

VERIFICATION BULLETIN

APRIL -MAY - JUNE 2022

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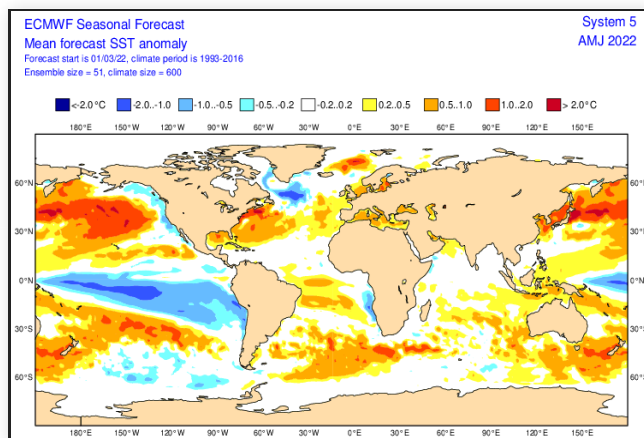
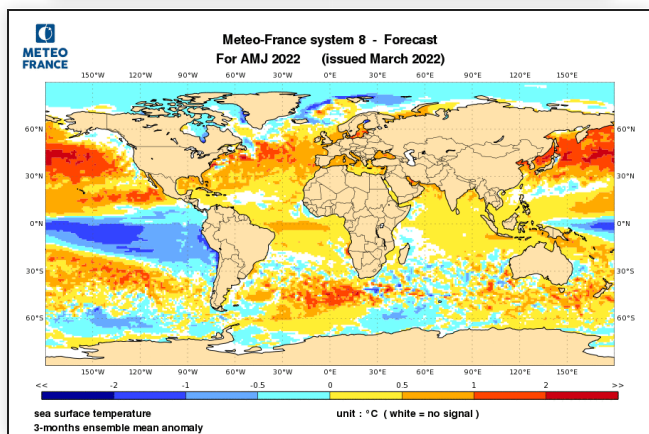
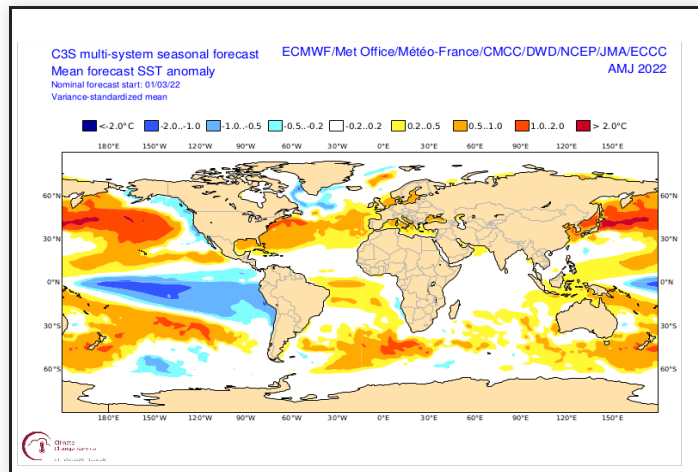
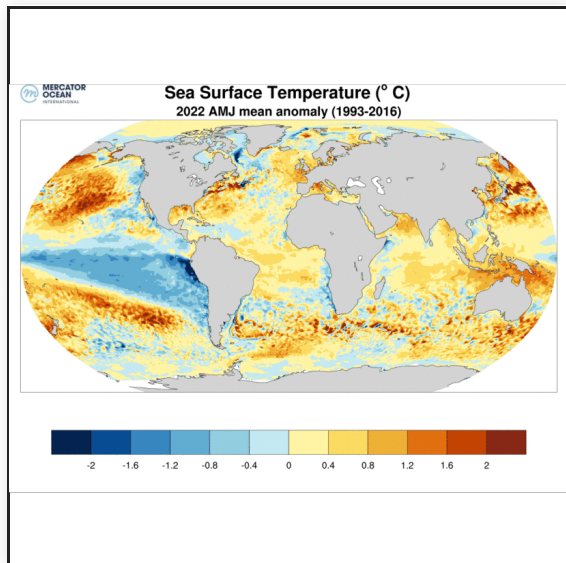
Introduction : Objective

- 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, related to "La Niña" and PDO-, are well predicted by both models, both in location and intensity.

In the other two oceans, Indian and Atlantic, the forecasts are also confirmed by the analysis. In the North Atlantic, the warm anomaly (from the American coasts to Europe) and the small cold anomaly south of Greenland) are present, even if MF-S8 seems a little too warm.

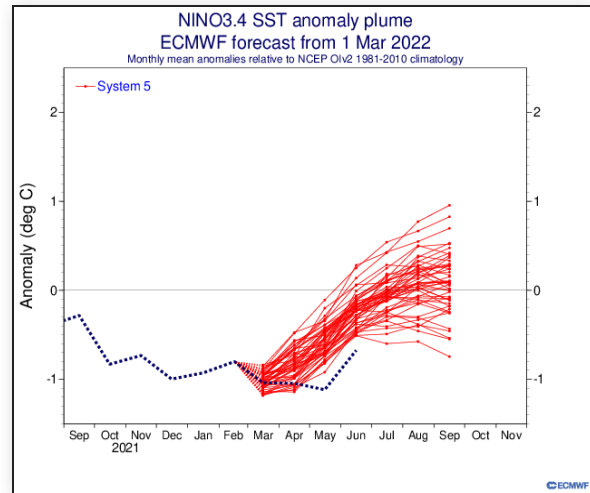
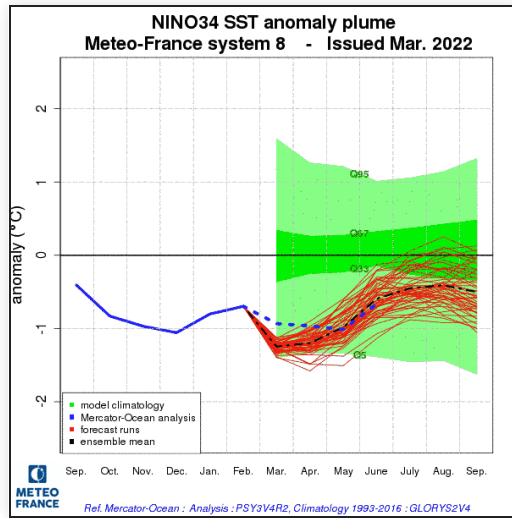


