

VERIFICATION BULLETIN

OCTOBER - NOVEMBER - DECEMBER 2019

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Introduction : Objective

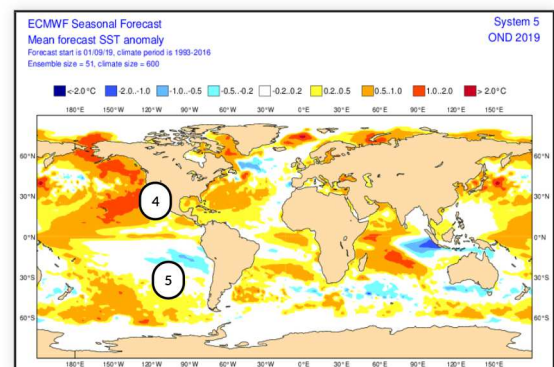
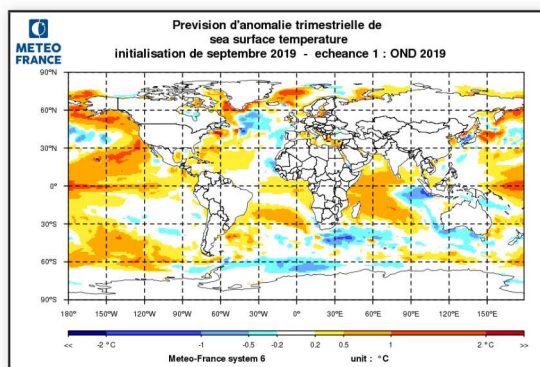
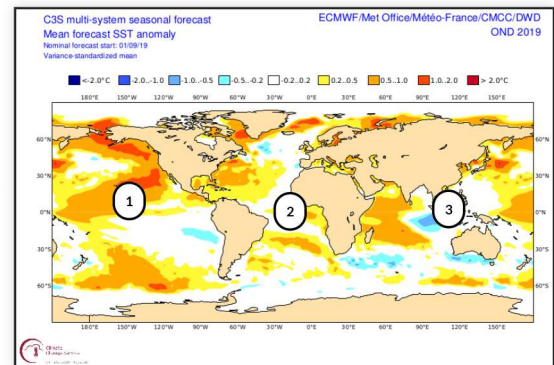
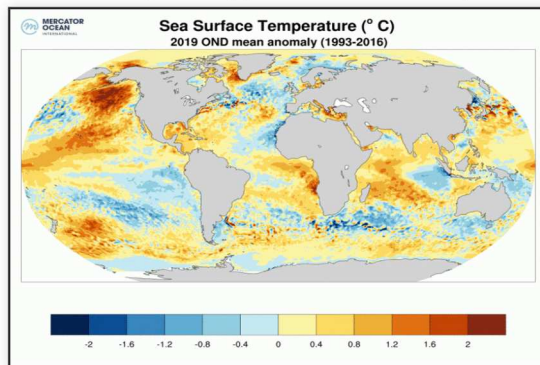
- The objective of the Seasonal Verification Bulletin is to present an evaluation of the main elements highlighted in the Seasonal Forecast Bulletin : oceanic forcings, large scale circulation patterns, and a focus on temperature and precipitation forecast over Northern Atlantic, Europe and the Mediterranean 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

SST patterns were generally very well captured by the models.

In the Atlantic Ocean, MF6 forecast was a little colder than ECMWF and closer to observed field. In southern Pacific, the forecast was not cold enough.

In the Indian Ocean, the very positive IOD was well predicted.



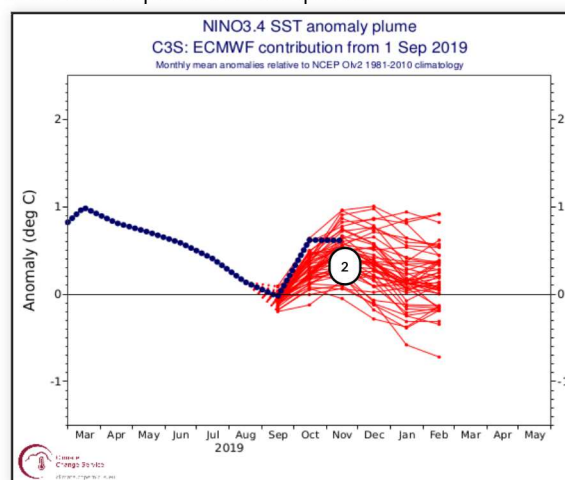
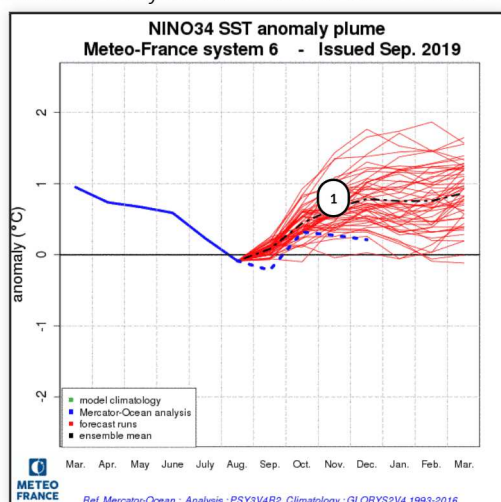
SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF6 (bottom left) and SEAS5 (bottom right)

- 1 - Good structure of anomalies on the pacific
- 2 - Warm anomaly predicted
- 3 - Positive IOD very well captured
- 4 - Values of anomalies correctly estimated
- 5 - Cold anomalies a little underestimated

Oceans : ENSO

CAUTION : reference analysis differ between MF-S6 (Mercator-Ocean 1993-2016) and SEAS5 (NCEP 1981-2010).

