

VERIFICATION BULLETIN

MAY - JUNE - JULY 2024

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Introduction : Objective

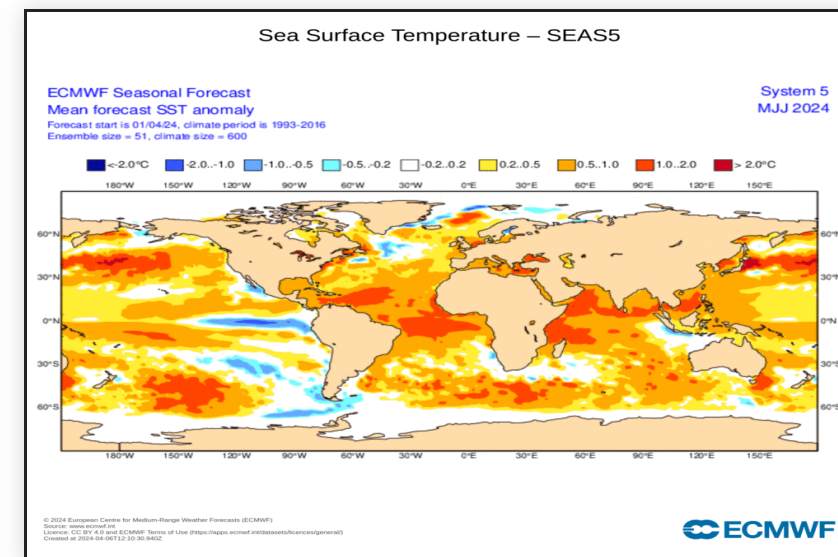
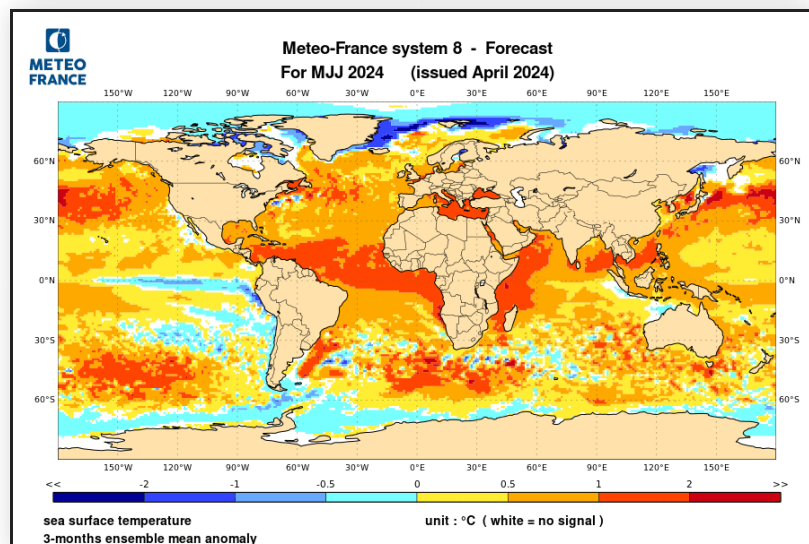
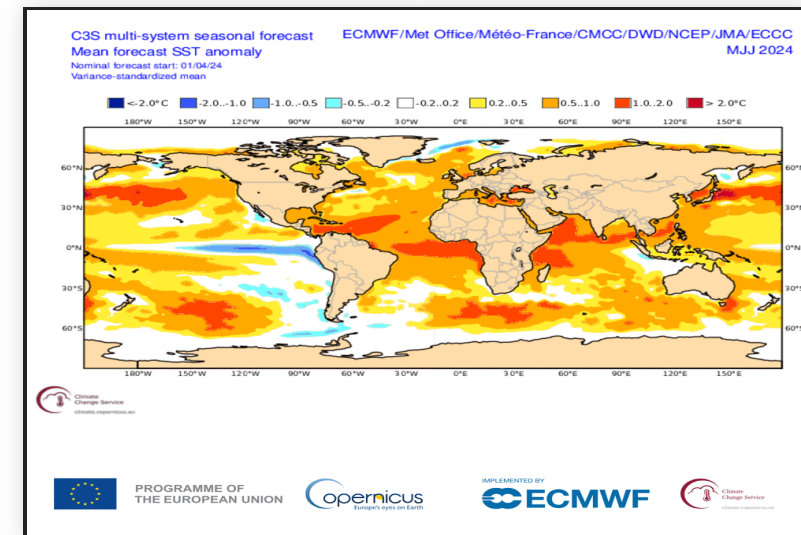
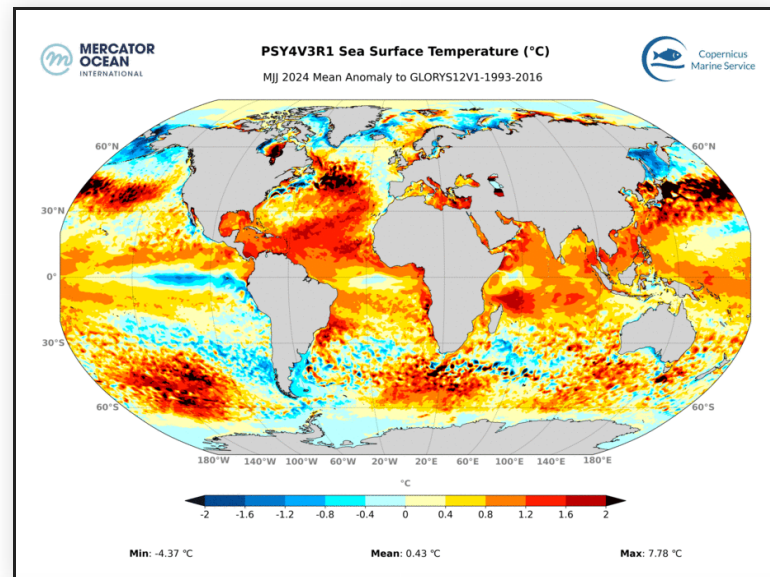
- The objective of the Seasonal Verification Bulletin is to present an evaluation of the main elements highlighted in the Seasonal Forecast Bulletin : oceanic forcings, large scale circulation patterns, and a focus on temperature and precipitation forecast over Northern Atlantic, Europe and the Mediterranean 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 observed were seen by most models (cf. multi-models and ECMWF): small negative anomaly over the eastern equatorial zone, PDO- pattern and anomaly in the South Pacific.

In the Indian Ocean, the contrast suggested by models between the west of the basin warmer than normal and the east close to normal is not visible on analysis.

In the Atlantic Ocean, the neutral anomaly near the equator was not predicted by the models, as well as the warm anomaly off Newfoundland and the neutral to slightly negative anomaly from Greenland to Spain

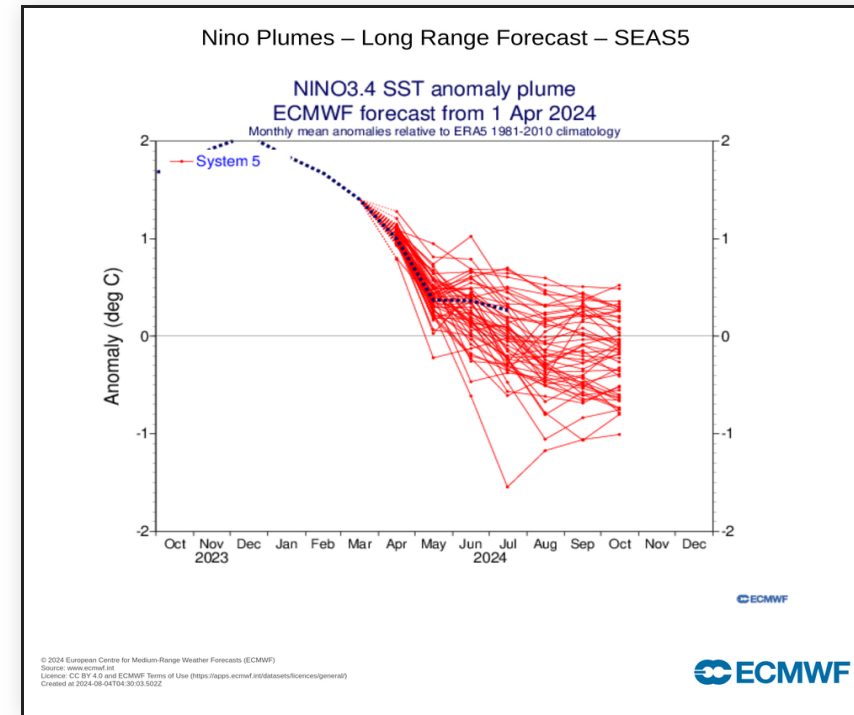
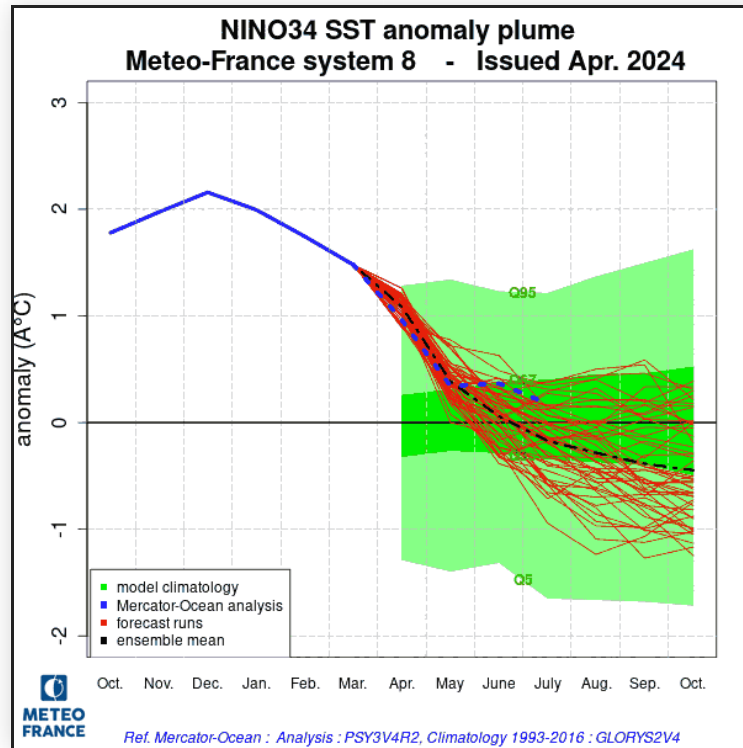


