

VERIFICATION BULLETIN

NOVEMBER - DECEMBER - JANUARY 2019-2020

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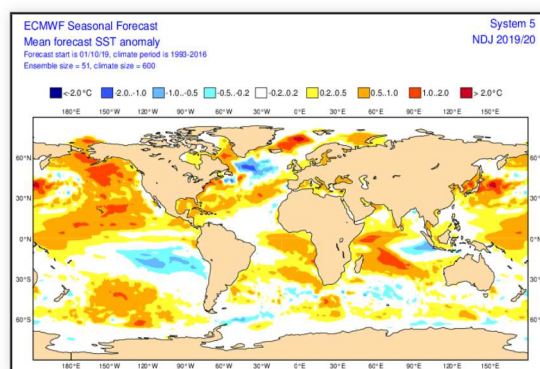
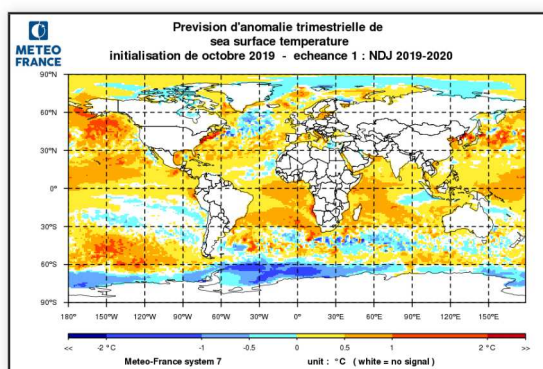
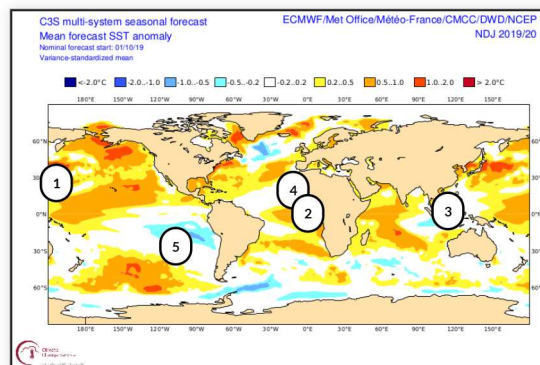
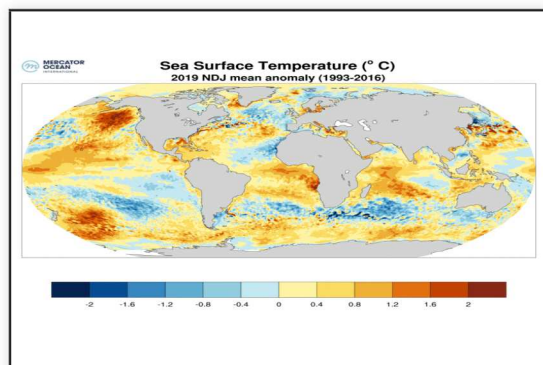
Introduction : Objective

- 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 (especially the strong IOD in Indian Ocean and the neutral phase of Enso in Pacific).

In the North Tropical Atlantic Ocean models are underestimated cold anomalies . In southern Pacific, the forecast was not cold enough.



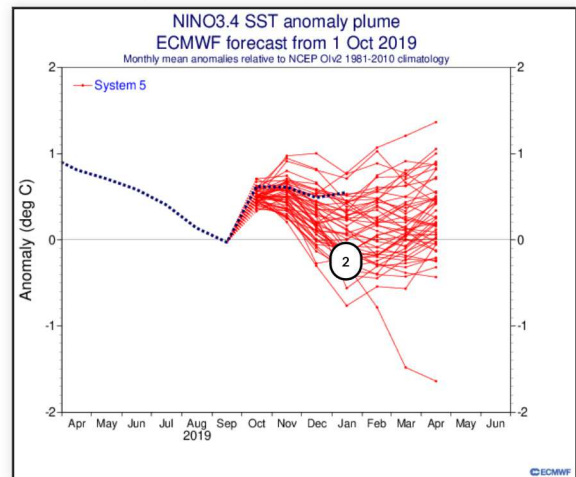
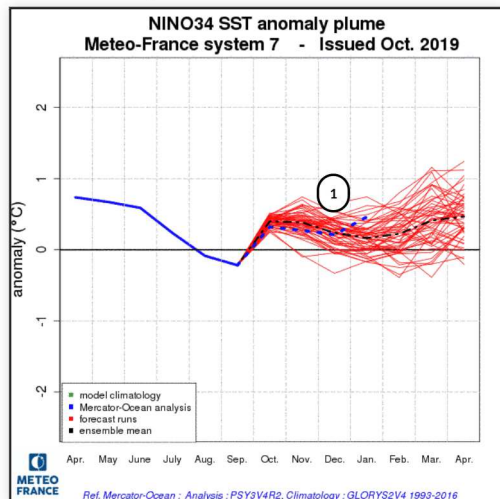
SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF7 (bottom left) and SEAS5 (bottom right)

- 1 - Good structure of anomalies on the north pacific
- 2 - Warm anomaly predicted
- 3 - Positive IOD very well captured
- 4 - Cold anomalies are underestimated
- 5 - the cold anomaly pole is not well forecasted by the models

Oceans : ENSO

CAUTION : reference analysis differ between MF-S7 (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.

