SEASONAL FORECAST OVER North Africa
JJA 2024

ACCCOF-17
Hybrid Session

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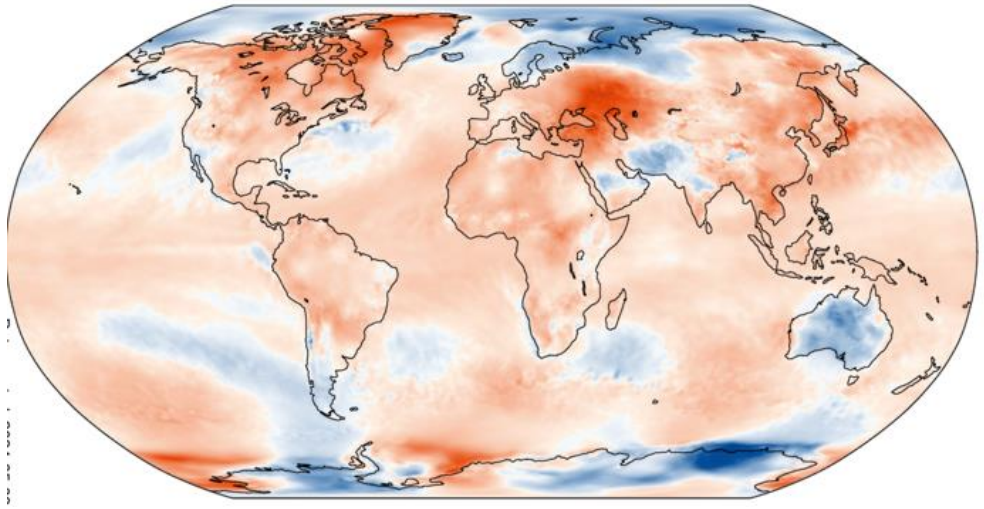
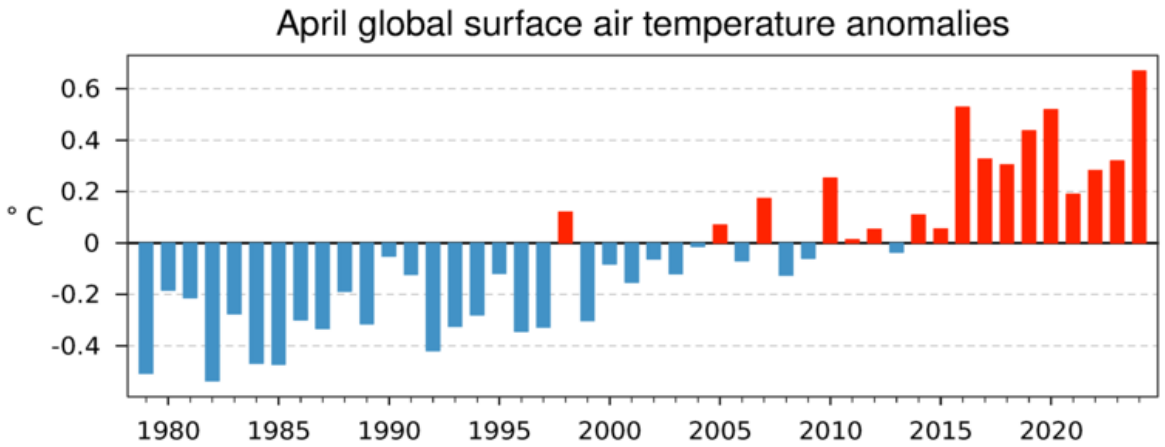
• *Temperature in April 2024*





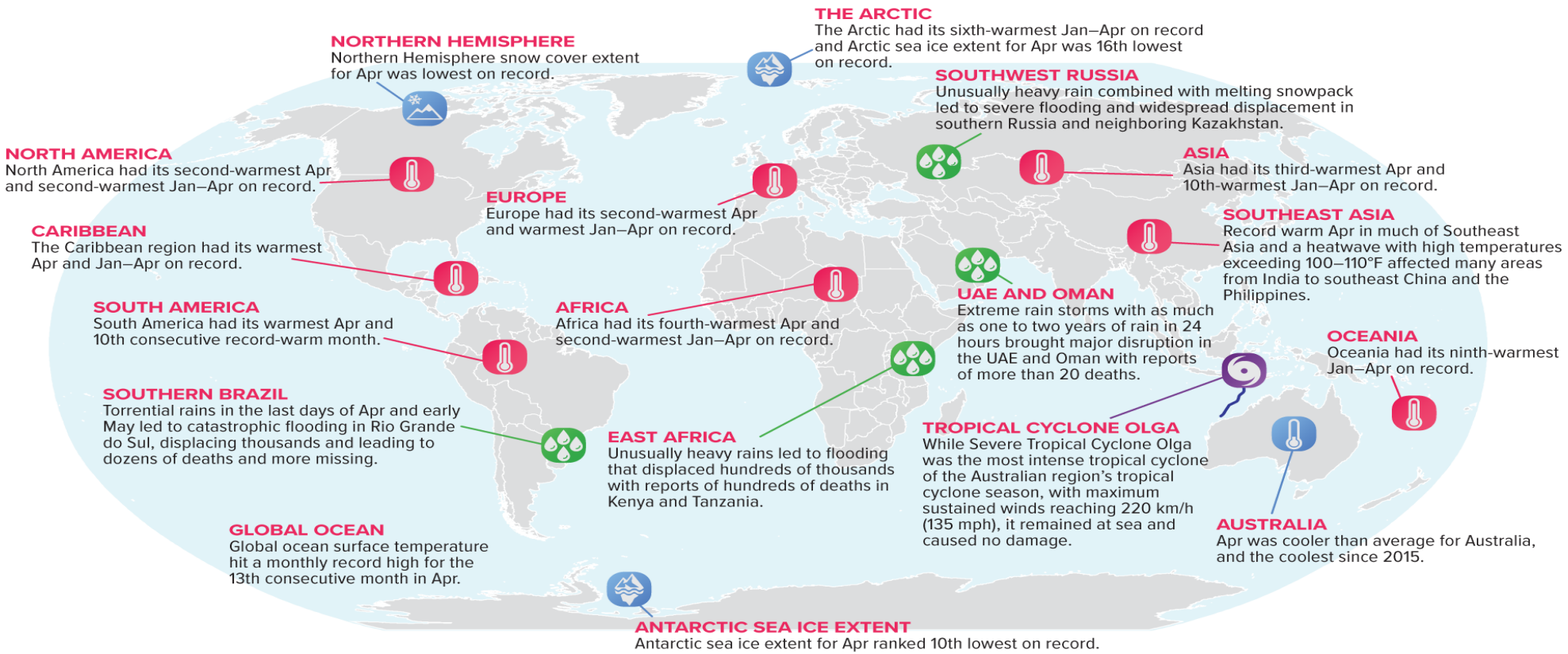
(Data: ERA5. Reference period: 1991-2020. Credit: C3S/ECMWF)

Globally, April 2024 was:

- the warmest April on record, 0.14°C warmer than April 2016, the previous warmest April
- 0.67°C warmer than the 1991-2020 average for April
- 1.58°C warmer than an estimate of the pre-industrial average for 1850-1900

