MEDITERRANEAN CLIMATE OUTLOOK FORUM
MEDCOF-13 Online Forum

MONITORING SUMMARY MEDCOF-13

for October 2019

Second Draft

Last update: 15 November 2019

Compiled by

WMO RA VI RCC Toulouse Node on Long Range Forecasting

Météo France

Toulouse, France

WMO RA I North Africa RCC Tunisian Node

Institut National de la Météorologie (INM)

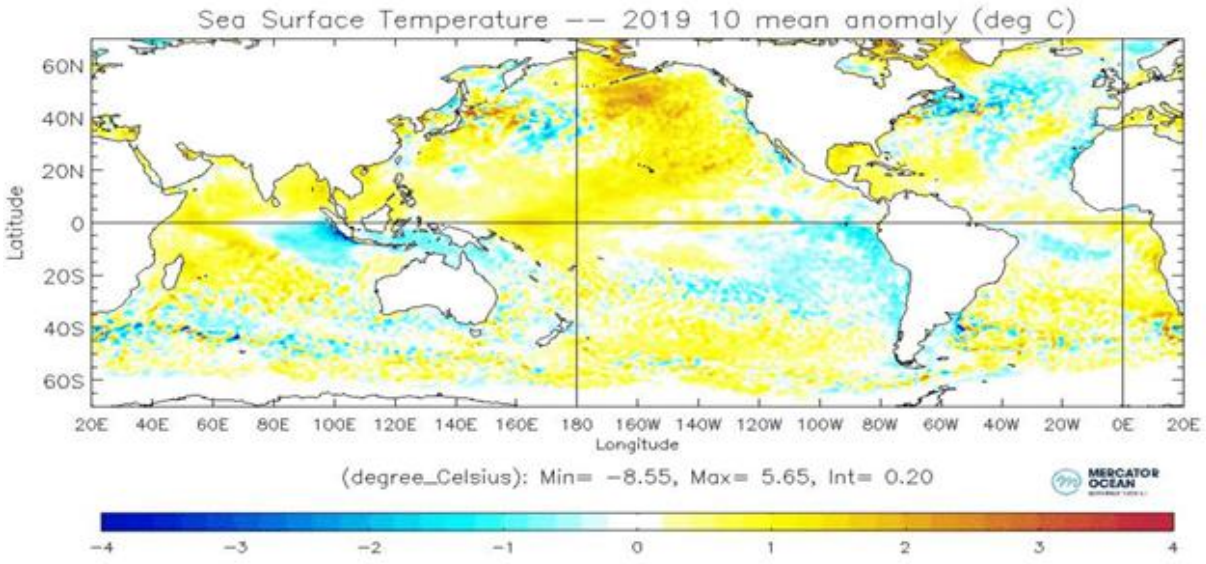
Tunis, Tunisia

WMO RA VI RCC Offenbach Node on Climate Monitoring

Deutscher Wetterdienst (DWD)

Offenbach, Germany

1. Oceanic Analysis



SST Anomalies for October 2019. Source: Mercator-Ocean

Current situation: Neutral ENSO. Strongly positive IOD.

OCTOBER NINO3.4 INDEX: +0.4 °C (Mercator Ocean PSYV4R2 analysis); see BOM site for weekly values: http://www.bom.gov.au/climate/enso/monitoring/nino3_4.png

OCTOBER DMI INDEX: +1.8 °C (Mercator Ocean PSYV4R2 analysis); sharp increase in the first half of October (to + 2.2°C, highest since 1982!); slight decrease in the first days of November, but still strongly positive; see BOM site for weekly values: http://www.bom.gov.au/climate/enso/monitoring/iod1.png

The main oceanic driver at global scale is the Indian Ocean Dipole, in a positive phase.

At regional scale, the Mediterranean Sea shows positive anomalies in October.

2. Large scale circulation

2.1. Modes of variability

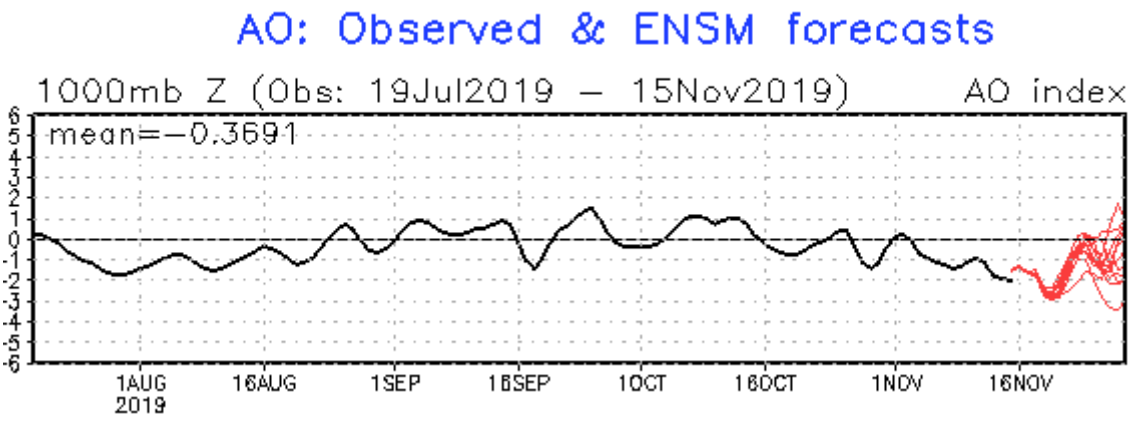
data	year	mm	NAO	EA	PNA	SCA
AnaCEP	2019	06	-0.15	+1.15	-0.49	+0.53
AnaCEP	2019	07	-1.21	+0.78	-1.15	-1.62
AnaCEP	2019	08	-0.14	+2.13	-0.50	+0.12
AnaCEP	2019	09	+0.46	+1.93	-2.28	-1.06
AnaCEP	2019	10	-0.15	+2.25	-1.21	+0.10

data	year	mmm	NAO	EA	PNA	SCA
AnaCEP	2019	MJJ	-1.47	+0.63	+0.05	+0.41
AnaCEP	2019	JJA	-0.57	**+2.02**	-0.99	-0.35
AnaCEP	2019	JAS	-0.32	**+2.37**	-1.95	-1.17
AnaCEP	2019	ASO	+0.15	**+3.57**	-1.91	-0.33

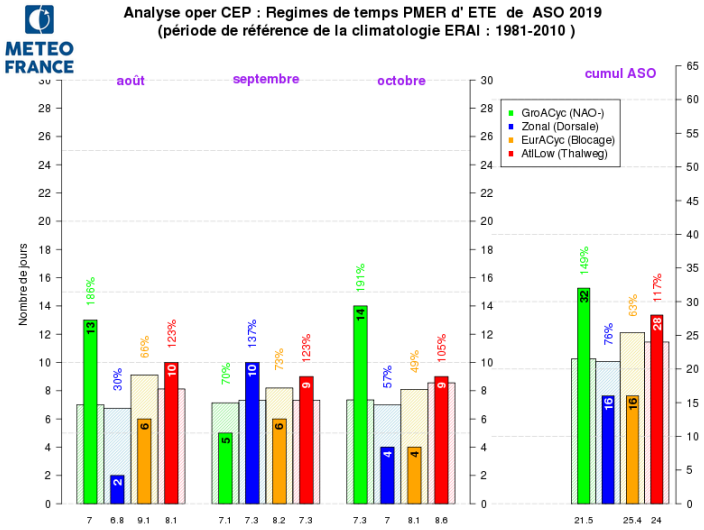
Main modes of variability (source Météo-France)

The **East-Atlantic mode** has been **strongly positive** these last months/seasons.

