

VERIFICATION BULLETIN

NOVEMBER - DECEMBER - JANUARY -2024/2025

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Introduction : Objective

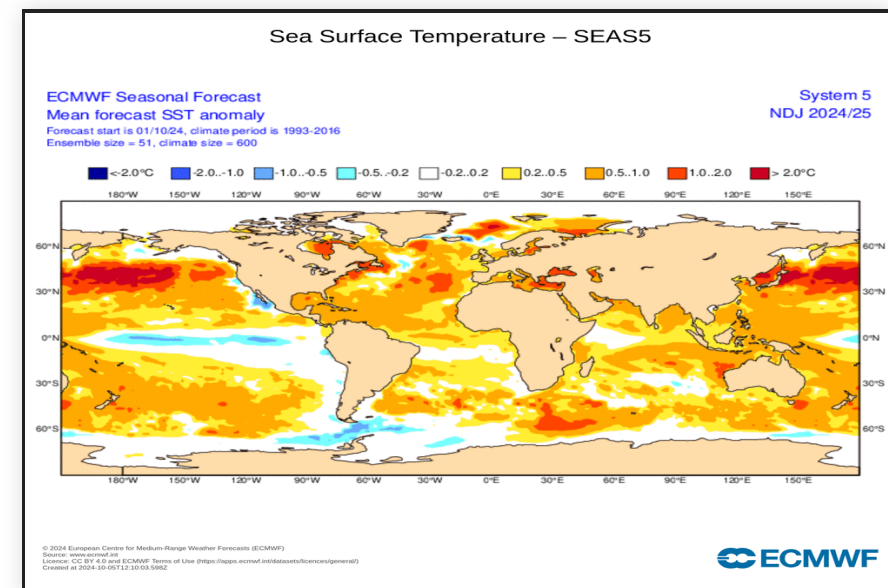
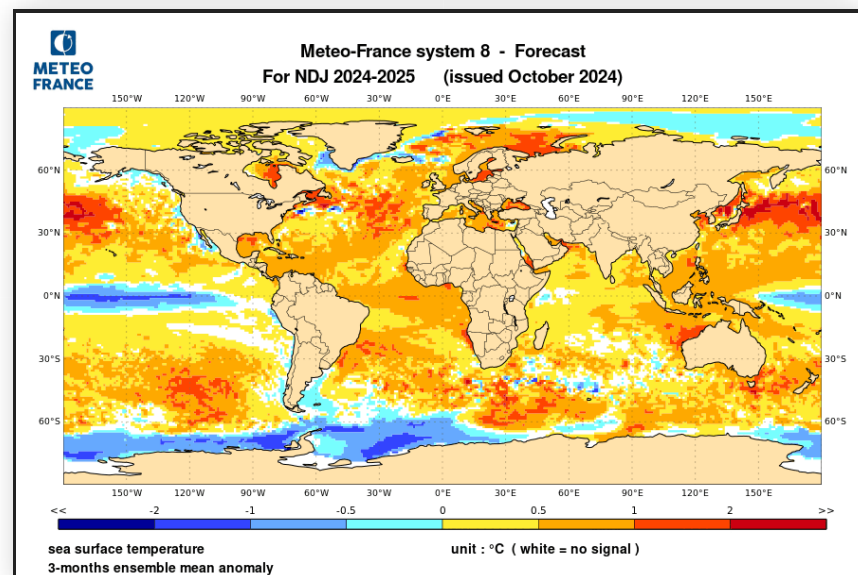
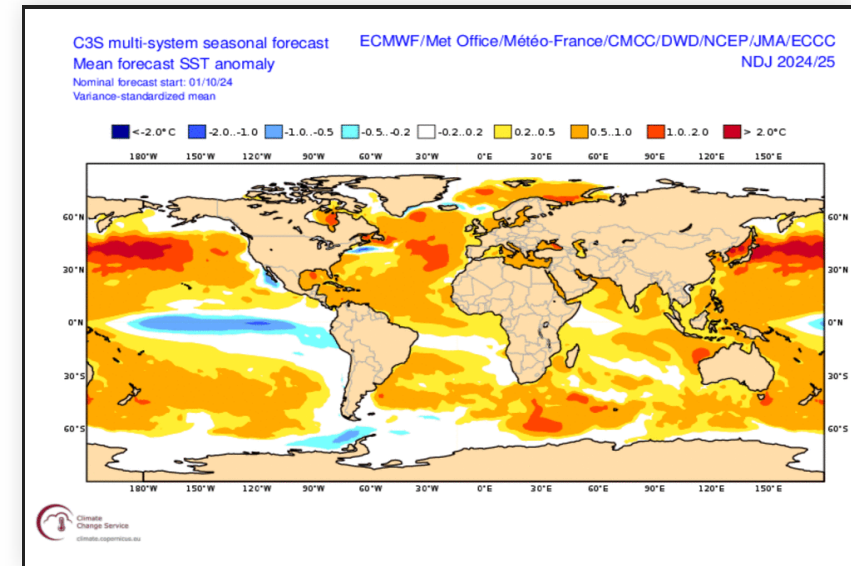
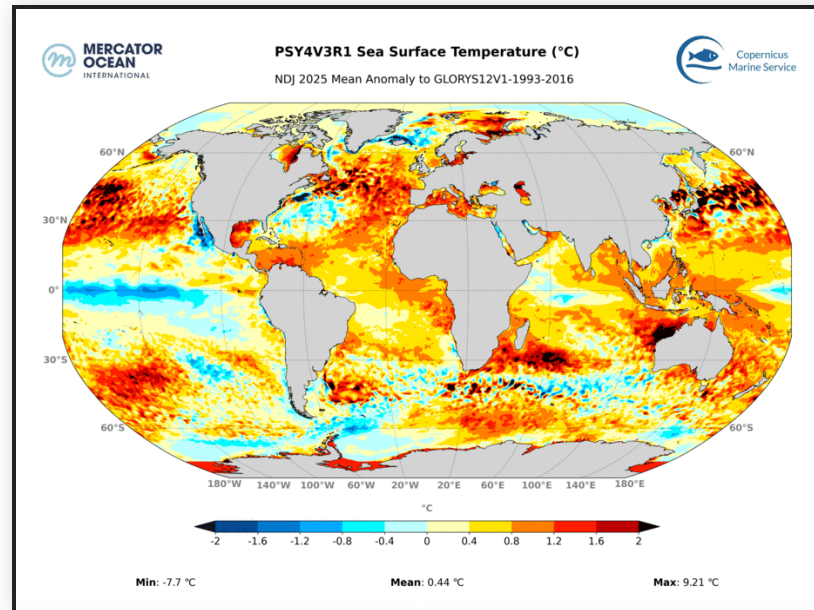
- The objective of the Seasonal Verification Bulletin is to present an evaluation of the main elements highlighted in the Seasonal Forecast Bulletin : oceanic forcings, large scale circulation patterns, and a focus on temperature and precipitation forecast over Northern Atlantic, Europe and the Mediterranean Basin.
- The aim is not to evaluate the mean skill of Seasonal Forecast models, for which scores are calculated over the whole hindcast period, but to enhance the knowledge of the behavior of models for advanced users (as National Meteorological Services), in parallel with an assessment of expertised forecast. This approach meets the need of many users, who want to know the recent real-time performances of forecasts, for specific events.
- Thanks to Mercator-Ocean and DWD (RCC-Climate Monitoring node for Europe) for providing products and analysis on the monitoring part.

Oceans : surface temperature anomalies

In the Pacific Ocean, the main anomalies are clearly visible in the models: a cold anomaly over the eastern equatorial basin, and warm anomalies in the northern and southern mid-latitudes. The PDO- pattern is correctly anticipated.

In the Indian Ocean, the east-west gradient in SST was suggested by models.

In the Atlantic Ocean, the anomalies are well forecast overall, including the cold anomaly near Iceland.

