

VERIFICATION BULLETIN

AUGUST - SEPTEMBER - OCTOBER 2021

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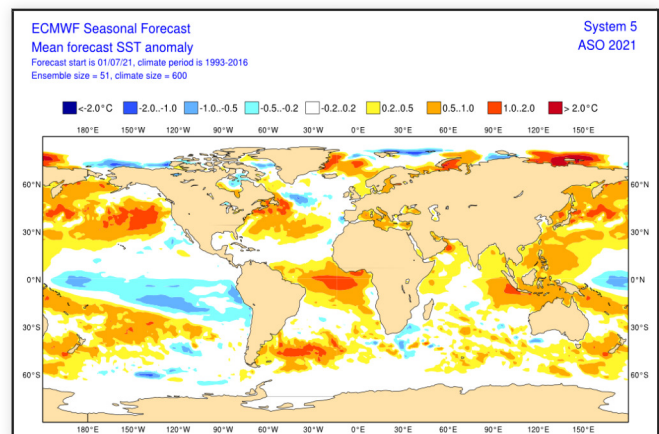
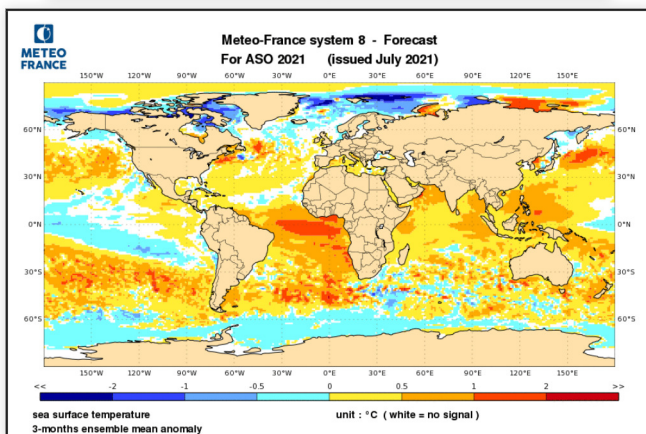
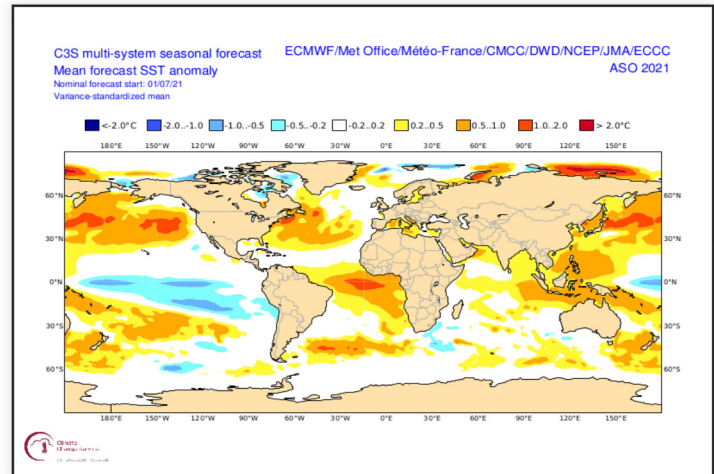
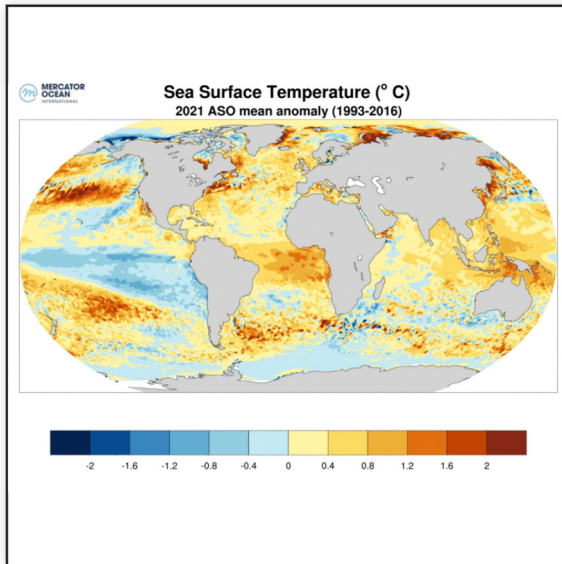
Introduction : Objective

- 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 tropical areas, good forecast of the main anomalies, even if models tend to underestimate the extension and the intensity of La Niña in the Eastern part of the equatorial Pacific.

At mid-latitudes, the main patterns were well forecasted. The forecast of MF-S8 was too cold in the North Atlantic up to the Arctic.

