# Météo-France Seasonal Forecast Bulletin

JULY - AUGUST - SEPTEMBER 2024

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# General synthesis : JAS 2024

**A) Oceanic forecast** :

- ENSO : Neutral conditions.

- IOD :  Neutral phase.

- PDO : persistance of a strongly negative phase

- Equatorial and Northeastern Atlantic : Strong positive anomaly.

**B) Drivers :**

- Negative phase of PDO

- Warm anomaly over the North Atlantic.

**C) Atmospheric circulation :**

Atmospheric response is convergent between the different models (subsidences from West Pacific to East Indian Ocean  and upwards motions around Africa).
They also agree on the patterns of stream functions, with two dipoles and still an anticyclonic curvature stretching as far as the Mediterranean basin, more or less remarquable depending on the model.
EA+, NAO+ and PNA- modes are predominant.

**D) Most likely conditions :**

Temperatures : The warmer-than-normal scenario is favored across Europe.

Precipitations : Dryer-than-normal is favored across southwestern Europe.

**Next bulletin : scheduled on July 19th**

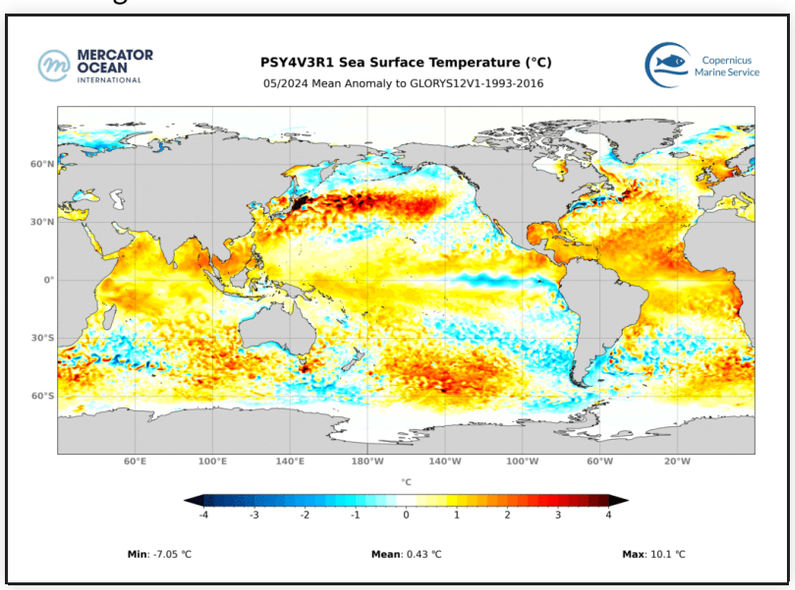
# Oceanic analysis of April 2024 : SST anomalies

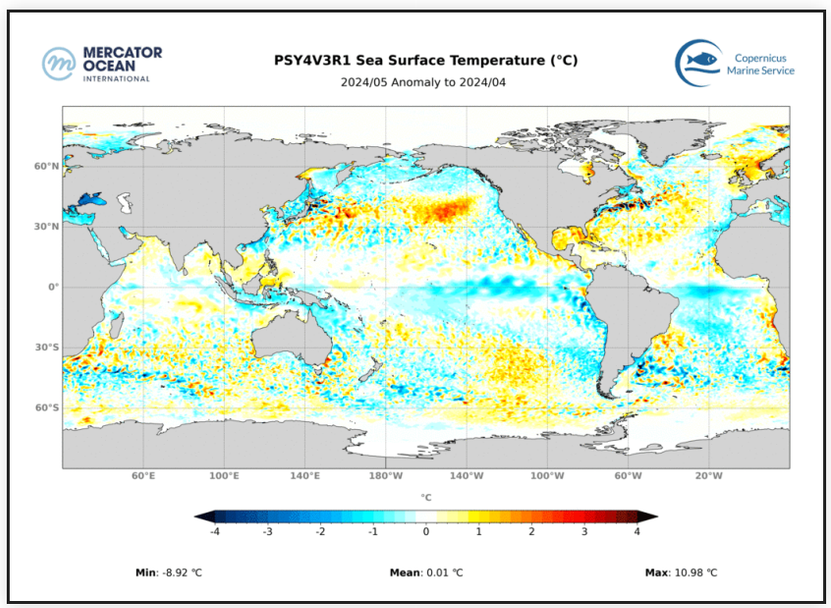
## Current ENSO situation : neutral conditions

In the Pacific Ocean : In the equatorial basin, a negative anomaly has spread in the eastern part. In the Northern Hemisphere, the PDO-pattern is enhanced.

In the Indian Ocean  : Overall, the SST remains above normal, with little change from last month

In the Atlantic Ocean : Warm anomalies remain marked over the intertropical zone and the eastern North Atlantic basin, although they are fading over south atlantic

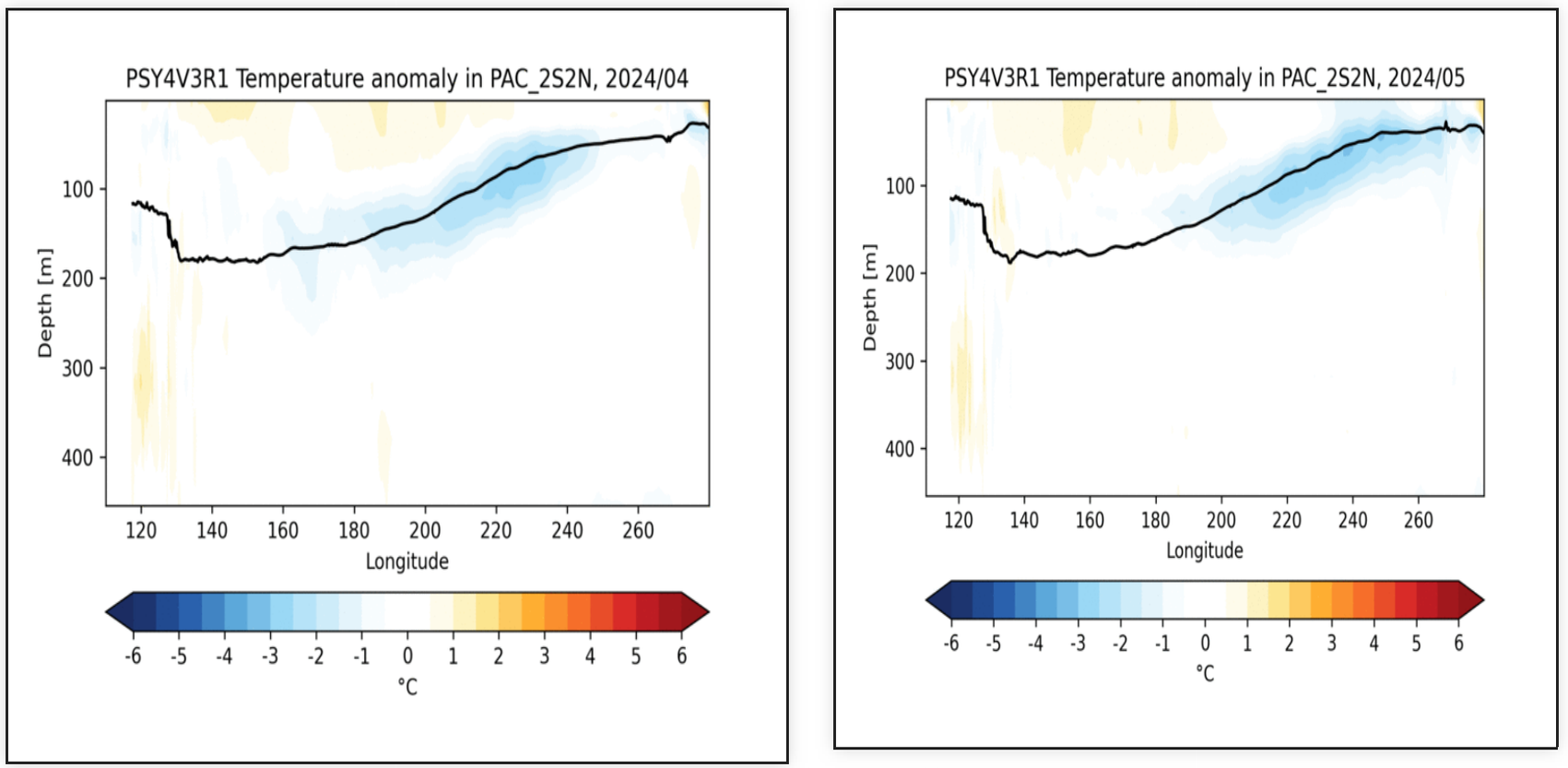



*SST Anomalies and trend with the previous month (c) Mercator-Ocean*

# Oceanic analysis of April 2024 : Pacific vertical section

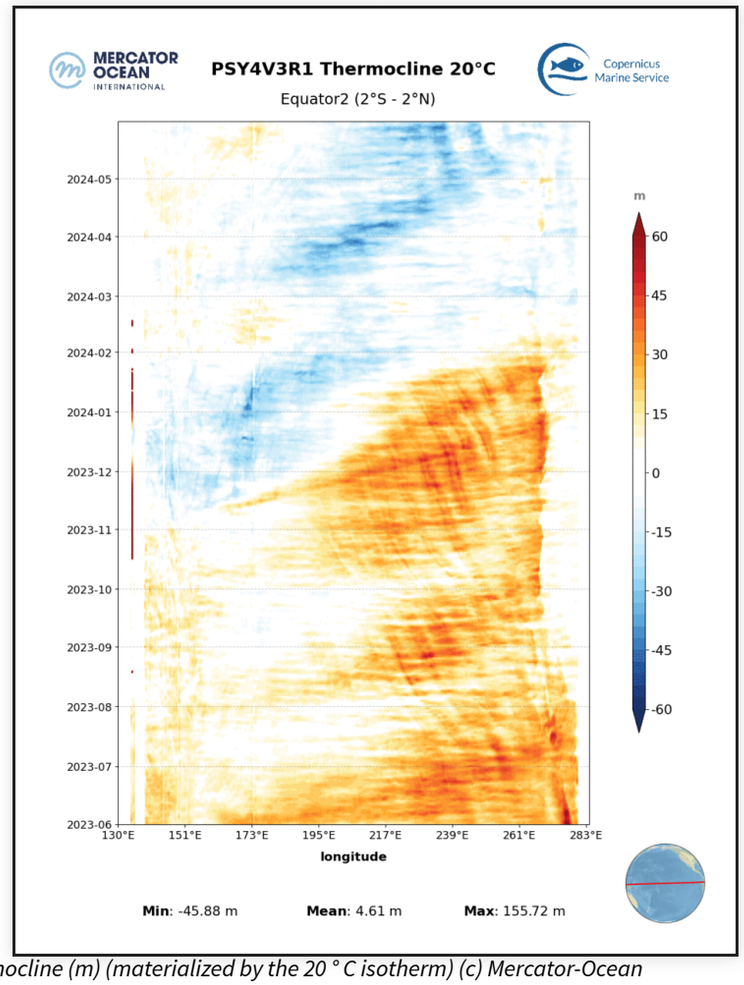
In the subsurface, a cold anomaly moved east of the basin.




*Ocean temperature anomalies in the first 500 meters of the equatorial Pacific basin, monthly average. (c) Mercator-Ocean*

# Oceanic analysis of April 2024 : Hovmüller diagram of the 20°C isotherm

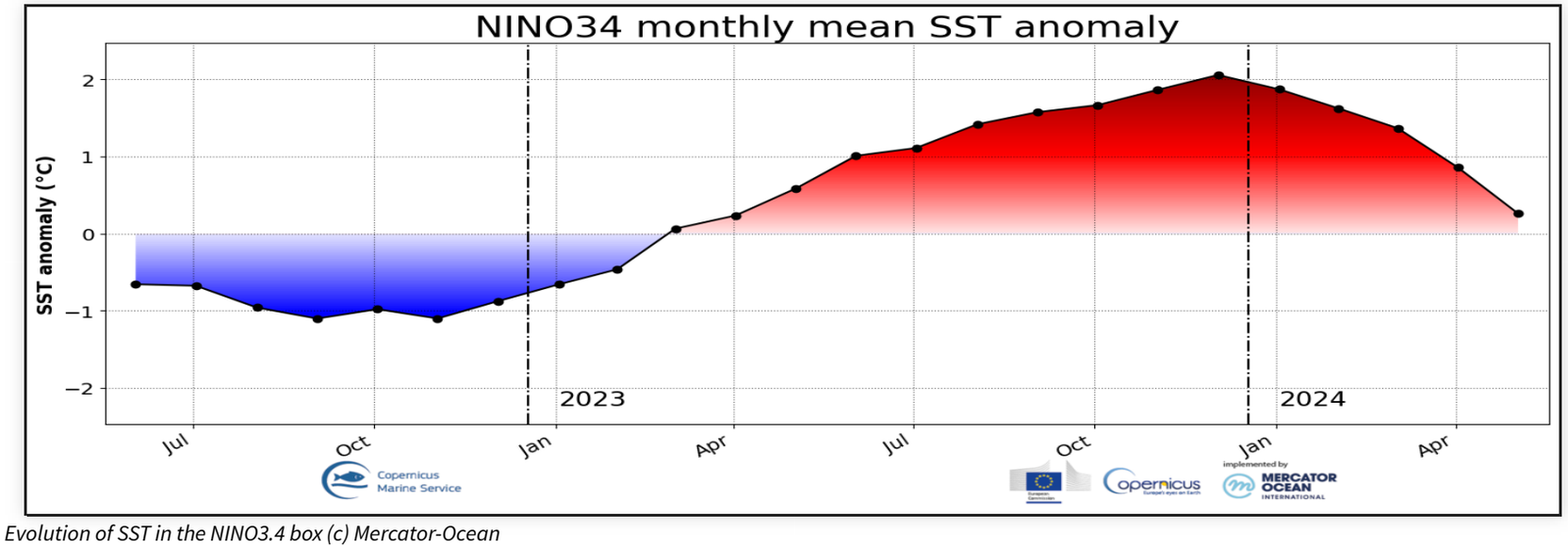
Same remark as before.




