

VERIFICATION BULLETIN

MARCH - APRIL - MAY 2025

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Introduction : Objective

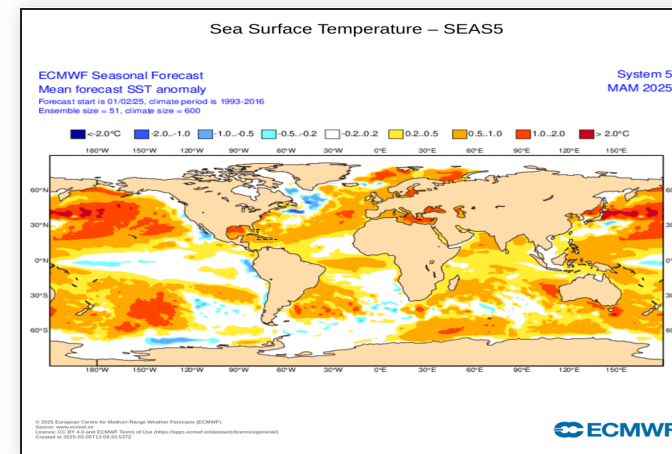
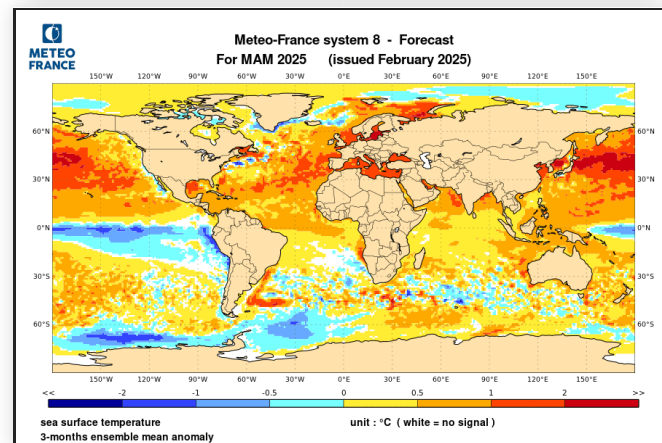
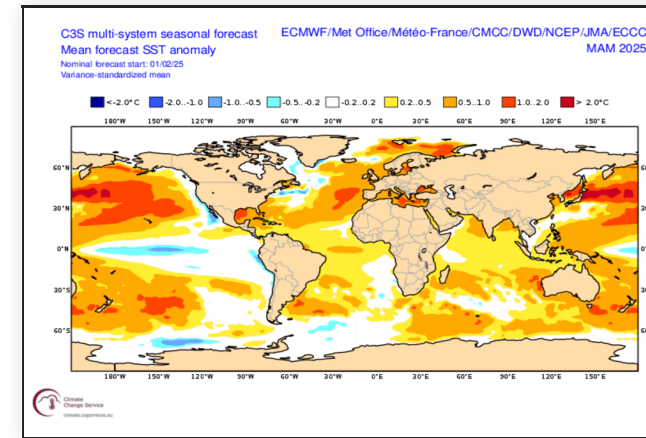
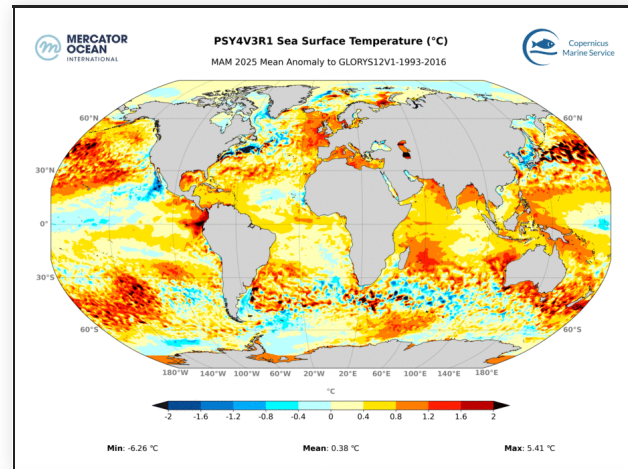
- The objective of the Seasonal Verification Bulletin is to present an evaluation of the main elements highlighted in the Seasonal Forecast Bulletin : oceanic forcings, large scale circulation patterns, and a focus on temperature and precipitation forecast over Northern Atlantic, Europe and the Mediterranean 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 was correctly predicted by the models. The weak anomaly in the equatorial zone is too pronounced with MF-S8. The strong warm anomaly near the Peruvian coast is not seen by any model.

In the Indian Ocean, model forecasts are close to reanalysis.

In the Atlantic Ocean, the main anomalies are generally well seen by the models.

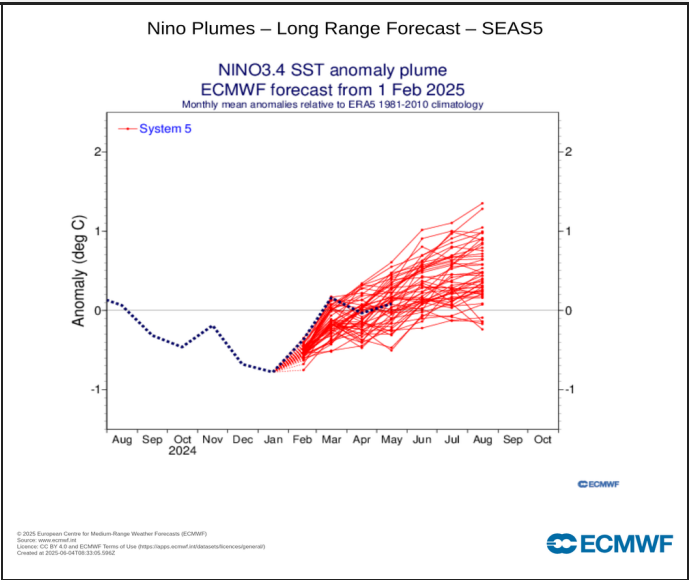
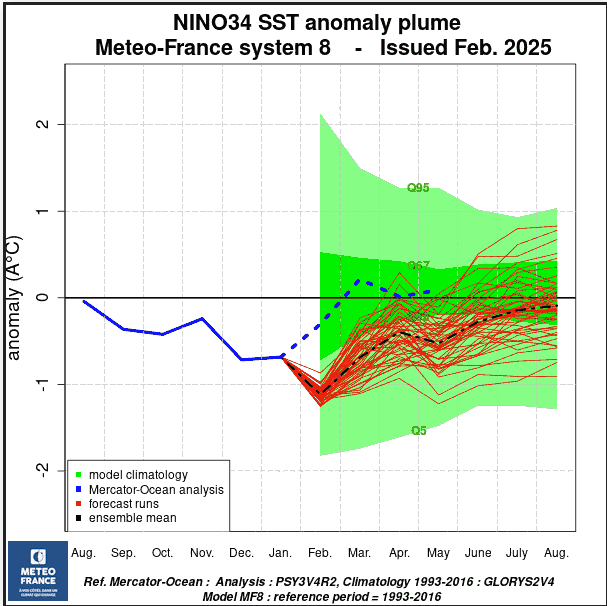