Arctic Oscillation (AO):
In October 2019 more or less around normal (monthly mean -0.08). In the first half of November 2019, development of an AO- phase due to weakening of the polar vortex. On 11 November 2019 very low temperatures for this time of year over northern Scandinavia (below -30°C), but the cold air did not advance significantly further south over Europe.

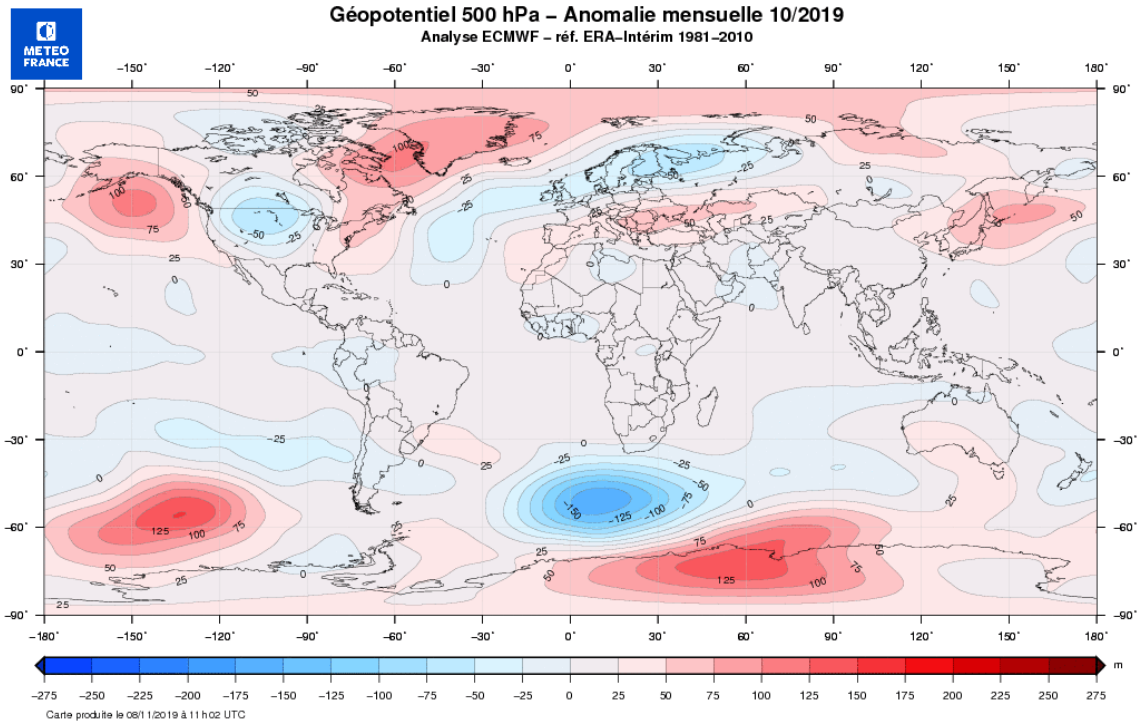


2.2. **Weather regimes**

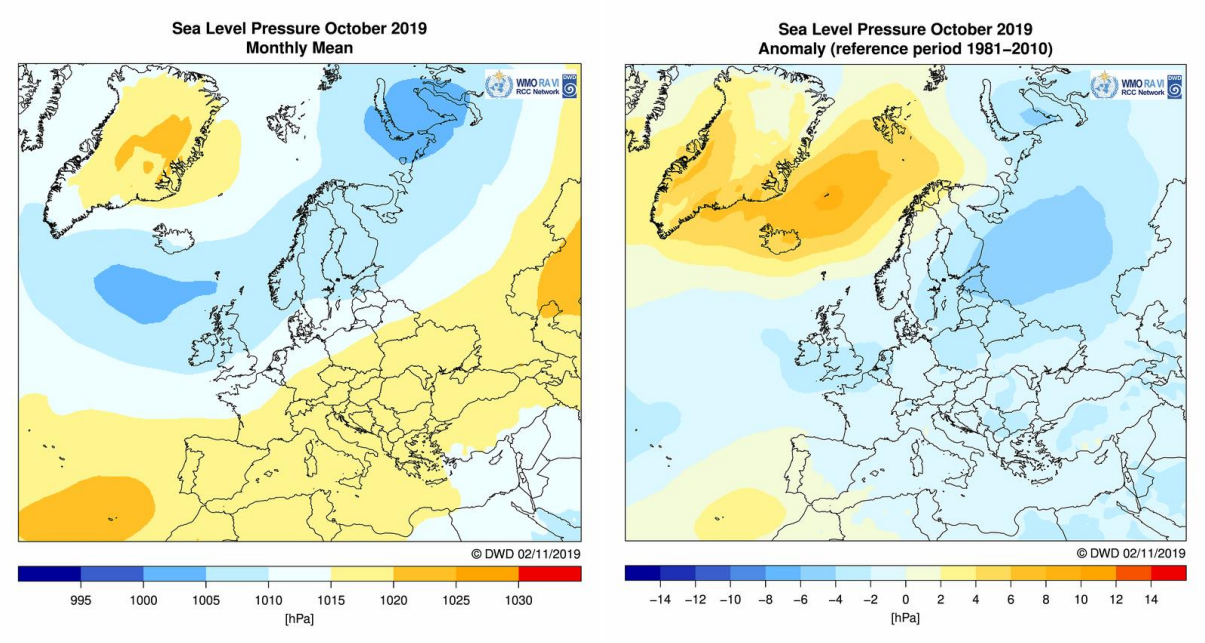


Distribution of weather types of Météo France classification (summer regime) for August-October 2019: NAO-, Atlantic ridge (Dorsale), Blocking (Blocage), Atlantic trough (Thalweg). Source: Météo France, http://seasonal.meteo.fr/en/content/suivi-clim-regimes-trim

Météo France weather type classification, too, shows a predominance of Greenland Anticyclone (NAO-) and Atlantic trough. For the southern half of Europe and the Mediterranean region, geopotential anomalies were largely positive, except a slight negative anomaly over Tunisia and Libya.