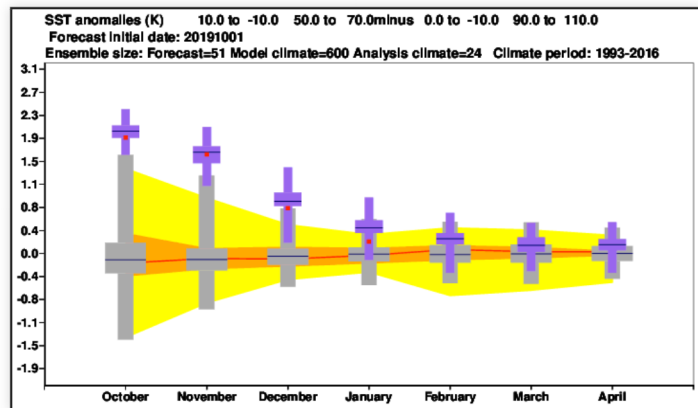
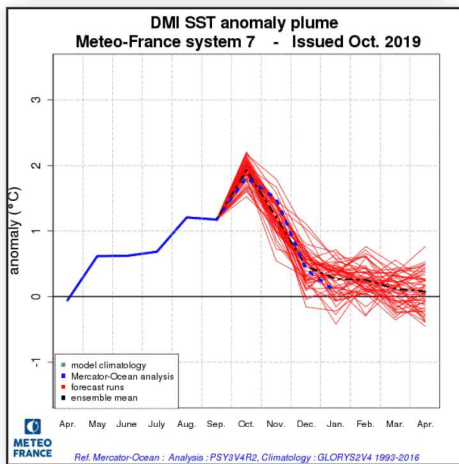
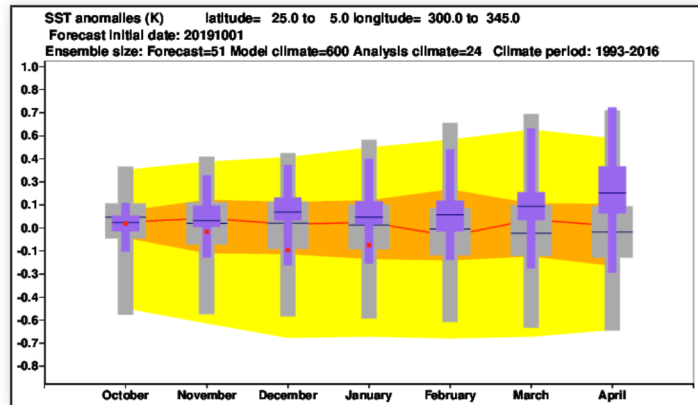
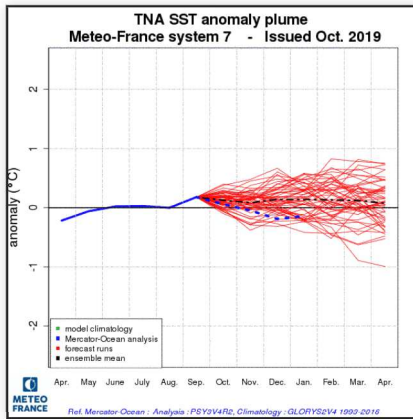


- 1 - Good forecasts, close to analysis
- 2 - Hot anomaly underestimated by most SEAS5 runs

Oceans : tropical Atlantic and Indian Ocean index

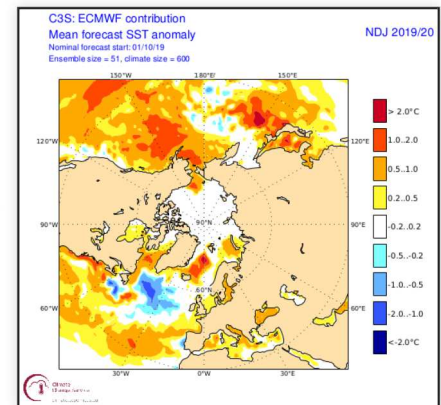
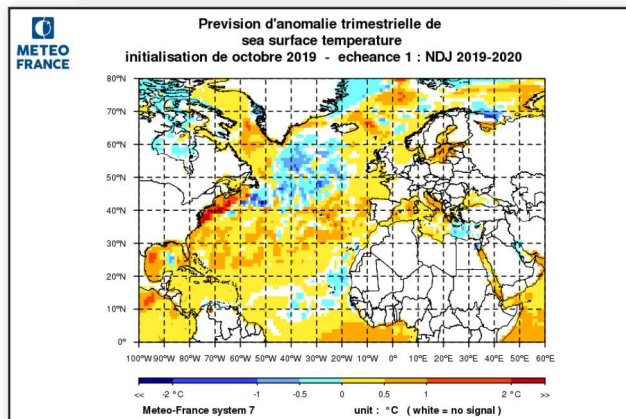
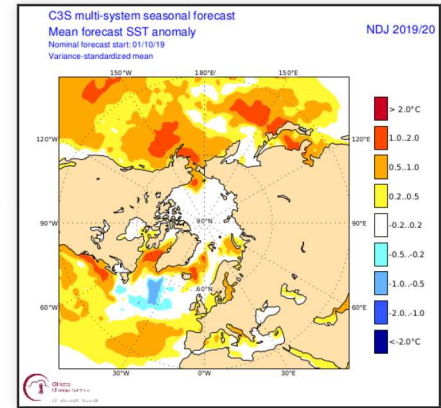
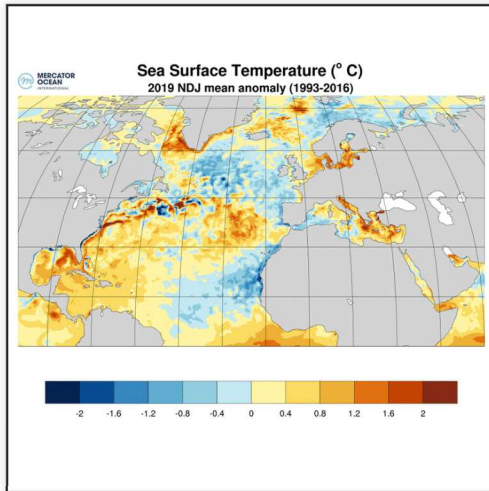
TNA : values are close to climatology