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S8 (bottom left) and SEAS5 (bottom right)

Oceans : ENSO

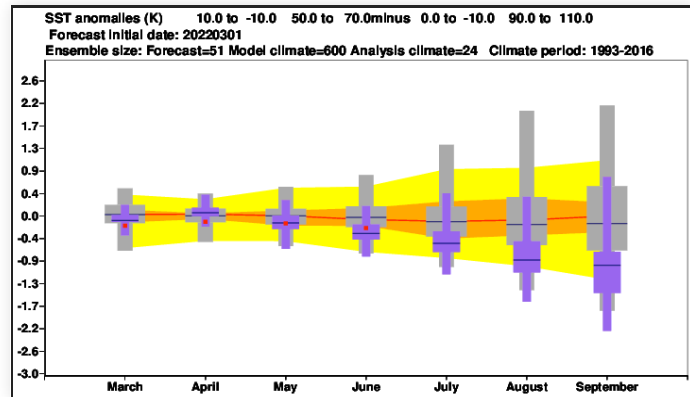
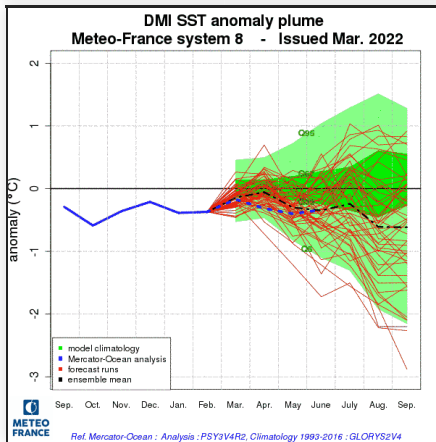
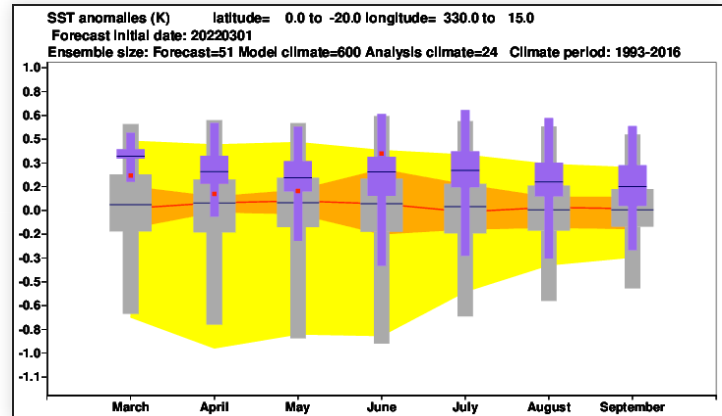
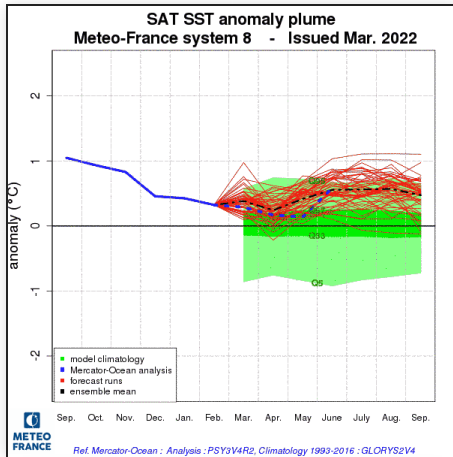
CAUTION : reference analyses differ between MF-S8 (Mercator-Ocean 1993-2016) and ECMWF-SEAS5 (NCEP 1981-2010).

A little too cold at the beginning of the term, MF-S8 recalibrates very well at the end of it. On the contrary, ECMWF-SEAS5 is well adjusted at the beginning of the quarter and then warms up much too quickly. The values observed in May and June are even out of the plume.