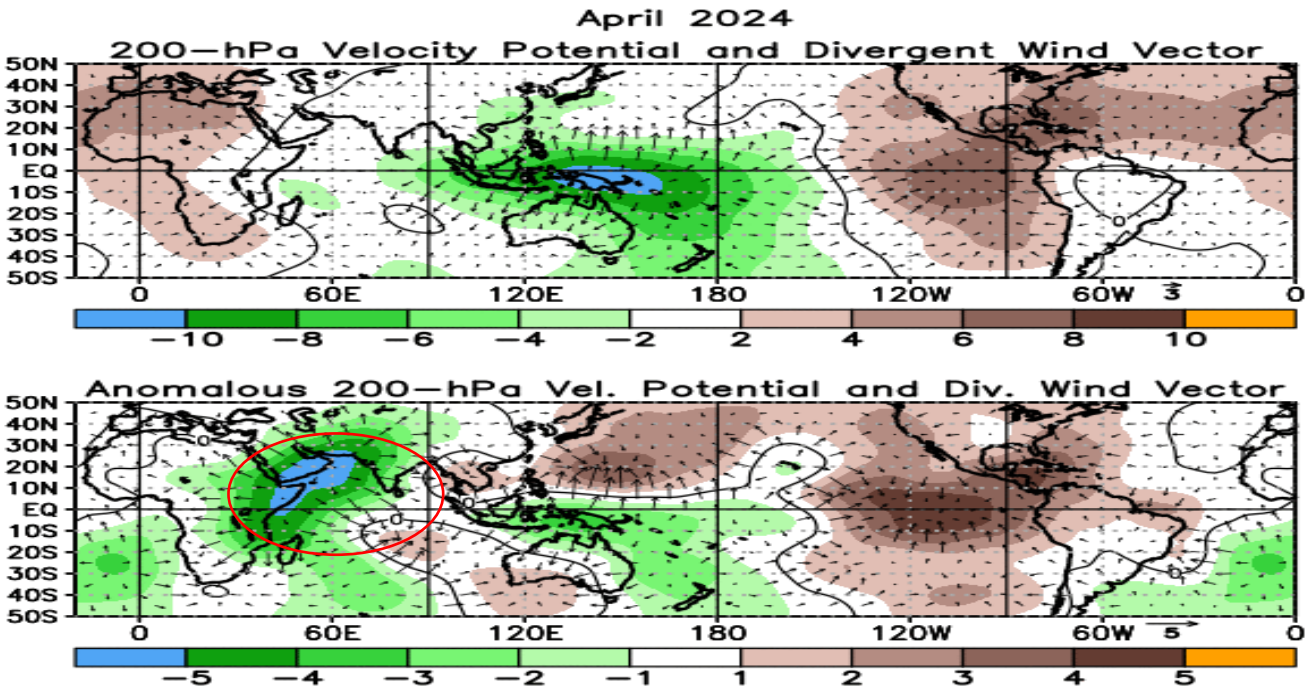
Selected Significant Climate Anomalies and Events: April 2024

GLOBAL AVERAGE TEMPERATURE
Apr 2024 global surface temperature ranked warmest since global records began in 1850, the 11th consecutive record-warm month.



Please note: Material provided in this map was compiled from NOAA's State of the Climate Reports. For more information please visit: https://www.ncei.noaa.gov/access/monitoring/monthly-report/global/

- *Convective activity in April 2024*

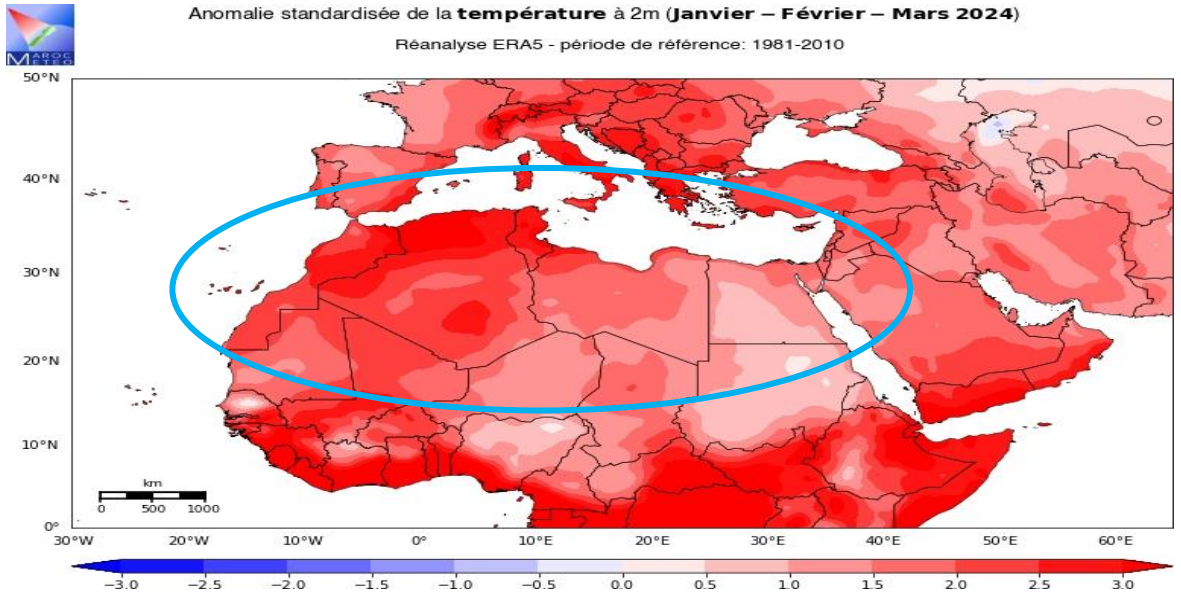


[Climate Prediction Center - Outlooks (noaa.gov)]

VERIFICATION

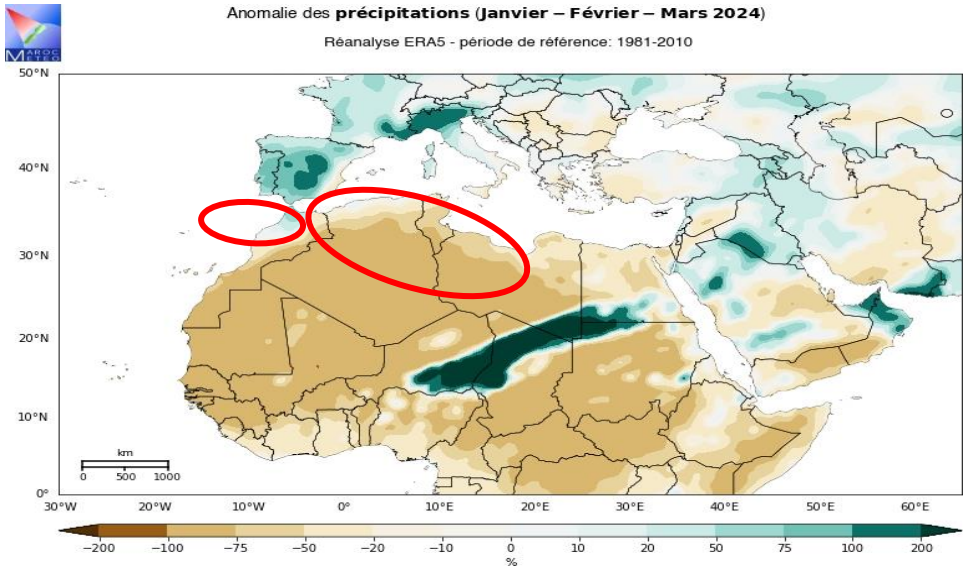
I. Seasonal Temperature Forecast

Model/multi-model	Morocco	Algeria	Tunisia	Libya	Egypt
ECMWF					
UK Met-Office					
C3S					
WMO LRF-NMME					
IRI	C Elsewhere	SE Elsewhere			
Synthesis	**Probably above normal conditions**	**Probably above normal conditions**	**Probably above normal conditions**	**Probably above normal conditions**	**Probably above normal conditions**



II. Seasonal Precipitation Forecast

Model/multi-model	Morocco	Algeria	Tunisia	Libya	Egypt
ECMWF	NE Elsewhere	Almost Algeria	Almo Tuni	Almost Libya	Almost Egypt
UK Met-Office	NE Elsewhere	NW&S Elsewhere	Almost Tunisia	E Elsewhere	Almost Egypt
C3S	NE Elsewhere	N Elsewhere		N Elsewhere	NW Elsewhere
LRF-NMME	NE Elsewhere	N S Elsewhere	Almo Tuni	NW SE Elsewhere	N Elsewhere
IRI	S Elsewhere				
Synthesis	**Probably normal to below normal conditions over the Northeast No special scenario elsewhere**	**Probably normal to below normal conditions over the North No special scenario elsewhere**	**Probably normal to below normal conditions**	**Probably normal to below normal conditions over the North No special scenario elsewhere**	**Probably normal to below normal conditions over the Northwest No special scenario elsewhere**