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S8 (bottom left) and SEAS5 (bottom right)

Oceans : ENSO

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

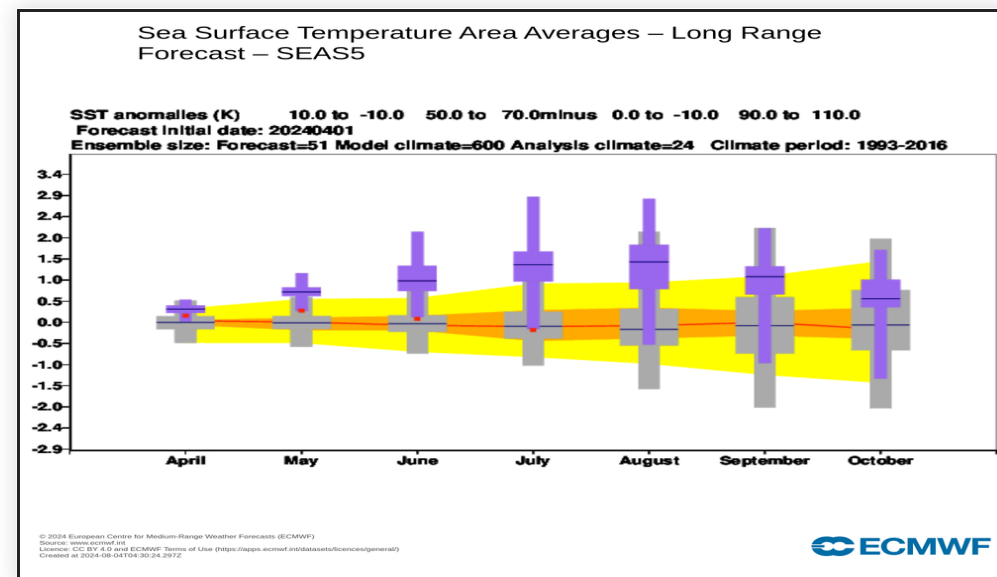
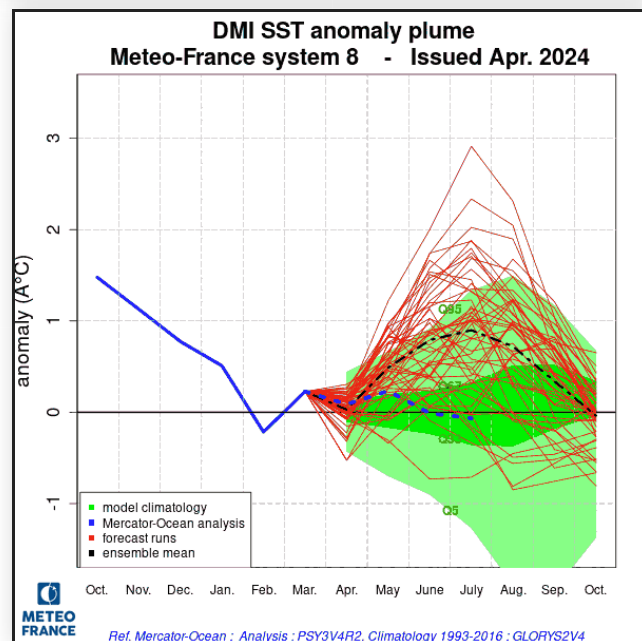
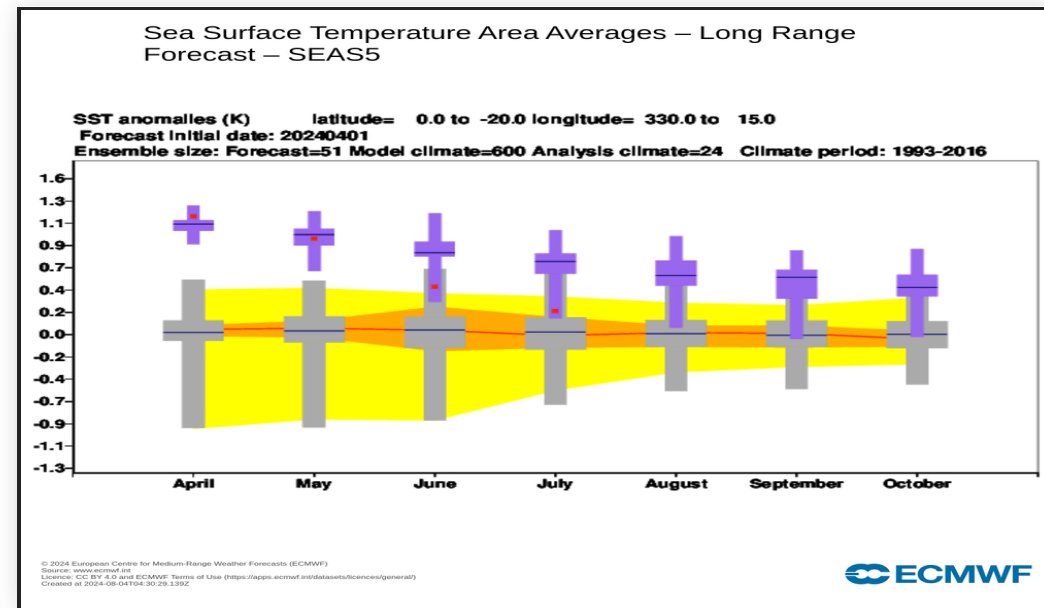
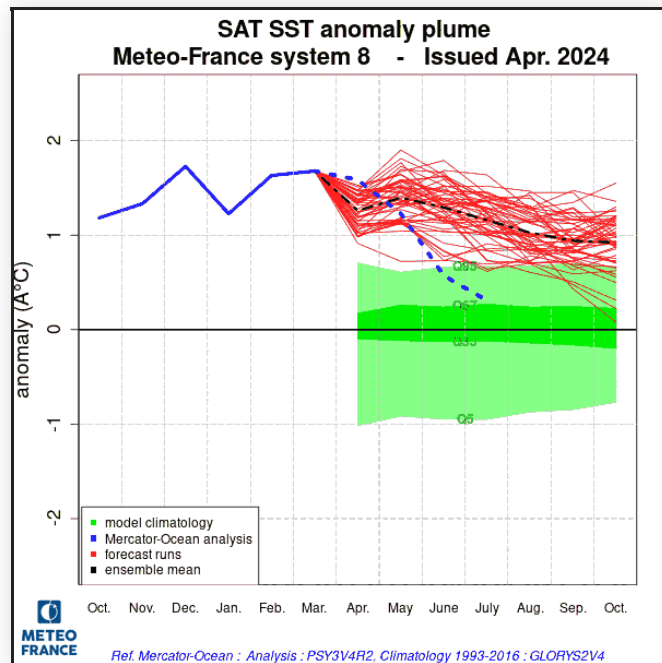
The analysis is within the range provided by the models.



Oceans : tropical Atlantic and Indian Ocean index

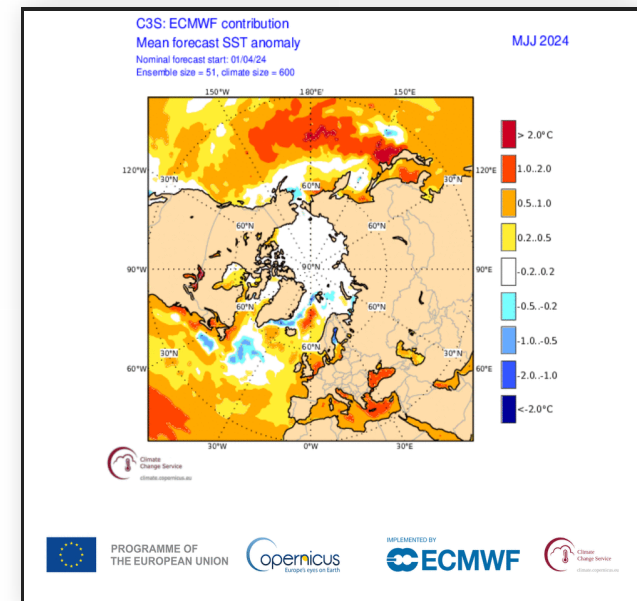
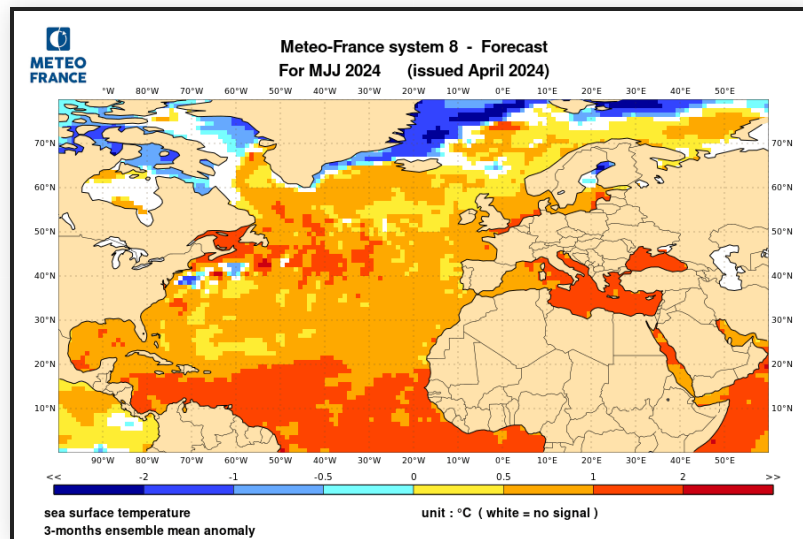
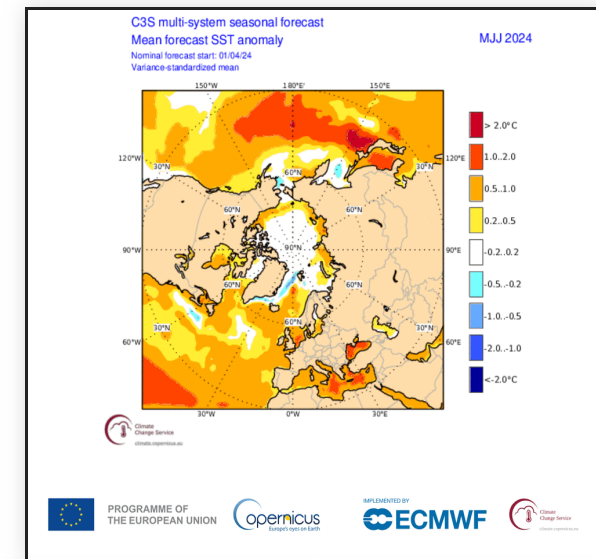
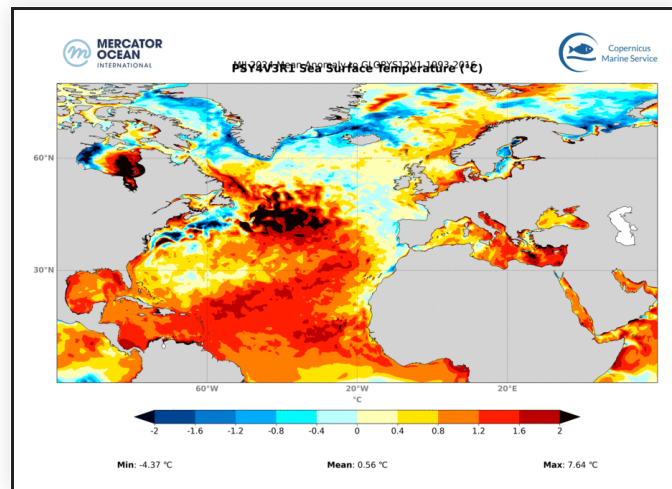
SAT : Decrease faster then expected.

