

VERIFICATION BULLETIN

SEPTEMBER - OCTOBER - NOVEMBER 2021

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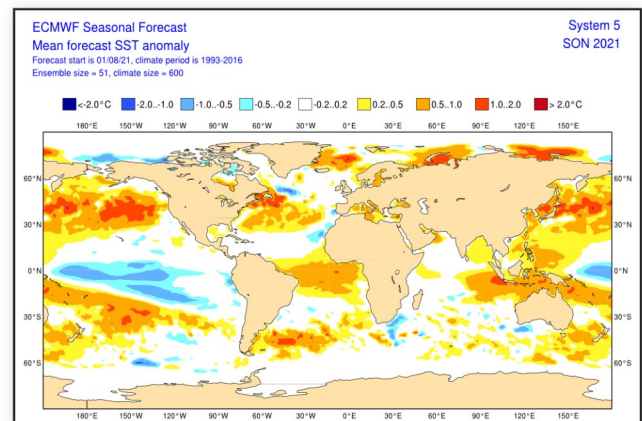
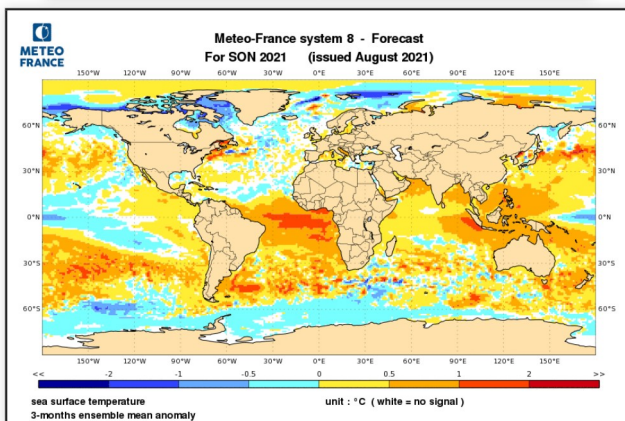
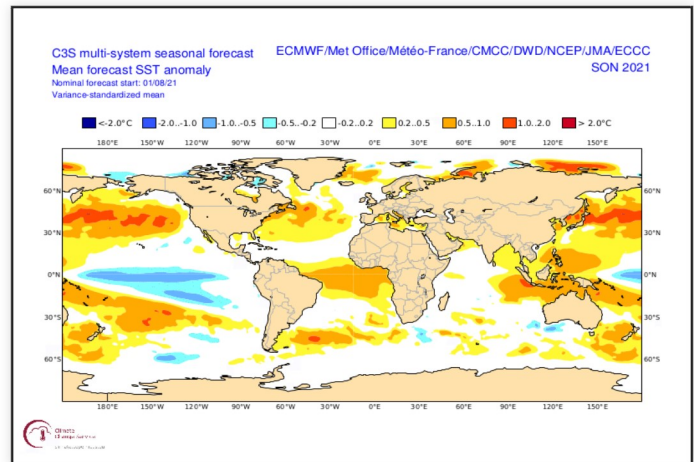
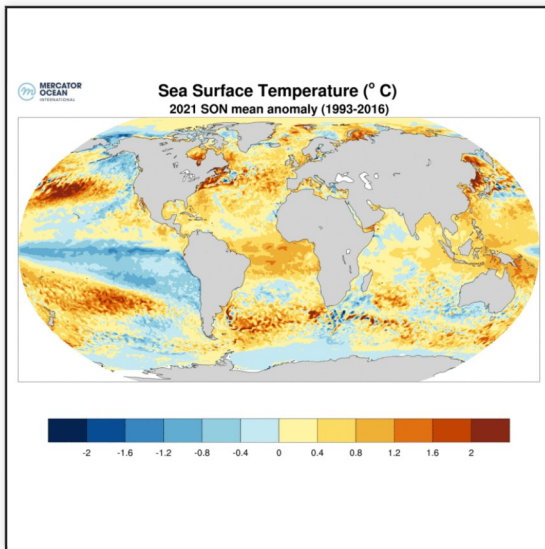
Introduction : Objective

- 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, especially with MF8

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 and not hot enough on the North Pacific.

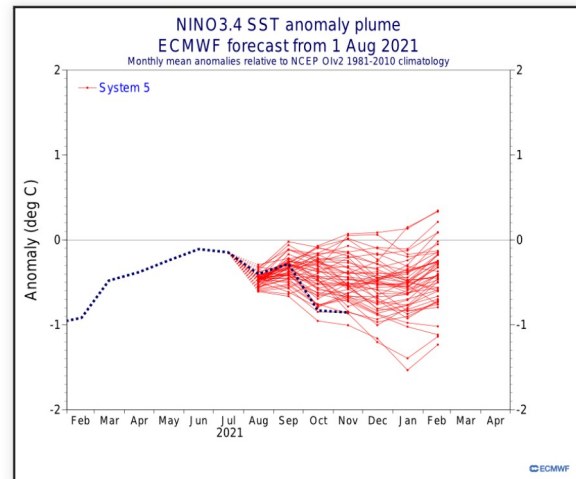
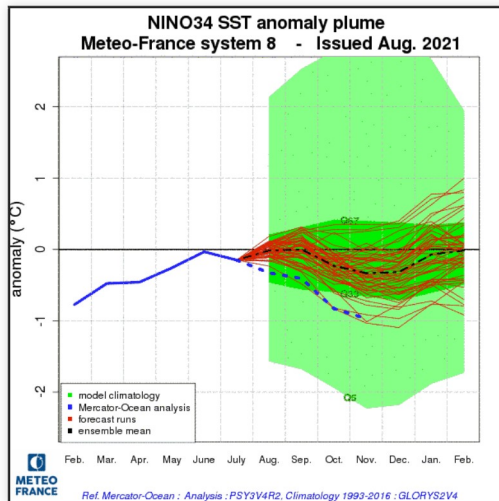


