VERIFICATION BULLETIN

FEBRUARY - MARCH - APRIL 2025

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Introduction : Objective

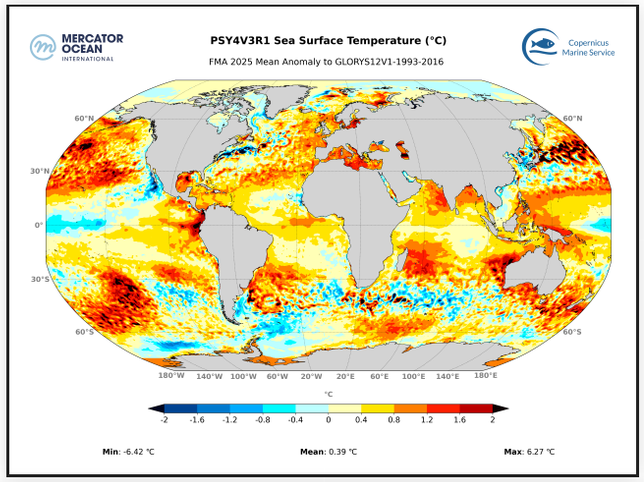
- **The objective of the Seasonal Verification Bulletin is to present an evaluation of the main elements highlighted in the Seasonal Forecast Bulletin : oceanic forcings, large scale circulation patterns, and a focus on temperature and precipitation forecast over Northern Atlantic, Europe and the Mediterranean 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.**

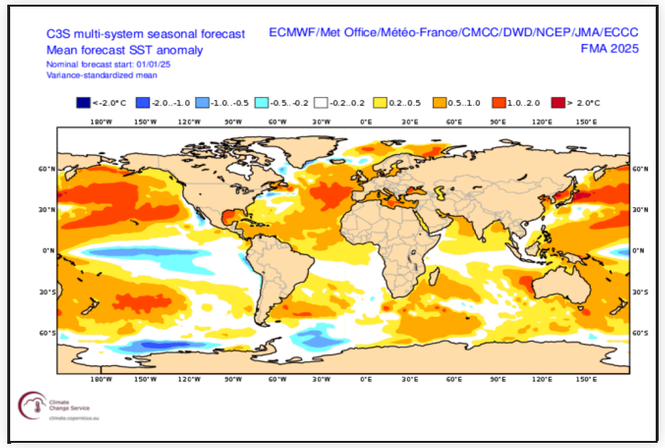
Oceans : surface temperature anomalies

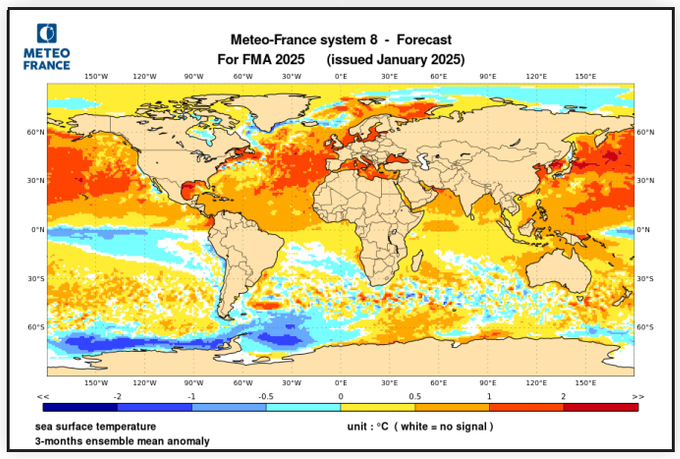
In the Pacific Ocean, the PDO- pattern is visible both in the analysis and in the forecasts. The negative anomaly in the central equatorial zone was correctly anticipated, but the warm anomaly in the east wat forecasted by no model.

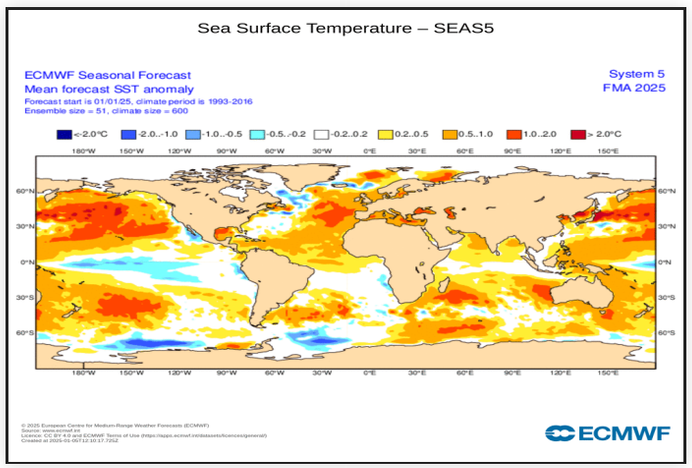
In the Indian Ocean, neutral anomaly around the equator is predicted by the models while the warm anomaly from Madagascar to Australia is suggested.

In the Atlantic Ocean, the warm anomaly in the equatorial zone is forecasted by the models. In the Northern Hemisphere, the pattern is well seen, even if the weak cold anomaly in the west is underestimated. The cold anomaly at the west Mauritania hasn't been anticipated.