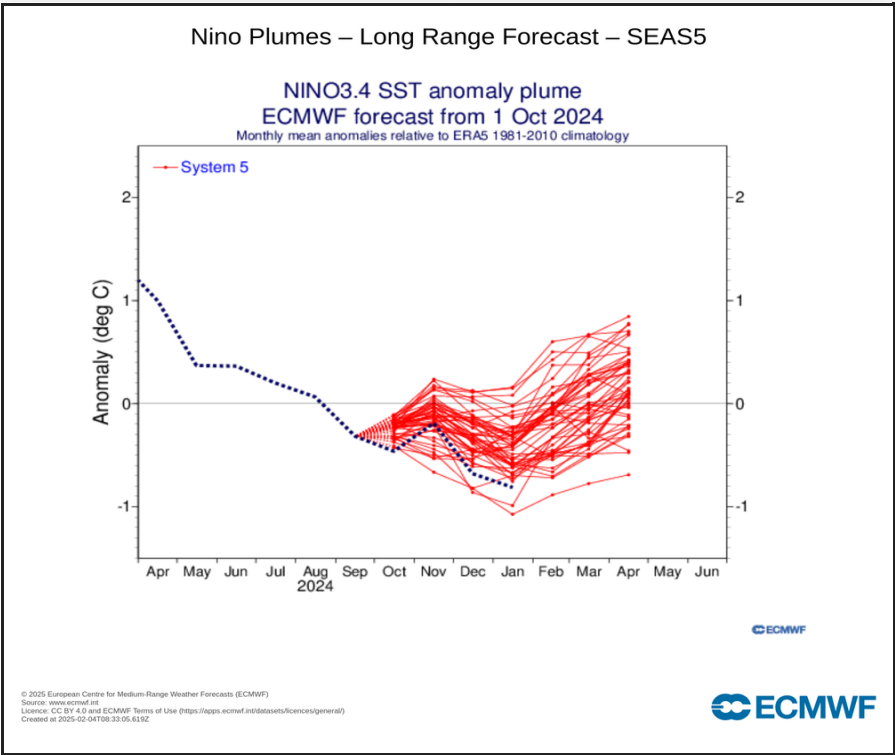
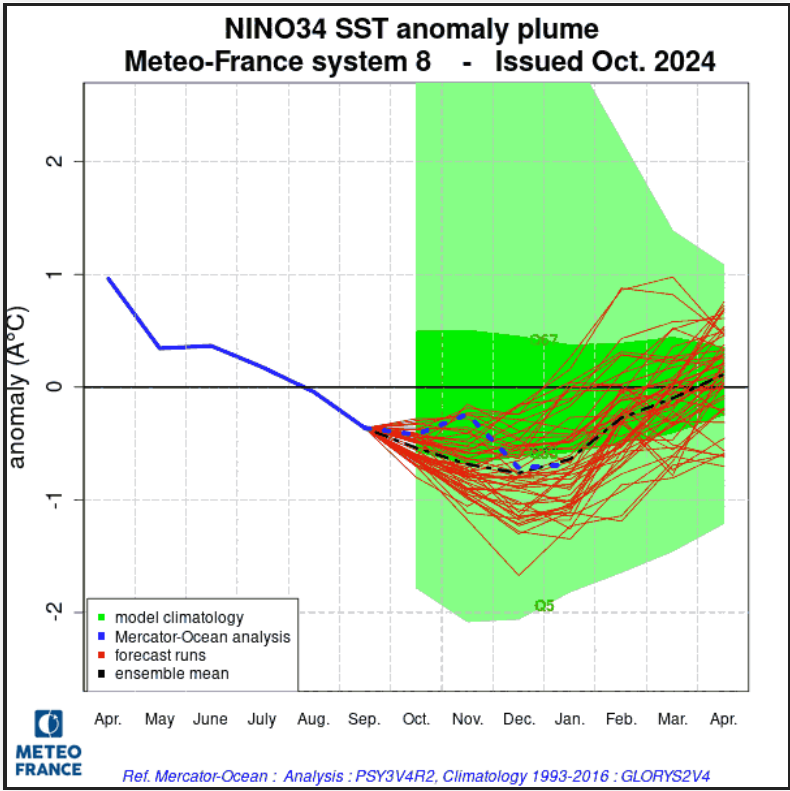


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S8 (bottom left) and SEAS5 (bottom right)

Oceans : ENSO

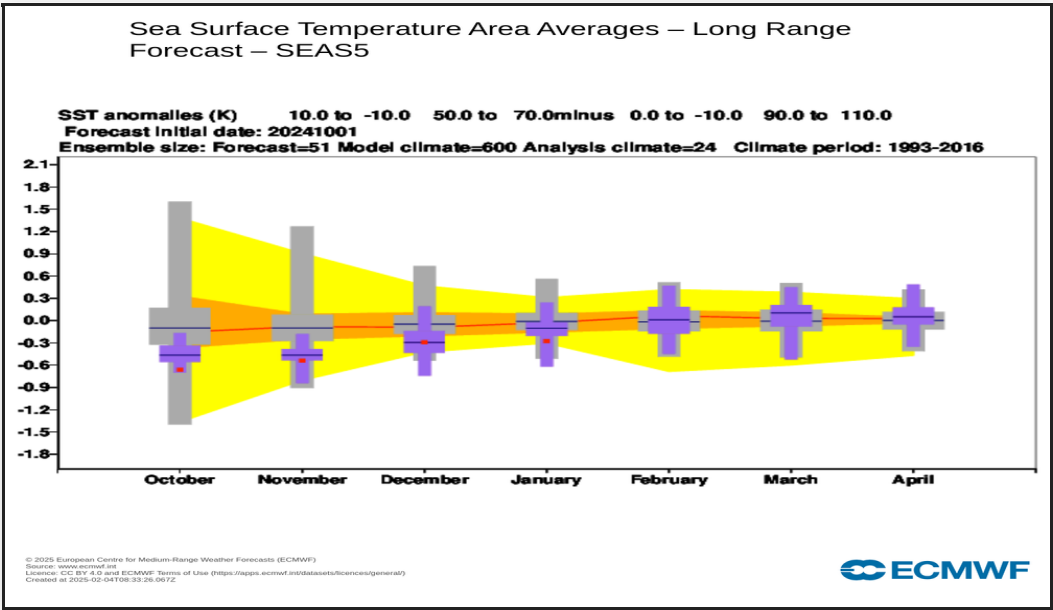
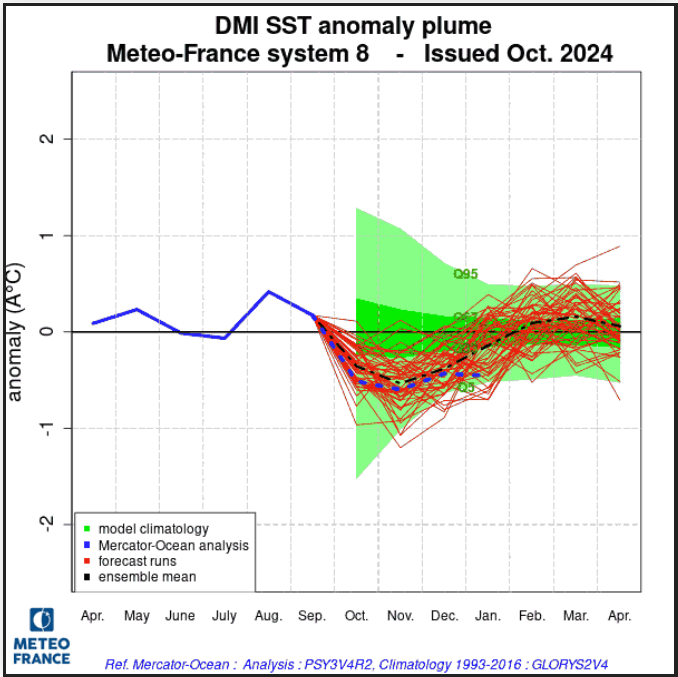
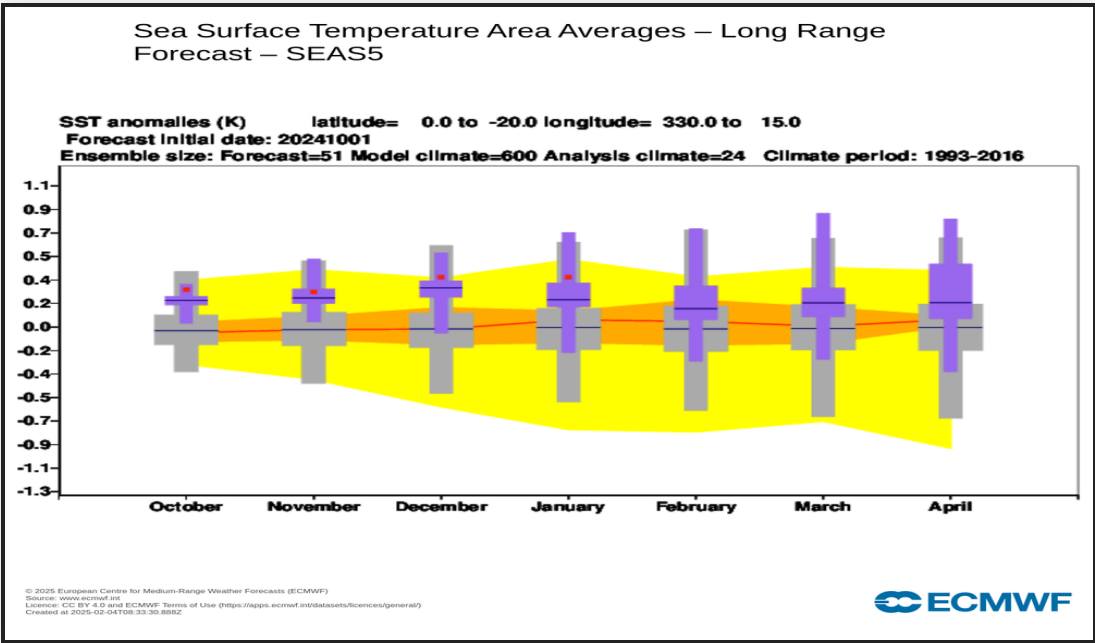
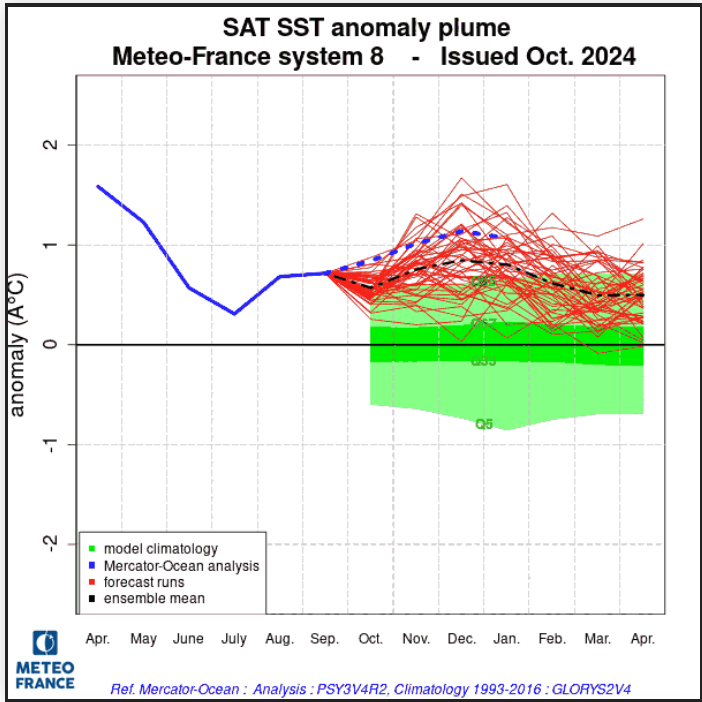
CAUTION : reference analyses differ between MF-S8 (Mercator-Ocean 1993-2016) and ECMWF-SEAS5 (NCEP 1981-2010).

