

VERIFICATION BULLETIN

DECEMBER - JANUARY - FEBRUARY -2024/2025

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Introduction : Objective

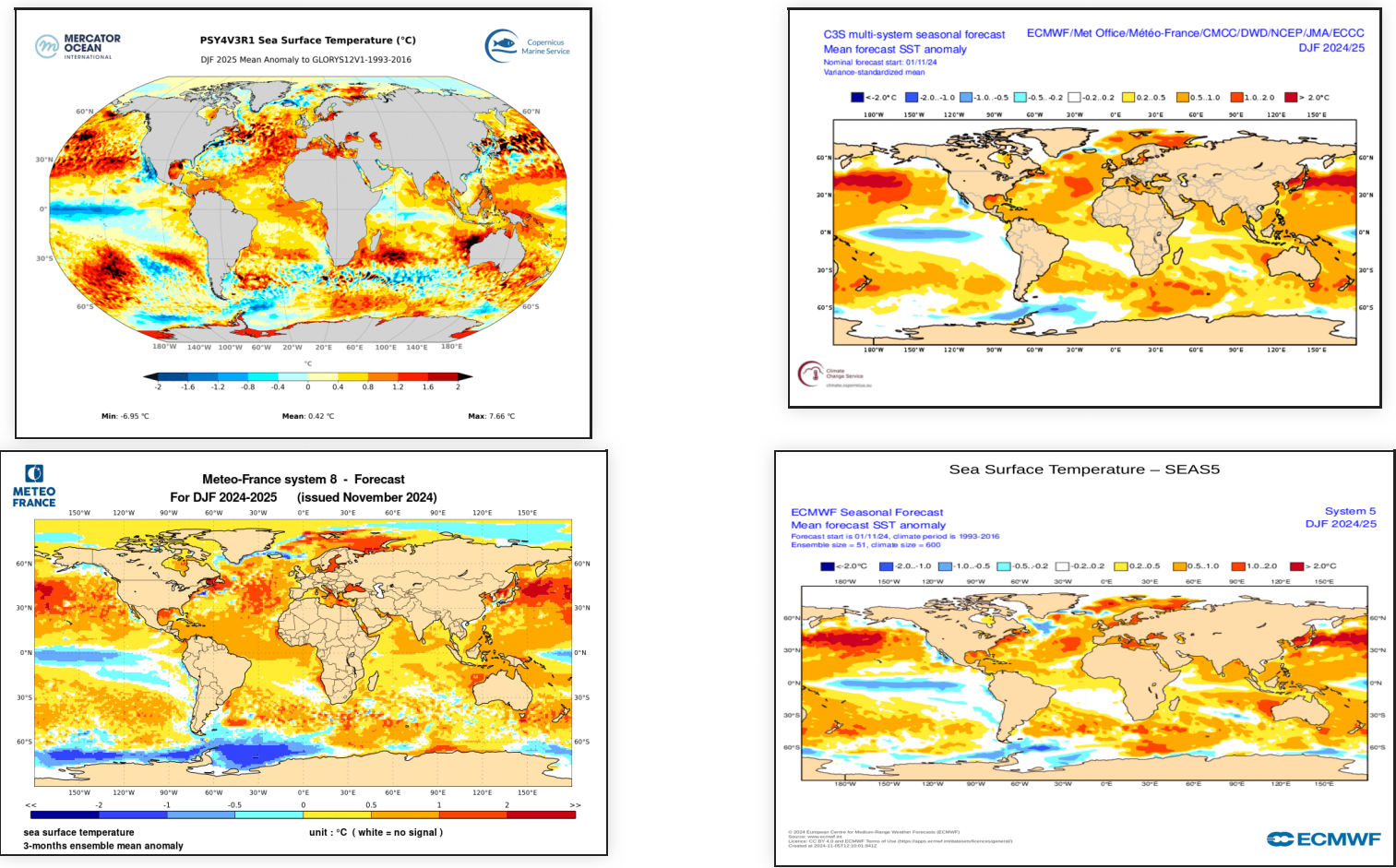
- The objective of the Seasonal Verification Bulletin is to present an evaluation of the main elements highlighted in the Seasonal Forecast Bulletin : oceanic forcings, large scale circulation patterns, and a focus on temperature and precipitation forecast over Northern Atlantic, Europe and the Mediterranean 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 PDO- pattern is less visible in the analysis than in the forecasts. The negative anomaly in the equatorial zone was correctly anticipated.

In the Indian Ocean, the small cold anomaly to the west of the basin was more or less well predicted by the models.

In the Atlantic Ocean, the warm anomaly in the equatorial zone is underestimated by the models. In the Northern Hemisphere, the pattern is well seen, even if the weak cold anomaly in the west is underestimated.

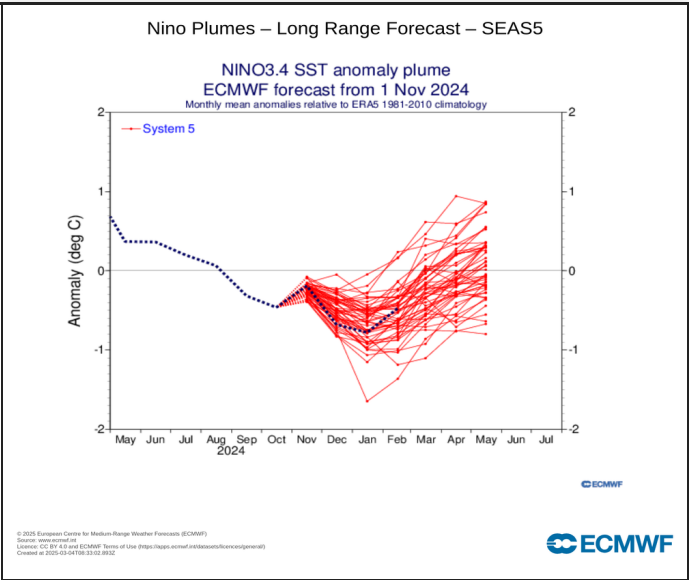
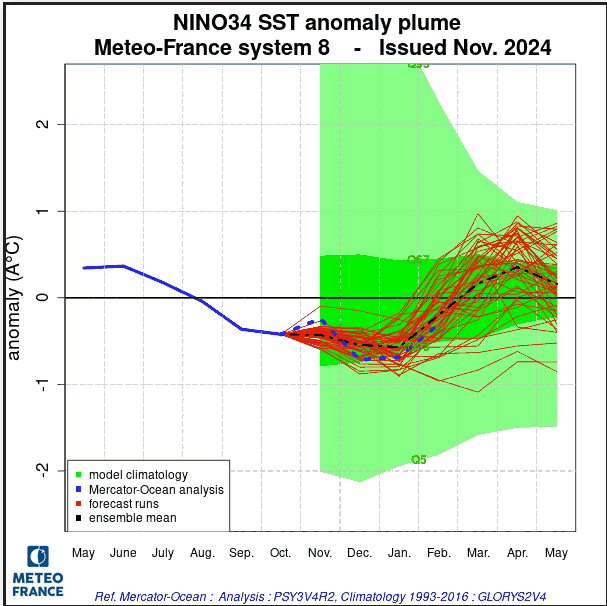