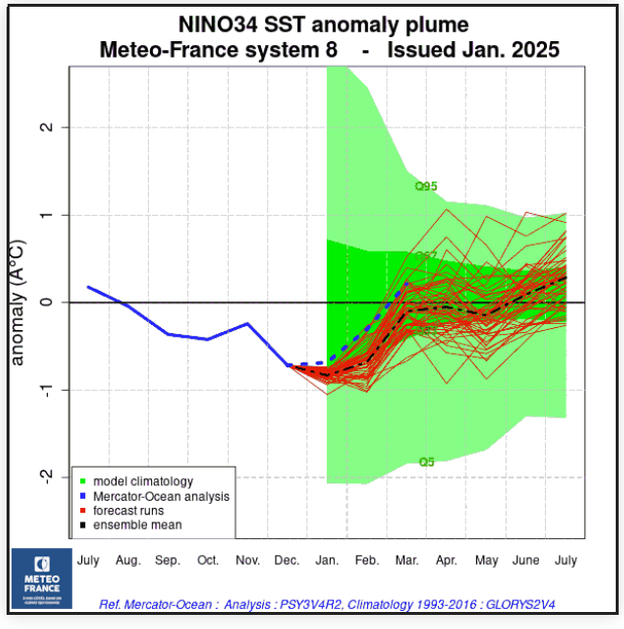


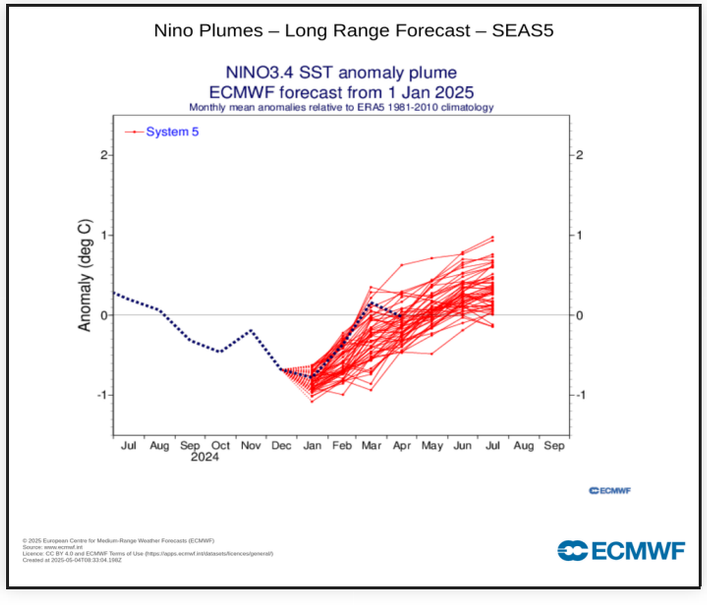
SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S8 (bottom left) and SEAS5 (bottom right)

Oceans : ENSO

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

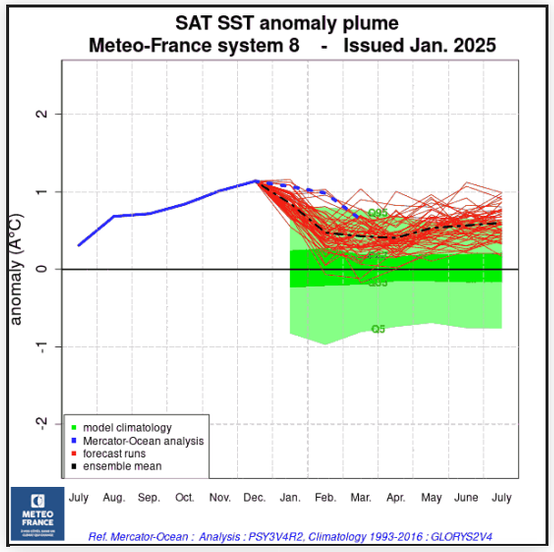
The analysis is close to the warmest part of the ensemble.

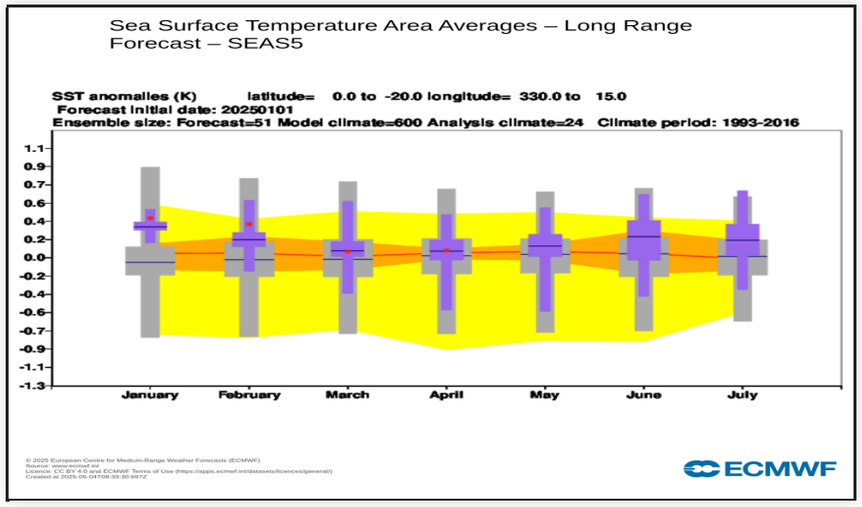


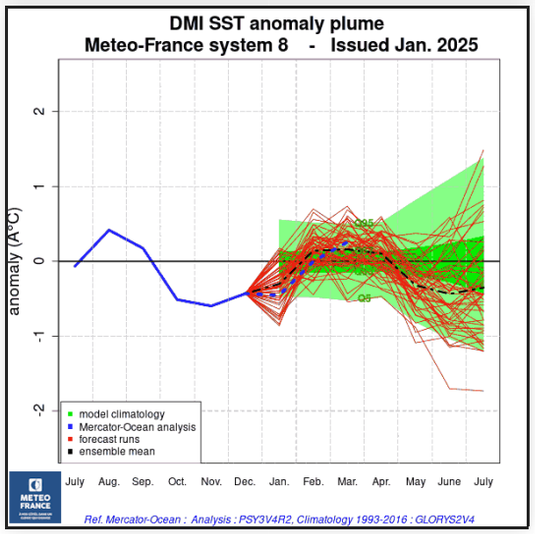


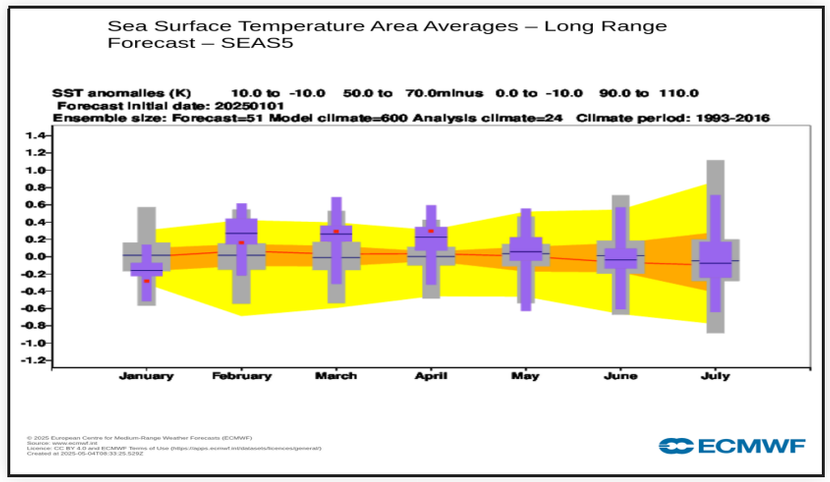
Oceans : tropical Atlantic and Indian Ocean index

SAT : The figures confirm the underestimation of the warm anomaly by MF, ECWF was close to analysis.
DMI : Good forecast