The analysis is inside of the plume, in the lower part for SEAS5.



Oceans : tropical Atlantic and Indian Ocean index

SAT : The member average underestimates warm temperature anomaly
DMI : Good forecast

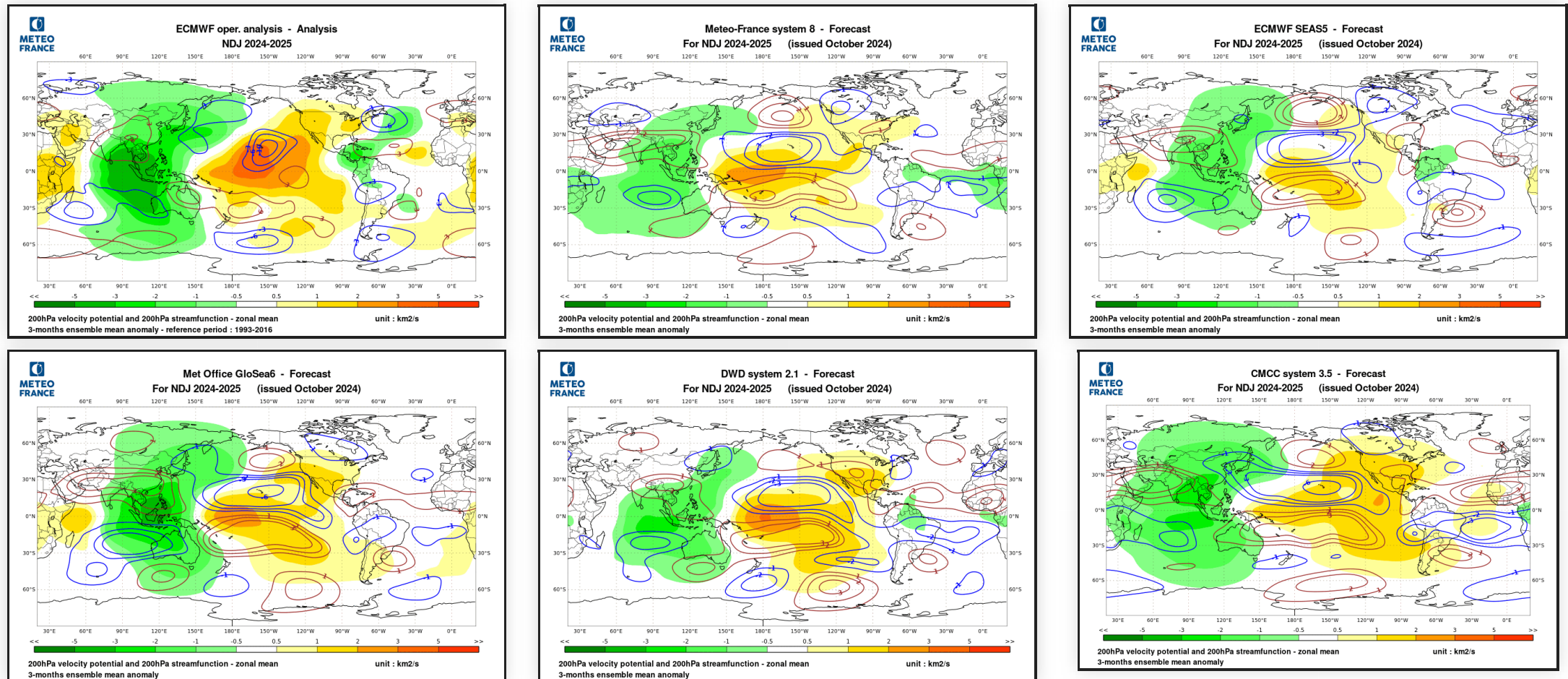


Atmospheric circulation : Global teleconnection

VP : The models correctly forecast areas of ascendancy over the Indian Ocean, and of subsidence over the Pacific Ocean and towards South America and the South Atlantic. The subsidence observed on Africa wasn't anticipated by most models.

SF : The quadripole around the Maritime Continent proposed by the models is more or less visible in the analysis unlike the teleconnection to North Pacific.

In the North Atlantic, the circulation anomalies revealed by the analysis were not well seen by the models.

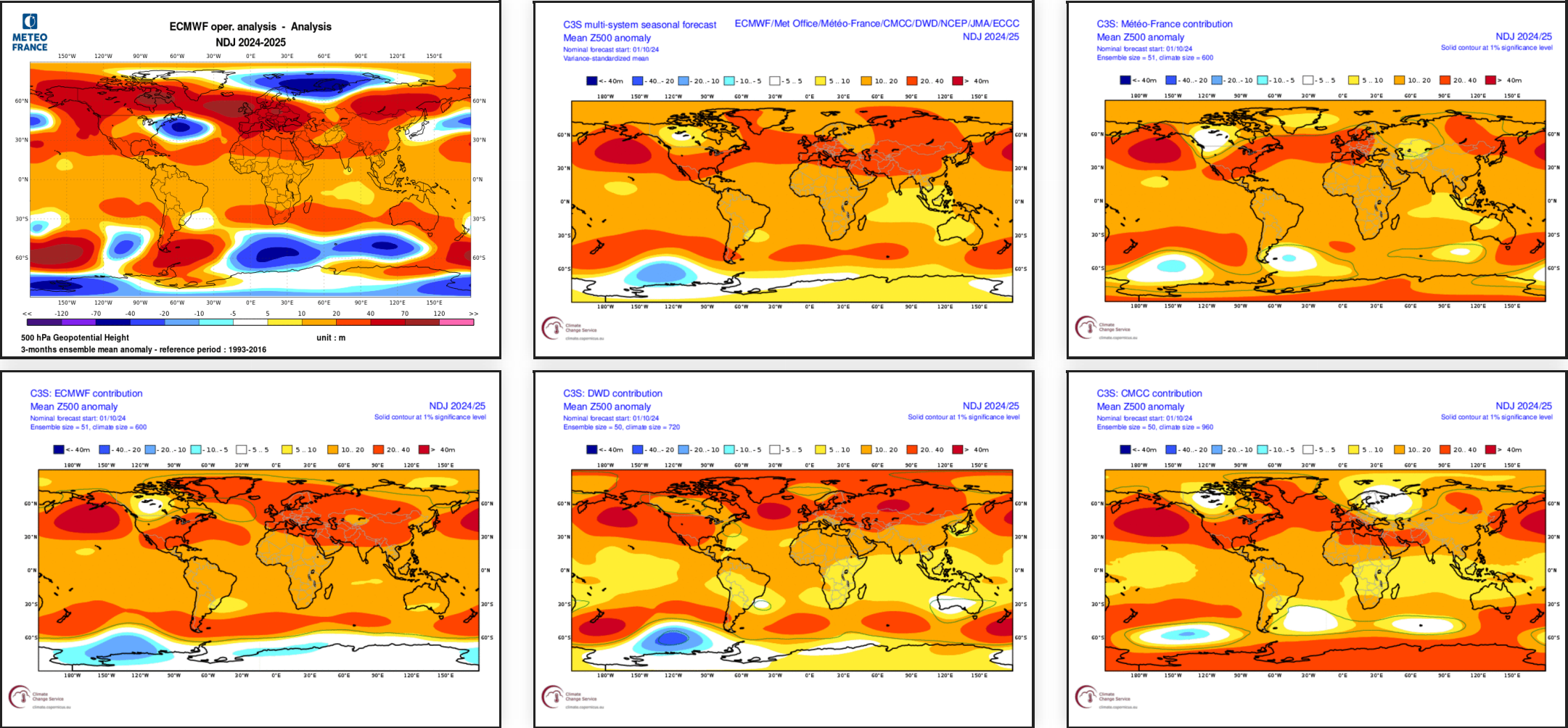


ECMWF analysis, MF-S8, ECMWF-SEAS5, CMCC, DWD and JMA 200hPa velocity potential anomalies (color range, green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

Atmospheric circulation : 500hPa Geopotential height

Southern Hemisphere : Good forecast of anomalies over the Pacific. Elsewhere the multi-model signal doesn't predicted the observed anomaly.

