

# Météo-France Seasonal Forecast Bulletin

NOVEMBER - DECEMBER 2024 - JANUARY 2025

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# 1. Oceanic analysis of September 2024

## 1. SST anomalies

# Oceanic analysis of September 2024 : SST anomalies

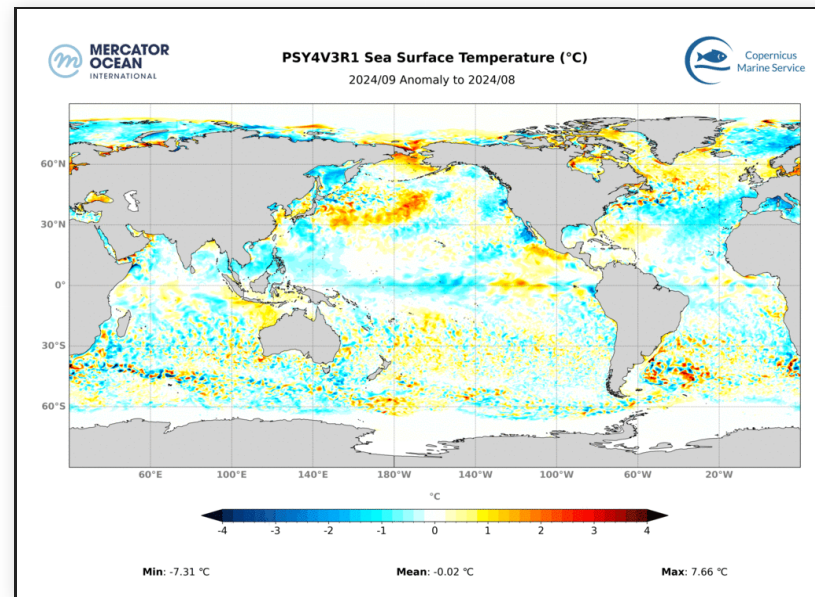
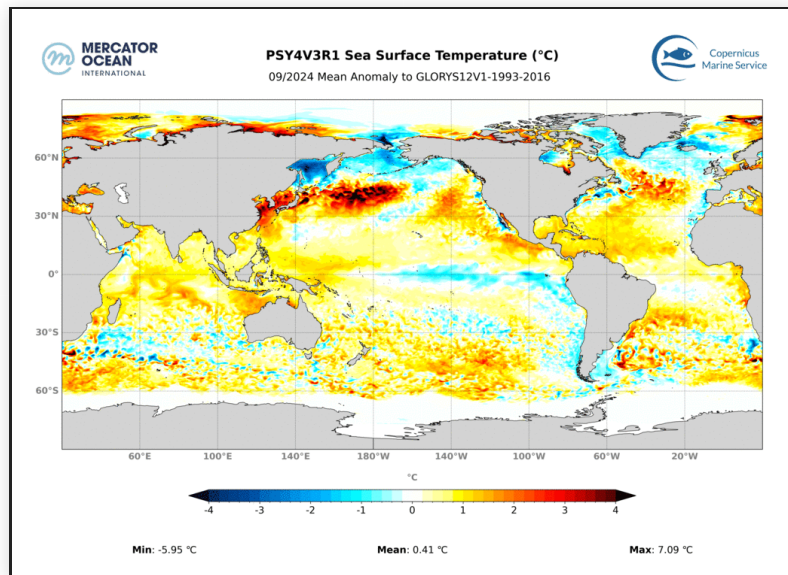
## Current ENSO situation : neutral conditions

Overall, SST are trending downwards in all basins.

In the Pacific Ocean :A small cold anomaly increases over the eastern equatorial zone, while the PDO- pattern has strengthened in the Northern Hemisphere.

In the Indian Ocean : SST remains above normal over the whole basin except the far south.

In the Atlantic Ocean : The warm SST anomaly is attenuating over the tropical zone.

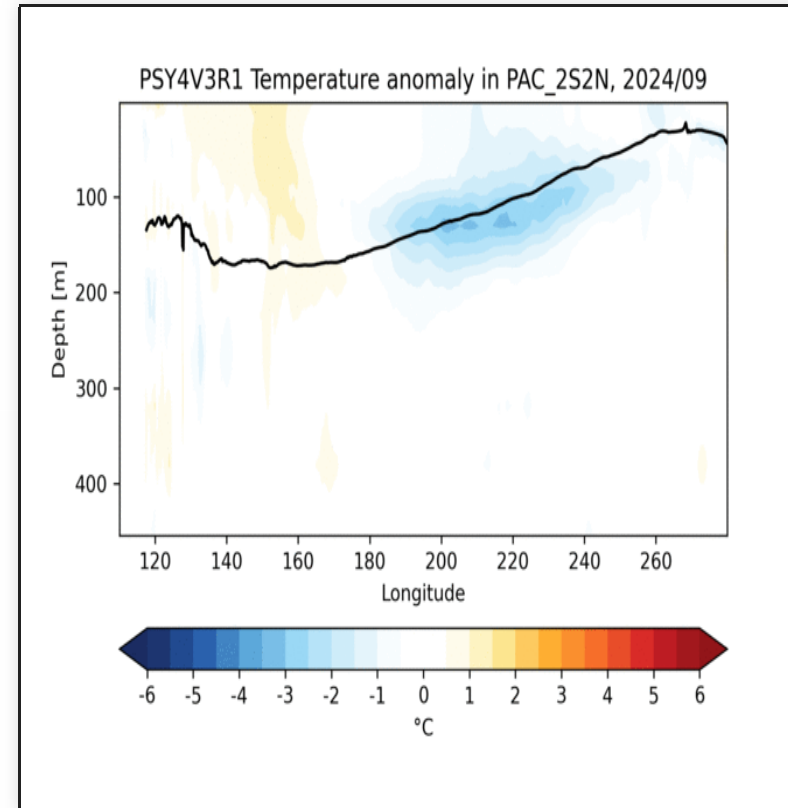
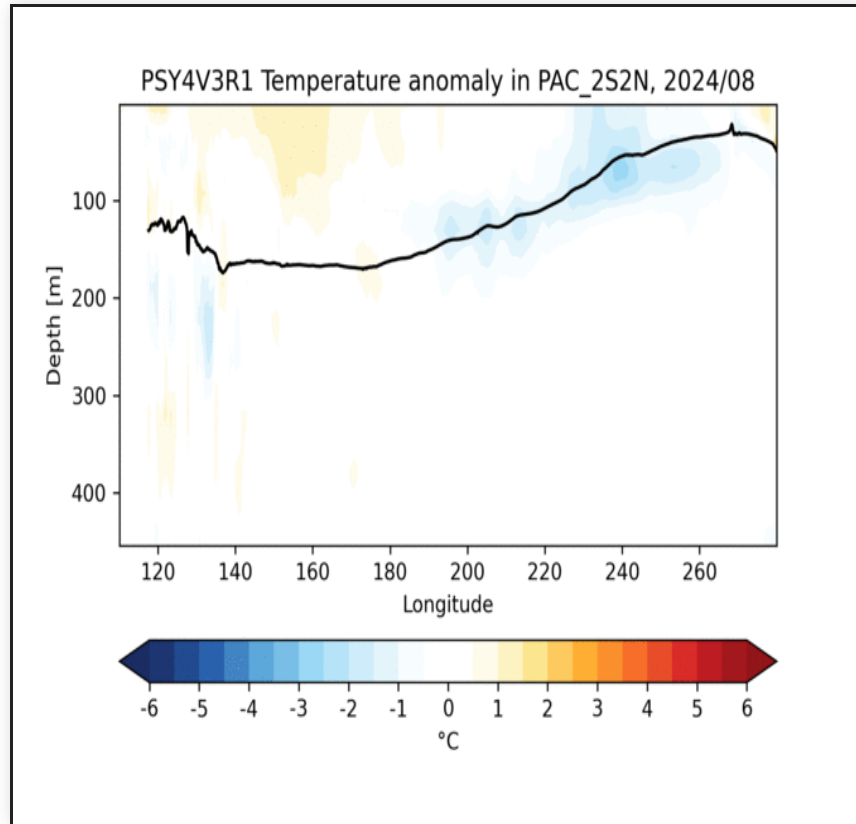


SST Anomalies and trend with the previous month (c) Mercator-Ocean



### Oceanic analysis of September 2024 : Pacific vertical section

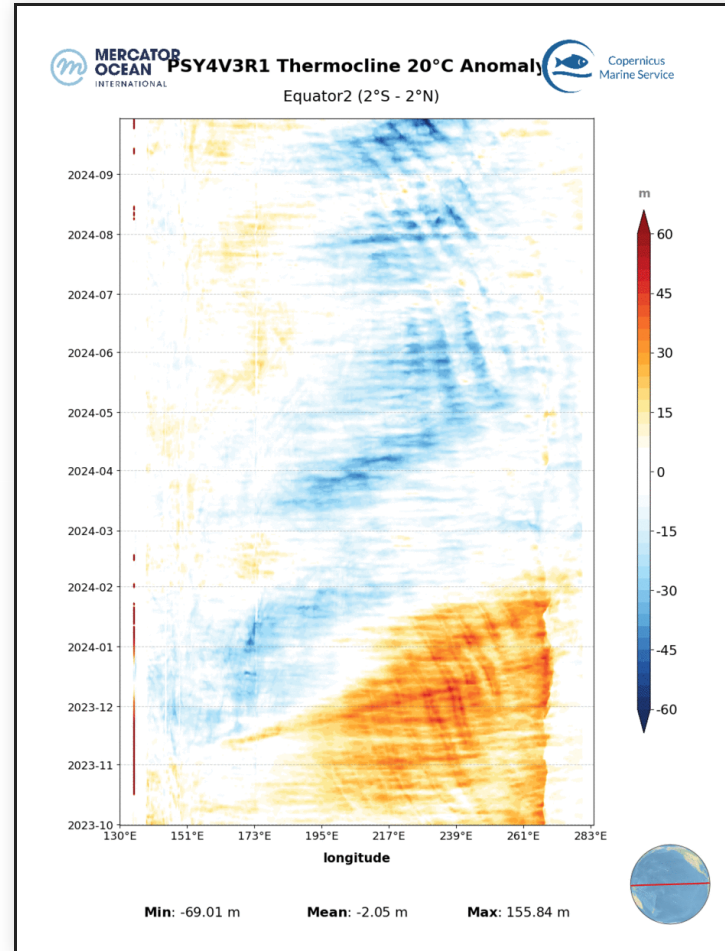
In the subsurface, there has been very little change since last month.



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

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

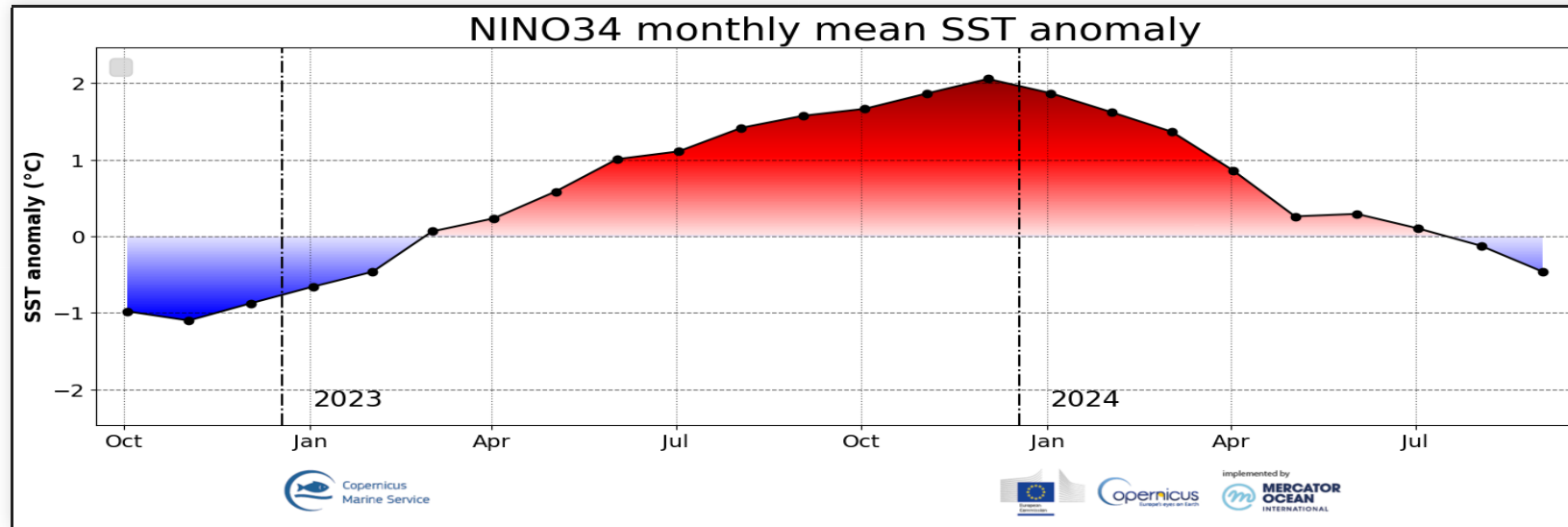
Same remark as before.



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

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

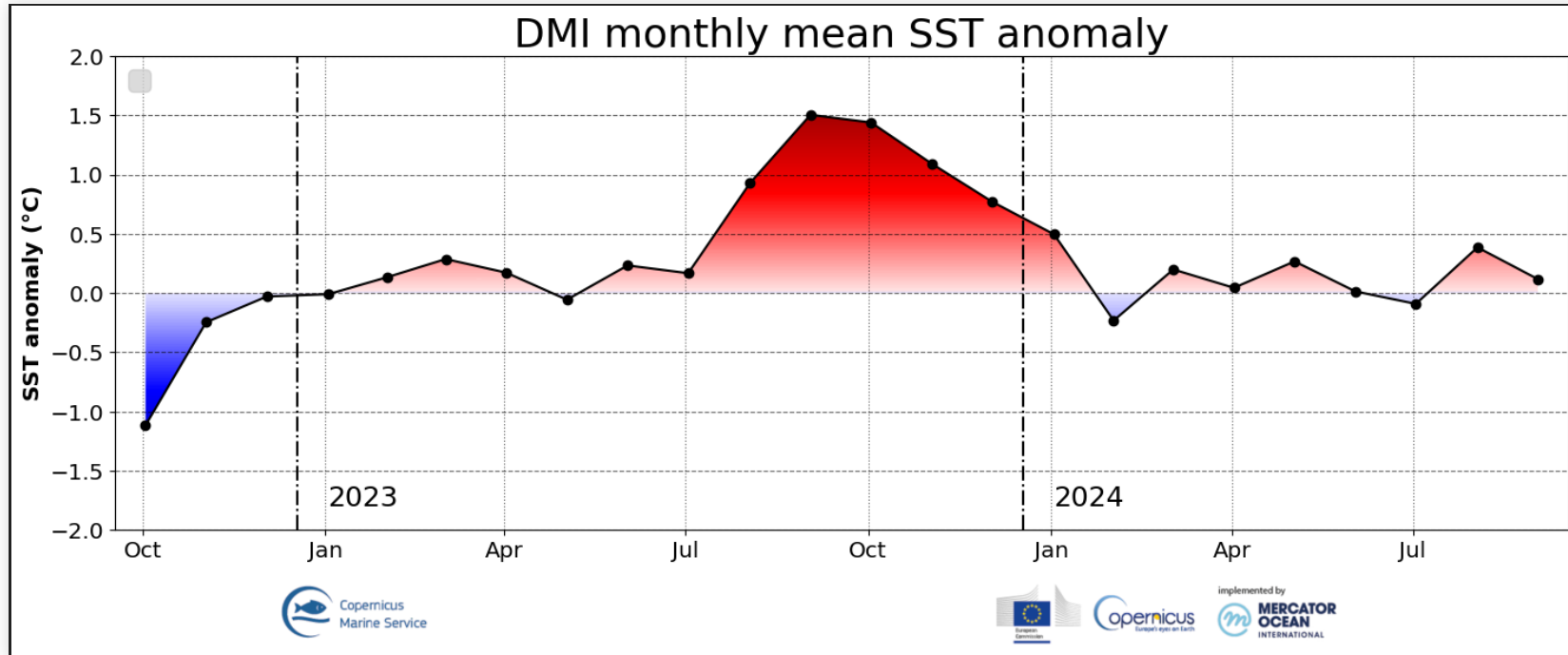
**Nino3.4 index issued from Mercator Ocean PSYV4R2 analysis : close to -0.5 °C**  
(see BOM site for weekly values : [http://www.bom.gov.au/climate/enso/monitoring/nino3\\_4.png](http://www.bom.gov.au/climate/enso/monitoring/nino3_4.png))