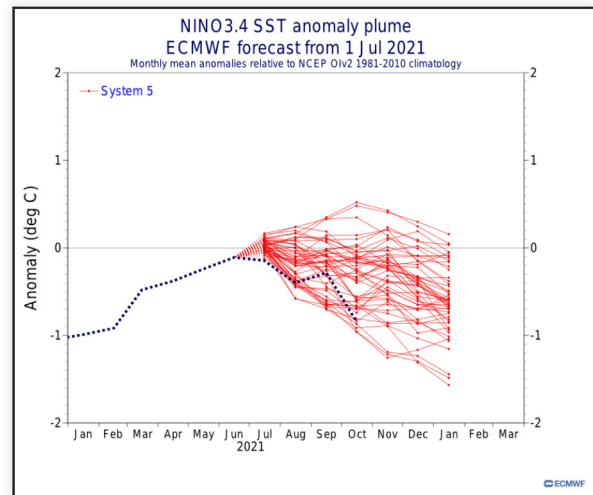
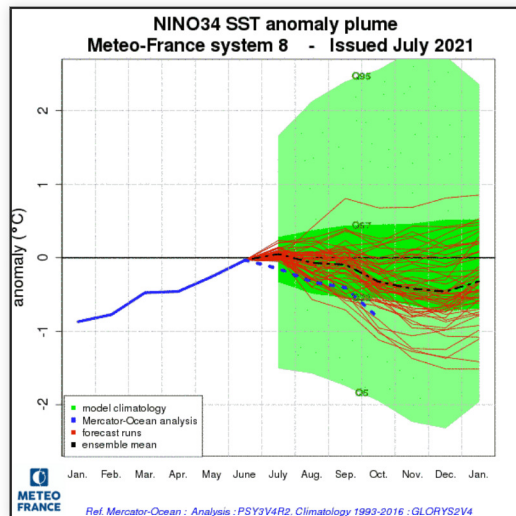


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S7 (bottom left) and SEAS5 (bottom right)

Oceans : ENSO

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

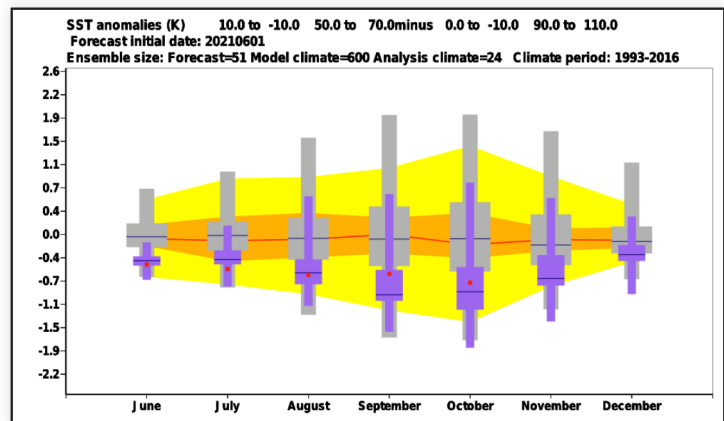
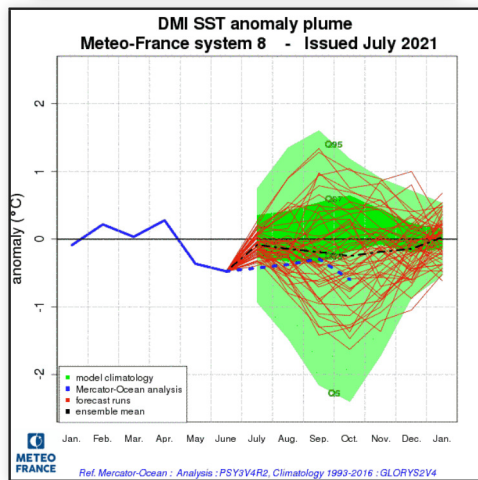
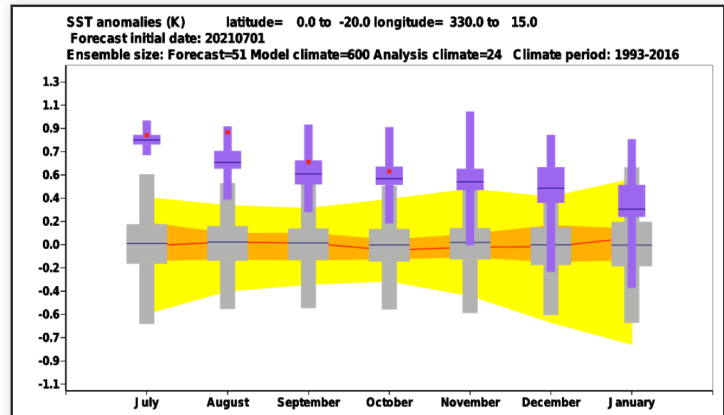
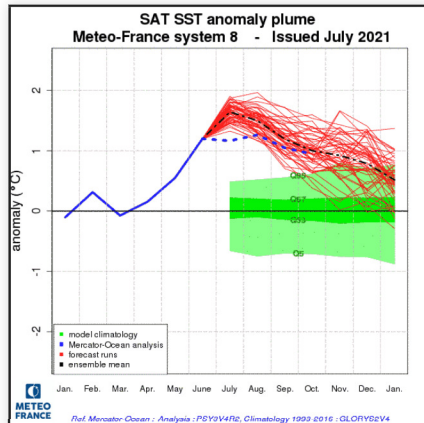
The forecasts of the two models were not cold enough. Anyway the analyses are in the spread of the probabilistic forecast.



Oceans : tropical Atlantic and Indian Ocean index

SAT : The negative trend was well anticipated.