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S8 (bottom left) and SEAS5 (bottom right)

Oceans : ENSO

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

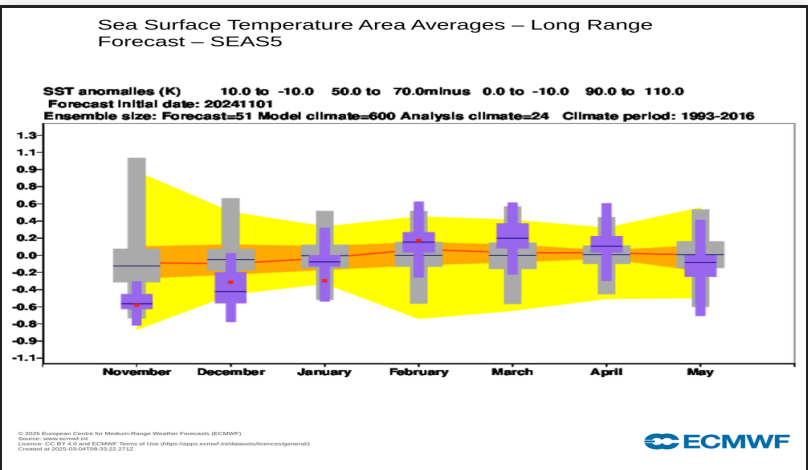
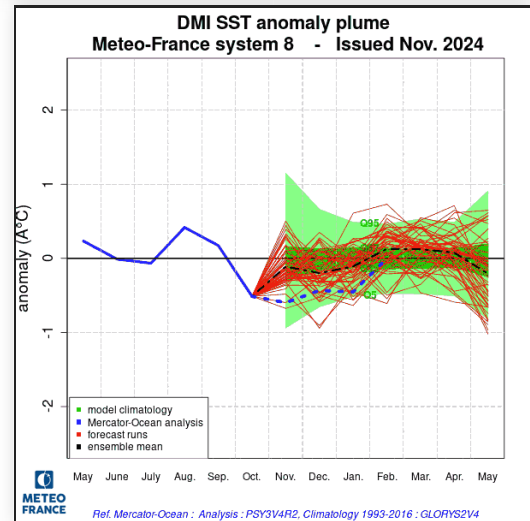
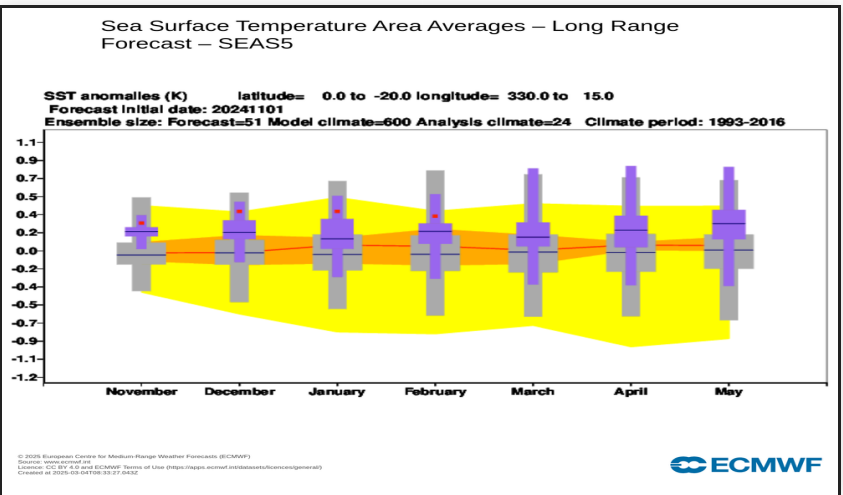
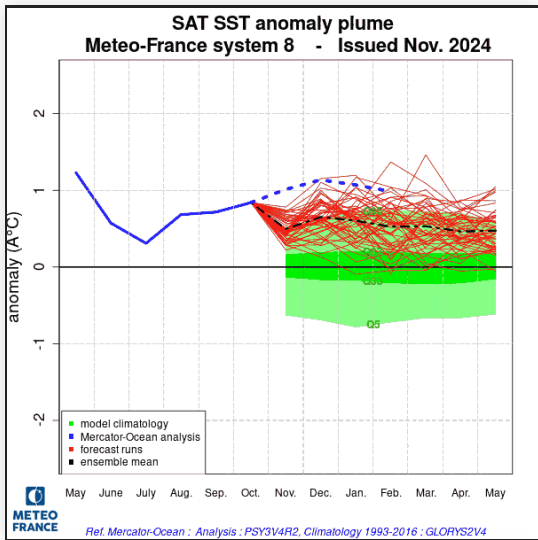
The analysis is inside of the plume, in the lower part for SEAS5.



Oceans : tropical Atlantic and Indian Ocean index

SAT : The figures confirm the underestimation of the warm anomaly.