Oceans : tropical Atlantic and Indian Ocean index

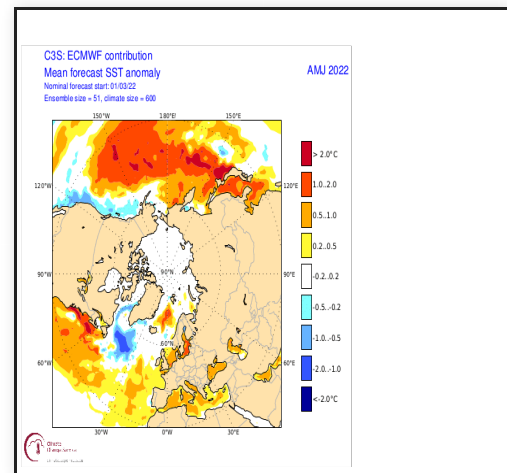
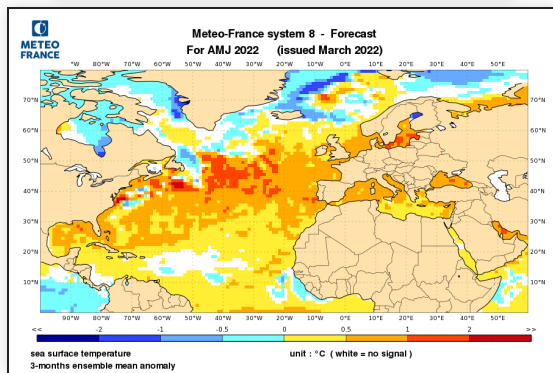
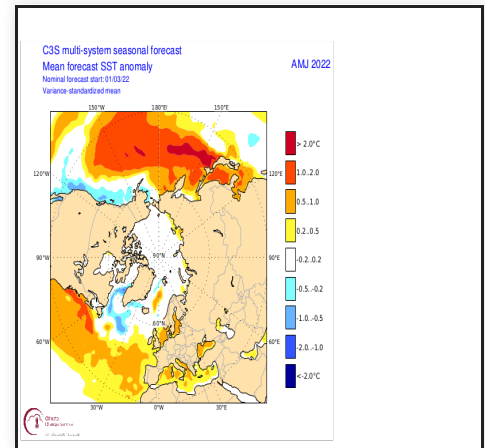
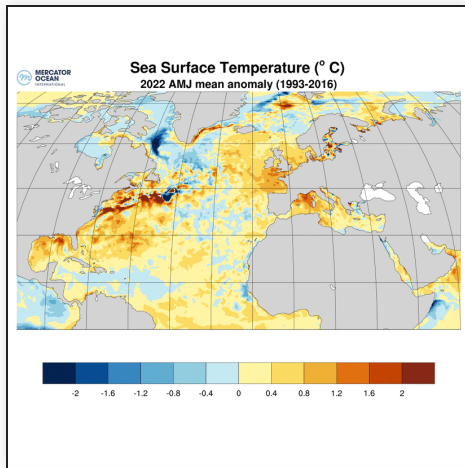
For both indexes, the models are close to the observation. Overall, they were a little too hot at the beginning of the quarter, but then they were adjusted.



Oceans : North Atlantic SST

In the North Atlantic, the warm anomalies between the USA and Europe, as well as the cold anomaly south of Greenland, are well seen by the ECMWF-SAE5 model. The MF-S8 model is a little less accurate.

In the Mediterranean, the forecasts are correct.



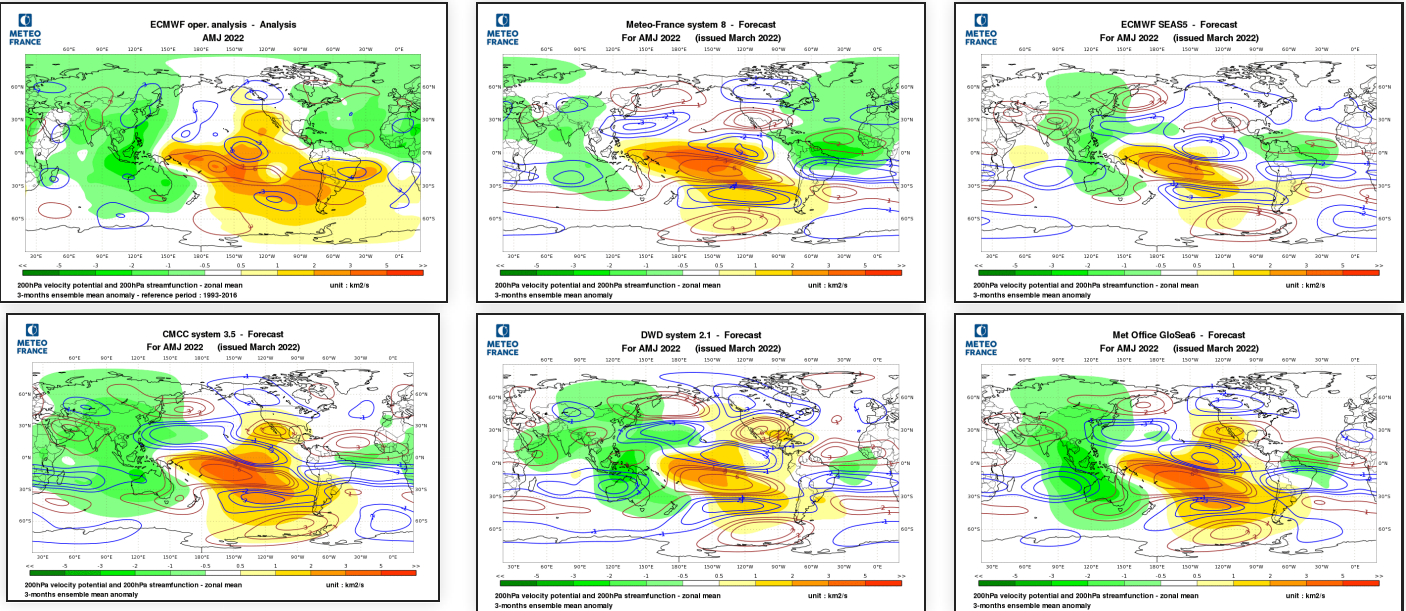
SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S8 (bottom left) and ECMWF SEAS5 (bottom right)

Atmospheric circulation : Global teleconnection

VP : The dipole of downward motion anomaly over the Pacific and upward motion anomaly over the Maritime Continent, the main characteristic of "La Niña", is present in the analysis. It has been well predicted by all models. The upward motion anomaly over the Equatorial Atlantic, linked to the positive SST anomaly, is also taken into account by the models.

SF : The dipoles on both sides of the equator on the Pacific and Atlantic Oceans predicted by the models are found well in the analysis, the absence of dipole in the Indian Ocean also.

The teleconnections to the mid-latitudes over the Pacific are present in the forecast as in the analysis. However, the teleconnections over the Atlantic suggested by some models are not seen in the analysis.