The combined analysis of the different models led to a correct forecast of the neutral phase over the quarter.

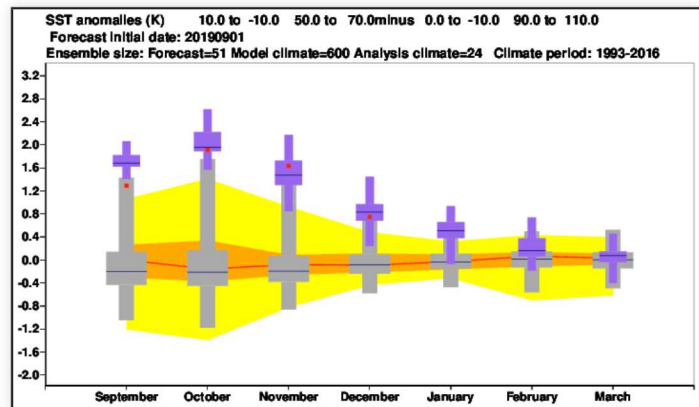
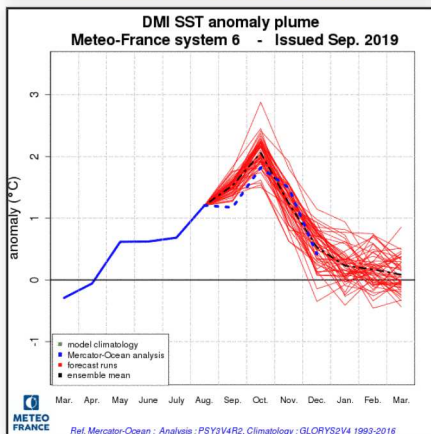
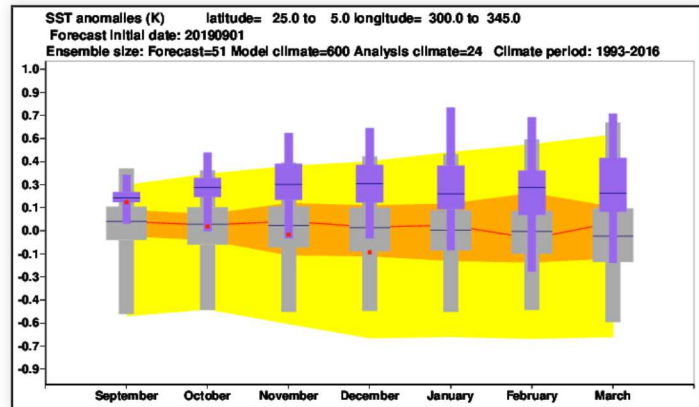
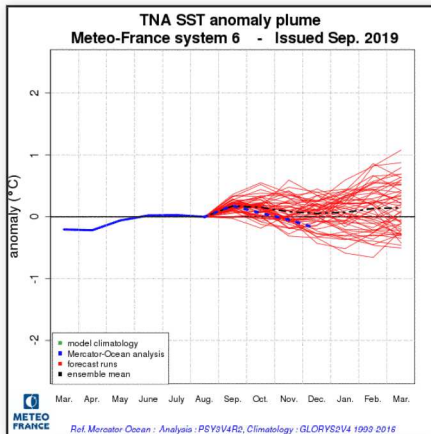


- 1 - Hot anomaly overestimated by most MF6 runs
- 2 - Hot anomaly underestimated by most CEP5 runs

Oceans : tropical Atlantic and Indian Ocean index

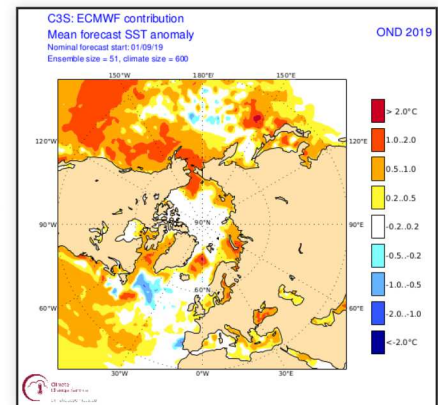
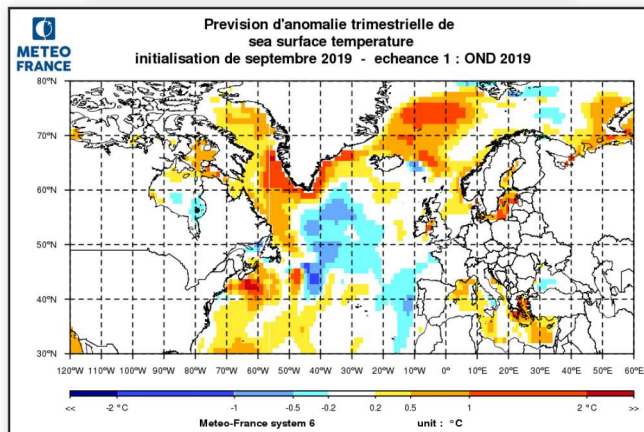
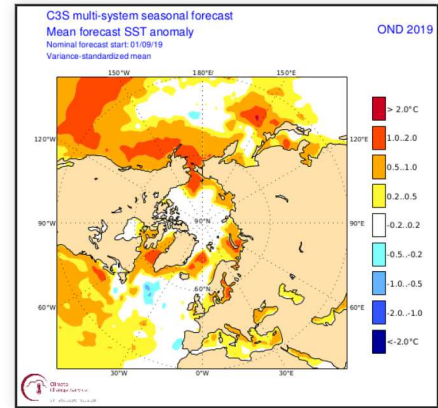
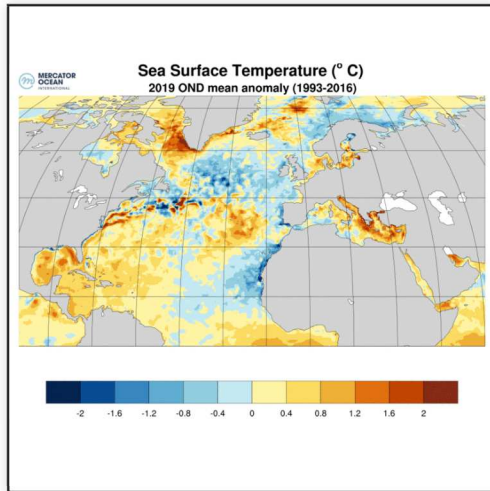
TNA : good prediction for MF-S6. ECMWF was too hot, especially at the end of the quarter

DMI : record values in October and the decrease that followed were very well predicted by both models.