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



Oceans : North Atlantic SST

Models are not enough cold on the eastern basin

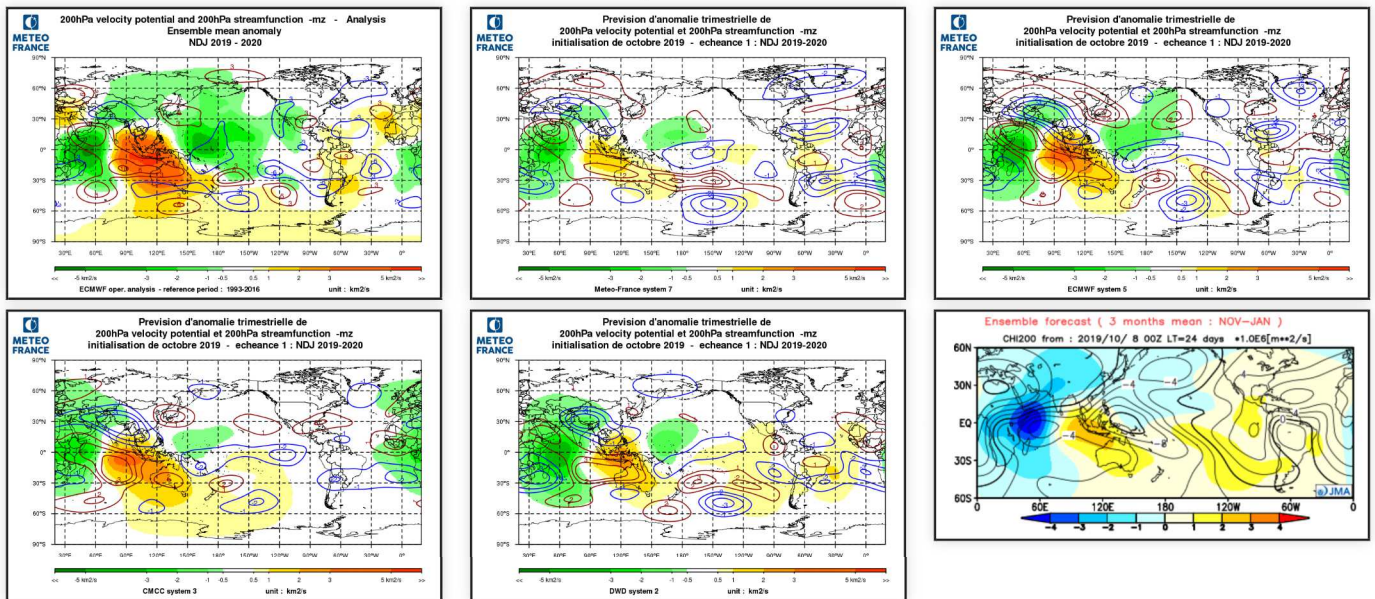


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), Météo-France system 7 (bottom left) and ECMWF SEAS5 (bottom right)

Atmospheric circulation : Global teleconnection

VP 200hPa : subsidence anomaly over Maritime Continent and Australia and ascent anomaly over the west of Indian Ocean and the west of the Pacific were well forecasted (especially by SEAS5). Subsidence anomaly on West Africa and South America wasn't well anticipated by the models.

SF 200 hPa : The forecast of streamfunction patterns over Indian Ocean and nearby regions were consistent. Elsewhere the structures aren't very marked. The weak anomalies on the Atlantic are fairly well correlated with MF7 and SEAS5.