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S8 (bottom left) and SEAS5 (bottom right)

Oceans : ENSO

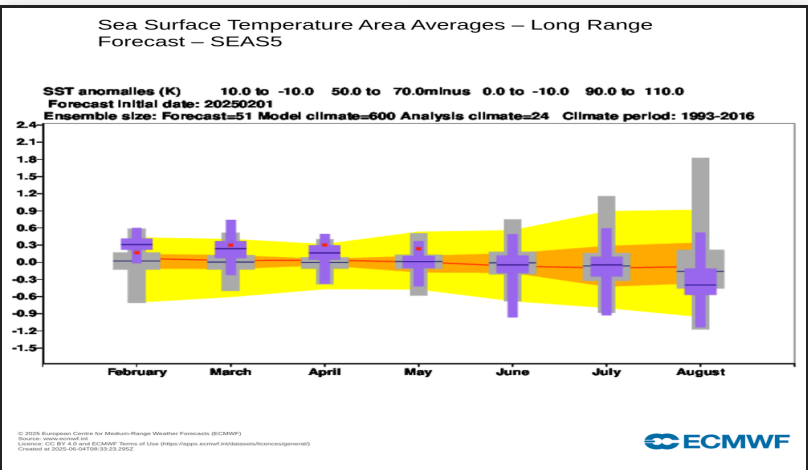
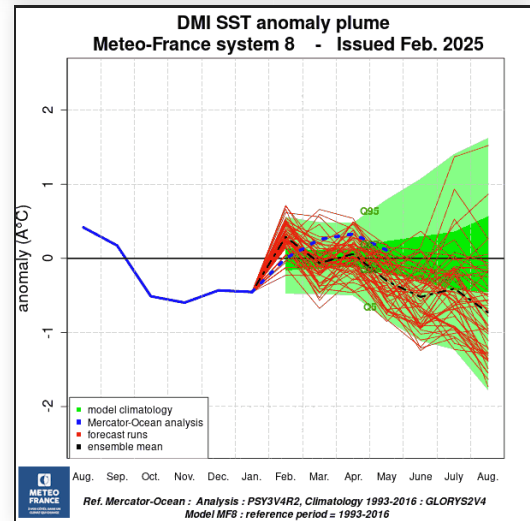
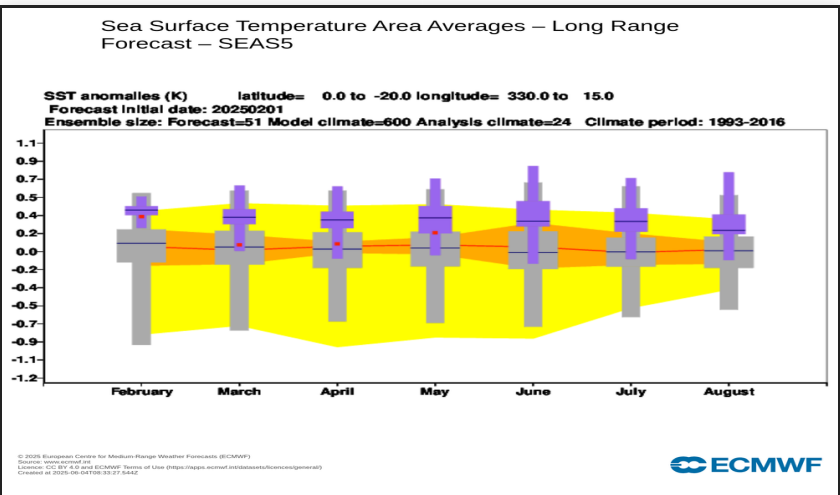
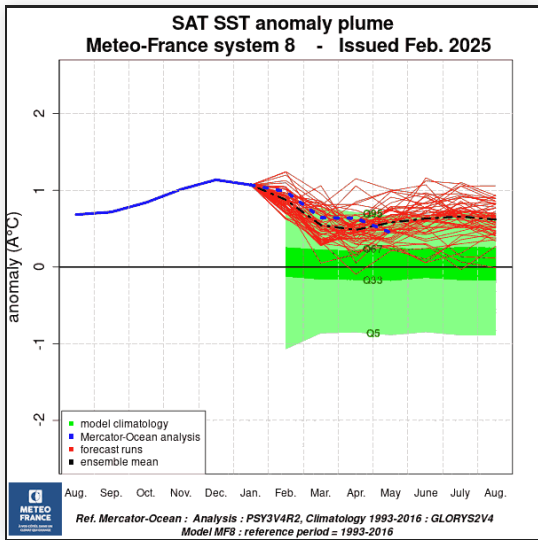
CAUTION : reference analyses differ between MF-S8 (Mercator-Ocean 1993-2016) and ECMWF-SEAS5 (NCEP 1981-2010).

The negative phase of ENSO has subsided faster than the models predicted, particularly MF-S8, which was too cold.