Oceans : North Atlantic SST

Good MF6 forecast. ECMWF is not enough cold on the northern and eastern basin

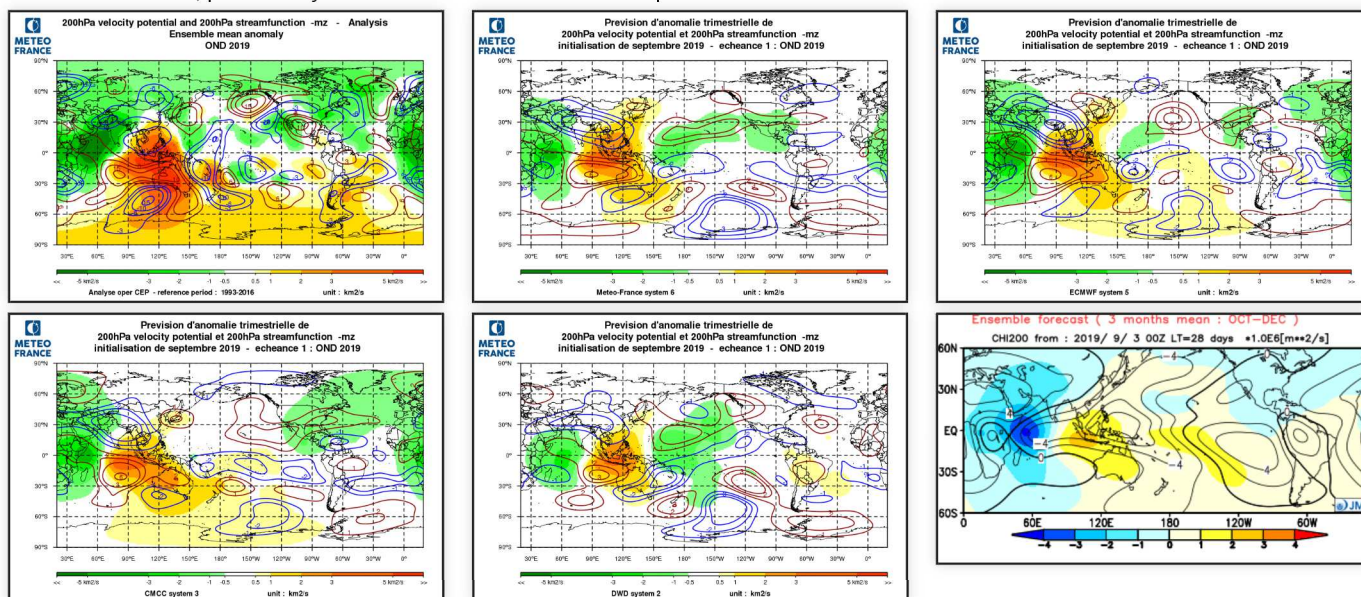


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), Météo-France system 6 (bottom left) and ECMWF SEAS5 (bottom right)

Atmospheric circulation : Global teleconnection

VP 200hPa : subsidence anomaly over Maritime Continent and Australia and Ascent anomaly over Africa were well forecasted. (except by DWD model which was too soft)

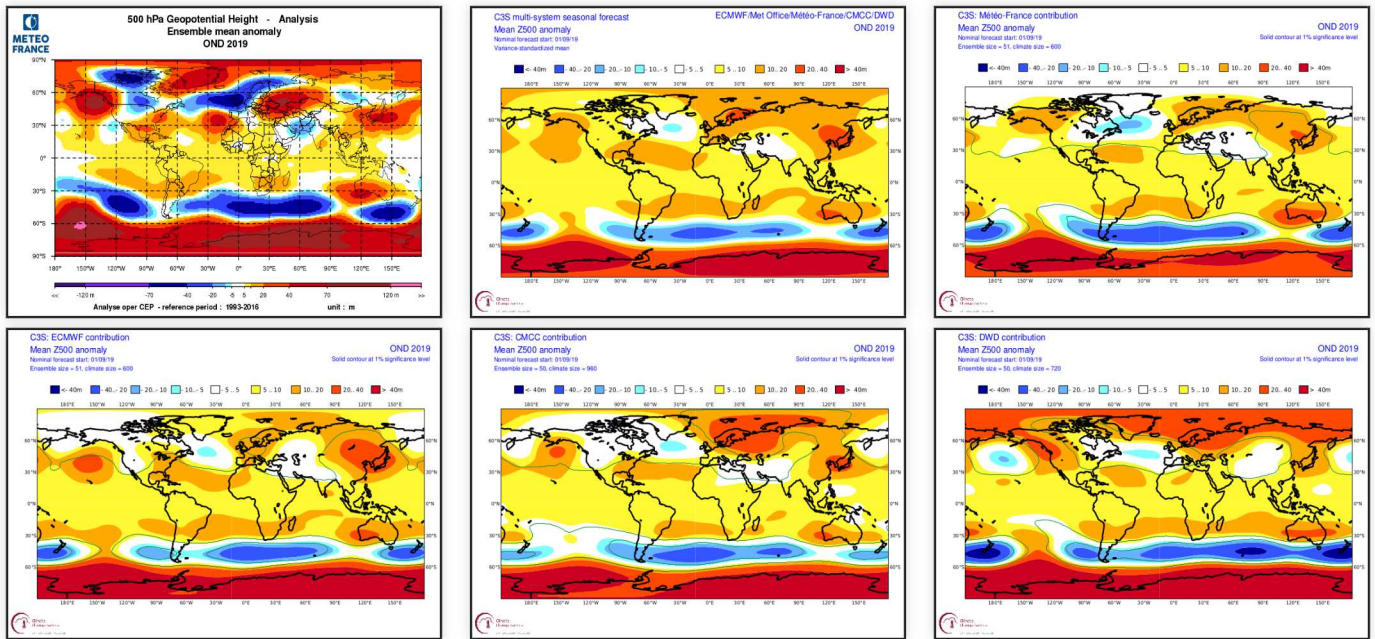
SF 200 hPa : The forecast of streamfunction patterns over Indian Ocean and nearby regions were consistent. Elsewhere forecasts have been inconsistent, particularly over the Atlantic Ocean and Europe