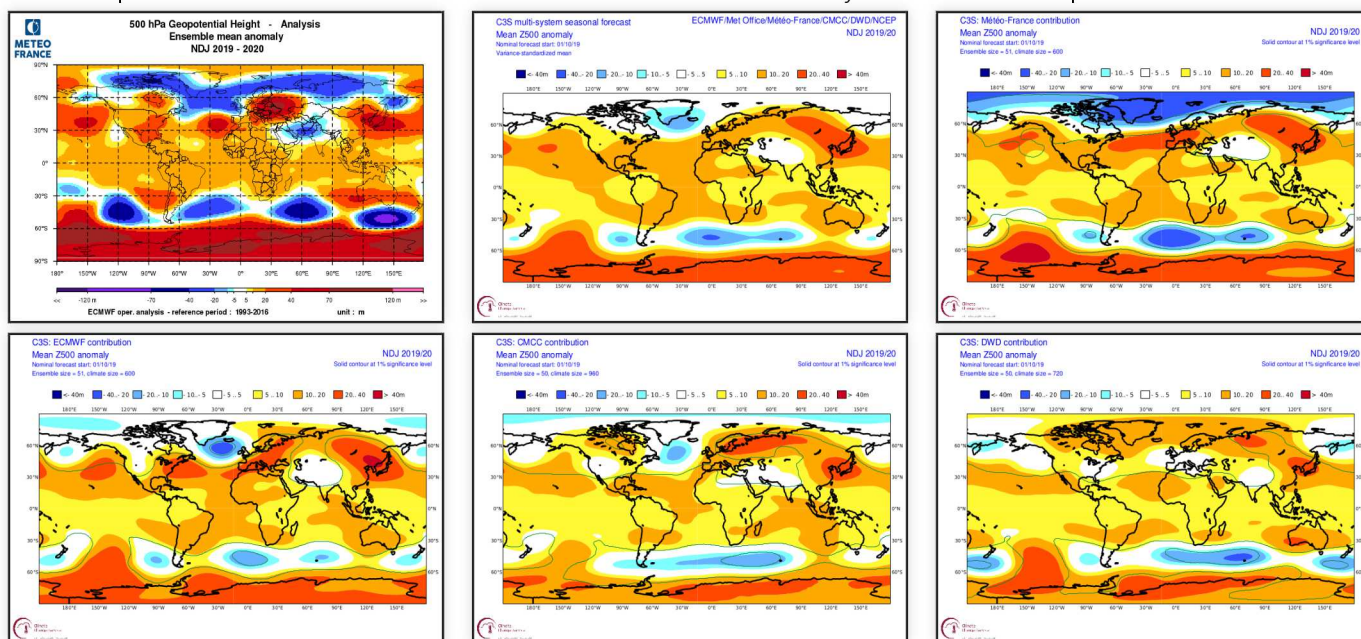


ECMWF analysis, MF7, ECMWF, CMCC, DWD and JMA 200hPa velocity potential anomalies (color range, green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

Atmospheric circulation : 500hPa Geopotential height

The large structures were quite well anticipated by the models, particularly the impact of IOD with negative anomaly in Central Asia surrounded by positive anomalies on Europe and east Asia.

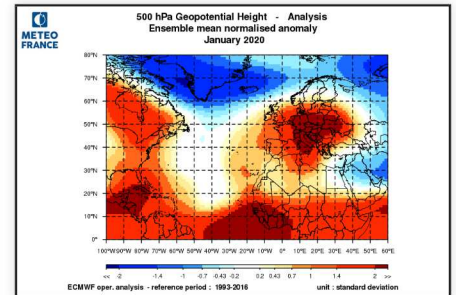
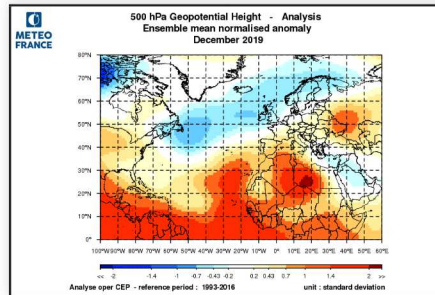
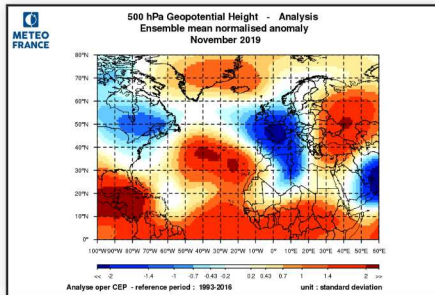
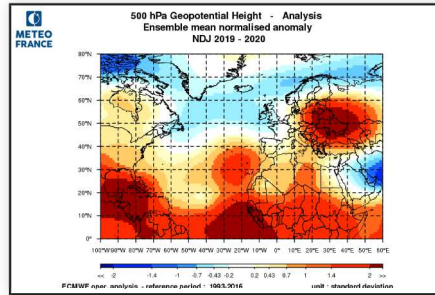
Over Europe and North Atlantic the anomalies of circulation were well forecasted by models with the exception of the DWD.



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 December and January 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.

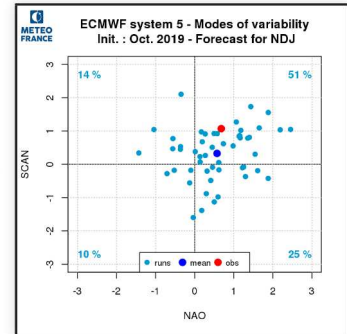
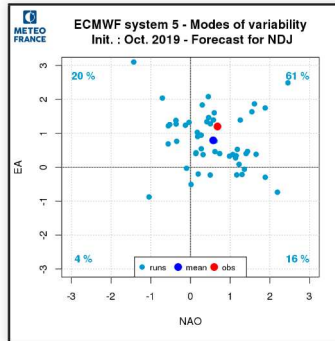
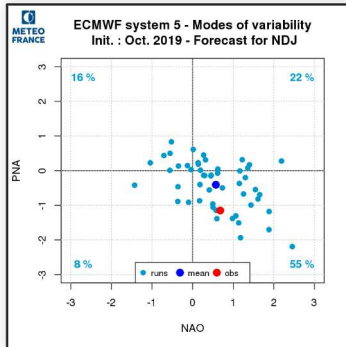
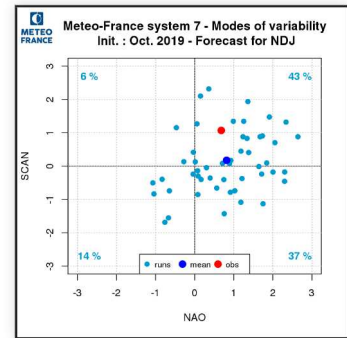
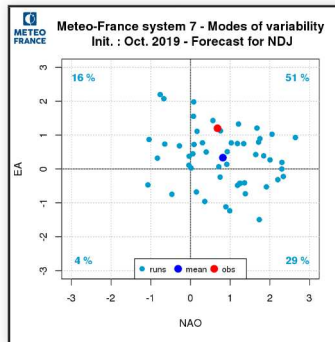
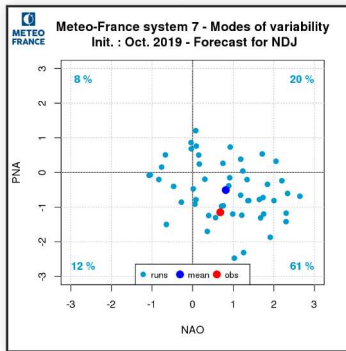