*Evolution of the anomalies of depth of the thermocline (m) (materialized by the 20 ° C isotherm) (c) Mercator-Ocean*

# Oceanic analysis of April 2024 : Pacific Ocean - Nino3.4 index history

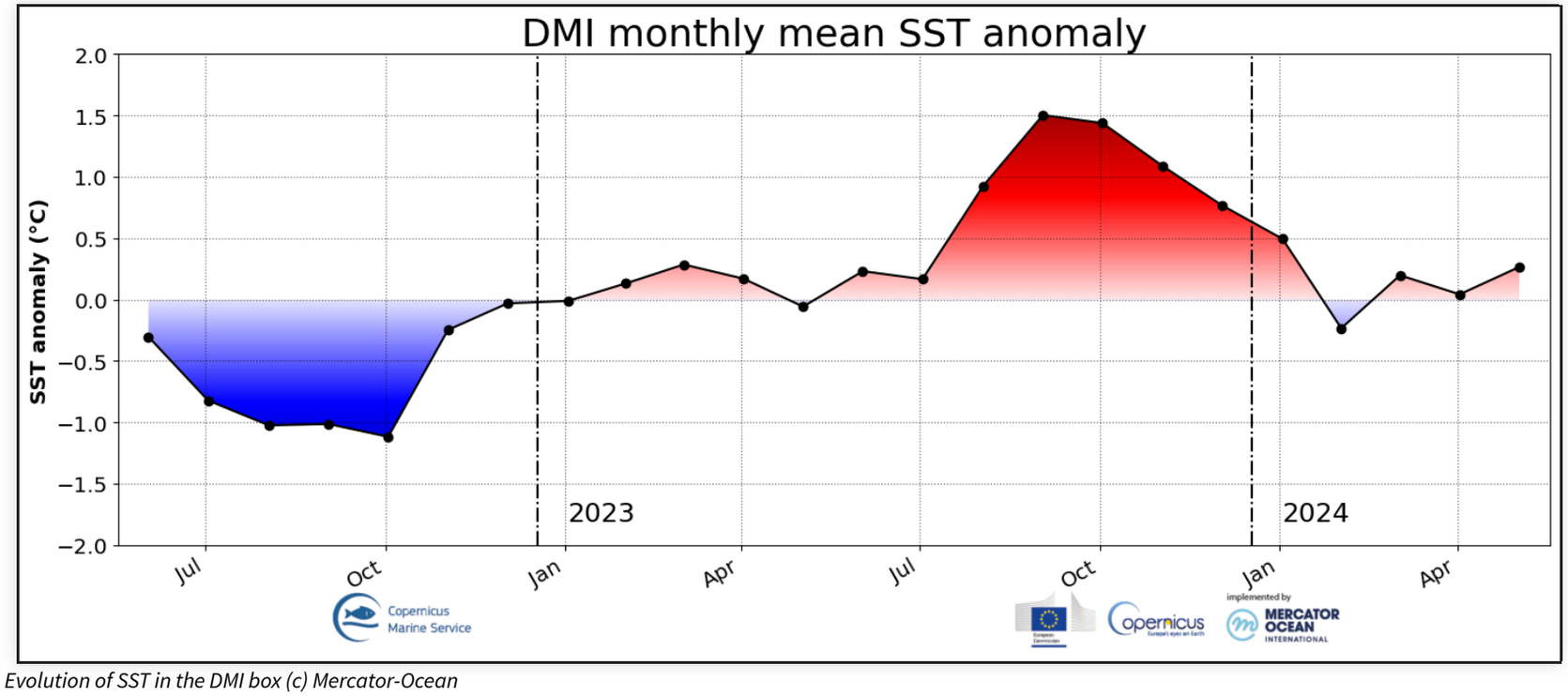
**Nino3.4 index issued from Mercator Ocean PSYV4R2 analysis : close to +0.3 °C**
(see BOM site for weekly values : http://www.bom.gov.au/climate/enso/monitoring/nino3_4.png )




*Evolution of SST in the NINO3.4 box (c) Mercator-Ocean*

# Oceanic analysis of April 2024 : Indien Ocean - DMI index history

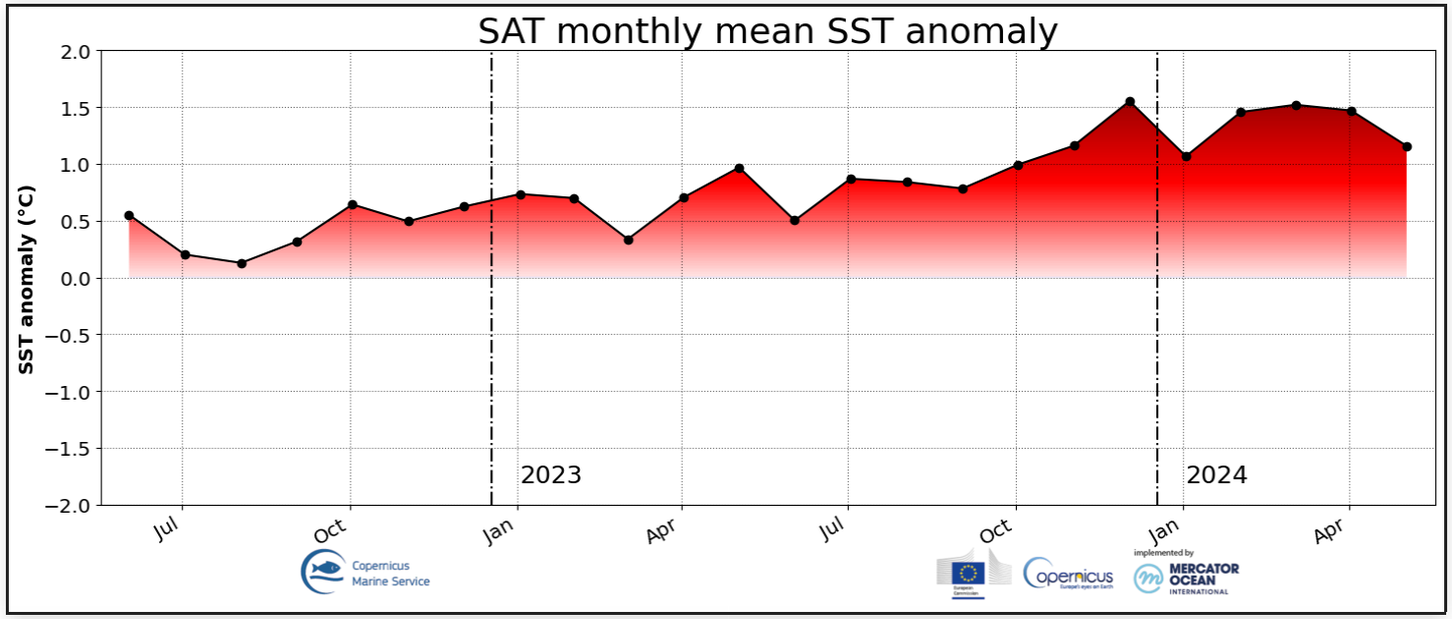
**DMI Index issued from Mercator Ocean PSYV4R2 analysis : close to +0.3°C**
(see BOM site for weekly values : http://www.bom.gov.au/climate/enso/monitoring/iod1.png )

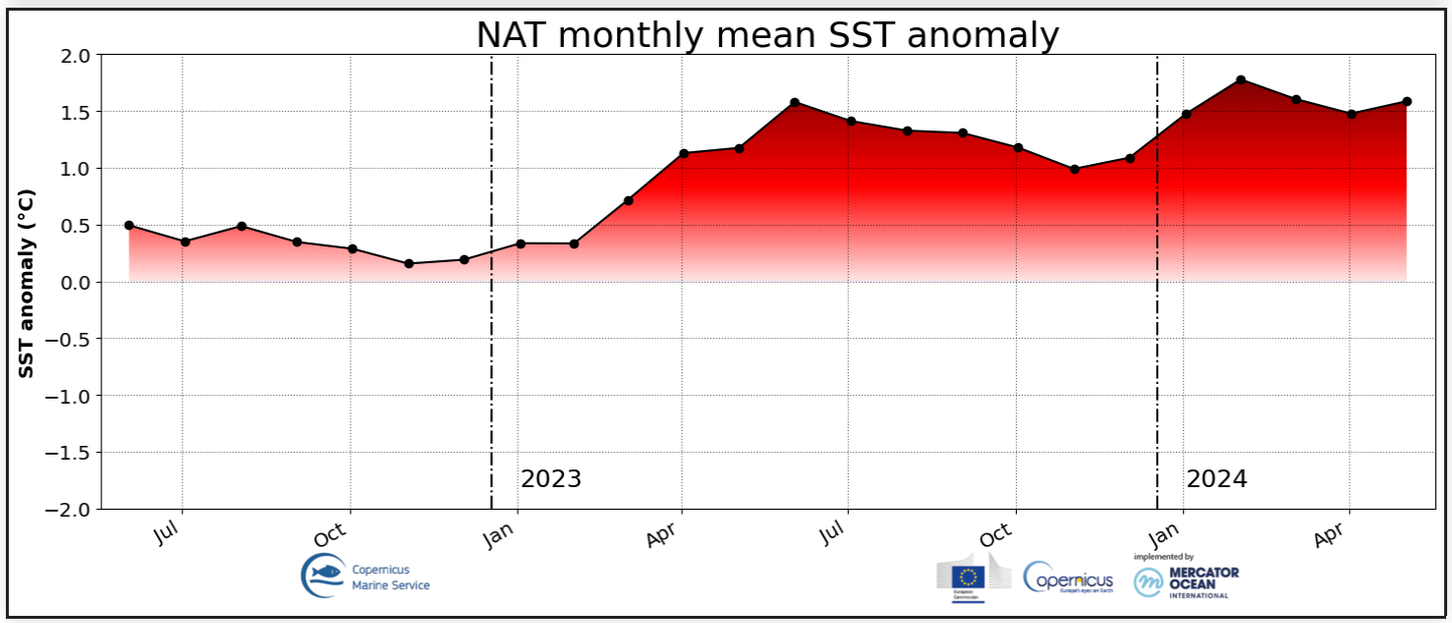



*Evolution of SST in the DMI box (c) Mercator-Ocean*

# Oceanic analysis of April 2024 : Atlantic Ocean : SAT and NAT index

Warm anomalies remain remarkably high, both in the equatorial zone and in the northern intertropical zone.




*Evolution of SST in the SAT and NAT box (c) Mercator-Ocean*

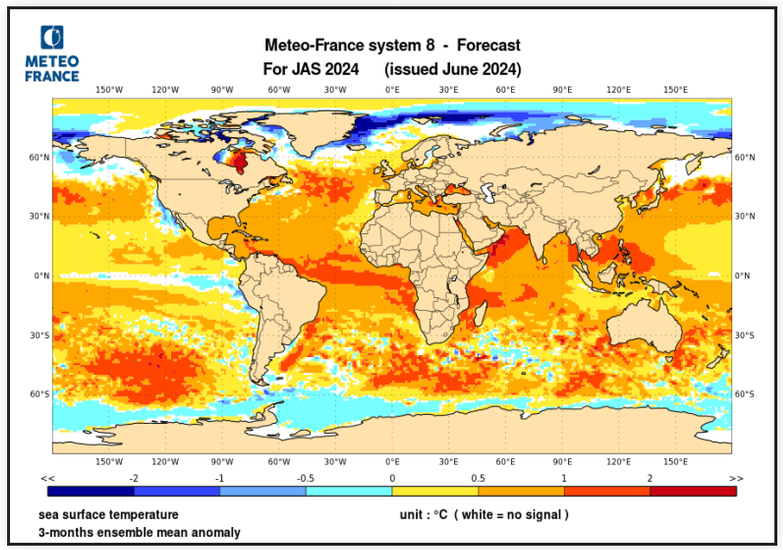
# Oceanic forecast : SST anomaly

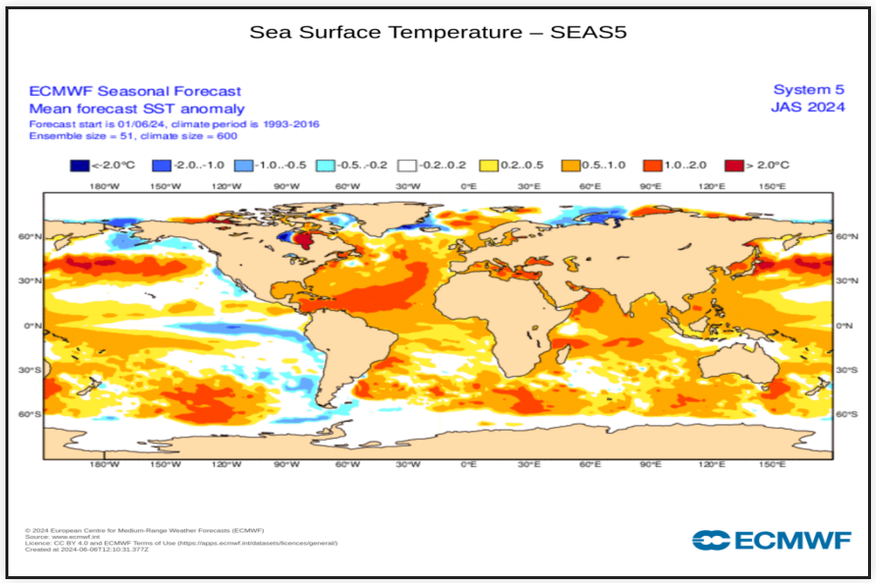
The two models offer very similar patterns.

In the Pacific Ocean : Over the eastern equatorial zone, a cold anomaly is expected by the models, more marked with ECMWF. In the Northern Hemisphere, the PDO- structure is weel marked.

In the Indian Ocean : The warm anomaly over the western part of the basin persists, while a relative cold anomaly is taking shape along the Indonesian coast.

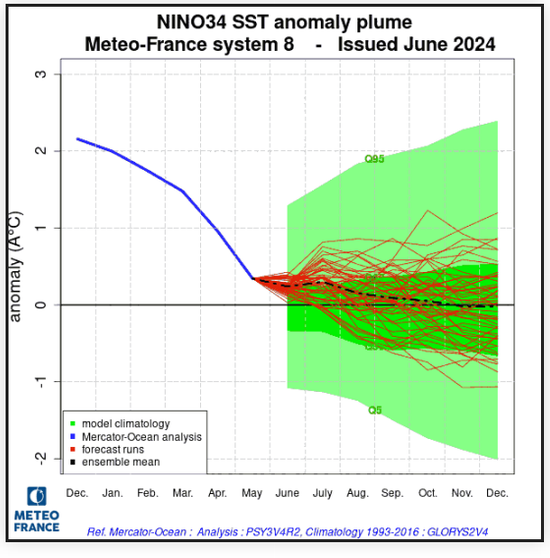
In the Atlantic Ocean : A warm anomaly persists over the intertropical zone with notable different between models. The strongest warm anomalies predicted by MF8 are located on the equatorial zone and the tropical southern Atlantic while for SEAS5 they concern the tropical north Atlantic.

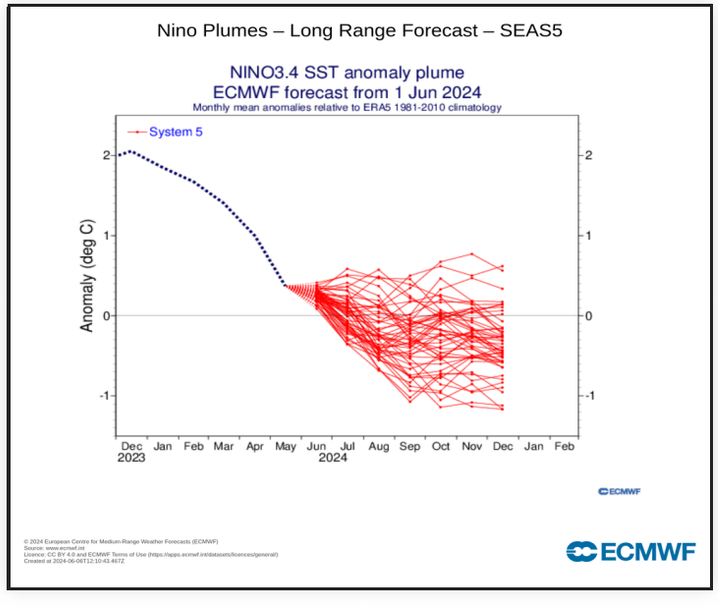


# Oceanic forecast : NINO3.4 Plume diagrams

MF8 is forecasting neutral conditions during next quarter while ECMWF forecast if for the beginning, and then becoming negative.