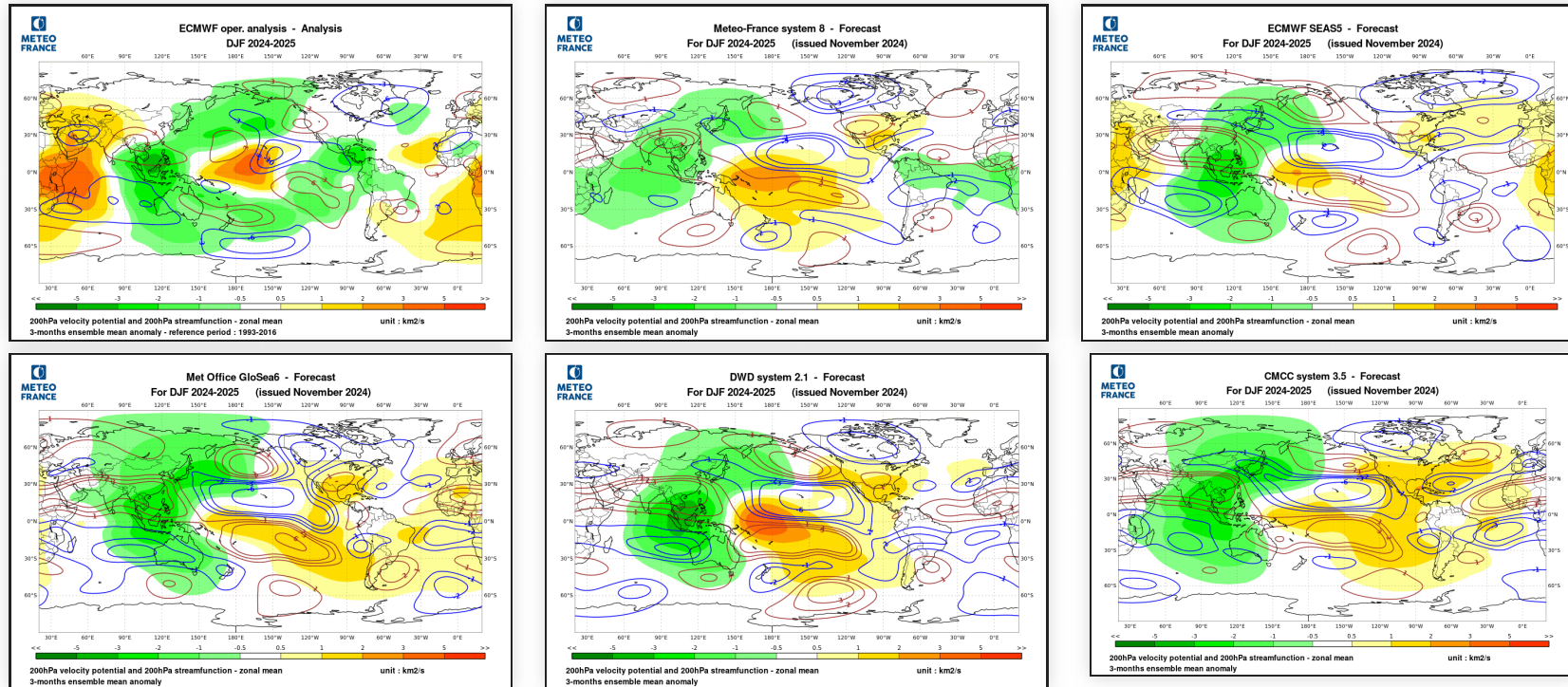
DMI : Good forecast for ECMWF. MF-S8 underestimated the negative anomaly.



Atmospheric circulation : Global teleconnection

VP : Significant differences between forecasts and analysis are visible: extension of updrafts in the North and South Pacific, a zone of downdrafts over the western Indian Ocean (linked to the negative SST anomaly) and Africa.

SF : On analysis, there is no Atlantic extension of the Indian Ocean dipole. Near Europe, the stream function anomalies predicted by the models are not well-reflected in the analysis.

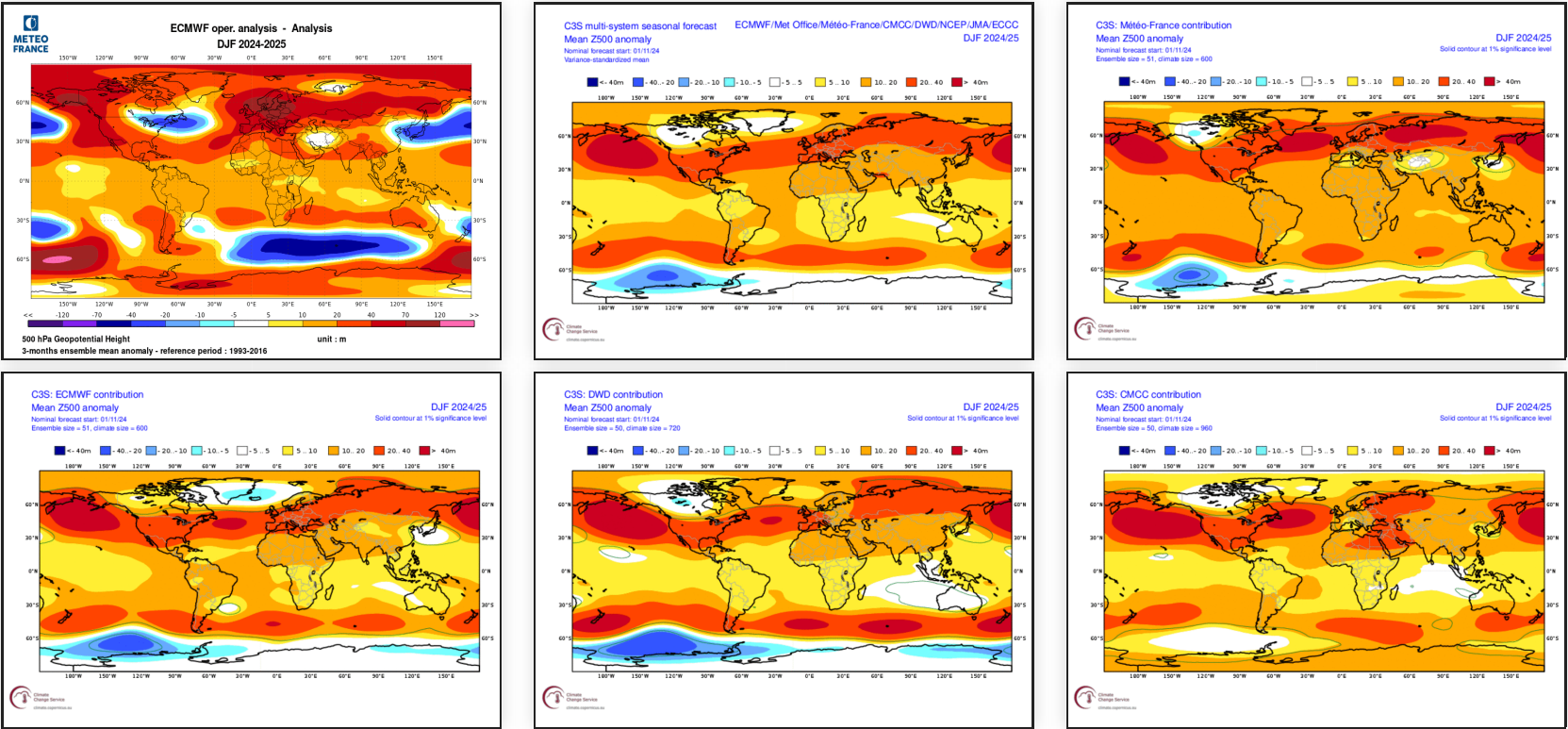


ECMWF analysis, MF-S8, ECMWF-SEAS5, CMCC, DWD and JMA 200hPa velocity potential anomalies (color range, green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

Atmospheric circulation : 500hPa Geopotential height

Southern Hemisphere : Poor forecast of the different anomalies.