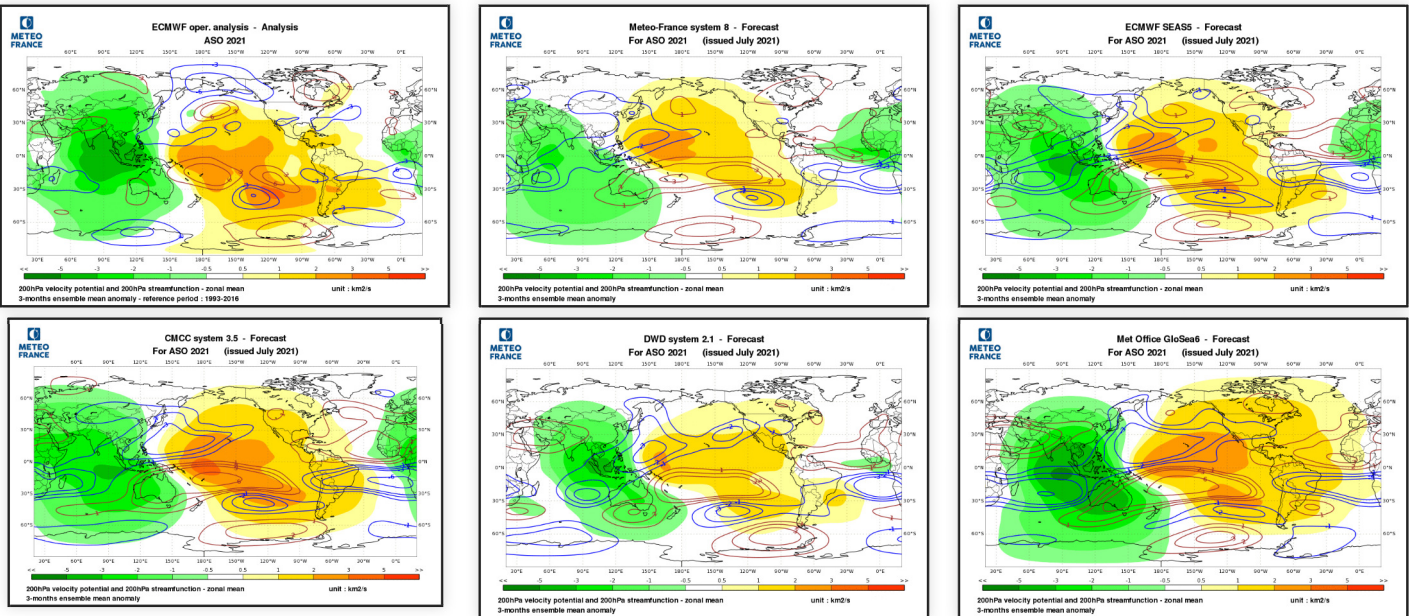
DMI : Both models had a majority of their run in the negative side. But the spread of MF-S8 was very large, compared to ECMWF-S5.



Atmospheric circulation : Global teleconnection

VP : very good forecast. The upward anomaly centred over the Indian Ocean extended to Africa and the downward anomaly over Pacific Ocean extended to the southern America, associated to La Niña, were globally well predicted.

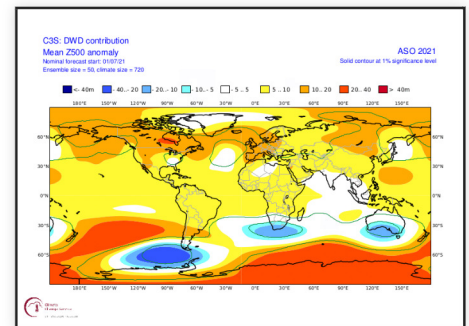
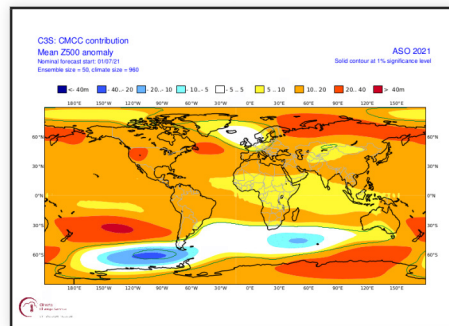
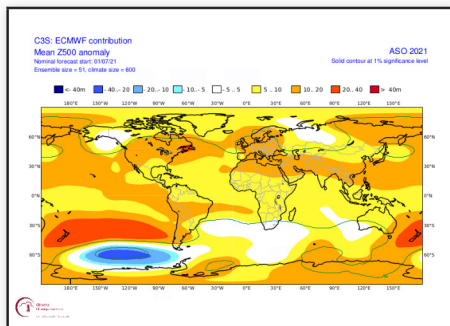
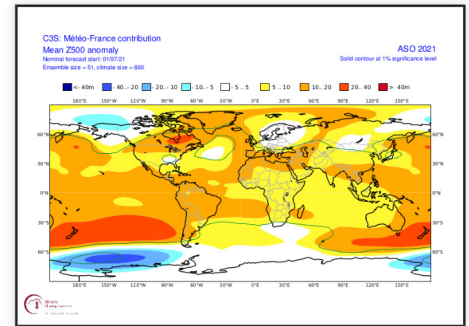
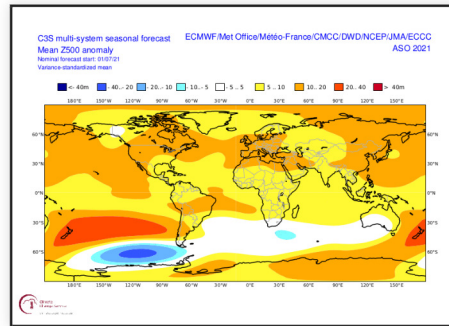
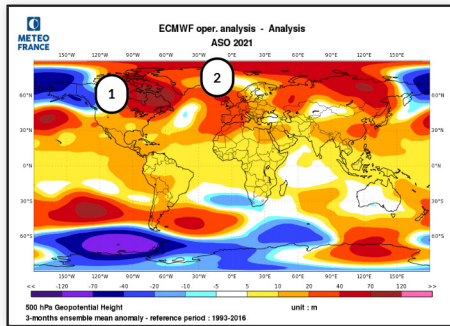
SF : no organised pattern of SF anomaly.