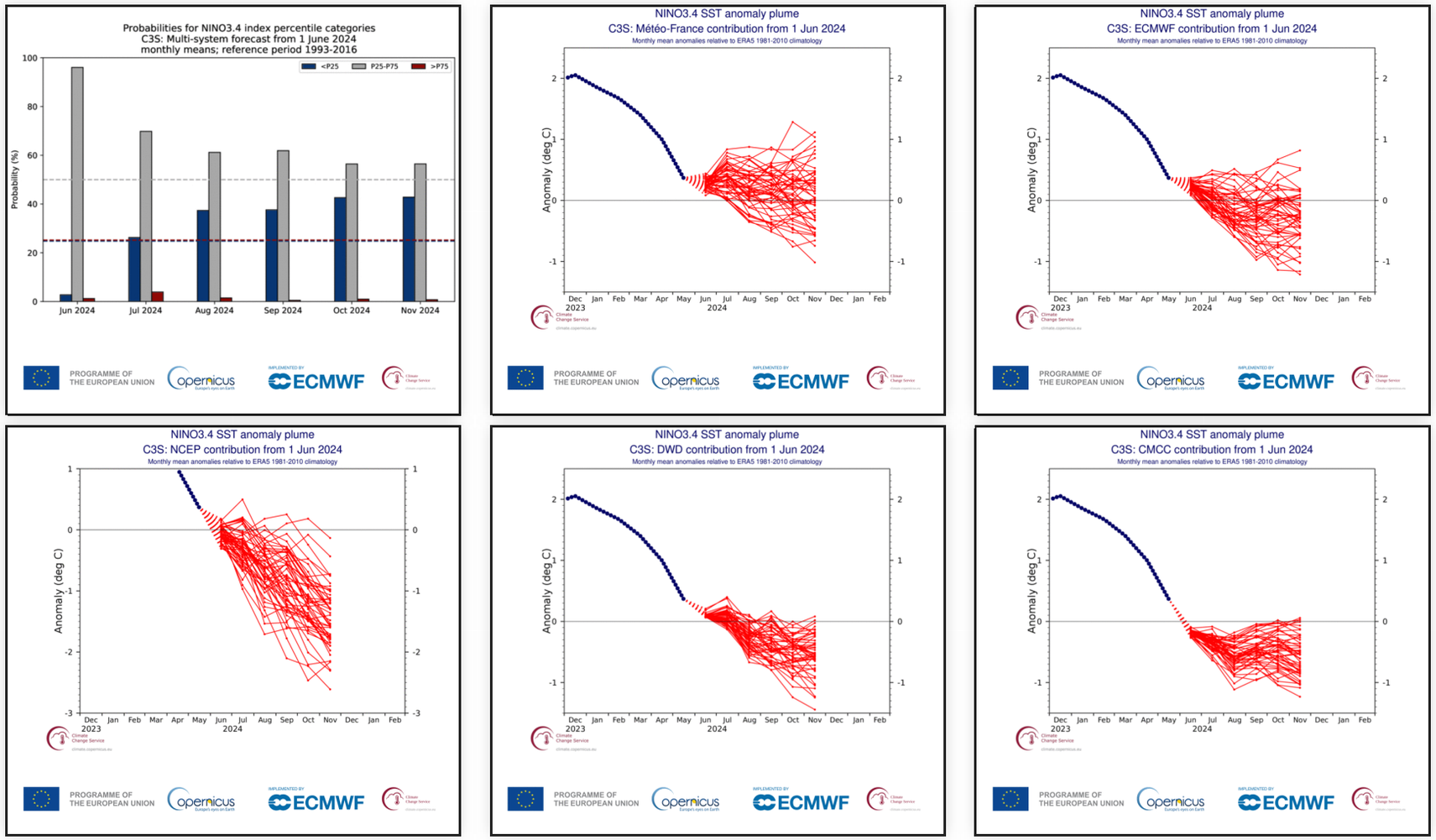


# Oceanic forecast : C3S Nino3.4 re-scaled plume diagrams

All models forecast  the further decrease of the Nino3.4 index, which takes neutral or negative values.

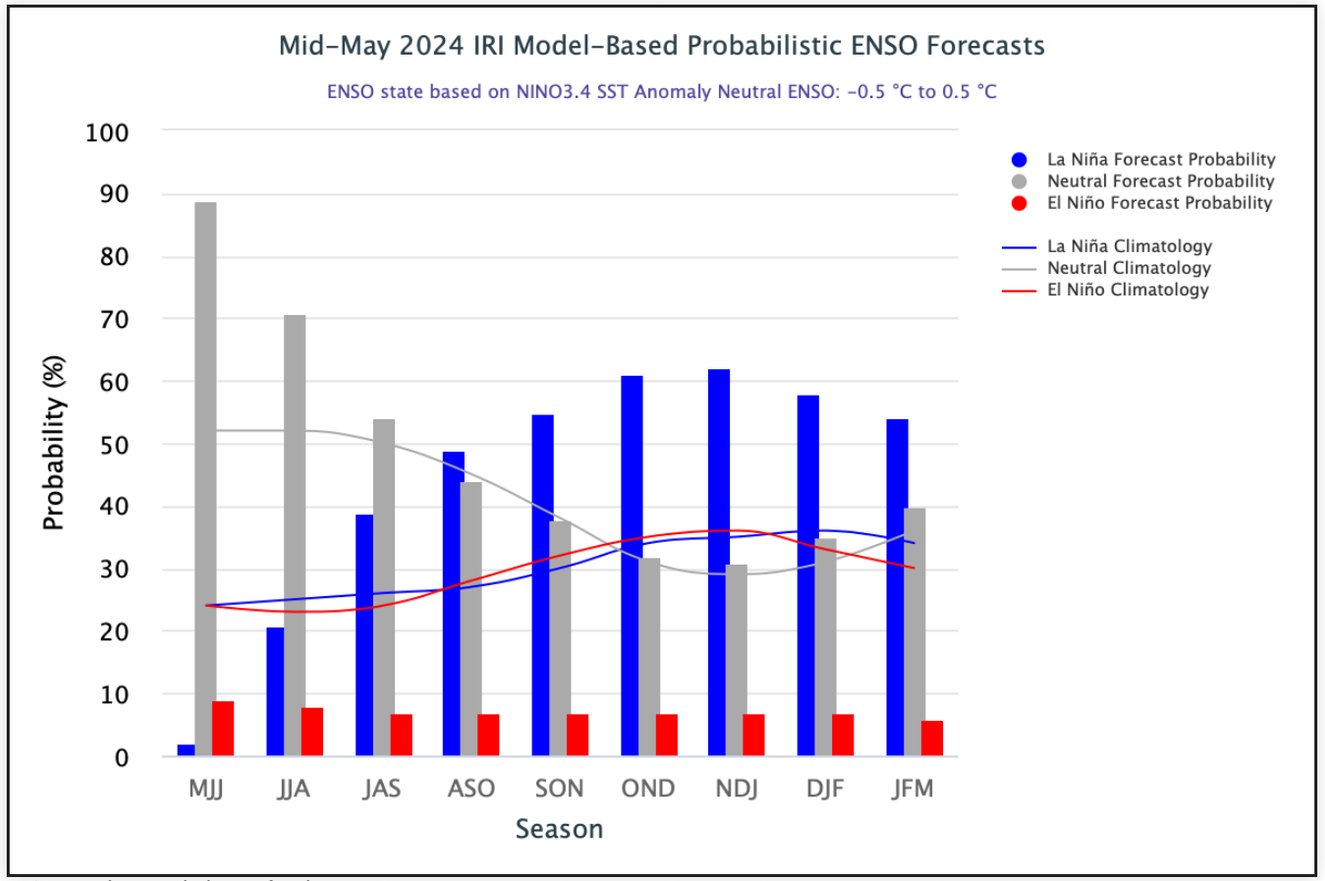
**The most likely phase for the next three months : Neutral phase**




*C3S multi-system probabilty forecast (top left figure) and C3S plume diagrams re-scaled from the variance of observations for the period 1981-2010.*

# Oceanic forecast : Synthesis from IRI

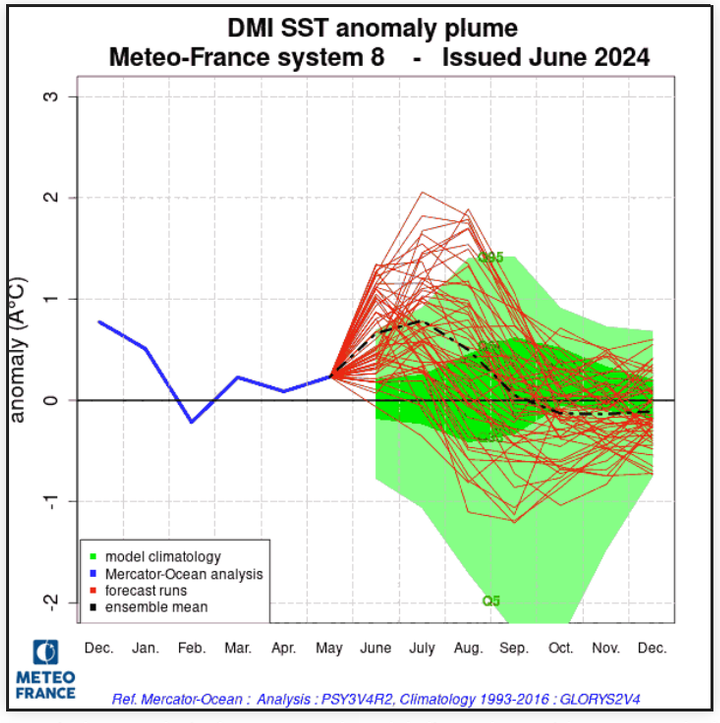
IRI forecast : about 55% probability of neutral conditions for JAS.

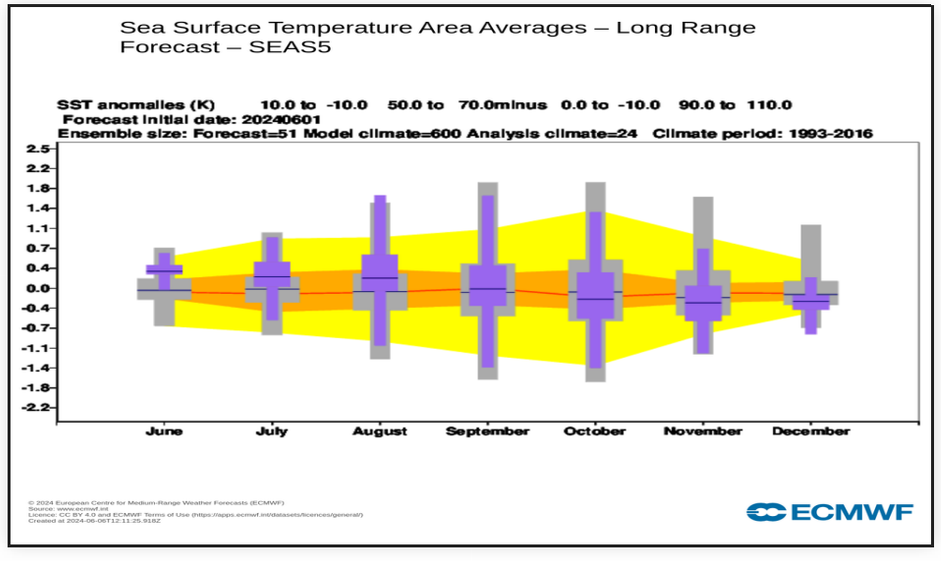



*Probability of Niño, Niña, and neutral phases for the next 8 quarters. source http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/*

# Oceanic forecast : Indian ocean - DMI evolution

For both models, the DMI index is expected to rise again over the next quarter, indicating a possible positive IOD phase. The spread remains wide. Positive phase could stard sooner than climatology.

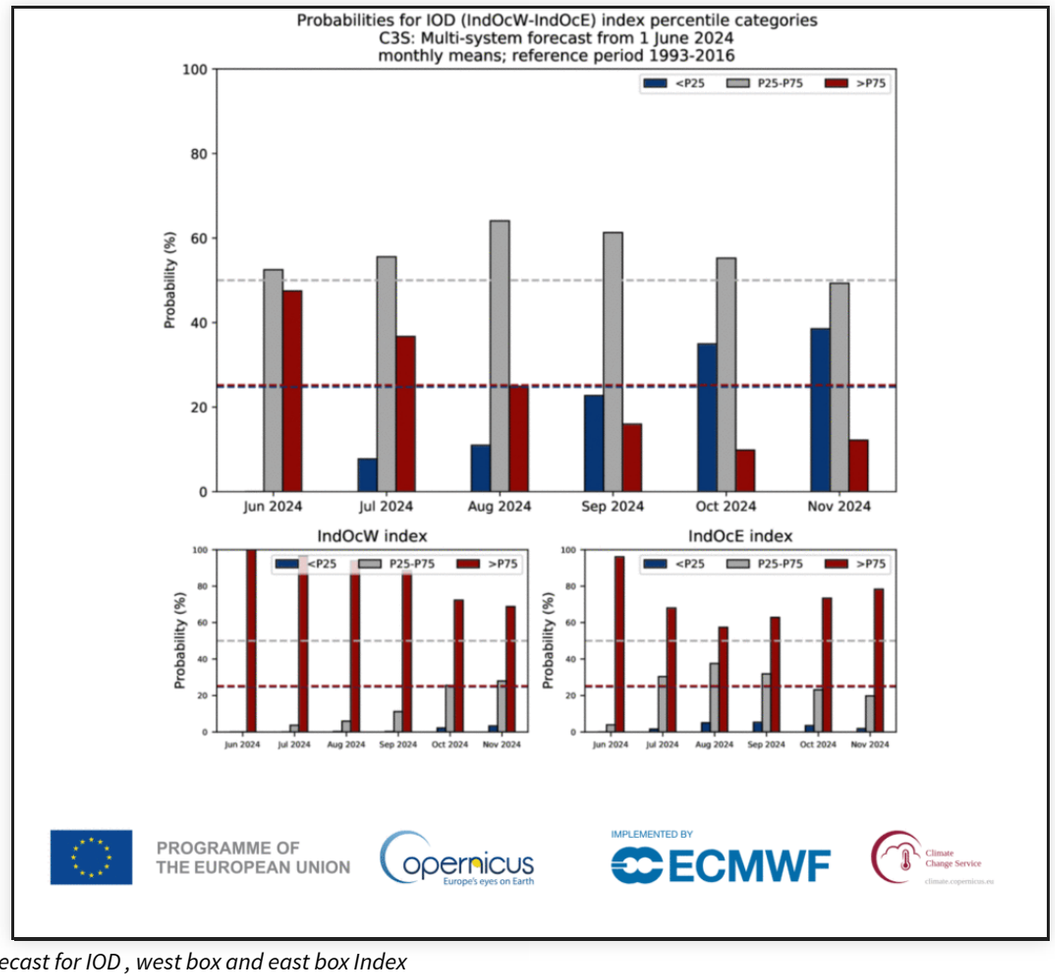



*DMI index : analysis, forecasts and model climatology with MF-S8 on the left and ECM-SEAS5 on the right*

# Oceanic forecast : C3S IOD re-scaled plume diagrams

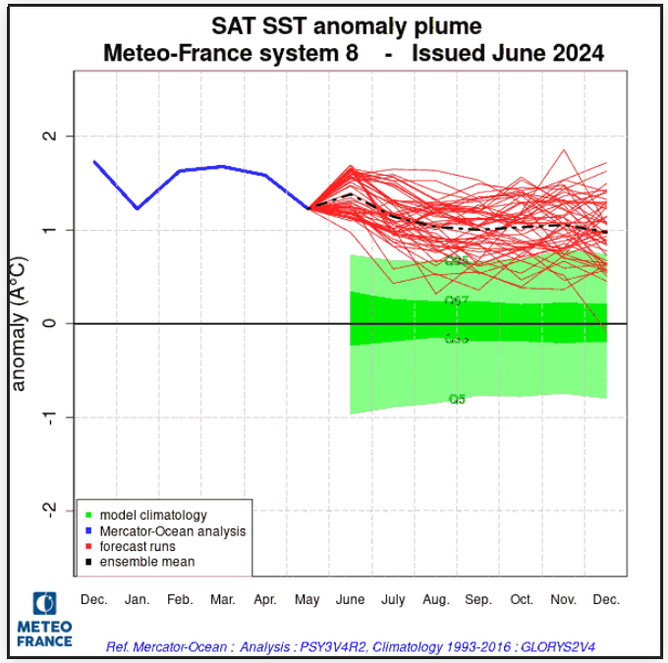
**Expected Phase for the next three months : neutral phase**