DMI : Both models failed to maintain a neutral DMI.



Oceans : North Atlantic SST

On the northern tropics, both models correctly anticipated the strong positive anomaly. Further north, SST conditions are less well predicted, particularly the neutral to slightly negative zone from Greenland to Spain.

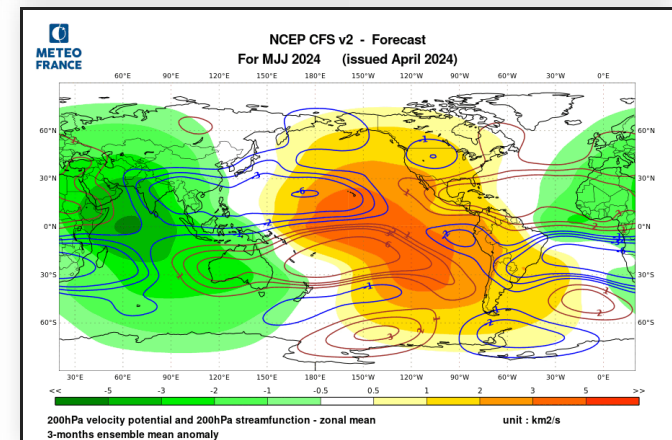
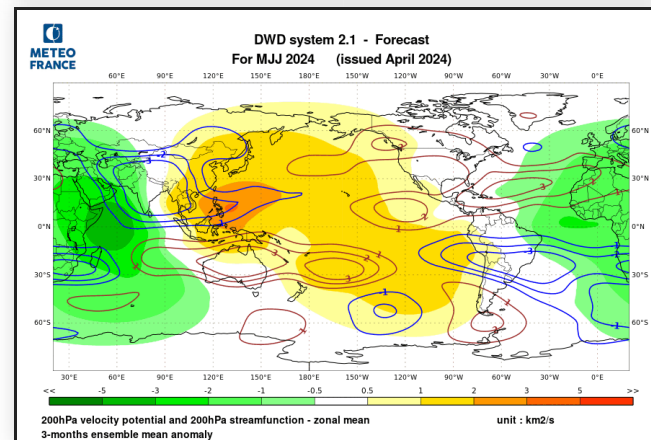
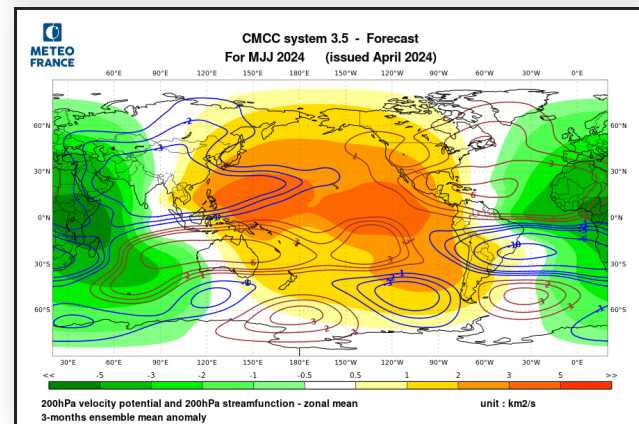
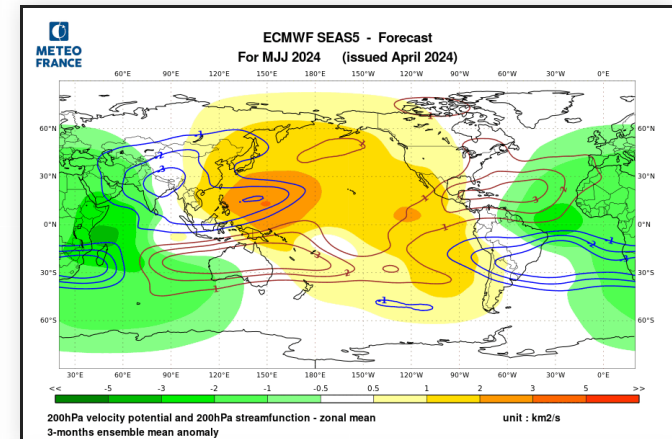
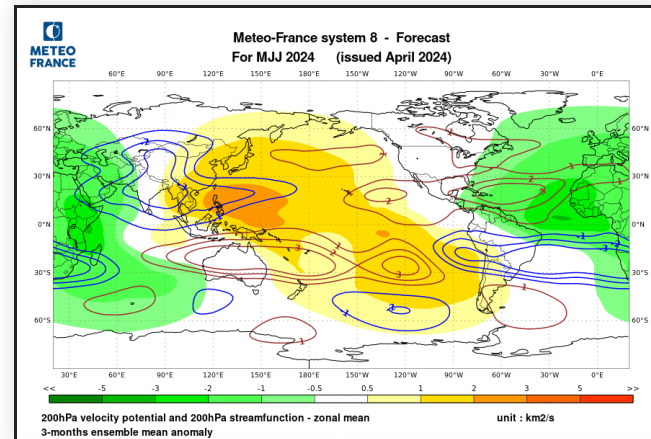
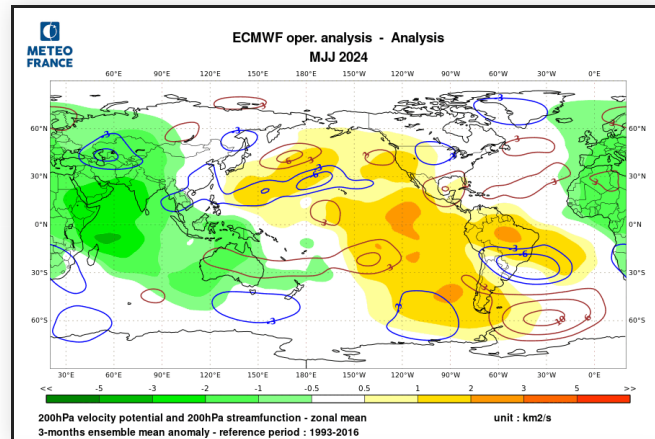


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S8 (bottom left) and ECMWF SEAS5 (bottom right)

Atmospheric circulation : Global teleconnection

VP : The zone of strong upwad motions from Africa to the maritime continent were forecasted further west by models except NCEP.
Most of the models also forecast subsidence to far west on the Pacific

SF : Low signal observed. The dipole around the maritime contient as weel as the anomalies from the south of Pacific to South America are well anticipated by the models. however the anomaly prédicted aroud India hasn't been observed and that of the Caribbean towards western Africa is overestimated.