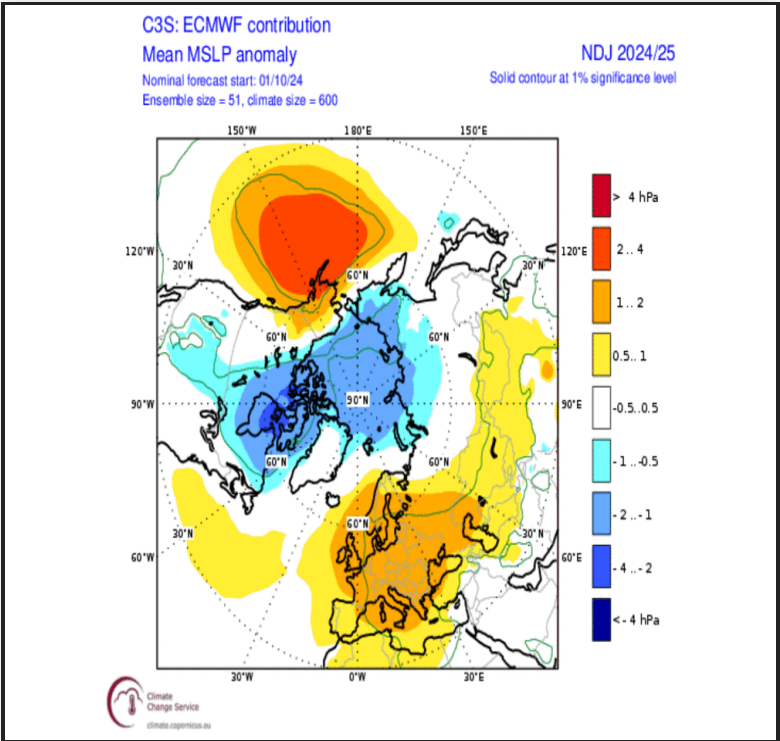
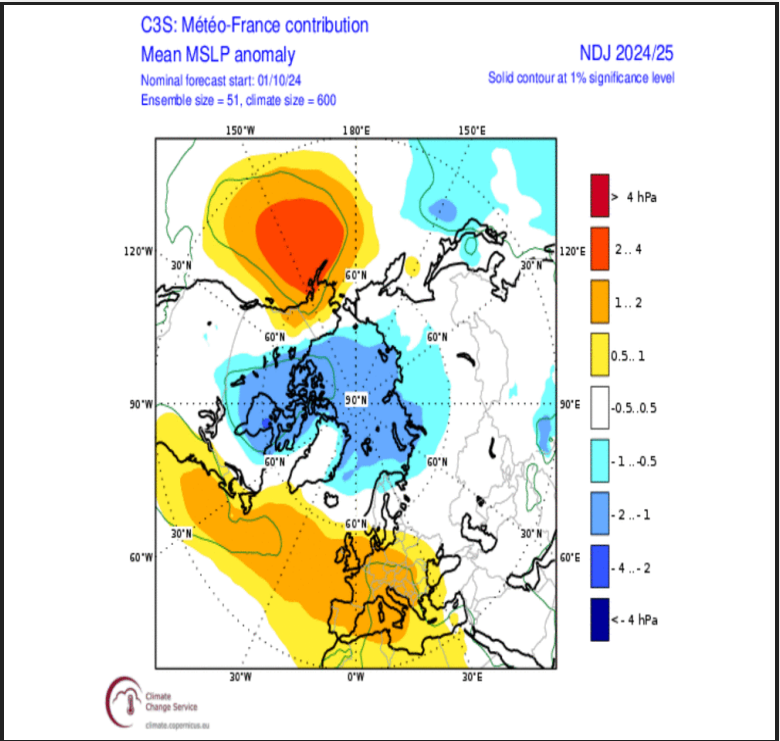
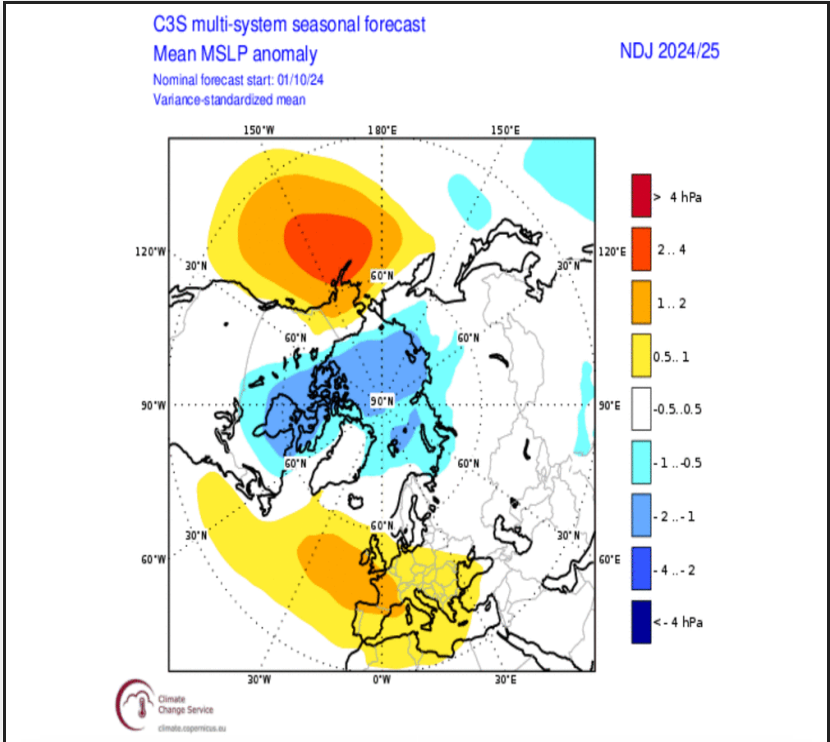
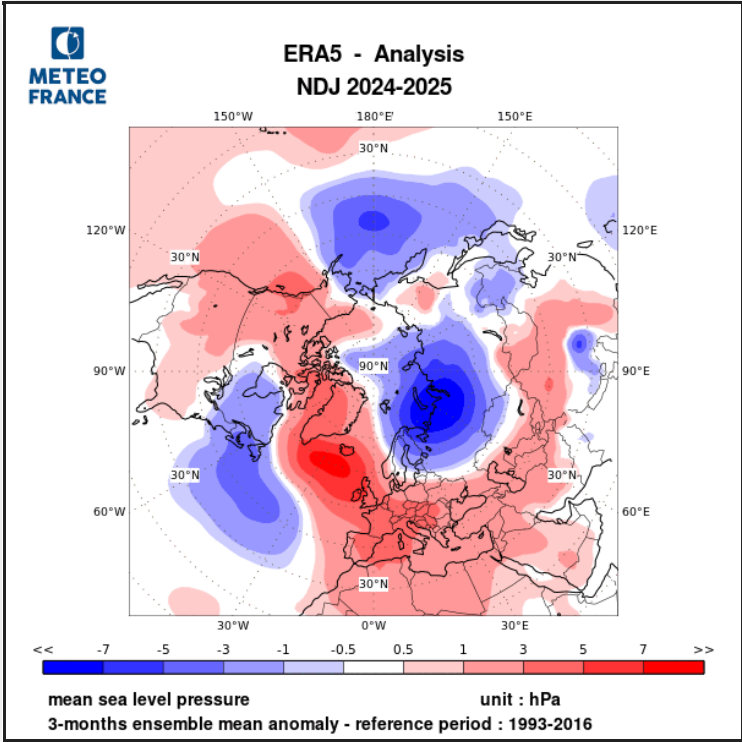
Northern Hemisphere : The PNA- pattern proposed by all models is not really observed on analysis (reverse pattern). The positive anomaly from Quebec to Europe and Scandinavia is suggested by models. However the two negative anomalies on either side, are poorly predicted.



ECMWF analysis, C3S multi-system, MF-S8, ECMWF-SEAS5, CMCC and DWD 500hPa geopotential height anomalies.