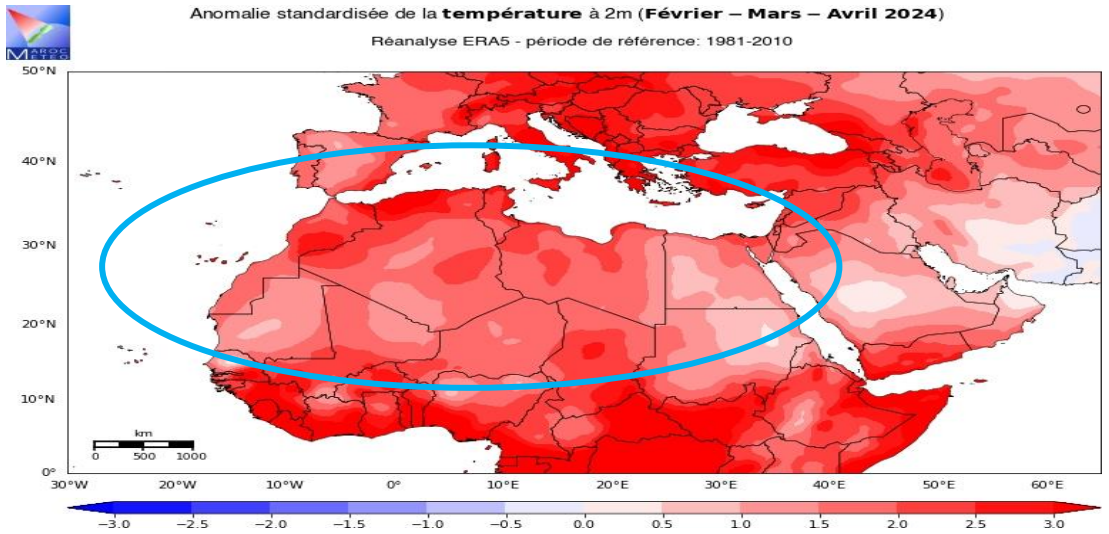
SEASONAL
TEMPERATURE AND PRECIPITATION FORECAST
FEBRUARY-MARCH-APRIL 2024

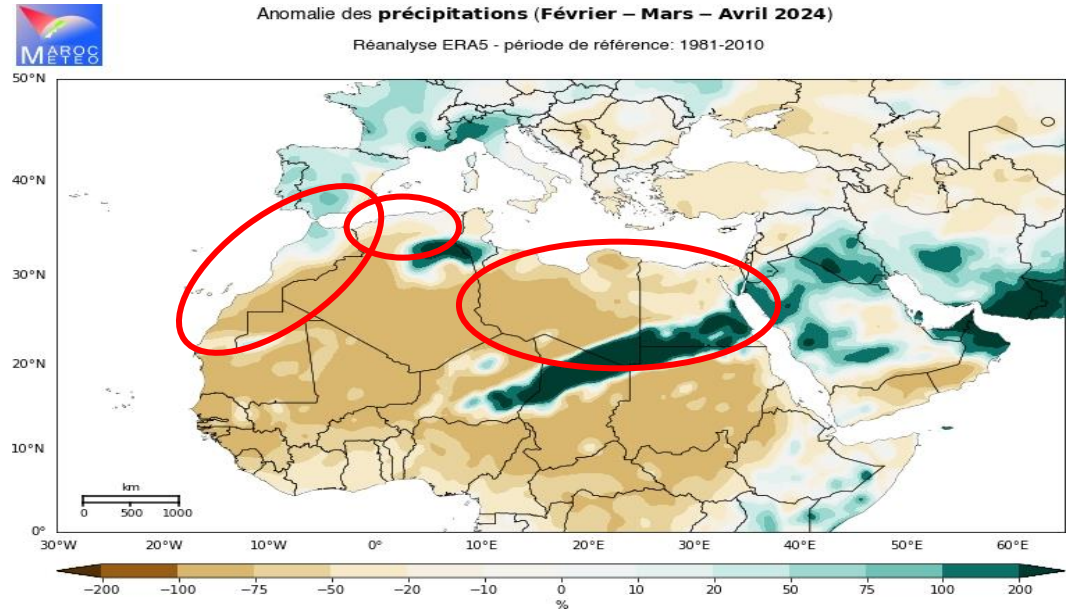
I. Seasonal Temperature Forecast

Model/multi-model	Morocco	Algeria	Tunisia	Libya	Egypt
ECMWF					
UK Met-Office					
C3S					
WMO LRF-NMME					
IRI	C Elsewhere	SW Elsewhere			
Synthesis	Probably above normal conditions	Probably above normal conditions	Probably above normal conditions	Probably above normal conditions	Probably above normal conditions

II. Seasonal Precipitation Forecast

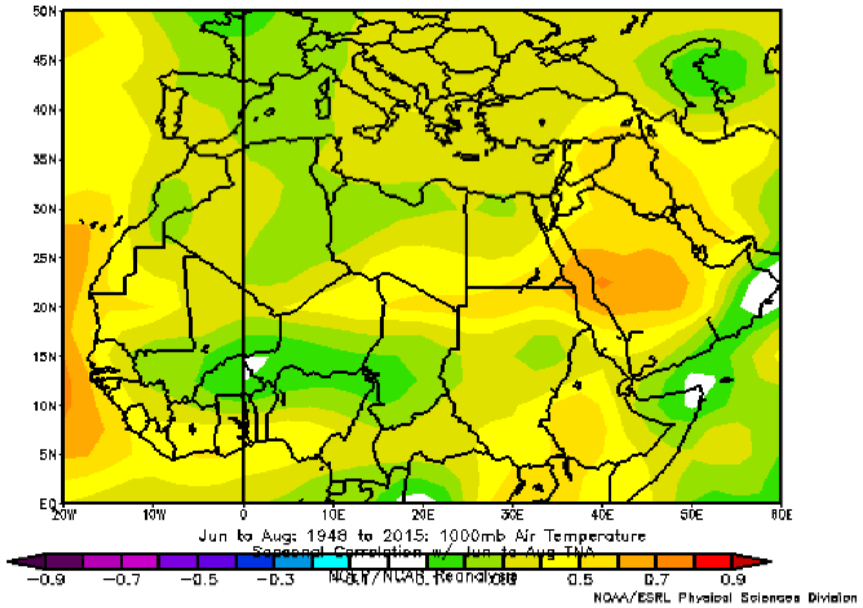
Model/multi-model	Morocco	Algeria	Tunisia	Libya	Egypt
ECMWF	N Elsewhere	N Elsewhere		Almost Libya	Almost Egypt
UK Met-Office	ATL Elsewhere	S Elsewhere			
C3S	Almost Morocco	N Elsewhere		SW Elsewhere	Almost Egypt
LRF-NMME	ATL Elsewhere	N Elsewhere		N Elsewhere	N Elsewhere
IRI	Almost Morocco			NE Elsewhere	NW Elsewhere
Synthesis	Probably normal to below normal conditions	Probably normal to below normal conditions over the North No special scenario elsewhere	No special scenario	Probably normal to below normal conditions	Probably normal to below normal conditions