Oceans : tropical Atlantic and Indian Ocean index

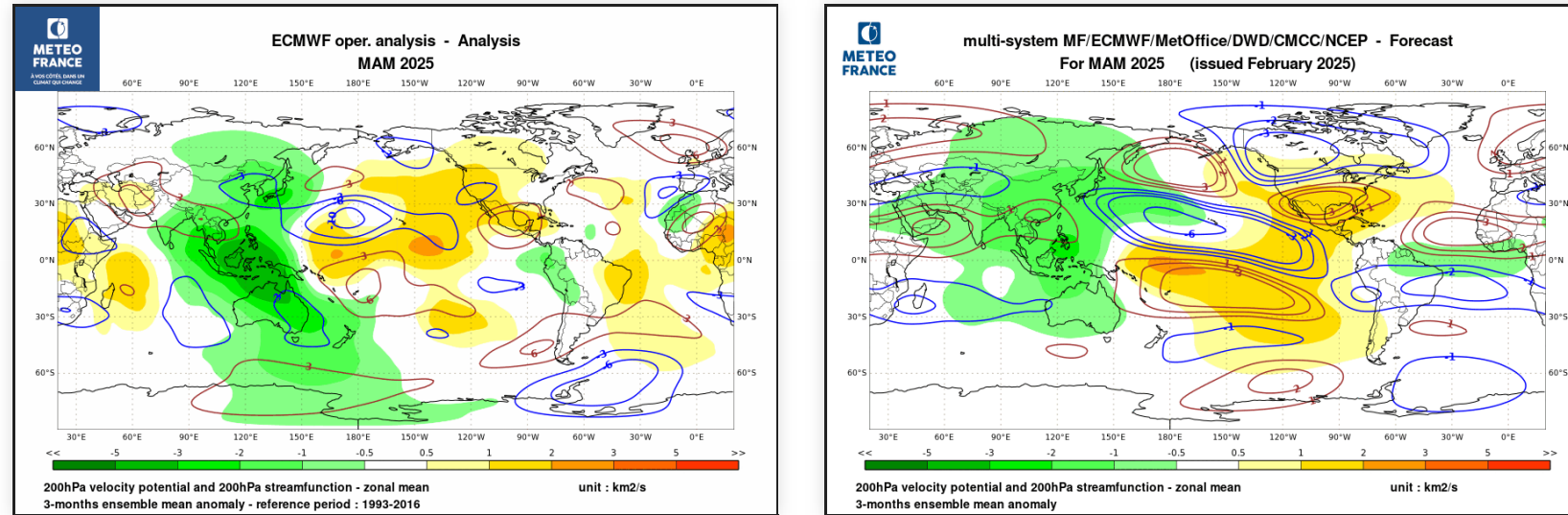
SAT : Good forecast for MF-S8.
DMI : The models slightly underestimated the DMI, but without consequence. It remains close to neutral.



Atmospheric circulation : Global teleconnection

VP : The main difference between MF-S8 and reanalysis is the zone of updrafts that stretches from the western Indian Ocean to Africa and the Atlantic Ocean.

SF : The Pacific Ocean dipole is visible on reanalysis, but without teleconnections. On the other hand, the Indian Ocean dipole and its westward extension do not appear in the analysis. The pattern over Europe has not been forecast.

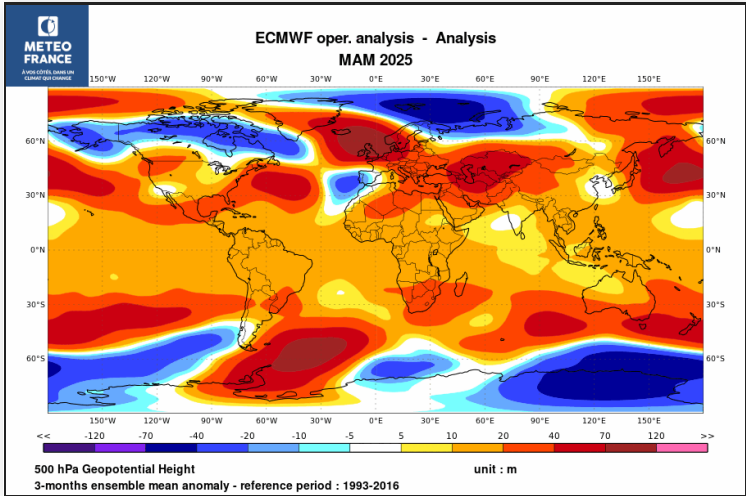


ECMWF analysis (left) and multi-model (right) for 200hPa velocity potential anomalies (color green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

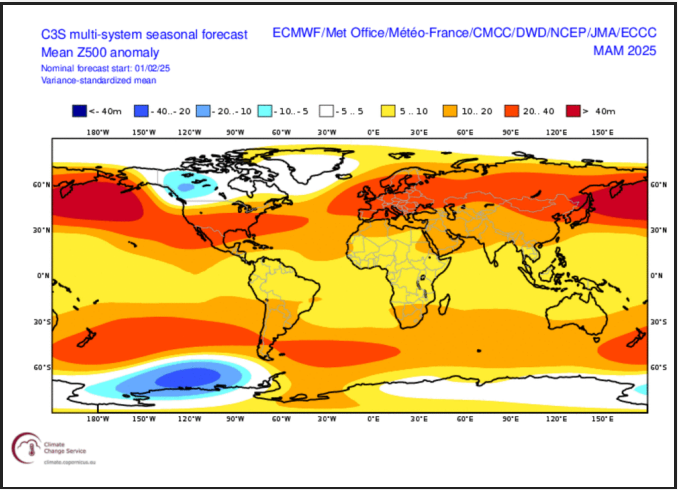
Atmospheric circulation : Atmospheric circulation

Southern Hemisphere : anomalies were well forecasted except the cold anomaly south of Australia.

Northern Hemisphere : Over the North Pacific and North America, the extension of the negative anomaly towards Alaska is more marked on analysis. Towards Europe, we find the same differences as for the stream functions.