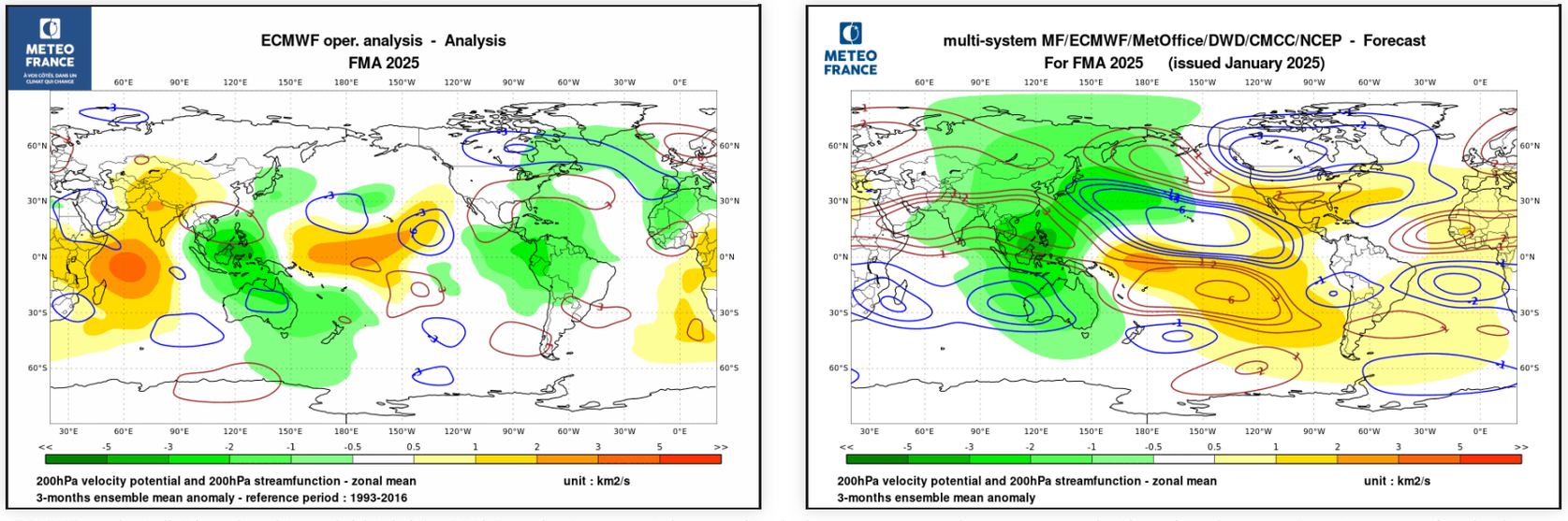




Atmospheric circulation : Global teleconnection

VP : Significant differences between forecasts and analysis are visible: a zone of downdrafts from the western Indian Ocean to India, and updraft motion from northern South America to north Atlantic Ocean and western Africa/southwest Europe.

SF : Teleconnections over the Pacific were far less pronounced than forecasted. From the Atlantic to the Indian Ocean, the predicted anomalies weren't observed. Over Europe, anomalies were suggested.

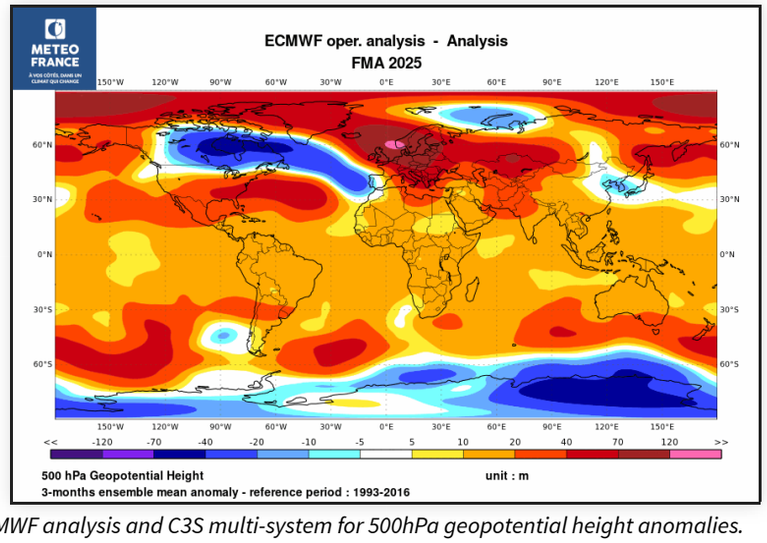


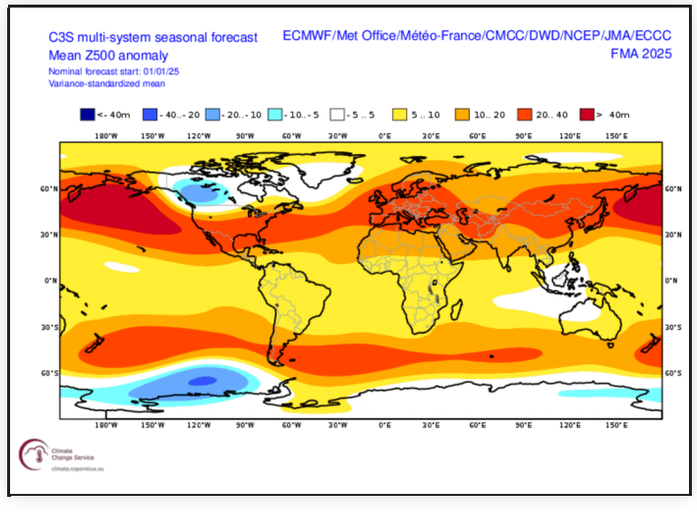
ECMWF analysis (left) and multi-model (right) for 200hPa velocity potential anomalies (color green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

Atmospheric circulation : Atmospheric circulation

Southern Hemisphere : anomalies were well forecasted except the cold anomaly in southwest Pacific Ocean.

Northern Hemisphere : On the North Pacific/America the anomalie were well anticipated by all models, except the negative anomaly over Japan. On the North Atlantic the negative anomaly observed from Newfoundland to Spain was not predicted. The positive anomaly over Europe is more or less well forecast.