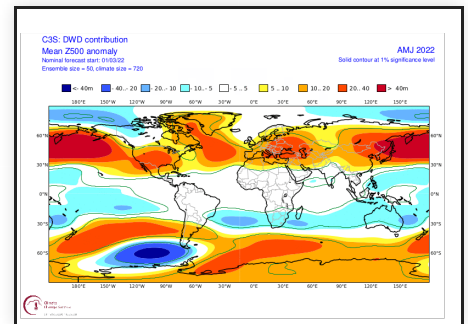
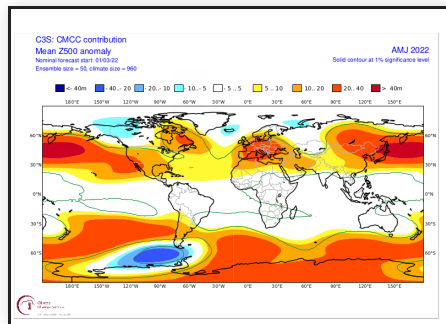
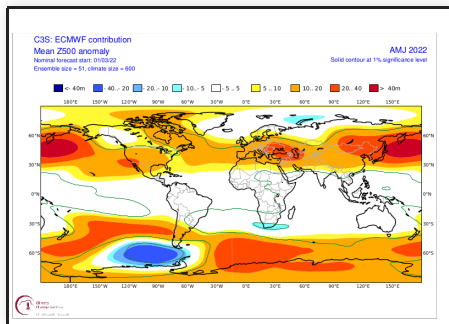
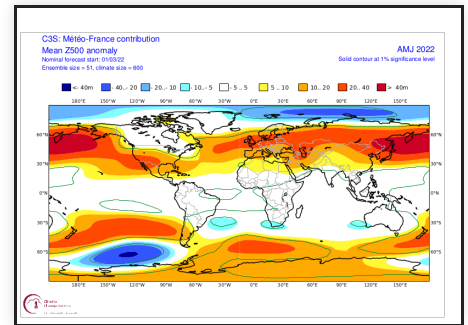
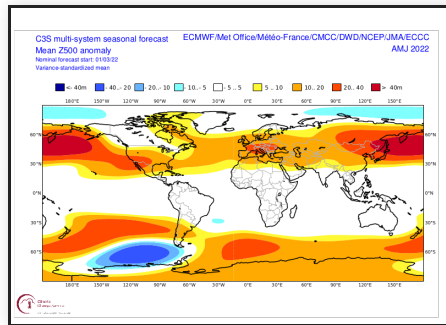
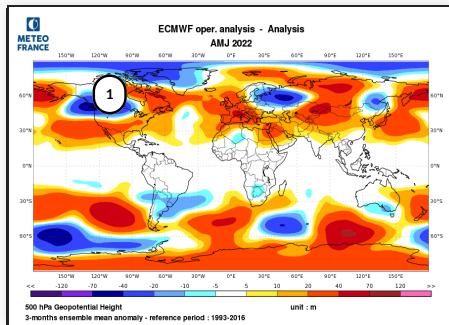


ECMWF analysis, MF-S8, ECMWF-SEASS, CMCC, DWD and JMA 200hPa velocity potential anomalies (color range, green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

Atmospheric circulation : 500hPa Geopotential height

In North America, the PNA- pattern, linked to "La Niña", is clearly visible in the analysis and also suggested by the models.

Over the North Atlantic, the positive anomaly extending from the US coast to Europe is globally predicted by the models. On the other hand, the negative anomaly over western Russia is not well predicted, barely suggested by some models (ECMWF or CMCC).



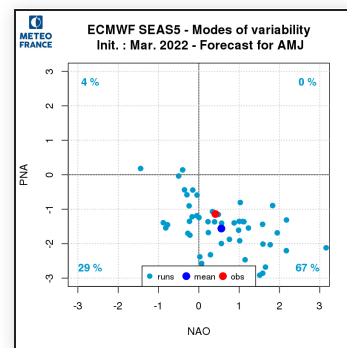
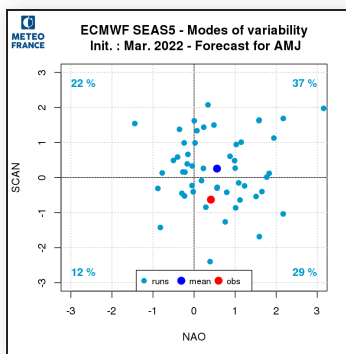
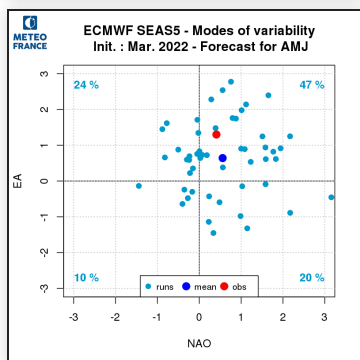
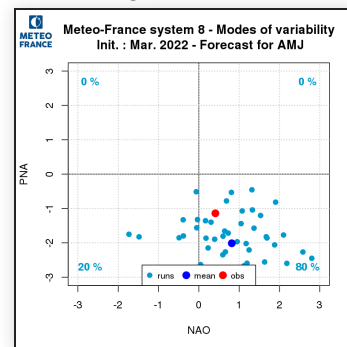
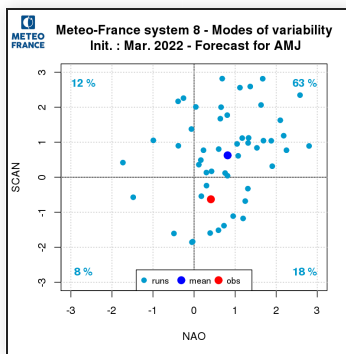
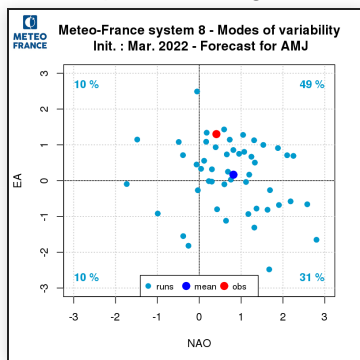
ECMWF analysis, C3S multi-system, MF-S8, ECMWF-SEAS5, CMCC and DWD 500hPa geopotential height anomalies.