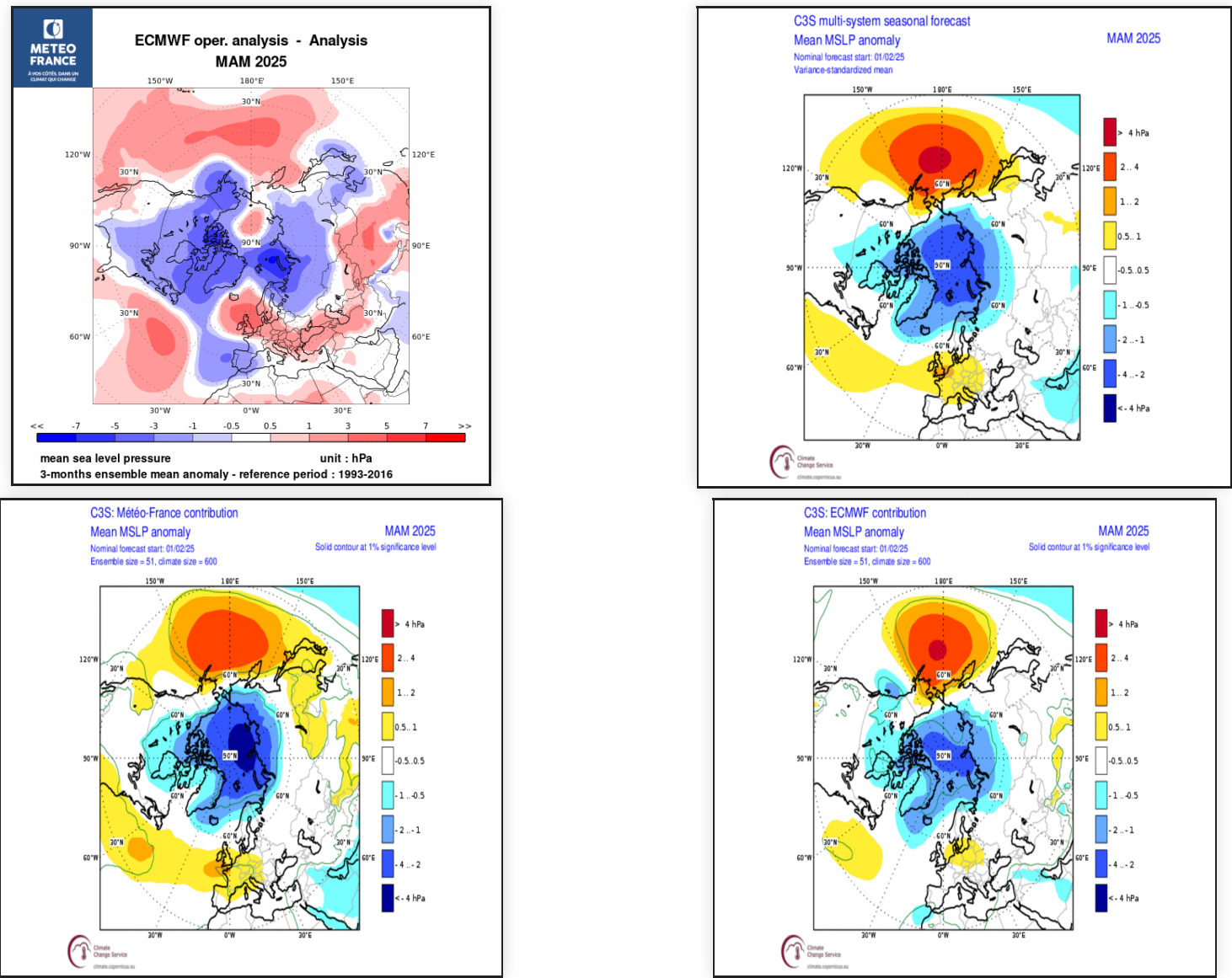


ECMWF analysis and C3S multi-system for 500hPa geopotential height anomalies.



Atmospheric circulation : MSLP

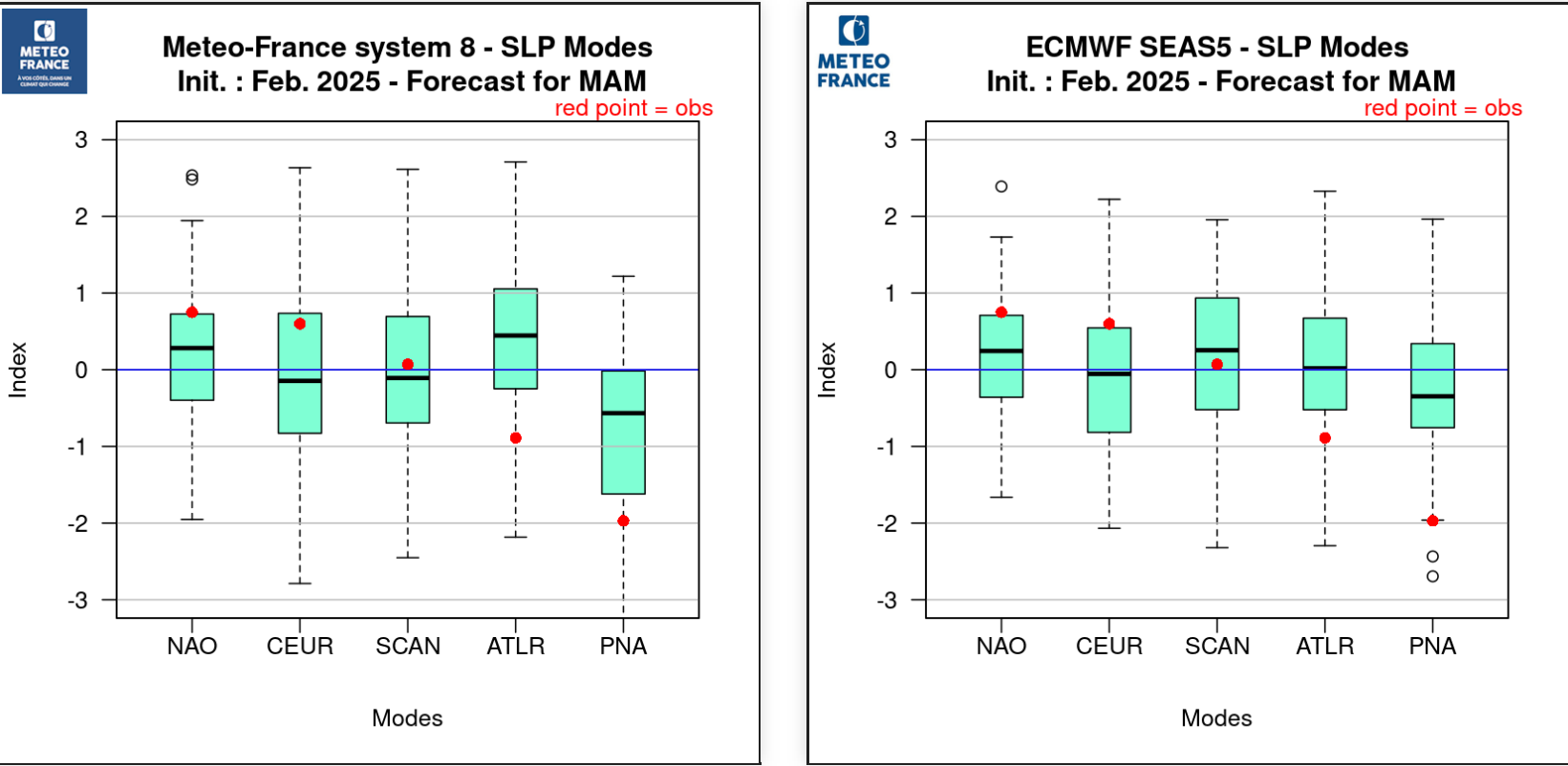
The negative anomaly over Alaska was not foreseen. Over Europe, the observed pattern is poorly anticipated by most models, except ECMWF, which has suggested this pattern.