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S7 (bottom left) and SEAS5 (bottom right)

Oceans : ENSO

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

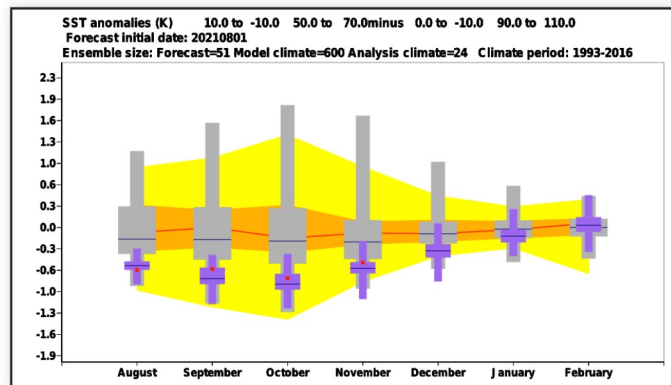
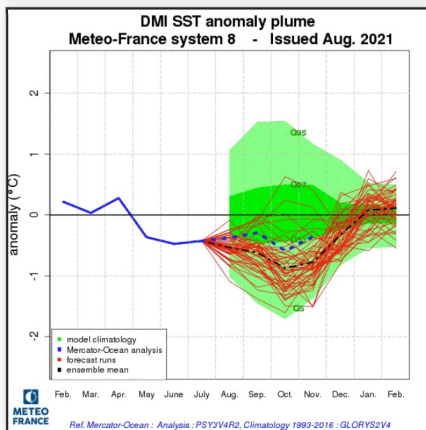
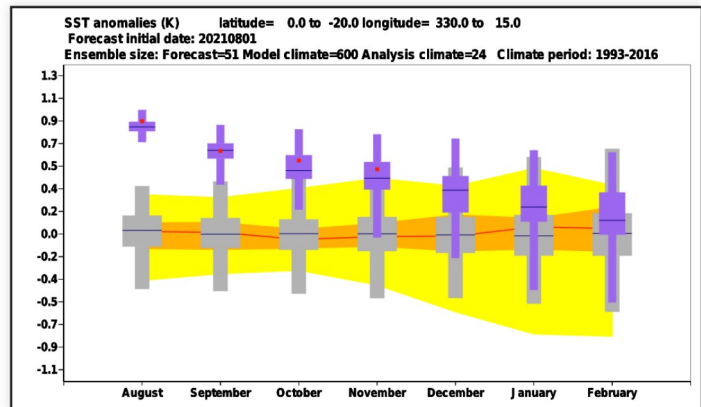
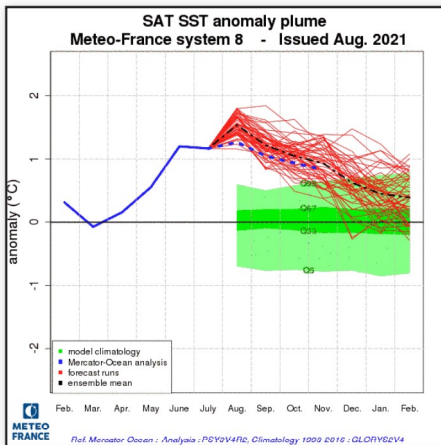
The forecasts of the two models were not cold enough. Anyway the analyses are in the spread of the probabilistic forecast.



Oceans : tropical Atlantic and Indian Ocean index

SAT : The negative trend was well anticipated.