Anomalies of geopotential height at 500hPa for October 2019. Source: Météo-France, http://seasonal.meteo.fr/content/suivi-clim-cartes

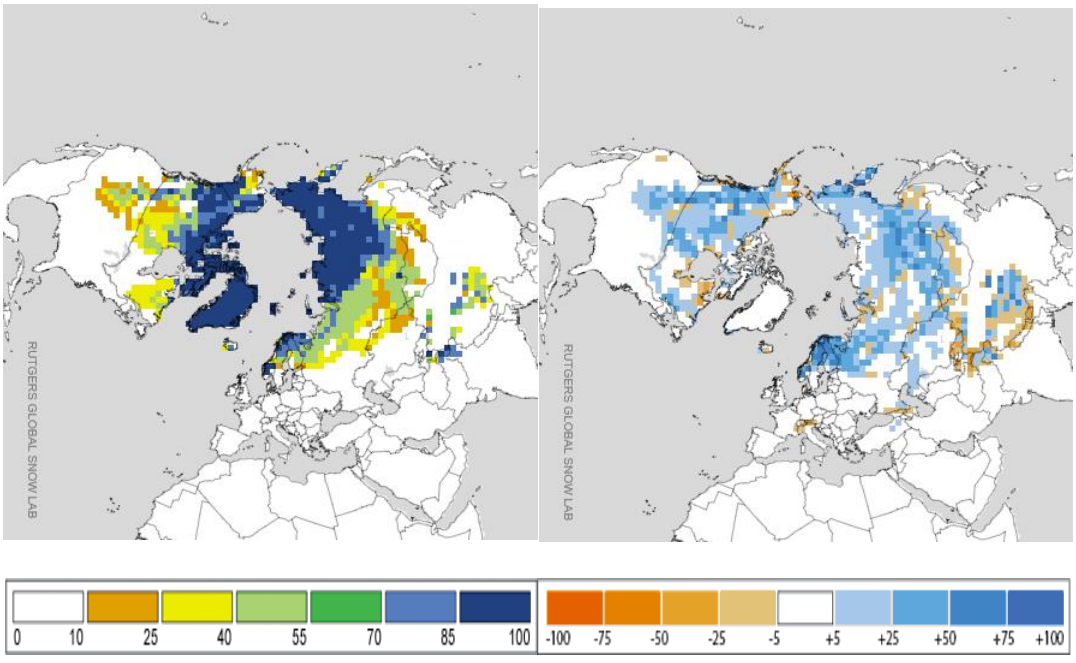


Mean sea level pressure over the North Atlantic, Europe and North Africa and 1981-2010 anomalies for October 2019. Source: DWD, https://www.dwd.de/EN/ourservices/rcccm/int/rcccm_int_ppp.html

Sea level pressure distribution shows the typical subtropical high-pressure belt extending from the Azores to Russia. The Azores High was more intense than normal in October, but over the Mediterranean region, high pressure was slightly weaker than normal.

2.3. Snow cover

Snow cover in Eurasia was above normal in October 2019, particularly over Scandinavia, where snow came quite early in the season.

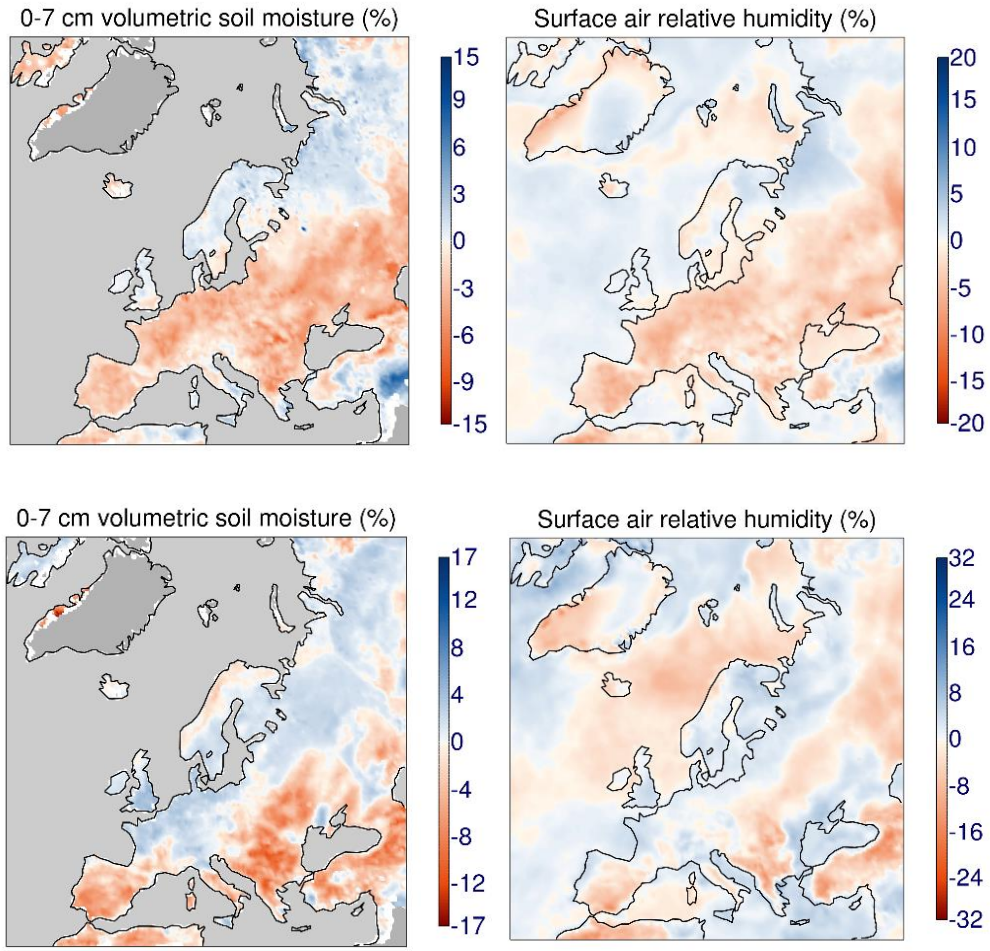


Left: Monthly snow cover in October 2019 (percent of days snow covered). Right: 1981-2010 anomalies (percent difference from 1981-2010 mean). Source: Rutgers University Global Snow Lab, https://climate.rutgers.edu/snowcover