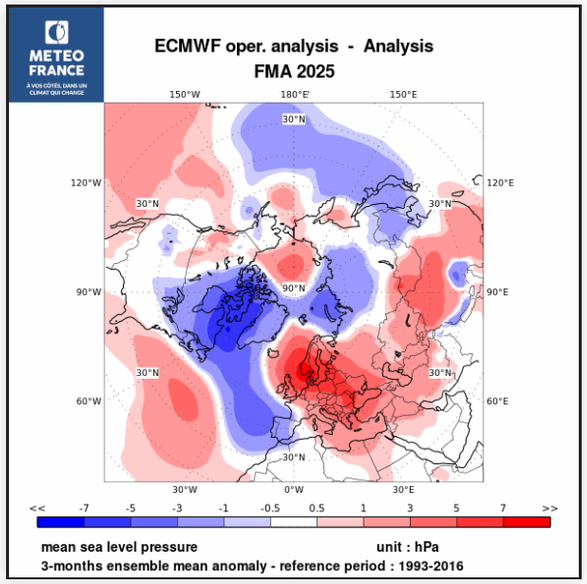


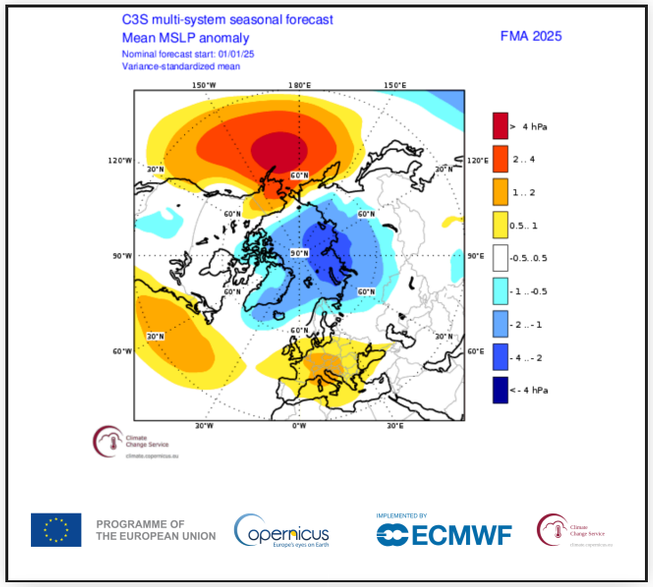


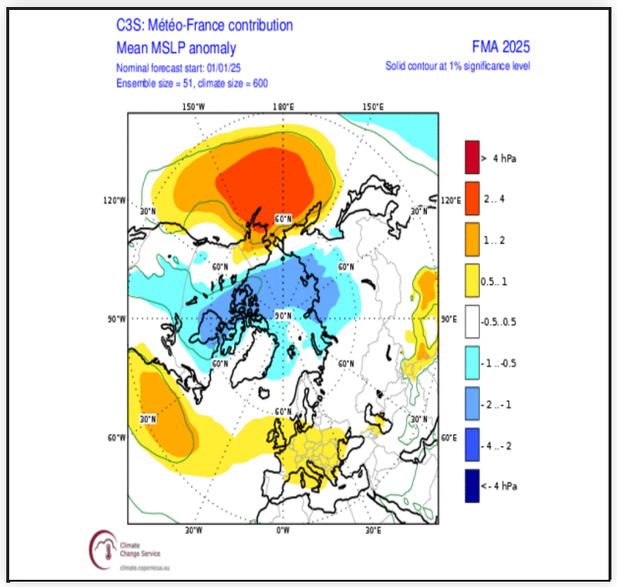
ECMWF analysis and C3S multi-system for 500hPa geopotential height anomalies.

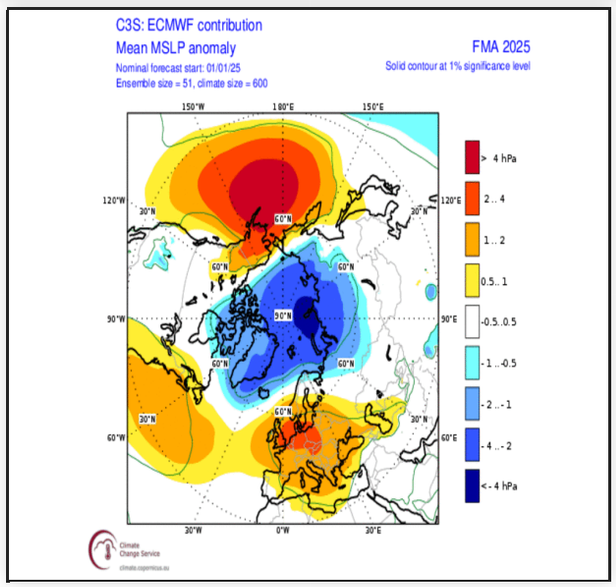
Atmospheric circulation : MSLP

Same elements as with the Z500 fields : the negative anomaly observed from Labrador Sea to Spain was not predicted, as well as the negative anomaly over north Pacific Ocean. Quite good anticipation of the positive anomaly on Europe, except Iberic Peninsula.