ECMWF analysis, MF7, ECMWF, 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

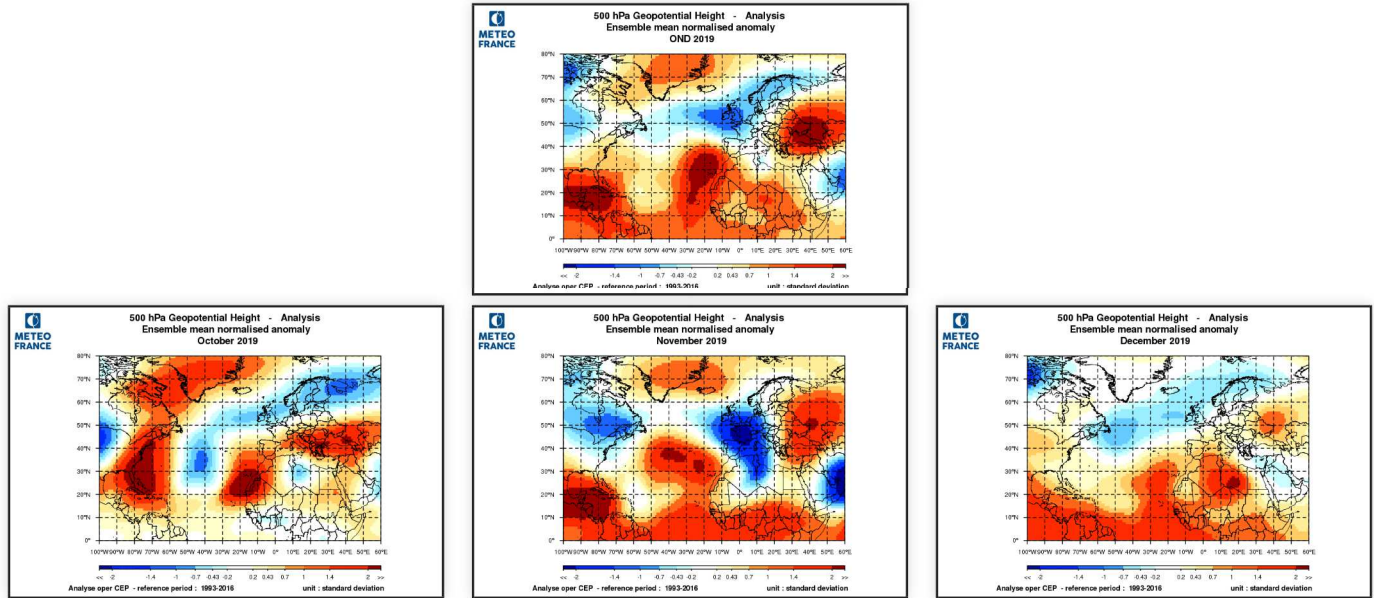
On northern hemisphere, the large scale structure was quite well anticipated by the models but with a large shift of the quadrupole on Atlantic, Europe and the Middle East, leading to a poor general situation for Europe. The large structures are quite well predicted on the southern hemisphere.



ECMWF analysis, C3S multi-system, MF7, ECMWF, CMCC and DWD 500hPa geopotential height anomalies.