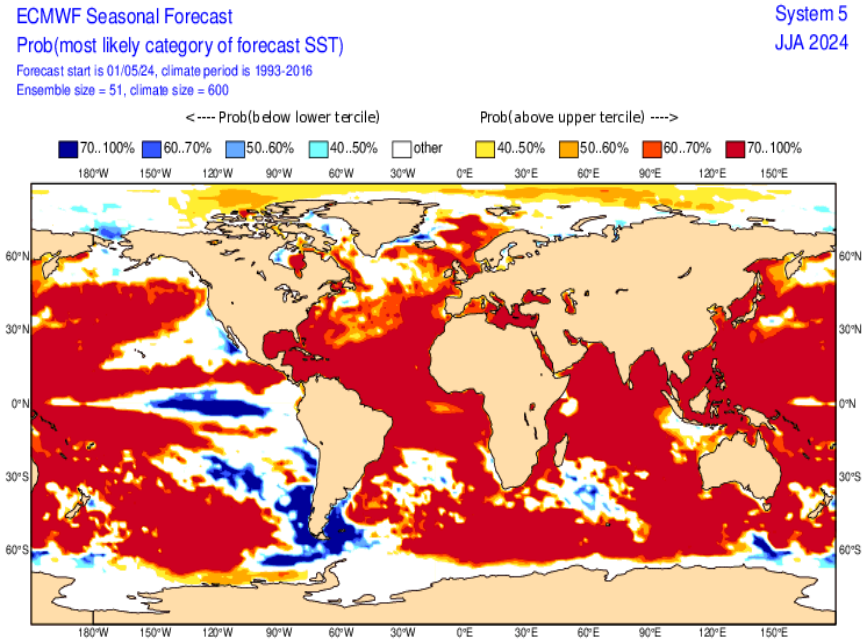
CLIMATE DRIVERS

• Tropical North Atlantic

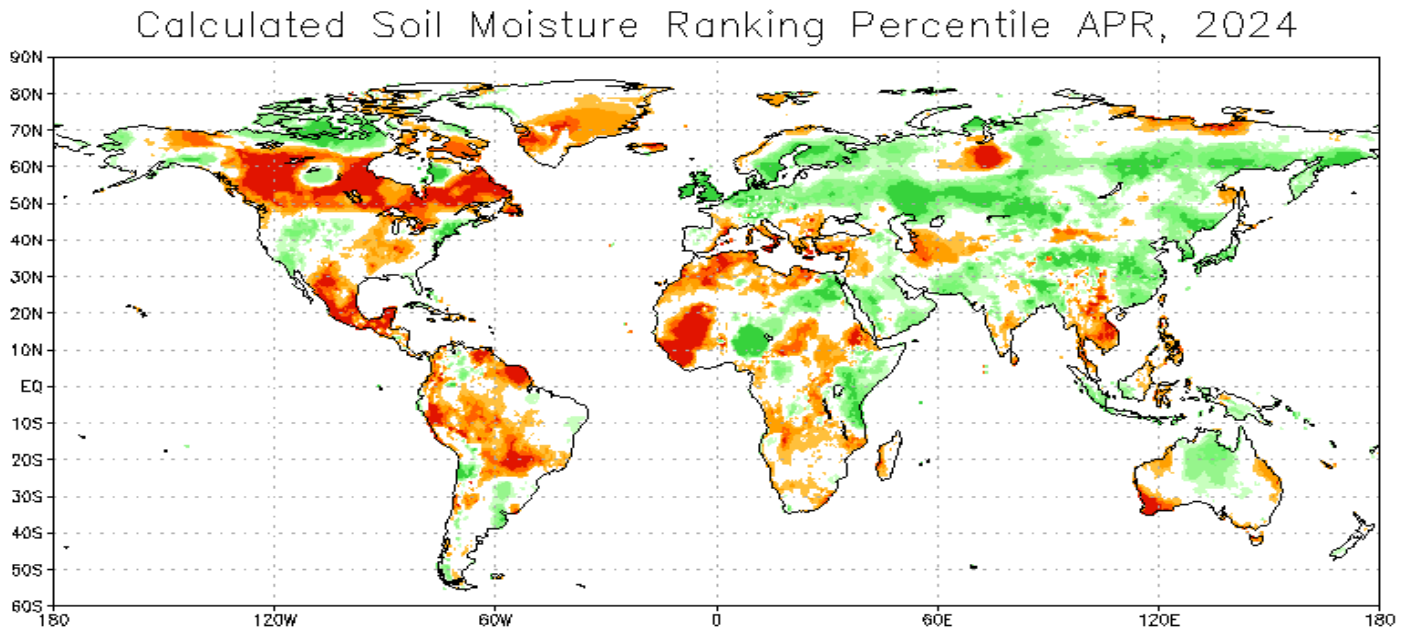


The Tropical North Atlantic index shows a positive link with temperature for JJA over Western and South-eastern of the North African domain.

The SSTs over TNA region is expected to be above average for JJA 2024, which could favor above normal conditions over Southern Morocco, Western Mauritania, Southern Libya and Southern Egypt.



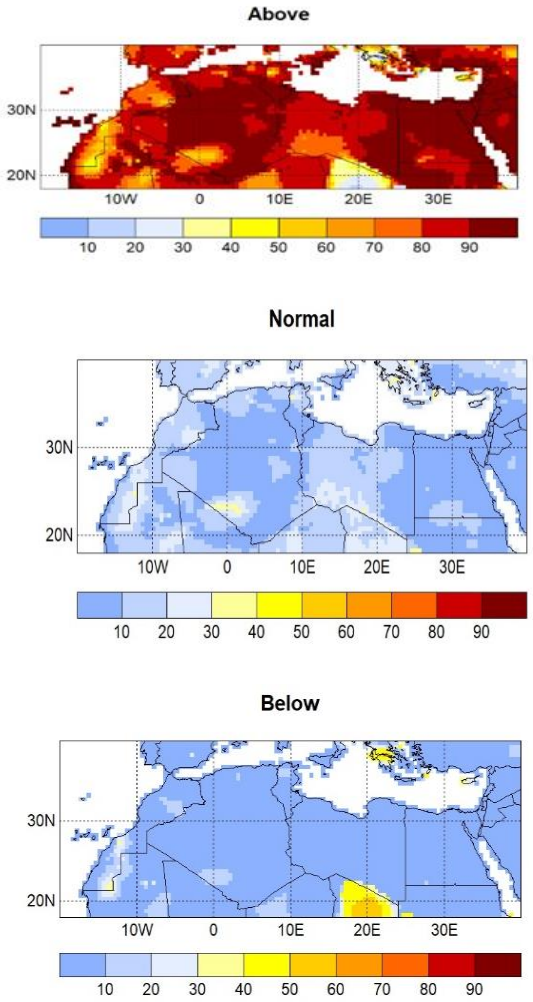
- *Soil Moisture:*



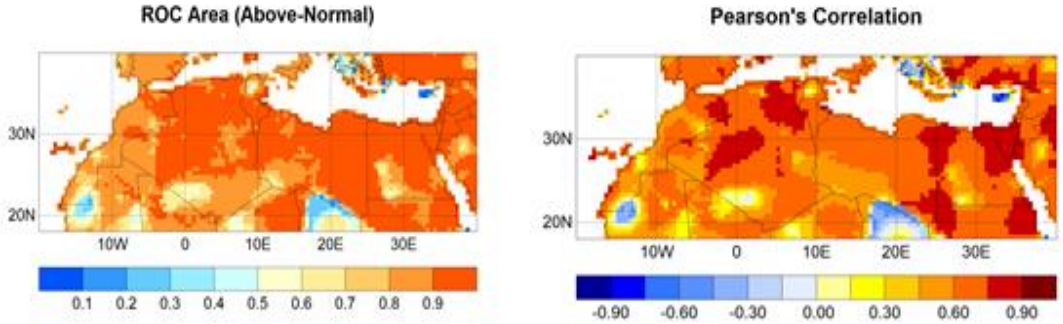
- Soil moisture is an important driver for Mediterranean summers.Studies have argued that dry soil moisture conditions prior to summer may enhance the likelihood of hot extremes, especially over the Mediterranean region.
- In April 2024, most of the NA domain experienced drier soil conditions, except for Northeast Egypt.

• North Atlantic SST:

➢ **Statistical forecasts of 2m temperature**

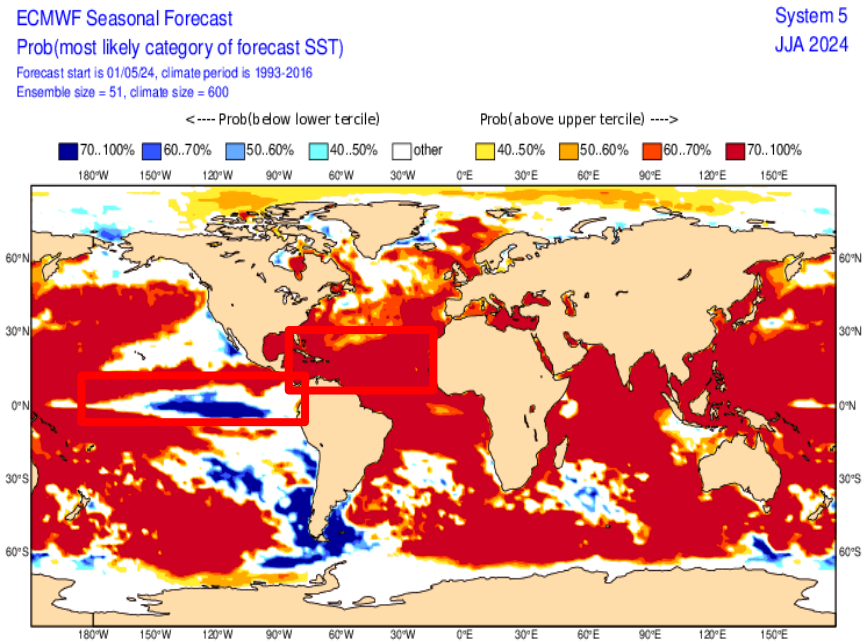


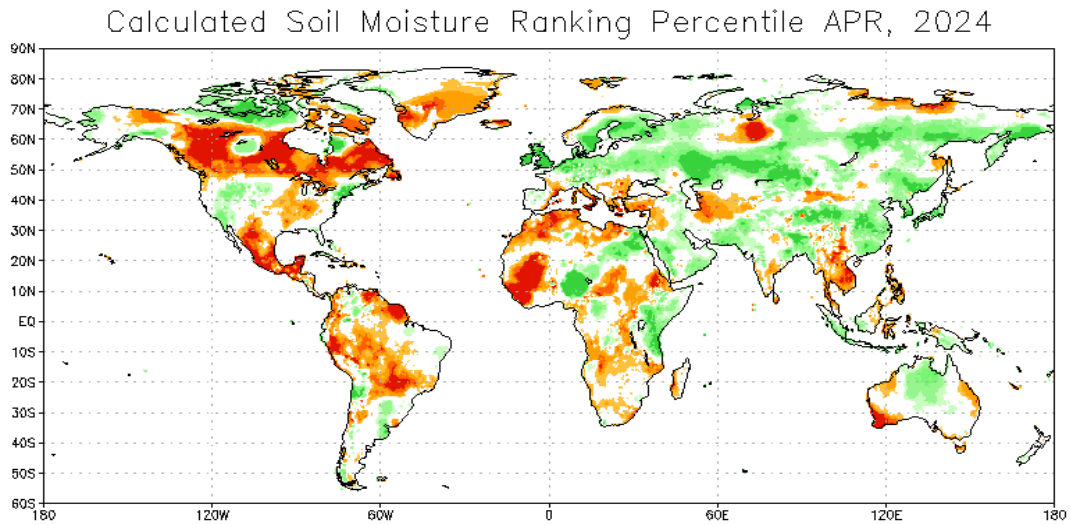
- Statistical forecasts of 2m temperature anomalies are produced by Canonical Correlation Analysis method using as predictors North Atlantic April SST (NOAA NCDC ERSST version4) and as predictand North Africa T2m (CPC /GHCN_CAMS).
- Statistical forecast is represented by probabilities of 3 categories above normal, normal and below normal.

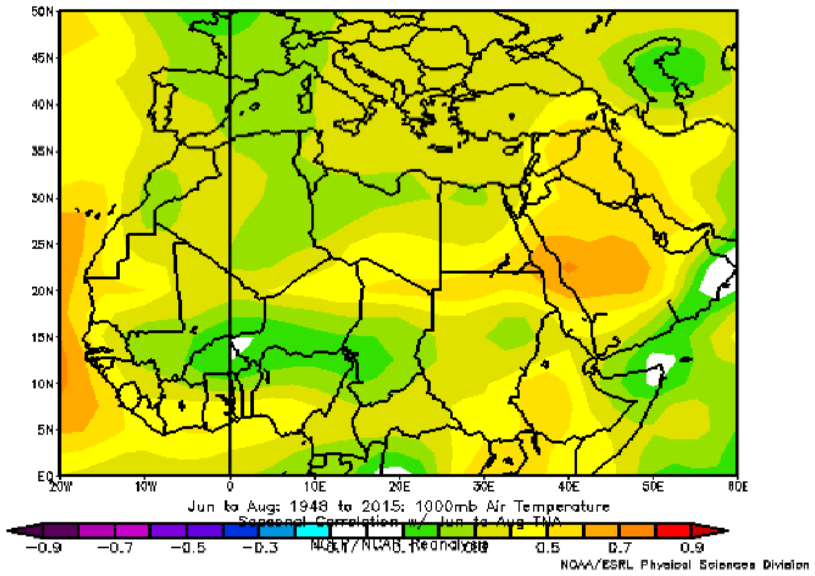


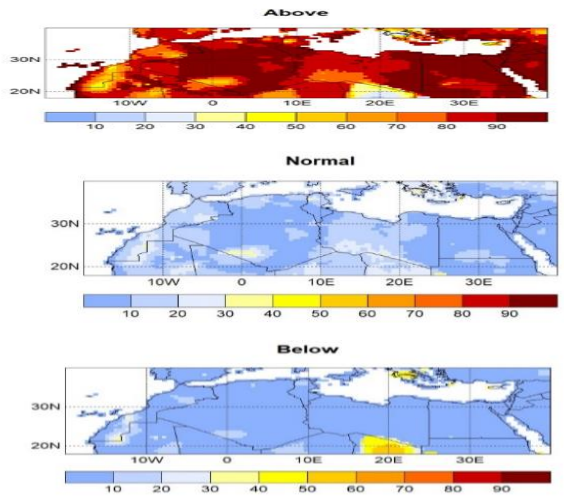
Skill of statistical forecast using CCA method : pearson correlation(left) and ROC above area(right)