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 the NAO and PNA modes are correctly predicted, unlike the sign of the ATLR mode, which is clearly negative.
The positive phase of CEUR was not expected (forecast close to zero).

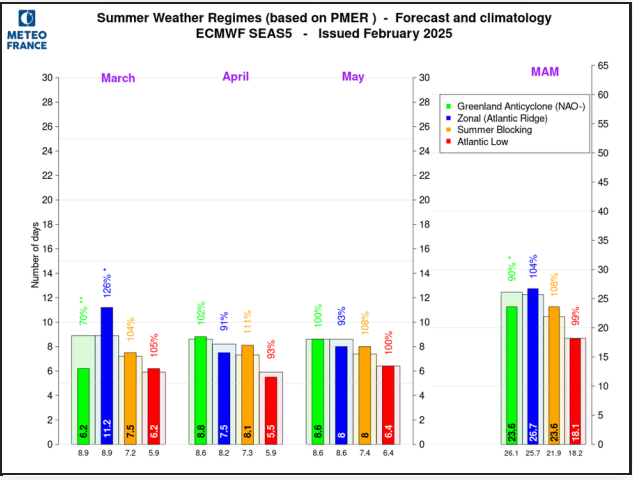
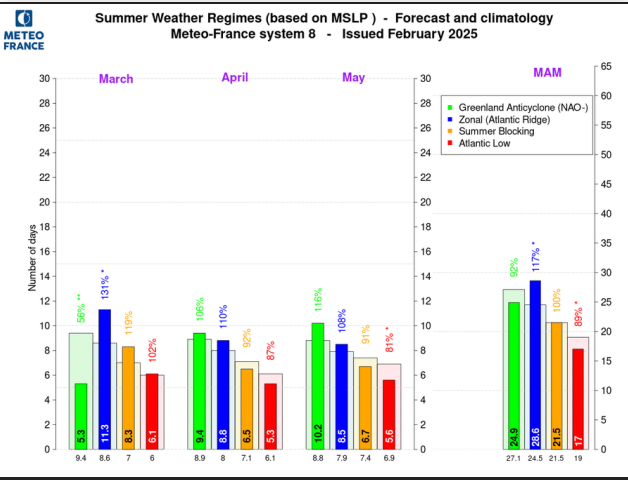
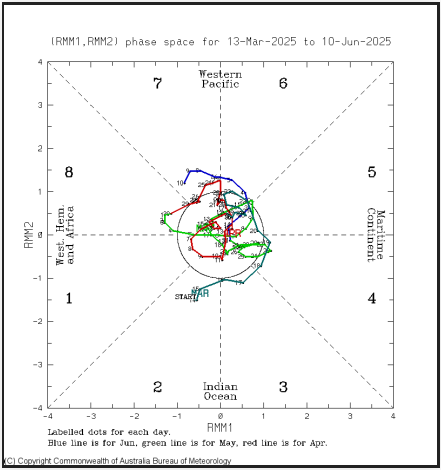
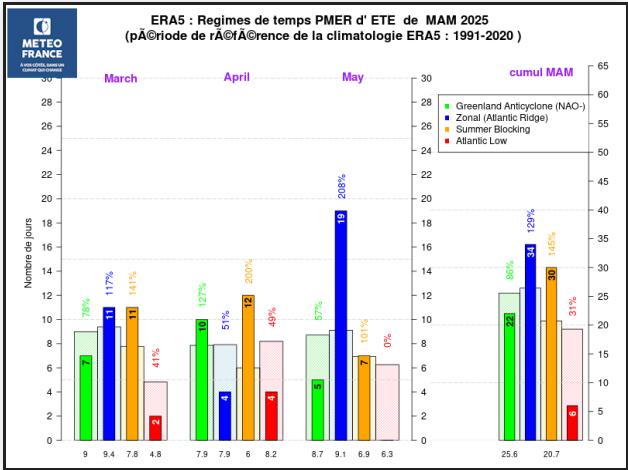


SLP modes of variability : MF-S8 and ECMWF-S5 forecasts -- red point = ERA5 reanalysis

Atmospheric circulation : Summer SLP weather regimes

In the analysis, zonal Atlantic ridge is over-represented and summer blocking is under-representated.