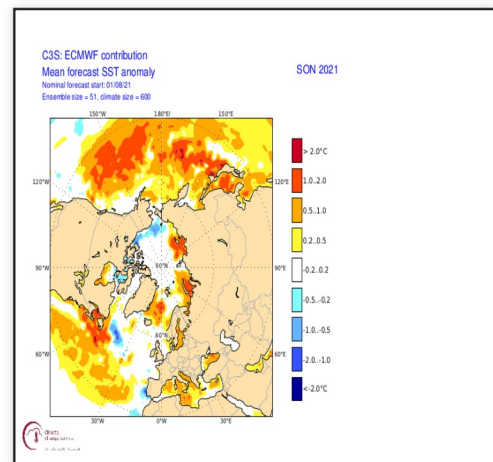
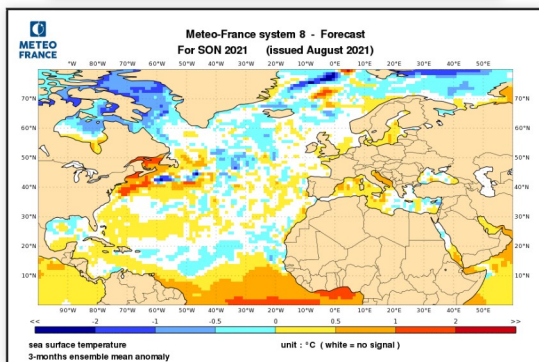
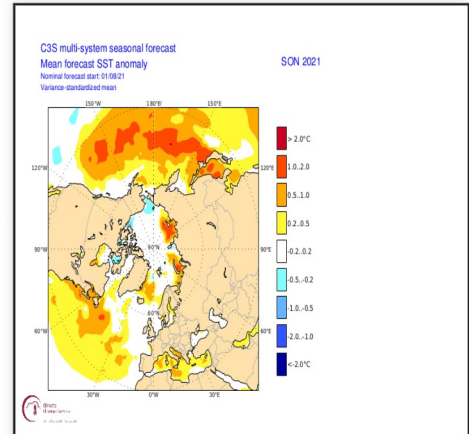
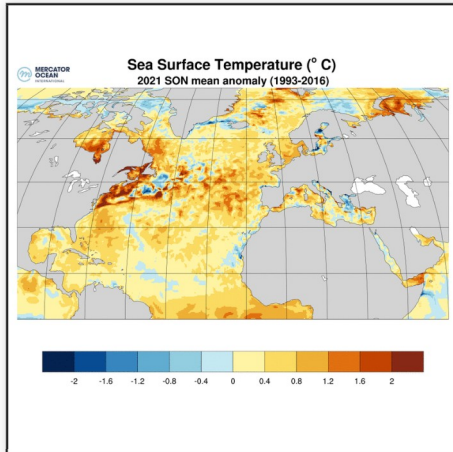
DMI : The forecast of this index in the lower tercile of climatology was well predicted.



Oceans : North Atlantic SST

The strong positive anomaly in the western part of the Ocean (close to North America) is correct, as well as the warm anomaly extending from Florida to Spain.

At high latitudes (north of 50N) MF8 is too cold.

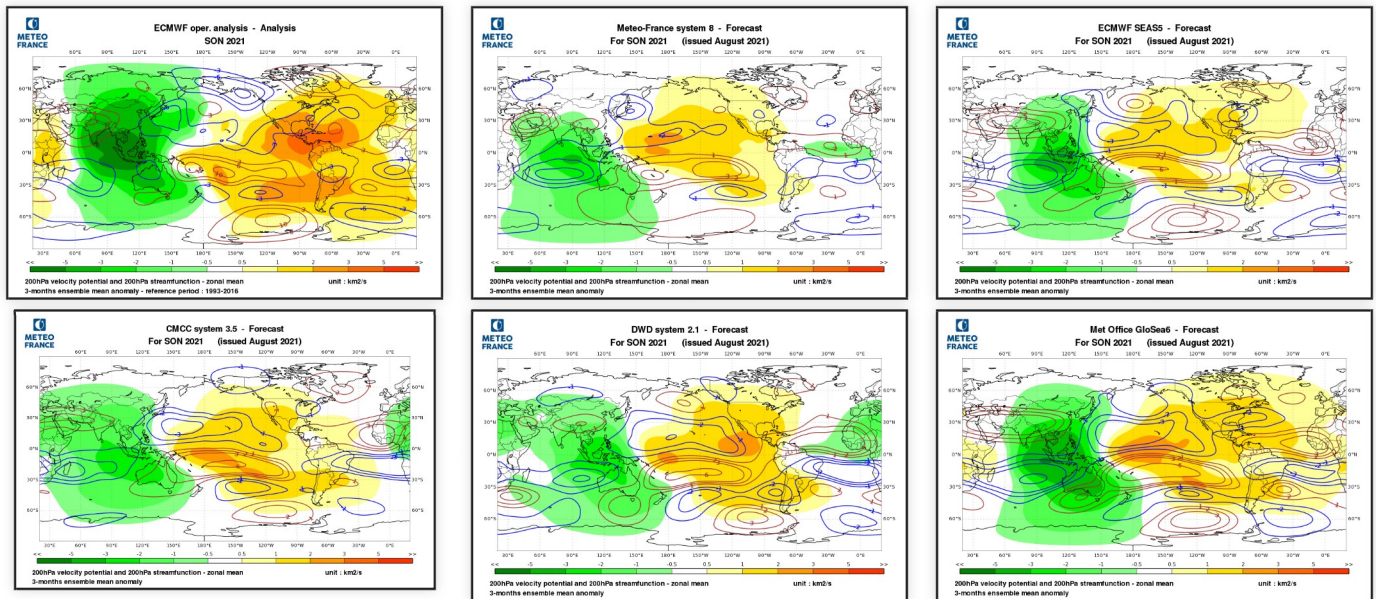


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S7 (bottom left) and ECMWF SEAS5 (bottom right)

Atmospheric circulation : Global teleconnection

VP : Good forecast on a global scale. The upward anomaly centred over the eastern Indian Ocean and the downward anomaly over Pacific Ocean extended to the southern America, associated to La Niña and the negative phase of IOD, were globally well predicted. The observed downward over Africa were not predicted by the models except by GlobSea6.