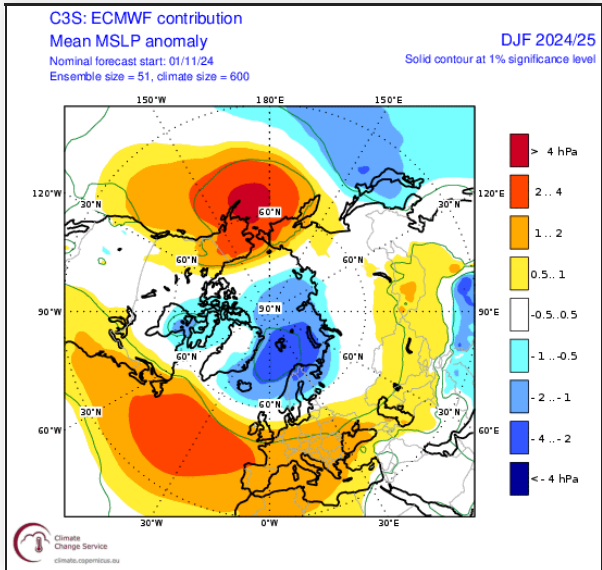
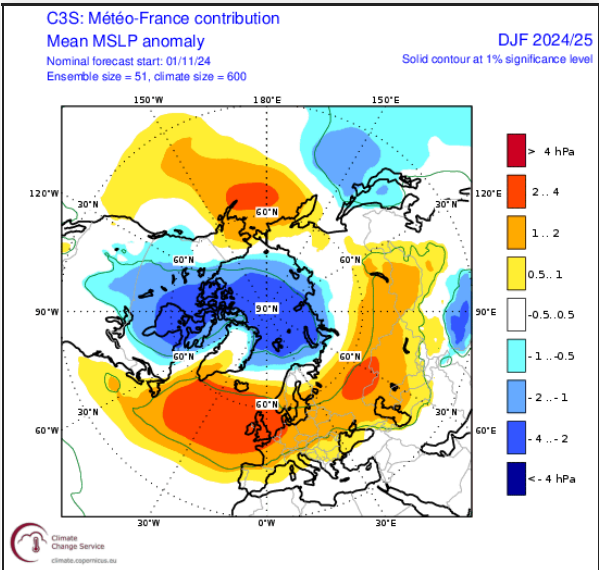
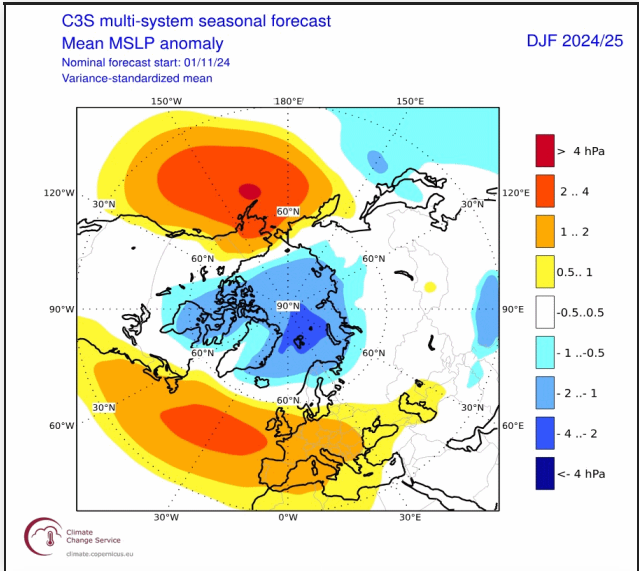
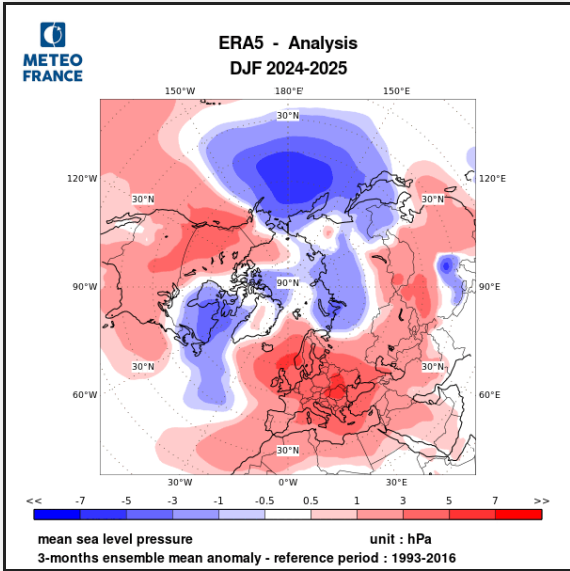
Northern Hemisphere : The PNA+ pattern was not anticipated, nor was the negative anomaly south of Newfoundland. The positive anomaly over Europe is more or less well forecast.



