scenario over SW		conditions over Morocco (50/30/20).	
Tunisia (1)	Near normal	Above normal over the north and the northeast (20/30/50) Near or above normal over the rest of the country (20/40/40)	Below normal	No clear signal (33/33/33)	No comment

References:

MedCOF-17 Outlook: http://medcof.aemet.es/images/doc_events/medcof17/step3/docStep3/Consensus_Statement_MedCOF-17.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/datasets/reanalysis-datasets/era5

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