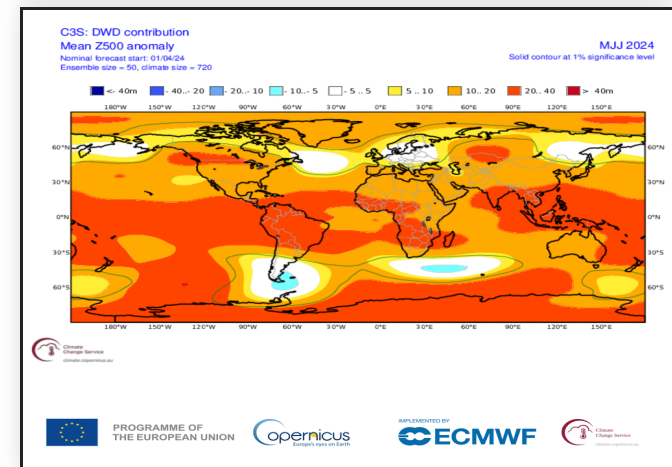
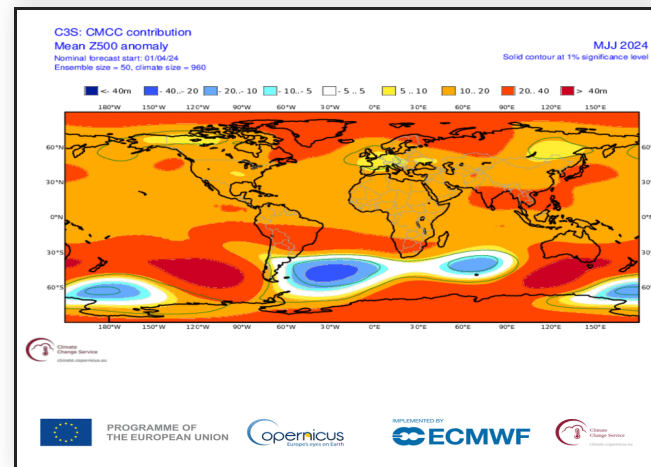
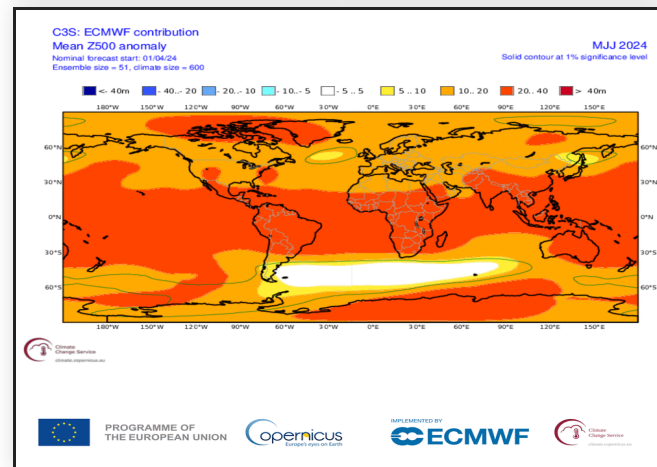
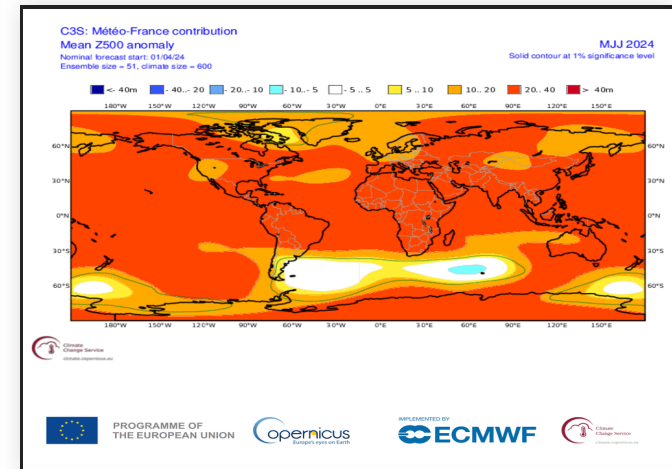
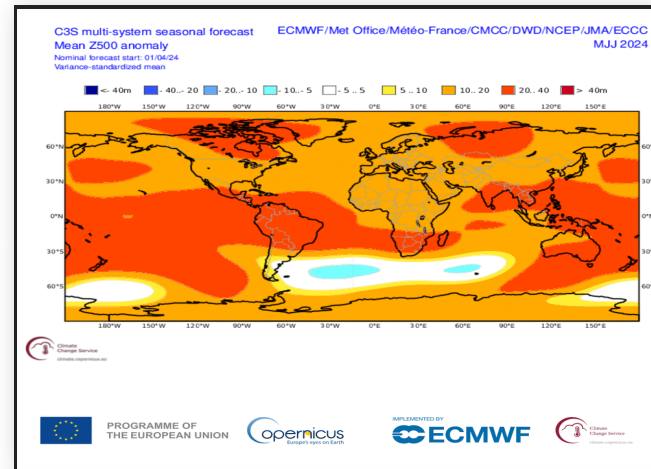
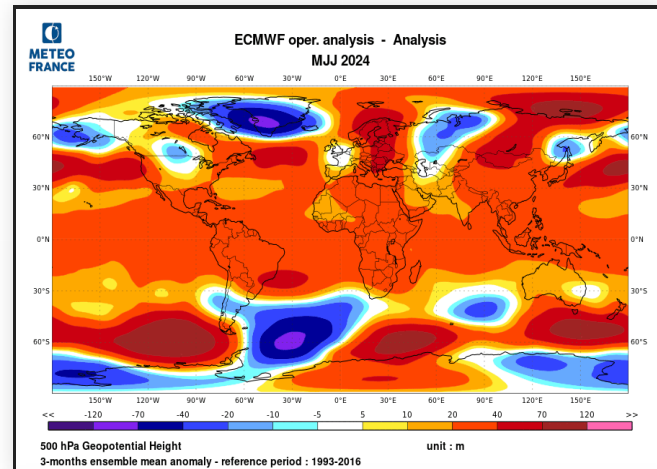


ECMWF analysis, MF-S8, ECMWF-SEAS5, CMCC, DWD and JMA 200hPa velocity potential anomalies (color range, green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

Atmospheric circulation : 500hPa Geopotential height

Southern Hemisphere : Main anomalies are suggested by multi-system.

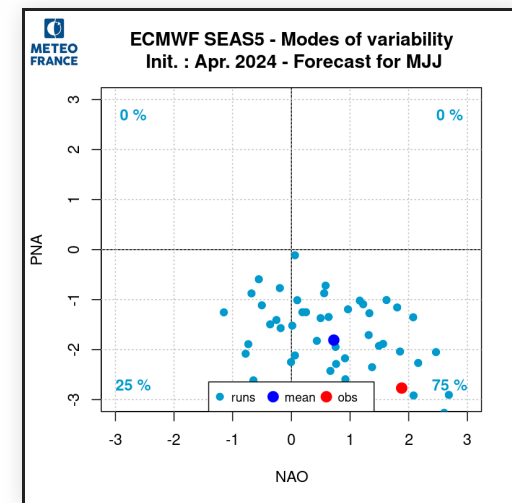
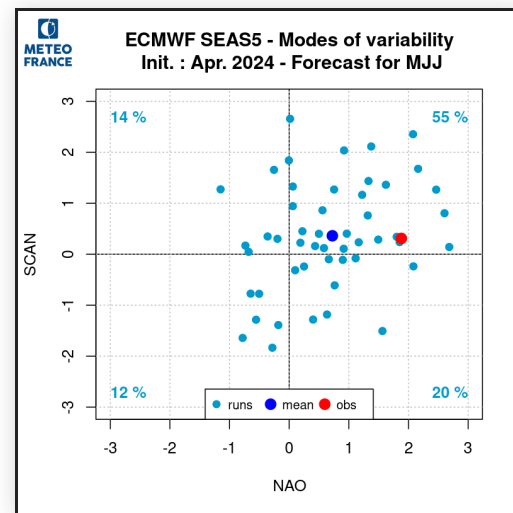
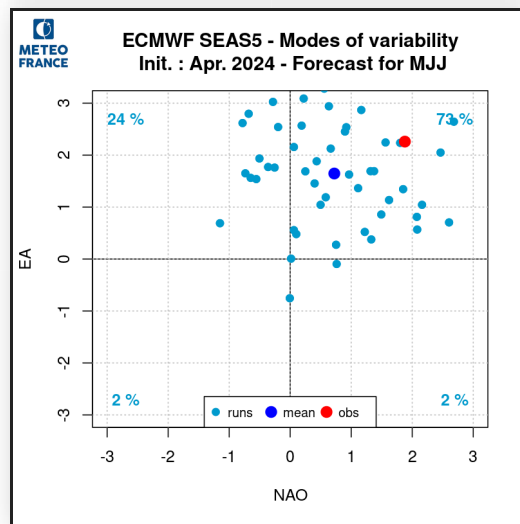
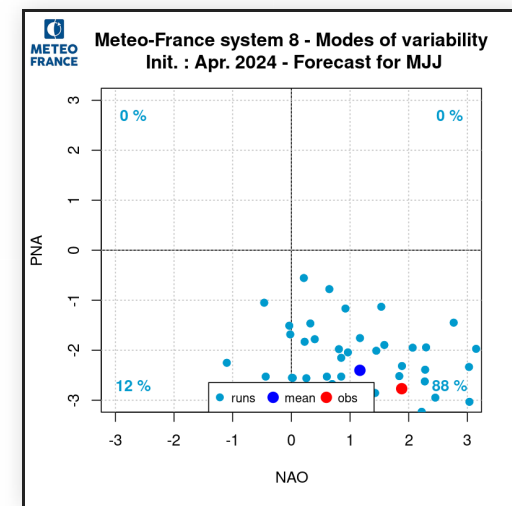
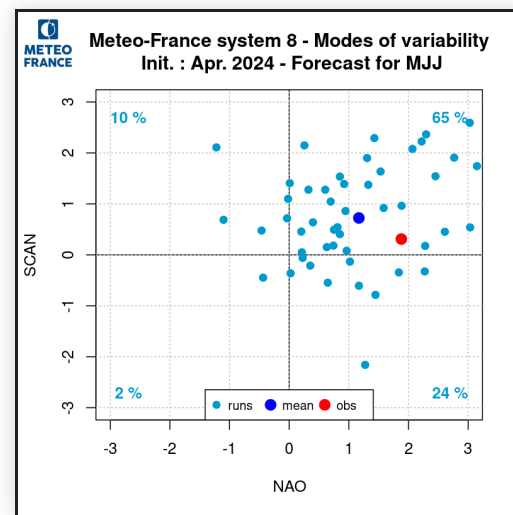
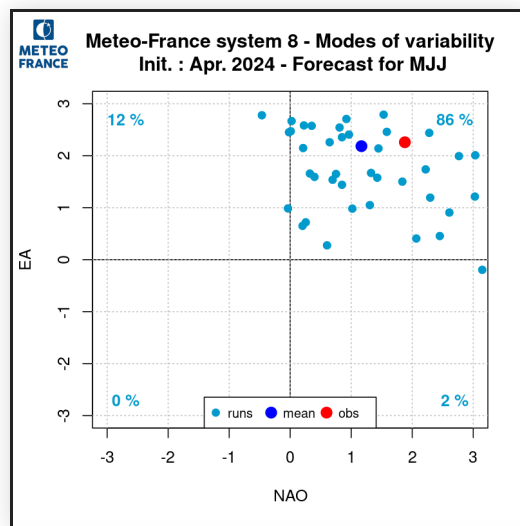
Northern Hemisphere : The analysis shows a large number of small areas with positive or negative anomalies throughout the northern hemisphere, which are very difficult to predict.