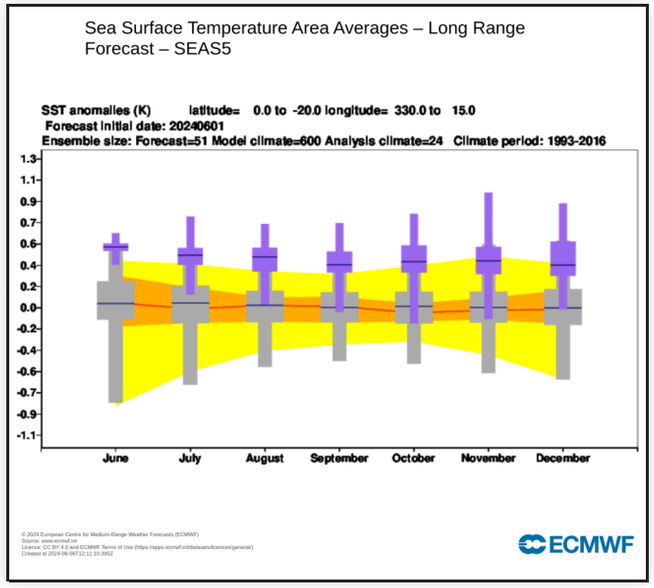


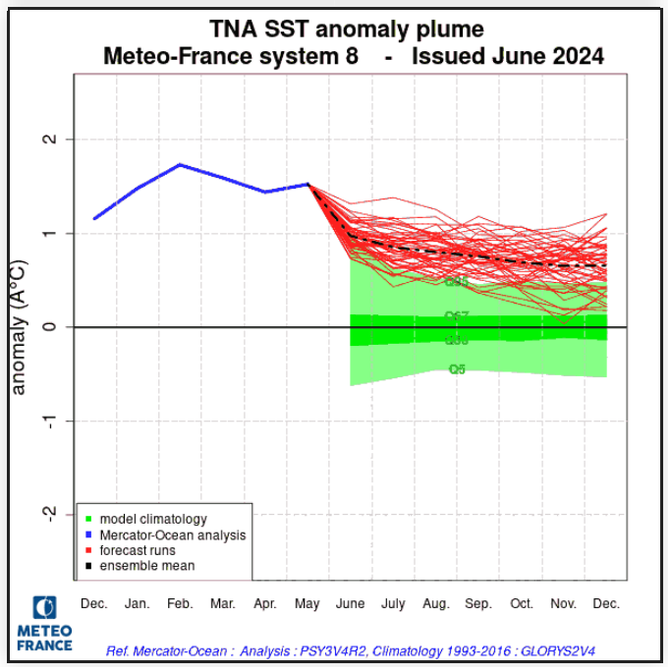

*C3S multi-system probabilty forecast for IOD , west box and east box Index*

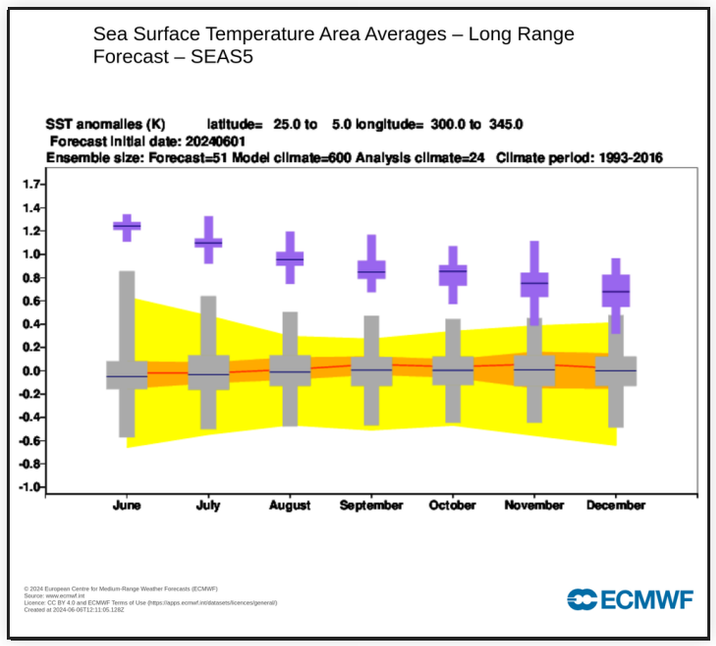
# Oceanic forecast : Atlantic Ocean - SAT and TNA evolution

Although the trend is downwards, both models maintain a very marked warm anomaly for the months ahead.



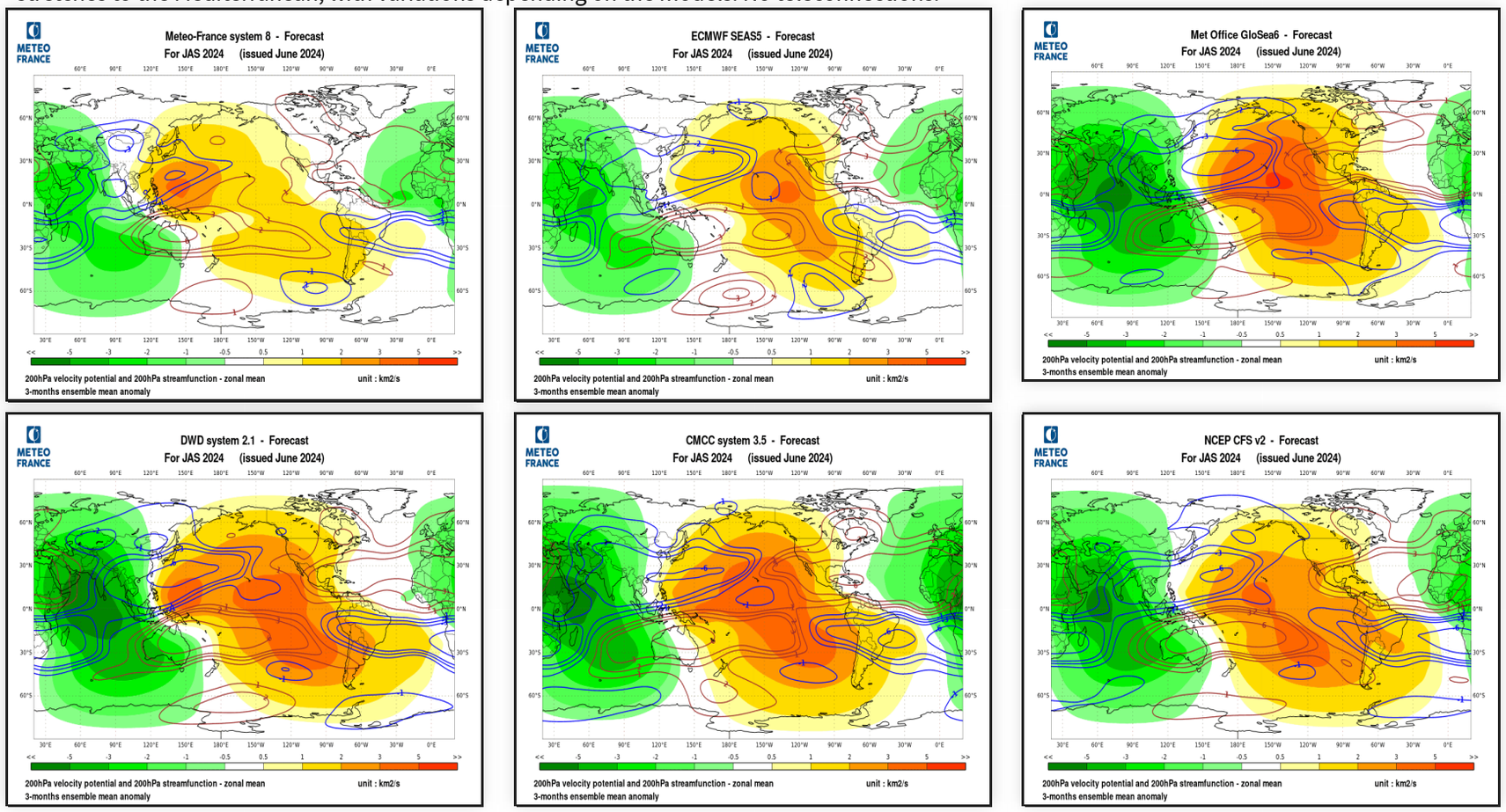




*Anomaly on the SAT and TNA box : analysis, forecasts and model climatology with MF-S8 on the left and SEAS5 on the right*

# Atmospheric circulation forecasts : velocity potentiel and stream function at 200hPa

Velocity Potential : All the models  agree to forecast a large zone of subsidences over the Pacific Ocean and lifts from the western Indian Ocean to Africa (extending for some models as far as the Atlantic).

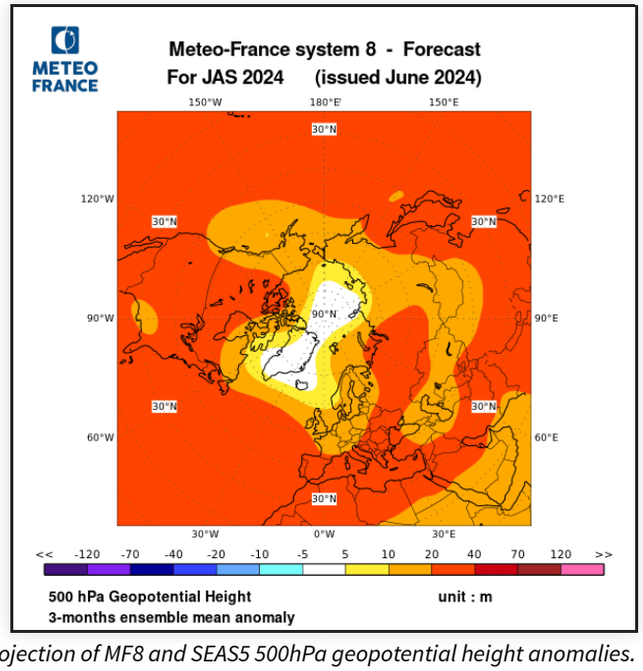
Streamfunctions : The models are also very well matched. Two dipoles are visible. The first is a cyclonic circulation thats extends from the western Pacific to the eastern Indian Ocean. The second is a anticyclonic circulation visible from Atlantic to Africa. A weak anticyclonic curvature signal stretches to the Mediterranean, with variations depending on the models. No teleconnections.

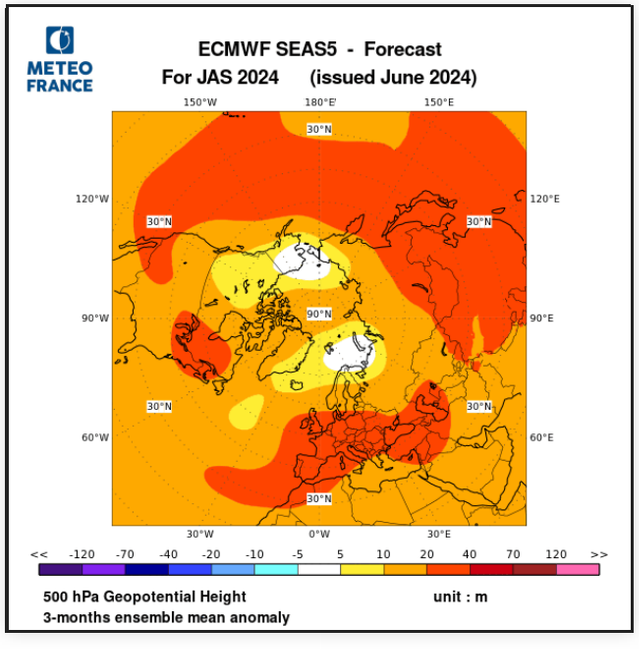



*MF8,SEAS5, UKMO, DWD, CMCC and NCEP 200hPa velocity potential anomalies (color range, green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).*

# Atmospheric circulation forecasts : 500 hPa Geopotential anomalies

The models suggest relative weakness at high latitudes and positive anomalies at temperate latitudes, with large disparities in the precise location of theses anomalies.

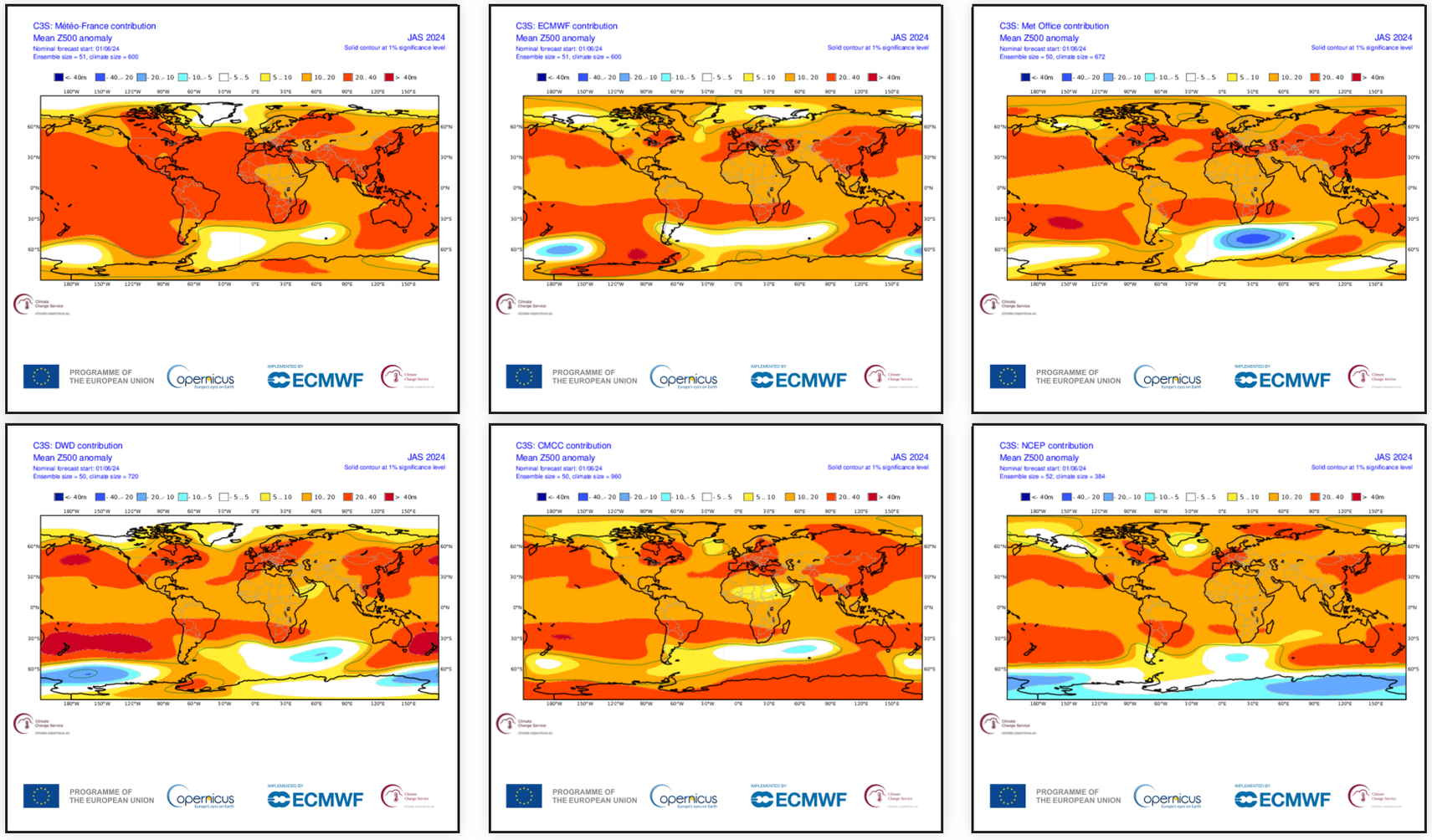



*polar projection of MF8 and SEAS5 500hPa geopotential height anomalies.*

# Atmospheric circulation forecasts : Z500 anomalies in C3S models

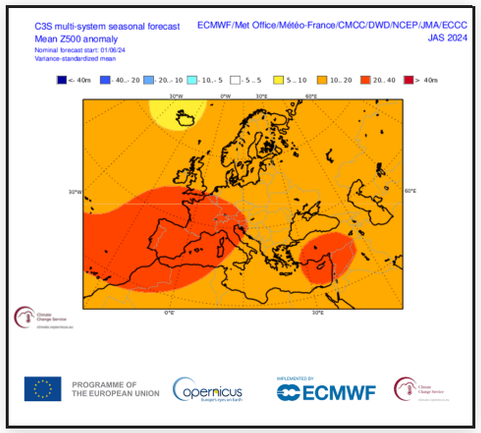
In the southern hemisphere the negative anomaly stretching from southern Argentina to the southern Indian Ocean shows a good accordance between models.
In the Northern Hemisphere the signals are weak and lack consensus, whether over America, Europe or Asia, except a weak anomaly over Greenland/Iceland.