Atmospheric circulation : MSLP

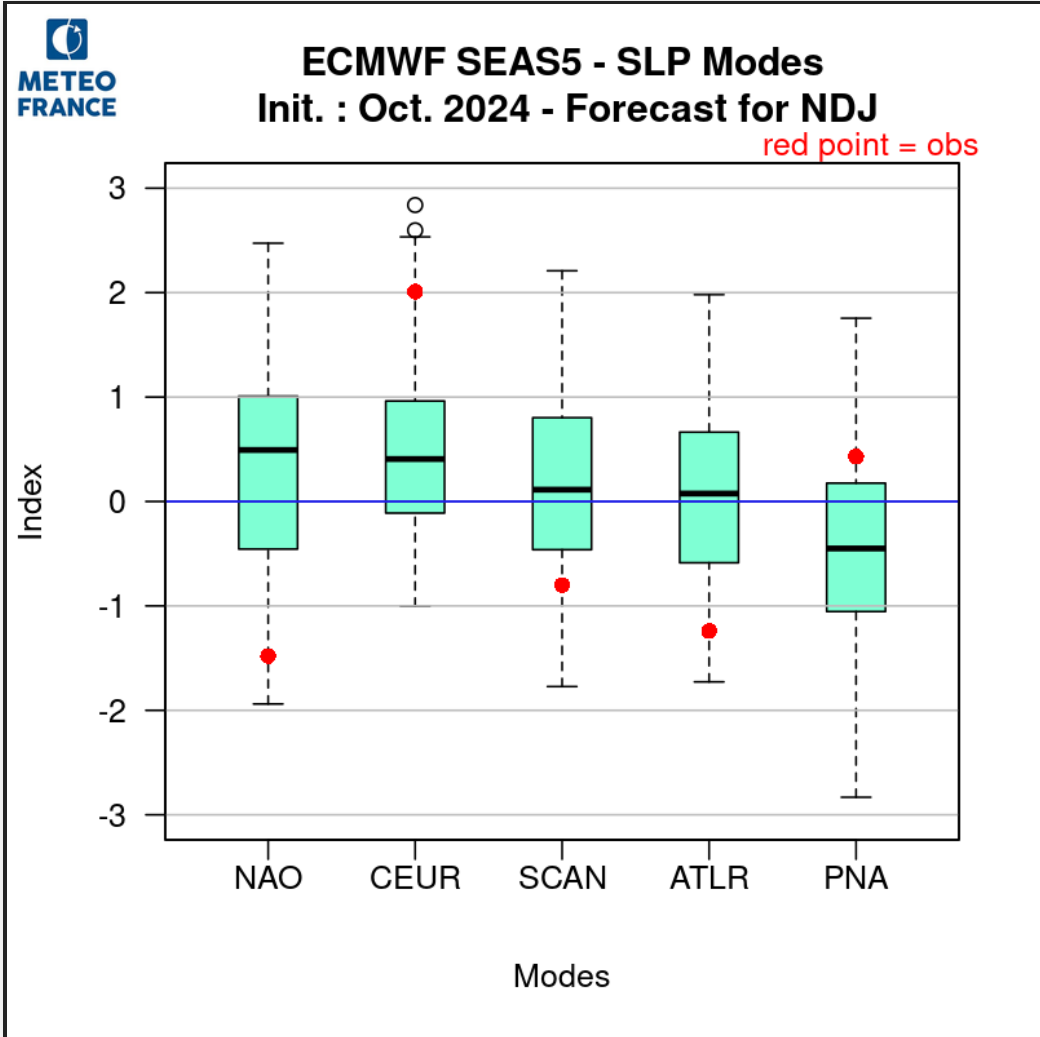
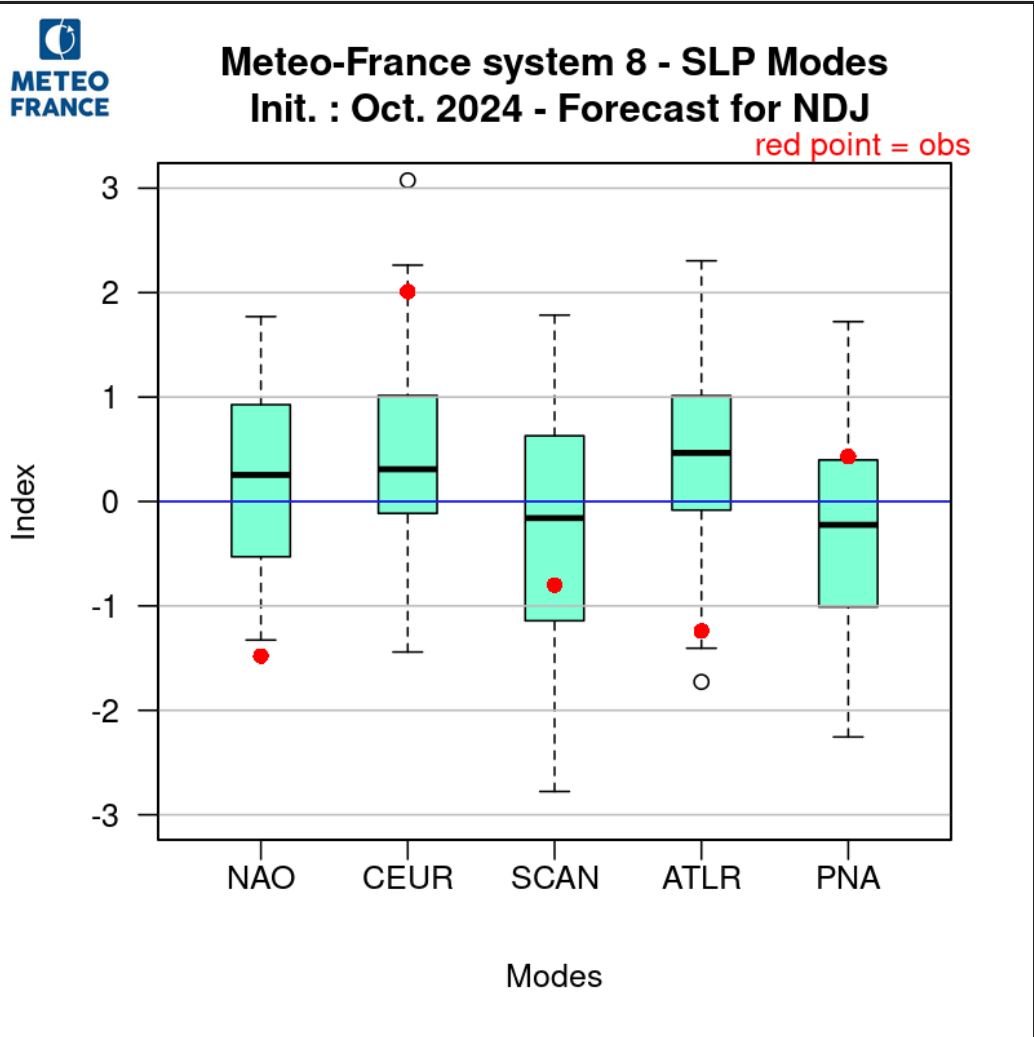
The positive anomaly on Western Europe was well anticipated, unlike the anomalies of Quebec to Greenland and northern Russia.



Analysis and multi-system C3S forecast MSLP anomalies (top), MF-S8 and ECMWF-SEAS5 MSLP anomalies (bottom)

Atmospheric circulation : Verification SLP Modes

Bad prediction of the sign of most modes except CEUR modes.

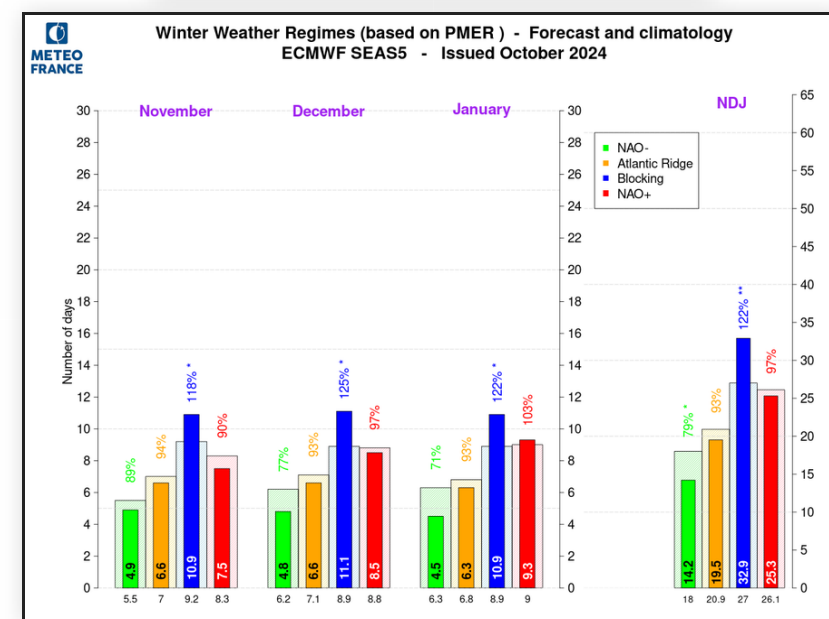
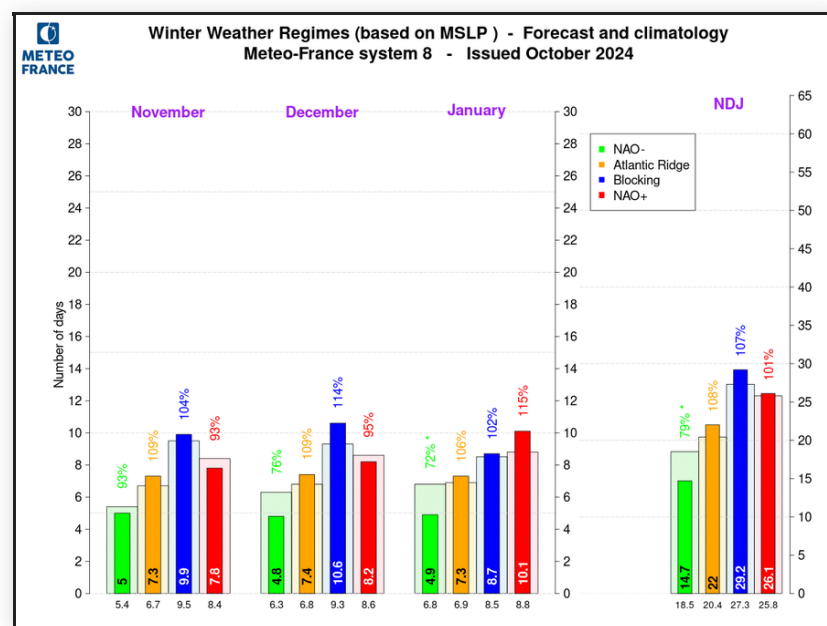
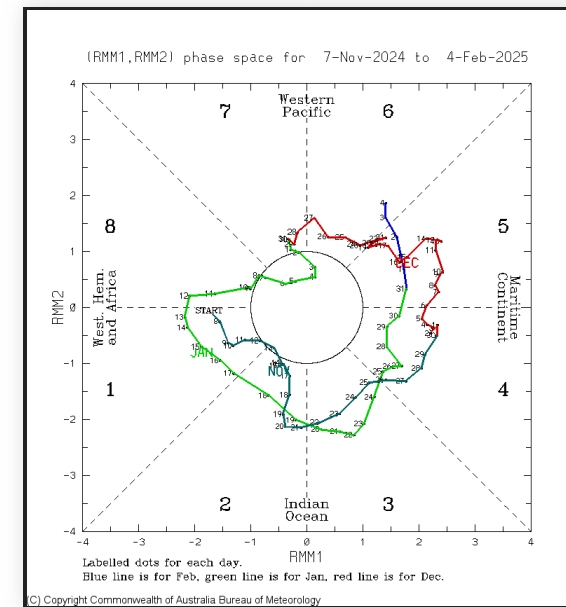
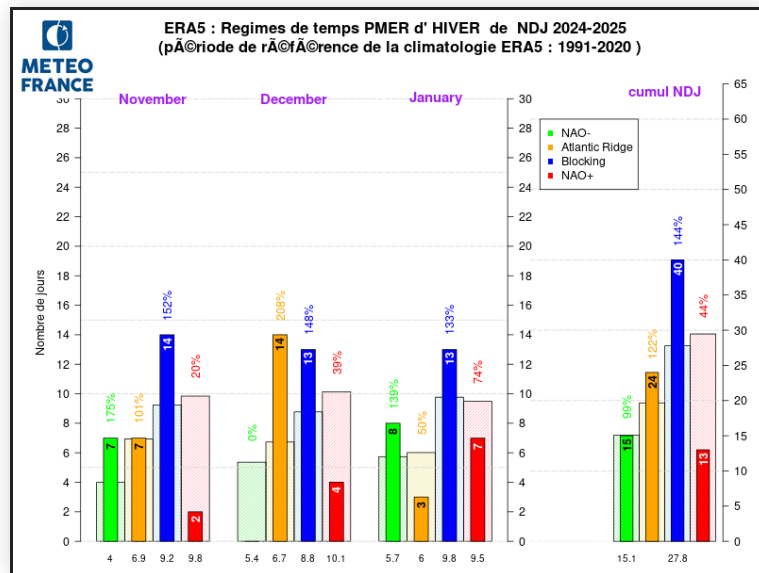


SLP modes of variability : MF-S8 and ECMWF-S5 forecasts -- red point = ERA5 reanalysis

Atmospheric circulation : Winter SLP weather regimes

Over the quarter, NAO+ was observed less frequently than its climatology whereas NAO- was forecasted less frequently than its climatology.