Atmospheric circulation : monthly 500hPa Geopotential height variation

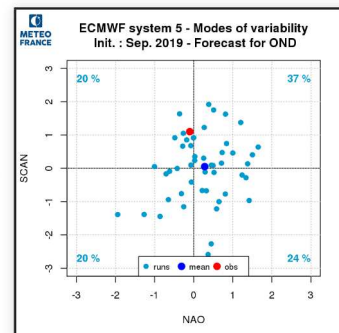
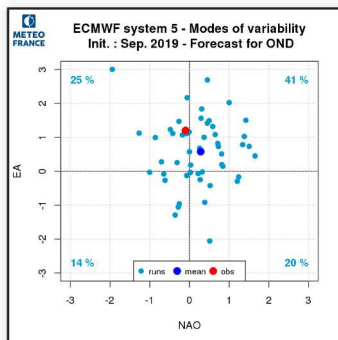
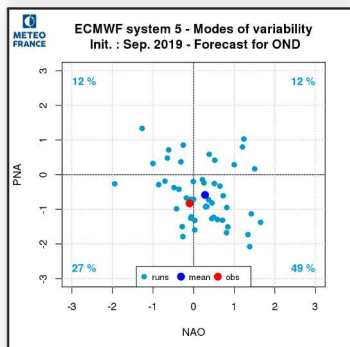
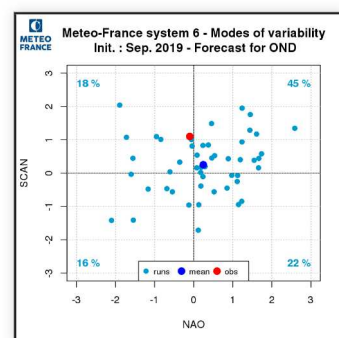
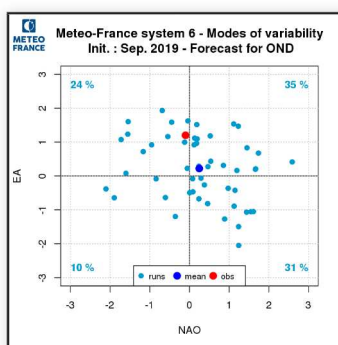
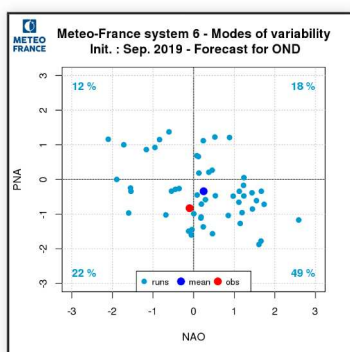
In the quarter, November is clearly distinguished from October and December and it strongly impacted the quarterly average. The models did not anticipate the particular episode of November. They were more consistent with the other two months.



ECMWF analysis, MF7 and ECMWF 500hPa geopotential height anomalies and below MF7 and ECMWF 500hPa geopotential height scores.

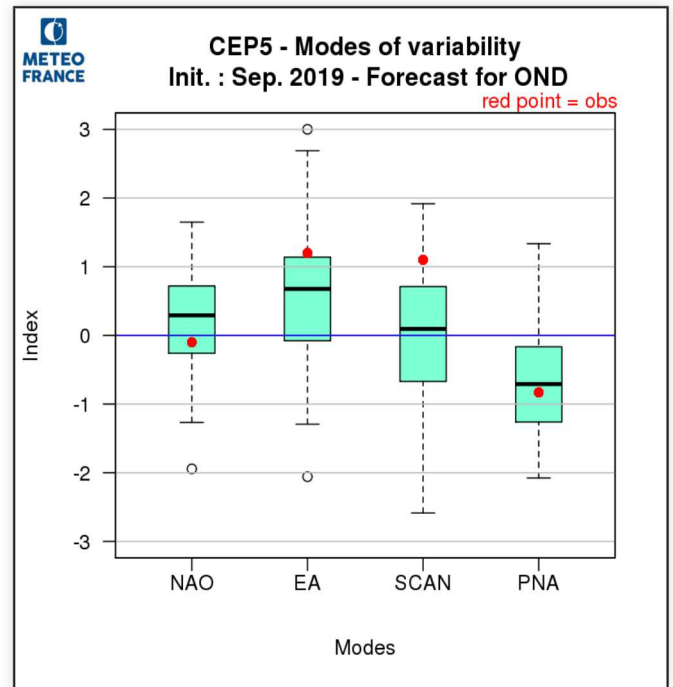
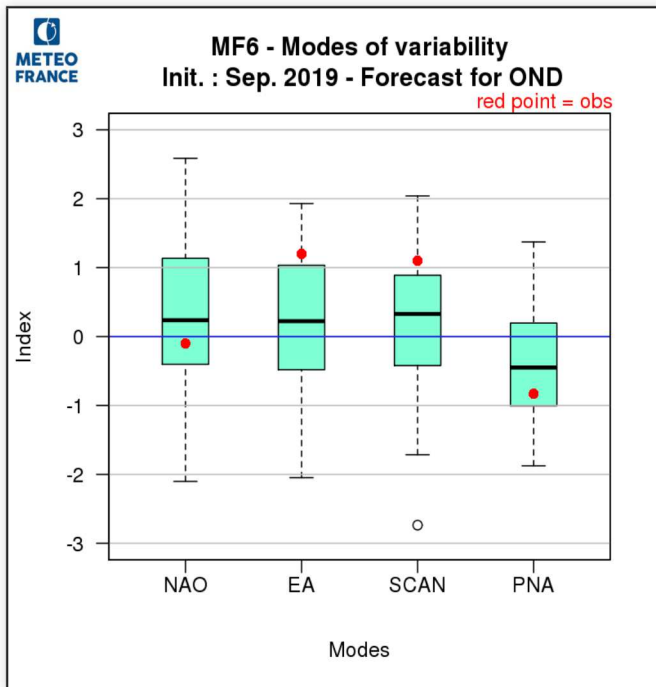
Atmospheric circulation : Modes of variability

The forecast of the modes was very insignificant. ECMWF rightly gave a little more weight to PNA- and EA+