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

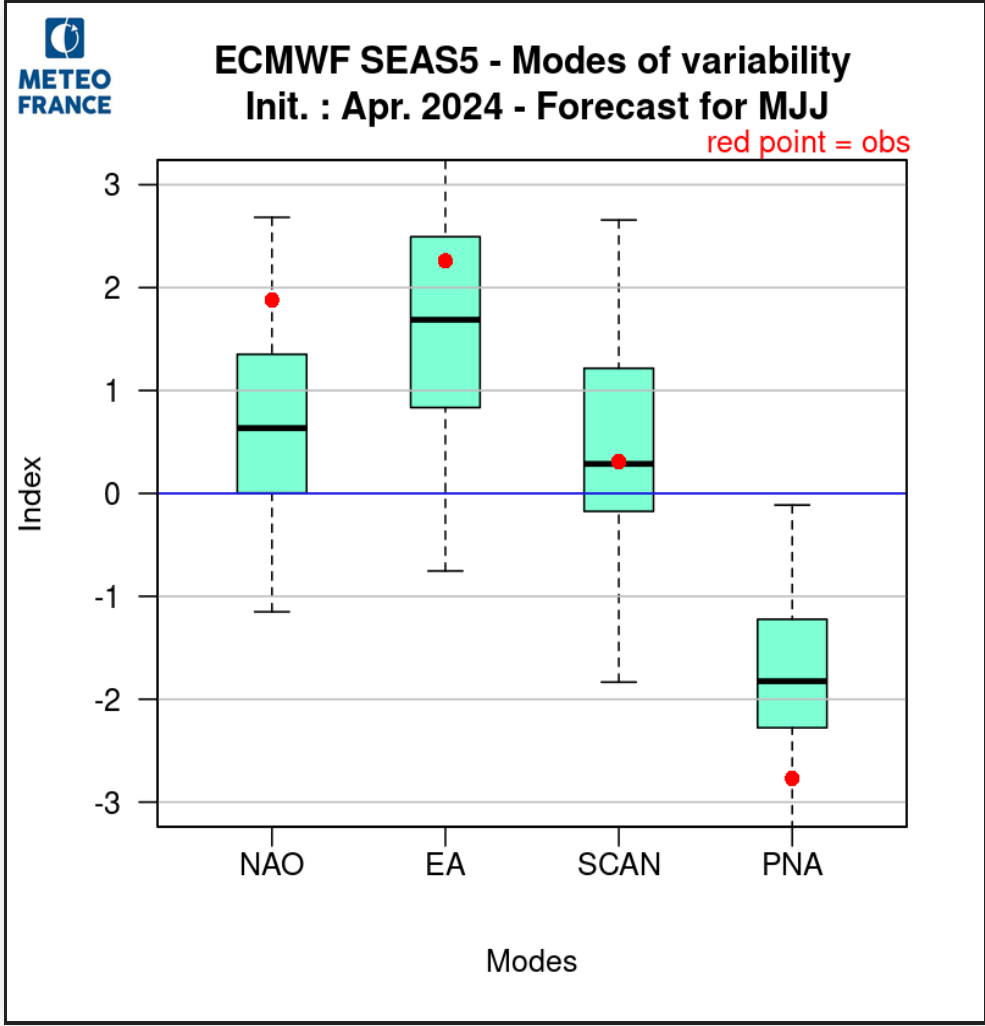
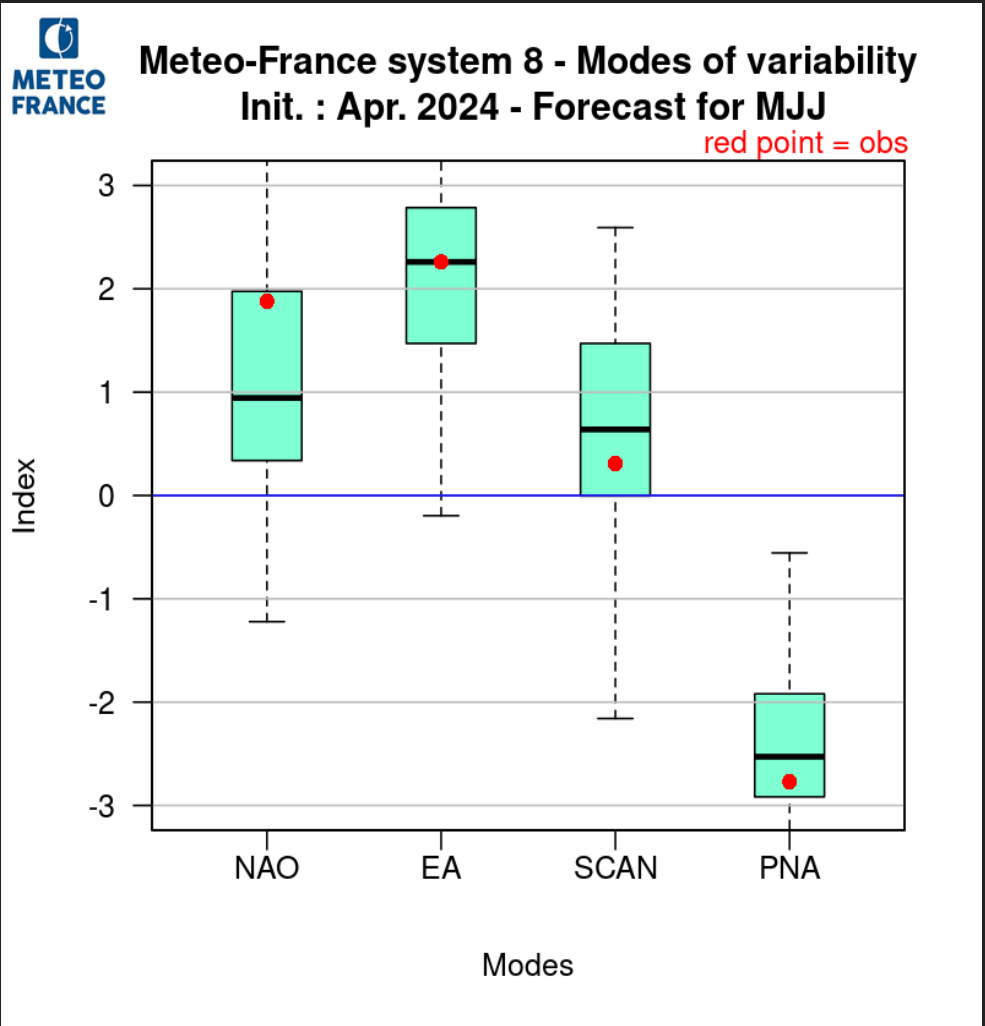
Atmospheric circulation : Modes of variability

Good model forecast, not only for the PNA- and EA+ modes, but also for the other two modes, NAO+ and SCAN+.