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

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

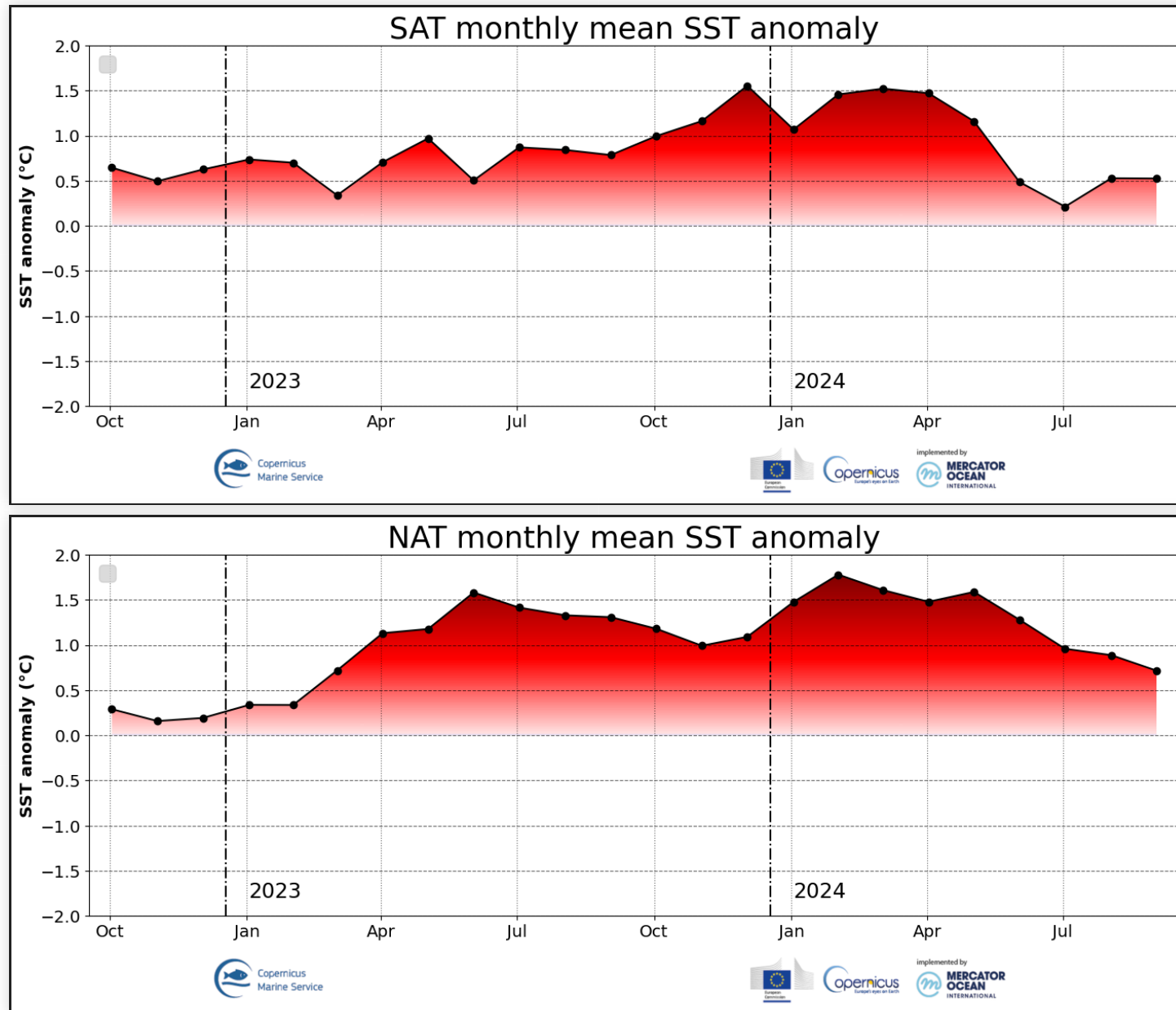
**DMI Index issued from Mercator Ocean PSYV4R2 analysis : close to zero**  
(see BOM site for weekly values : <http://www.bom.gov.au/climate/enso/monitoring/iod1.png>)



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

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

The warm anomaly now increases in the equatorial basin (SAT index), while it decreases but remains at high level in the northern intertropical zone (NAT index).



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

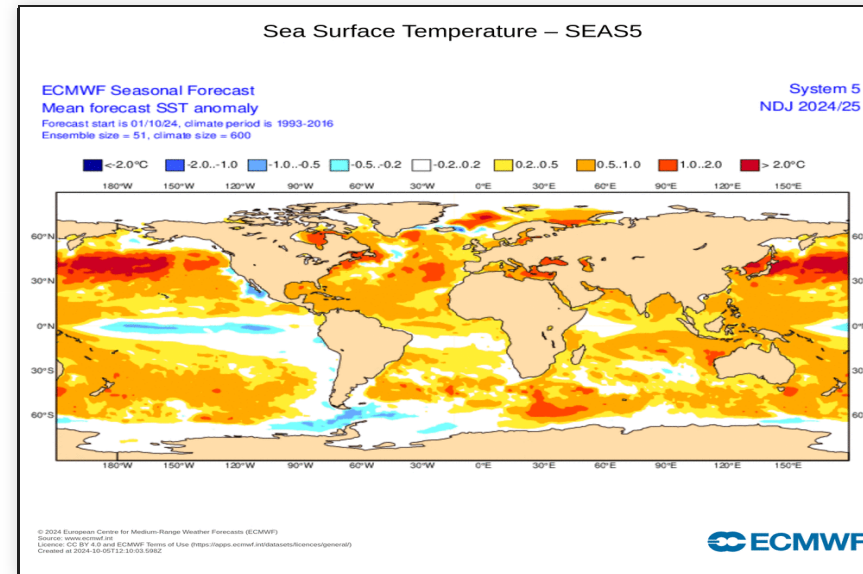
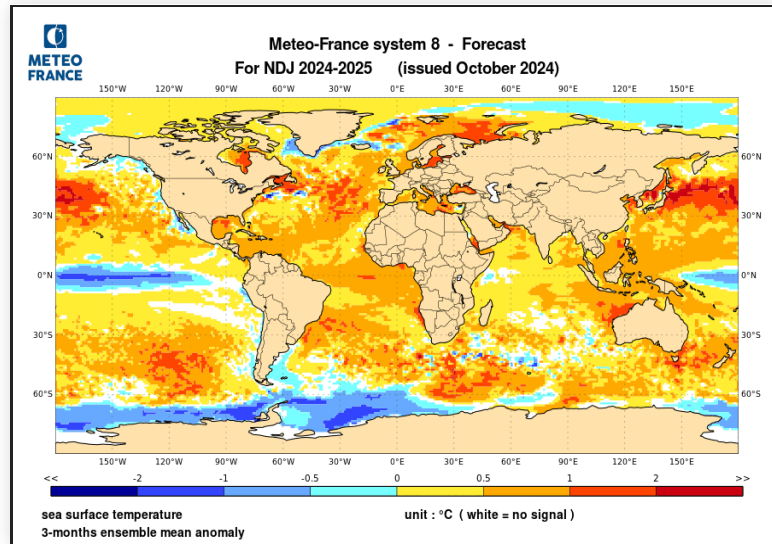
## Oceanic forecast : SST anomaly

The two models are quite similar.

In the Pacific Ocean : Over the eastern equatorial basin, a cold anomaly is visible. In the Northern Hemisphere, the PDO- pattern persists.

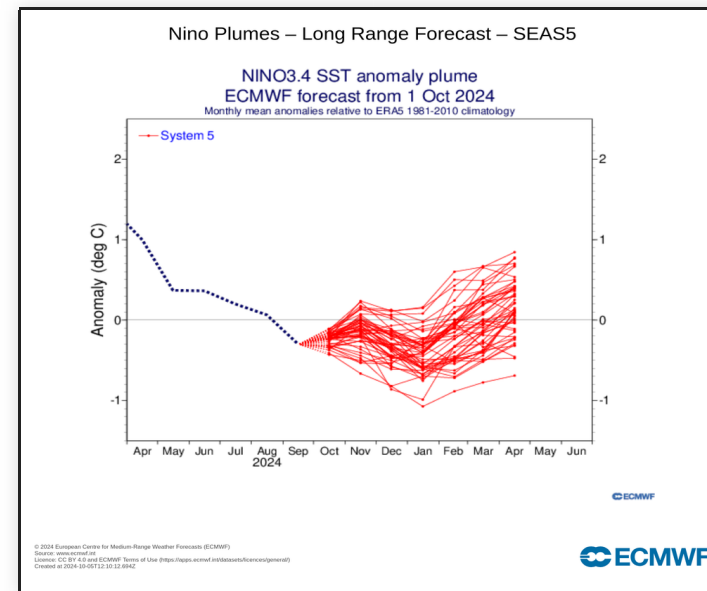
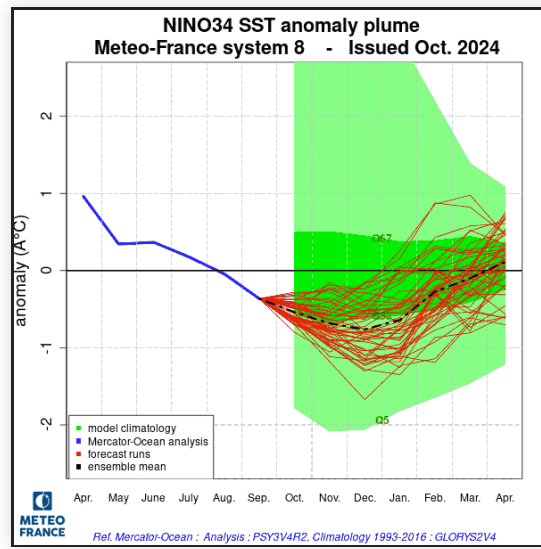
In the Indian Ocean : Warm anomaly weaker in the west than in the east.

In the Atlantic Ocean : differences between models with warmer SEAS5 in the North Atlantic and less warm in the south.



### Oceanic forecast : NINO3.4 Plume diagrams

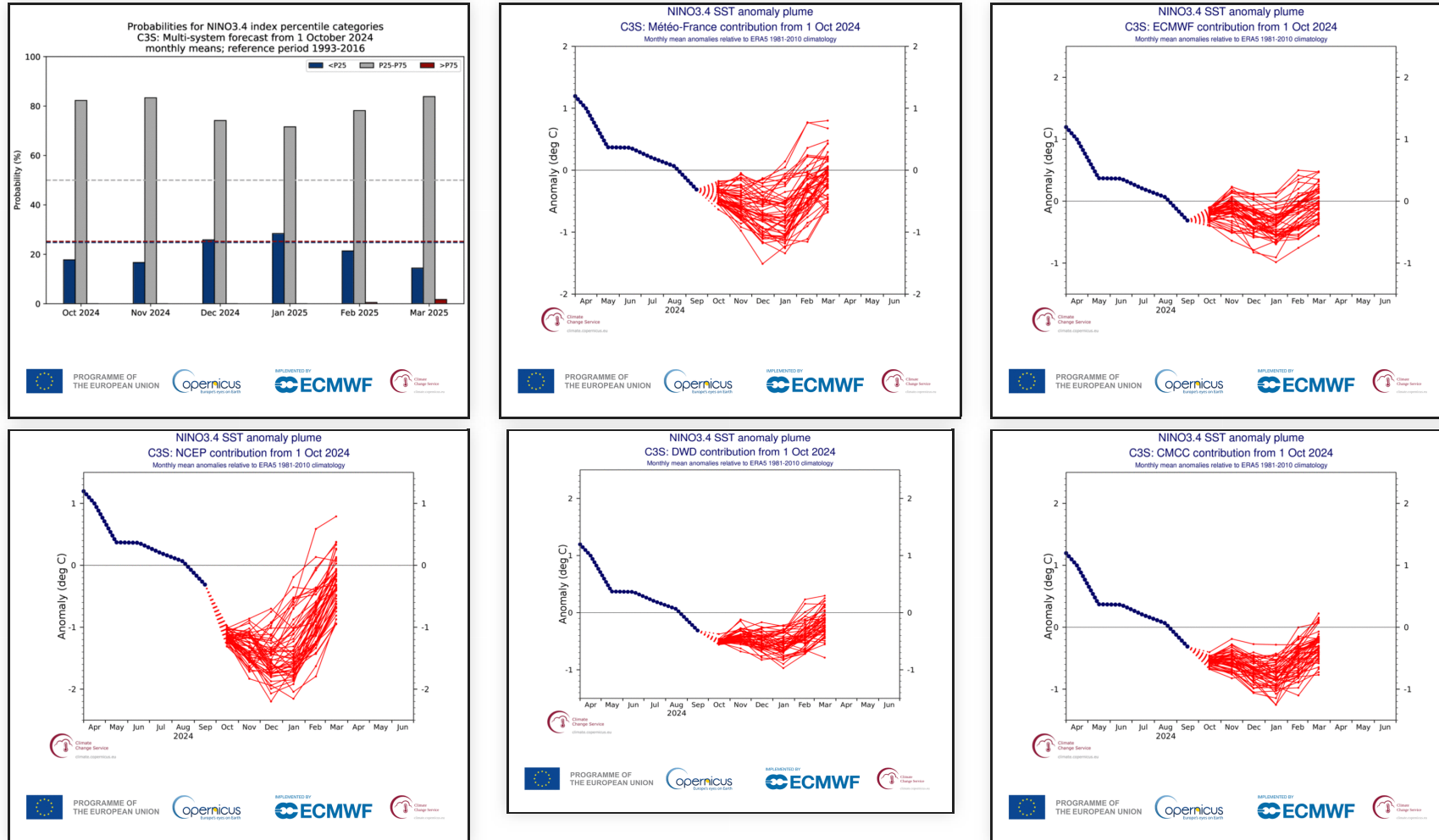
Index decreases, getting close to -0.7 in december in both two models.