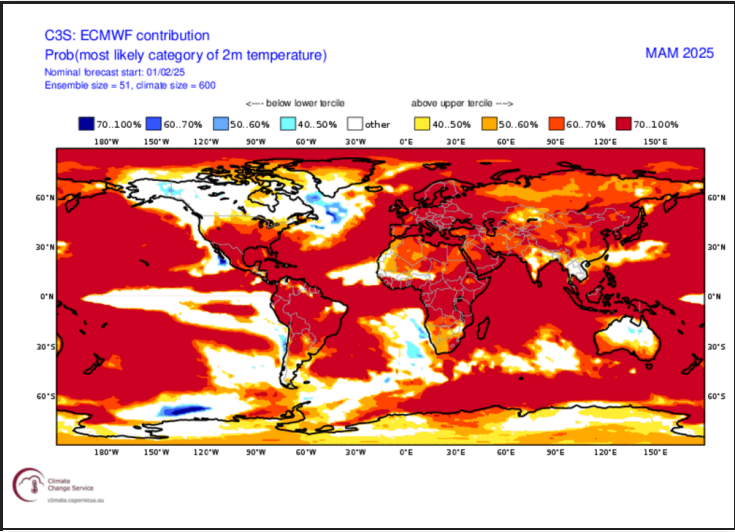
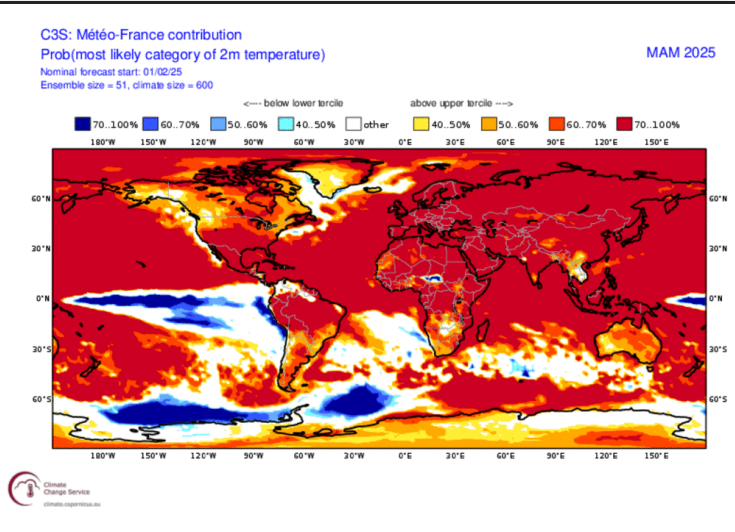
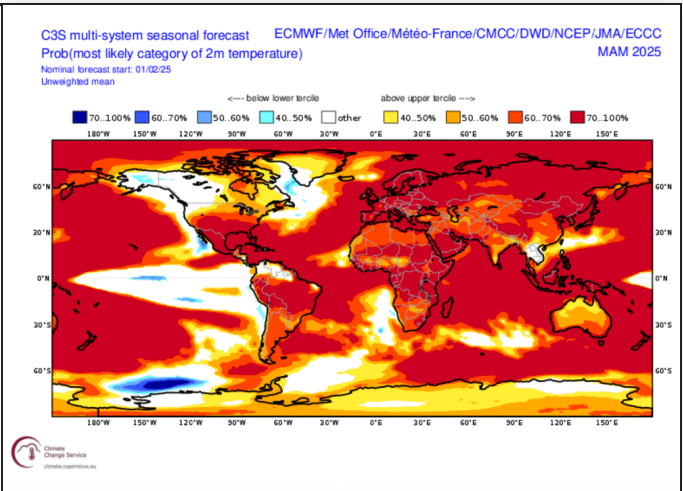
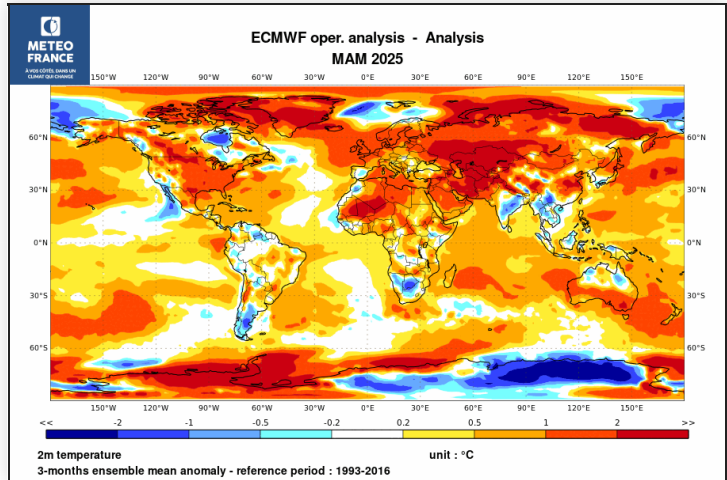
This signal wasn't forecasted by models which where close to their climatology.



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

Climatic parameters : temperature on the globe

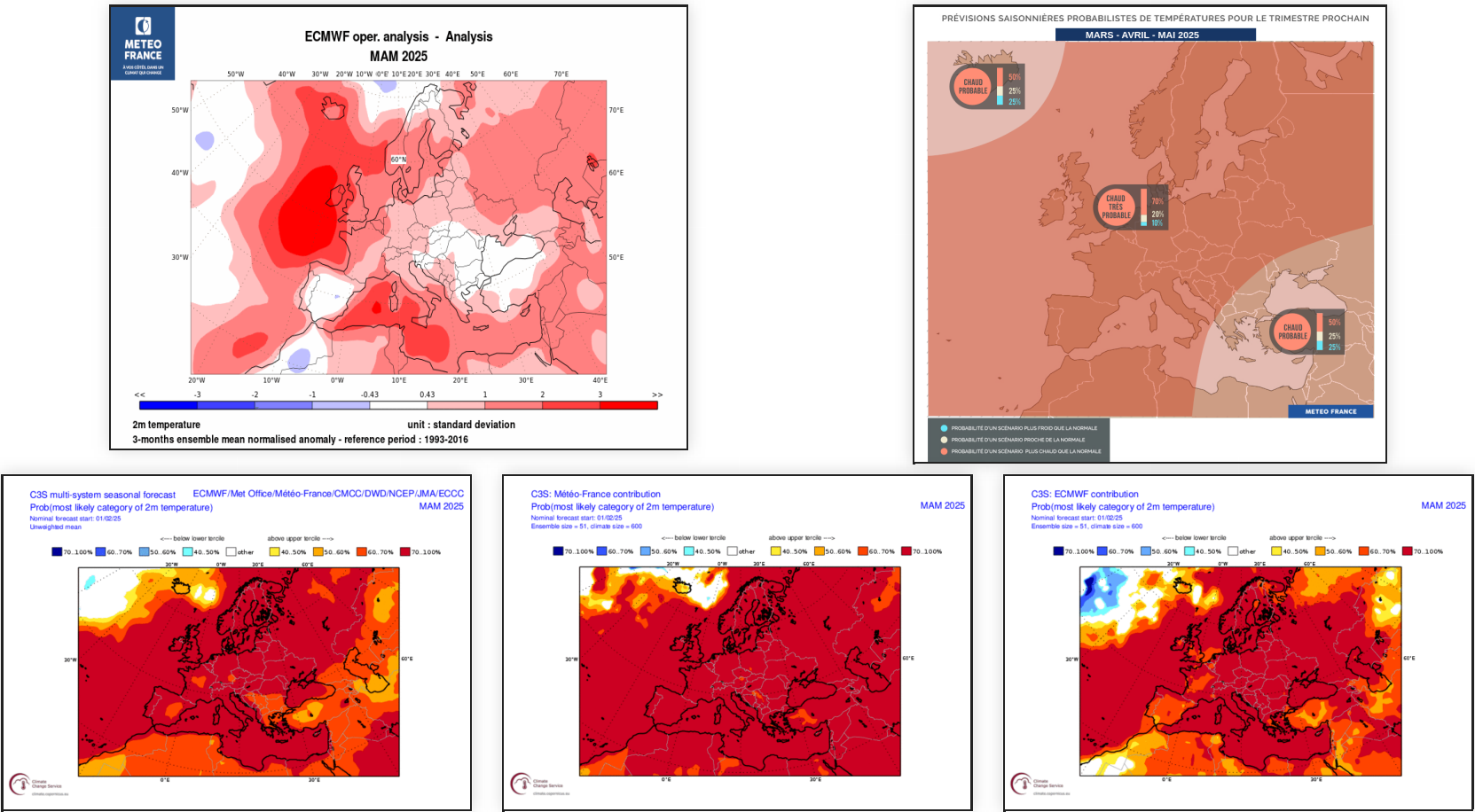
Warm anomalies dominate.
Cold anomalies are limited and, more often than not, better anticipated by ECMWF than by other models.