ECMWF analysis, MF7 and ECMWF 500hPa geopotential height anomalies and below MF7 and ECMWF 500hPa geopotential height scores.

Atmospheric circulation : Modes of variability

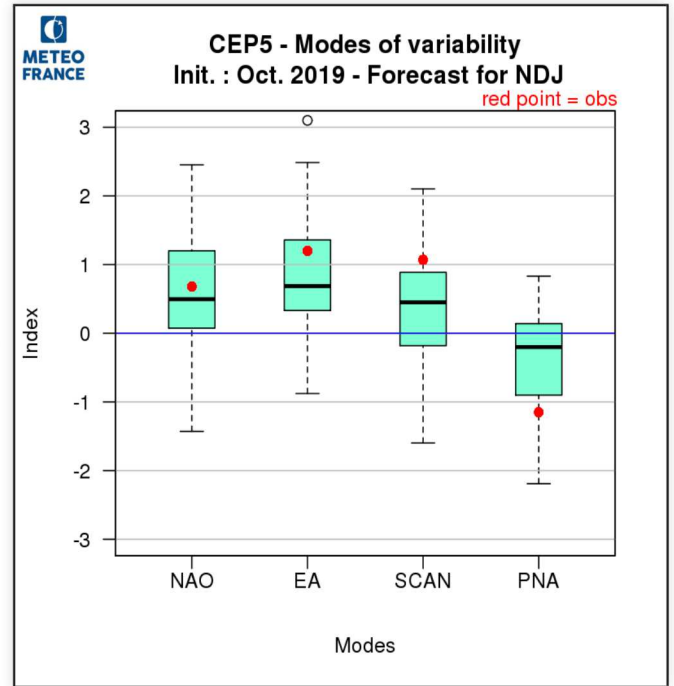
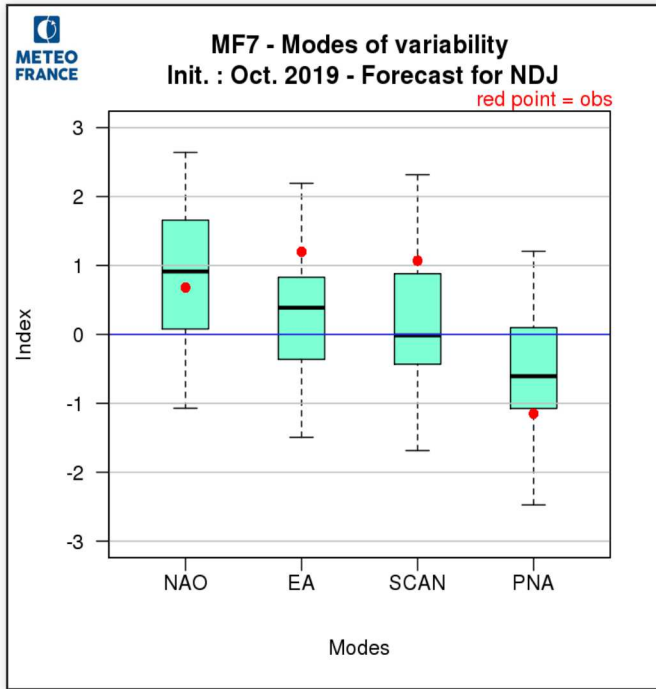
Models favor the positive phase of NAO/EA and the negative phase of PNA which has been well observed.

On the other hand they were more divided in the SCAN mode while the index analyzed is greater than 1.