## 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 : Negative phase

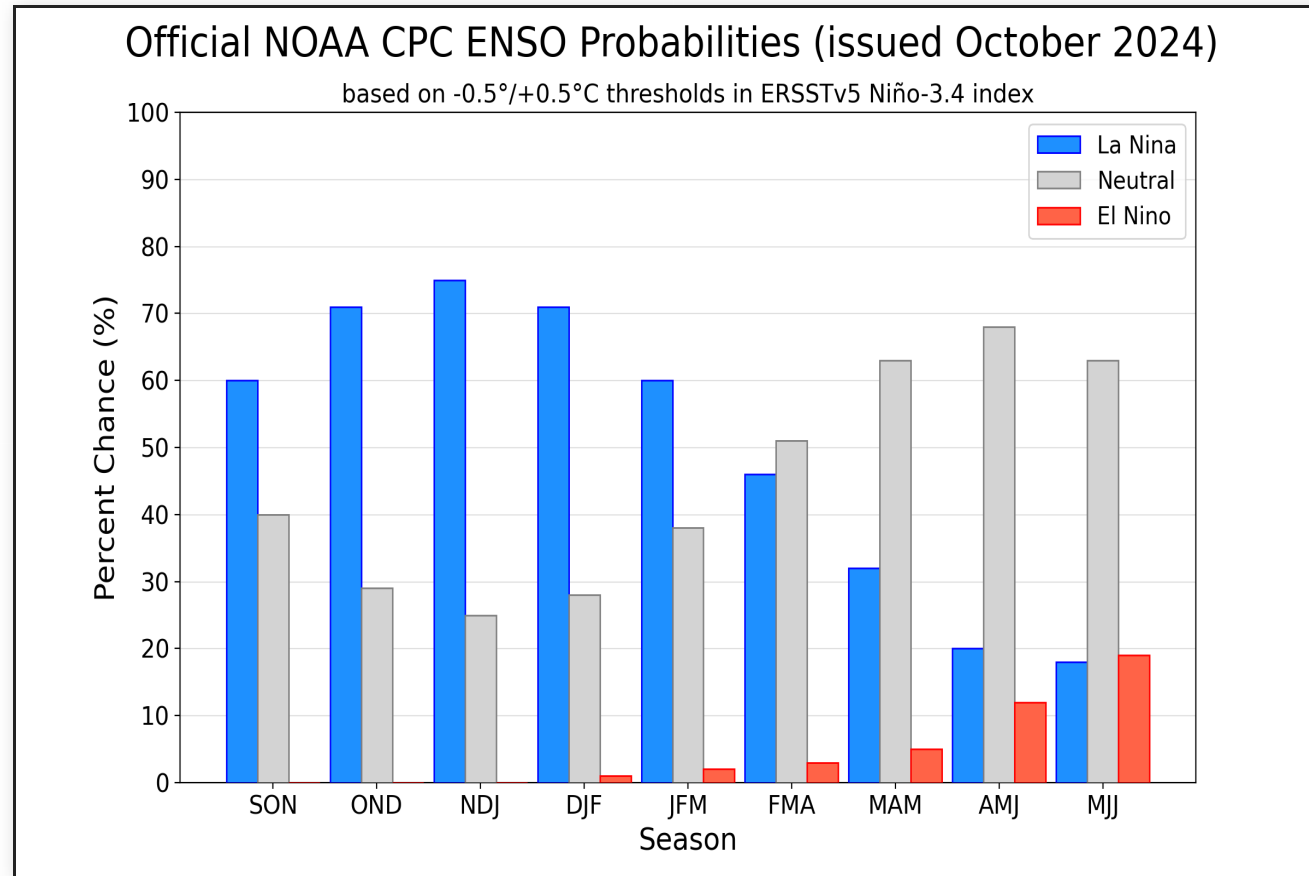


C3S multi-system probability forecast (top left figure) and C3S plume diagrams re-scaled from the variance of observations for the period 1981-2010.



### Oceanic forecast : Synthesis from IRI

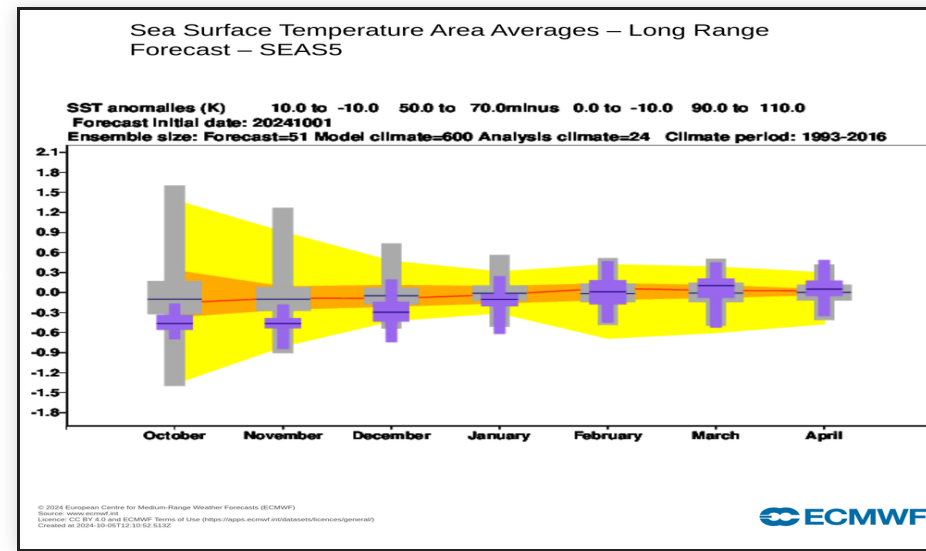
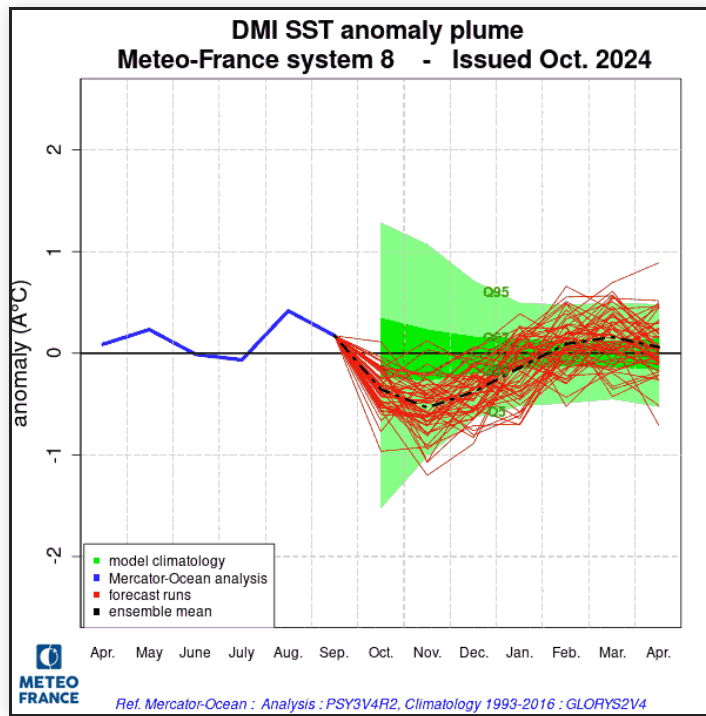
IRI forecast : about 70% probability of a "La Niña" phase for SON.



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

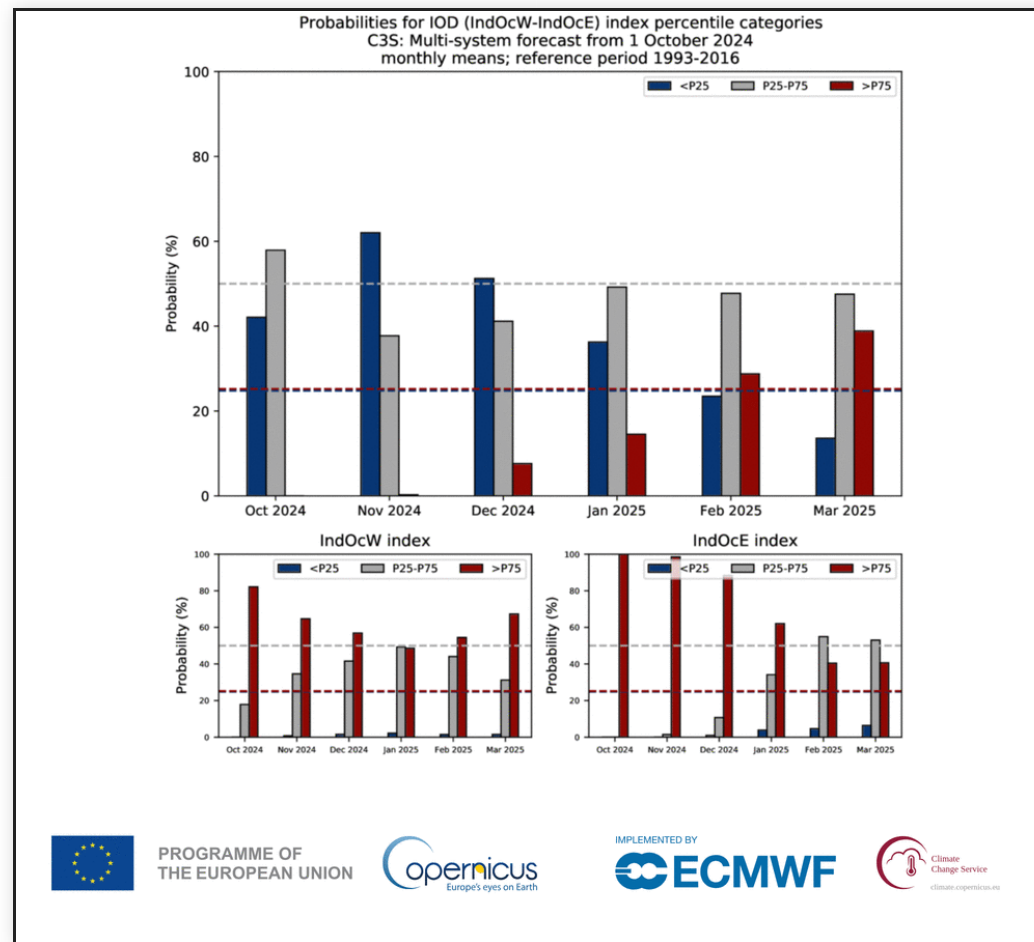
Neutral or negative phase for IOD in the coming quarter.



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

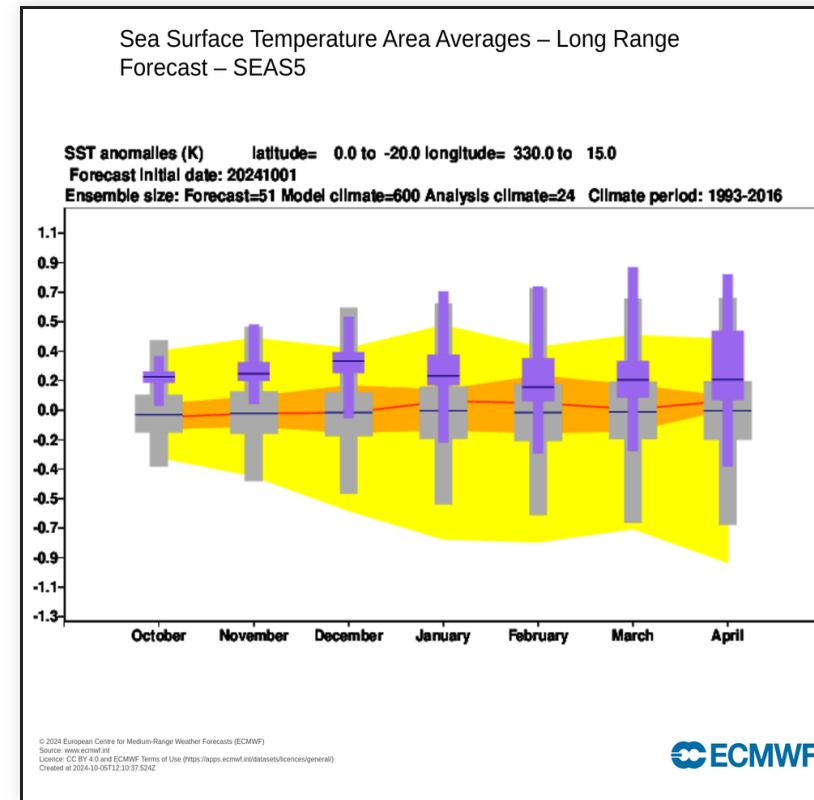
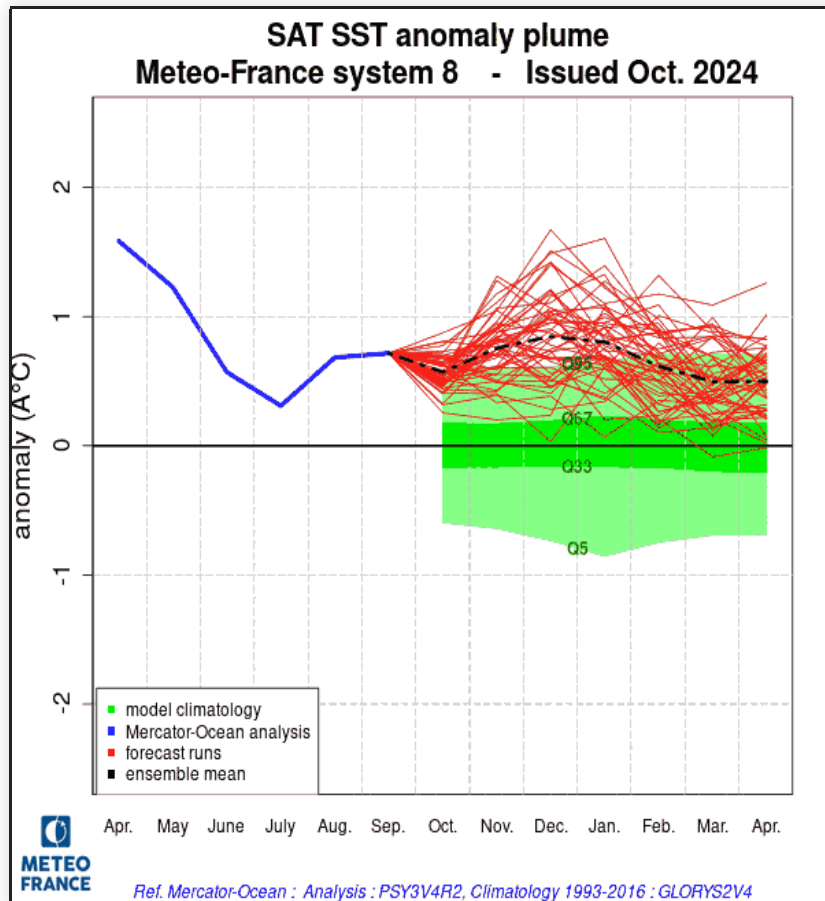
Expected Phase for the next three months : Neutral



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

### Oceanic forecast : Atlantic ocean - SAT evolution

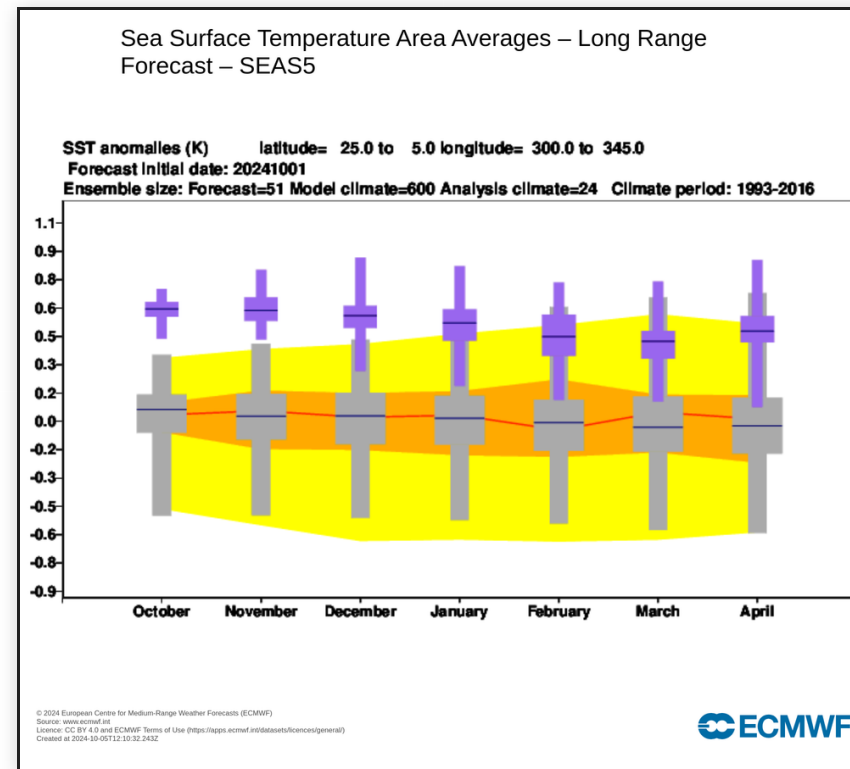
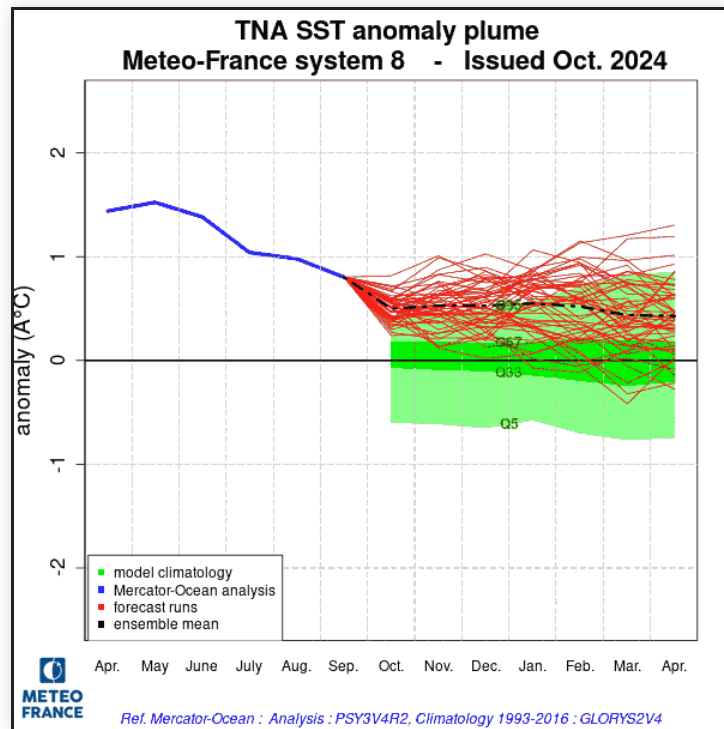
Both models maintain a very marked warm anomaly for the quarter.