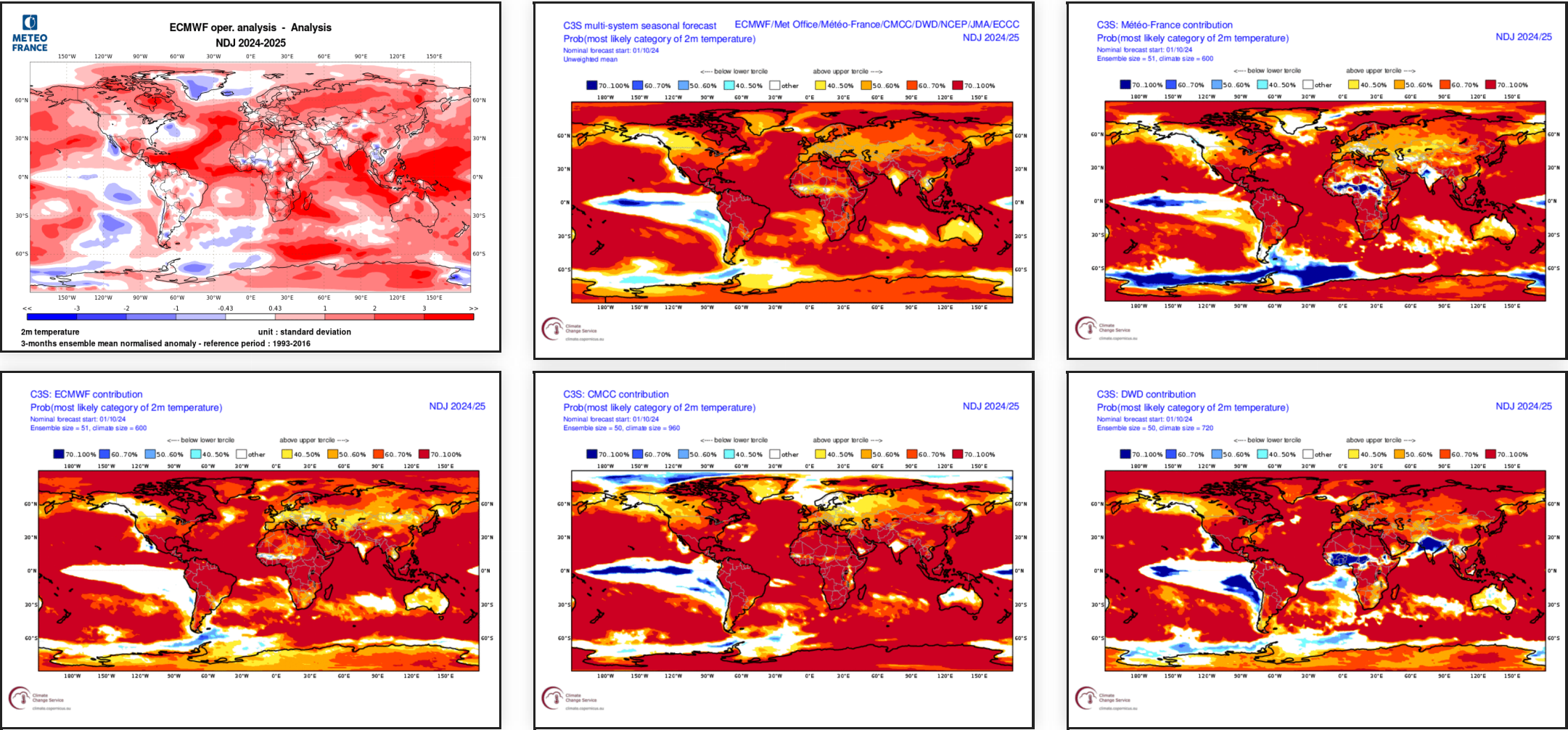
The Blocking regimes were correctly favored by both models, in particular by SEAS5 for all months as this was observed.



weather regime : ECMWF analysis top left, MF8 and ECMWF forecasts at the bottom. MJO phase top right

Climatic parameters : temperature on the globe

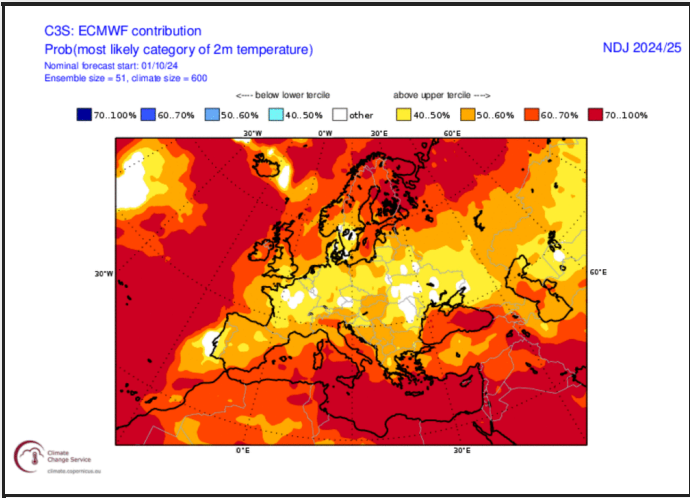
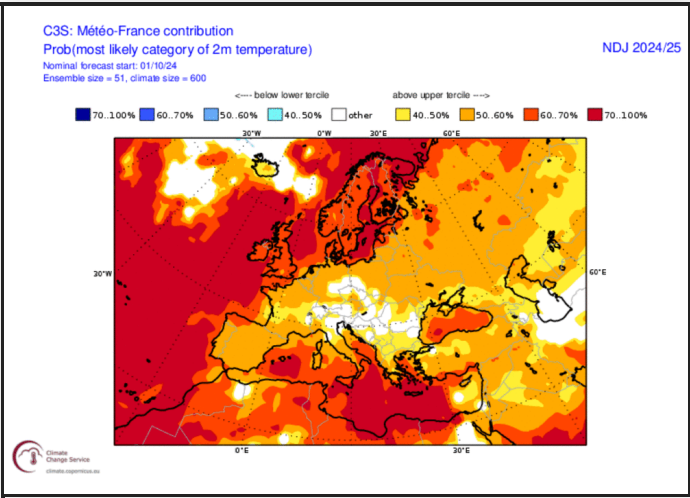
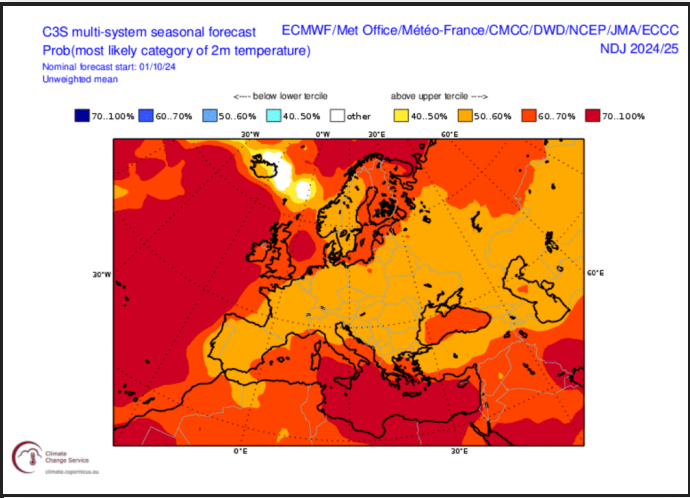
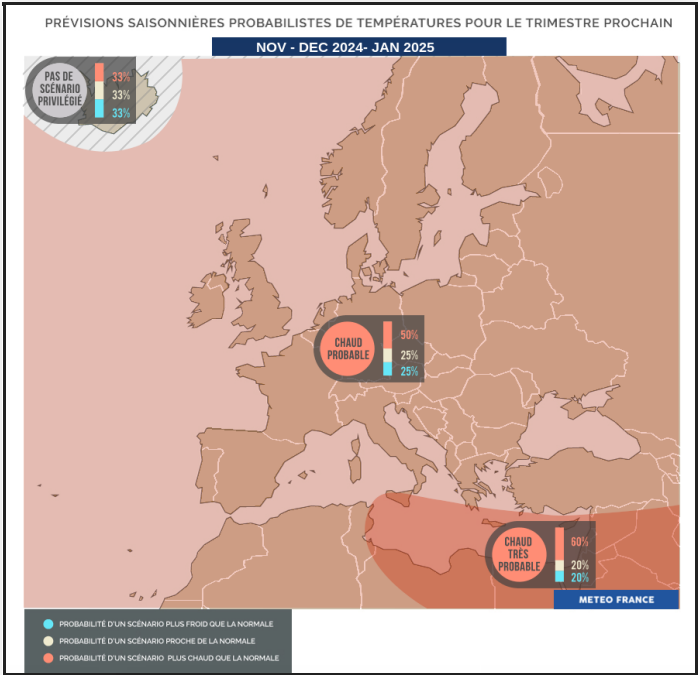
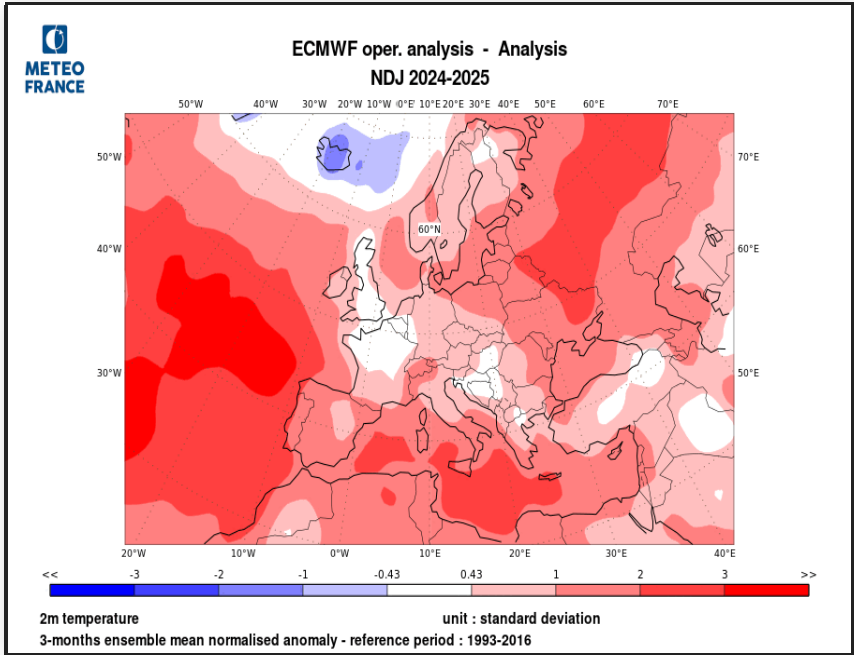
Warm anomalies predominate.
Major land regions with lowers chances of higher tercile are often neutral or cold anomalies observed (western Europe, Sahel, India, Greenland)