1 - Look like PNA -

Atmospheric circulation : Modes of variability

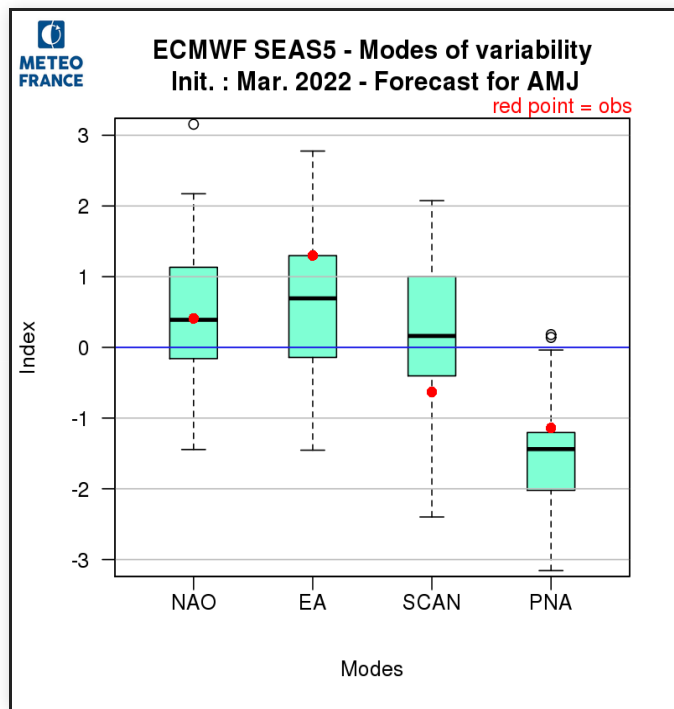
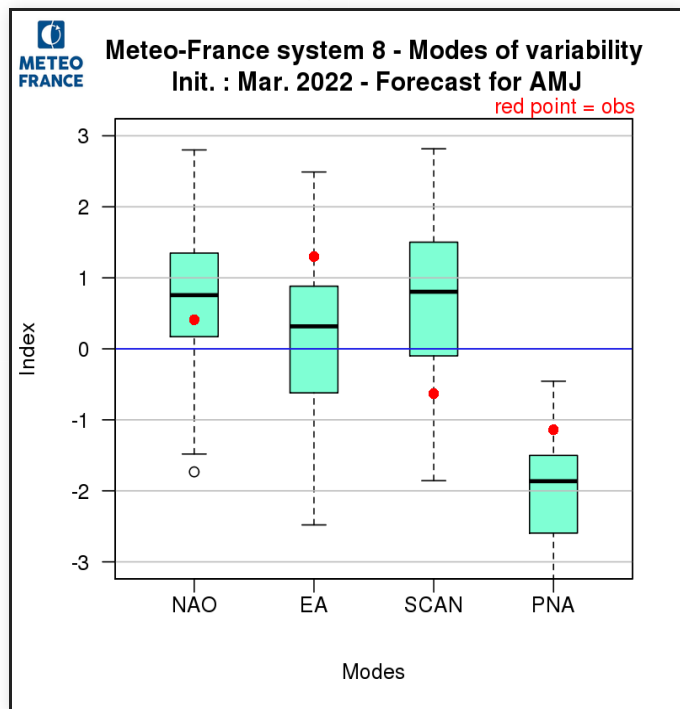
Neither model provides a negative SCAN mode.

Both models predicted a negative PNA and a positive NAO. However, ECMWF-SEA5 is closer to the analysis (e.g. positive EA).



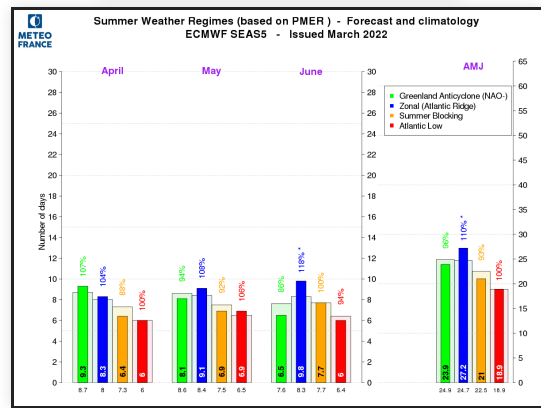
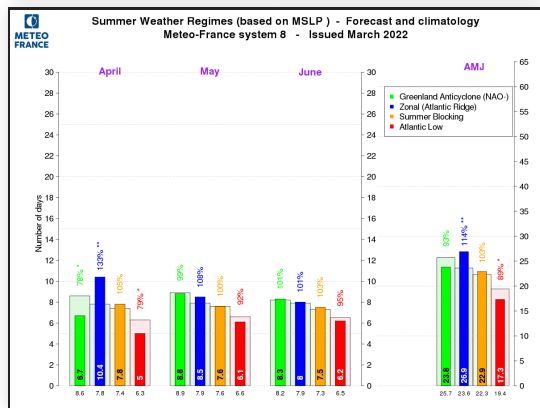
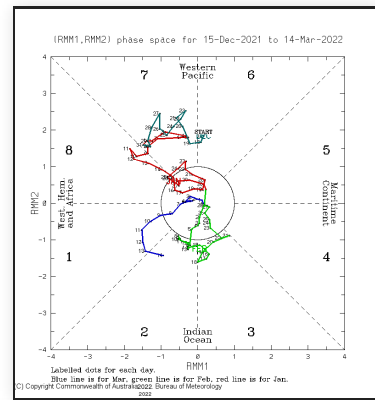
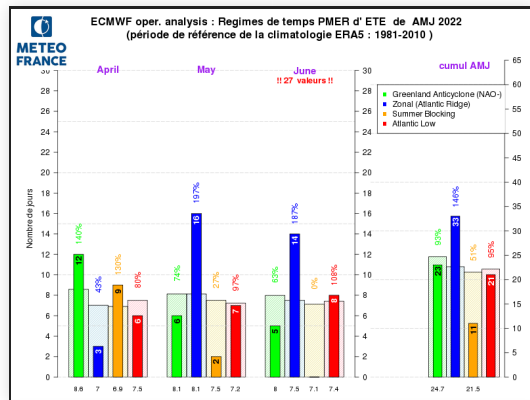
Atmospheric circulation : Modes verification