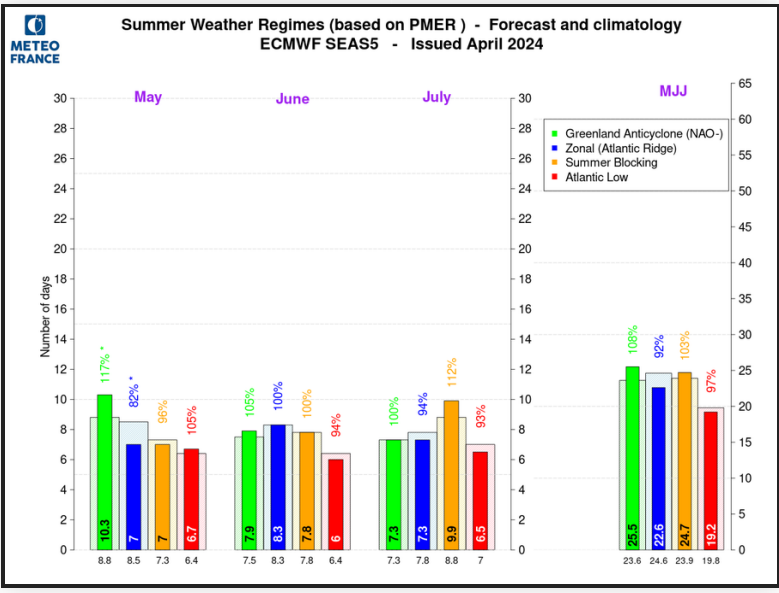
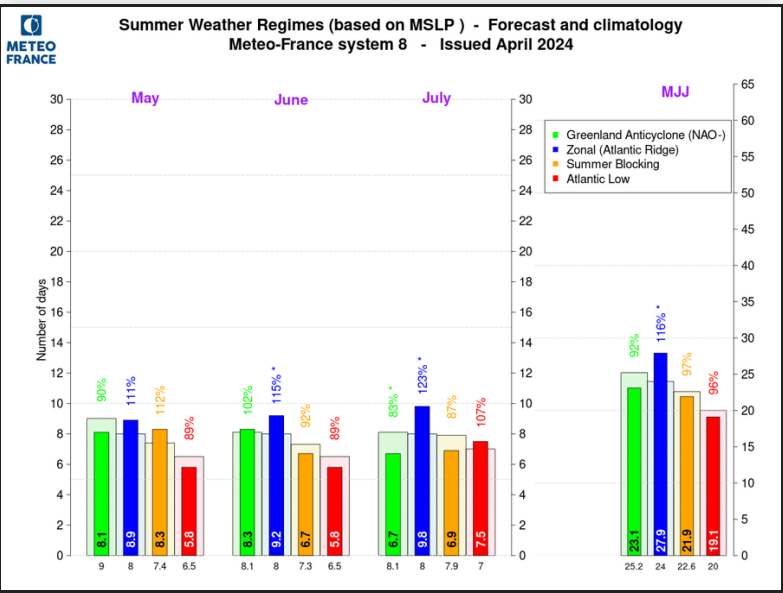
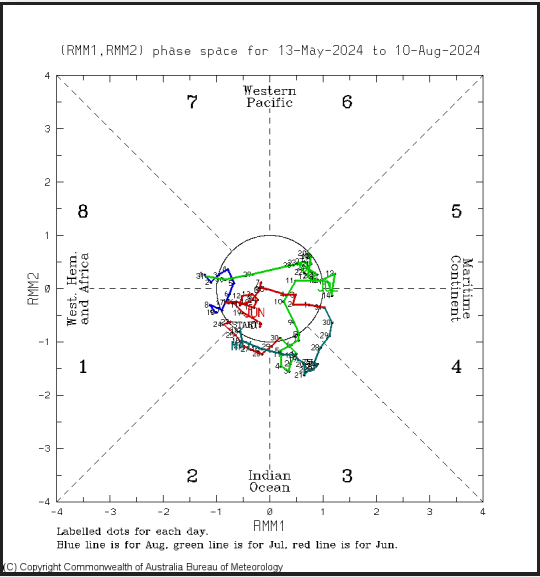
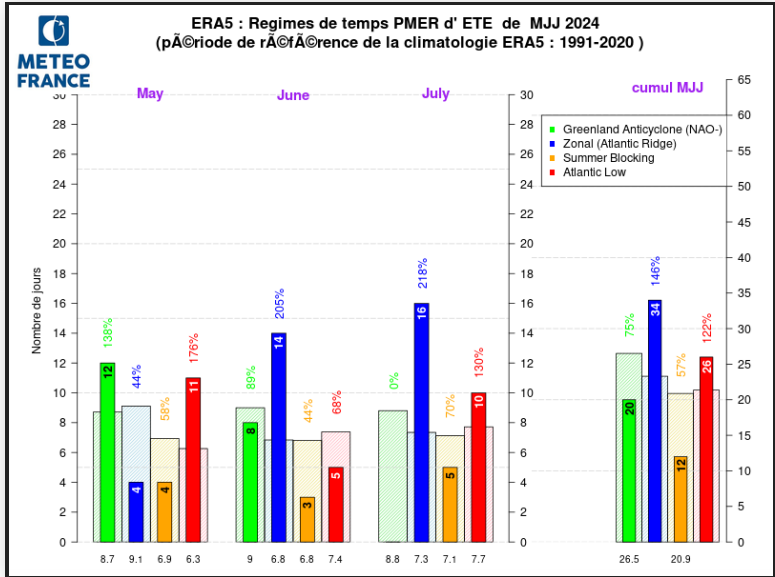
Atmospheric circulation : Modes verification

Same observation as for the previous slide



Atmospheric circulation : Summer SLP weather regimes

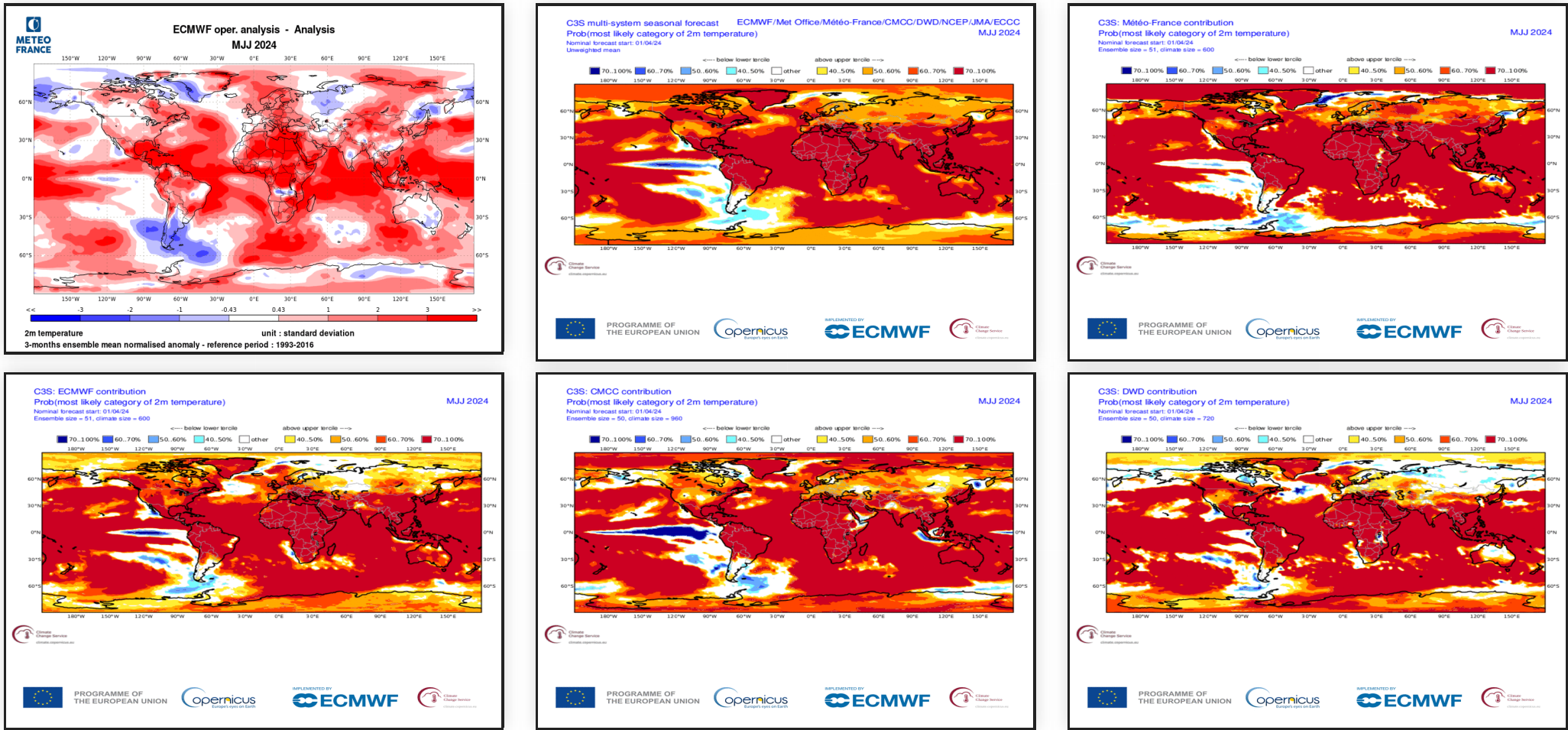
Zonal regime is over-represented in the analysis as in MF8 model.