ECMWF analysis, MF-S7, 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

At mid-latitude in the northern hemisphere, the pattern of Z500 anomalies is very complex. The models suggested a succession of positive and neutral anomalies, but were not in phase. DWD and maybe MF-S8 were the closest to the reanalysis..

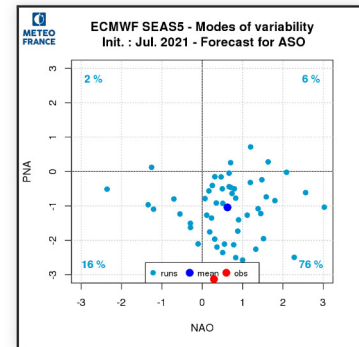
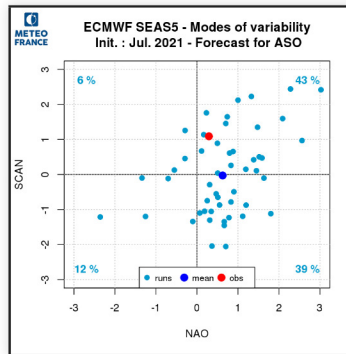
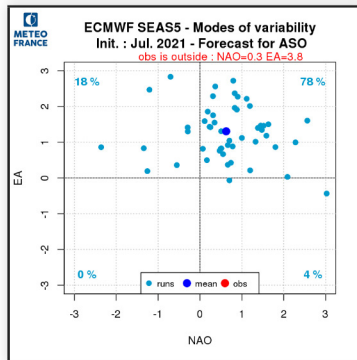
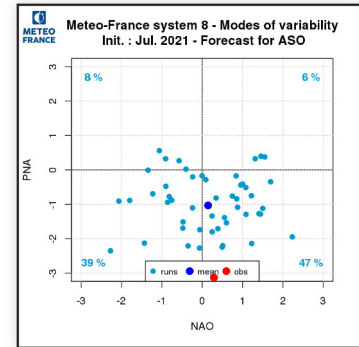
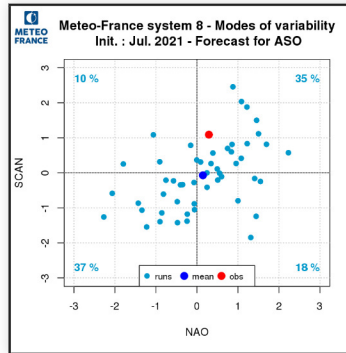
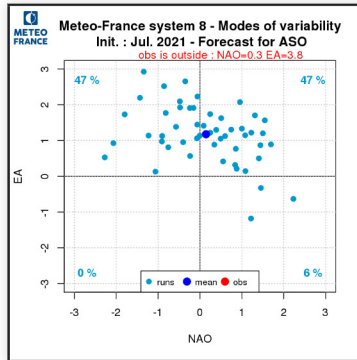


ECMWF analysis, C3S multi-system, MF-S7, ECMWF-SEASS, CMCC and DWD 500hPa geopotential height anomalies.