Atmospheric circulation : Modes verification

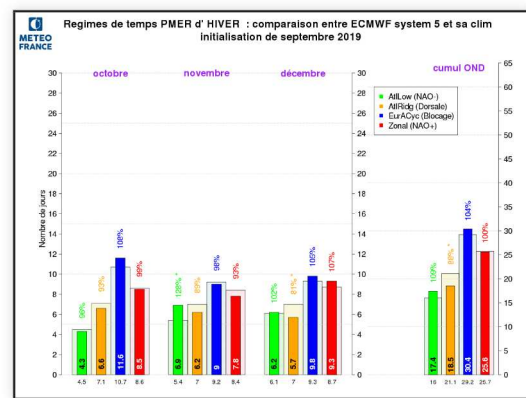
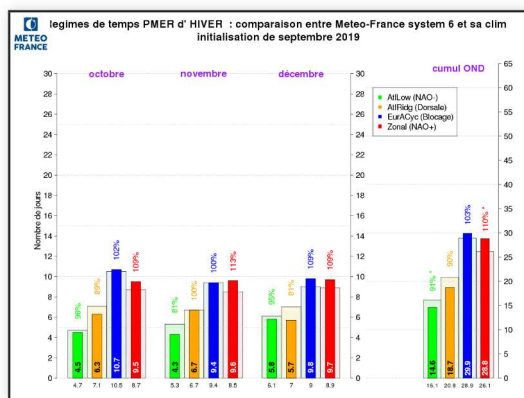
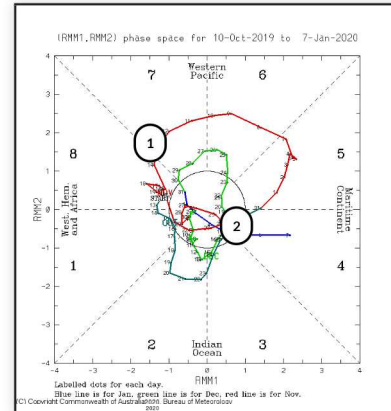
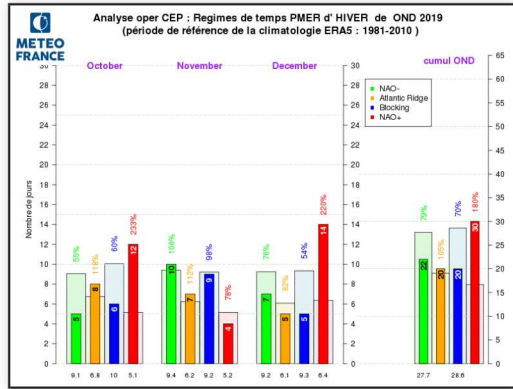
The EA+ and PNA- forecast of ECMWF is actually better than that of MF6. The models again show their inability to predict the SCAN mode.



Atmospheric circulation : Winter SLP weather regimes

The models did not give a very marked option. They did not anticipate the excess of NAO+.

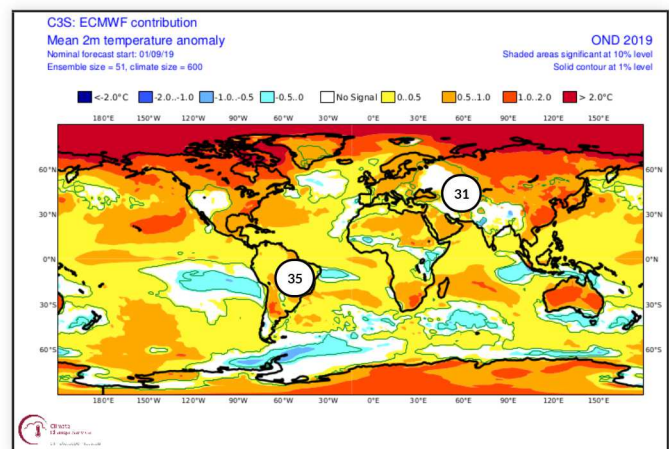
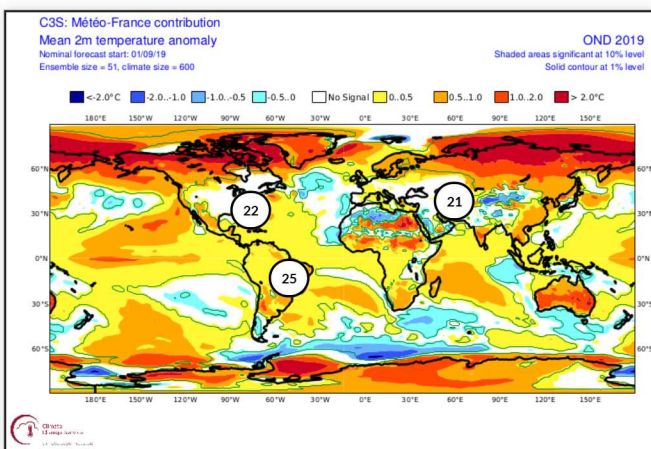
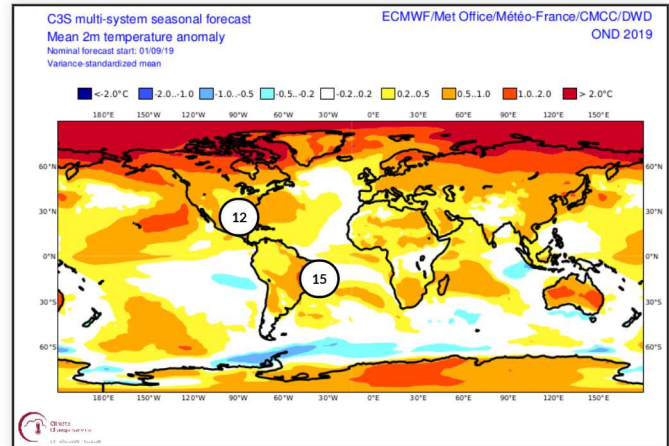
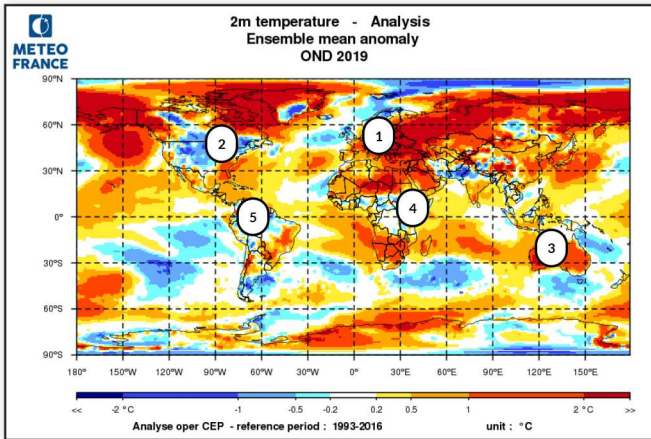
The connection with the MJO is unclear.