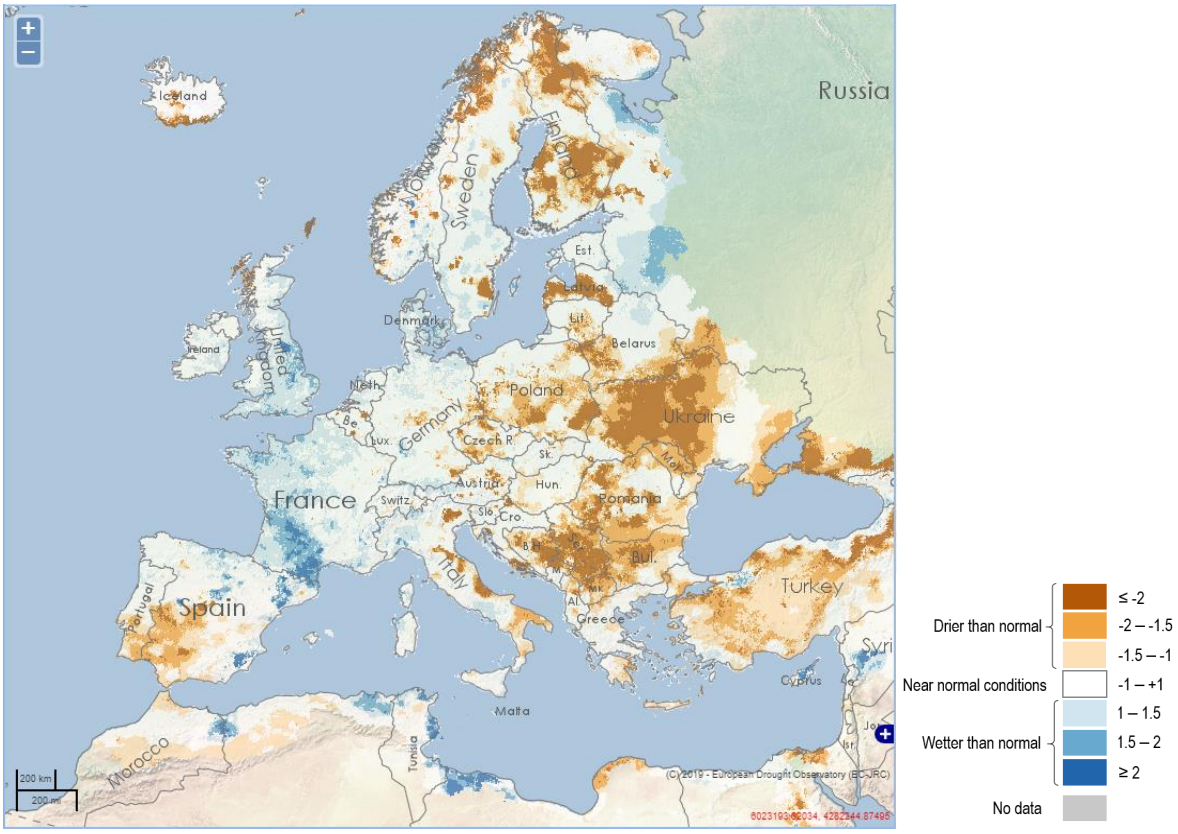
2.4. **Drought**

Like in 2018, extended drought conditions prevailed in large parts of Europe also in 2019. Both soil moisture and surface air relative humidity were well below normal over large parts of Central and Southern Europe during the hydrological year November 2018 – October 2019. This also included large parts of the MedCOF domain (Iberia, France northern Italy, Balkans, Eastern Europe), even western parts of North Africa. In October 2019, some rainfalls terminated the drought period in much of France and Central Europe, whereas below-normal moisture conditions continued in Iberia, North Africa, Balkans, and came up in Turkey.

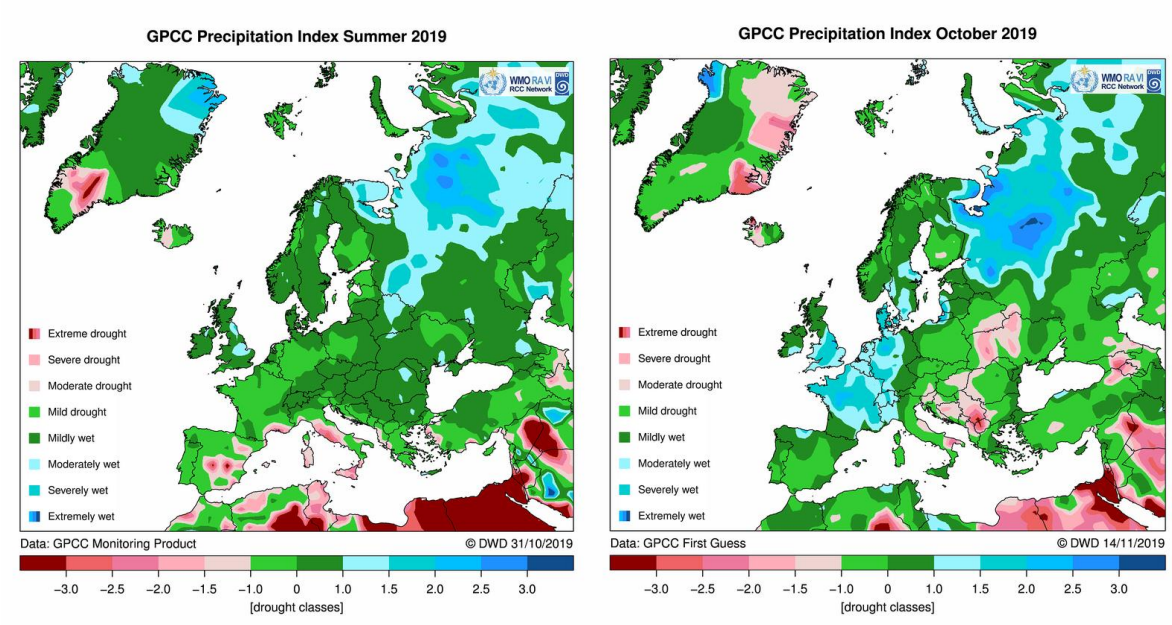
However, heavy rainfalls in late October and the first half of November affected particularly northern Spain, southern France and northern Italy, locally also North Africa, resulting in above-normal soil moisture in these areas, while soils remained dry in southwestern Spain, eastern parts of Italy, central parts of the Balkan Peninsula, western/central Ukraine and much of Turkey. The GPCC precipitation index shows a shift of the most severe drought conditions from the western Mediterranean region in summer to the Balkans in October. Forecasts for one week show a further increase of soil moisture especially for the western parts of the domain.



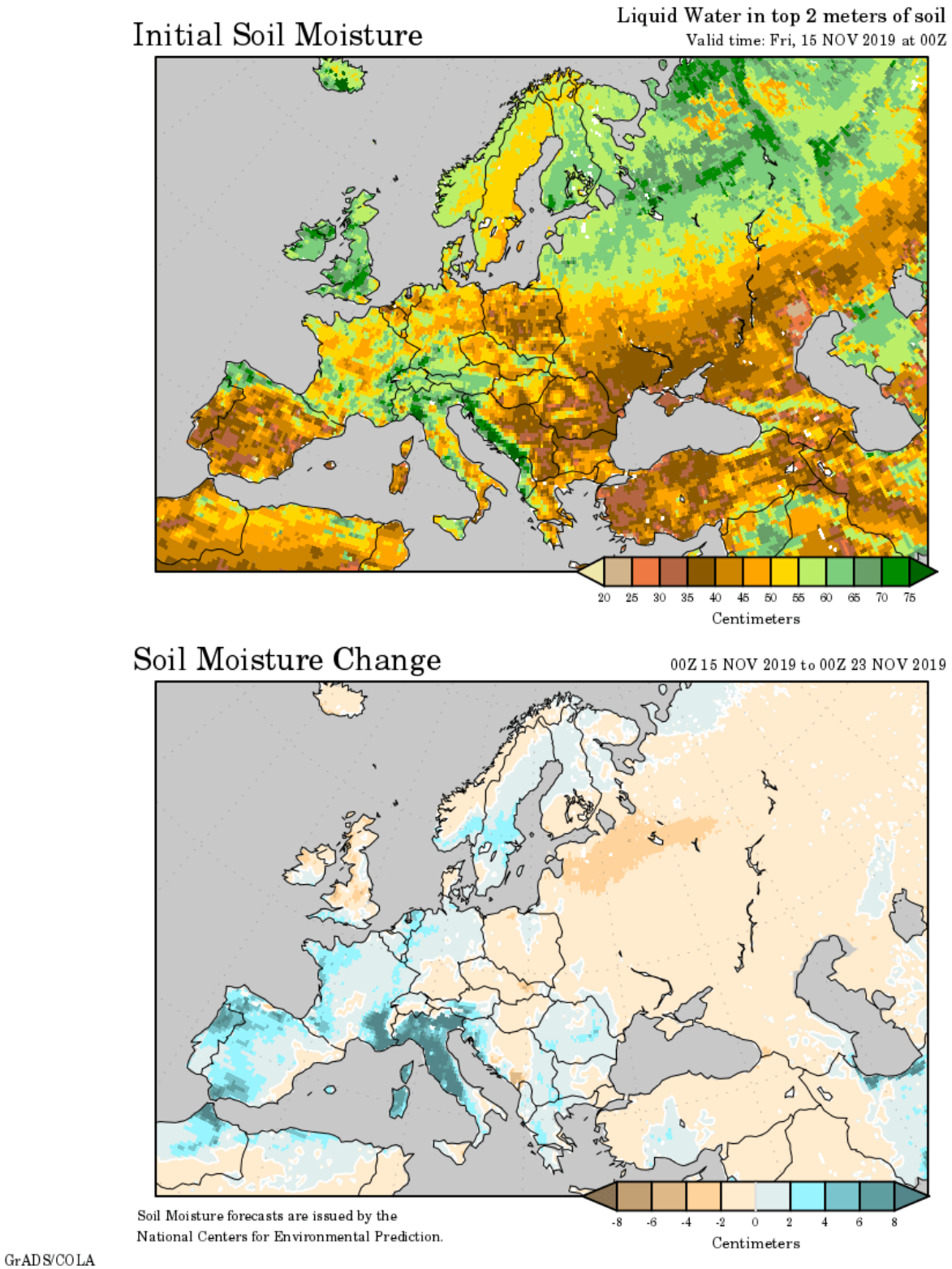
Anomalies in the volumetric moisture content of the top 7 cm of soil and the relative humidity of surface air for November 2018 to October 2019 (upper maps) and for October 2019 only (lower maps) with respect to 1981-2010. The darker grey shading denotes where soil moisture is not shown due to ice cover or climatologically low precipitation. Data source: ERA5 Credit: Copernicus Climate Change Service/ECMWF, https://climate.copernicus.eu/precipitation-relative-humidity-and-soil-moisture-october-2019