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Climatic parameters : temperature over Europe

Warm anomalies over maritime areas were well forecast. Over continental Europe, warm anomalies dominate overall and have been anticipated. However, near-normal conditions over the Iberian Peninsula and the Balkans were not seen.

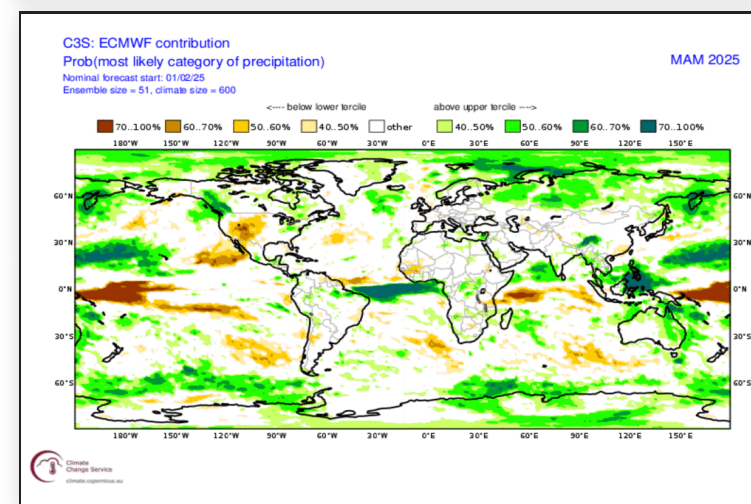
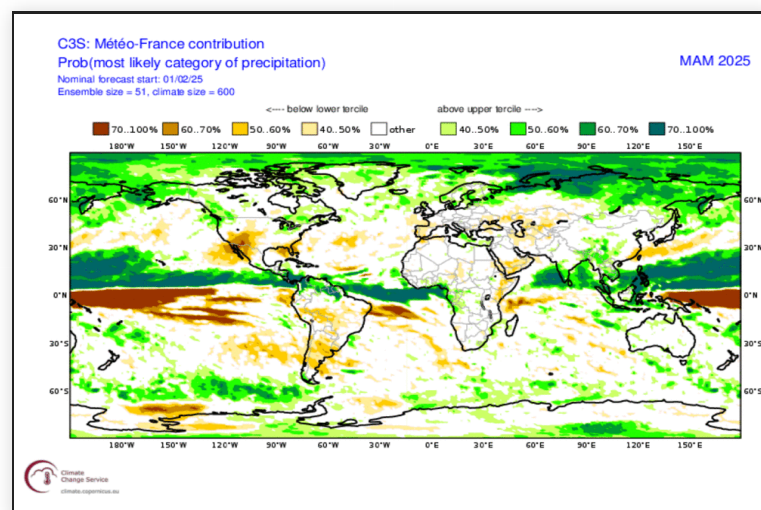
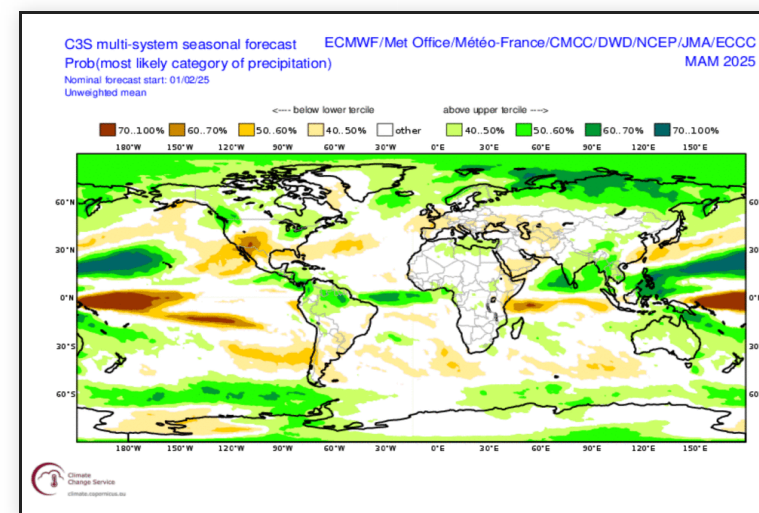
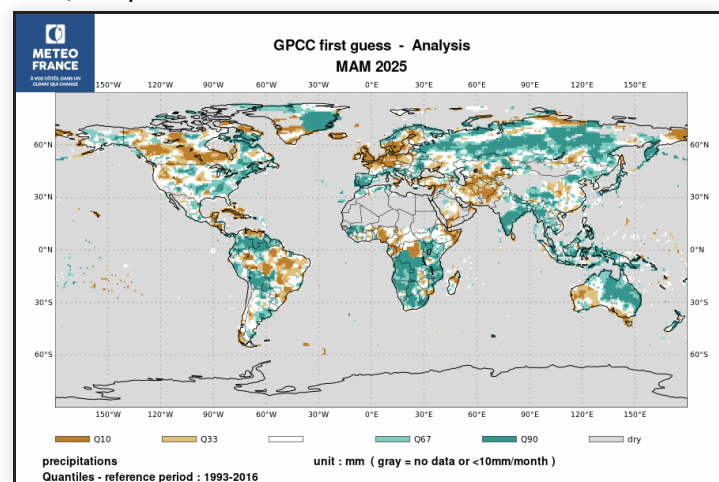