Atmospheric circulation : Modes verification

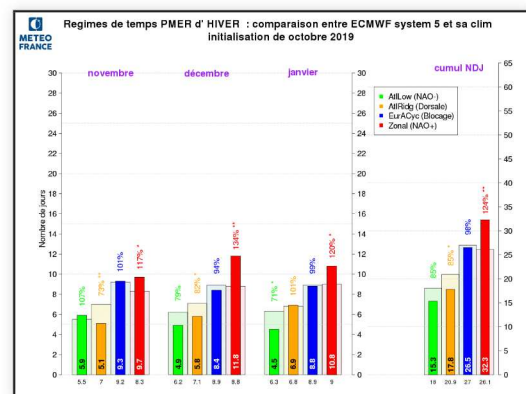
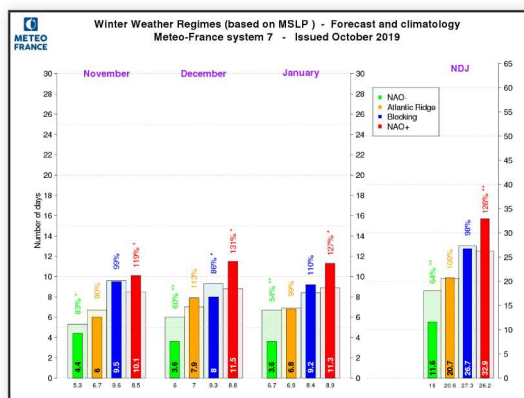
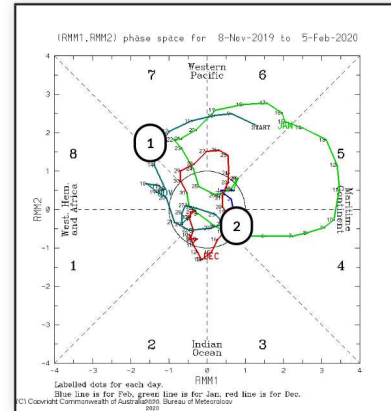
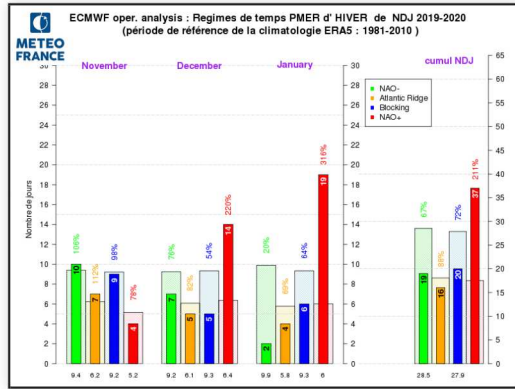
The EA+ and SCAN + forecast of ECMWF is actually better than that of MF6.



Atmospheric circulation : Winter SLP weather regimes

The models anticipate the excess of NAO+.

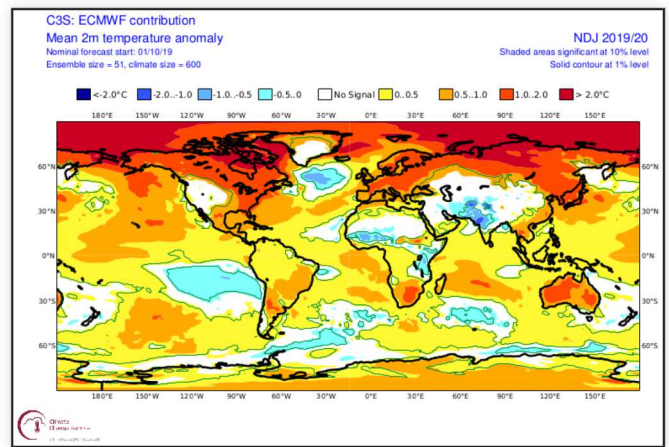
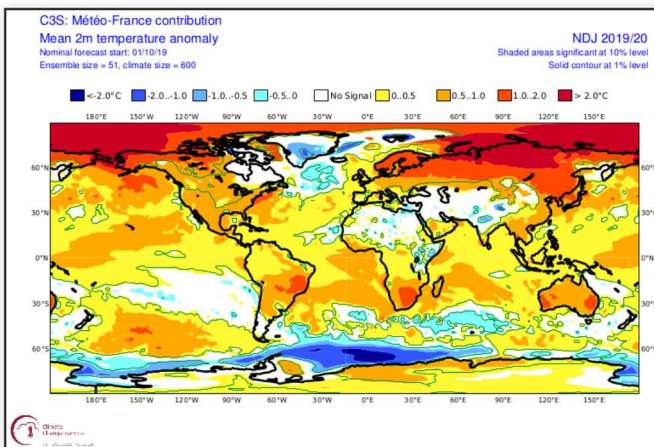
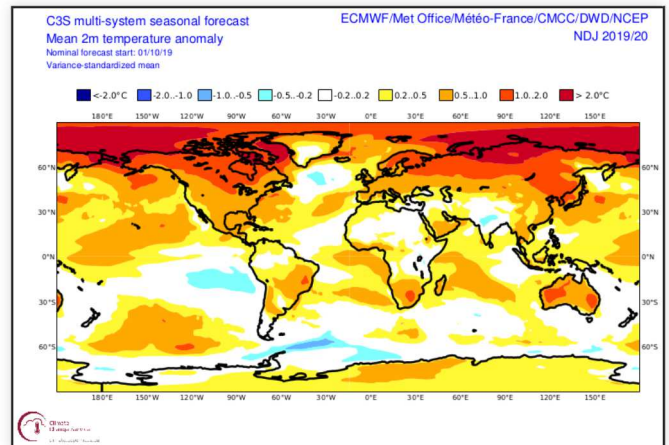
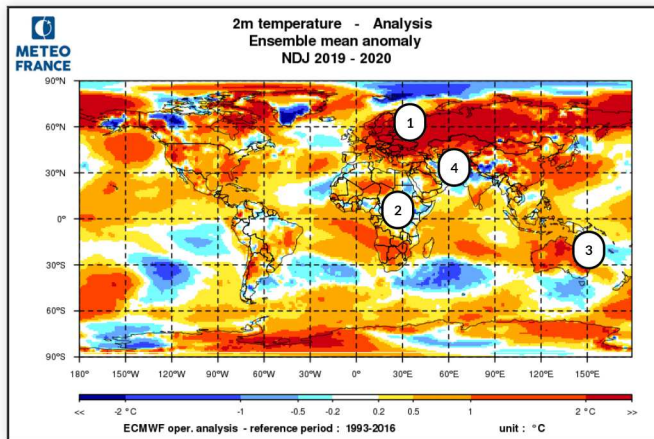
No influence from MJO : MJO was not very active in phase 3 et 4 favoring the NAO+ regime.