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

Atmospheric circulation : MSLP

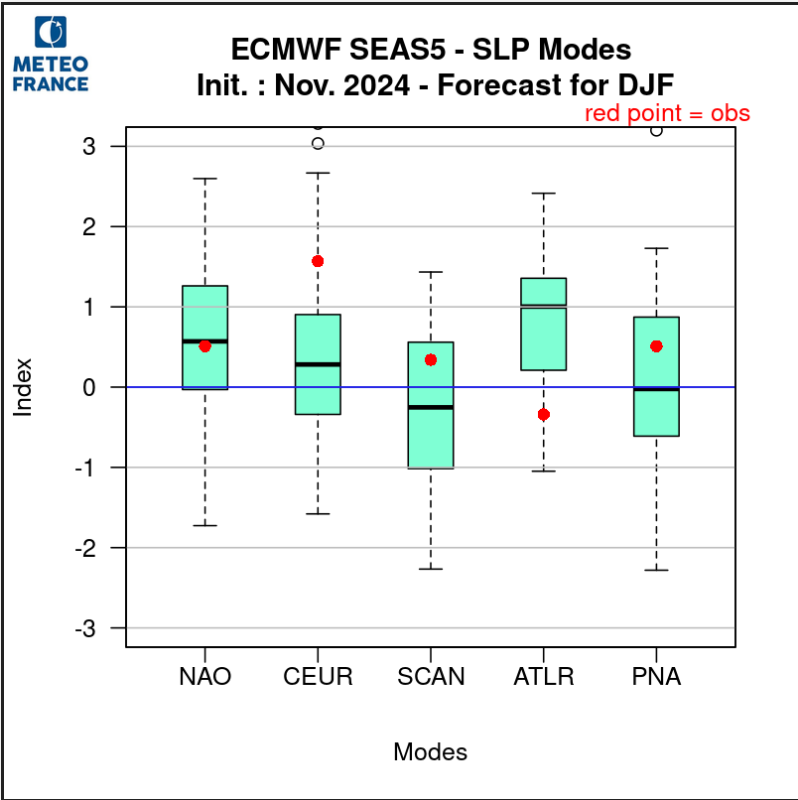
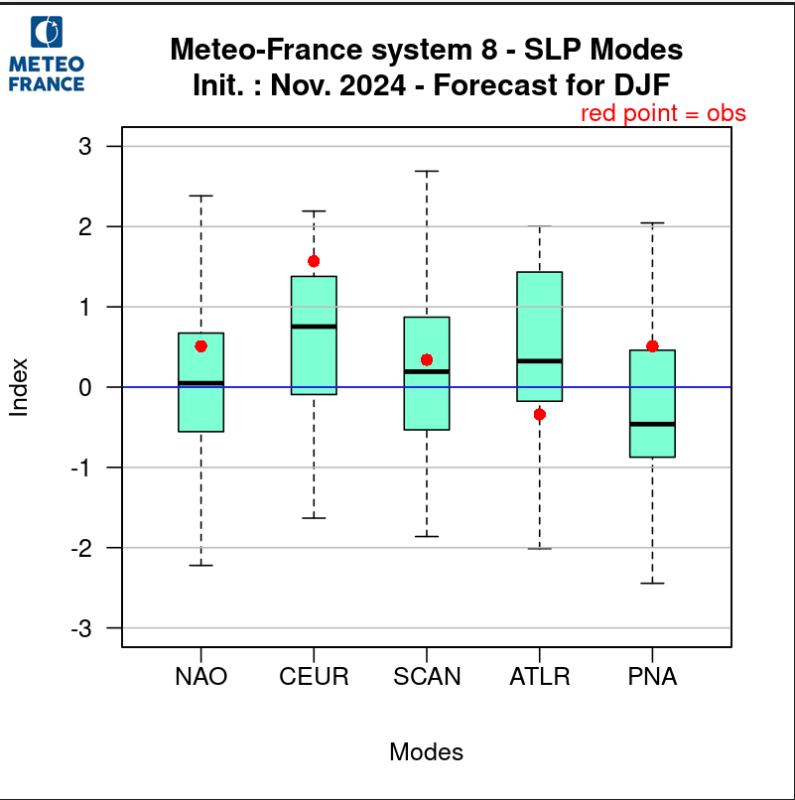
In North America, negative anomalies in the Bering Sea and over Quebec were not anticipated. In Europe and Russia, on the other hand, the positive anomaly is well forecast.



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

Atmospheric circulation : Verification SLP Modes

MF-S8 is better than ECMWF.

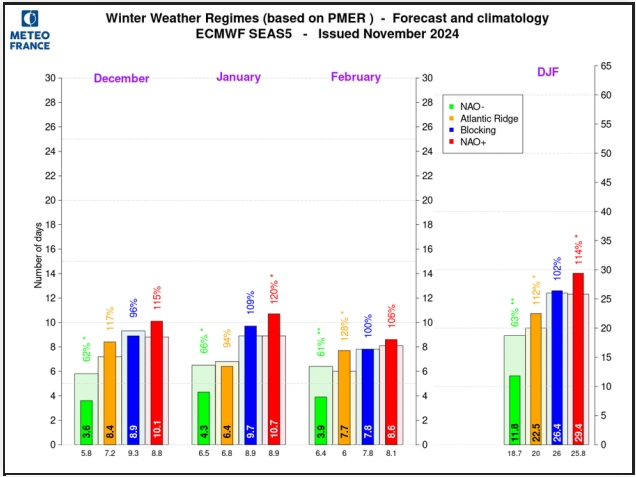
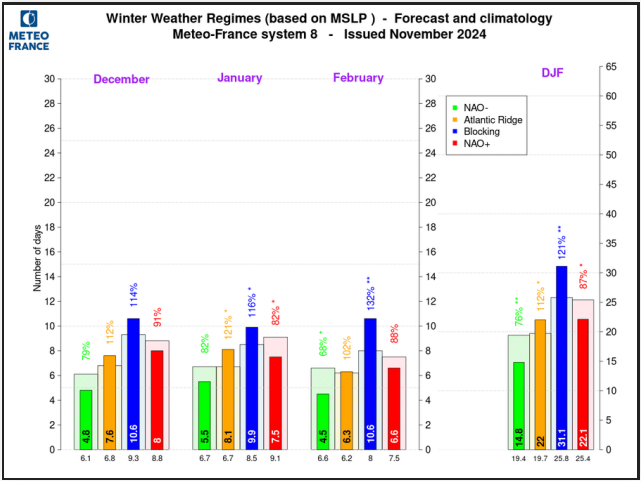
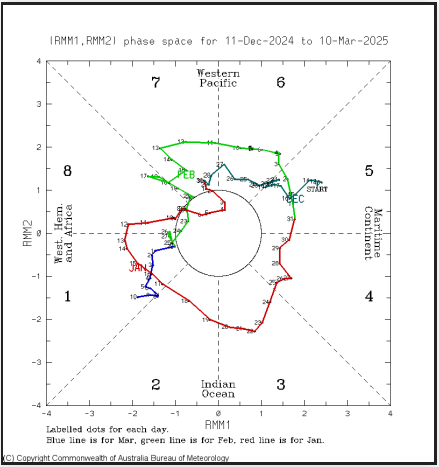
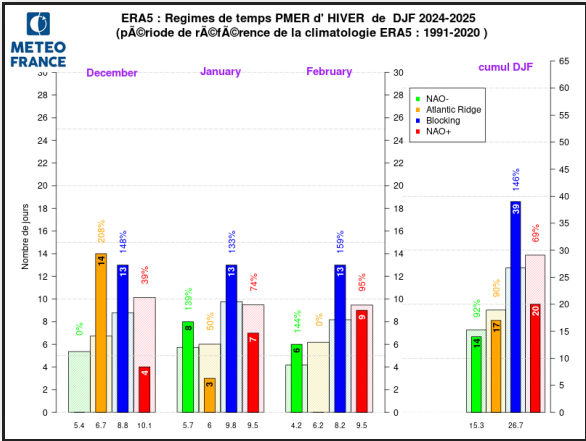