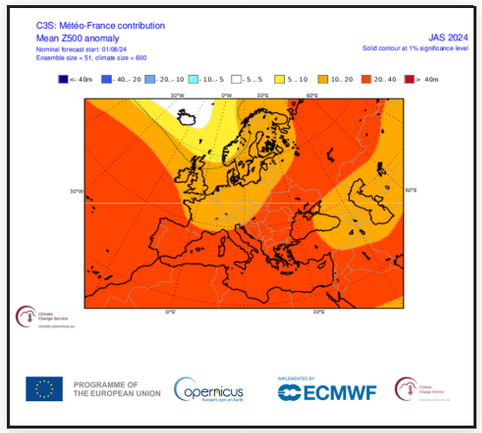


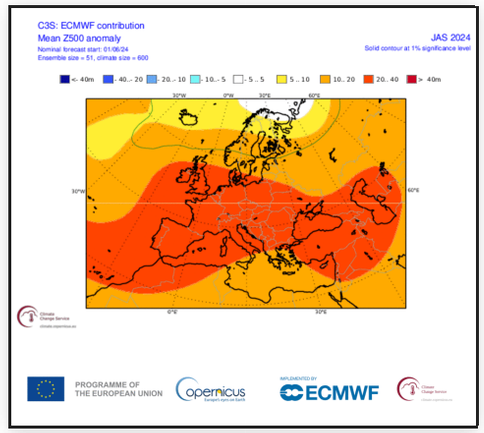

*MF-S8, SEAS5, UKMO, DWD, CMCC and NCEP 500hPa geopotential height anomalies.*

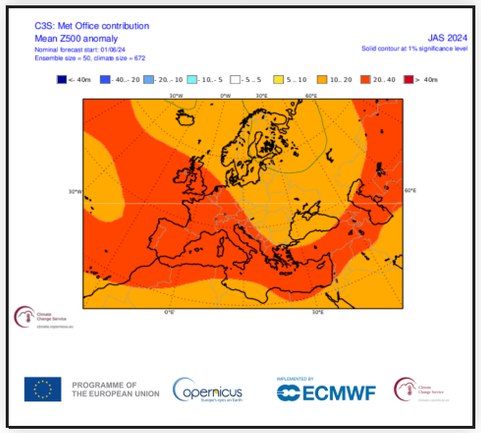
# Atmospheric circulation forecasts : Z500 anomalies in C3S models

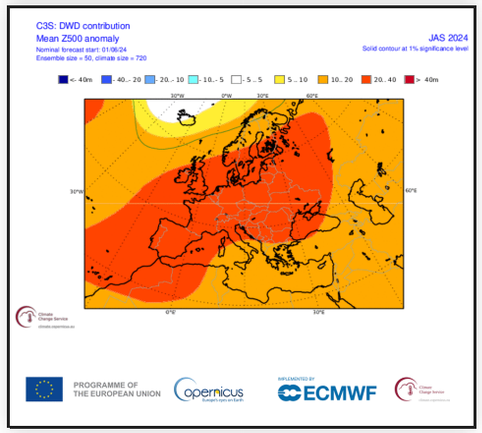
Zooming in on the European continent confirms the lack of convergence between models, whether in Europe or around the Mediterranean Basin.

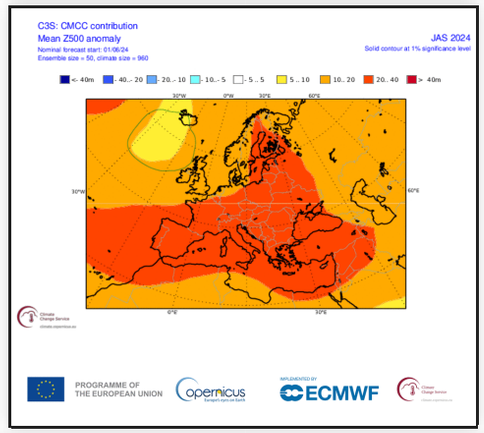


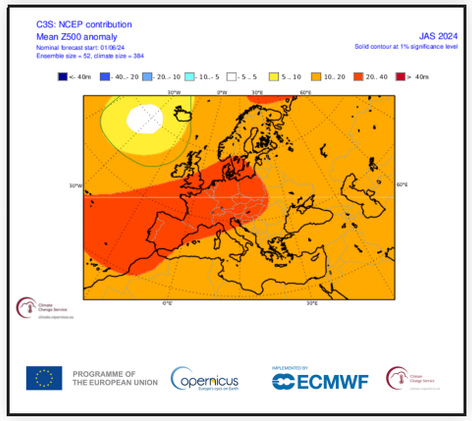



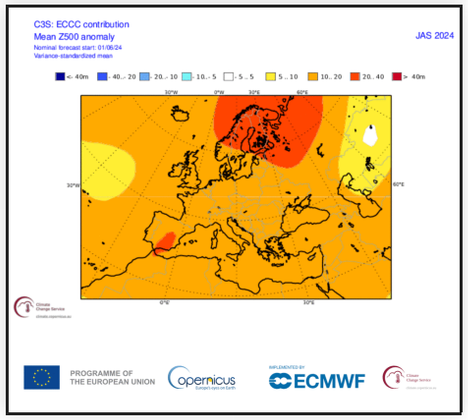



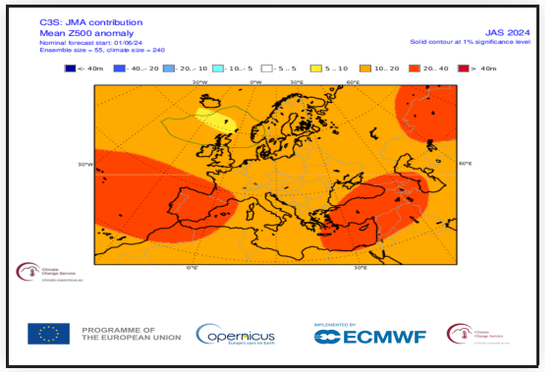



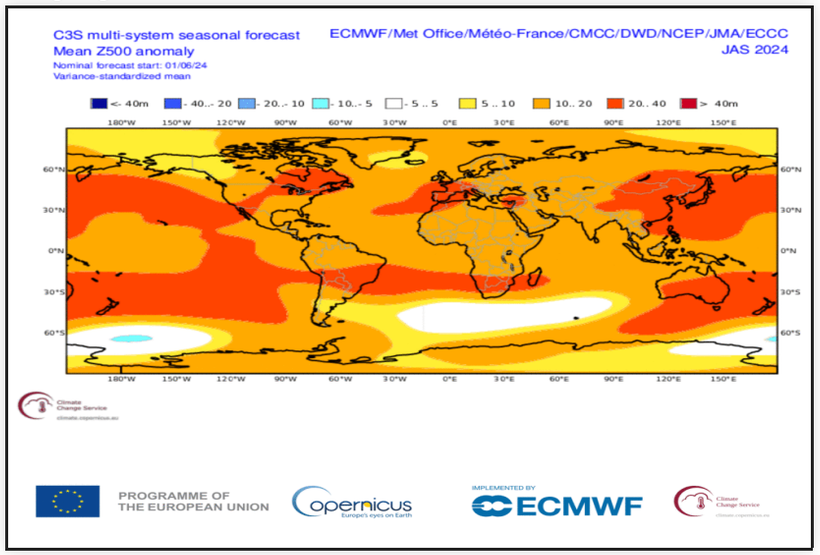



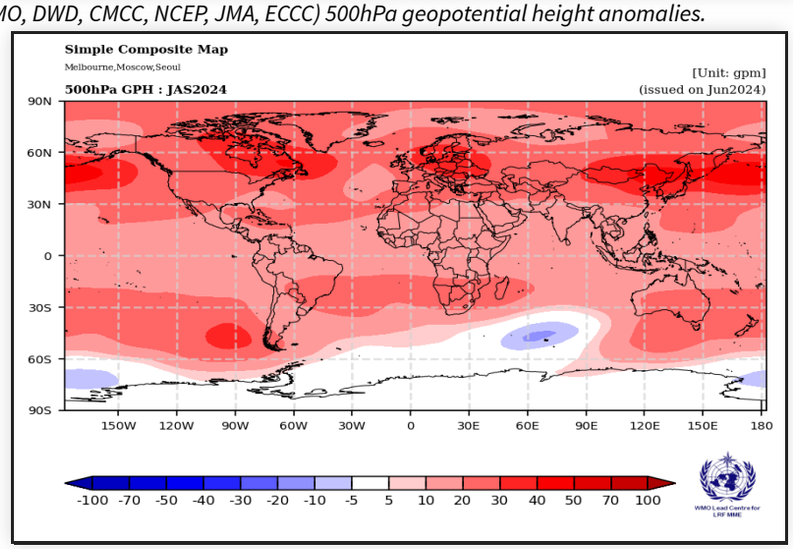

*multi-models 500hPa geopotential height anomalies*

# Atmospheric circulation forecasts : Z500 anomalies multi-systems

The two multi-models are in good agreement in the southern hemisphere. In the north, they share some similarities in America. Elsewhere, and particularly in Europe, the suggested patterns differ (C3S multi-model has similarities with zonal regime while others models MME models looks like blocking regime)



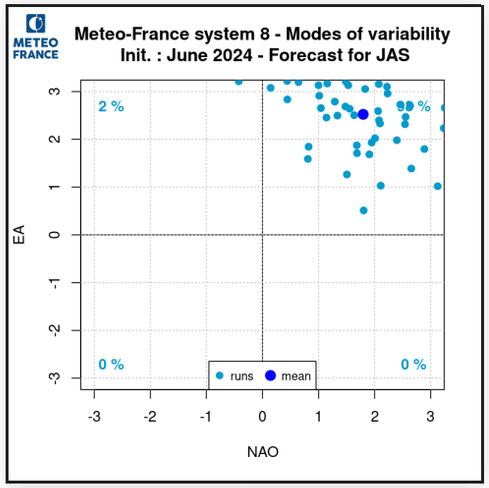

*C3S multi-models (MF-S8, ECMWF-SEAS5, UKMO, DWD, CMCC, NCEP, JMA, ECCC) 500hPa geopotential height anomalies.*

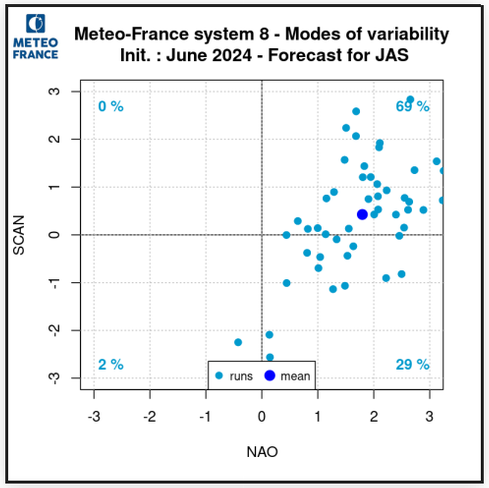


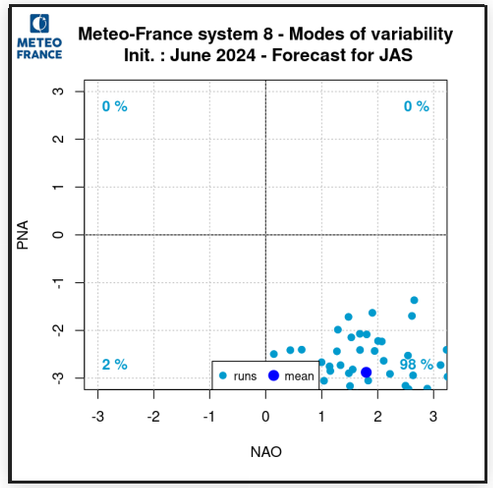

*Others models of WMO multi-models 500hPa geopotential height anomalies.*

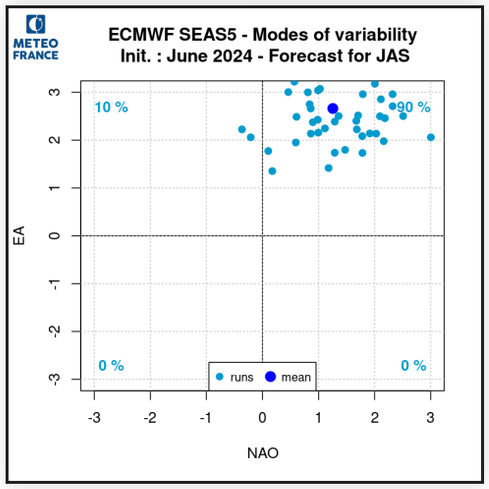
# Modes of variability : forecast

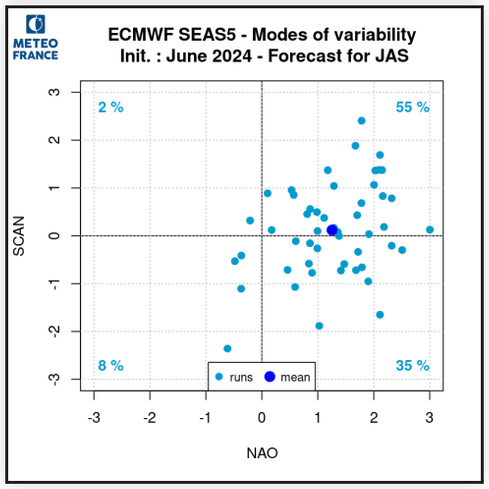
However, when it comes to variability modes, the two models are very close. The NAO+, EA+ and PNA- modes are clearly preferred. The SCAN+ mode signal is weaker.