Soil moisture anomalies for the first 10-day period in November 2019 (1990-2013 reference). Source: EU Joint Research Centre (JRC), http://edo.jrc.ec.europa.eu/edov2/php/index.php?id=1111



GPCC Precipitation Index for summer and October 2019. Source: GPCC at DWD, https://www.dwd.de/EN/ourservices/rcccm/int/rcccm_int_spi.html



Soil moisture in top 2 meters of soil (liquid water in cm) on 15 November 2019 and forecast for the following week. Source: National Centers of Environmental Prediction (NCEP), http://wxmaps.org/pix/soil4

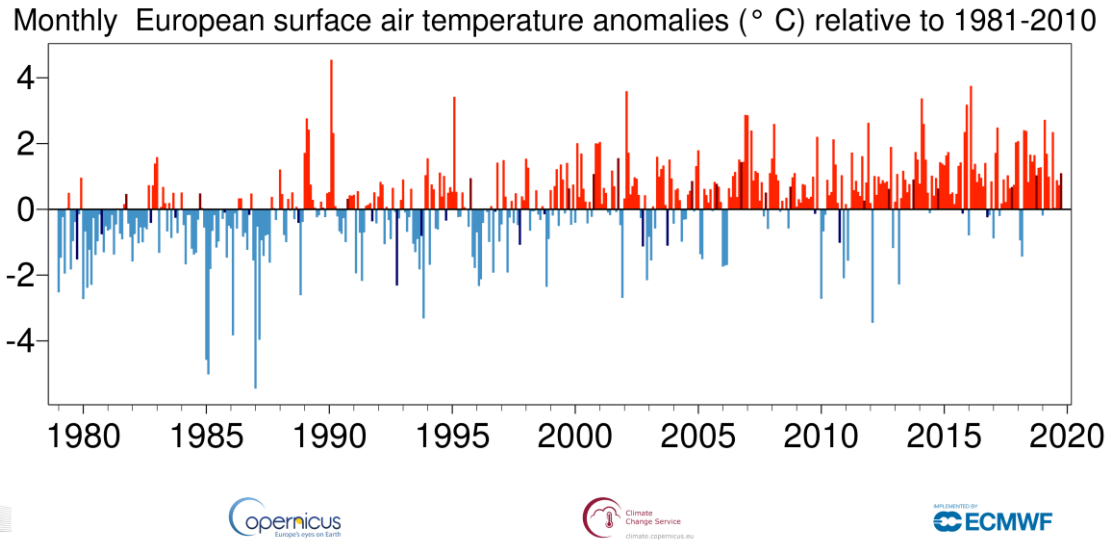
3. Drivers

- No significant late-summer SST pattern in northern Atlantic
- Eurasian snow cover above normal in October : NAO- supposedly enhanced (but not observed during recent winters)
- High IOD index has been shown to favour positive geopotential anomaly over Europe. Conclusion : **positive geopotential anomaly over Europe** linked to strong positive IOD
- Soil moisture below normal -> reduced evaporation -> temperature increase (see e.g. Seneviratne et al. 2012), in summer more effective than in winter

4. Temperature

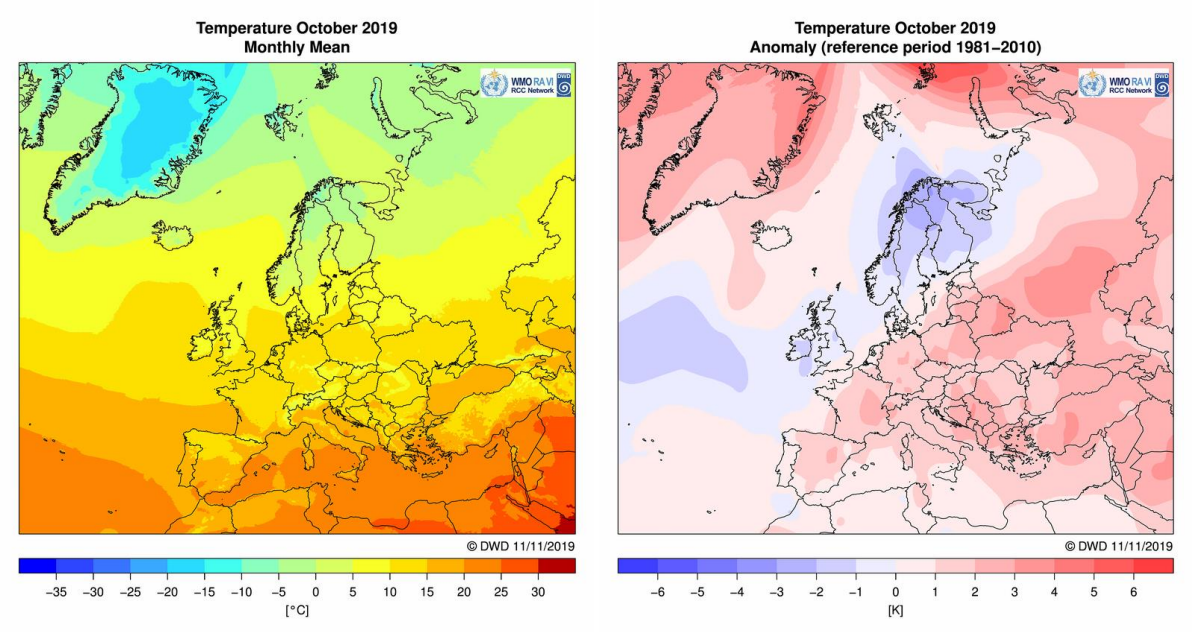
Europe/RA VI

According to Copernicus data, October 2019 was +1.1°C warmer than on 1981-2010 average. It was the third warmest October in the period from 1979 onwards. Only 2001 and 2006 were warmer. Based on NOAA data, the warming trend for October months 1979-2018 (data for 2019 are not available yet) is +0.30°C/decade for Europe. (https://www.ncdc.noaa.gov/cag/global/time-series/europe/land/1/10/1880-2019?trend=true&trend_base=10&begtrendyear=1979&endtrendyear=2019)