SF : The three dipoles around the equator on the main oceans were well forecasted as well as the teleconnections to southern Pacific and the Atlantic. At temperate latitude of the northern hemisphere, stream function are not organized.

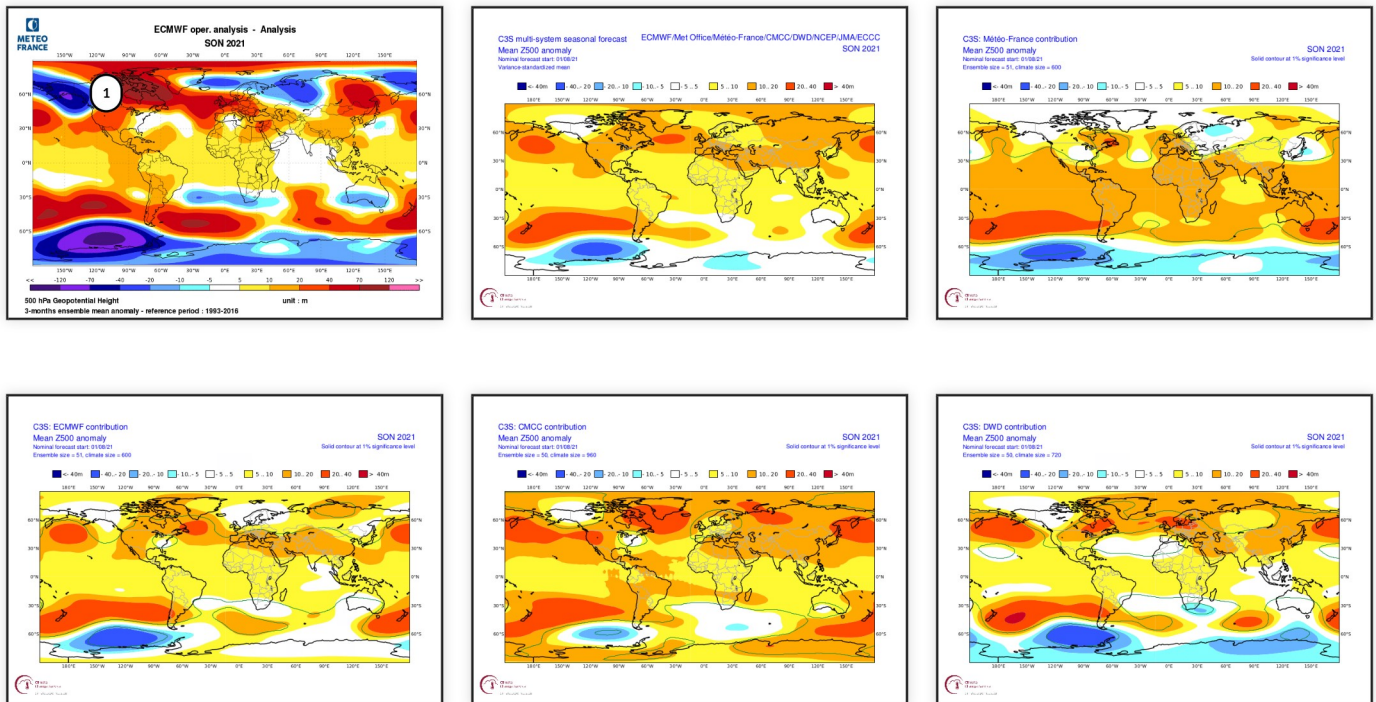


ECMWF analysis, MF-S7, ECMWF-SEAS5, CMCC, DWD and JMA 200hPa velocity potential anomalies (color range, green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

Atmospheric circulation : 500hPa Geopotential height

From the north Pacific to the north America the negative phase of the PNA was well forecasted.

The positive anomaly over the North Atlantic and negative from the north of Iceland to the west of Russia were well suggested by the multi-model.

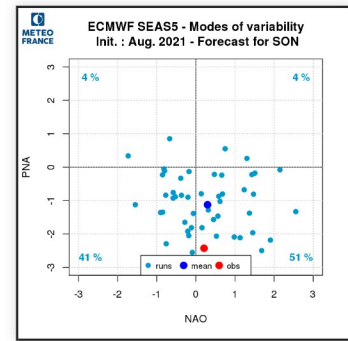
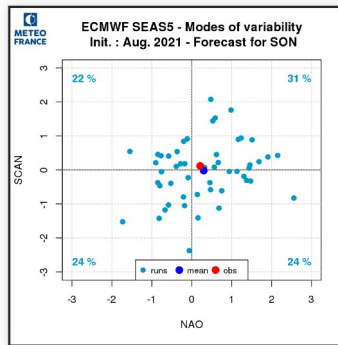
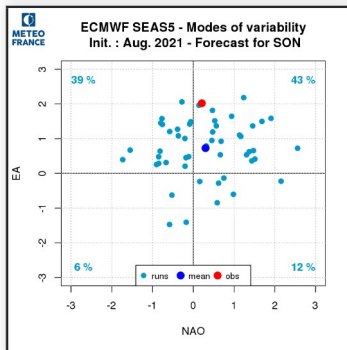
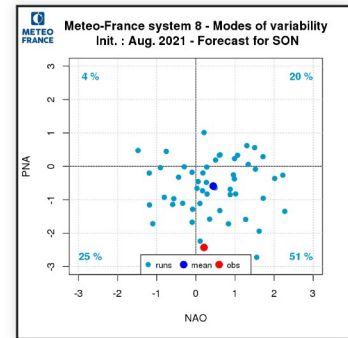
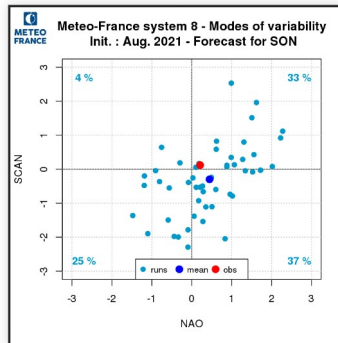
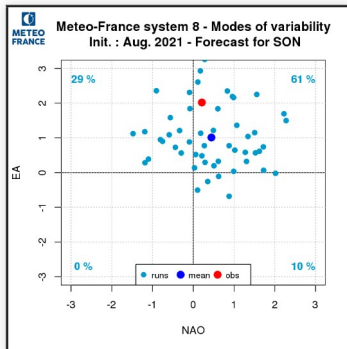