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

### Oceanic forecast : Atlantic ocean - TNA evolution

Both models maintain a marked warm anomaly for the quarter slowly decreasing.

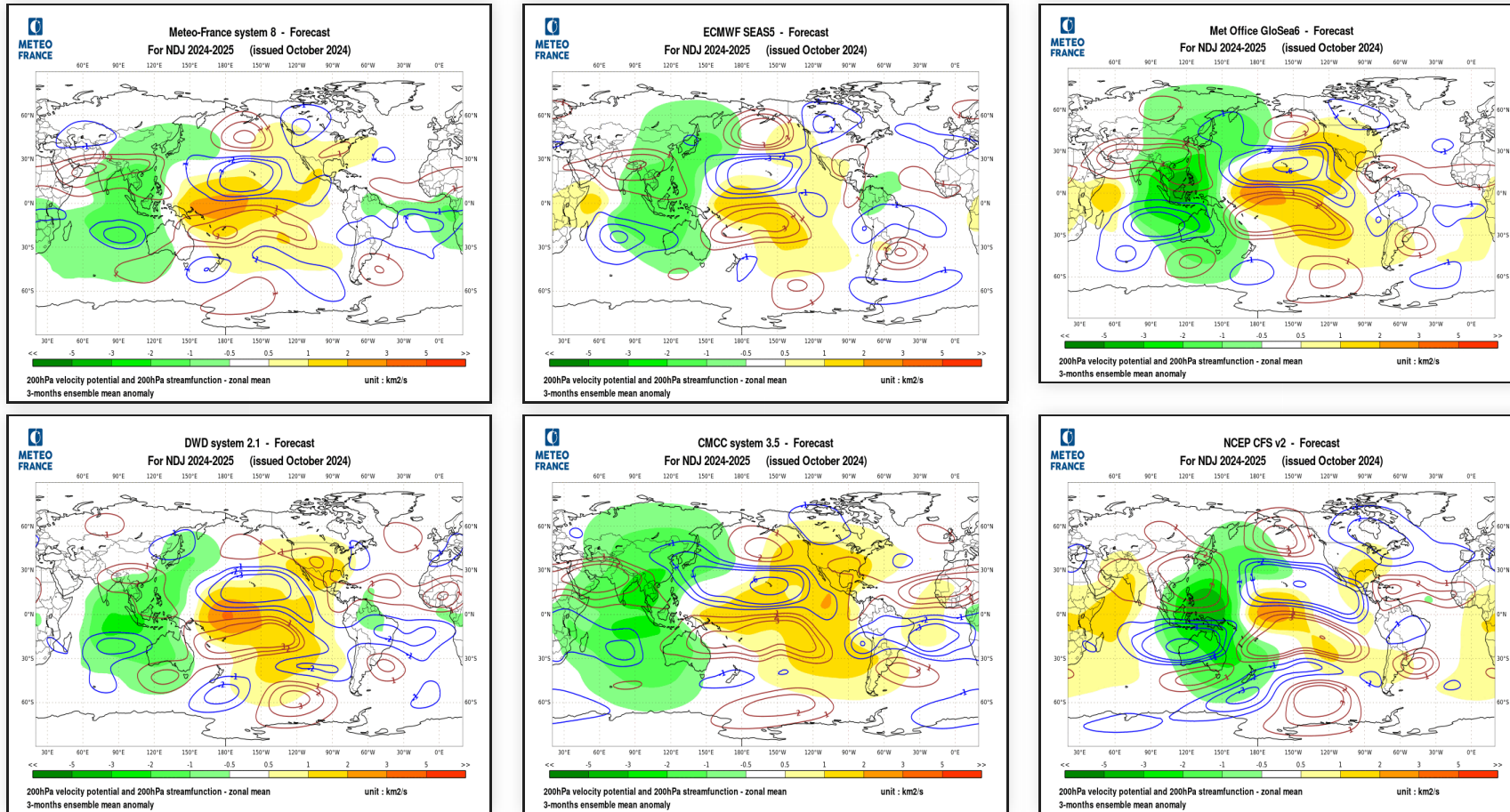


TNA index : analysis, forecasts and model climatology with MF-S8 on the left and ECM-SEAS5 on the right

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

Velocity Potential : All the models agree in forecasting a large zone of subsidences over the Pacific Ocean, which some of them extend towards the Atlantic Ocean, and a zone of ascendances over the Indian Ocean.

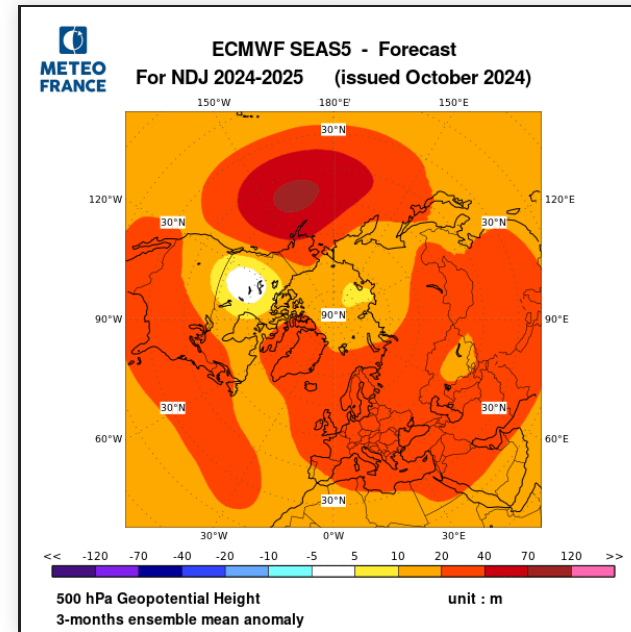
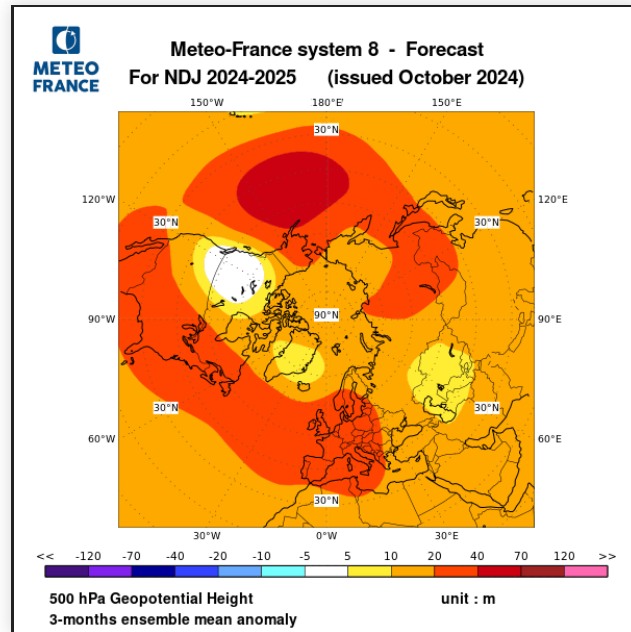
Streamfunctions : All models predict a quadripole centered on the Maritime Continent (much or less pronounced). The anticyclonic circulation between Indian and Saudi Arabica extends as far as North Africa and the north atlantic ocean. Over Europe, the patterns differ from model to model.



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

Both models agree in predicting a weak Z500 around Bering Strait and slightly neutral over Scandinavia, and a zone of positive anomalies from New Land to western Europe.



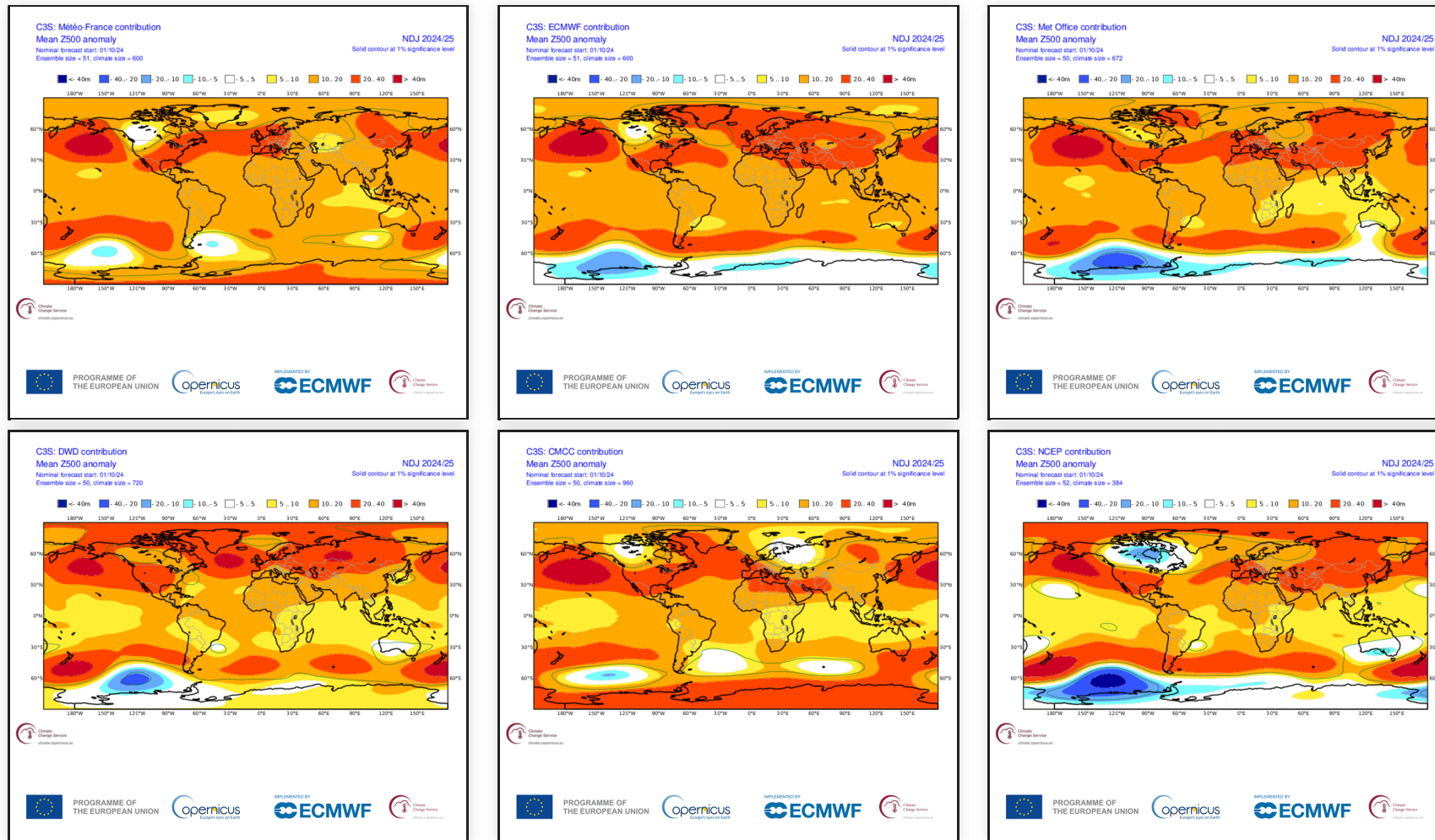
polar projection of MF8 and SEAS5 500hPa geopotential height anomalies.



## Atmospheric circulation forecasts : Z500 anomalies in C3S models

In the southern hemisphere, some similarities between models with positive anomalies near the pole and weaknesses at temperate latitudes placed more or less in the same places.

In the Northern Hemisphere, most models agree on two minimums, one near Alaska and the other between Greenland and Scandinavia . Similarly, a large zone of positive anomalies from the United States to Europe is the general consensus.

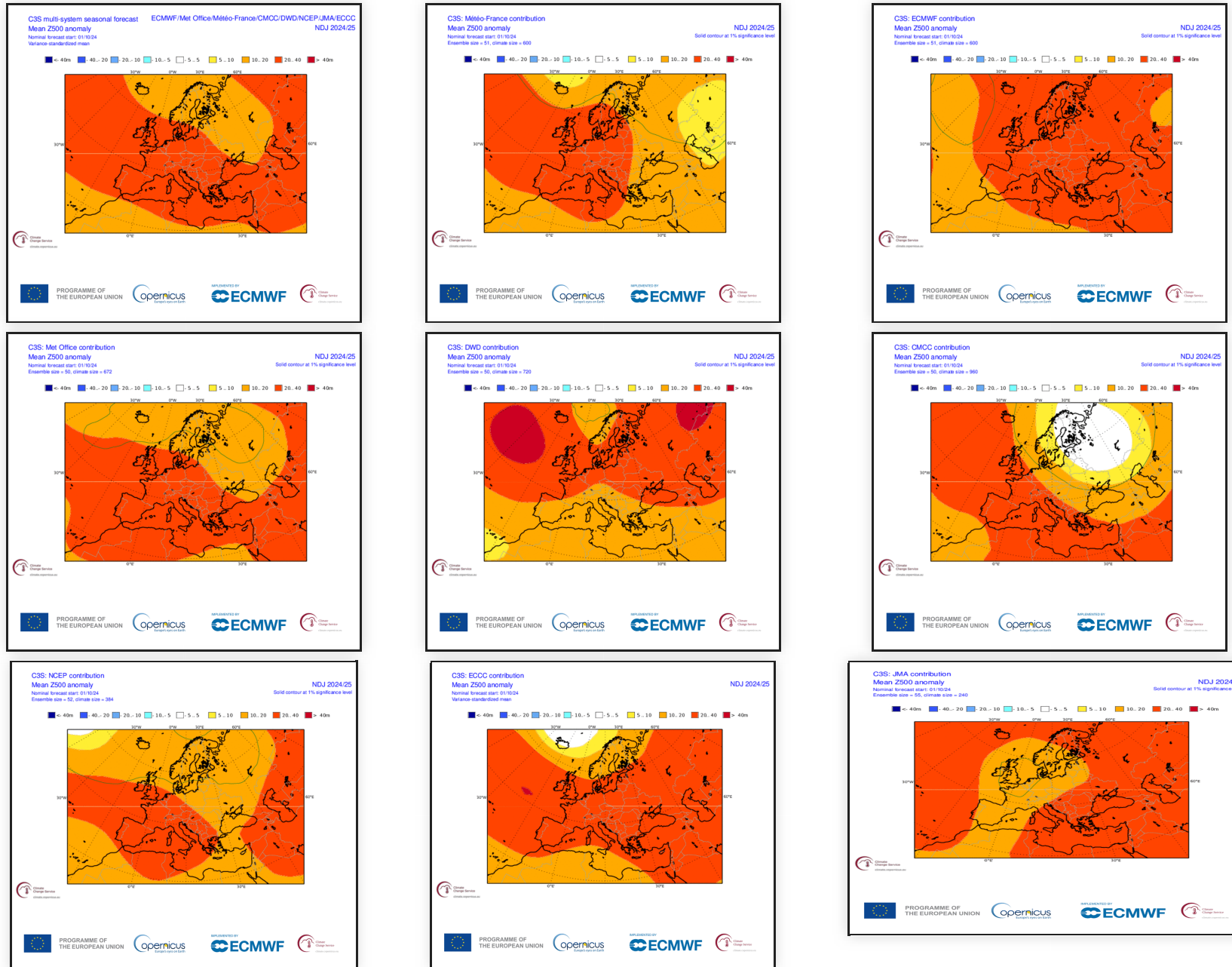


MF-S8, SEAS5, UKMO, DWD, CMCC and NCEP 500hPa geopotential height anomalies.