- 1 - The MJO in this sector favors NAO-.
- 2 - no clear influence for the rest of the period

Climatic parameters : temperature on the globe

Good forecast around the Indian Ocean.



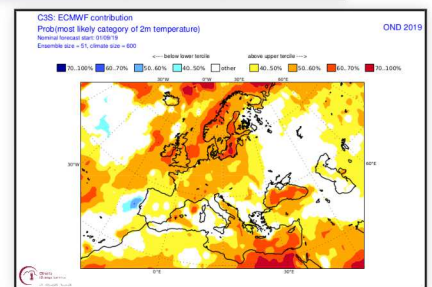
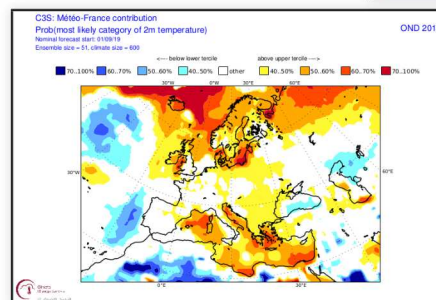
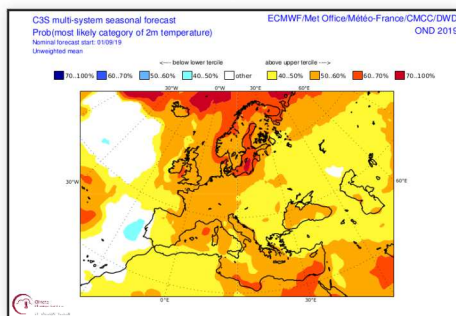
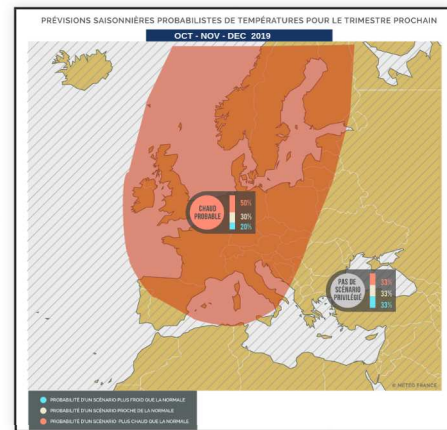
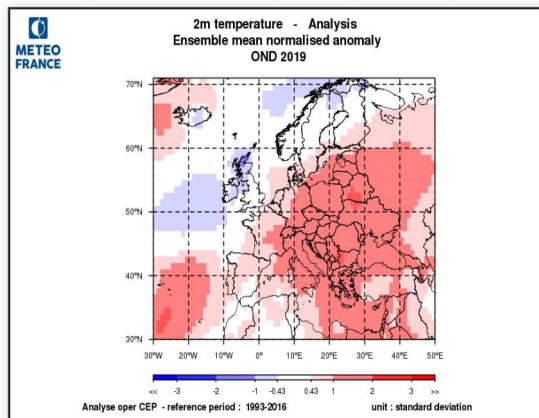
ECMWF analysis top left, forecast for multi-model top right and MF6 and SEAS5 on the bottom line.

- 1 - Very strong hot anomaly
- 2 - remarkable cold anomaly
- 3 - Hot anomaly related to the IOD
- 4 - Cold anomaly related to the rain due to the IOD
- 5 - Cold anomaly
- 12 - Cold anomalies over North America was not expected
- 15 - Cold anomalies over Brazil was not expected
- 21 - Hot anomalies over Europe was not expected
- 22 - Good prediction for North America
- 25 - Cold anomalies over Brazil was not expected
- 31 - Very hot anomaly was not expected
- 35 - Cold anomalies over Brazil was not expected

Climatic parameters : temperature over Europe

Connected with the shift of the general circulation forecast, the hot zone was foreseen too far to the west.