ECMWF analysis, C3S multi-system, MF-S7, ECMWF-SEAS5, CMCC and DWD 500hPa geopotential height anomalies.

1 - Look like PNA -

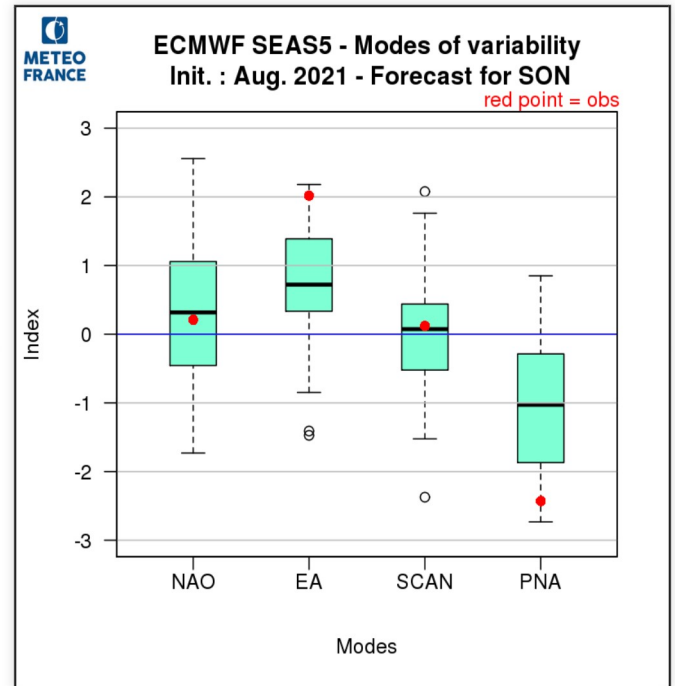
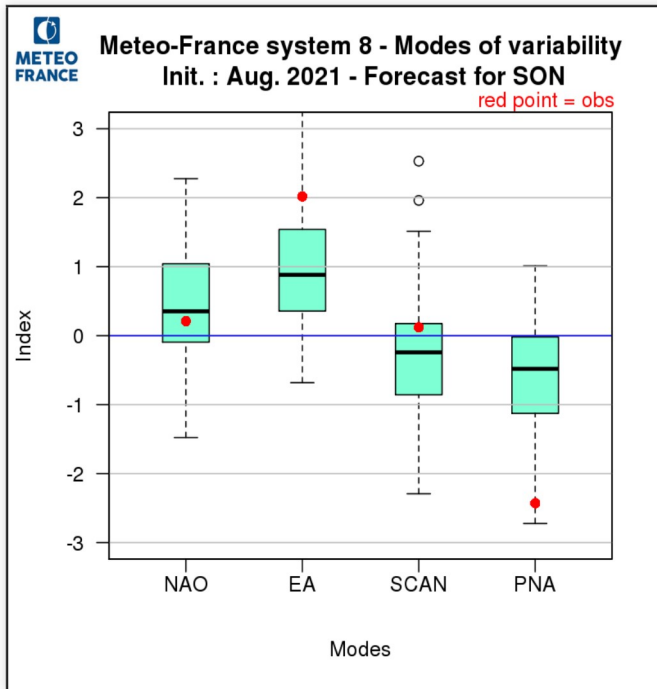
Atmospheric circulation : Modes of variability