## Atmospheric circulation forecasts : Z500 anomalies in C3S models

On this scale, there are similarities between most of models : a zone of positive anomaly from the Mediterranean basin to Western Europe, and relative weakness further north, with different positioning depending on the model. DWD only shows a relative weakness over wester mediterranean sea, and high values in the north.

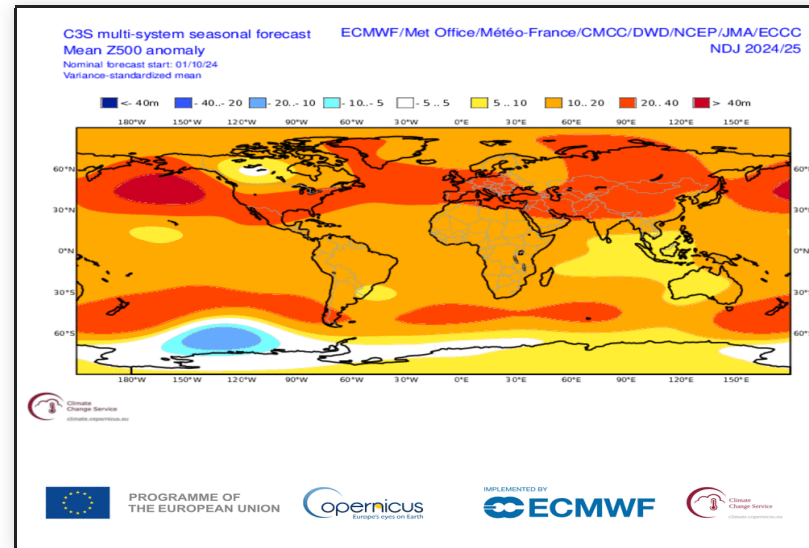


multi-models 500hPa geopotential height anomalies

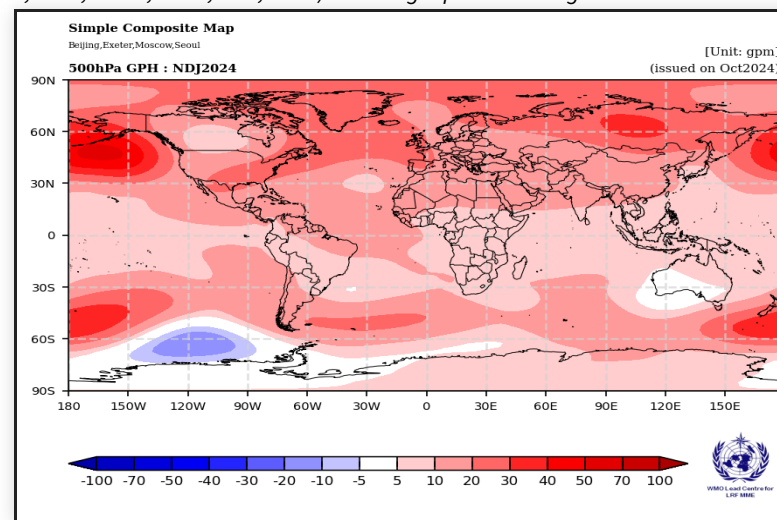
## Atmospheric circulation forecasts : Z500 anomalies multi-systems

Both multi-models agree on the minimum in the South Pacific, but much less on the minimum south of the Indian Ocean.

In the Northern Hemisphere, on the other hand, we find the anomalies already mentioned above.



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

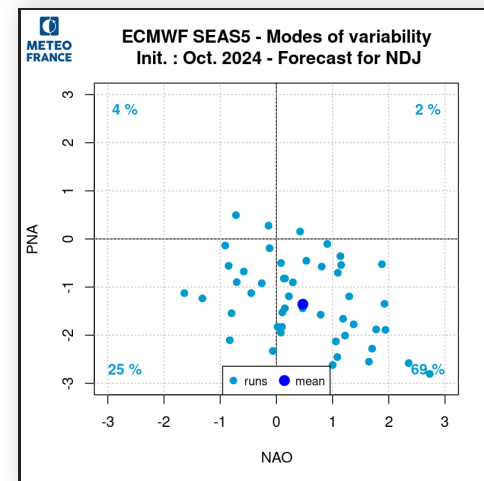
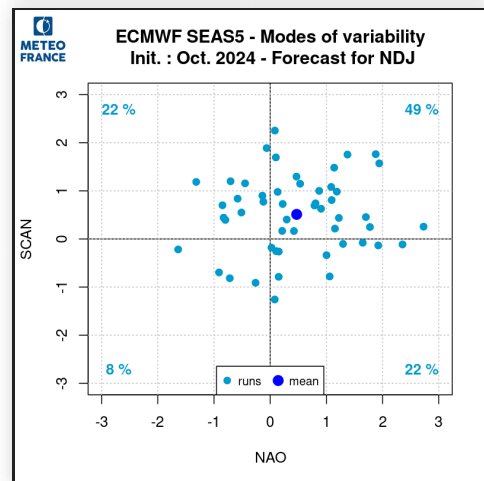
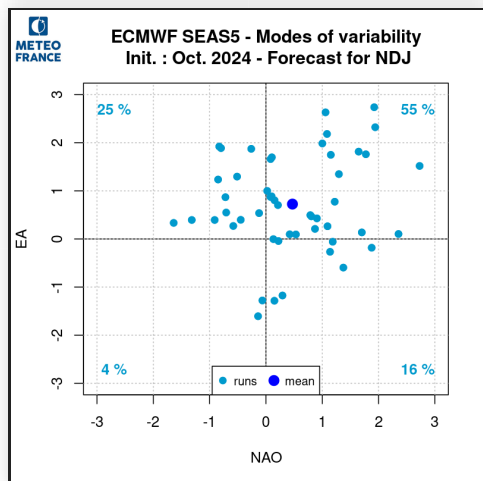
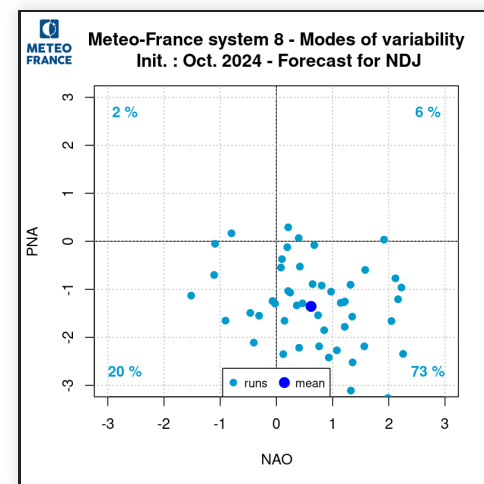
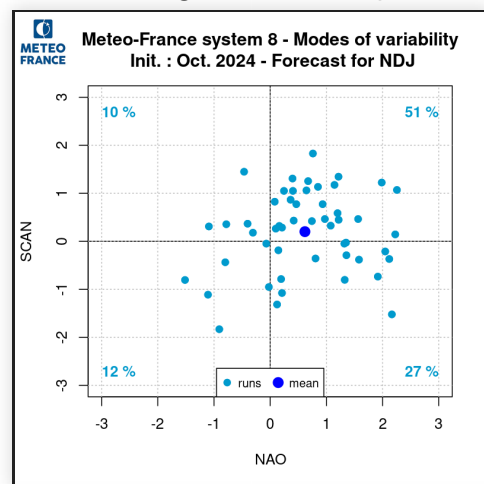
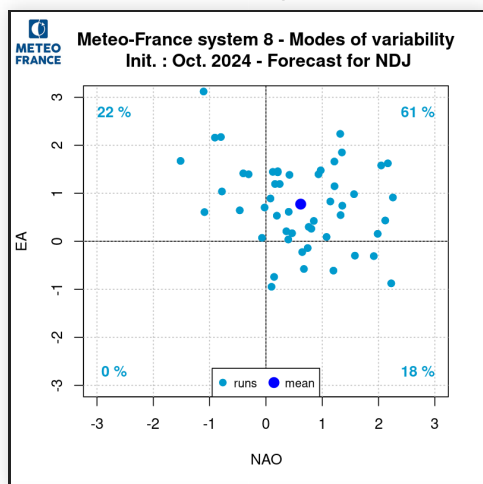


Others models of WMO multi-models 500hPa geopotential height anomalies.

## Modes of variability : forecast

In terms of variability modes, the two models are highly convergent, with EA+ and PNA- modes favoured, linked to anomalies at 500 hPa.

The NAO+ mode is also preferred and SCAN is neutral in average with wide dispersion.

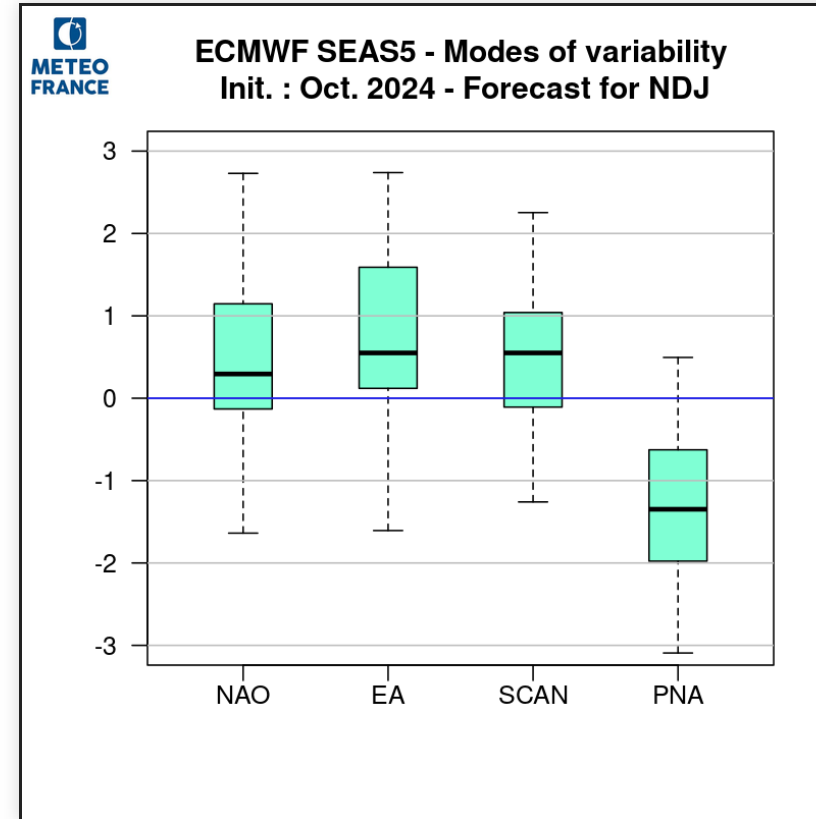
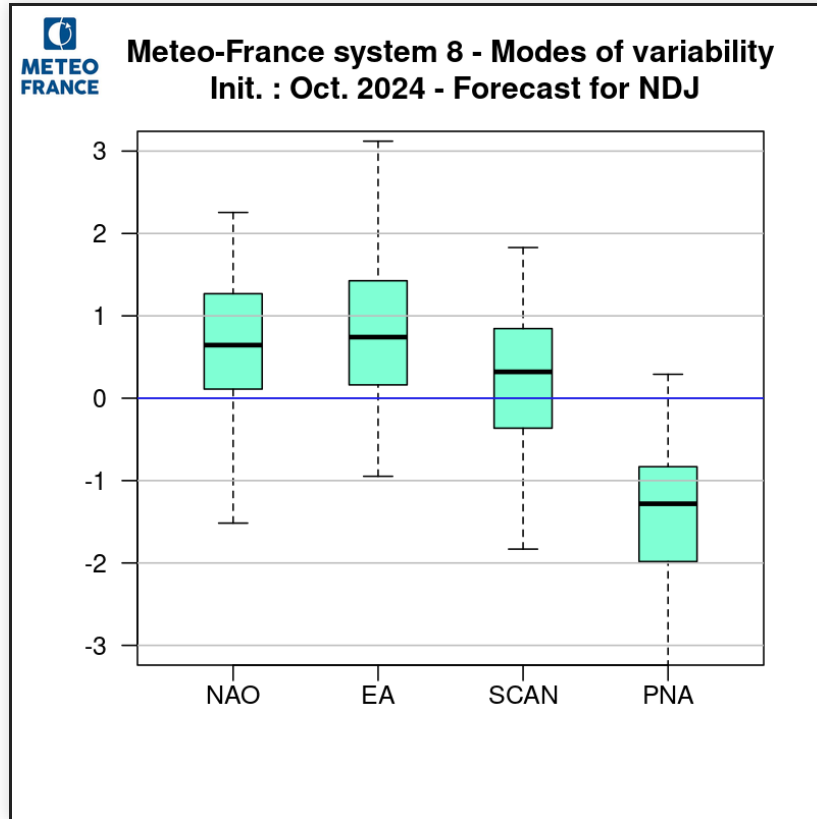


See the modes of variability patterns

### Modes of variability : forecast

In terms of variability modes, the two models are highly convergent, with EA+ and PNA- modes favoured, linked to anomalies at 500 hPa.