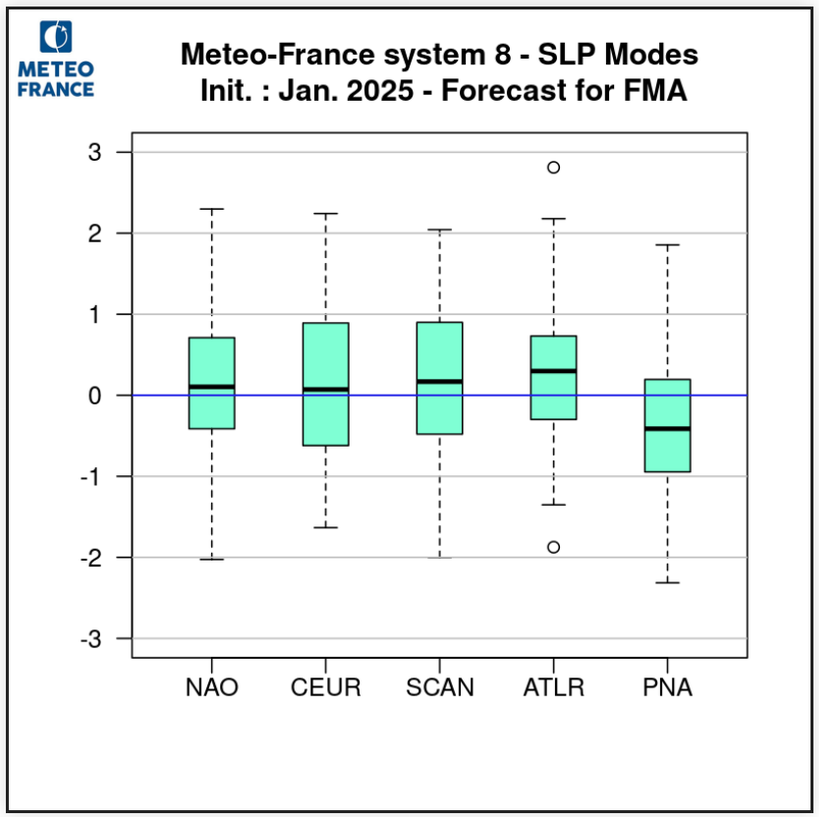


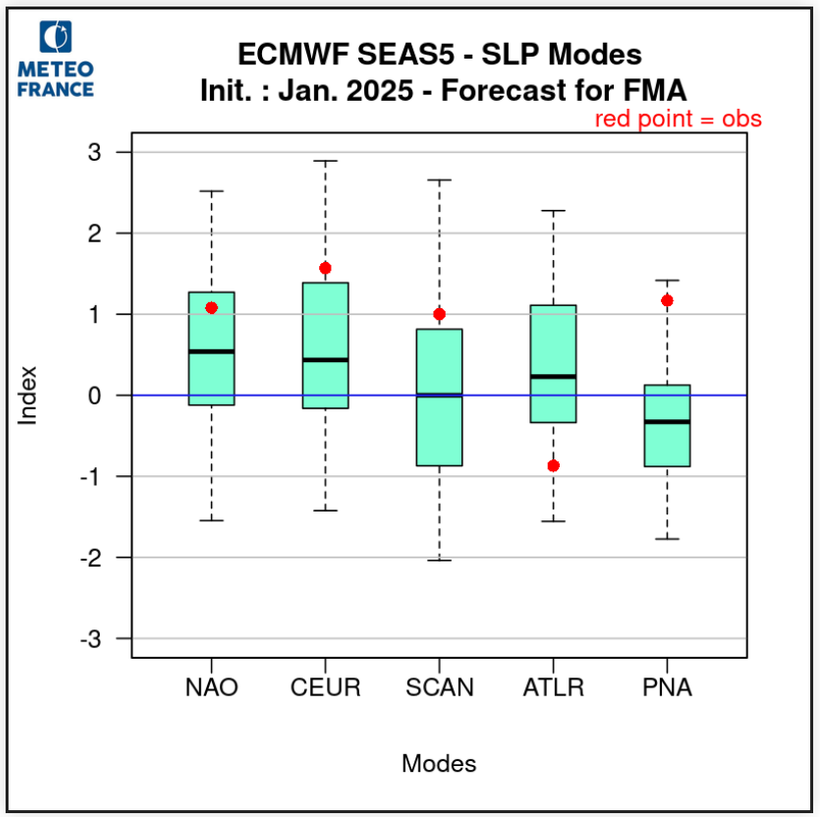


Analysis and multi-system C3S forecast MSLP anomalies (top), MF-S8 and ECMWF-SEAS5 MSLP anomalies (bottom)

Atmospheric circulation : Verification SLP Modes

The sign of NAO, CEUR, SCAN modes was well forecasted, contrary to ATL mode which was expected positive while it was strongly negative last month, and PNA was expected negative while it was strongly positive.





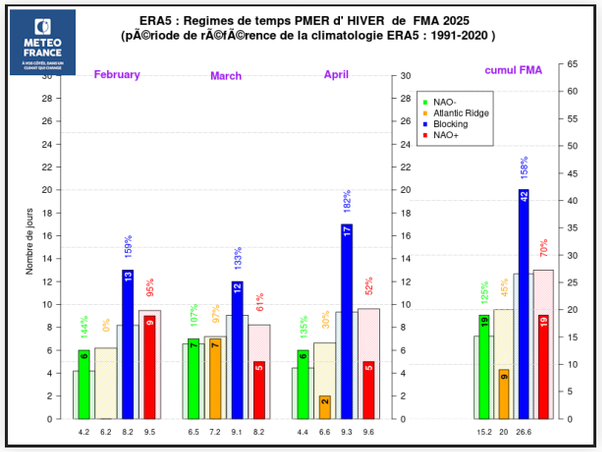
SLP modes of variability : MF-S8 and ECMWF-S5 forecasts -- red point = ERA5 reanalysis

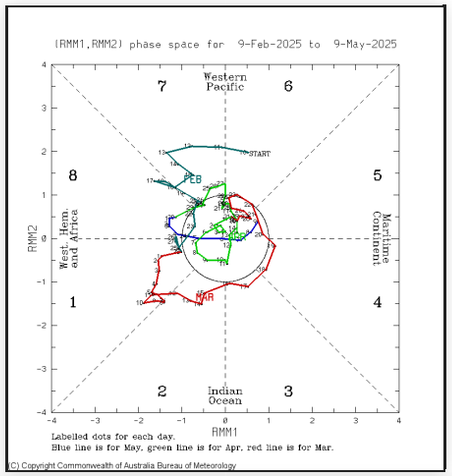
Atmospheric circulation : Winter SLP weather regimes

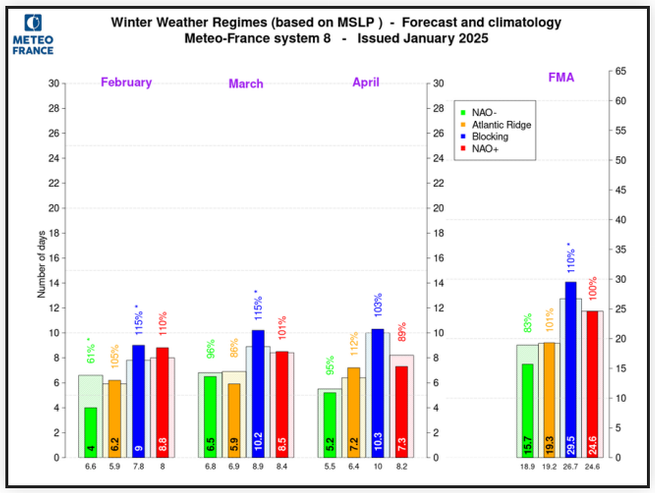
The Blocking regime largely dominates over the quarter, as well as over each of the individual months.

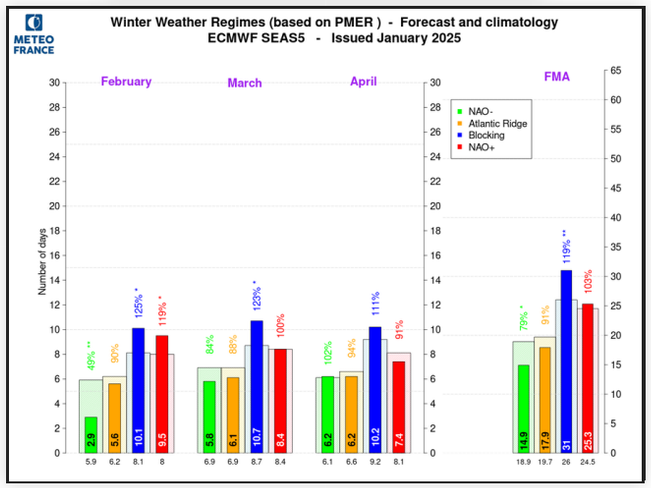
Both models anticipated the more frequent than normal blocking regime.

Atlantic ridge and NAO+ was quitely less observed than forecasted by models.