Same observation as for the previous slide



Atmospheric circulation : Summer SLP weather regimes

The Zonal regime clearly dominates over the quarter, which was suggested by both models. In contrast, the marked underrepresentation of the Summer Blocking regime was not seen by the models.

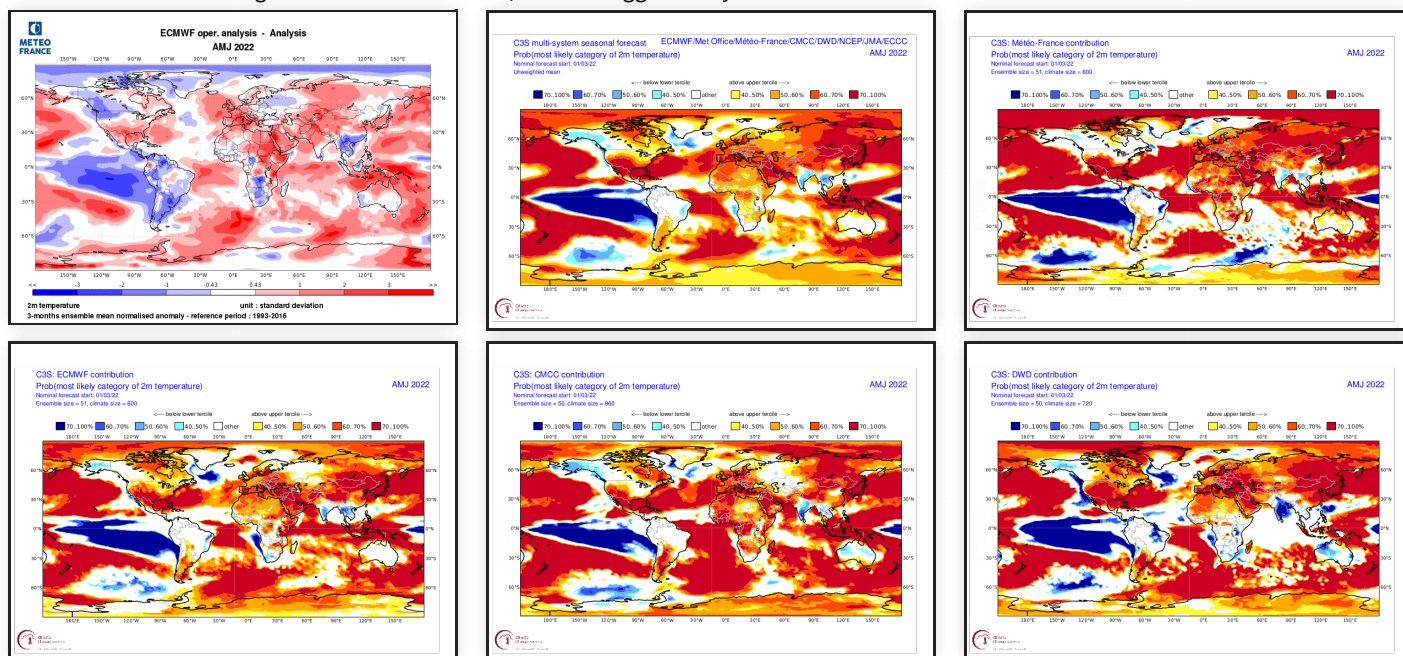


weather regime : ECMWF analysis top left, MF8 and ECMWF forecasts at the bottom. MJO phase top right

Climatic parameters : temperature on the globe

Between the tropics, the high probability areas were well predicted by the models.

In North America, the pattern is correct. Over Europe and Asia, the two cold anomalies over the West and the extreme East of Russia, in connection with the negative anomalies in Z500, are not suggested by the models.