- **PREDICTABILITY FROM CLIMATE DRIVERS**





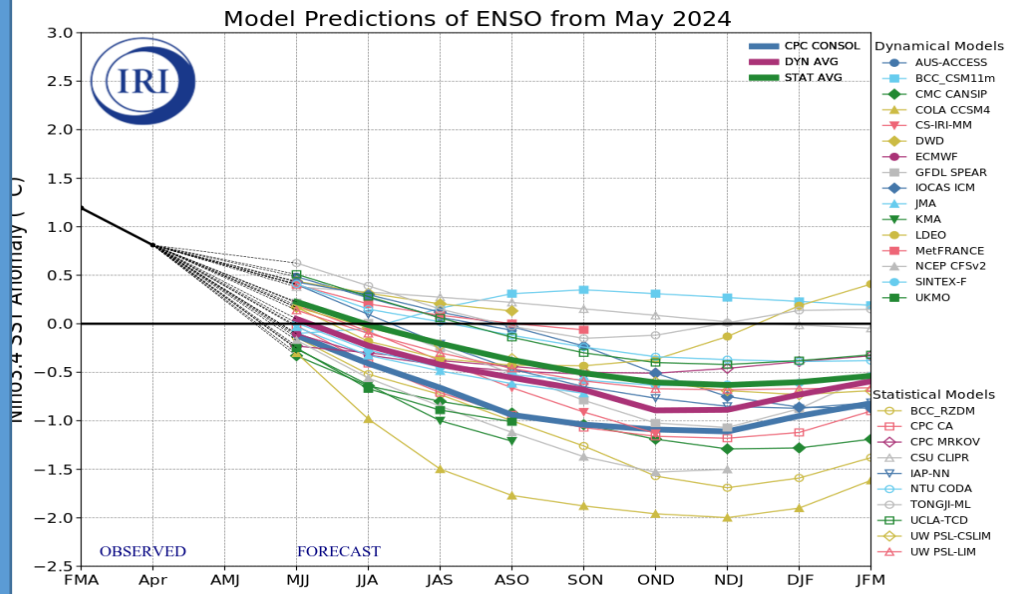


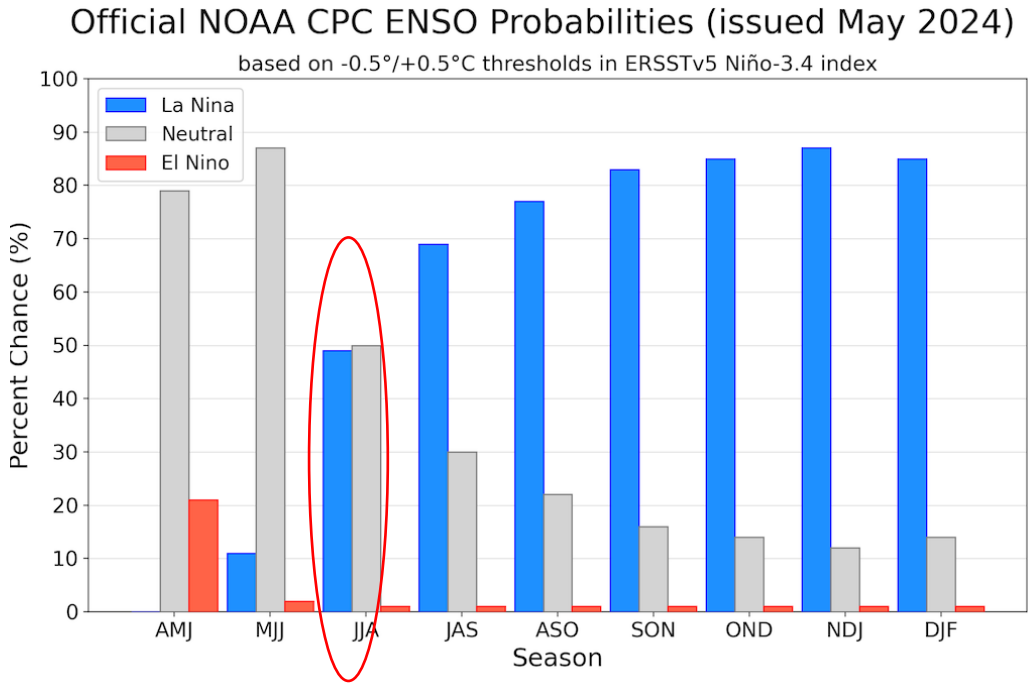


DYNAMICAL OUTPUTS

MULTI-MODEL OUTPUT

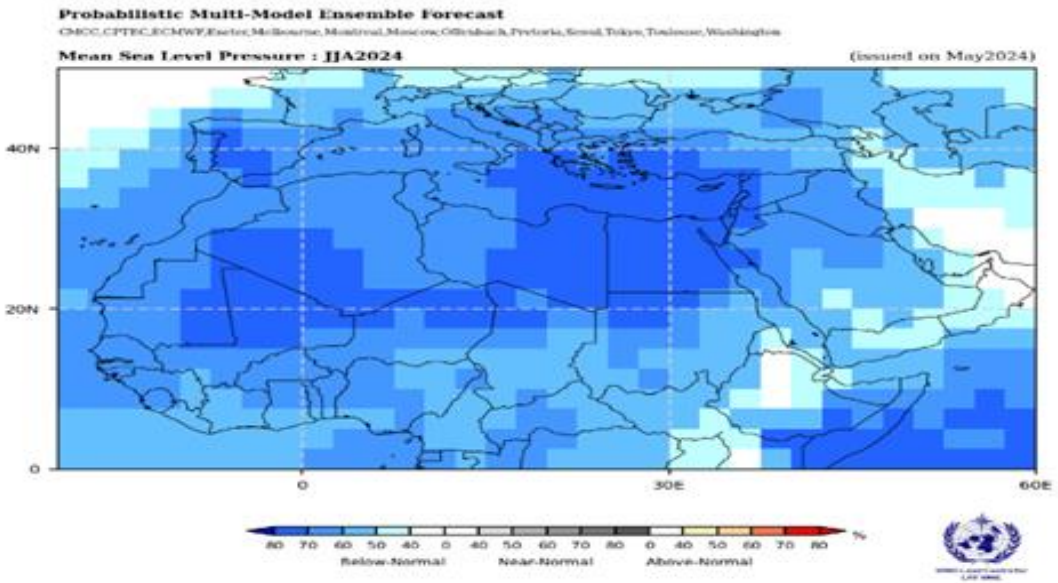
- *ENSO prediction*

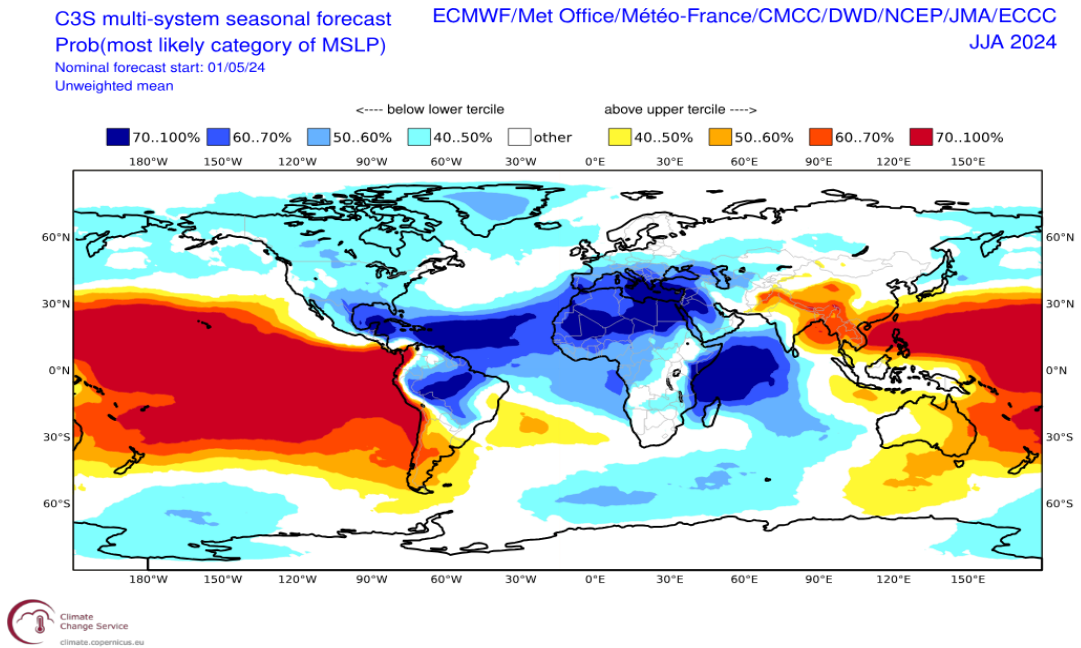




- It is likely to have a transition from El Niño to ENSO-neutral in the next month. La Niña may develop in June-August 2024 (49% chance) or July-September (69% chance).

• Dynamical Circulation

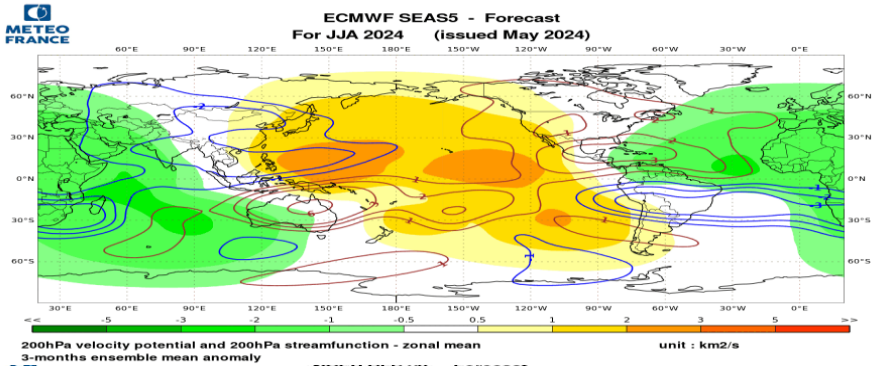


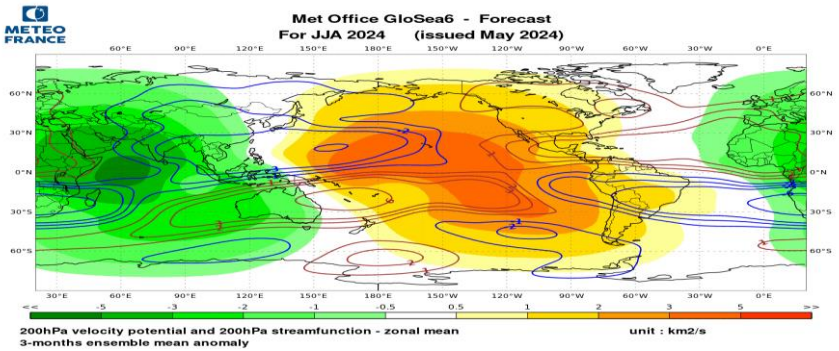


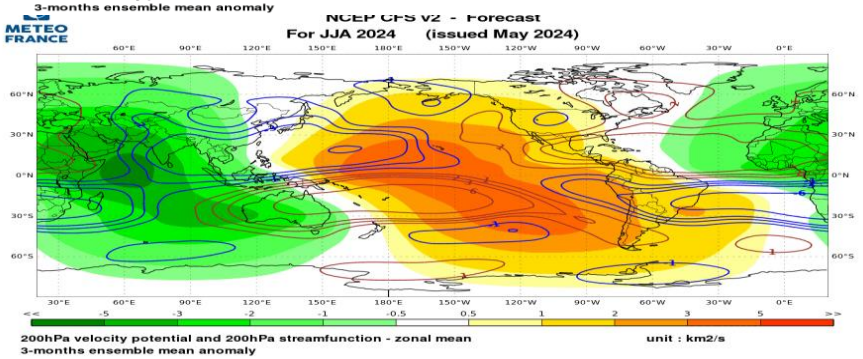
➢ *SLP:*

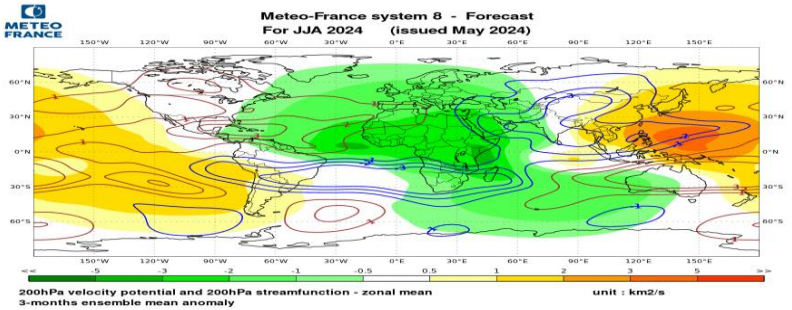
- Below-normal sea level pressure is projected over most of NORAF.
- Dynamical circulation near the surface suggests below-normal conditions over the whole North Africa region.
- Highest probability of below-normal conditions across Southeast Algeria and Eastern Mauritania.
- Reflects a possible strengthening of the Saharan Low.
- Eastern Mediterranean is expected to have a higher probability of below-normal conditions.