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



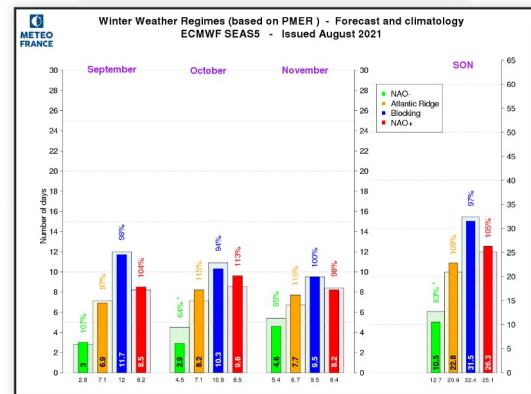
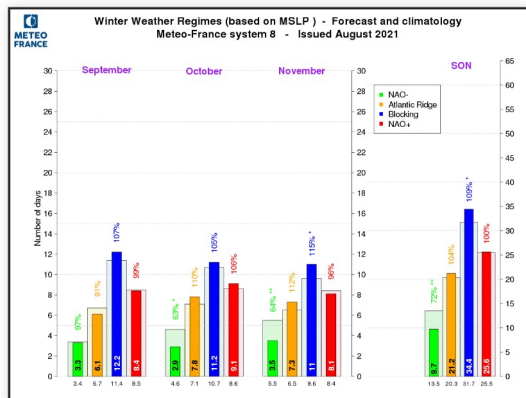
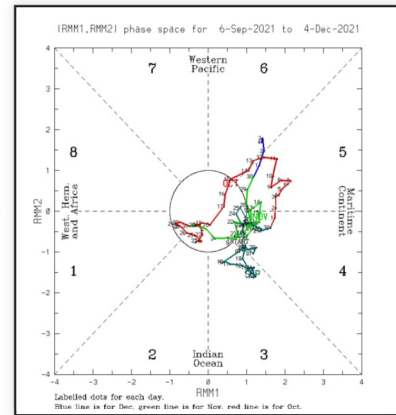
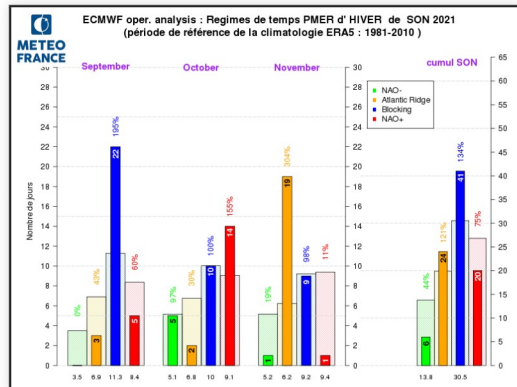
Atmospheric circulation : Winter SLP weather regimes

Strong intra-seasonal variability.

The deficit of the nao - regime is rather well forecasted while the excedent of the blocking is suggested by MF8 and that of the atlantic ridge by SEAS5.

It could be noted that the often active MJO between phases 3 to 6 may have favoured Blocking and Atlantic-Ridge regimes

<https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2019GL084683>

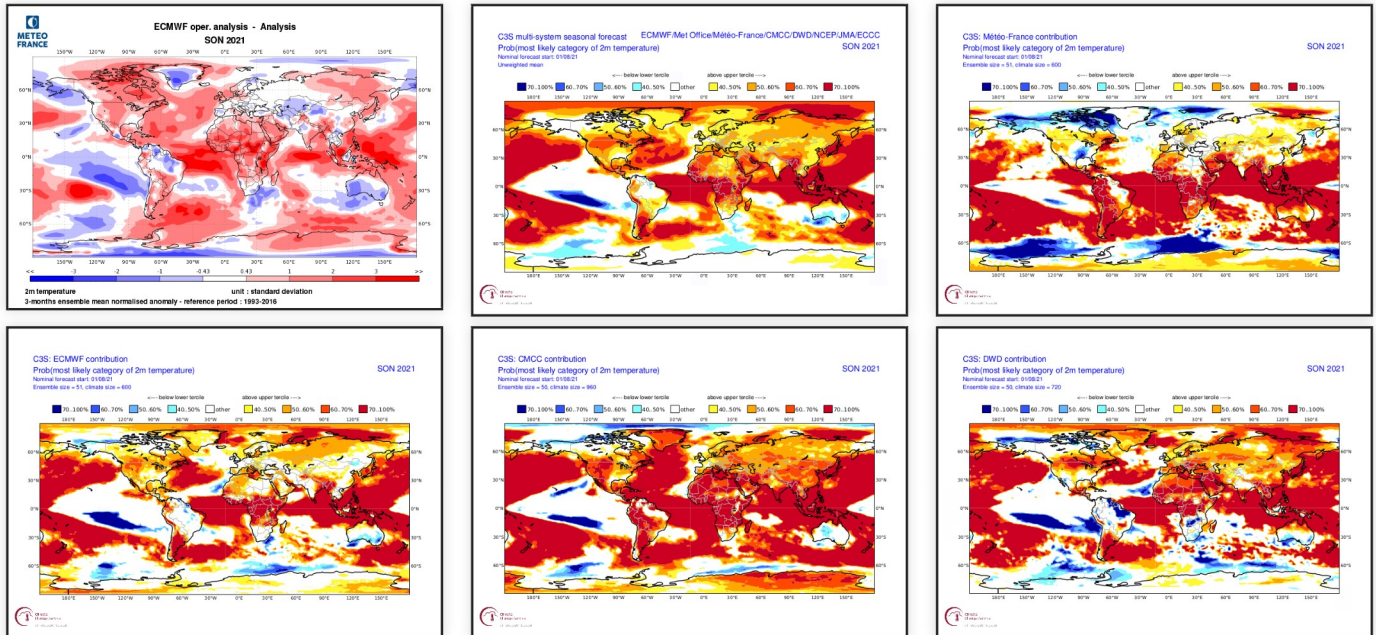


weather regime : ECMWF analysis top left, MF7 and ECMWF forecasts at the bottom. MJO phase top right

Climatic parameters : temperature on the globe

The main anomalies in the tropics were well forecasted.