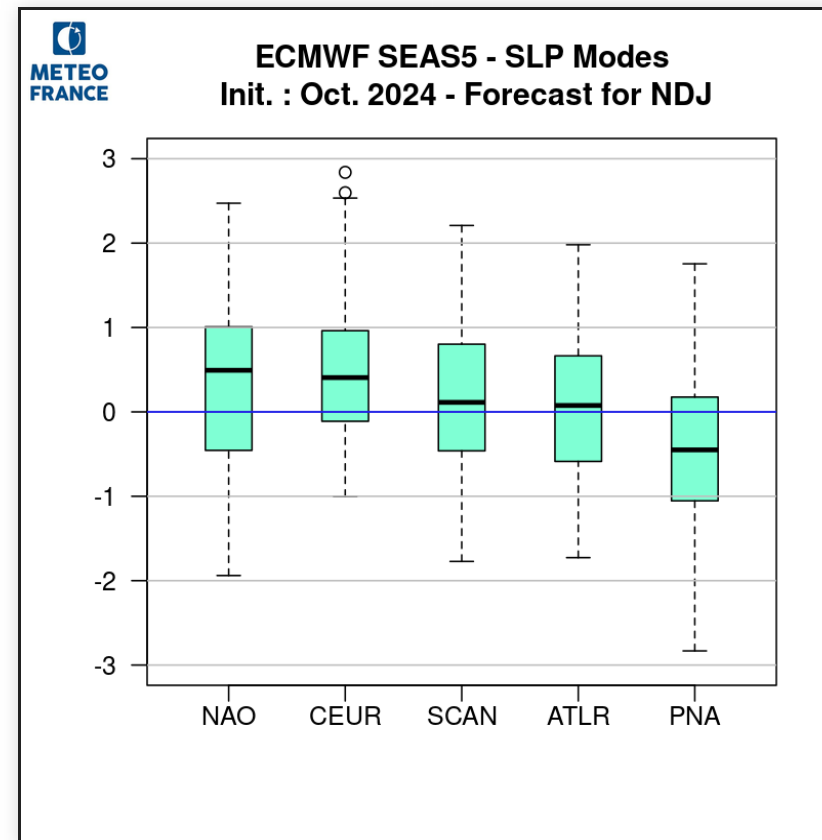
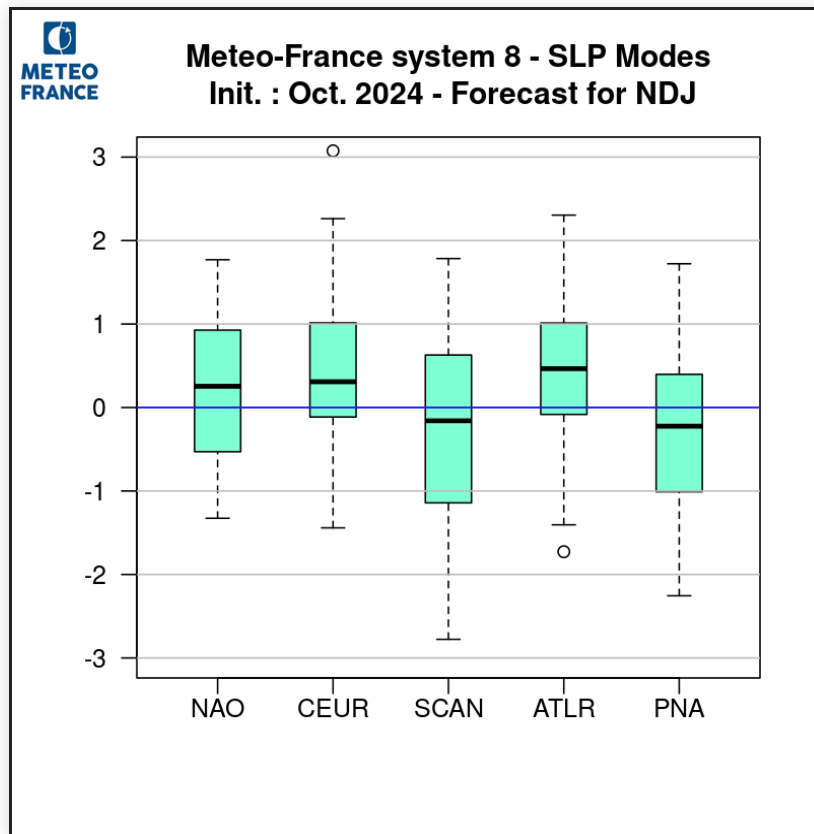
The NAO+ mode is also preferred and SCAN is neutral in average with wide dispersion.



MF-S8 and ECMWF-SAES-S5 boxplot of modes of variability

### Modes of variability : SLP Modes forecast

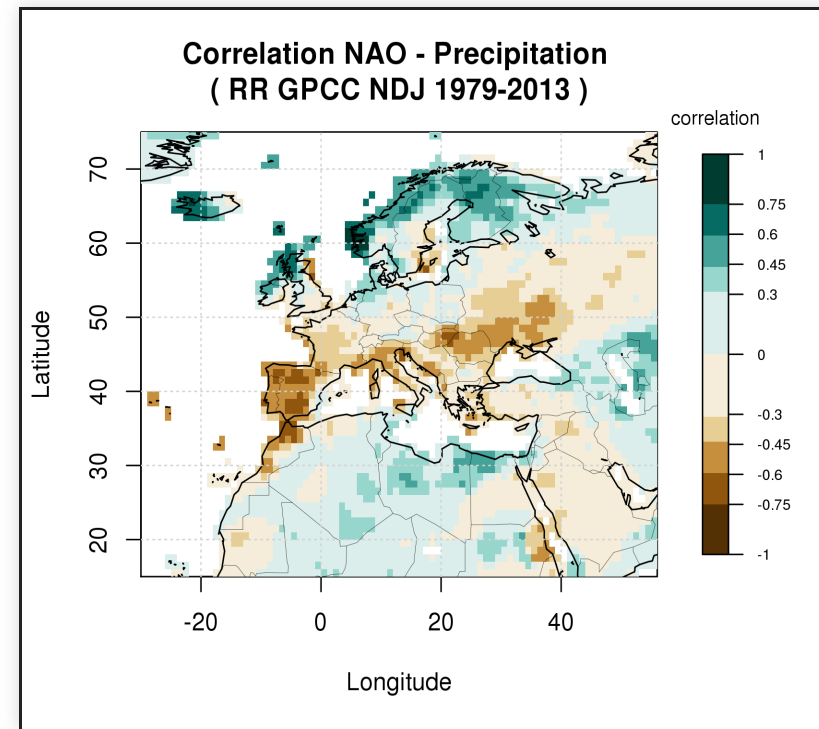
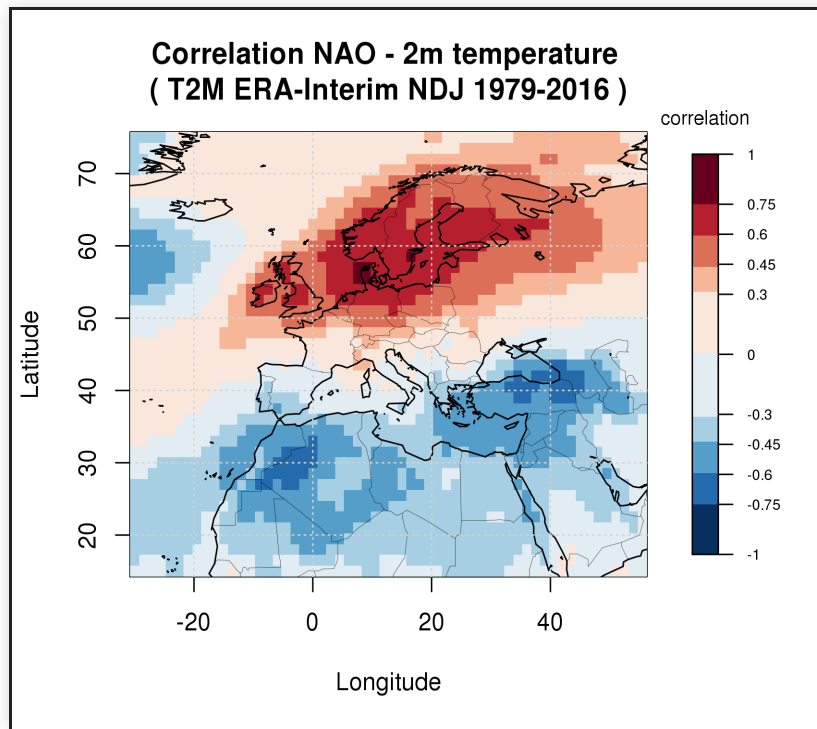
In Pmer modes, both models agree on CEUR+, NAO+ and PNA-. Only MF8 shows ATLR+.



MF-S8 and ECMWF-SAES-S5 boxplot of MSLP modes of variability. [link to pattern](#)

### Modes of variability : NAO impacts

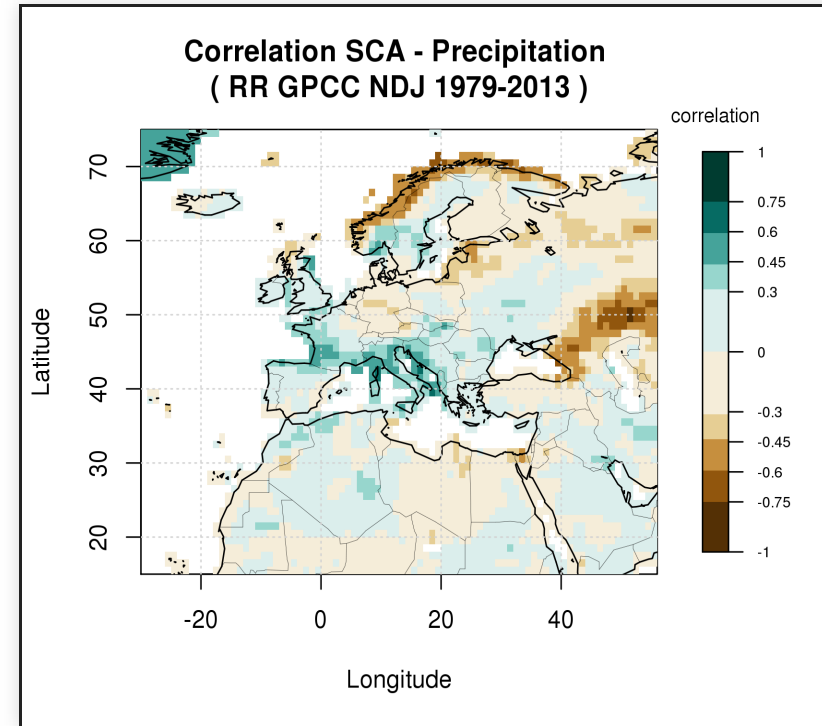
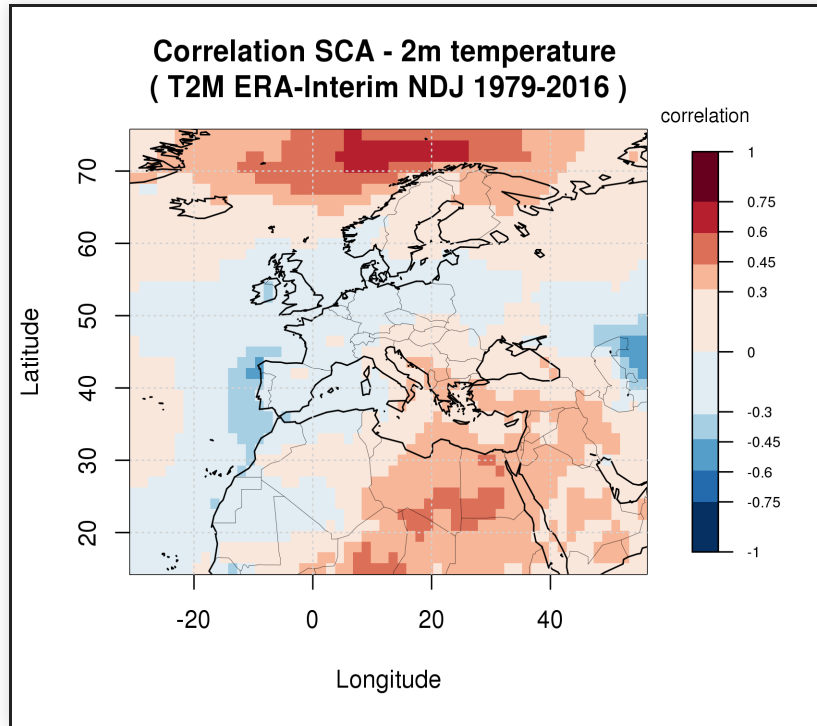
Positive phase of the NAO next quarter.



### Modes of variability : SCA impacts

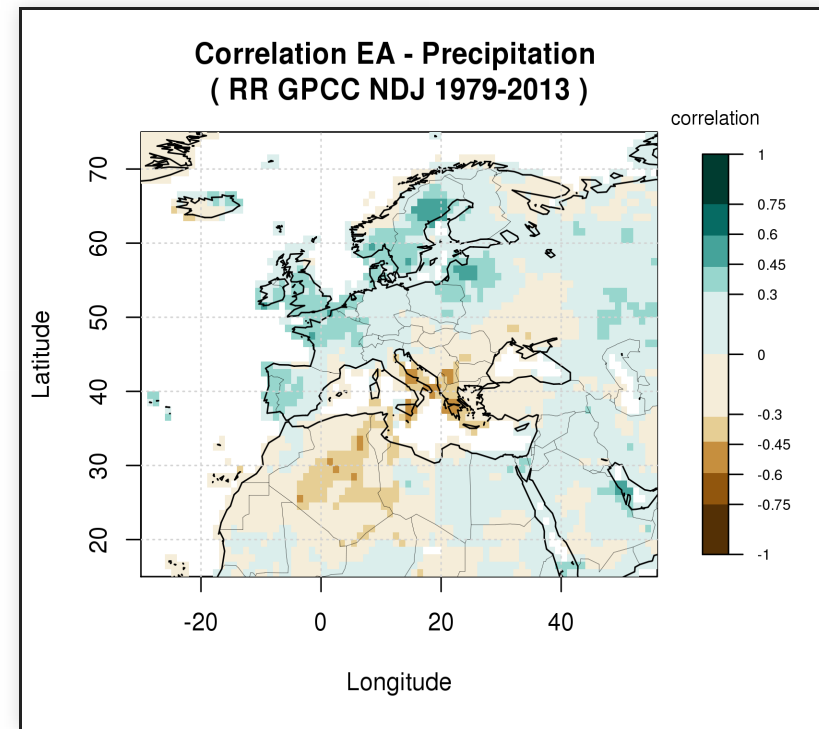
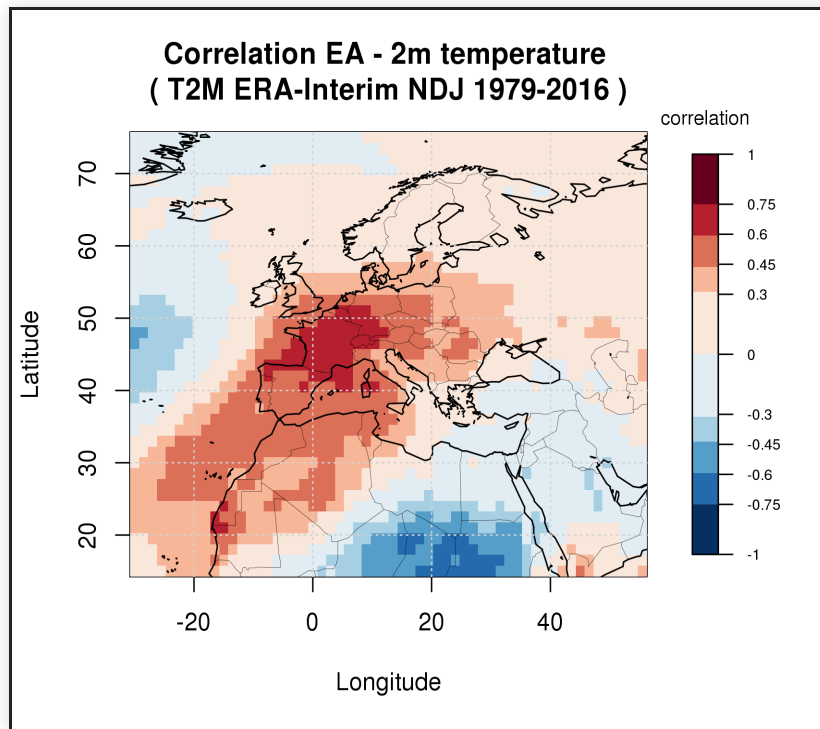
Blocking regim favors colder than normal conditions over western Europe and warmer from Scandinavia to Russia.

Little impact on precipitation.