• *Dynamical Circulation*



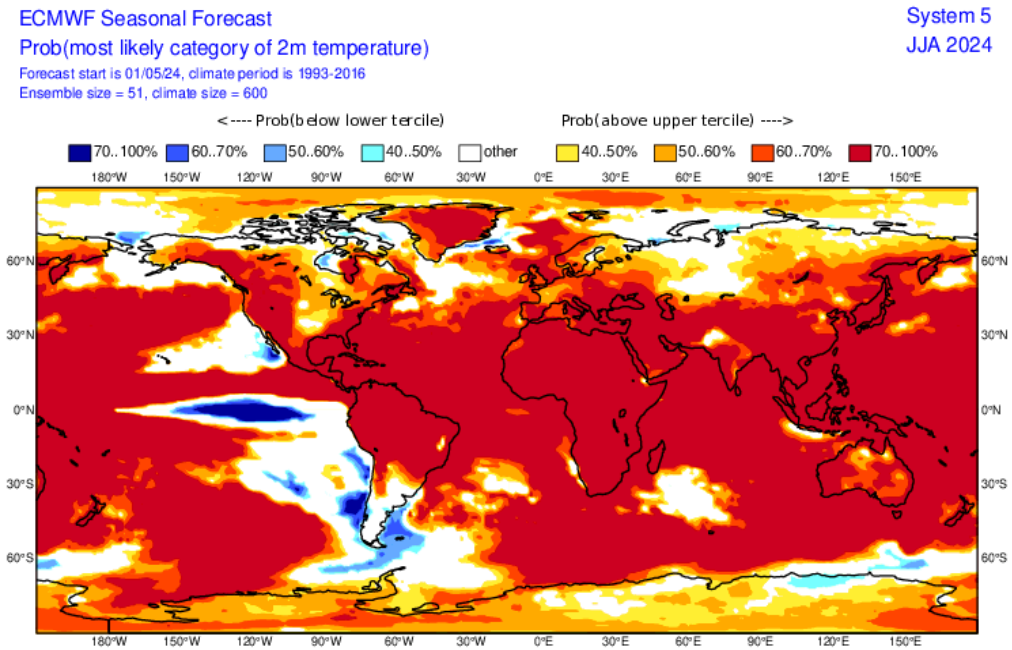


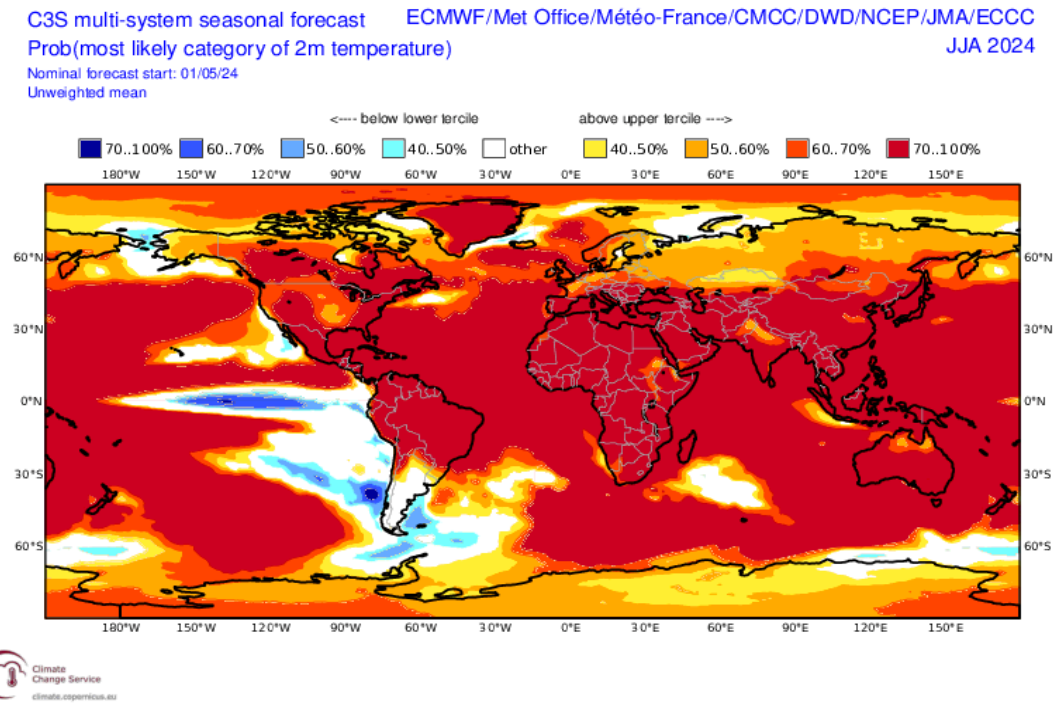




- *Potential velocity & streamfunction:*
- In the atmosphere, a consistent signal of divergence across models.
- Some cases (MF model) indicate probable cyclonism over the eastern part of the domain.

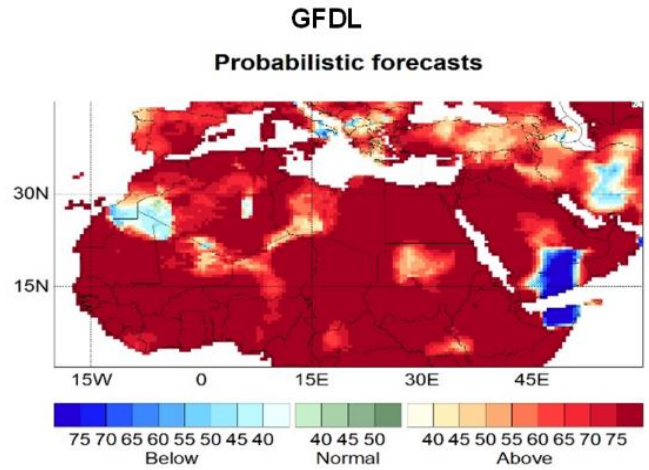
• TEMPERATURE

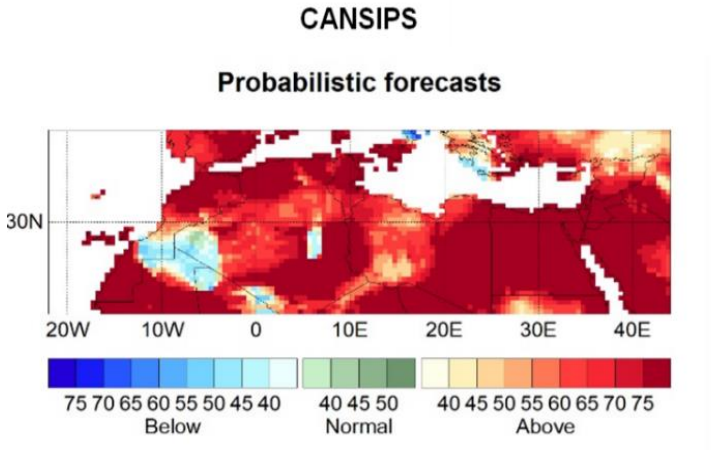


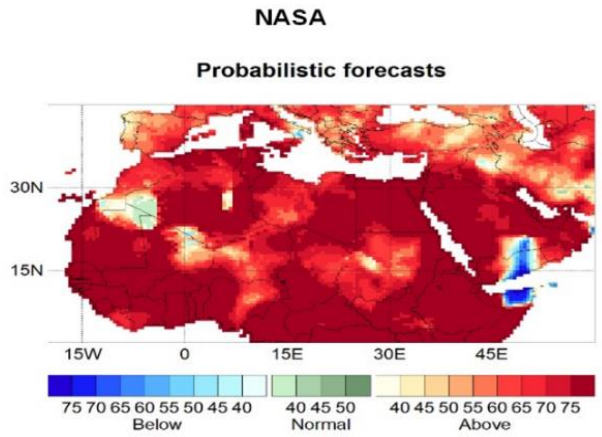


- According to C3S and ECMWF, temperatures during June, July, and August (JJA) 2024 are generally forecasted to be above average across the entire Mediterranean region.
- There is a higher likelihood, exceeding 70%, of experiencing warmer temperatures over almost all North African countries.