- 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 especially around the Indian Ocean and the Eurasia

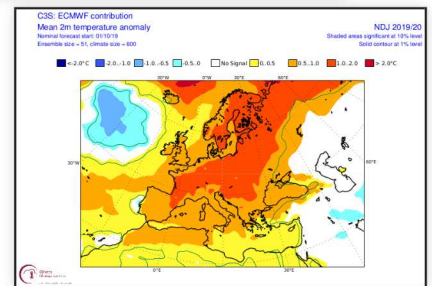
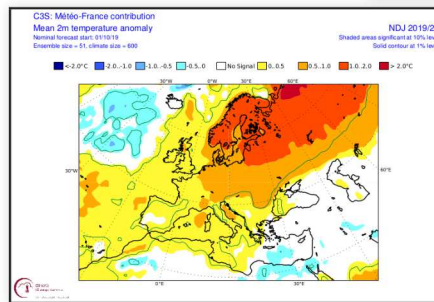
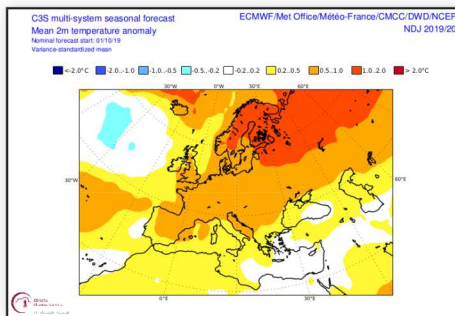
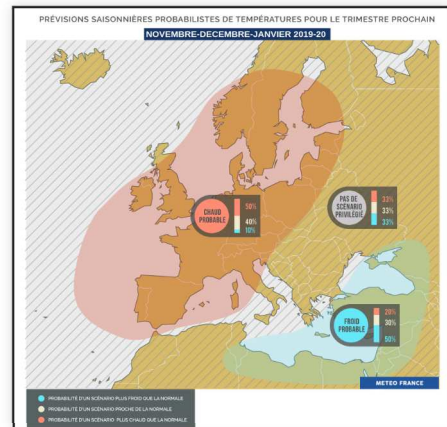
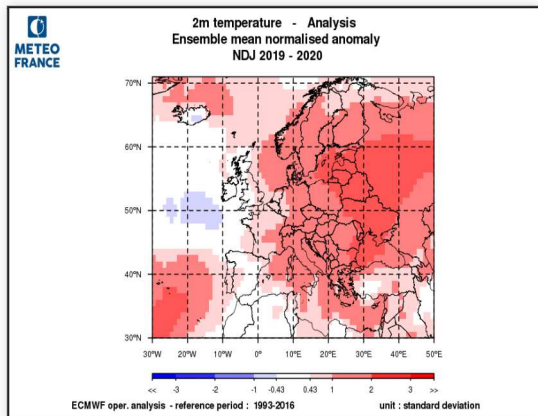


ECMWF analysis top left, forecast for multi-model top right and MF7 and SEAS5 on the bottom line.

- 1 - Very strong hot anomaly on a large scale
- 2 - Cold anomaly related to the rain due to the IOD
- 3 - Hot anomaly related to the IOD
- 4 - Cold anomalie linked to IOD

Climatic parameters : temperature over Europe

The hot anomaly observed is exceptional and it is shifted to the south-east relative to the forecast of the synthesis map. SEAS5 is better on the extension towards the Black Sea and the Balkans but on the other hand it too extends towards British Islands and Spain. A cold anomaly was forecast over the eastern Mediterranean when it was warmer than normal.

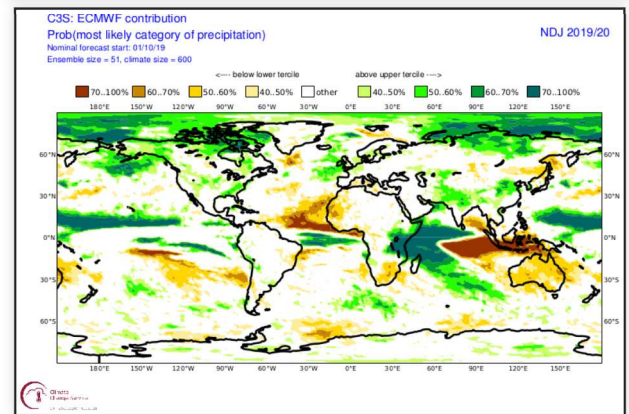
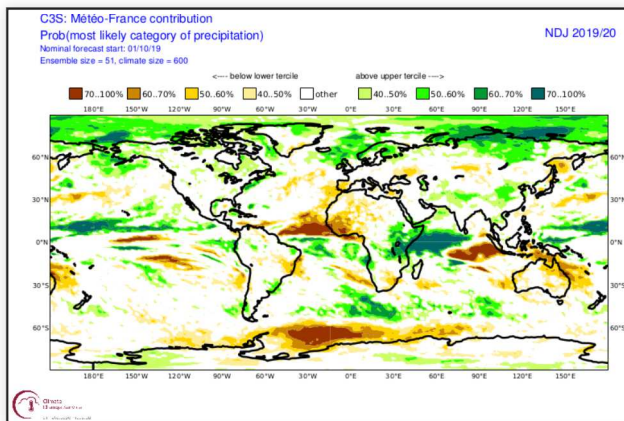
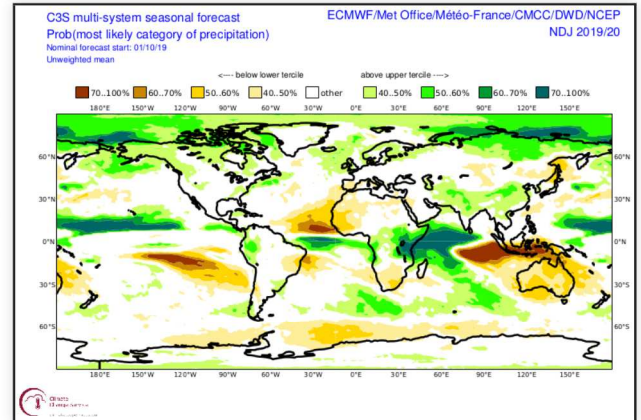
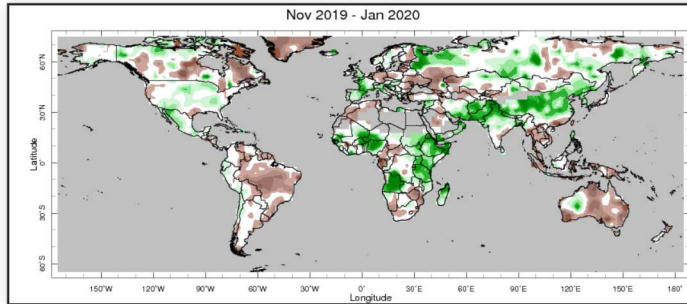