Monthly European-mean surface air temperature anomalies relative to 1981-2010, from January 1979 to October 2019. The darker coloured bars denote the October values. Data source: ERA5. Credit: Copernicus Climate Change Service/ECMWF, https://climate.copernicus.eu/surface-air-temperature-october-2019

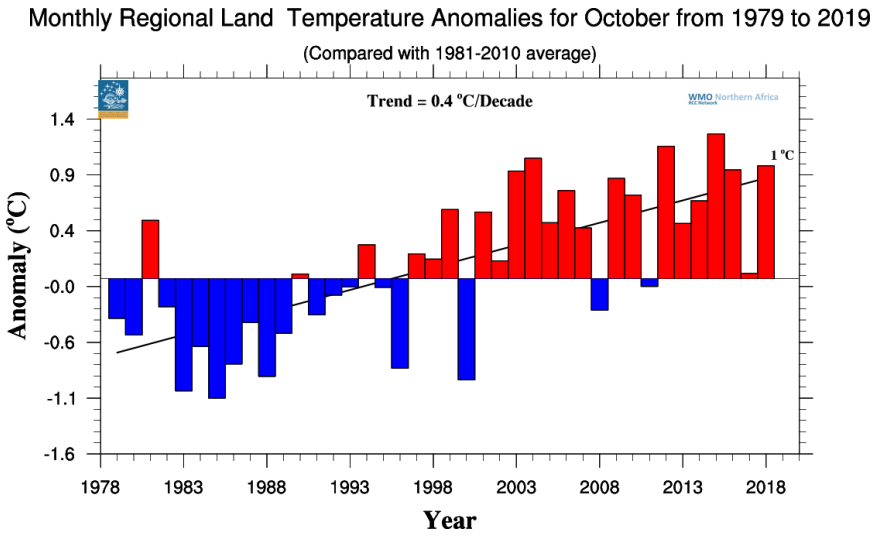
In fact, the RA VI domain of the Mediterranean region was particularly warm in October. Anomalies were mostly between +1 and +3°C, locally even above in Serbia and Turkey. Lowest anomalies in Portugal, Spain and southern Italy were below +1°C, but still positive. Monthly mean temperatures in the lowlands ranged from +10°C in the northern Ukraine to around 25°C in eastern and southern parts of the Middle East. In higher elevations, mean temperatures were mostly between 5 and 10°C.



Mean temperature (left) and anomalies (1981-2000 reference, right) in °C in the RA VI Region (Europe) interpolated from CLIMAT station data, for October 2019. Source: DWD, http://www.dwd.de/EN/ourservices/rcccm/int/rcccm_int_ttt.html

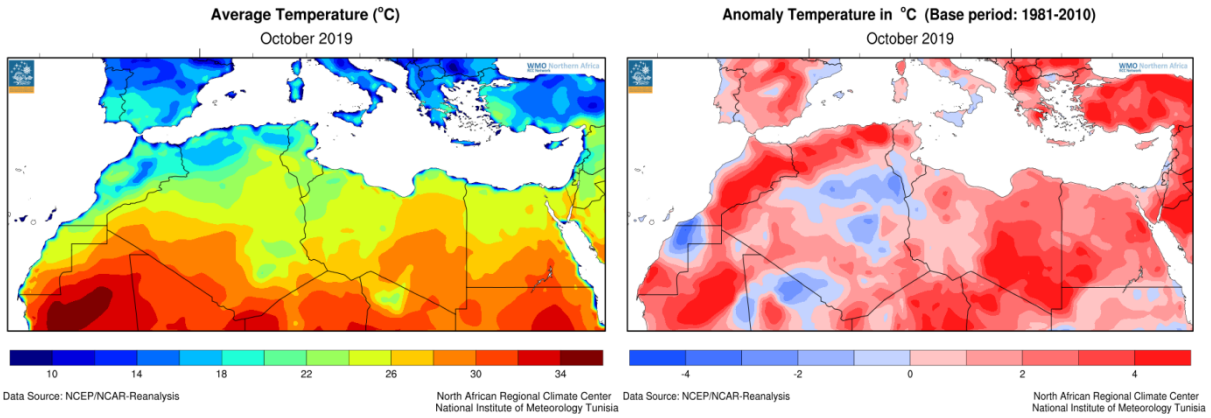
North Africa

The graph below shows the monthly trend of air temperature anomaly of October in degrees Celsius since 1979 through 2019. For each year, the positive anomaly is indicated by the red vertical bars and the negative anomaly is indicated by the blue vertical bars. The black line tracks the changes in the trend over time. The land mean temperature of North Africa region was above the normal 1981-2010, has reached 1 °C. For October, the warming rate was about +0.4°C per decade.



Monthly mean temperature anomaly (October 2019) time series plots with trend line

October 2019 was hotter than normal over most of North Africa. The registered temperatures were above normal over all of Libya and Egypt and over most parts of Algeria, Tunisia and Morocco. Below-normal anomalies were registered over the middle and the southwest of Algeria, the extreme southwest of Tunisia and a part of the south of Morocco. Monthly mean temperature in October 2019 ranged from less than 14°C in the north of Morocco and Algeria to above 32 °C in the extreme south of Algeria.

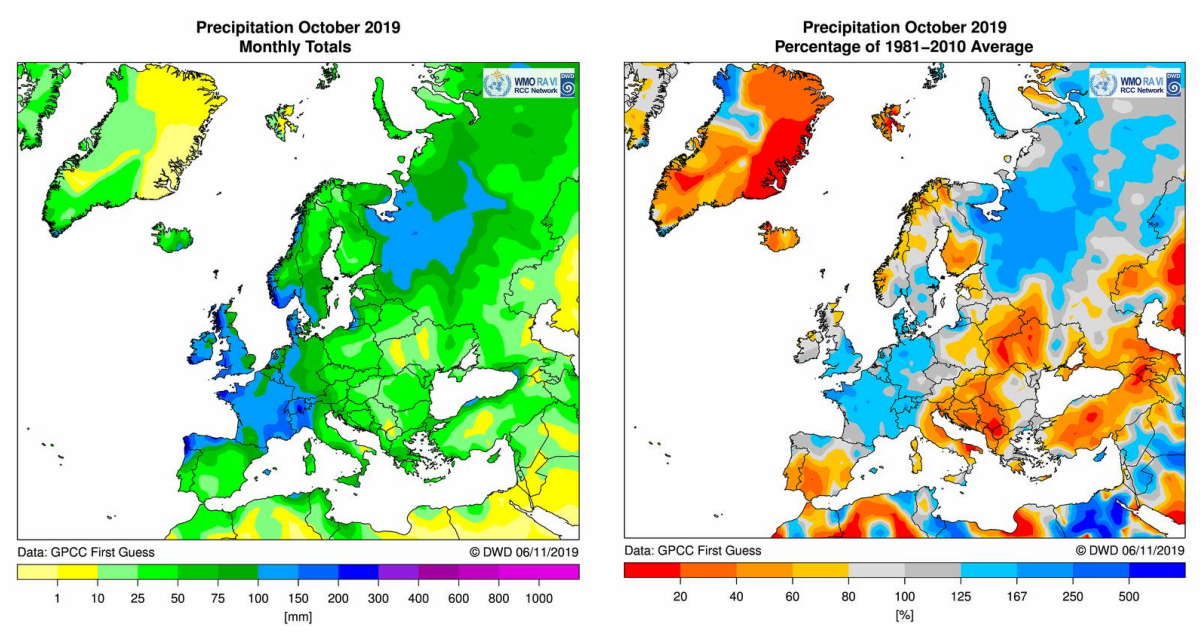


Left: Mean temperature; Right: Absolute anomalies of temperature in the RAI-NA Region (North Africa)
Data from NCDC (National Climate Data Centre NOAA – reference 1981-2010),
http://www.meteo.tn/htmlen/donnees/climatemonitoring.php.