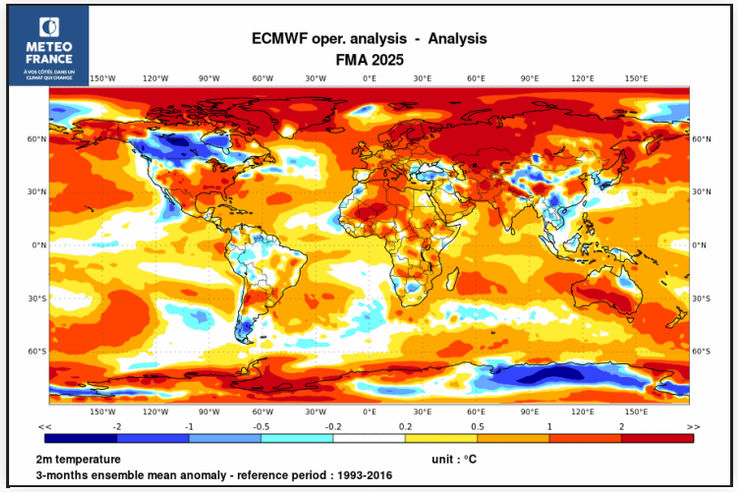


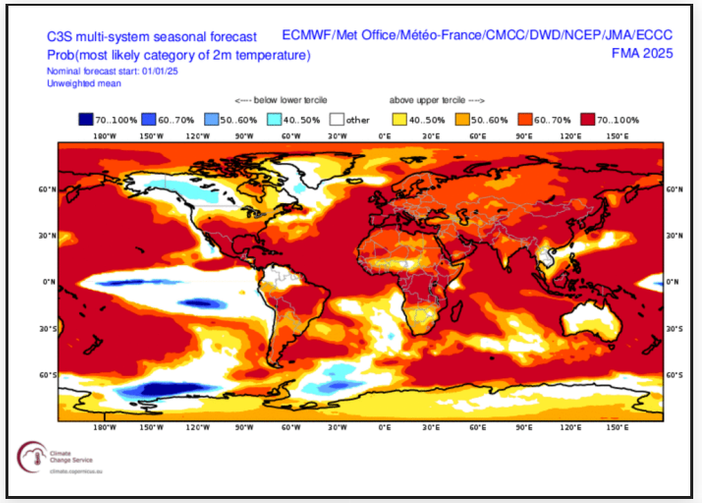


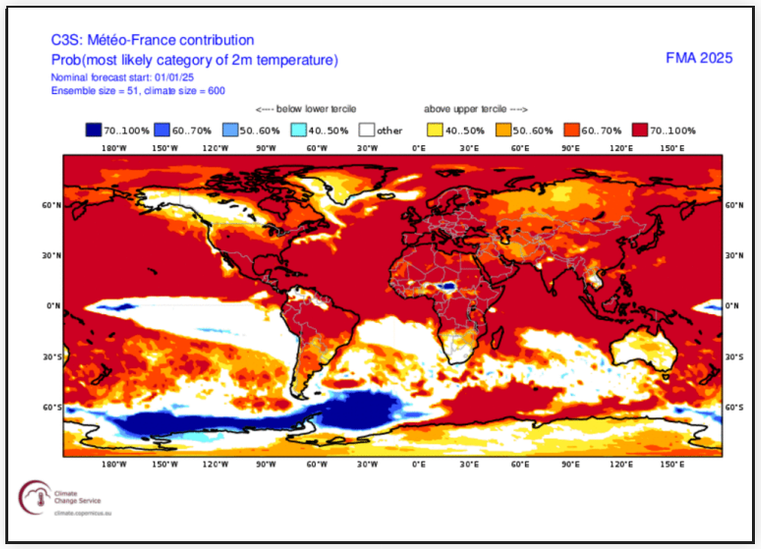
weather regime : ECMWF analysis top left, MF8 and ECMWF forecasts at the bottom. MJO phase top right

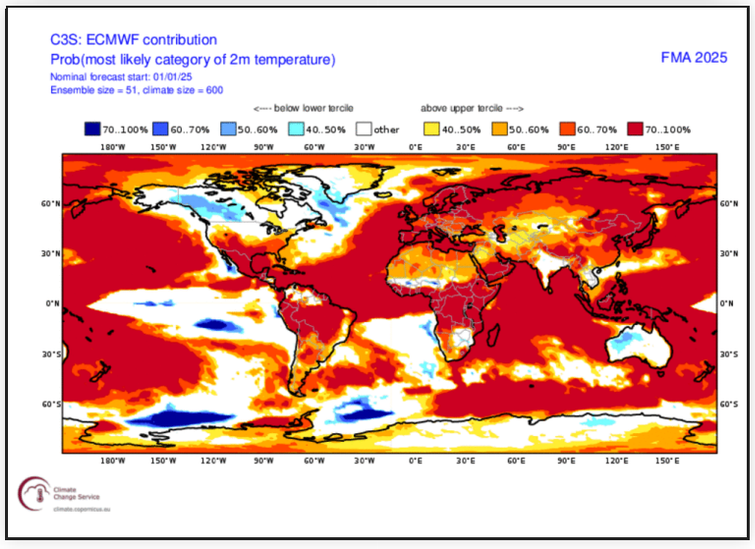
Climatic parameters : temperature on the globe

Warm anomalies dominate.
Some observed cold anomalies (North America, North of South America) were well anticipated, and others (Patagonia, Southeast Asia) weren't suggested by the models. Similarly, the regions predicted to have the lowest probability of warm conditions experienced a warm anomaly (around Alaska, Greenland and Australia)









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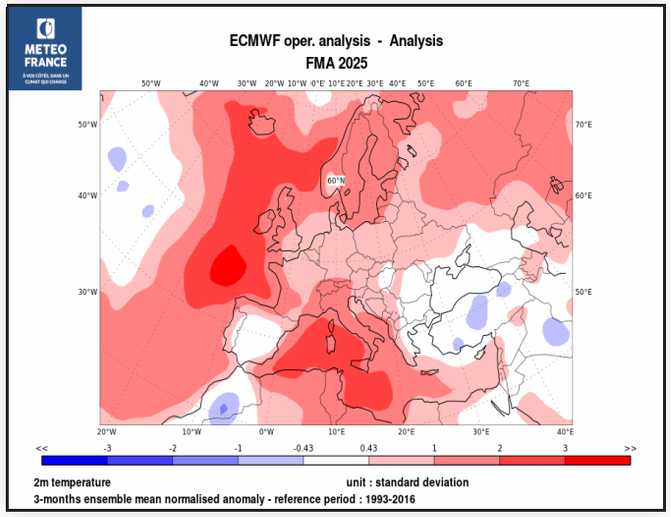
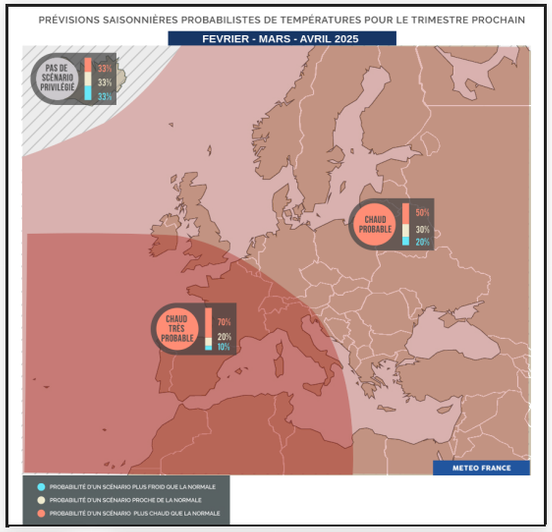
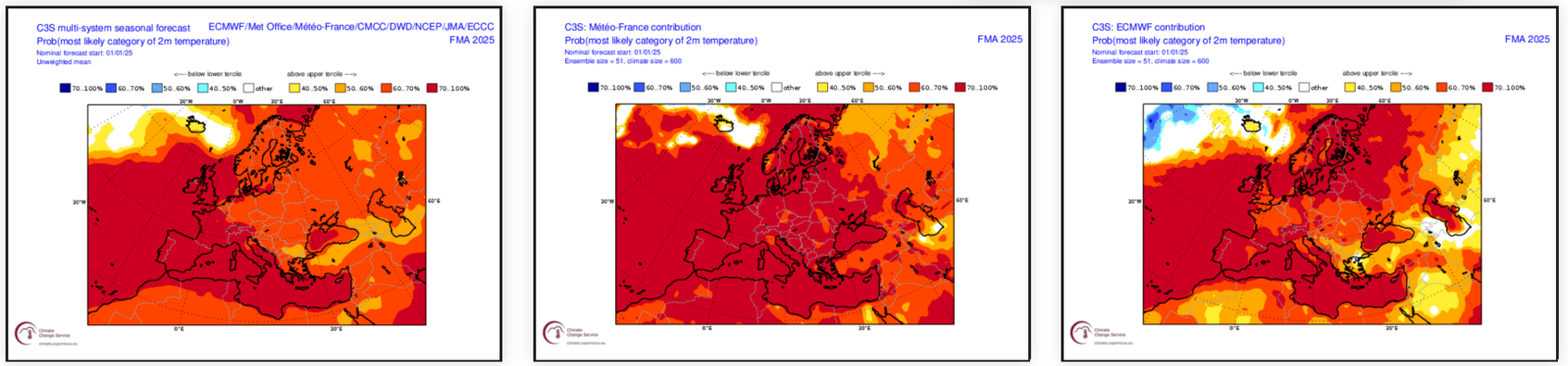
Climatic parameters : temperature over Europe