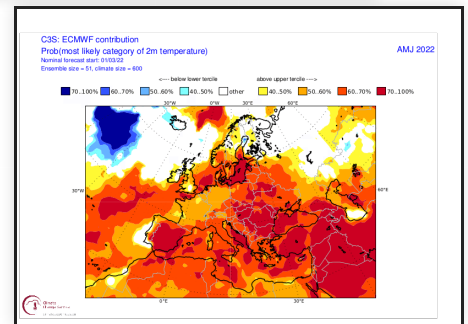
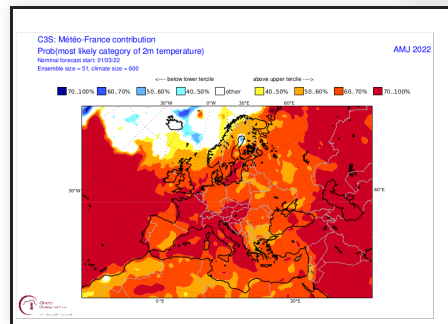
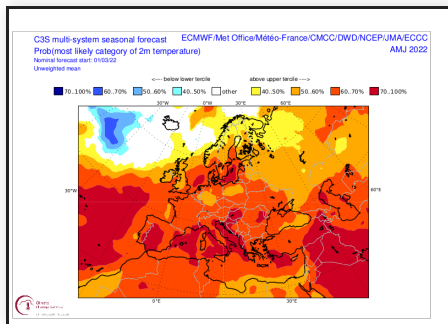
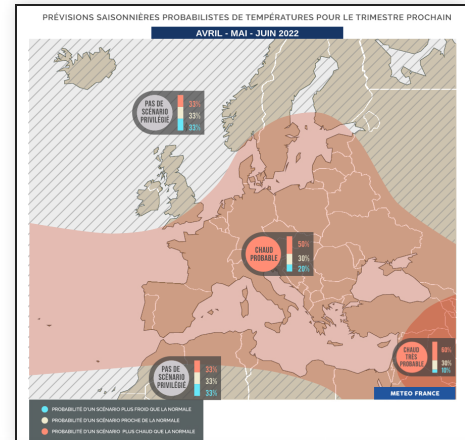
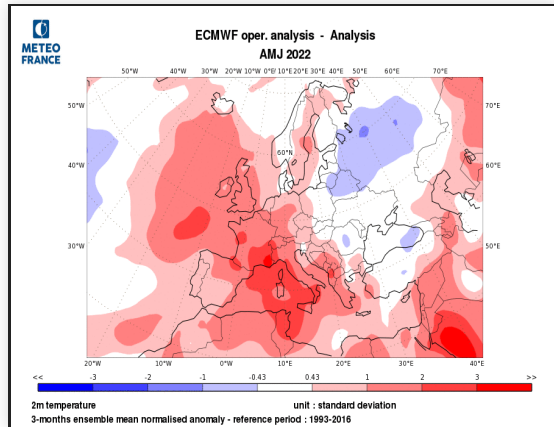


ECMWF analysis top left, forecast for multi-model top center and forecast for MF-S8 top right, ECMWF-SEASS, CMCC, DWD on the bottom line.

Climatic parameters : temperature over Europe

The warmer-than-normal scenario adopted for the Mediterranean Basin and the western three-quarters of continental Europe is validated by an observed mean temperature well above normal.

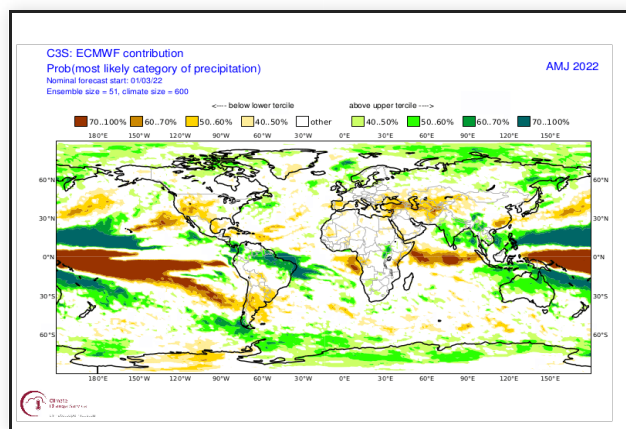
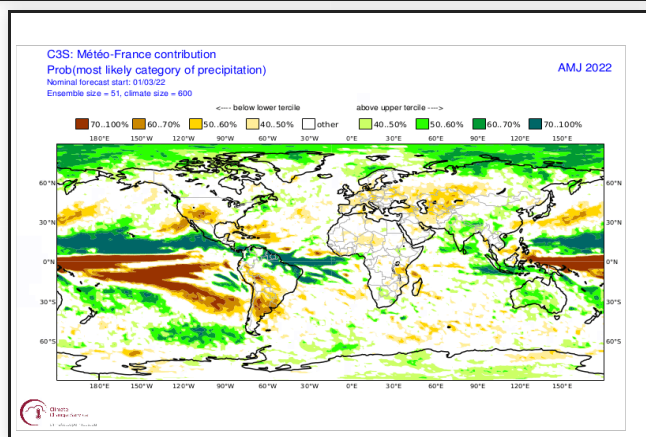
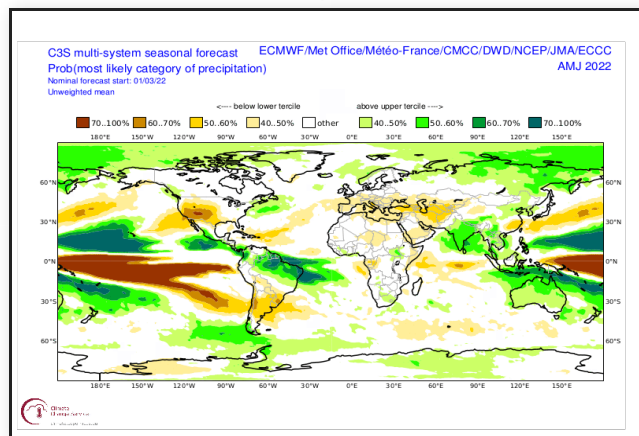
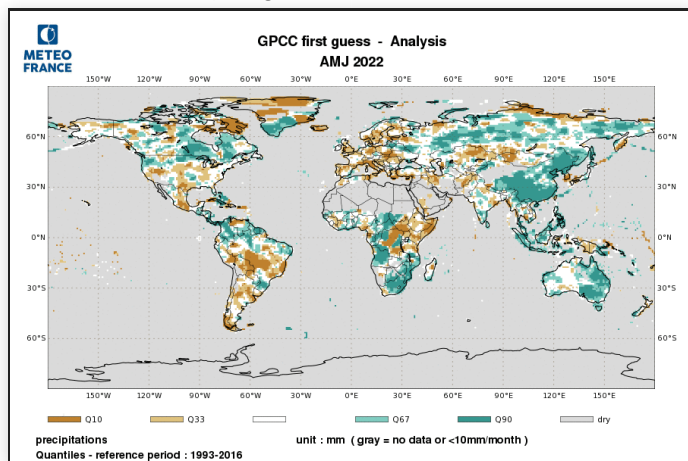
Only the conditions in eastern Europe do not correspond to the scenario adopted because of the minimum in Z500 which was not forecast.