SLP modes of variability : MF-S8 and ECMWF-S5 forecasts -- red point = ERA5 reanalysis

Atmospheric circulation : Winter SLP weather regimes

The Blocking regime largely dominates over the quarter, as well as over each of the individual months.

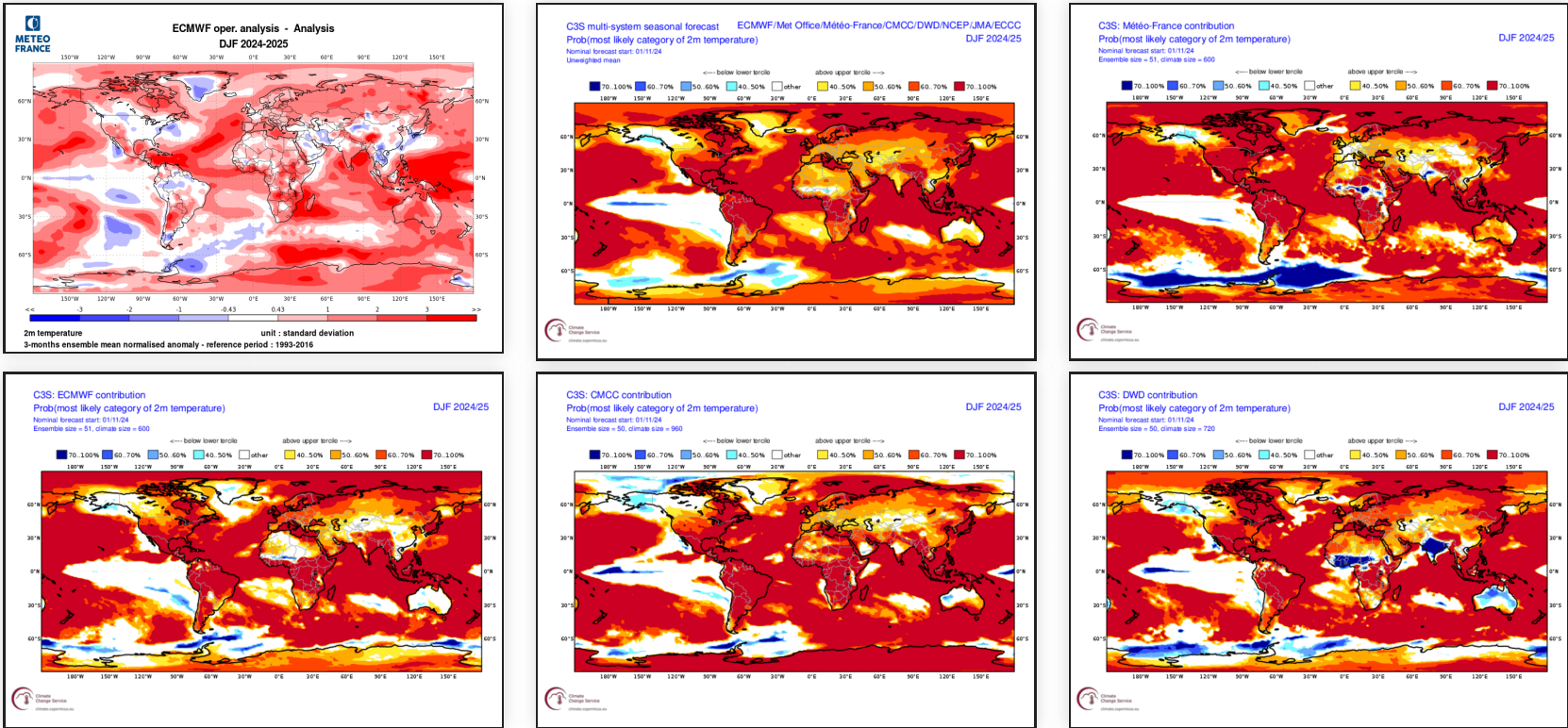
MF-S8 anticipated the more frequent than normal blocking regime, unlike ECMWF, which preferred the NAO- and Atlantic Ridge regimes.