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

Climatic parameters : temperature on the globe

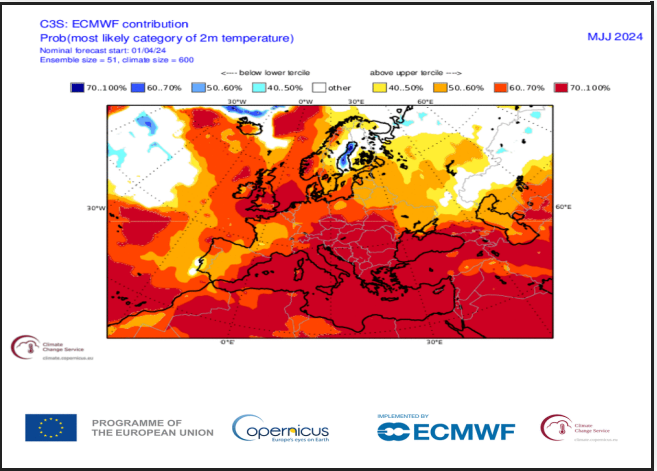
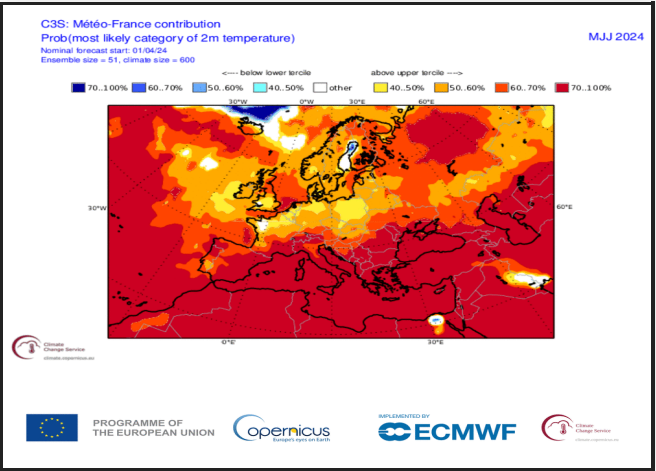
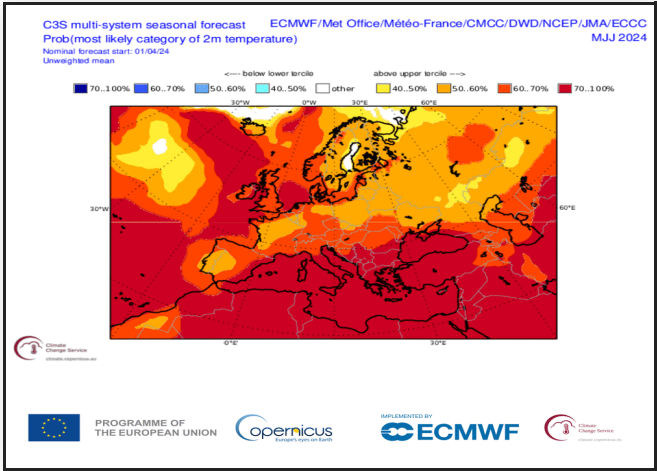
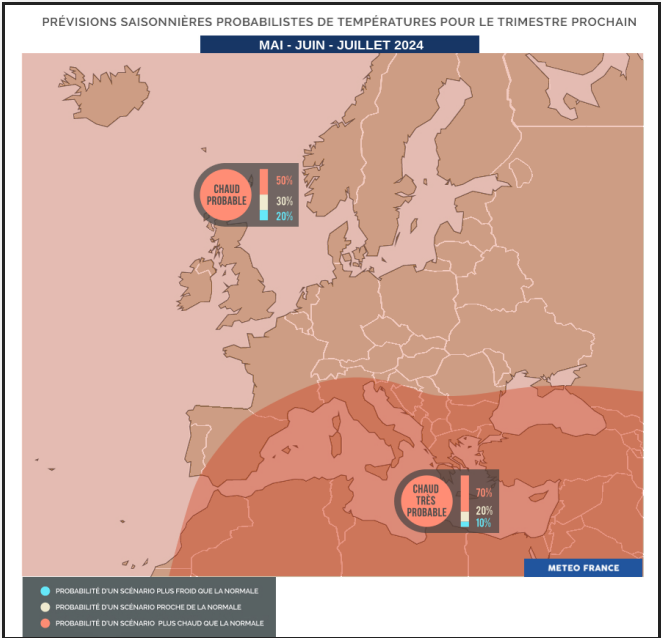
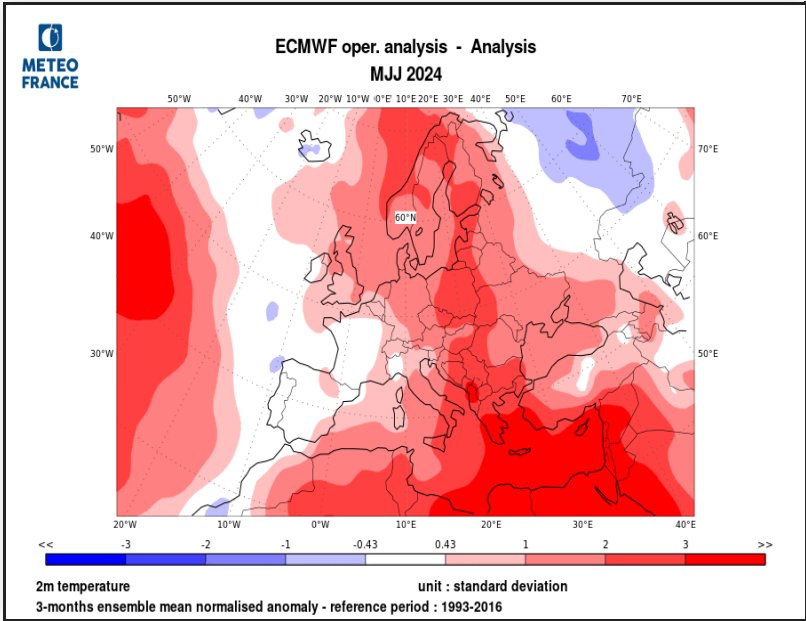
In the southern hemisphere, the main cold anomalies are more or less forecasted and are linked to oceanic anomalies.
In the Northern Hemisphere, negative temperature anomalies are correlated with negative Z500 anomalies, and have therefore not been correctly forecast.



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

For the eastern Mediterranean Basin and Central Europe, conditions were indeed warmer than normal. In Western Europe, near-normal conditions were not forecast.

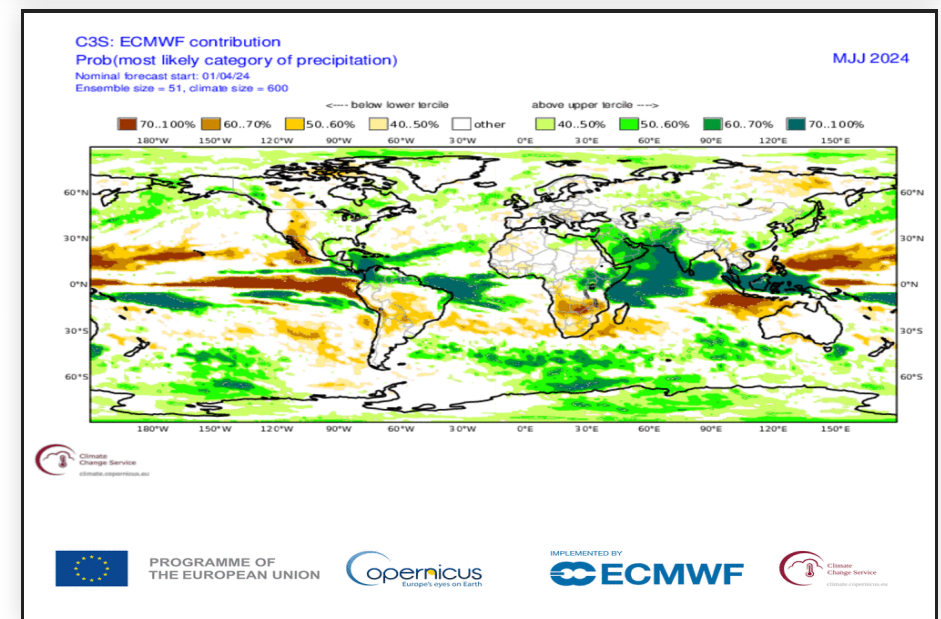
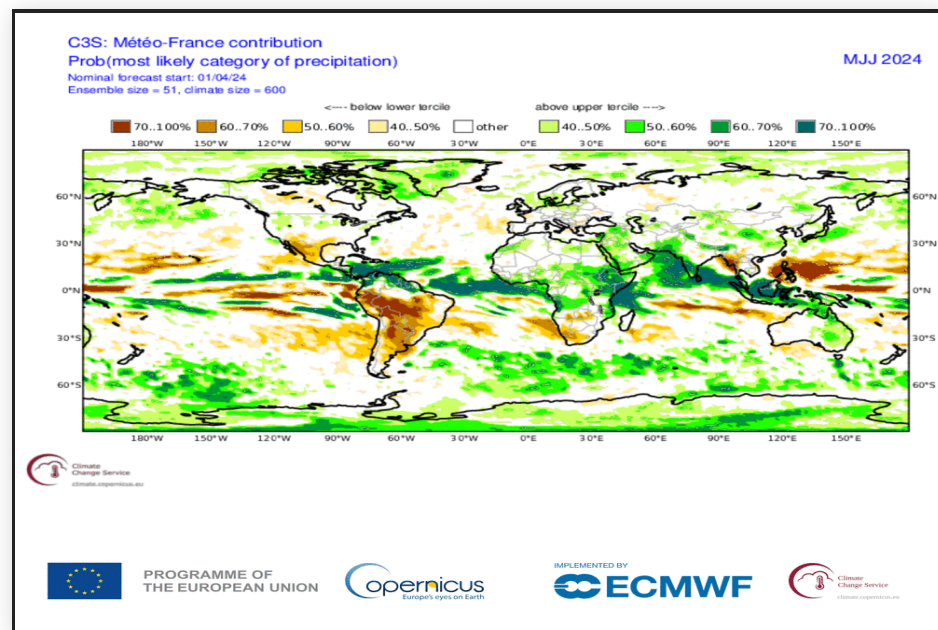
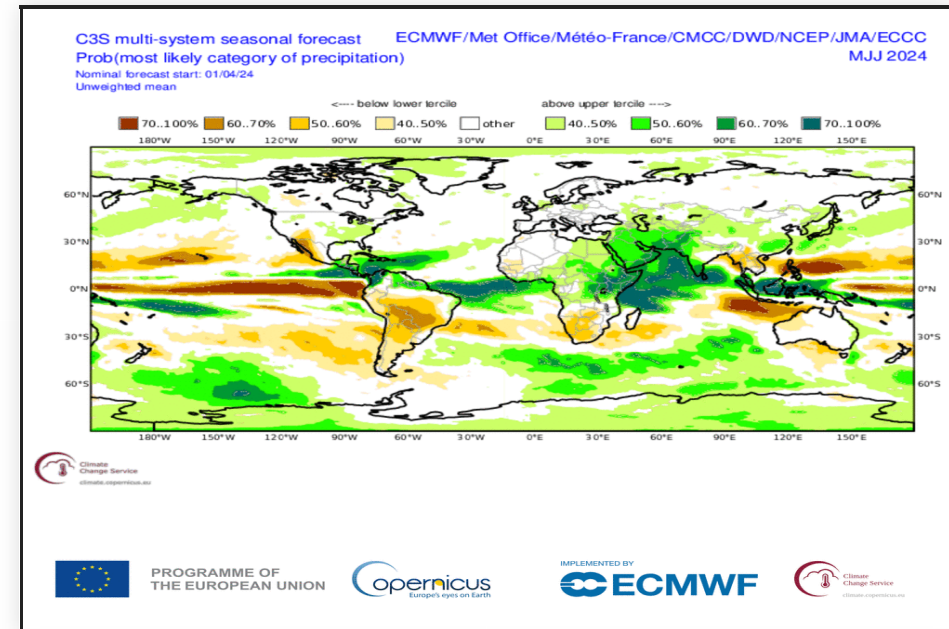
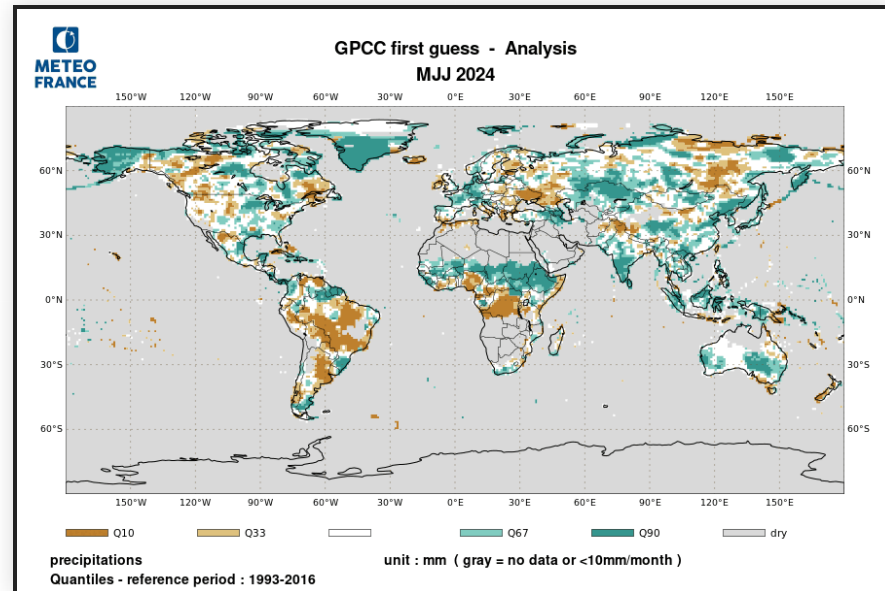