### Modes of variability : EA impacts

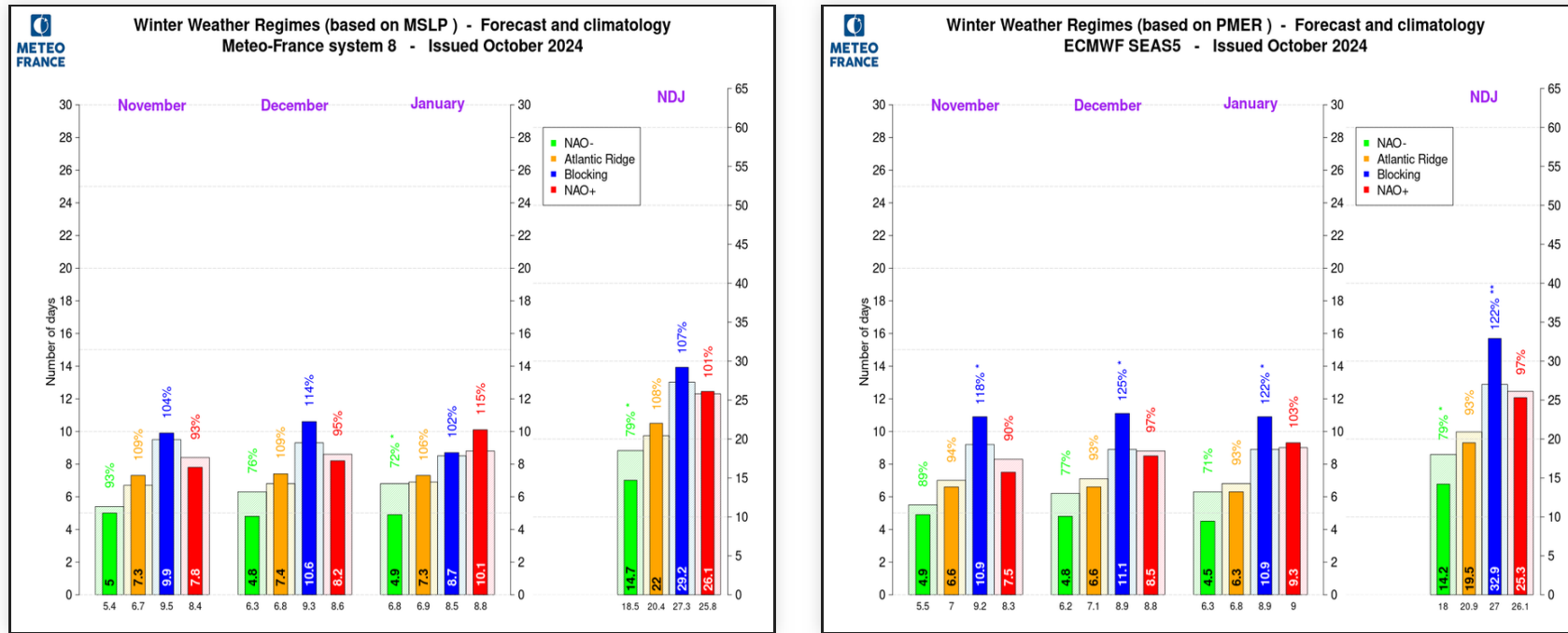
Positive EA is expected next quarter. This mode has a strong influence in particular on the temperature on southern Europe.





# Weather regimes : winter MSLP

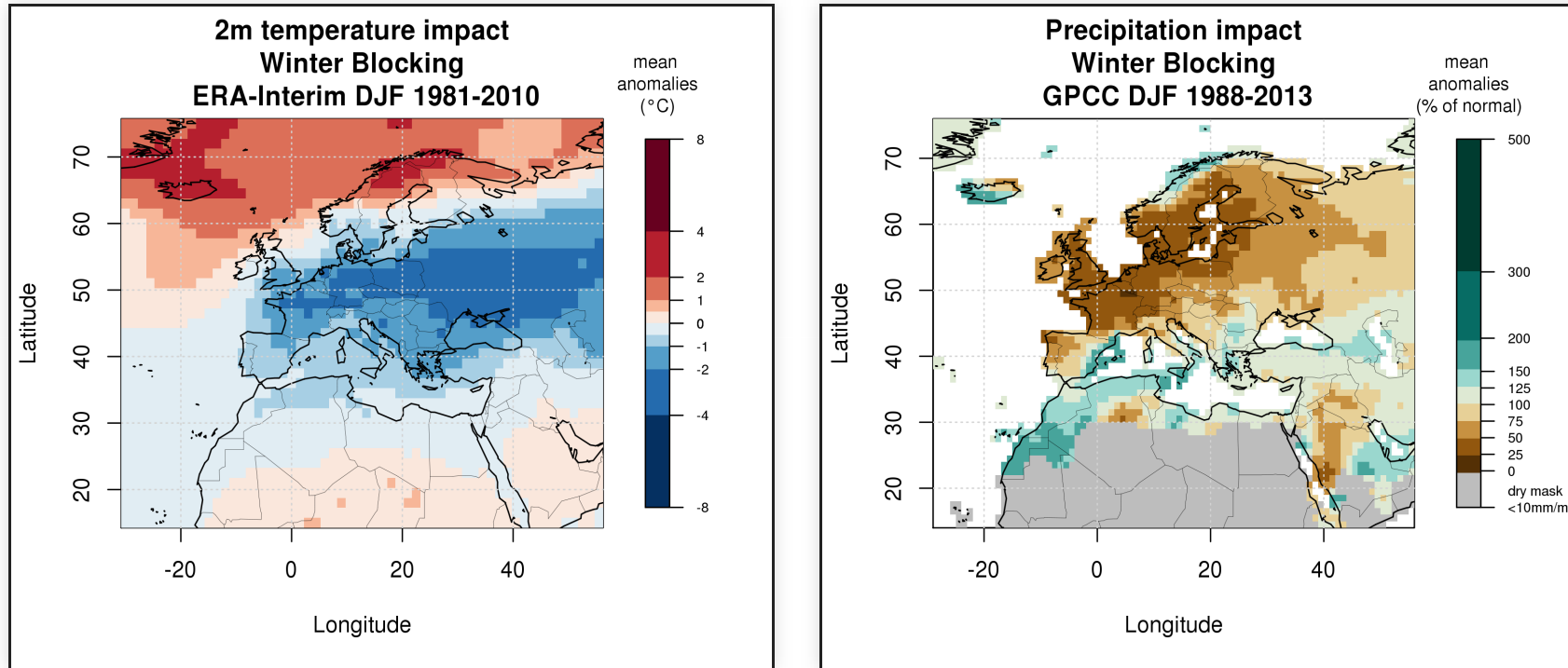
NAO- is under-represented in Both models, SEA5 shows also an upper-represented blocking for the quarter.



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

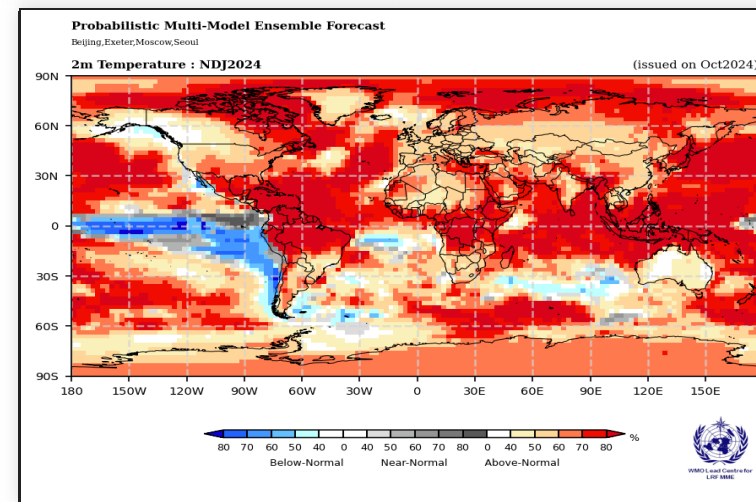
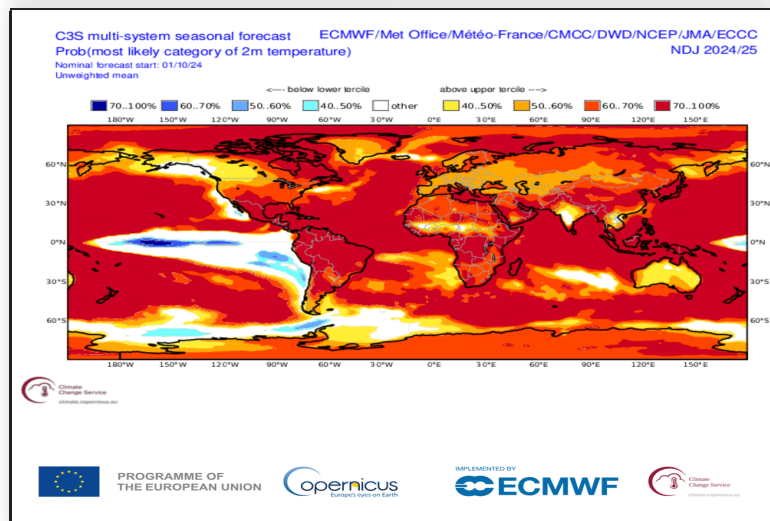
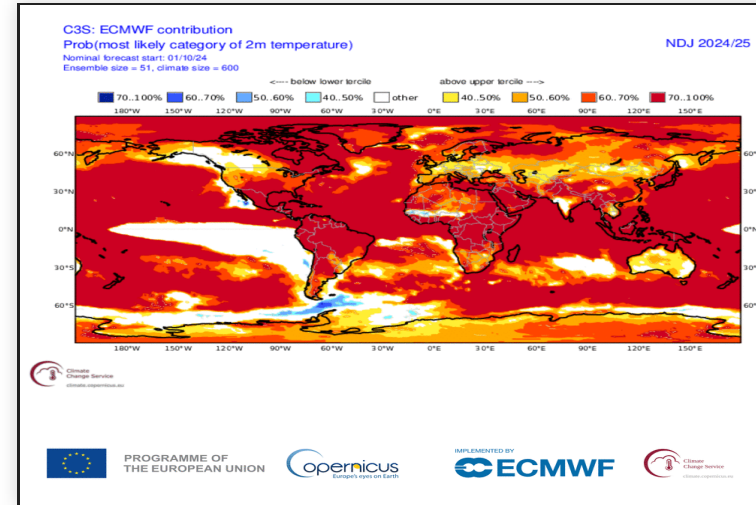
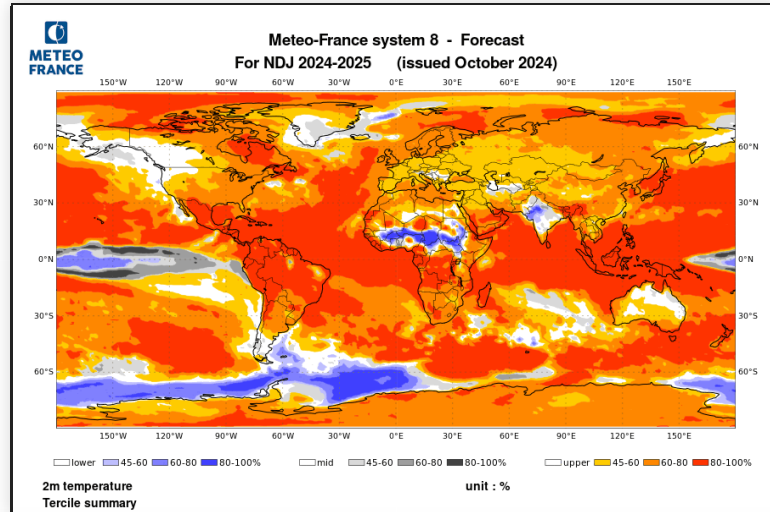
The blocking regime is slightly favored by MF8 for this quarter.



Impact of Summer Blocking 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 almost the entire globe, with a few exceptions: from the eastern equatorial Pacific to the South American coasts, around Alaska and to a lesser extent over parts of Russia.

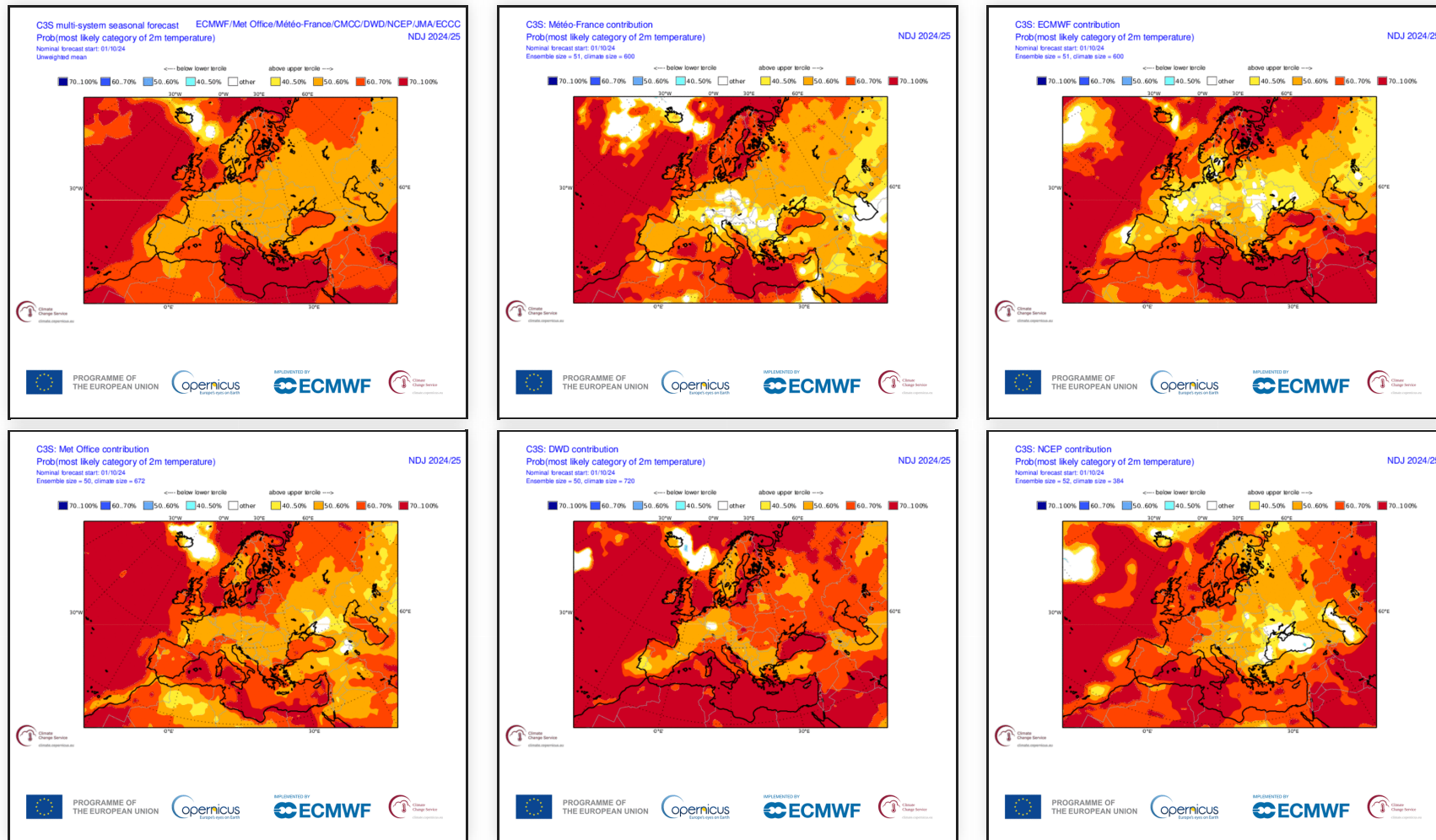


2m temperature probability map from MF-S8 (top left), ECMWF-SEASS (top right), C3S multi-models(bottom left) and others models of WMO multi-models (bottom right)

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

A warmer-than-normal scenario is very likely over the Mediterranean Basin and north Africa.