ECMWF analysis top left, synthetic forecast map top right. Forecast for multi-system , MF7 and SEAS5 on the bottom line.

Climatic parameters : Precipitations over the globe

Very good forecast around the Indian Ocean and in the south of Asia

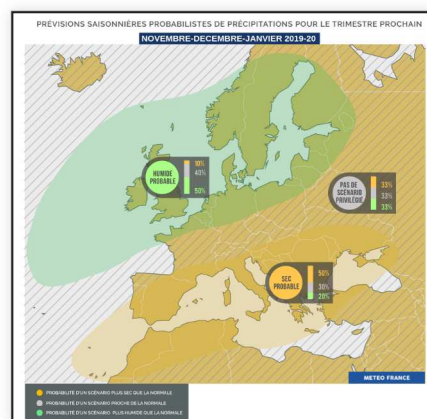
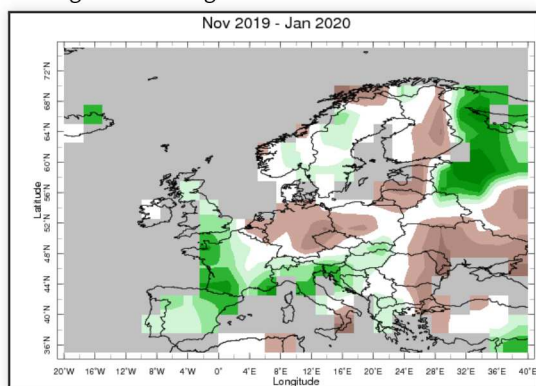
On Europe and American continent few significant forecasts and generally not in accordance with observations.



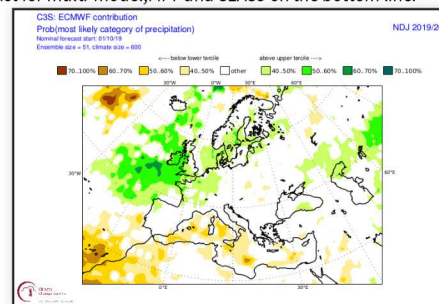
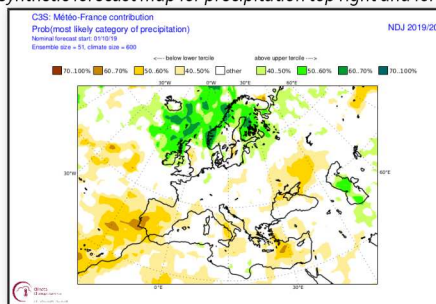
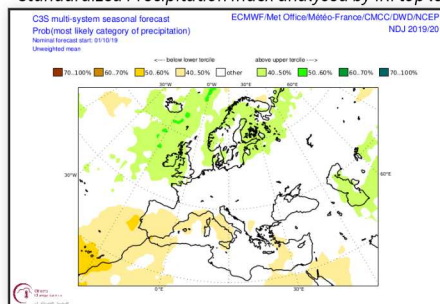
Standardized Precipitation Index analysed by IRI top left, forecast for multi-model top right and MF7 and SEAS5 on the bottom line.

Climatic parameters : Precipitations over Europe

The observed signal is heterogeneous and little correlated with forecasts.



Standardized Precipitation Index analysed by IRI top left, Synthetic forecast map for precipitation top right and forecast for multi-model, MF7 and SEAS5 on the bottom line.



General summary : for the period NDJ 2019-2020

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 over Eurasia and North Atlantic, leading to a good general situation for Europe despite a singular November.

The EA+ and NAO+ modes were better captured by ECMWF than by MF. SCAN mode was also predicted by ECMWF.

3) Climatic parameters over Europe :

Hot temperatures anomalies were well forecasted over Europe with a slight shift towards the northwest (temperatures warmer than normal expected towards the Atlantic facade not observed and conversely temperatures warmer than normal over south-eastern Europe not expected).

Regarding precipitation the observed signal is heterogeneous and little correlated with forecasts.