- **HYBRID TEMPERATURE FORECAST**



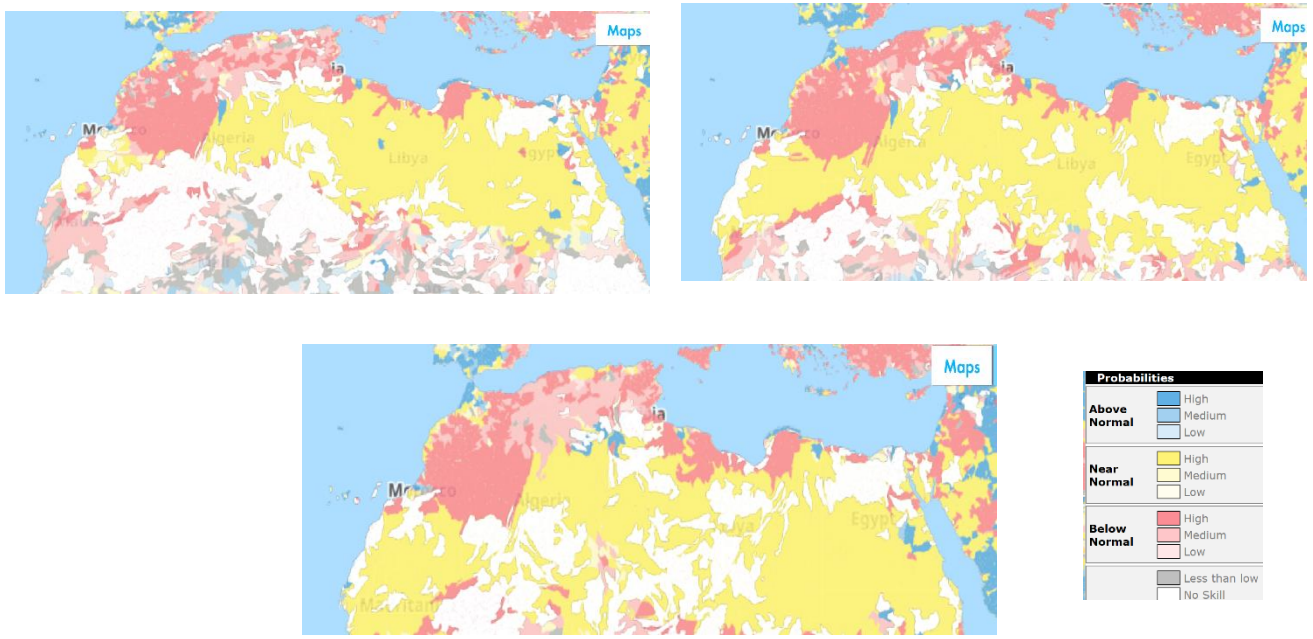




- The methodology involves utilizing dynamical model outputs and a statistical Canonical Correlation Analysis (CCA) method to identify linear combinations of observed and predicted CCA modes that maximize their correlation.
- The maps below depict the calibrated summer forecast using CCA for NASA, GFDL, and CanSips models.
- There is a high likelihood of above-normal temperatures across the North Africa region.

•*Warning for specific areas in North Africa*

➢Soil Moisture Seasonal Forecast (June, July and August 2024)



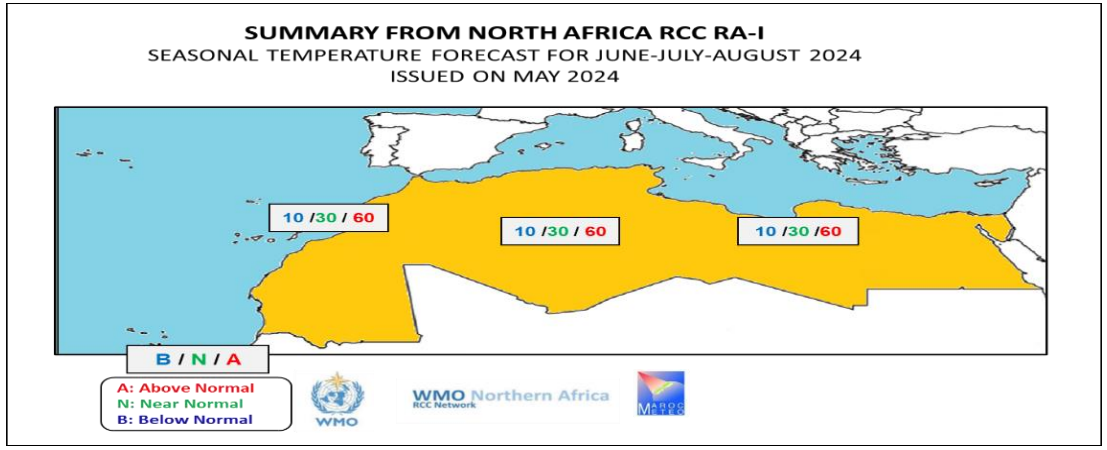
Soil moisture Seasonal Forecast by HYPE model for June, July,and August 2024

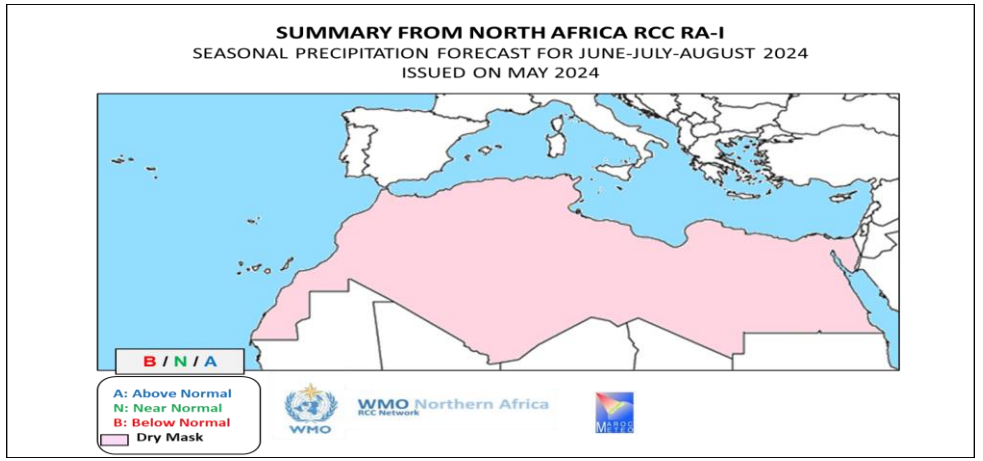
- Areas with no skill are shown in white and excluded from the analysis.
- There is a high probability of below-normal soil moisture conditions starting in June and continuing through July and August 2024.
- Combined with the expected hot extremes, this elevates the risk of forest fires.
- Therefore, a special warning should be issued for the forested areas of Morocco, Algeria, and Tunisia.

SUMMARY FROM NA RCC-LRF

- A transition from El Niño to ENSO-neutral is expected in the next month.
- La Niña development probabilities:
  - 49% chance during June-August 2024.
  - 69% chance during July-September 2024.
- Below-average sea-level pressure expected over North Africa.
- Accompanied by increased divergence at high altitudes.
- Limited confidence regarding cyclonic activity due to inconsistent model signals (stream-function at 200 hPa).
- **Temperature forecasts for JJA 2024:**
  - Consistent warming trend predicted by both dynamical and statistical forecasts.
  - Supported by climate drivers.
  - Increased chance of hot extremes over northern part of NORAF.
- **Soil forecasts for June, July, and August:**
  - Forecast models indicate a likely trend towards dry soil conditions prevailing during the summer
  - This, combined with expected above-normal temperatures, could potentially impact forests and increase the risk of forest fires, but the exact extent and severity remain uncertain

Summary from NA RCC-LRF





The analysis of current circulation, sea surface temperature, ENSO phenomenon and dynamical/statistical models outputs show for **June-July-August 2024**:

- **For Temperature:**
  - Probably above normal conditions over Morocco,Algeria, Tunisia, Libya, Egypt and Mauritania.
- **For Precipitation :**
  - A dry mask is applied over North African region given that JJA is climatologically very dry season.

➢ **Advisories:**

- There is a possibility of hot extremes and an elevated risk of fires in forested areas of Morocco, Algeria, and Tunisia. These predictions include inherent uncertainties and should be monitored closely.
- It is recommended to prepare for these conditions, keeping in mind the potential variability and uncertainty in the forecasts.

THANK YOU VERY MUCH FOR YOUR ATTENTION