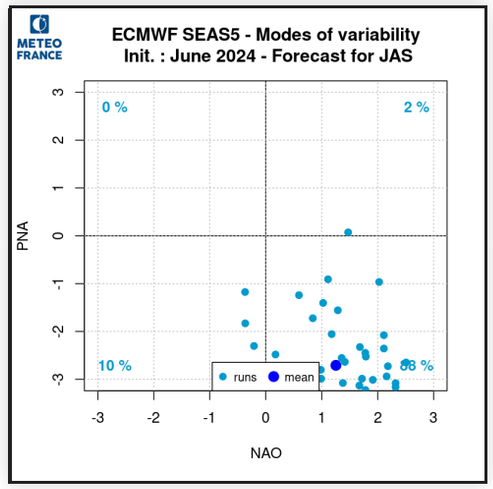


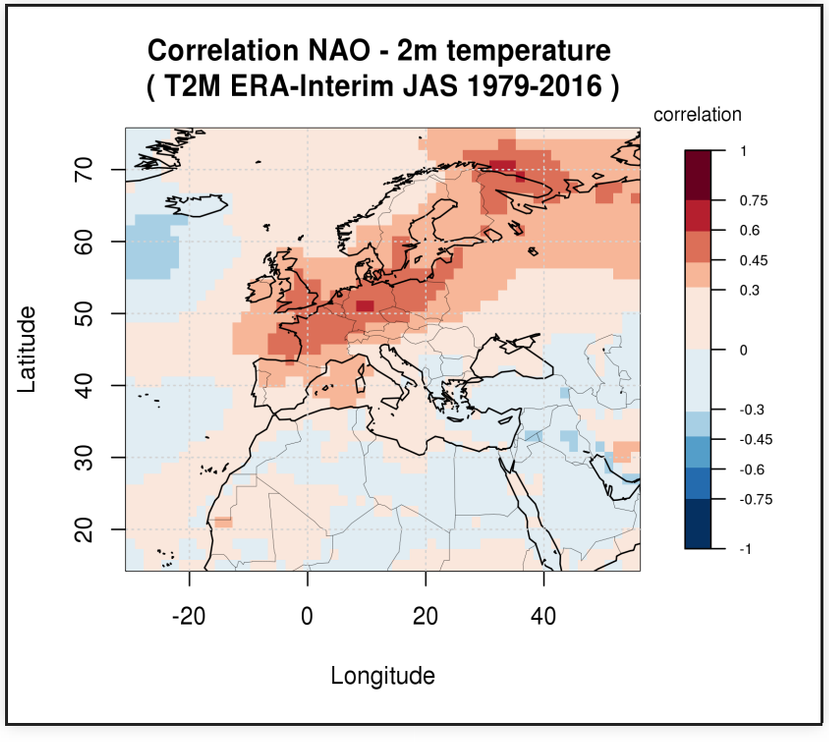



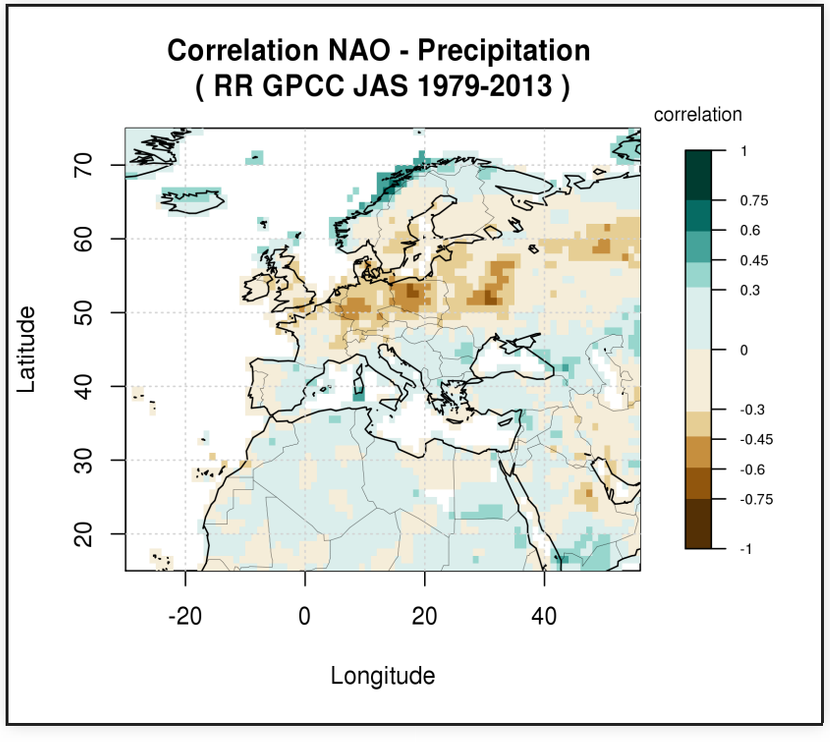




See the modes of variability patterns

# Modes of variability : NAO impacts

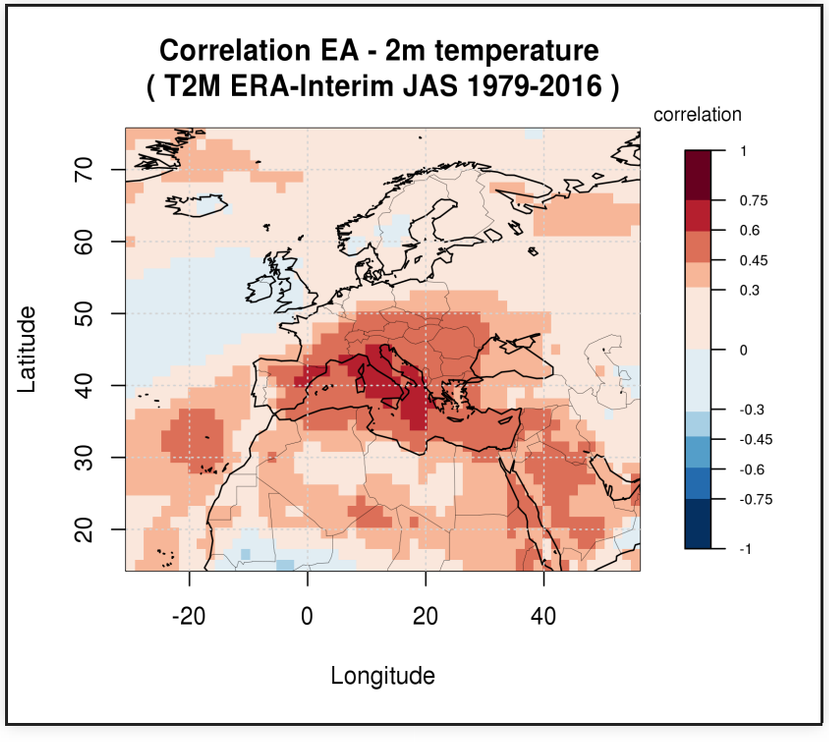
Positive phase of the NAO next quarter.

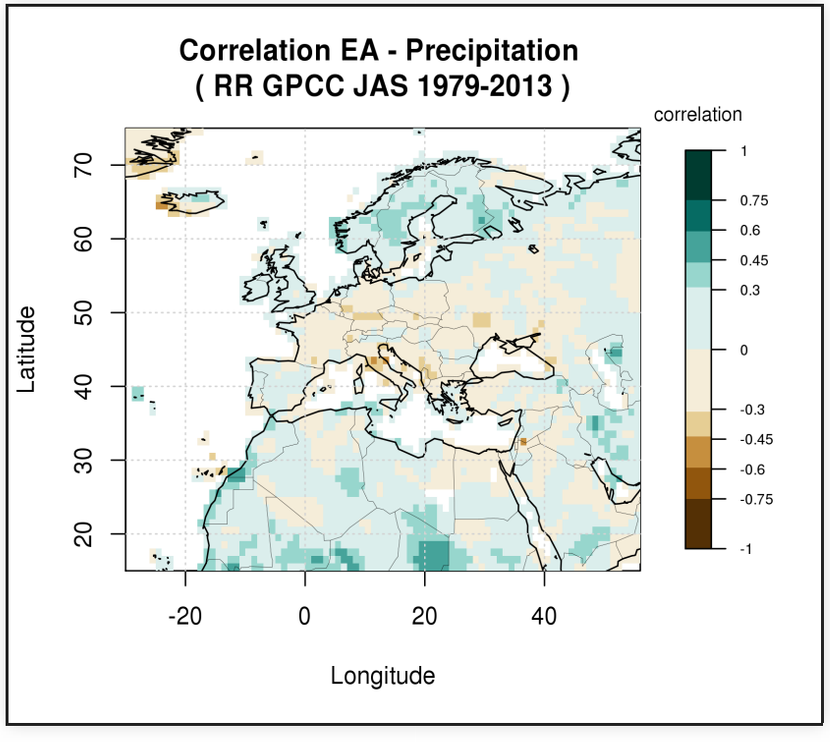


# Modes of variability : EA impacts

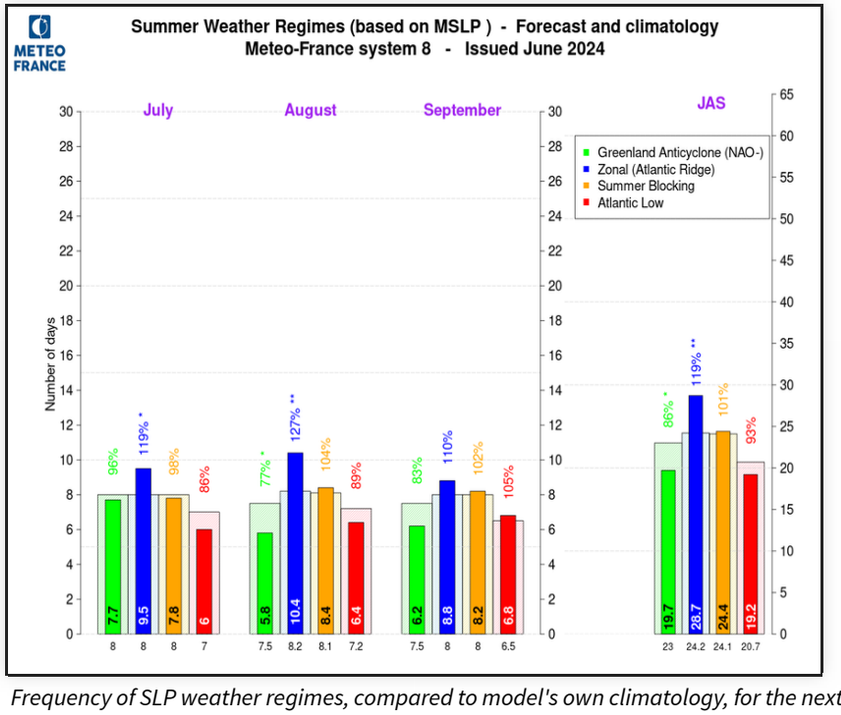
Positive EA is expected next quarter. This mode has a strong influence in particular on the temperature on southern Europe.

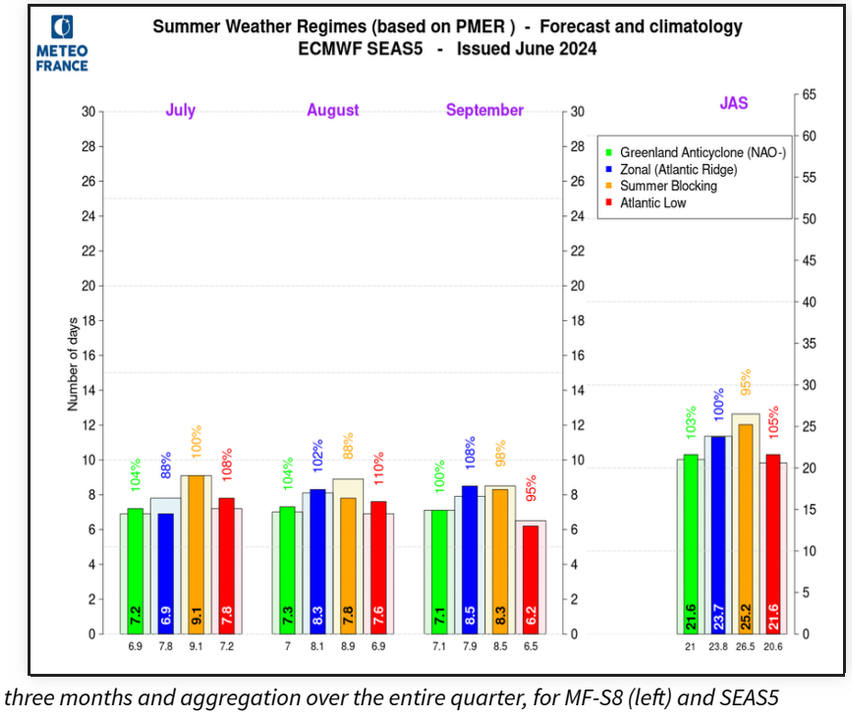


# Weather regimes : summer MSLP

MF8 favors Zonal regime at the expense of Greenland Anticyclonic. ECMWF has a no signal significantly different from the climatology.

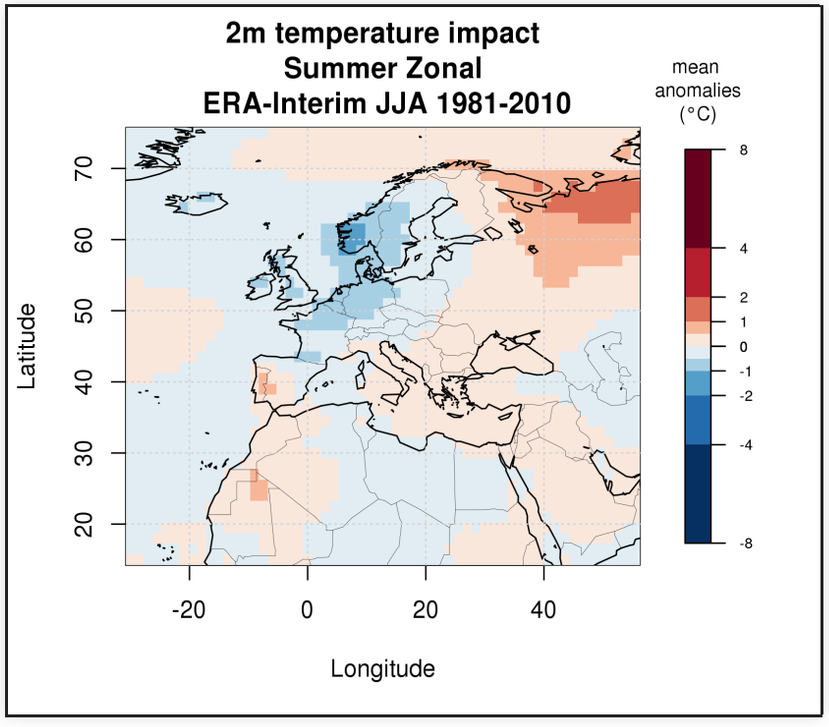


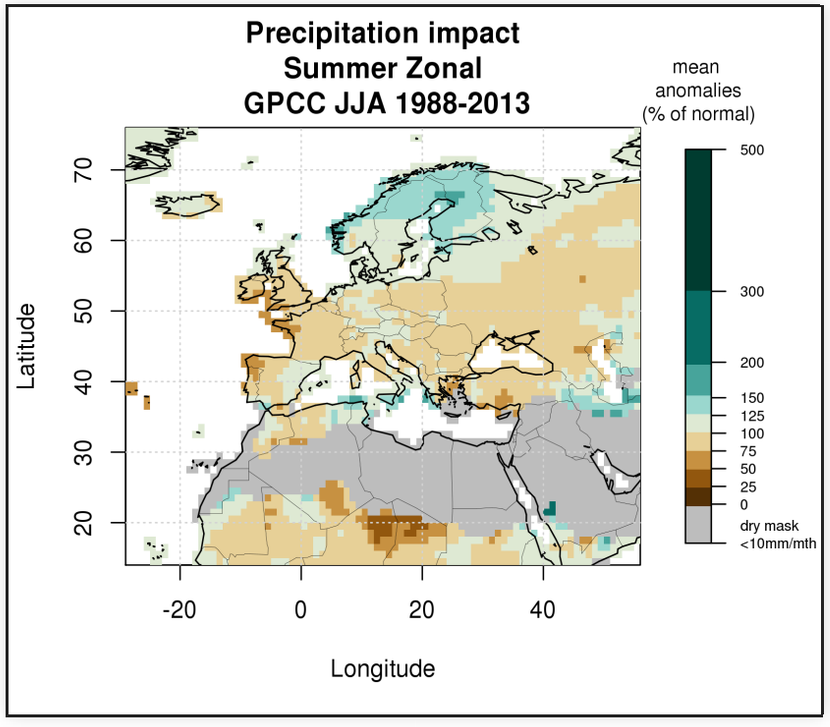




*Frequency of SLP weather regimes, compared to model's own climatology, for the next three months and aggregation over the entire quarter, for MF-S8 (left) and SEAS5 (right).*

# Weather regimes : Impacts

The zonal regime favors colder-than-normal conditions over northwestern Europe, and drier-than-normal conditions over all of Europe except Scandinavia,