ECMWF analysis top left, synthetic forecast map top right. Forecast for multi-system , MF-S8 and SEAS5 on the bottom line.

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, except South of Africa.

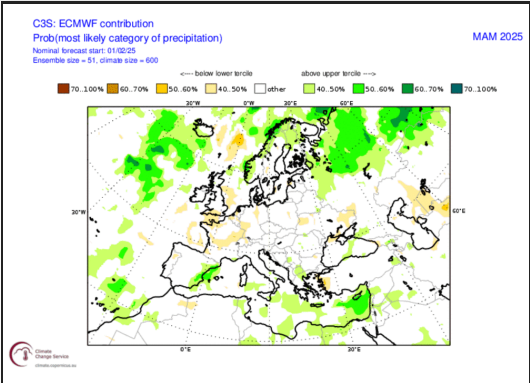
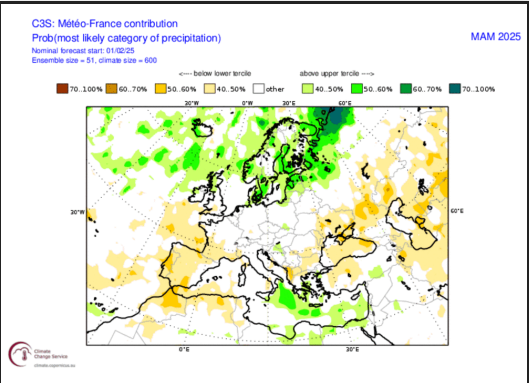
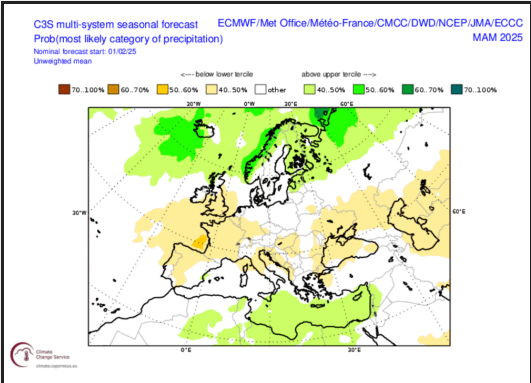
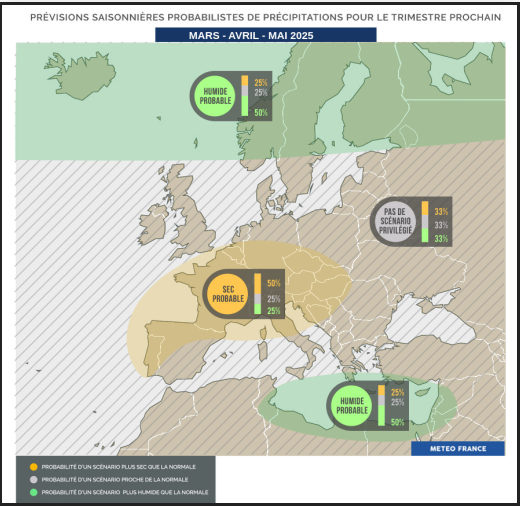
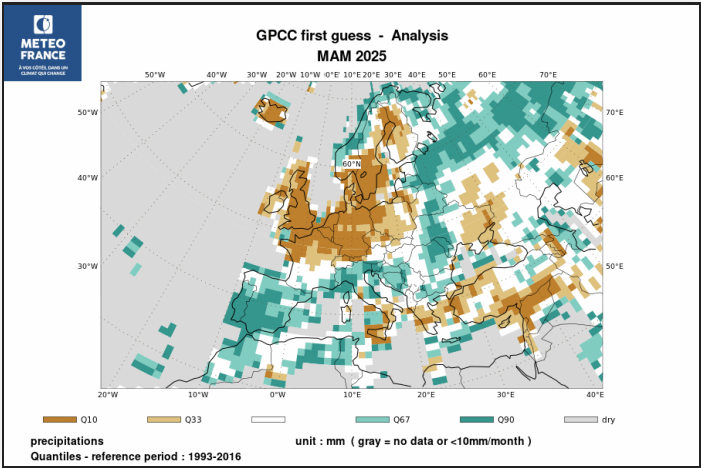
In the Northern Hemisphere, forecasts for western North America are not correct. The wet anomaly over Russia is suggested by the models, but positioned too far north.



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

In line with the discrepancies between analysis and forecast of atmospheric circulation over Europe, the forecast dry anomaly is positioned too far south. Note that ECMWF suggested a weak moist signal over eastern Spain.



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 MAM 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, downdrafts from the western Indian Ocean to the Atlantic Ocean were not predicted.

SF 200 hPa : The models correctly anticipated the dipole over the western Pacific Ocean. However, the dipole forecast between the Indian and Atlantic Oceans was not reflected in the analysis.

Over Europe, the negative circulation anomaly over Spain was not forecast.

Z500 :In the Southern Hemisphere, around South America are correctly forecast.

In the Northern Hemisphere, the negative anomaly over Canada is well forecast, but not sufficiently extended westwards (Alaska). The negative anomaly over Spain was not anticipated either..

3) Climatic parameters over Europe :

Temperatures : The warmer-than-normal conditions forecast are confirmed by analysis over a very large part of Europe.

Precipitations : The zone with a drier-than-normal scenario is found in the analysis, but in a more northerly position, due to the negative Z500 anomaly over Spain.