5. Precipitation

Europe/RA VI

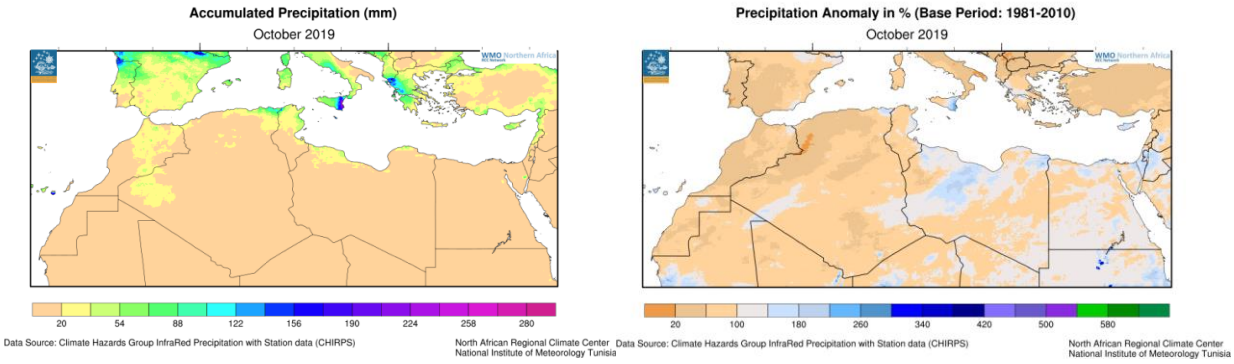
Precipitation in October 2019 showed a high variability within the domain. Wettest areas were northern Spain, north-western and south-eastern France and north-western Italy with totals of above 150 or 200 mm locally. This mostly corresponded to above 125% of the normal. Southern and eastern parts of the domain were much drier, locally below 10 mm the whole month or below 20% of the normal. An extreme precipitation event affected especially northern Spain, southern France and northwestern Italy on 21-24 October 2019, which contributed substantially to the high totals and anomalies in these areas.



Monthly precipitation totals (left) and percentage of 1981-2010 normal (right) for October 2019 in Europe/RAVI. Data from GPCC (First Guess version). Source: DWD, http://www.dwd.de/EN/ourservices/rcccm/int/rcccm_int_rrr.html

North Africa

Monthly precipitation totals in October 2019 were below 20 mm over almost the entire RA-I domain. Rainfall amounts exceeding 60 mm were registered in the extreme northeast of Algeria and the eastern coast of Tunisia. Near-normal conditions occurred over most parts of Libya and Egypt. These regions received between 75% and 125% of the normal. Slightly above-normal conditions occurred especially in the middle of Libya. Over Tunisia, Algeria and Morocco the precipitation was below normal during this month of the year with less than 20%.



Left: Total precipitation; Right: Absolute anomalies of precipitation in the RAI-NA Region (North Africa). Data from NCDC (National Climate Data Centre NOAA – reference 1981-2010)

http://www.meteo.tn/htmlen/donnees/climatemonitoring.php.

6. Likely evolution of large-scale climate patterns in the next months

ENSO

Most climate models forecast ENSO-neutral conditions for the rest of 2019 and into the first quarter of 2020. When ENSO is neutral, it has little effect on global climate, meaning other influences are more likely to dominate.

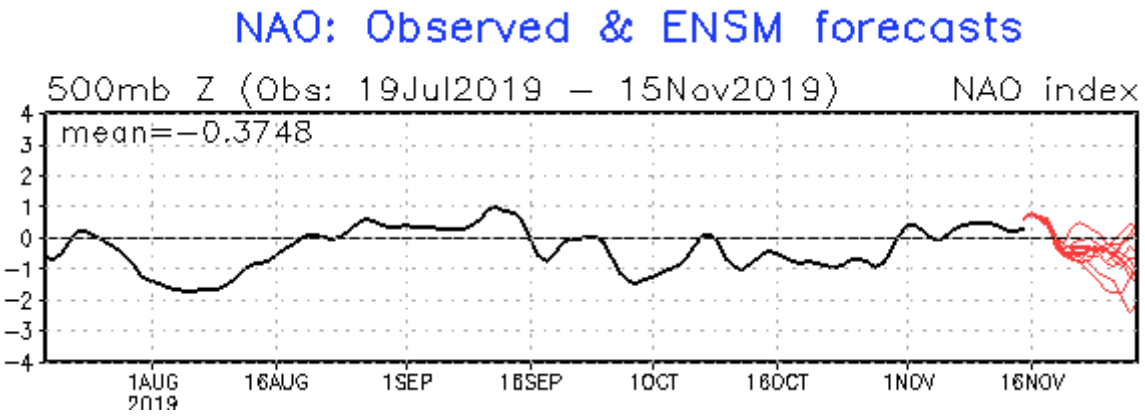
http://www.bom.gov.au/climate/enso/

IOD

Strong positive IOD is expected to decrease during the following winter. It will likely remain positive until December 2019 or January 2020, and will probably come to neutral conditions in February 2020. Therefore, we still can expect that IOD will be one of the main global drivers this winter, though with tendency to weaken.