Probabilities are weaker in the northern half of Europe related to the anticyclonic curvature at 200 hPa over the north Atlantic ocean.



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

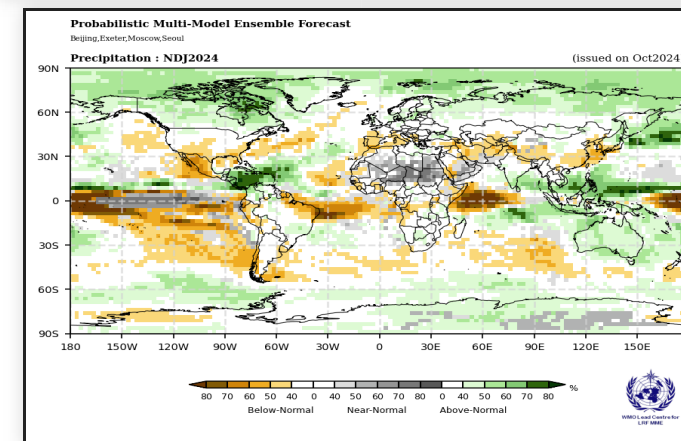
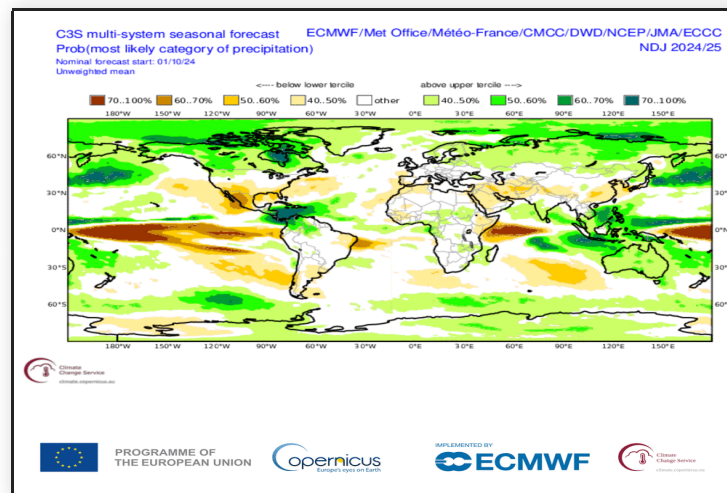
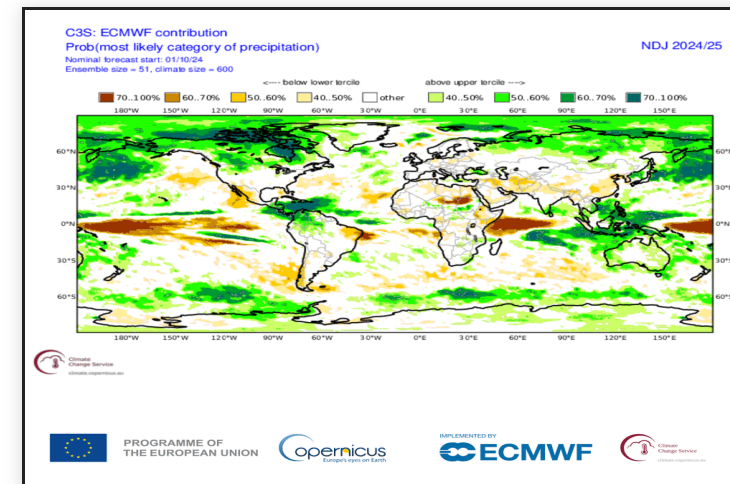
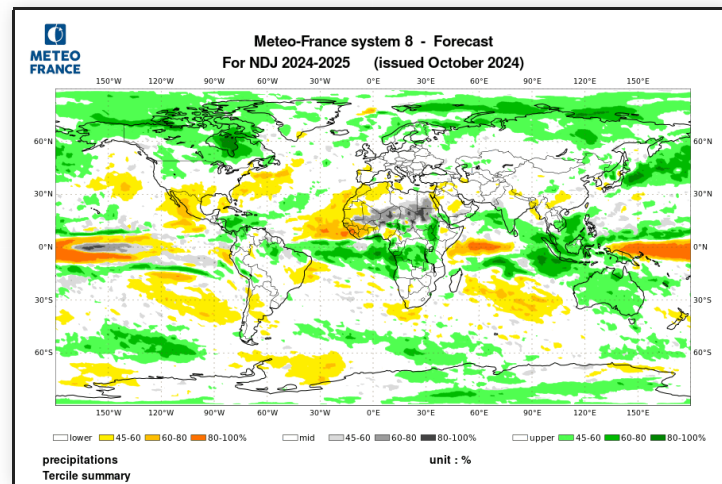


## Forecast of climatic parameters : Precipitation

In the equatorial zone, precipitation anomalies are fairly well correlated with sea surface temperature anomalies.

On North America drier conditions are expected from Mexico to south-west of USA while wetter conditions are favored from Alaska to Canada

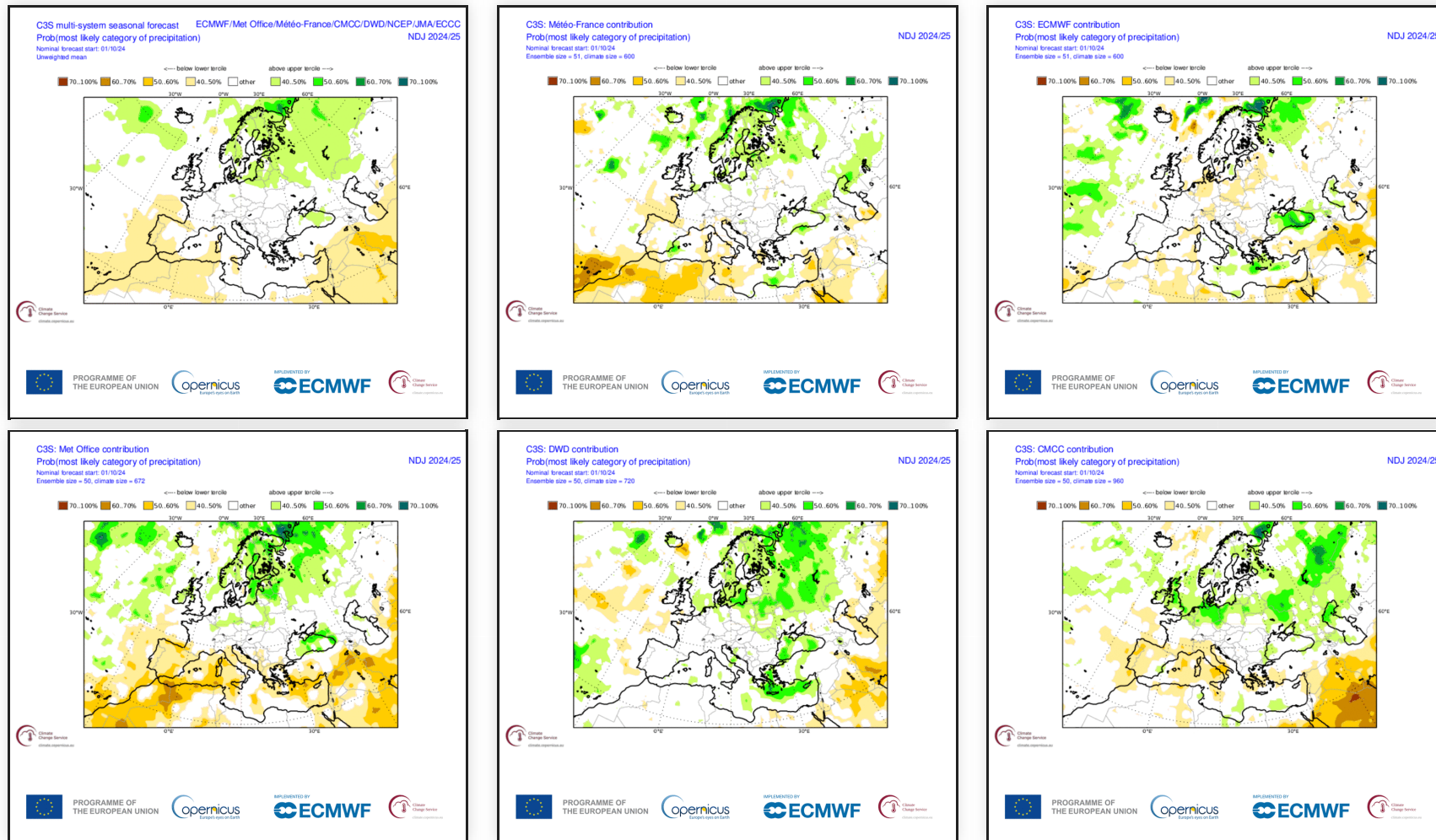
On Eurasia dry conditions are most likely over Middle East while wetter conditions are expected on the north of Russia



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 drier-than-normal scenario is envisaged by most models on the western Europe as well as the Middle East. A wetter-than-normal signal is likely over the far north of Europe, black sea and a large part of the eastern mediterranean bassin, from Sicily to Geeks islands.

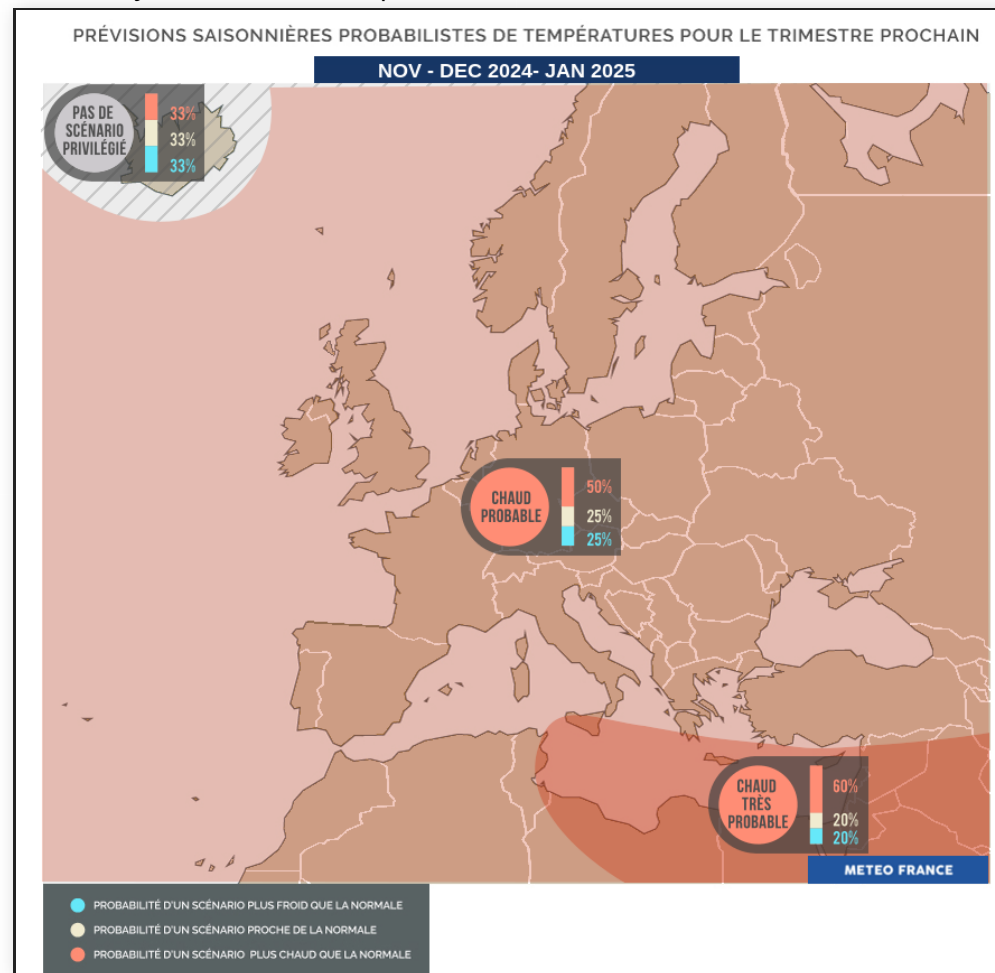


C3S multi-models probability map (top left) and MF-S8, SEAS5, UKMO, DWD, CMCC models.

## Synthesis map for Europe : Temperature

The warmer-than-normal is most likely over the southern Europe and all around Mediterranean Basin.

The Normal scenario is the most likely over western Europe .



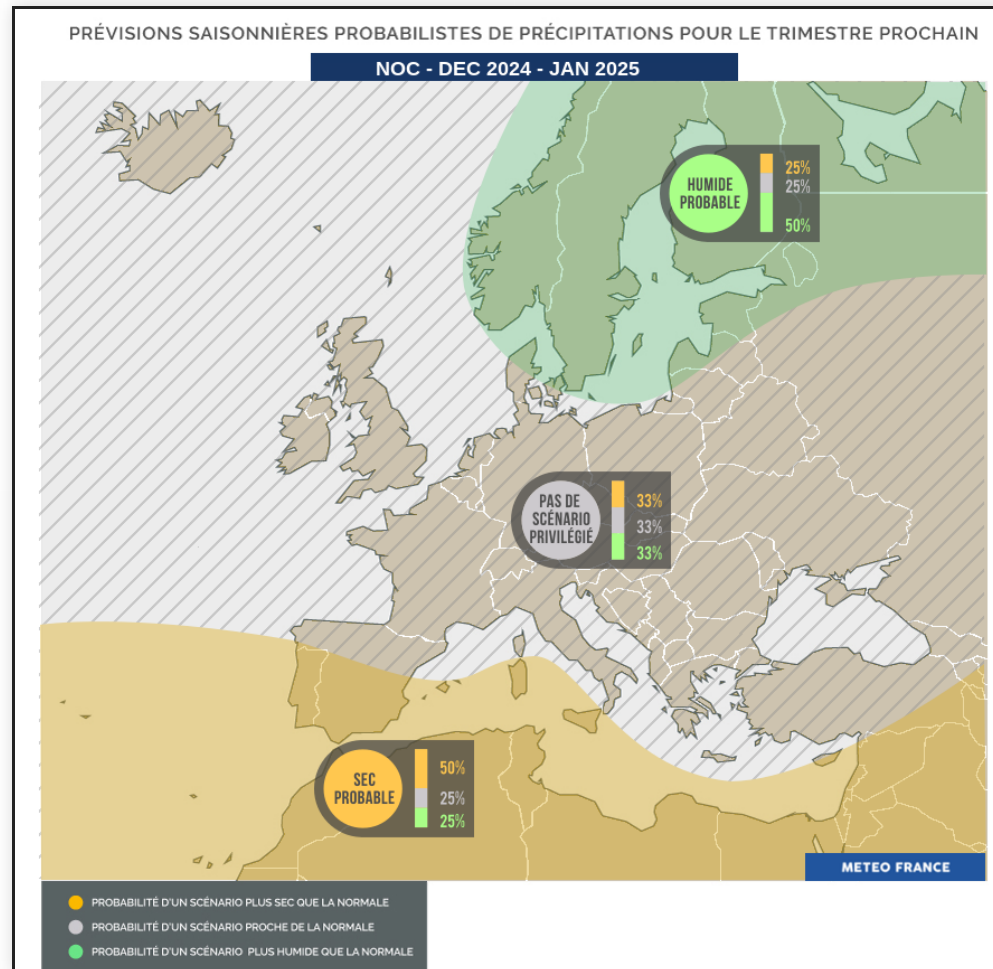
Synthesis map of probabilistic forecast for Europe. (c) Météo-France/DCSC/ACS

### Synthesis map for Europe : Precipitation

A drier-than-normal scenario is likely for far western Europe, the western Mediterranean Basin and the Middle East.

A wetter-than-normal scenario is likely on Scandinavia.

No scenario emerges elsewhere.



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