Strong positive anomalies in maritime areas are well anticipated by models. On land warm conditions prevailed across virtually all of Europe as expected. However, forecasts didn't anticipate near-normal to colder conditions from the Spain to Morocco, and over Middle East.







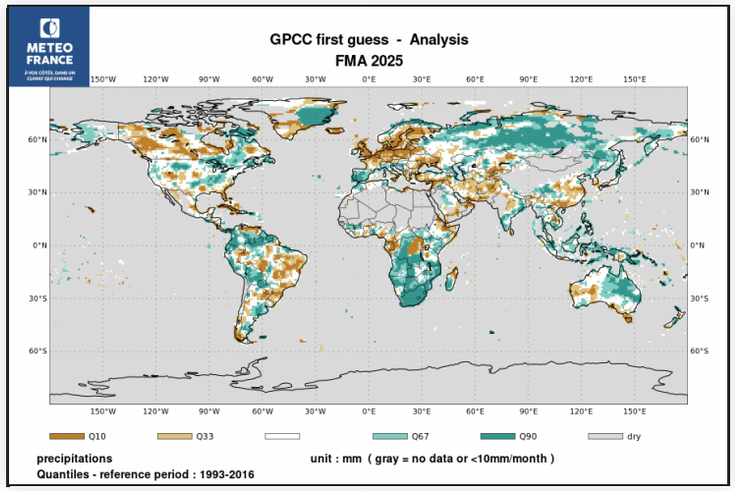
ECMWF analysis top left, synthetic forecast map top right. Forecast for multi-system , MF-S8 and SEAS5 on the bottom line.

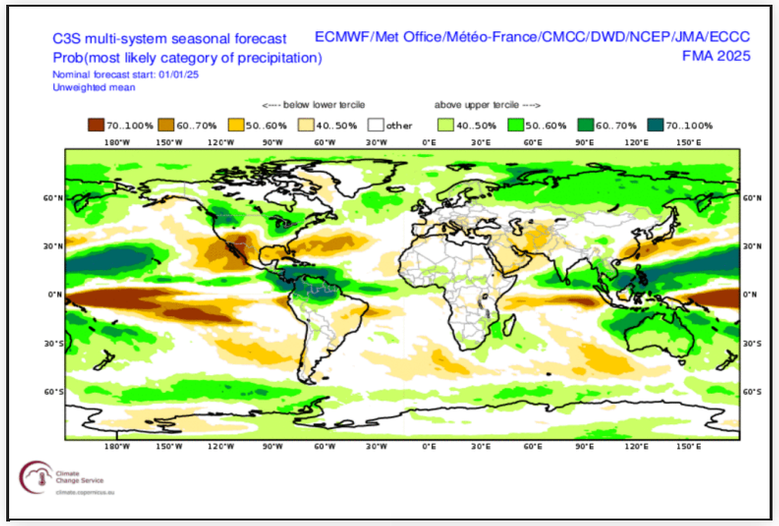
Climatic parameters : Precipitations over the globe

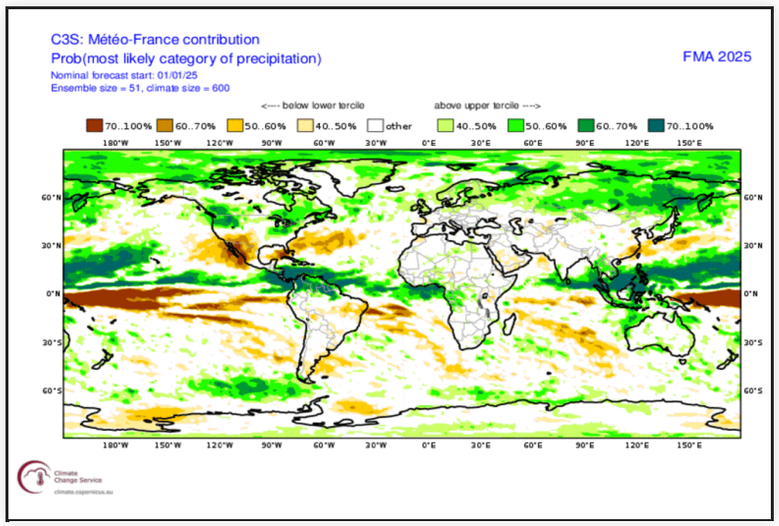
In the inter-tropical zones, the wet signal forecast by the models over the Maritime Continent is confirmed by analysis.