Over the north hemisphere the two regions above normal (north America/Atlantic and eastern Russia) are well in line with the higher probability predictions of upper tercile. On the other hand, near or below anomalies on a large part of Eurasia weren't forecasted by models which favour the upper tercile.

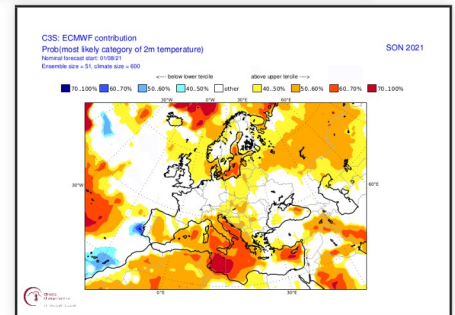
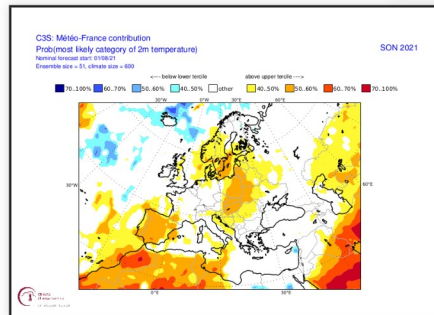
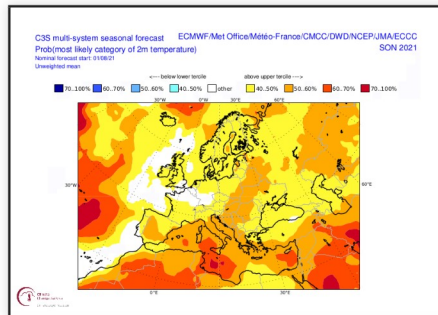
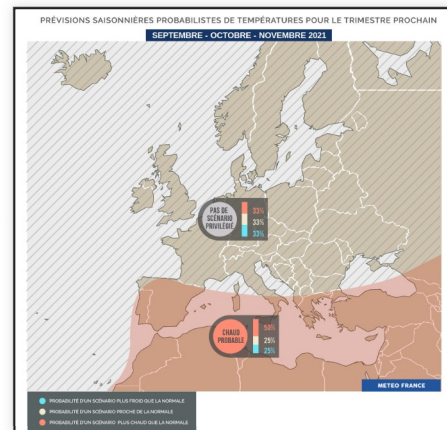
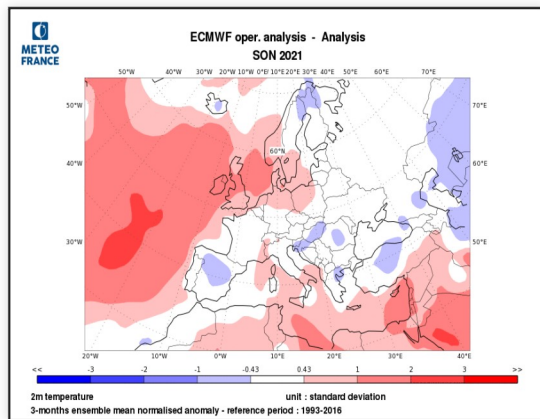


ECMWF analysis top left, forecast for multi-model top center and forecast for MF-S7 top right, ECMWF-SEAS5, CMCC, DWD on the bottom line.

Climatic parameters : temperature over Europe

Over Europe, anomalies were neutral or in the colder tercile (Central and East Europe).