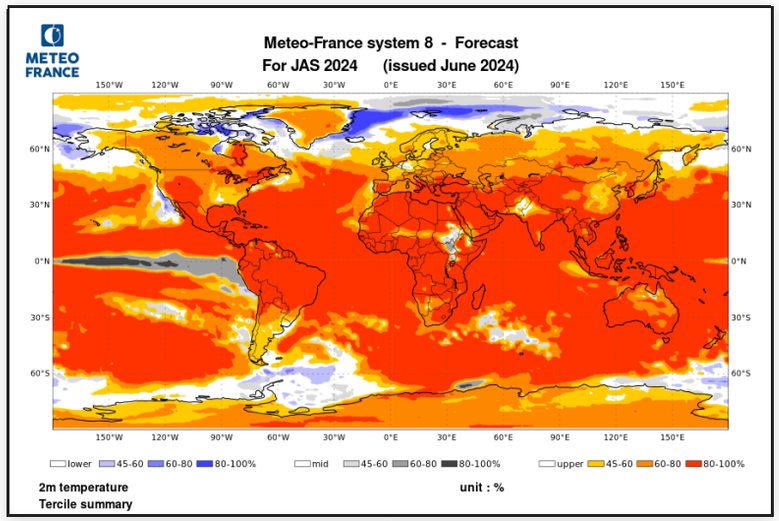


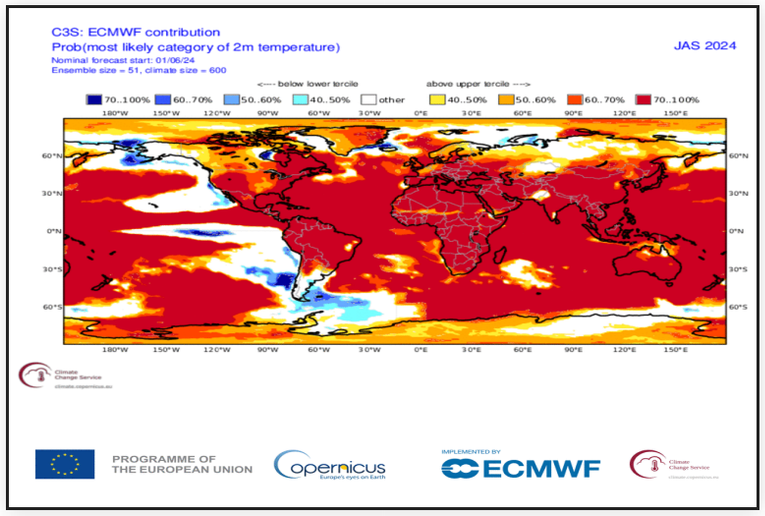



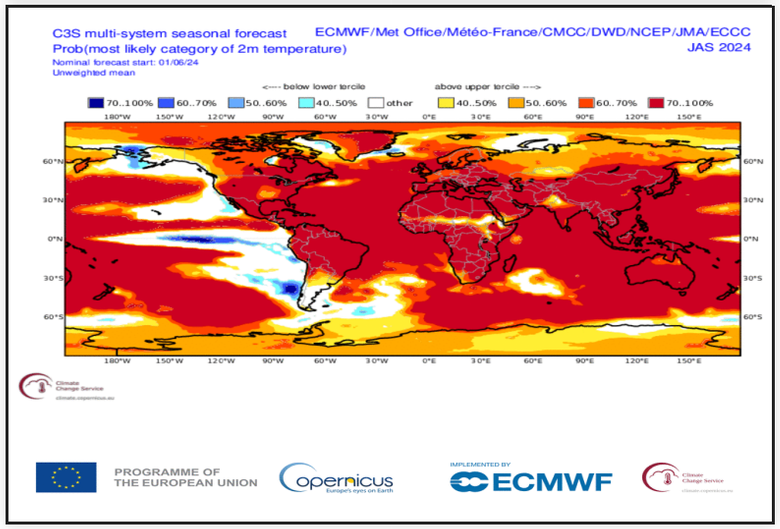

*Impact of Summer Zonal weather regimes on temperature and precipitation. (ref ERA-interim 1981-2010)*

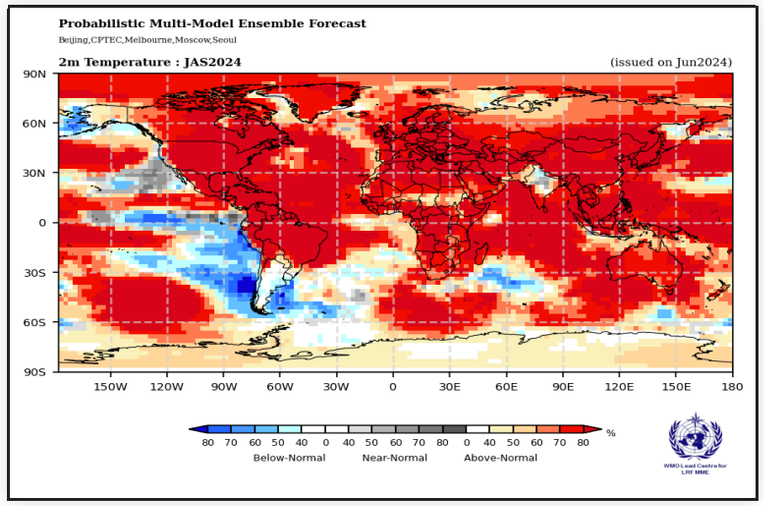
# Forecast of climatic parameters : Temperature probabilities

A warmer-than-normal signal is most likely over the whole globe, with the exception of eastern Pacific, southern South America and Alaska.



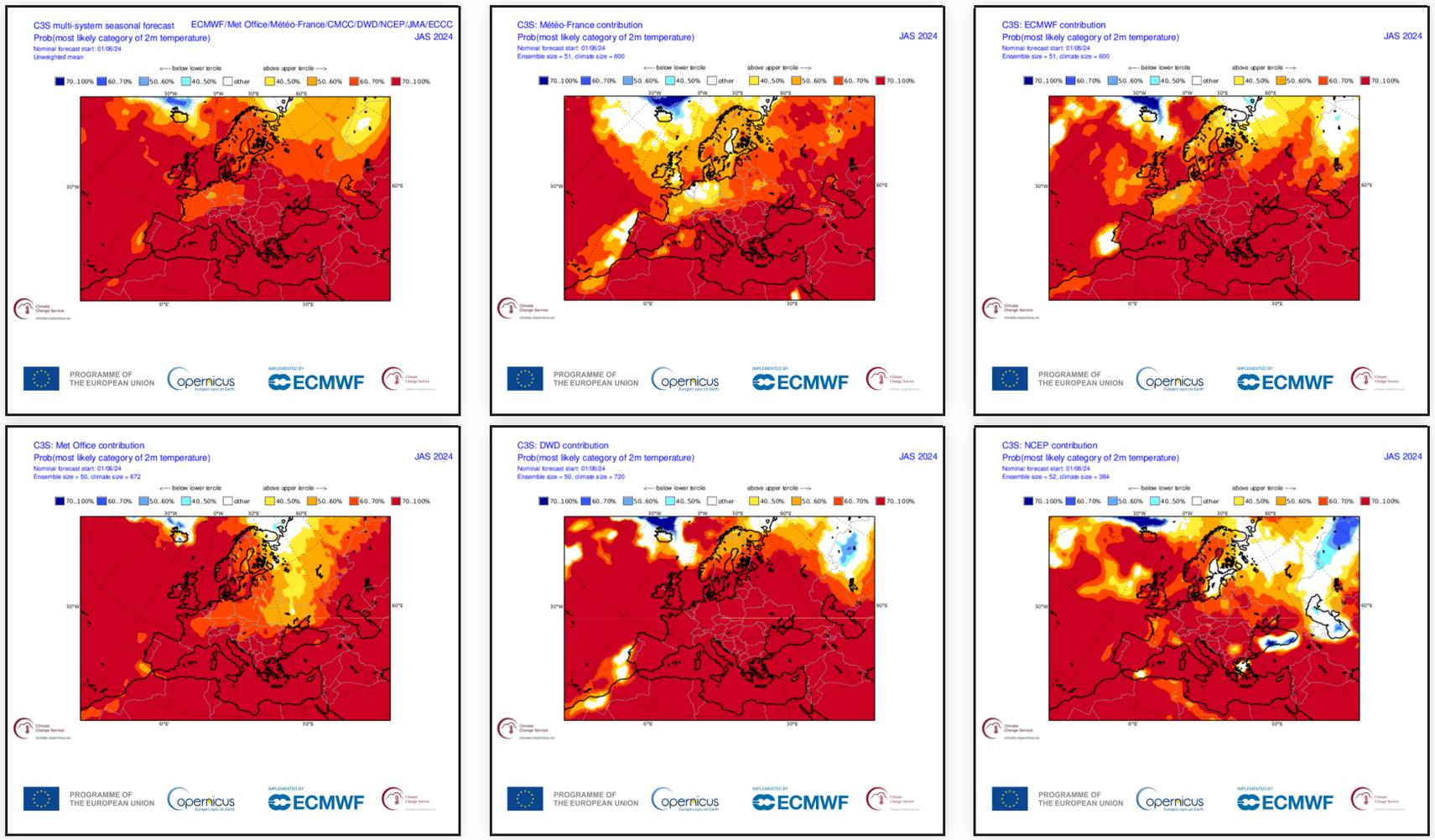




*2m temperature probability map from MF-S8 (top left), ECMWF-SEAS5 (top right), C3S multi-models(bottom left) and others models of WMO multi-models (bottom right)*

# Forecast of climatic parameters : T2M probabilities over Europe in C3S models

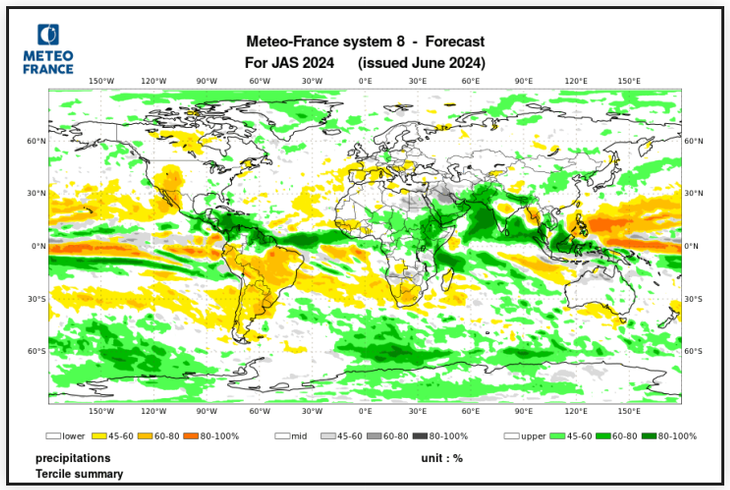
A warmer-than-normal scenario is very likely over the Mediterranean Basin related to the anticyclonic curvature at 200 hPa.
Probabilities are weaker from north of France to Scandinavia.

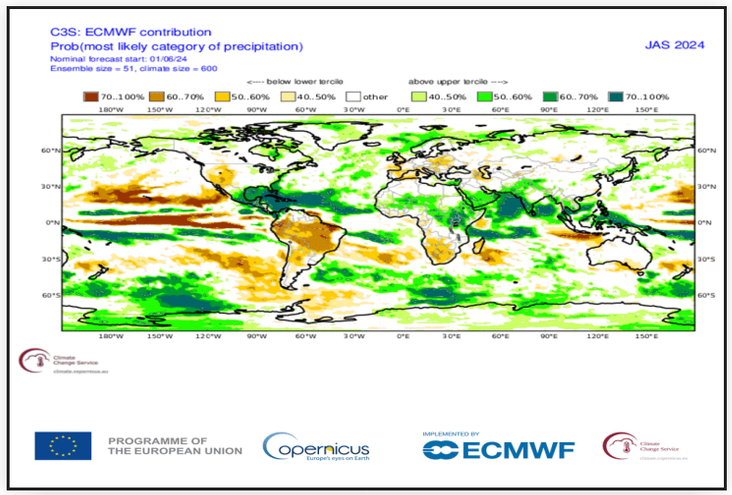


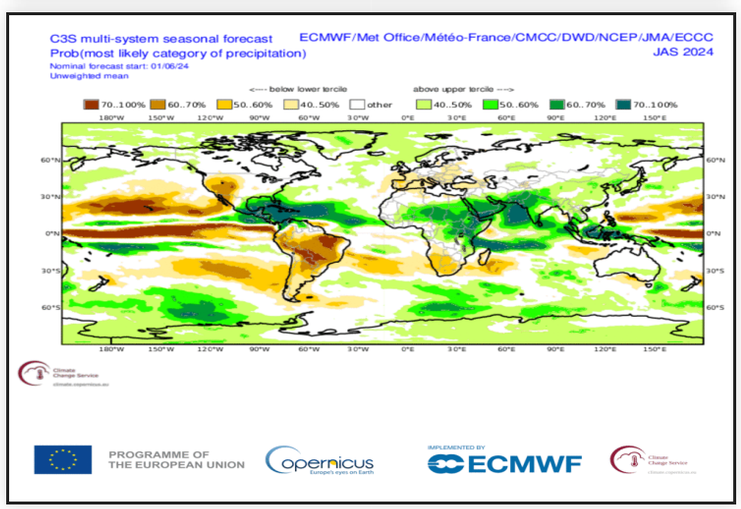

*C3S multi-models probability map (top left) and MF-S8, ECMWF-SEAS5, UKMO , DWD, CMCC models.*

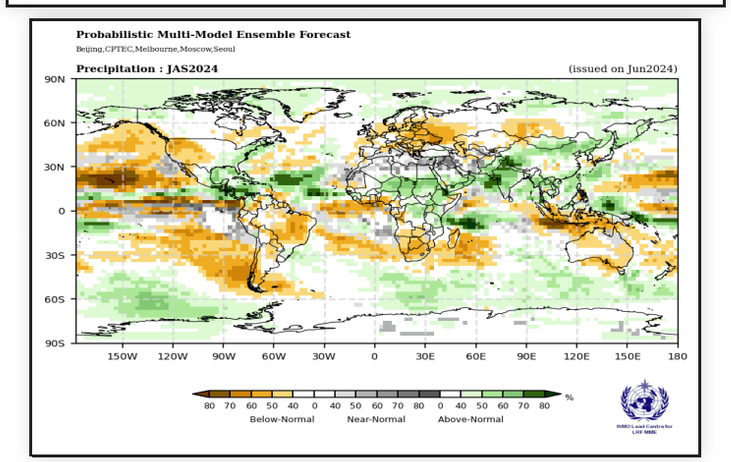
# Forecast of climatic parameters : Precipitation

In the Northern Hemisphere, wet conditions are more likely near Gulf of Mexico and Alaska while dry conditions are referred on the west of the United States as on Europe (South-West Europe for the multi-model C3S, and Eastern Europe for others multi-model MME)



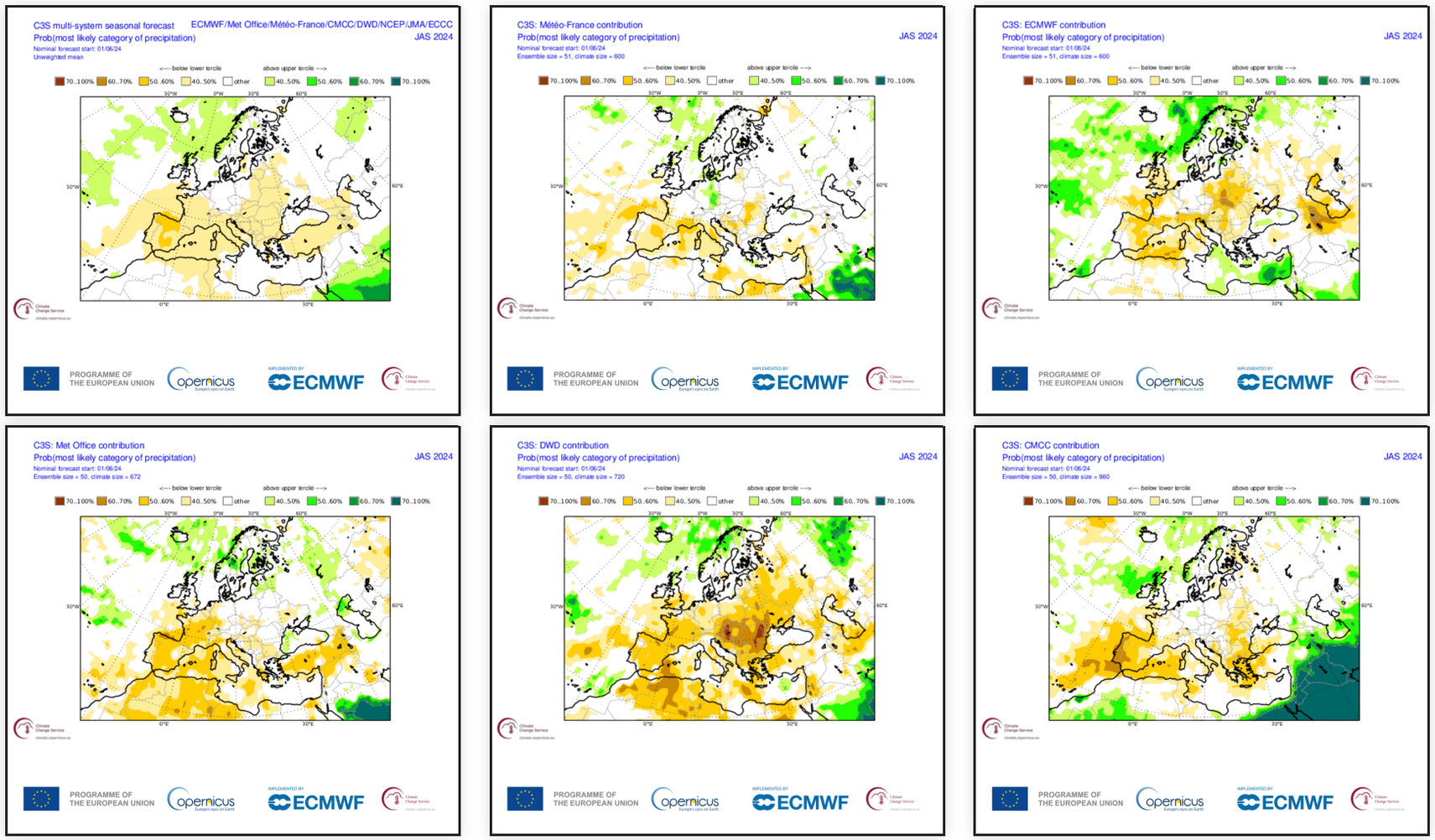




*precipitation probability map from MF-S8 (top left), ECMWF-SEAS5 (top right), C3S multi-models (bottom left) and others models of WMO multi-models (bottom right)*