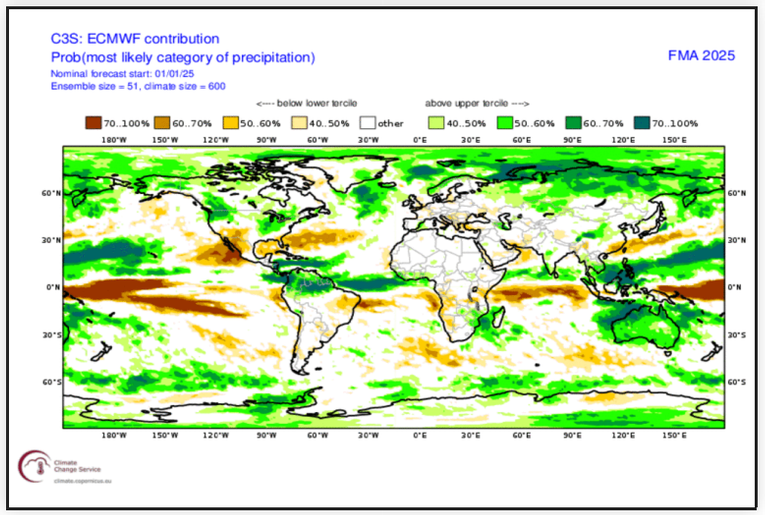
In the Northern Hemisphere, forecasts for North America are not good. The positive anomaly over the northern Eurasian continent is confirmed by analysis.

In the southern hemisphere the wet anomaly over South Africa was not anticipated.





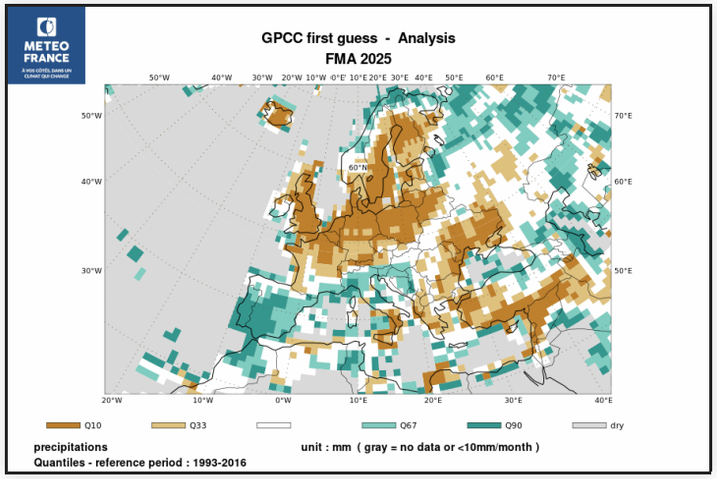


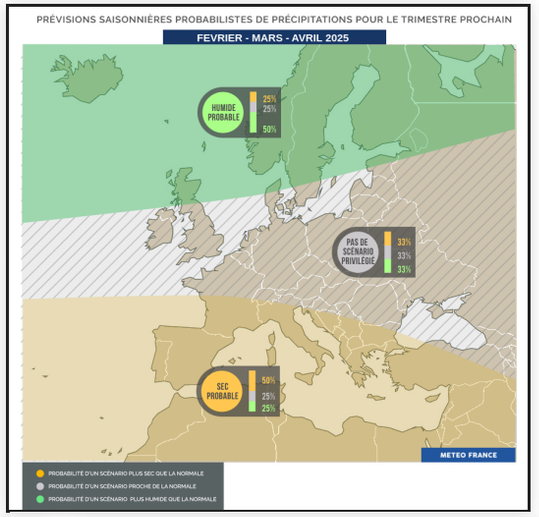


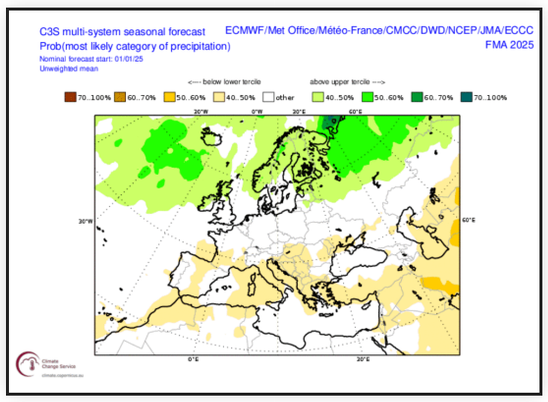
Standardized Precipitation Index analysed by IRI top left, forecast for multi-model top right and MF-S8 and SEAS5 on the bottom line.

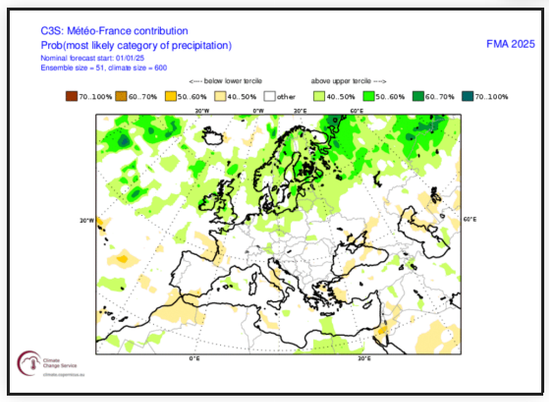
Climatic parameters : Precipitations over Europe

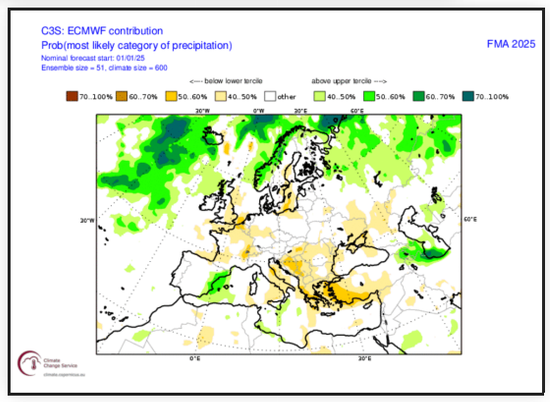
The wet signal predicted by the models is limited, on analysis, to the far north of Europe. A dry signal was forecasted around the western Mediterranean basin while a wet anomaly was observed.
The wet anomaly avec Iberian Peninsula has not been anticipated.











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).

General summary : for the period JFM 2025

1) **Oceans :**

The main SST anomalies predicted by the models are validated by analysis.

2) **Large scale atmospheric circulation :**

VP 200 hPa : Downdrafts over the equatorial Pacific and updrafts over the Maritime Continent were well forecast. On the other hand the downdrafts over the western Indian Ocean to India were not predicted as well as updrafts over northern South America to Spain.

SF 200 hPa : No real anticipation. Over the North Atlantic, the circulation anomalies observed were poorly forecasted, a bit better over Europe.

Z500 :The Z500 anomalies predicted by the models are confirmed by analysis in the Southern Hemisphere.In North America, the anomlie hasn't been anticipated. Forecasts are significantly better for Europe.

3) **Climatic parameters over Europe :**

Temperatures : Warm conditions prevailed across virtually all of Europe as expected. However, forecasts didn't anticipate near-normal conditions from Spain to Morocco.

Precipitations : Poor forecast.