- 1 - Look like PNA- shift eastward
- 2 - strong positive anomaly

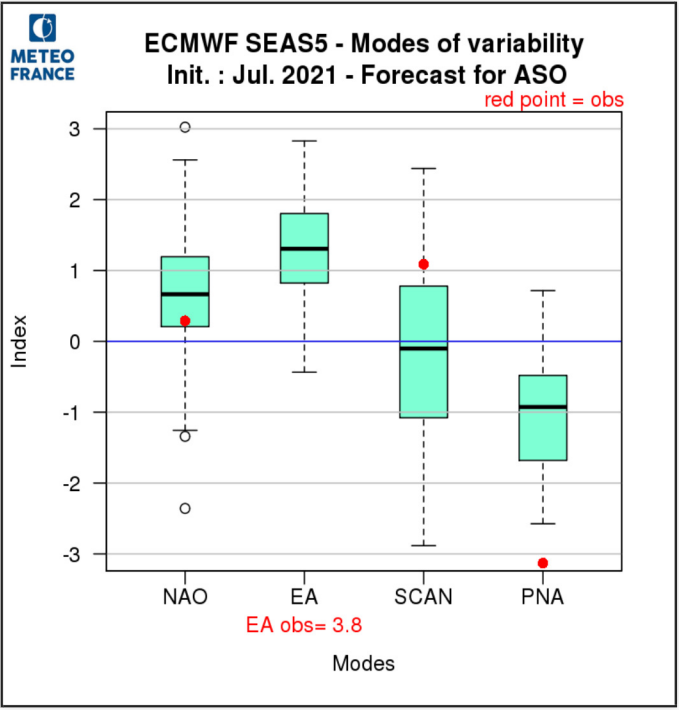
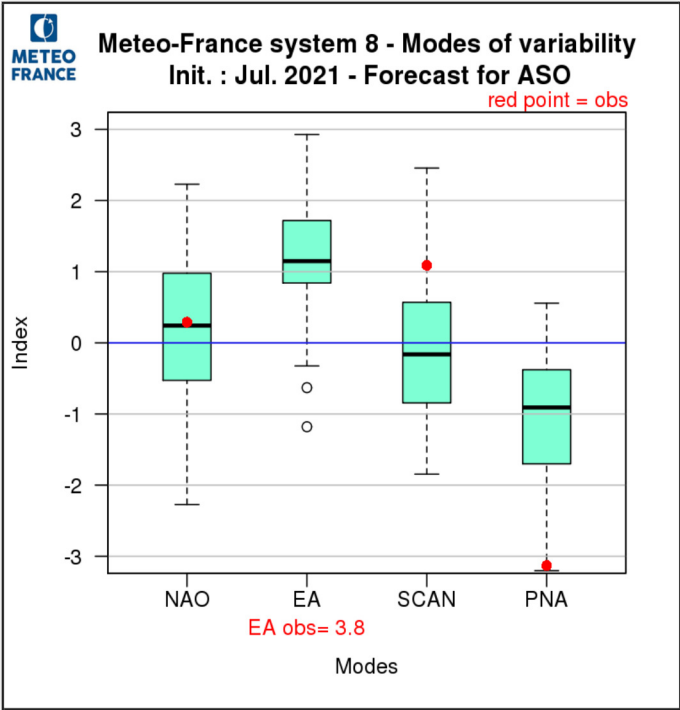
Atmospheric circulation : Modes of variability

The signs of the modes of variability ($EA > 0$, $PNA < 0$, $NAO \sim 0$) were correctly forecasted.



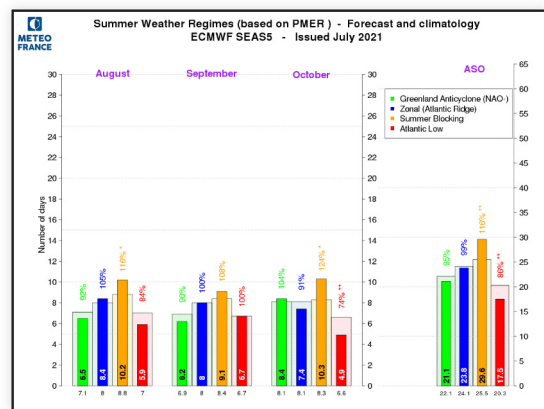
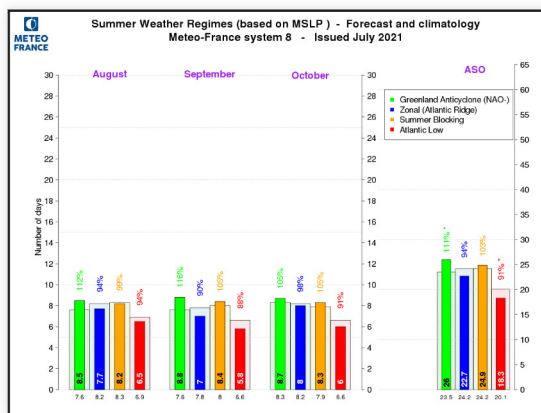
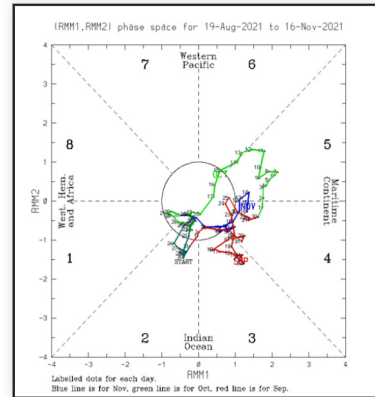
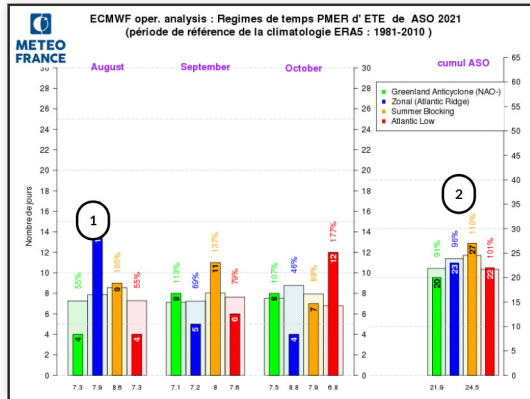
Atmospheric circulation : Modes verification

Same observation as for the previous slide



Atmospheric circulation : Summer SLP weather regimes

Strong intra-seasonal variability. But at seasonal scale, regime frequencies are close to normal.