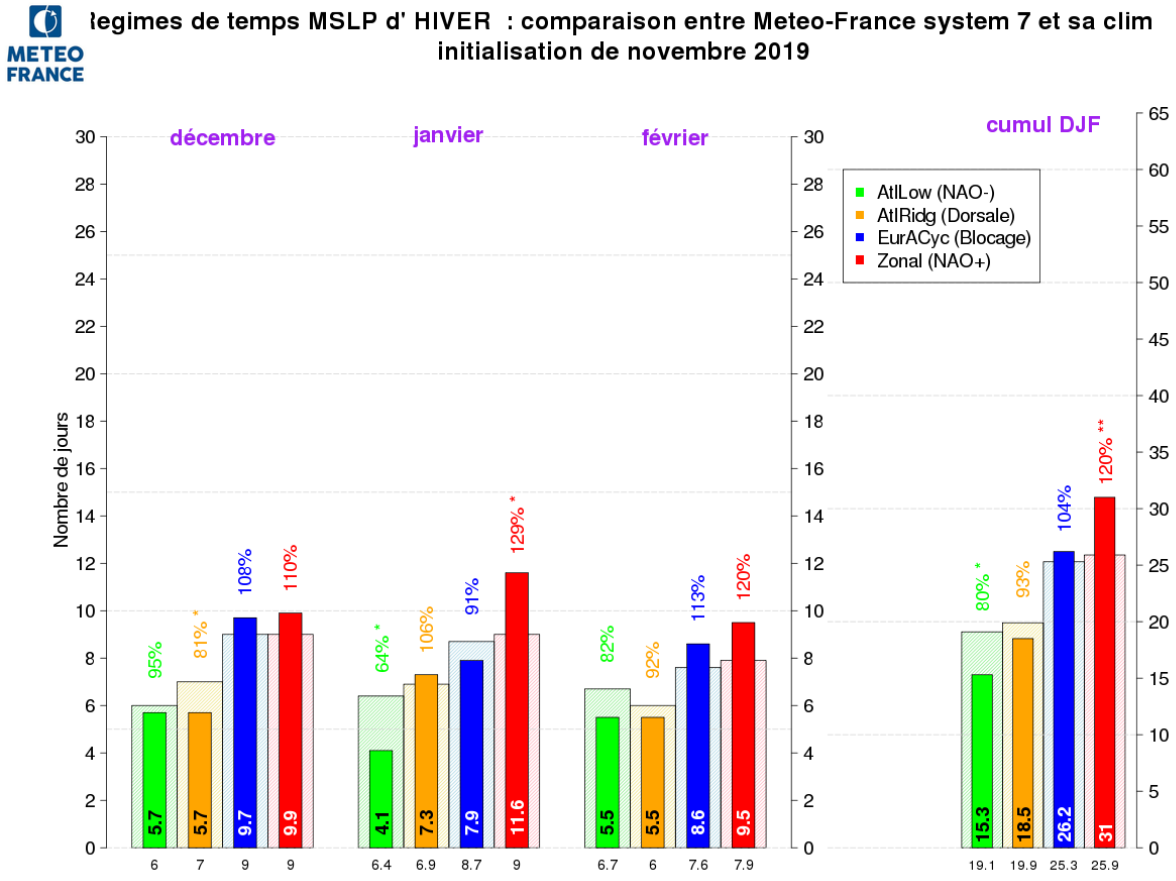
http://www.bom.gov.au/climate/enso/#tabs=Indian-Ocean

NAO



NAO observed and forecasted for the following two weeks by ENSM model of NOAA CPC. Source: https://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/nao.shtml#forecast

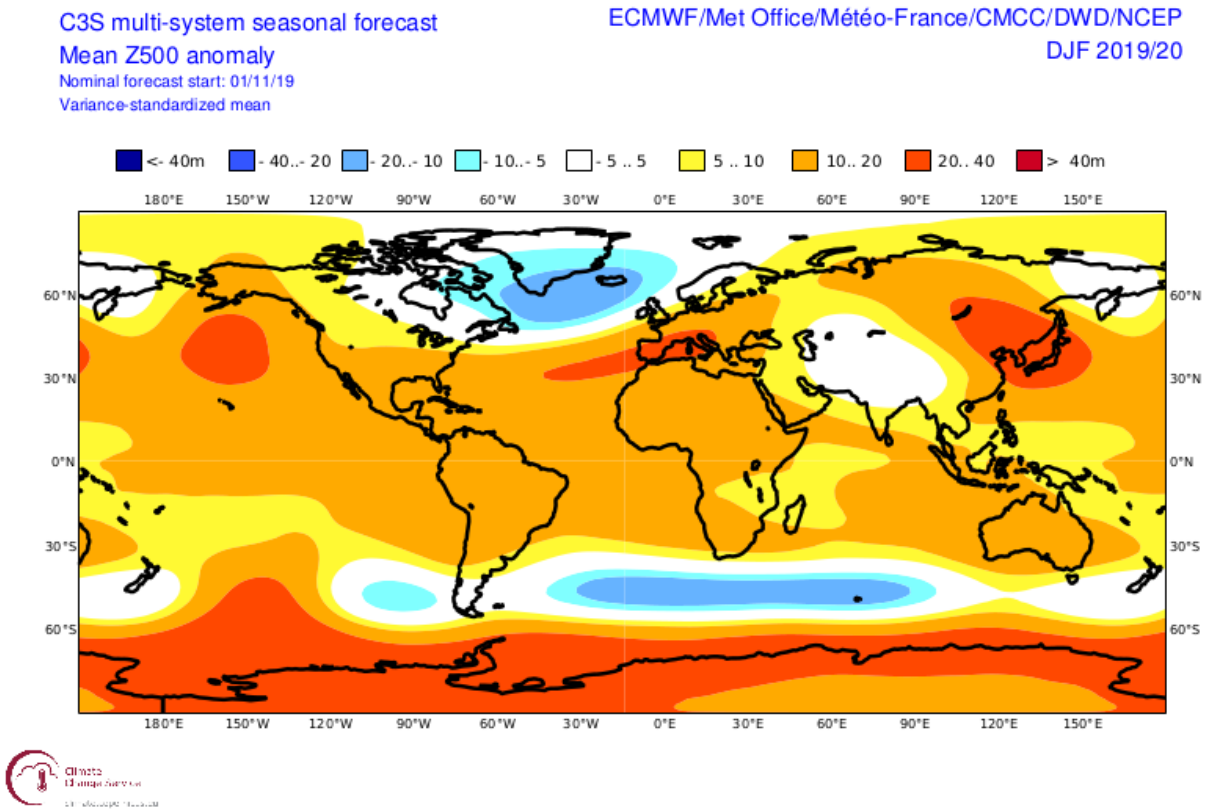
NAO switched from slightly negative to more or less neutral conditions from October to November 2019. For the next two weeks, most NOAA ensemble forecasts suggest a neutral or slightly negative NAO (maybe triggered by above-normal Eurasian snow cover). However, circulation forecasts of Météo France (and to a lesser degree also ECMWF) show a NAO+ domination for the following winter, with peak in January.



Forecasts of weather types by Météo France S7 model. Source: Météo France, http://seasonal.meteo.fr/content/PS-previ-regimes **(password required)**

EA

The present high EA+ mode might be affected by the strong IOD+ mode. Since IOD will continue to be positive, also EA+ is expected to be continued at least for the first part of winter 2019/20. The C3S multi-system seasonal forecast of 500 hPa anomalies, however, rather shows a typical NAO+ pattern (for EA+ Atlantic pressure systems should be shifted more to the south in winter), though there is uncertainty.



Copernicus C3S forecasts of 500 hPa anomalies for DJF 2019/20. Source: Copernicus, https://climate.copernicus.eu/charts/c3s_seasonal/c3s_seasonal_spatial_mm_z500_3m

AO

ENSM forecasts show an end of the AO- phase quite soon. The further development is open, but during an NAO+ phase, long significant Arctic outbreaks are unlikely.

Soil moisture

Soil moisture is less important in winter than in summer due to less evaporation. However, it can be important especially in southern countries when warming occurs und humidity is low. Since there were some more heavy precipitation events in the western Mediterranean in November and further events might occur, soil moisture might increase further. In southeastern parts of the domain, it might be more effective.

References:

Météo France monthly and seasonal climate monitoring maps: http://seasonal.meteo.fr (password protected)

WMO RA I RCC Node on Climate Monitoring Website with monitoring results: http://www.meteo.tn/htmlen/donnees/climatemonitoring.php

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

GPCC: http://gpcc.dwd.de

Copernicus Climate Change Service: https://climate.copernicus.eu

NOAA National Climate Data Center: https://www.ncdc.noaa.gov

NOAA National Centers of Environmental Prediction (NCEP): https://www.ncep.noaa.gov/

Rutgers University: https://climate.rutgers.edu

Deutscher Wetterdienst (DWD), Germany: https://www.dwd.de

EU Joint Research Centre: http://edo.jrc.ec.europa.eu

Australian Government – Bureau of Meteorology: http://www.bom.gov.au