ECMWF analysis top left, forecast for multi-model top center and forecast for MF-S8 top right, ECMWF-SEAS5, CMCC, DWD on the bottom line.

Climatic parameters : temperature over Europe

Over the Atlantic Ocean and Mediterranean Sea, the warm temperature anomaly is linked to the positive SST anomaly. Inland, temperatures are above to normal, except for some regions of central and western Europe (close to normal) and Iceland (colder than normal).

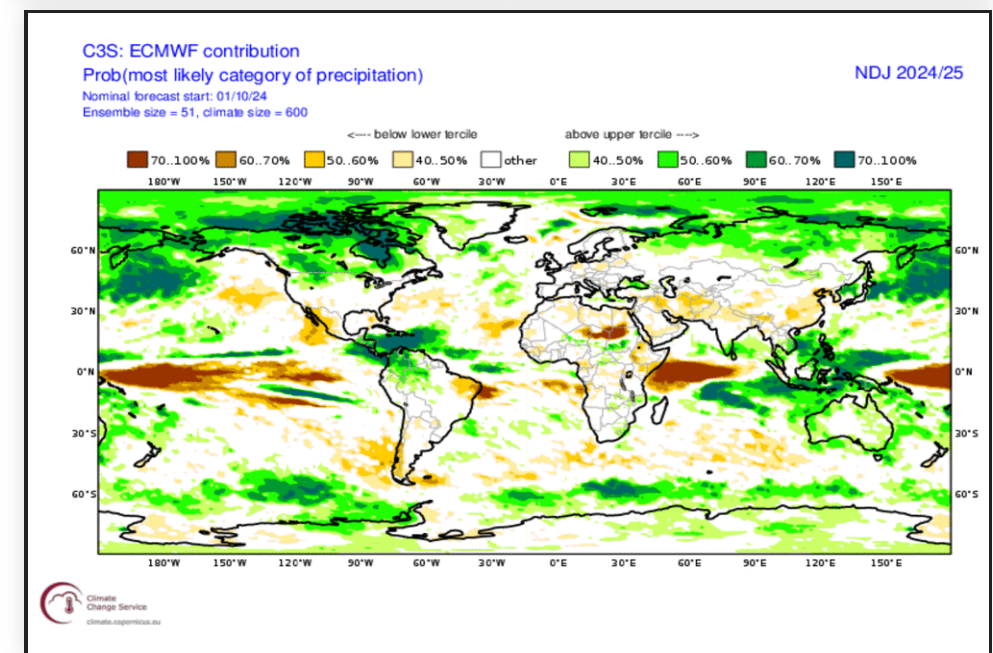
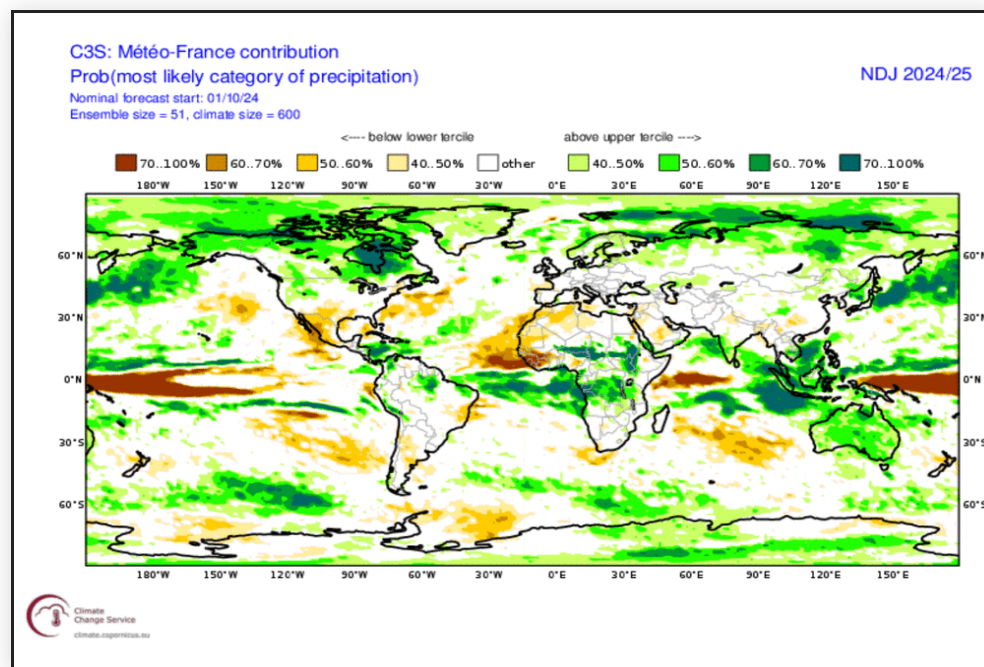
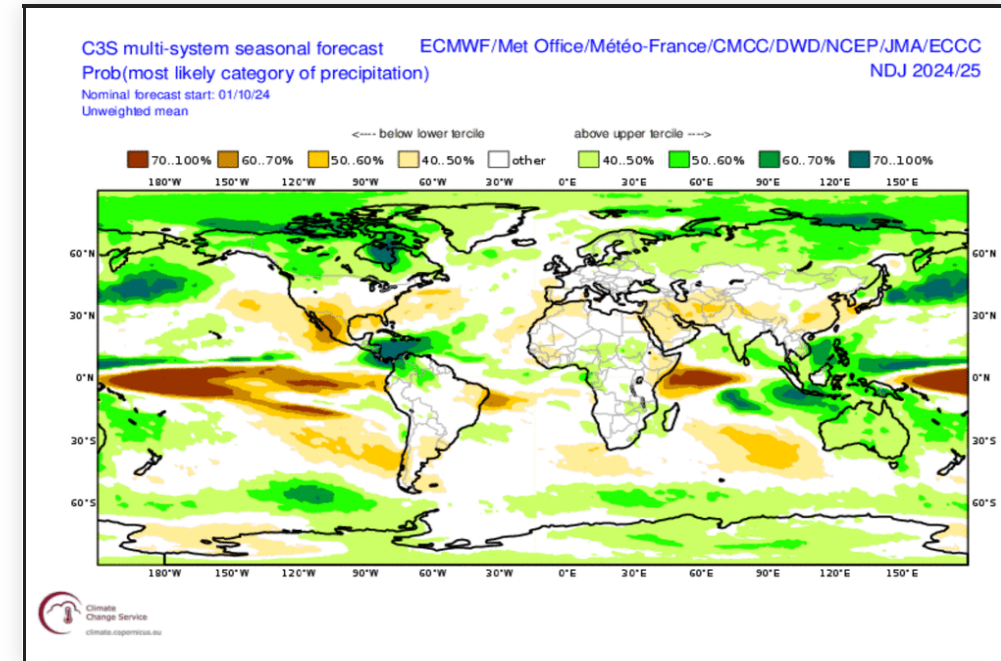
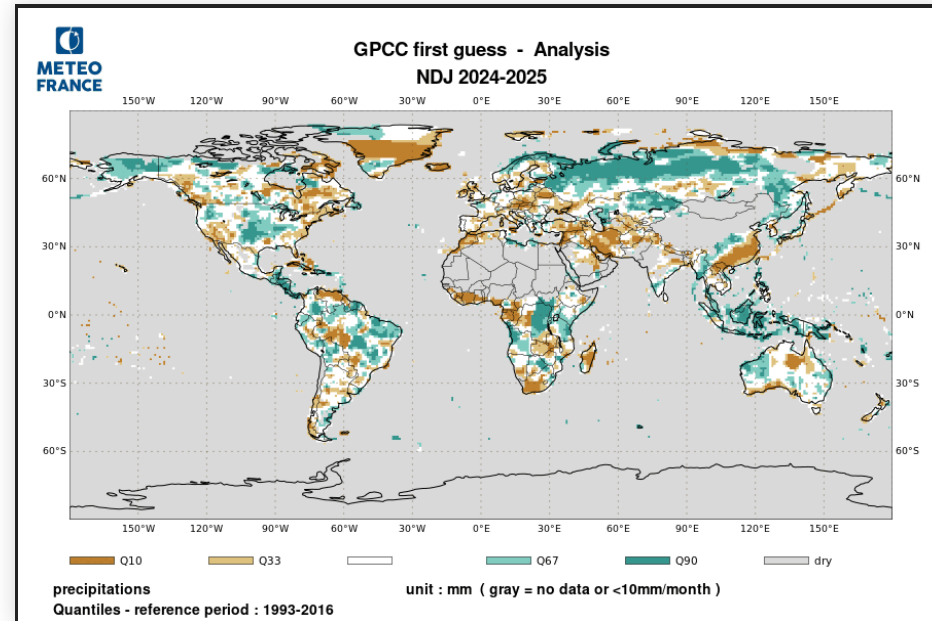


ECMWF analysis top left, synthetic forecast map top right. Forecast for multi-system , MF-S8 and SEAS5 on the bottom line.