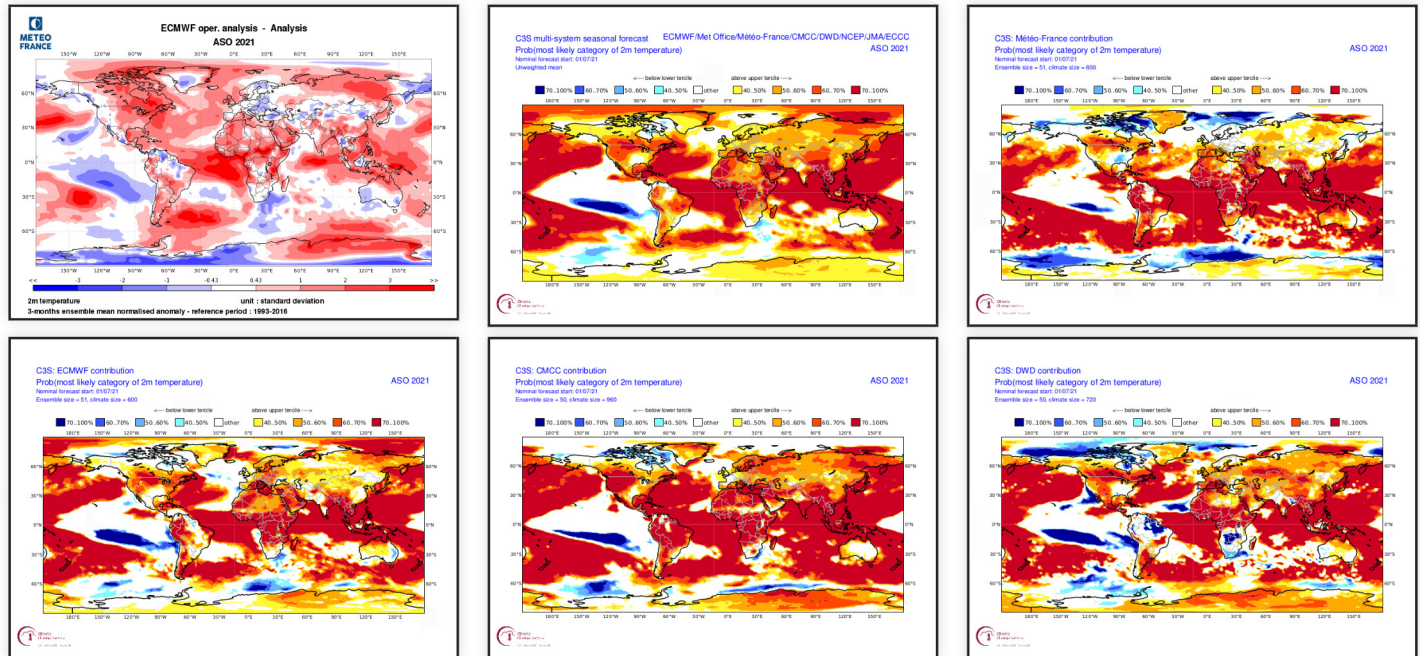
weather regime : ECMWF analysis top left, MF7 and ECMWF forecasts at the bottom. MJO phase top right

- 1 - very strong predominance of the zonal regime in August
- 2 - Close to climatology

Climatic parameters : temperature on the globe

The main anomalies over North and South America, Africa, Oceania and south of Asia were well forecasted.

Over the rest of Asia, a large band from Central Europe to China (in th cold tercile) was not forecasted.



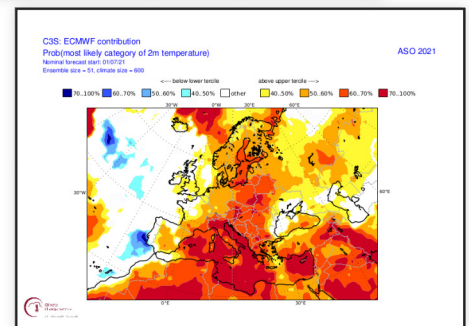
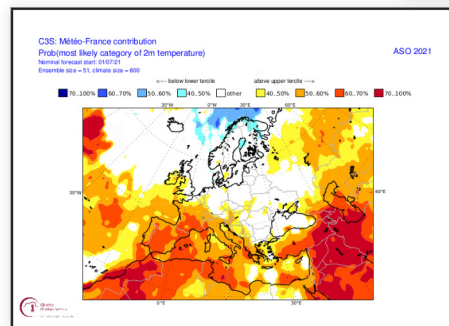
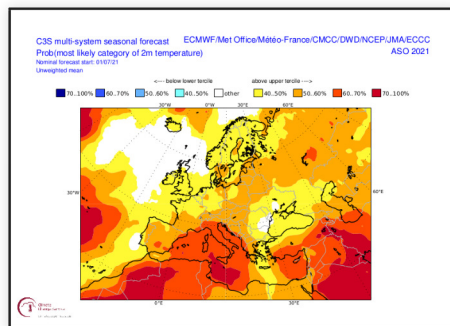
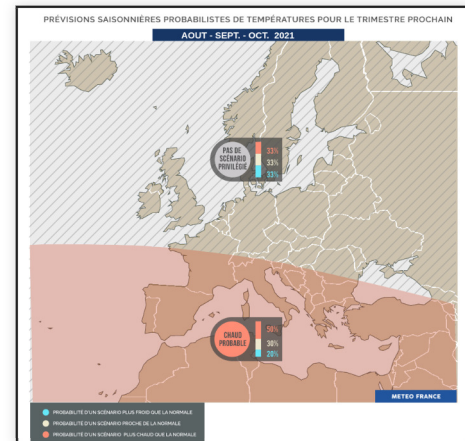
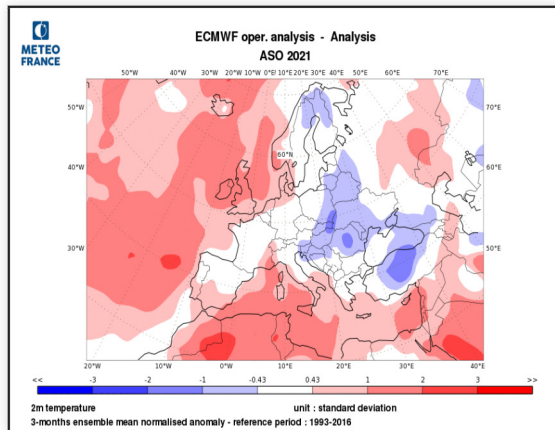
ECMWF analysis top left, forecast for multi-model top center and forecast for MF-S7 top right, ECMWF-SEAS5, CMCC, DWD on the bottom line.