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

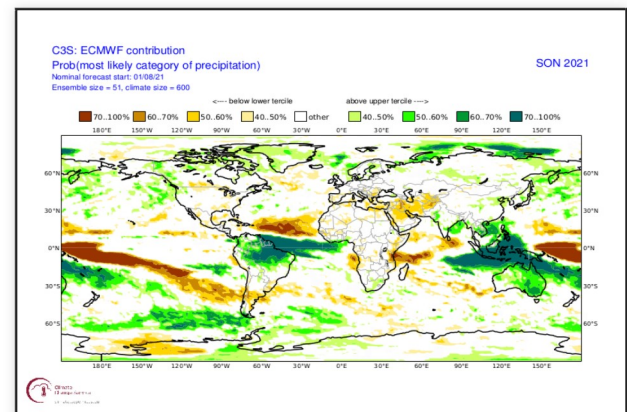
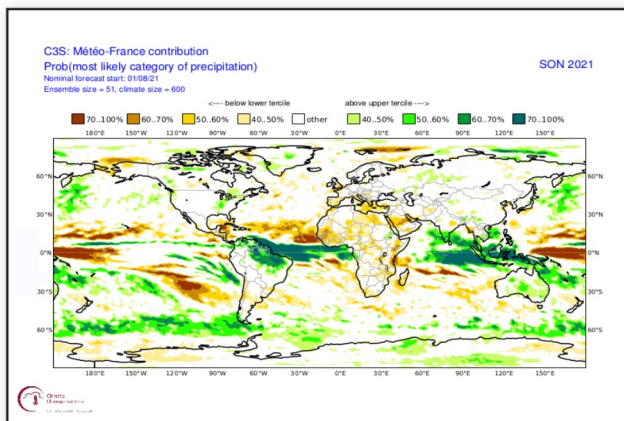
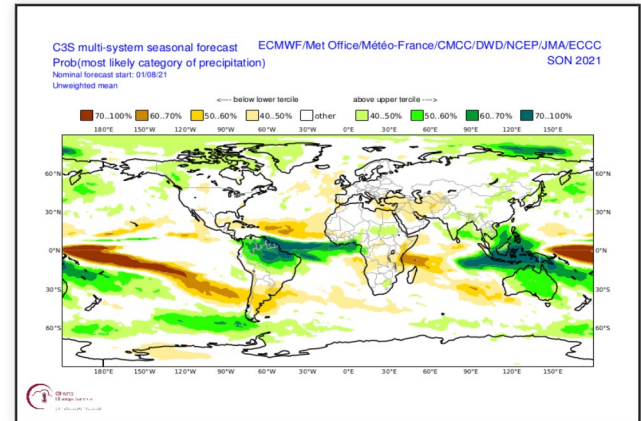
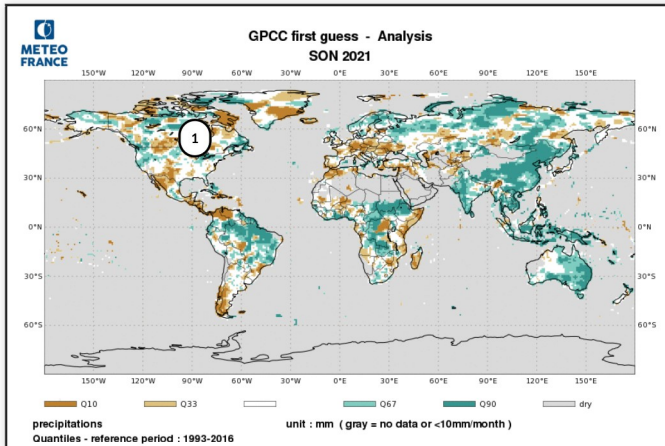


ECMWF analysis top left, synthetic forecast map top right. Forecast for multi-system, MF-S7 and SEAS5 on the bottom line.

Climatic parameters : Precipitations over the globe

Quite good forecast near equator.

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



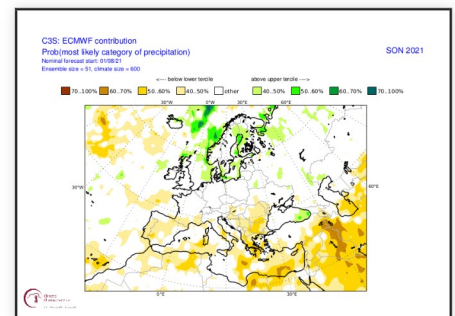
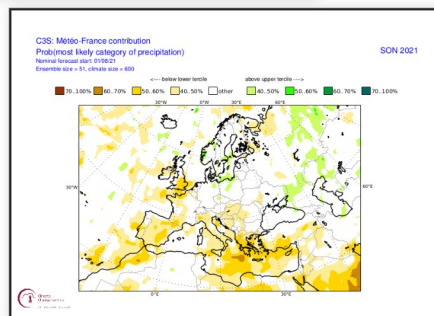
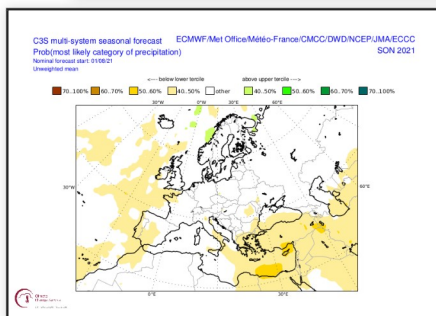
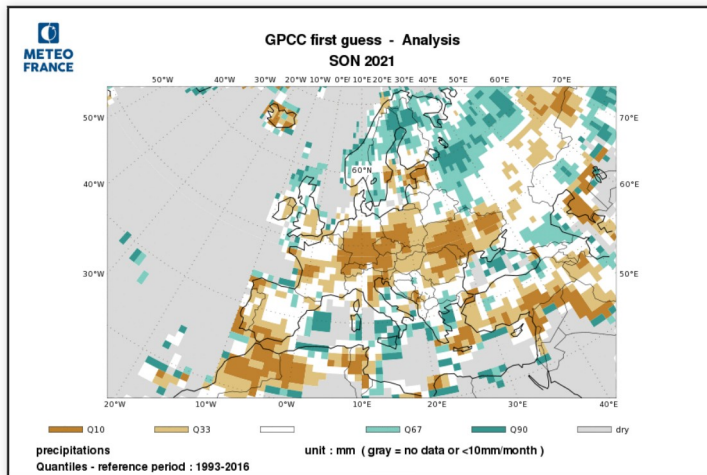
Standardized Precipitation Index analysed by IRI top left, forecast for multi-model top right and MF-S7 and SEAS5 on the bottom line.

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.



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 SON 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 in the northern hemisphere

Z500 : Models forecasted quite correctly the anomalies over north America but much less well on the Atlantic and Eurasia where the C3S multi-model highlights the main structure.

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.