ECMWF analysis top left, synthetic forecast map top right. Forecast for multi-system , MF-S8 and SEAS5 on the bottom line.

Climatic parameters : Precipitations over the globe

In the equatorial zone, the predicted wet anomalies from the Horn of Africa to India and over the Maritime Continent are confirmed on analysis as well as dry conditions over South America

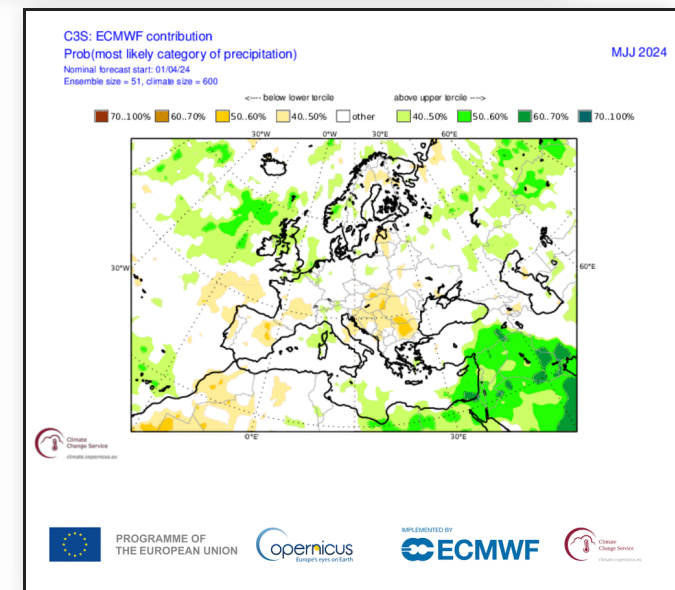
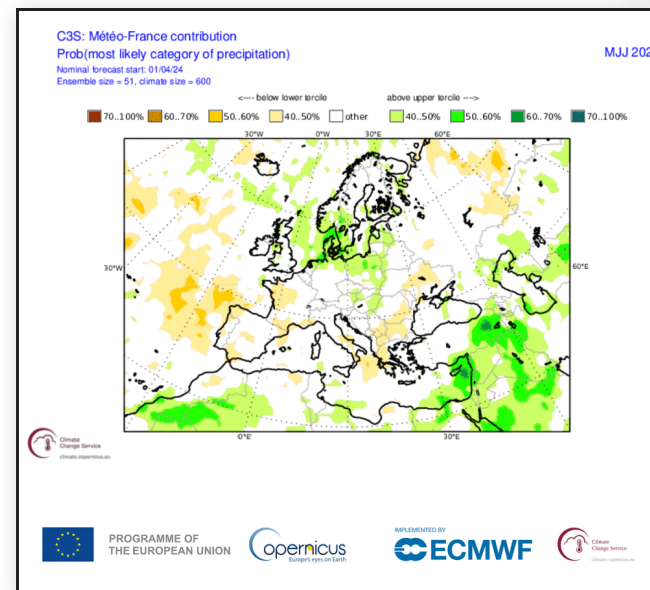
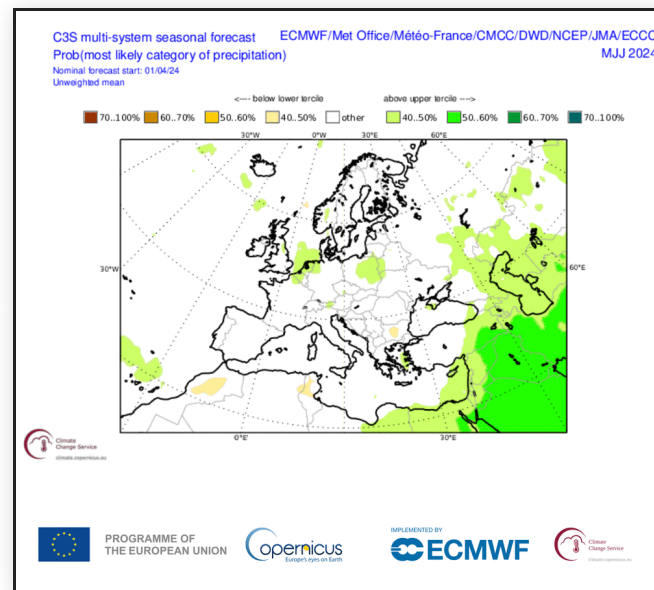
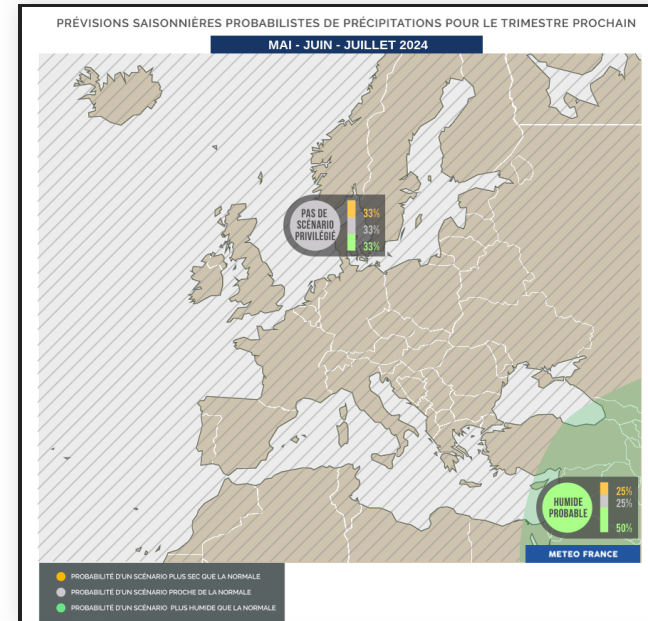
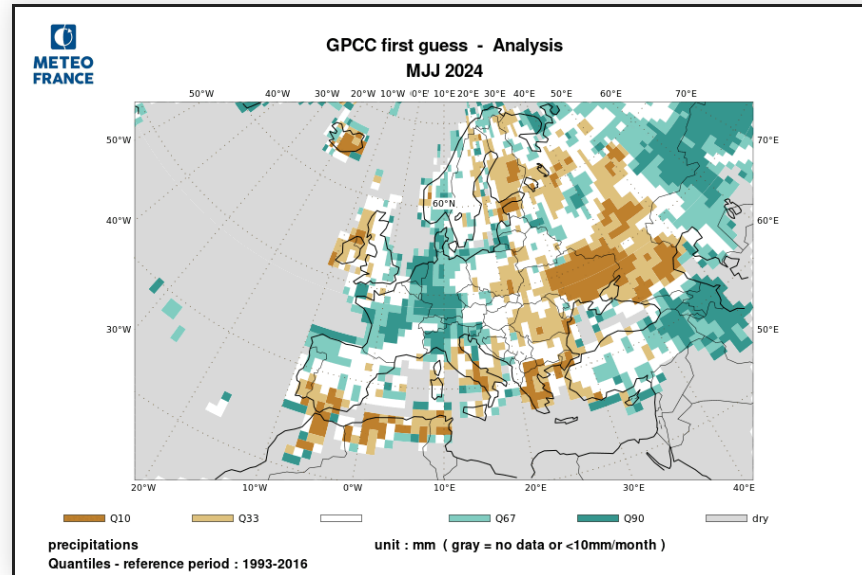
in the Northern Hemisphere, no large-scale convergence between models and analysis.



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

Wet signal south-eastern of Black Sea was anticipated by models; Elsewhere forecasts didn't provide for large areas of anomaly.



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 MJJ 2024

1) Oceans :

The main anomalies visible in the analysis were well predicted by the models. However on the Atlantic and the Indian Ocean there are significant differences between forecast and analysis.

2) Large scale atmospheric circulation :

VP 200 hPa : The upward motion areas (Indian Ocean and Africa) and the downward motion areas (Pacific Ocean) are globally seen by the models but shifted to the west

SF 200 hPa : The main anomalies are well forecasted in the southern hemisphere while on the northern the observed anomalies are small and not really correlated with forecasts.

Z500 : The quarterly analysis reveals several anomalies, both positive and negative, in the northern hemisphere, which are generally poorly seen by the models (Alaska, Greenland, etc.). This is particularly true of the small negative anomaly over France in the analysis.

3) Climatic parameters over Europe :

Temperatures : The warm anomalies were well anticipated over eastern Europe but not wrongly expected further west.

Precipitations : Only the wet anomaly southeastern of Black Sea was forecasted.