Climatic parameters : temperature over Europe

Over Europe, anomalies were neutral or in the colder tercile (Central and East Europe). MF-S8 had the best forecast compared to ECMWF and C3S multi-model.

Over the Mediterranean Basin, there was closer to normal conditions.

The synthesis map only highlighted an enhanced probability for the warm scenario on the South of the domain, this signal was globally correct.

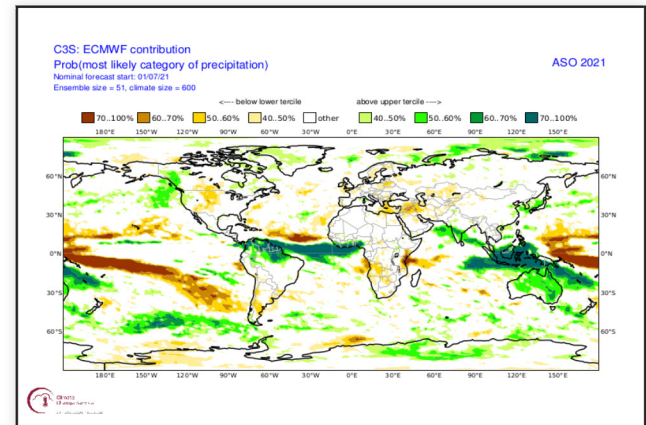
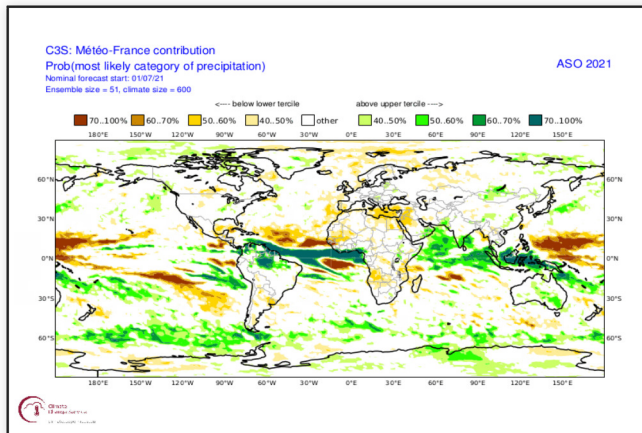
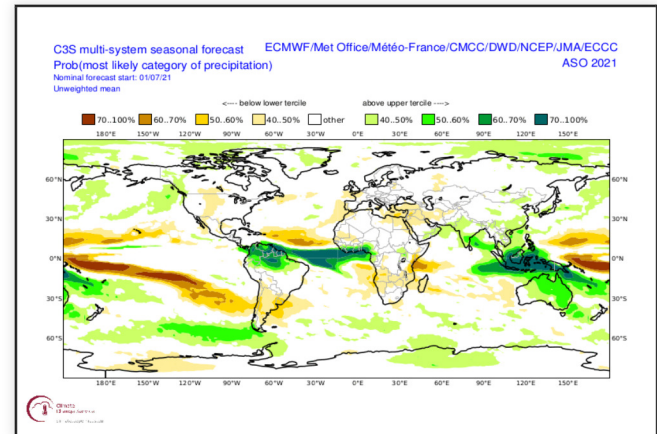
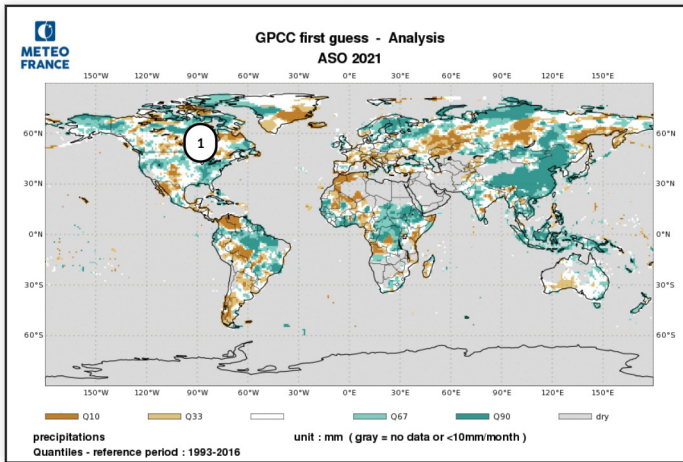


ECMWF analysis top left, synthetic forecast map top right. Forecast for multi-system, MF-S7 and SEAS5 on the bottom line.