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

Climatic parameters : temperature on the globe

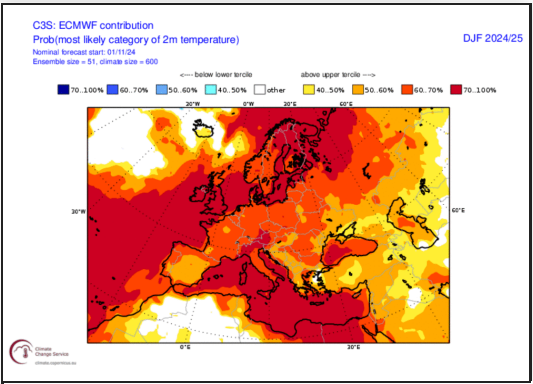
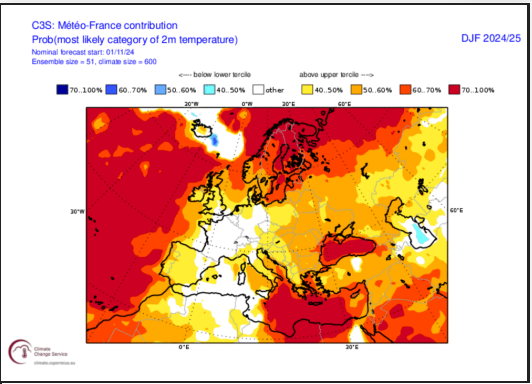
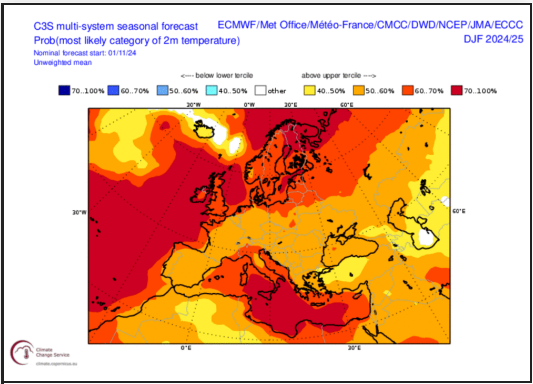
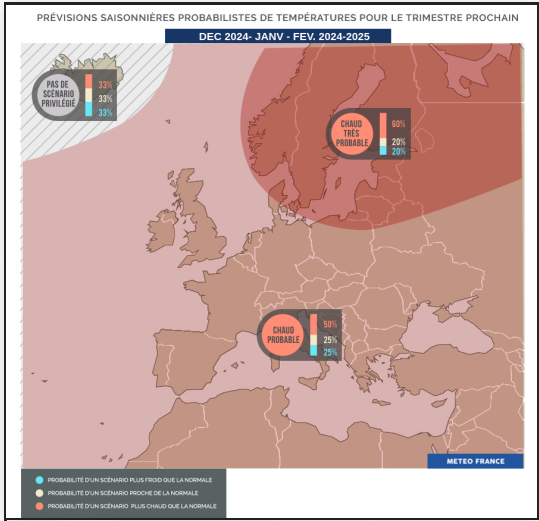
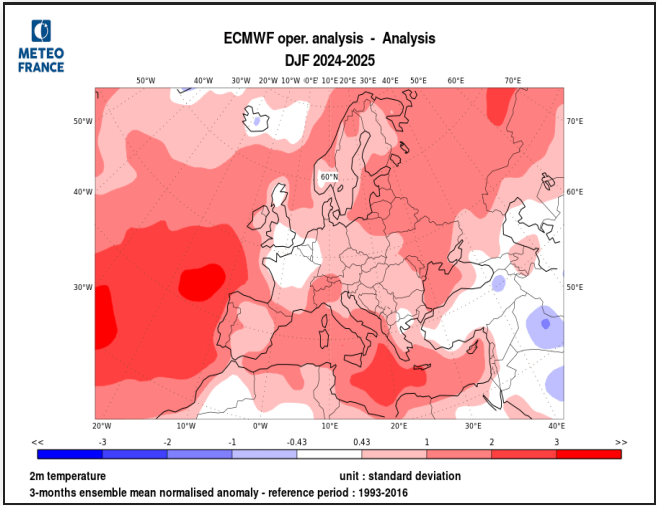
Warm anomalies dominate.
Forecasts for Asia and Africa are quite good. On the other hand, they are logically poor for North America.



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

Strong positive anomalies in maritime areas are well anticipated by models. On land, anomalies are fairly well seen, especially by MF-S8. The scenario used in the synthesis map is close to the analysis.

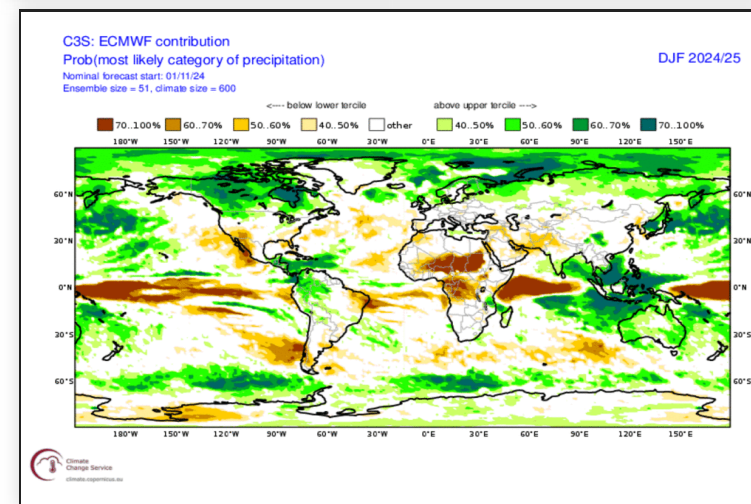
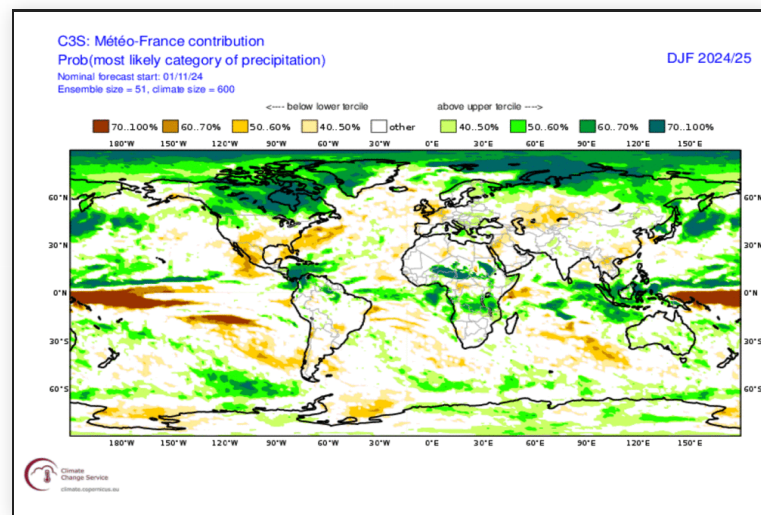
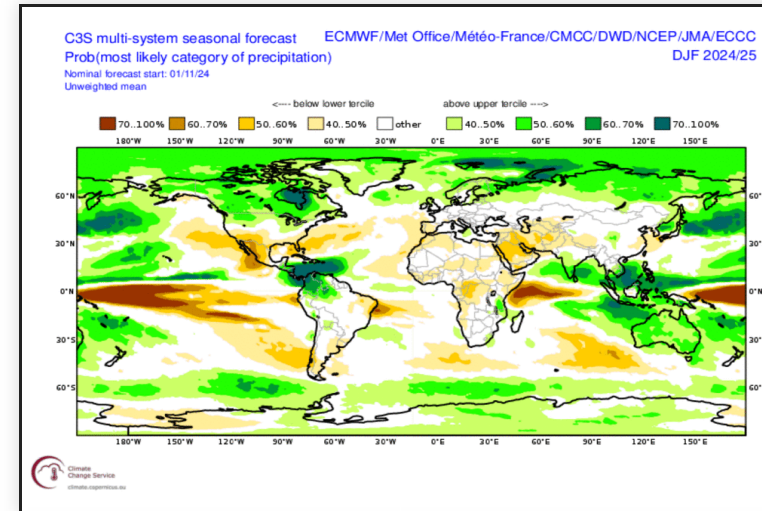
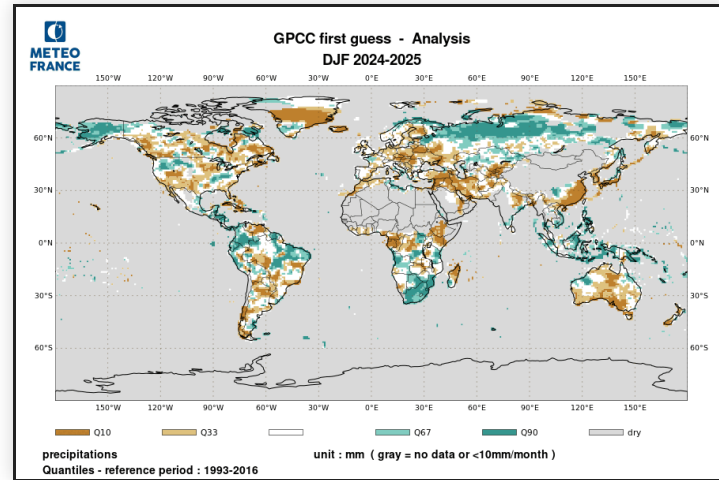