# Forecast of climatic parameters : Precipitation probabilities over Europe in C3S models

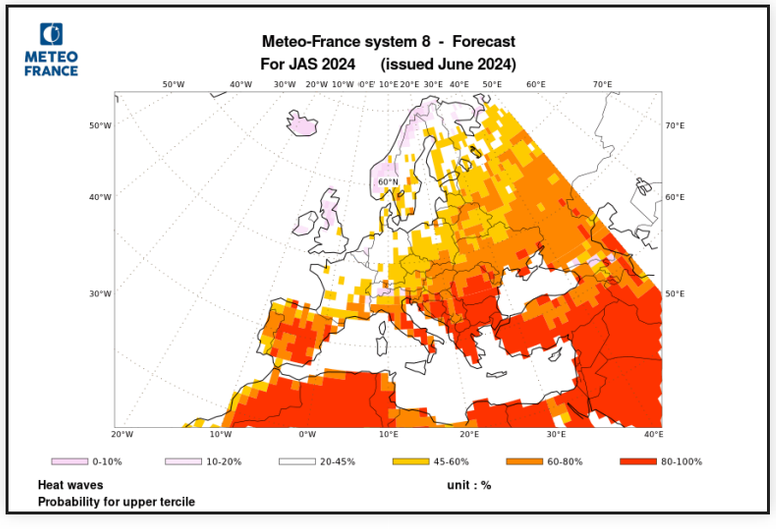
The southwest of Europe seems to be dryer-than-average, particularily Spain and Portugal. This dry signal extends into central and south-eastern Europe for some models (DWD,ECMWF)

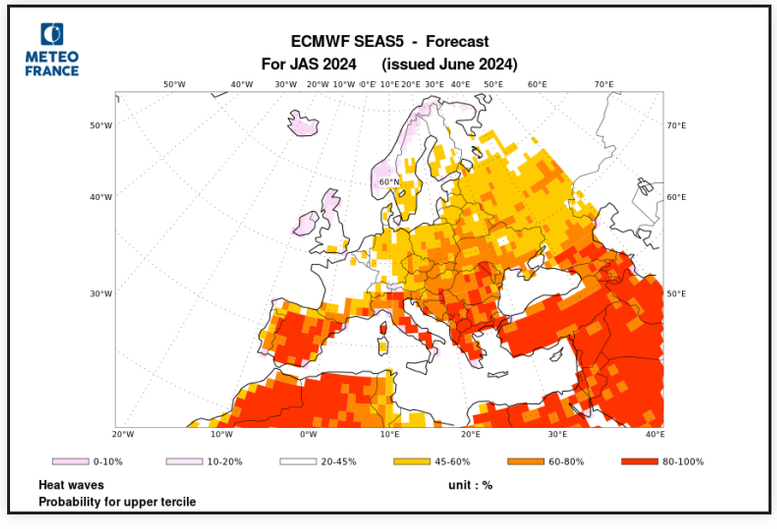



*C3S multi-models probability map (top left) and MF-S8, SEAS5, UKMO, DWD, CMCC models.*

# Forecast of climatic parameters : Heat waves

The probability of heat waves is higher than climatology over south of Europe for both models.

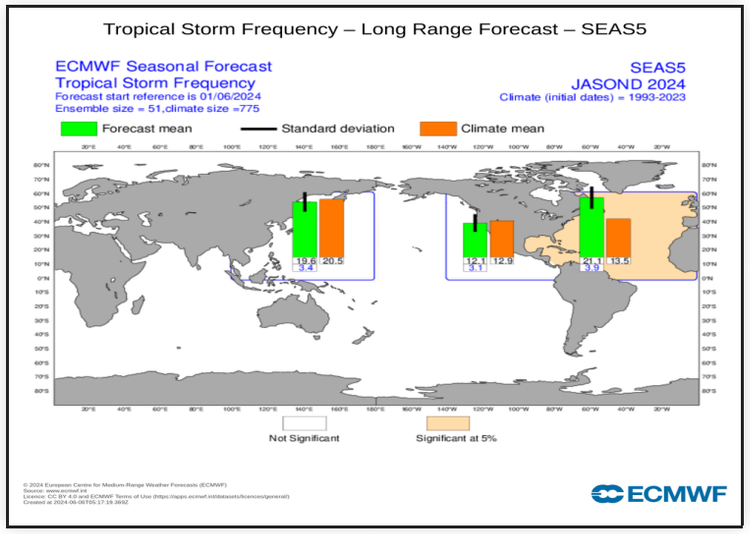


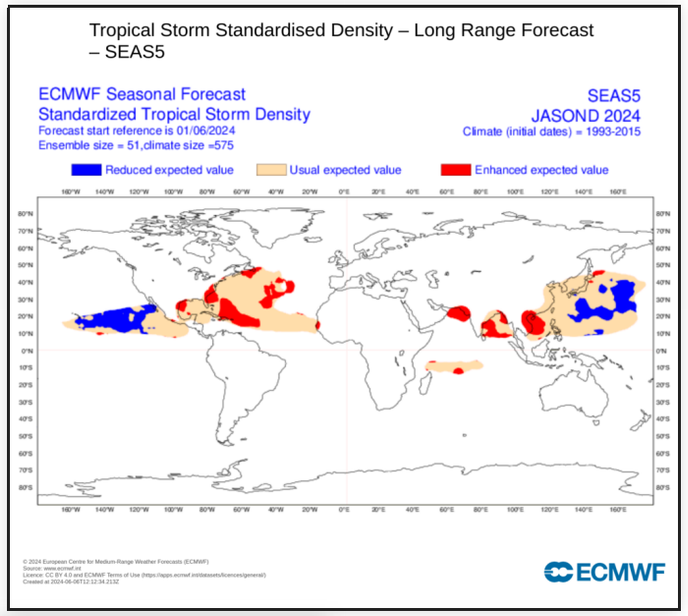



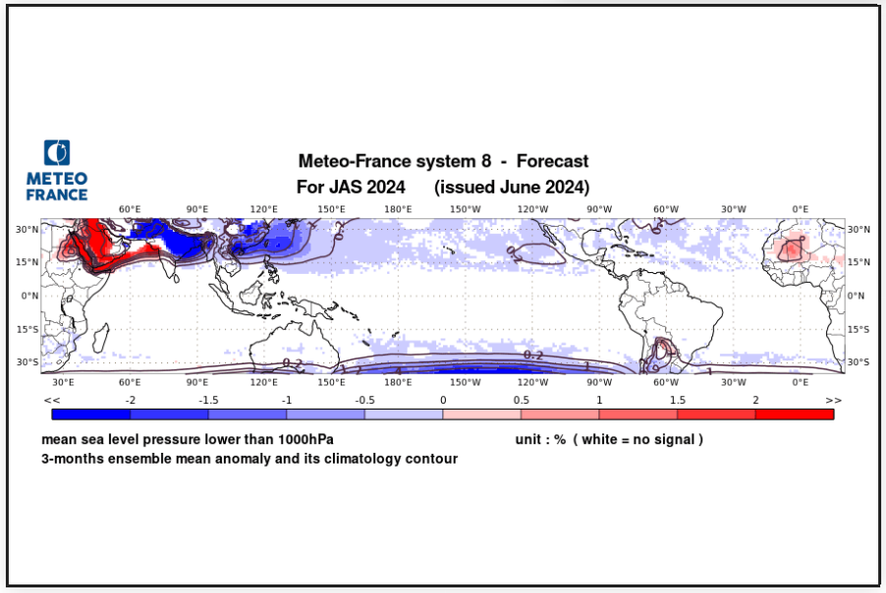

*Heat wave probability for MF8 (left) and ECMWF (right). A heat wave is detected if the corrected T2M is above the daily 90th percentile and a fixed 20°C threshold.* *more details here*

# Forecast of climatic parameters : Tropical Storm Frequency

The frequency of tropical storms in the Atlantic is higher than normal.

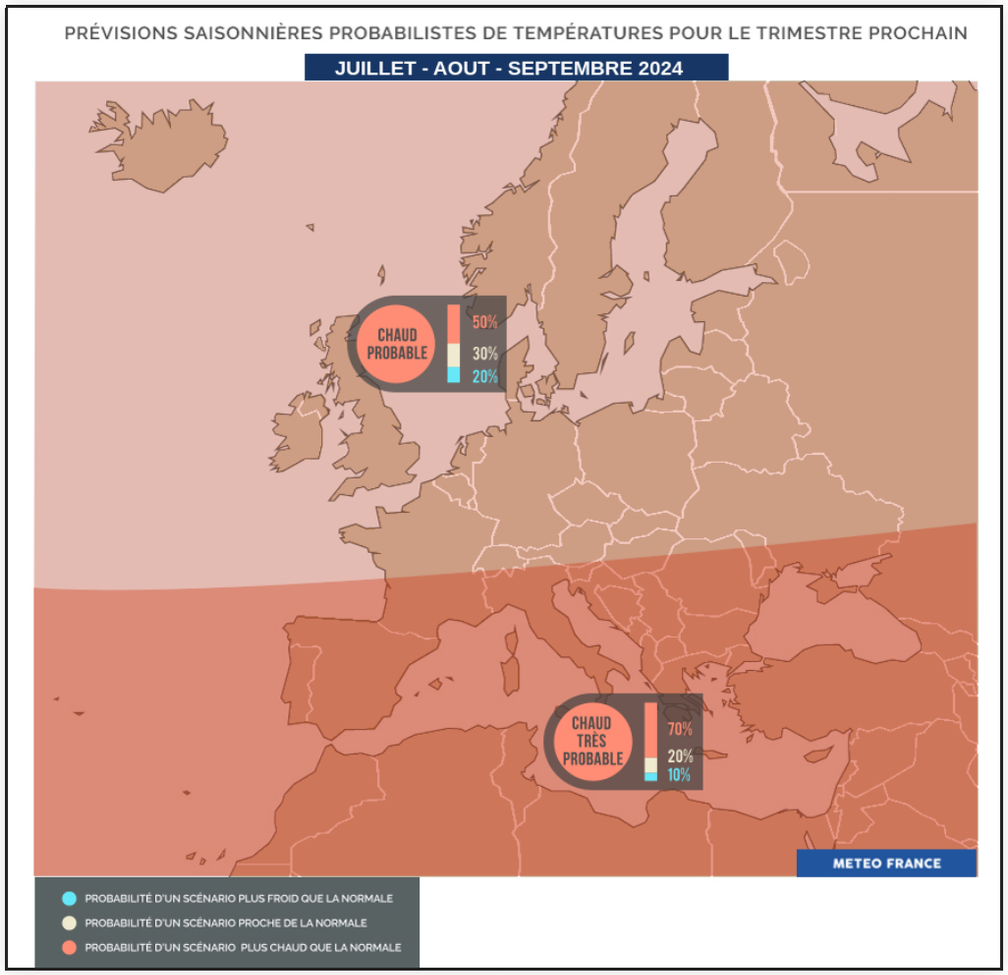


# Synthesis map for Europe : Temperature

A warmer-than-normal scenario is likely across Europe, and very likely in southern Europe around the Mediterranean.



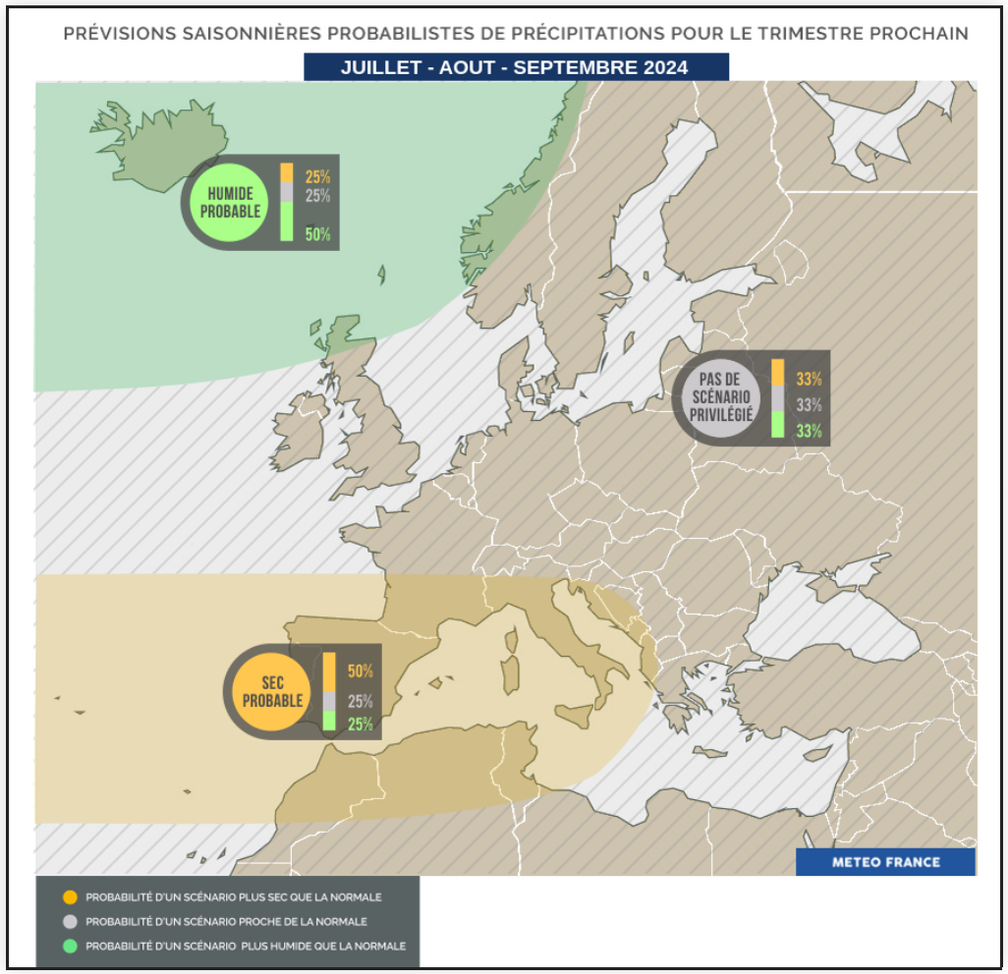

*Synthesis map of probabilistic forecast for Europe. (c) Météo-France/DCSC/ACS*

## Synthesis map for Europe : Precipitation

A drier than normal scenario is likely around the western Mediterranean basin.

A wetter-than-normal scenario is likely from Iceland to North Scotland to Norway.

No scenario emerges elsewhere.




*Synthesis map of probabilistic forecast for Europe. (c) Météo-France/DCSC/ACS*