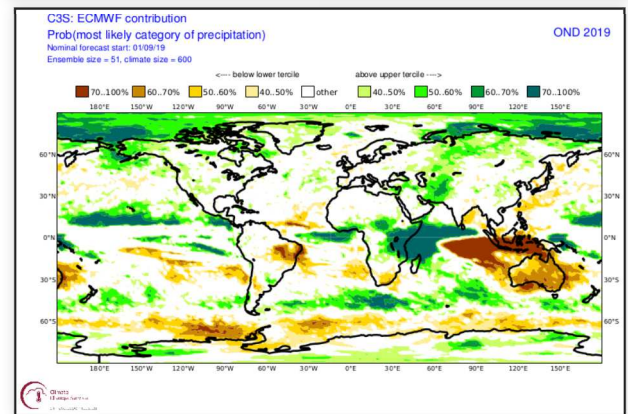
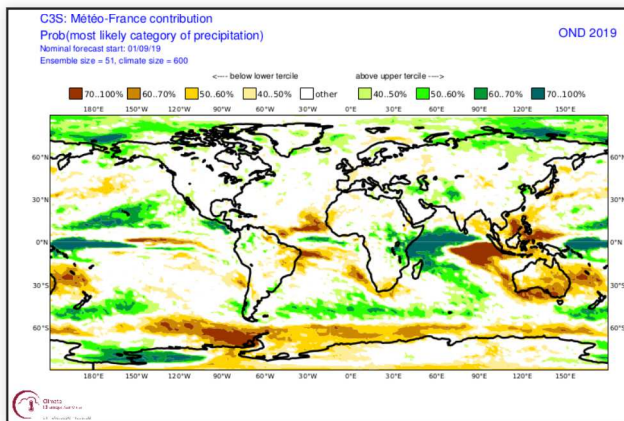
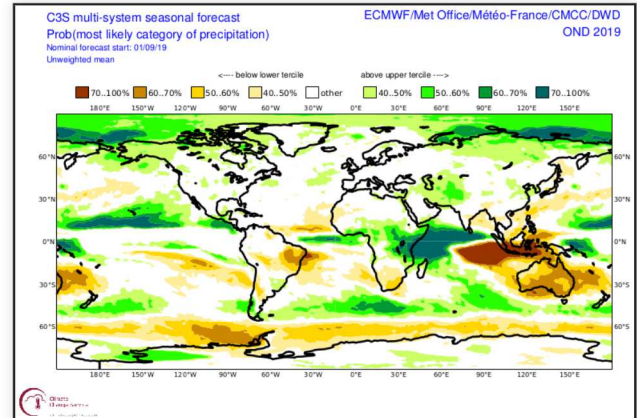
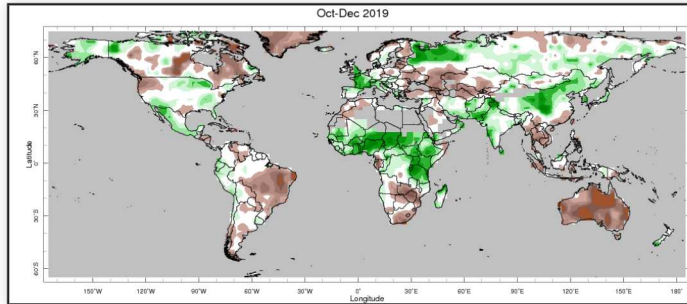
The cold anomaly on the northwestern fringe of Europe was not foreseen



Climatic parameters : Precipitations over the globe

Very good forecast around the Indian Ocean. Fairly good in South America.

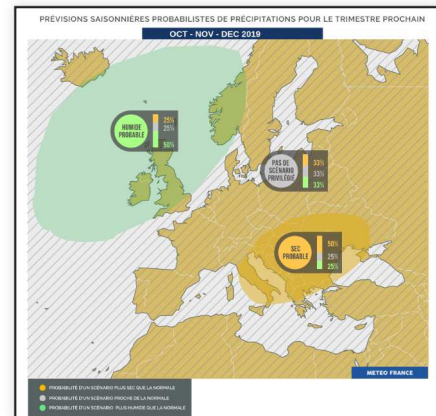
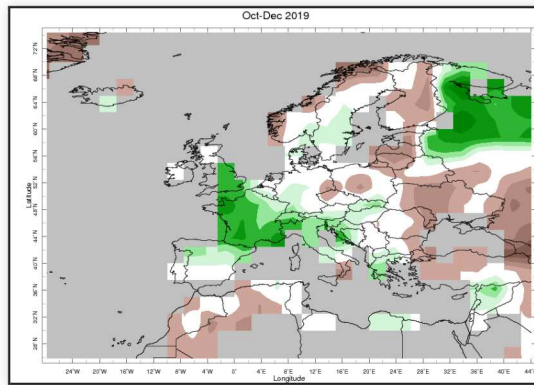
For the northern hemisphere, few significant forecasts and generally not in accordance with observations.



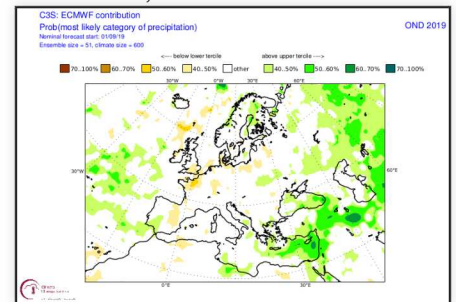
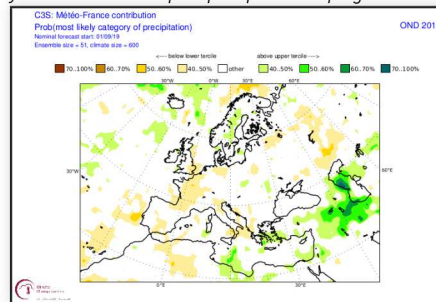
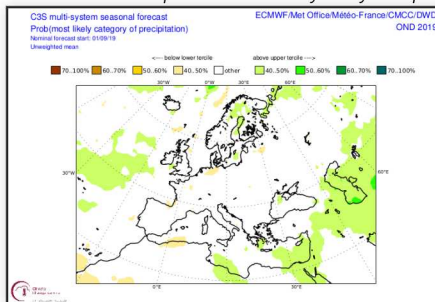
Standardized Precipitation Index analysed by IRI top left, forecast for multi-model top right and MF6 and SEAS5 on the bottom line.

Climatic parameters : Precipitations over Europe

Connected with the shift of the general circulation forecast, both wet and dry areas were foreseen too far to the west.



Standardized Precipitation Index analysed by IRI top left, Synthetic forecast map for precipitation top right and forecast for multi-model, MF6 and SEAS5 on the bottom line.



General summary : for the period OND 2019

1) Oceans :

SST patterns were generally very well captured by the models. The structure of the record IOD was particularly well forecasted

2) Large scale atmospheric circulation :

VP and SF 200hPa : The forecast over Indian Ocean and nearby regions were very consistent.

Z500 : The large scale structure was quite well predicted but with a large shift of patterns on Europe and North Atlantic, leading to a poor general situation for Europe.

The EA+ and PNA- modes were better captured by ECMWF than by MF. Both models failed to predict SCAN mode.

3) Climatic parameters over Europe :

Connected with the shift of the general circulation forecast, the significant areas were foreseen too far to the west.