ECMWF analysis top left, synthetic forecast map top right. Forecast for multi-system , MF-S8 and SEAS5 on the bottom line.

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.

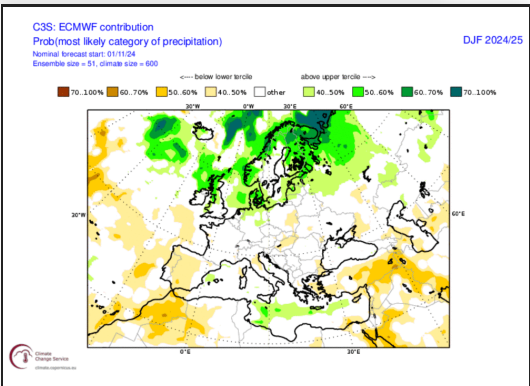
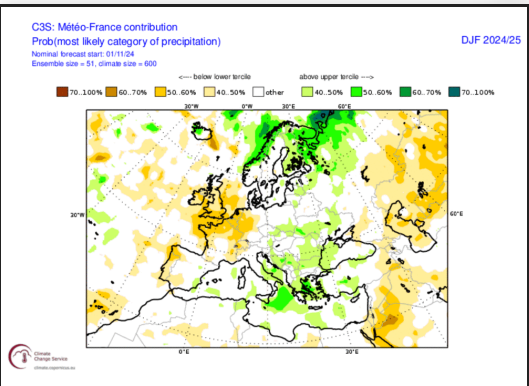
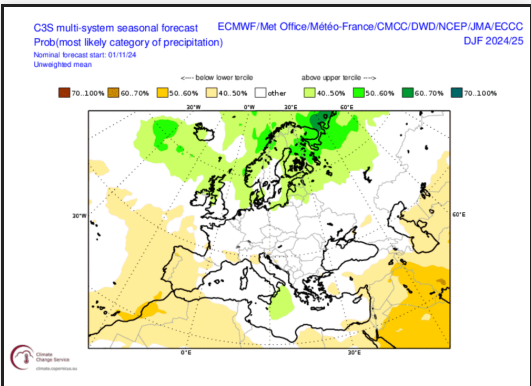
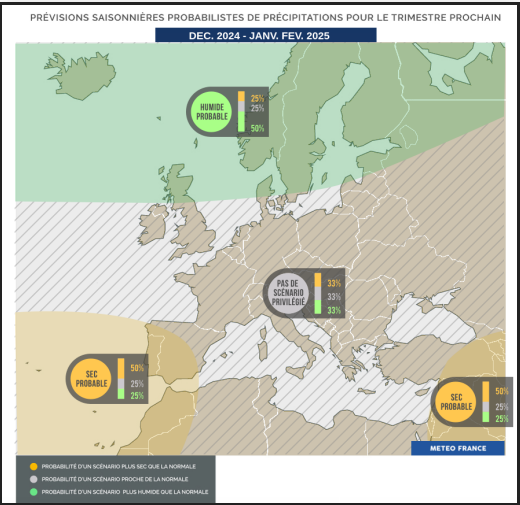
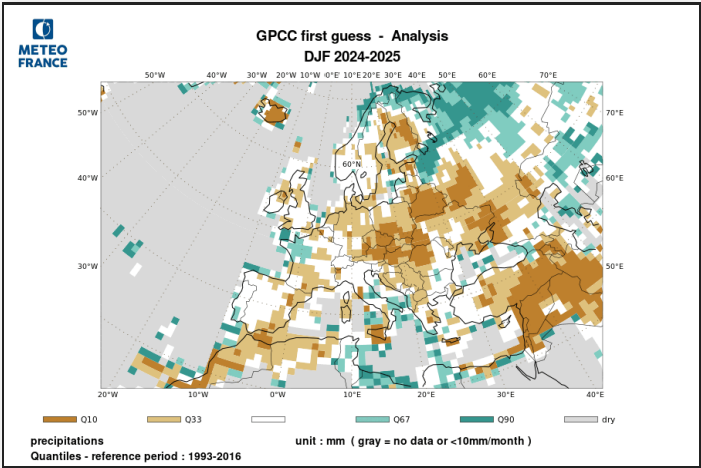
In the Northern Hemisphere, forecasts for North America are not good. The positive anomaly over the northern Eurasian continent is confirmed by analysis.



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

The wet signal predicted by the models is limited, on analysis, to the far north of Europe.
The dry scenarios proposed for the Near East and from Spain to Morocco are consistent with the analysis. However, the dry anomaly from Central Europe to the Near East has not been anticipated.



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).