Climatic parameters : Precipitations over the globe

Quite good forecast near equator.

At mid-latitudes, the signals were very weak in the forecasts.



Standardized Precipitation Index analysed by IRI top left, forecast for multi-model top right and MF-S7 and SEASs on the bottom line.

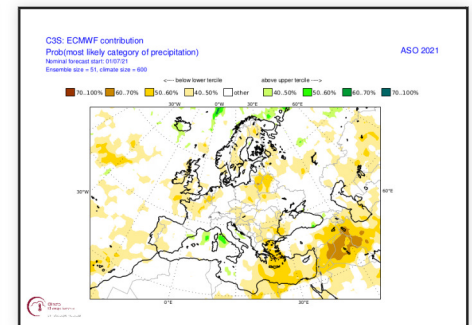
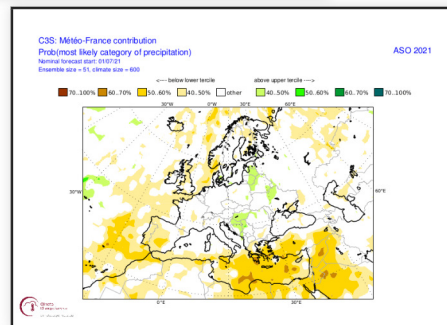
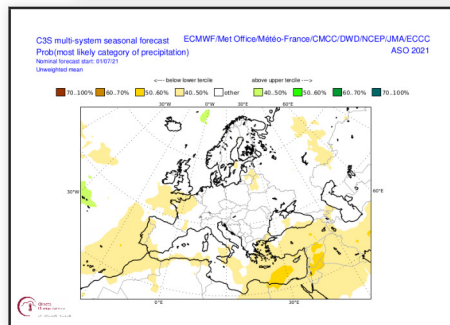
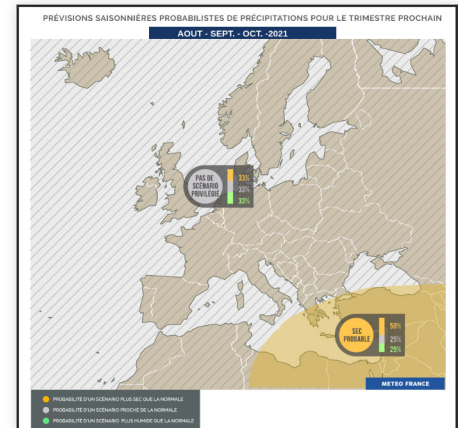
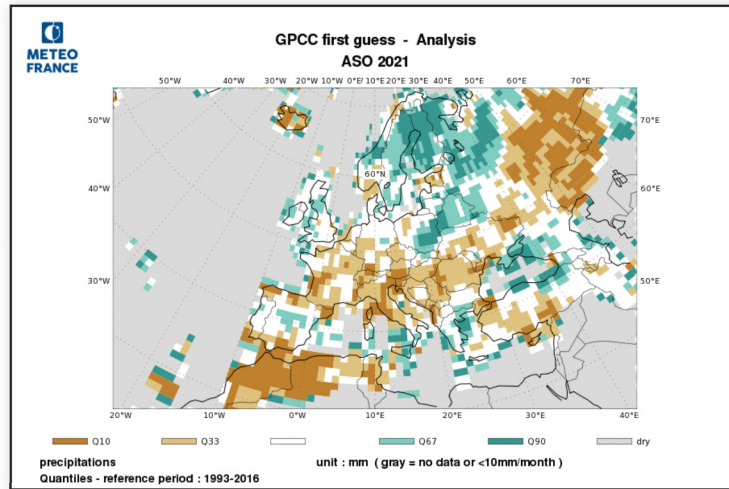
1 - Unusual precipitation forecast for a La Niña situation, due too a shift in the main circulation patterns.

Climatic parameters : Precipitations over Europe

Dry conditions in many countries in Europe, except in the North (British Isles, Scandinavia, Baltic countries).

Models didn't forecast these patterns.

The only conclusive signal was located on the far eastern Mediterranean Sea, and had been opportunely drawn on the synthesis map.



Precipitation anomalies analysed by IRI (top left). Synthetic forecast map for precipitation (top right) and forecast for multi-model, MF-S7 and SEAS5 (on the bottom line).

General summary : for the period ASO 2021

1) Oceans :

The main patterns were well predicted by models. Correct forecast of ENSO evolution, although underestimated.

2) Large scale atmospheric circulation :

VP 200 hPa : the main patterns were very well forecasted.

SF 200 hPa : weak signal in the reanalysis and in the forecast

Z500 : complex pattern, in the northern hemisphere, some models forecasted quite correctly the anomalies but the C3S multi-model mean was not contrasted enough enough to give relevant information

3) Climatic parameters over Europe :

Temperatures : normal or cold over the European continent (not clearly forecasted by models) and warm on the Medit. Basin (well forecasted).

Precipitations : no clear information in the models about the dry signal observed in many countries. Not better concerning the wet anomaly over Scandinavia and around.