Climatic parameters : Precipitations over the globe

In the inter-tropical zones, the wet signal forecast by the models over the Maritime Continent is confirmed by analysis, as is the dry signal over Mexico.

In the Northern Hemisphere, large-scale convergence between models and analysis is more difficult to establish, except for wet signal over north Russia.

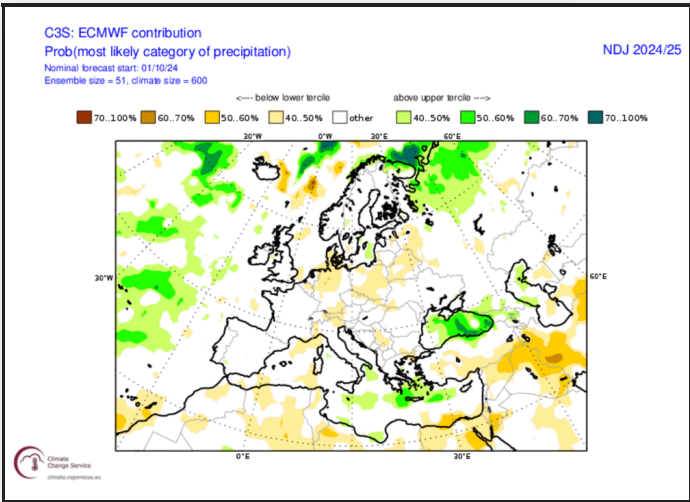
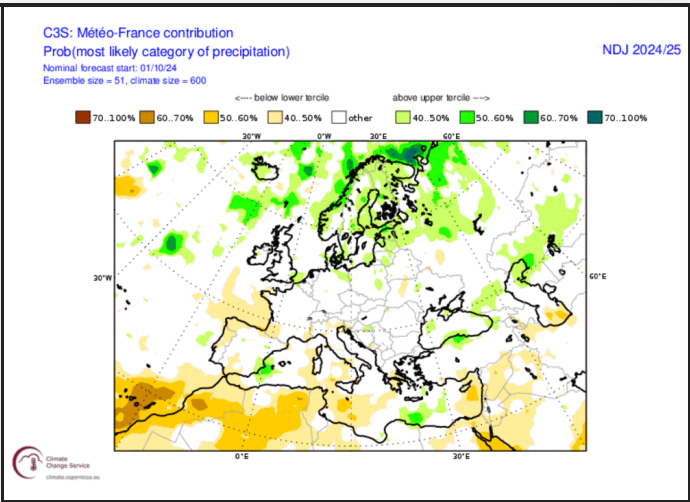
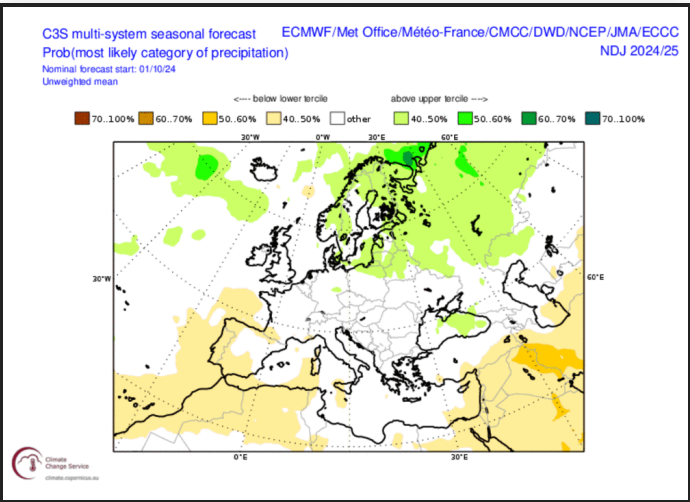
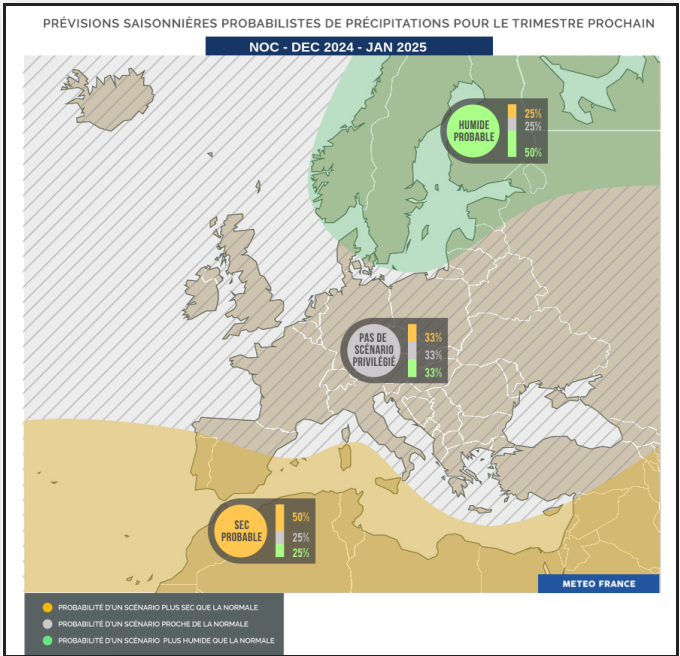
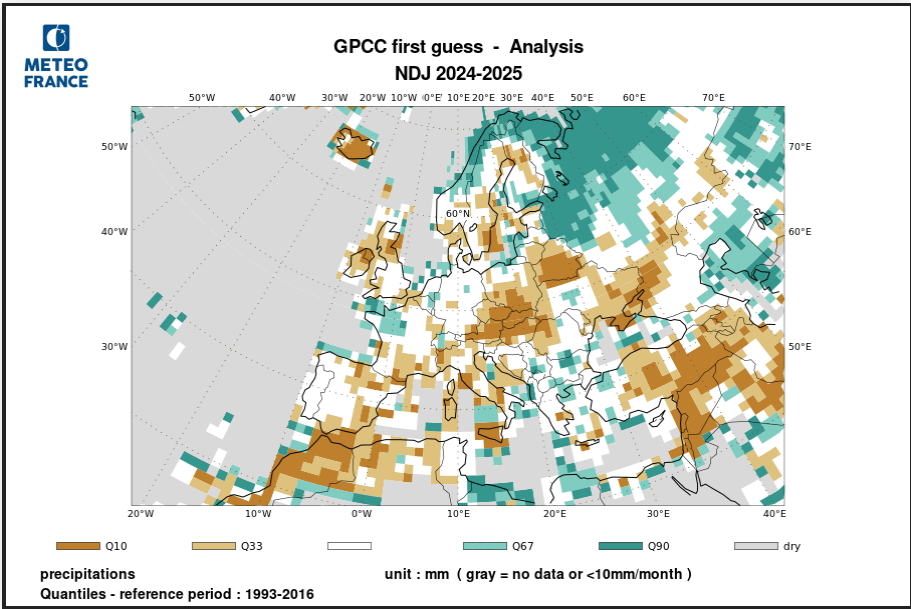


Standardized Precipitation Index analysed by IRI top left, forecast for multi-model top right and MF-S8 and SEAS5 on the bottom line.

Climatic parameters : Precipitations over Europe

Wet conditions are well forecasted around Scandinavia

The rather dry signal observed from the west to the center of Europe, in connection with the positive MSLP observed, wasn't really anticipated by the models.



Precipitation anomalies analysed by IRI (top left). Synthetic forecast map for precipitation (top right) and forecast for multi-model,MF-S8 and SEAS5 (on the bottom line).

General summary : for the period NDJ 2024-2025

1) Oceans :

The main anomalies predicted by the models are confirmed by analysis, across all basins

2) Large scale atmospheric circulation :

VP 200 hPa : DOWNDRAFT and UPDRAFT zones are well anticipated by the various models.

SF 200 hPa : Circulation anomalies in the intertropical zone were rather well forecast unlike teleconnections to North America. Over Europe and the North Atlantic, the weak signal at analysis wasn't expected.

Z500 : In Europe and the North Atlantic, the positive anomaly on the west and center of Europe was anticipated, while forecasts aren't correlated to analysis elsewhere.

3) Climatic parameters over Europe :

Temperatures : The temperature scenario envisaged in the summary map favors warm anomalies on all Europe except Iceland, whereas it was observed warm anomalies over almost Europe.

Precipitations : Good forecast for wet anomalies around Scandinavia. Dry signal over most country of Europe wasn't expected.