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

The forecasts were quite good for South America, the Maritime Continent, Australia, East Asia and Europe.

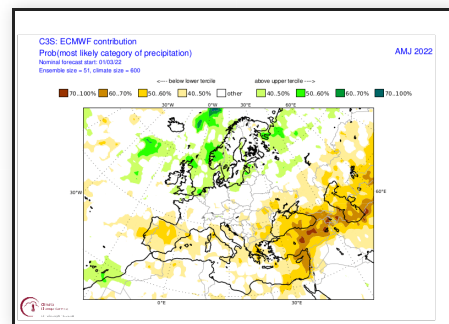
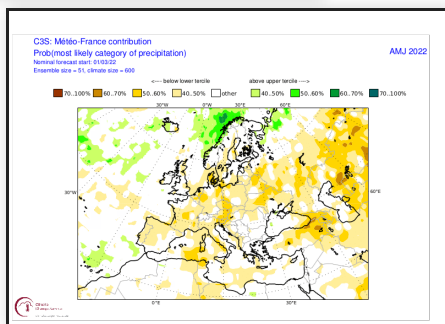
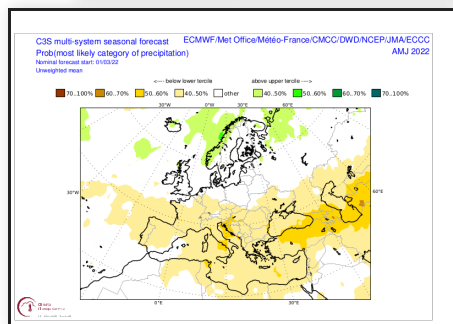
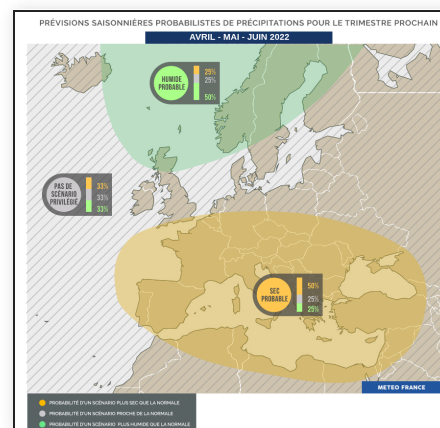
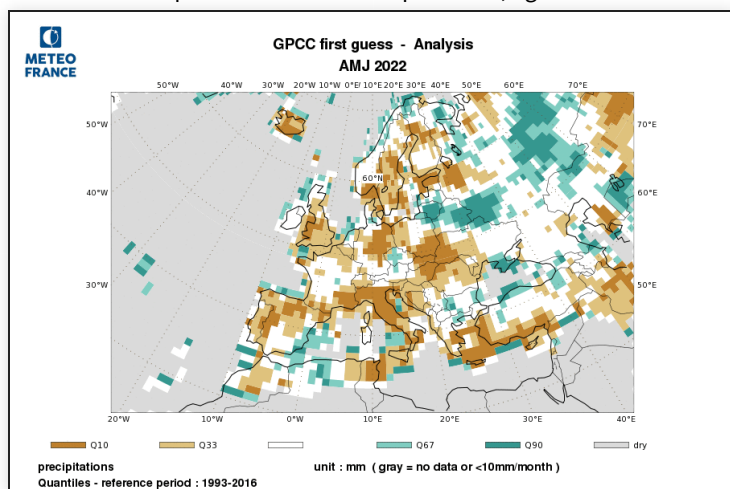


Standardized Precipitation Index analysed by IRI top left, forecast for multi-model top right and MF-S8 and SEAS5 on the bottom line.

Climatic parameters : Precipitations over Europe

The drier-than-normal scenario forecast from the Mediterranean regions to Central Europe is relevant.

On the other hand, the wetter-than-normal area is not well positioned. It is forecast over Scandinavia, but is located in the analysis over western Russia up to the Black and Caspian Seas, again due to the Z500 anomaly not forecast over this area.



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 AMJ 2022

1) Oceans :

The main SST anomalies were well predicted by the models, in the Pacific Ocean (linked to "La Niña" and PDO-) but also in the Atlantic and Indian Oceans.

The forecast of the evolution of the different ocean indexes is correct overall, with one exception: ECMWF-SAE5 did not anticipate the persistence of the "La Niña" phenomenon as summer approaches.

2) Large scale atmospheric circulation :

VP 200 hPa : The forecast is good for the Pacific and Indian Oceans and are characteristic of "La Niña". In the Equatorial Atlantic, the upward motion anomaly related to the positive SST anomaly has been well observed and forecast.

SF 200 hPa : The equatorial dipoles have been well planned, as well as the teleconnections on the Pacific Ocean. The teleconnections over the Atlantic Ocean suggested by some models are not verified by the analysis.

Z500 : The forecasts are globally correct, although some smaller scale negative anomalies were not anticipated.

3) Climatic parameters over Europe :

Temperatures :The suggested scenario is correct for Western Europe. This is not the case for the Eastern European countries, due to one of those smaller scale anomalies mentioned above not being foreseen.

Precipitations : The drier scenario expected over most of Europe is well forecast. As for temperatures, conditions in Eastern Europe have been poorly anticipated.