

VERIFICATION BULLETIN

OCTOBER - NOVEMBER - DECEMBER 2020

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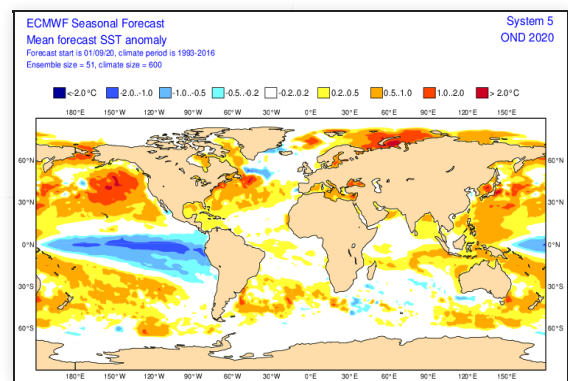
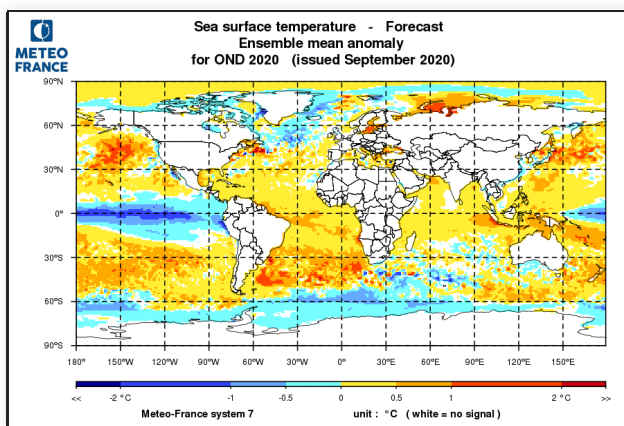
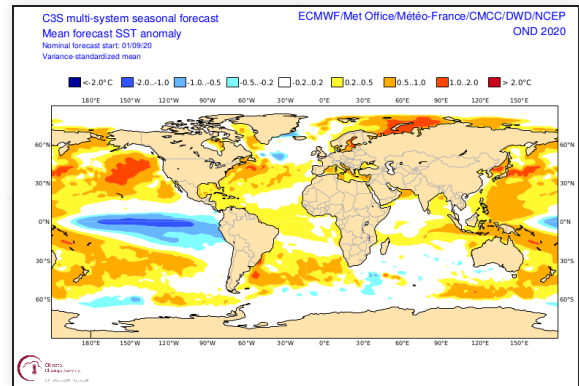
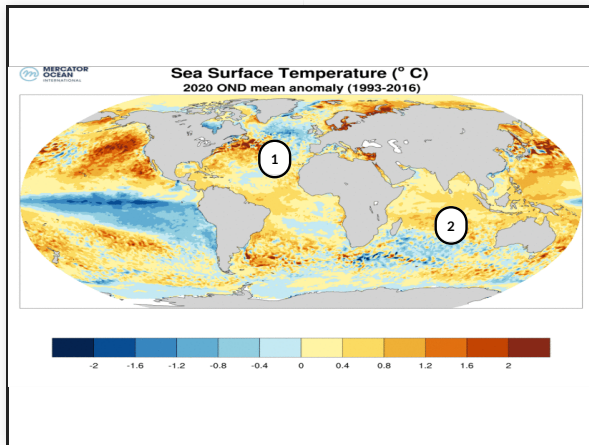
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Introduction : Objective

- **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

Very good SST anomaly forecast. Some small imperfections in the North Atlantic and the Indian Ocean.



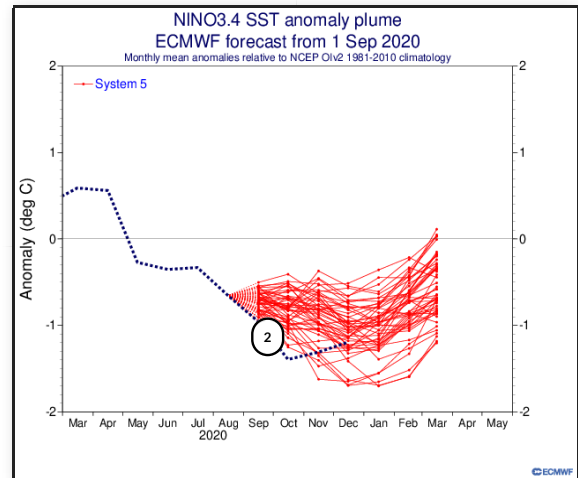
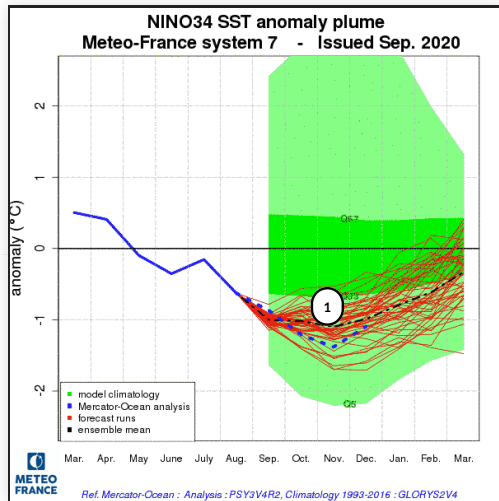
SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S7 (bottom left) and SEASS (bottom right)

- 1 - This cold water band was not forecasted by the models
- 2 - Underestimated hot anomaly

Oceans : ENSO

CAUTION : reference analyses differ between MF-S7 (Mercator-Ocean 1993-2016) and SEAS5 (NCEP 1981-2010).

The peak of the cold anomaly was slightly underestimated especially by ECMWF

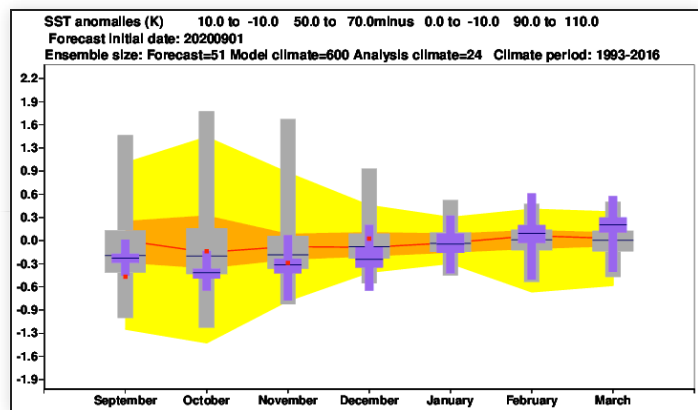
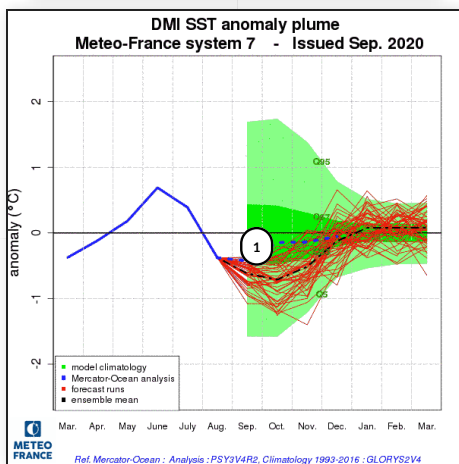
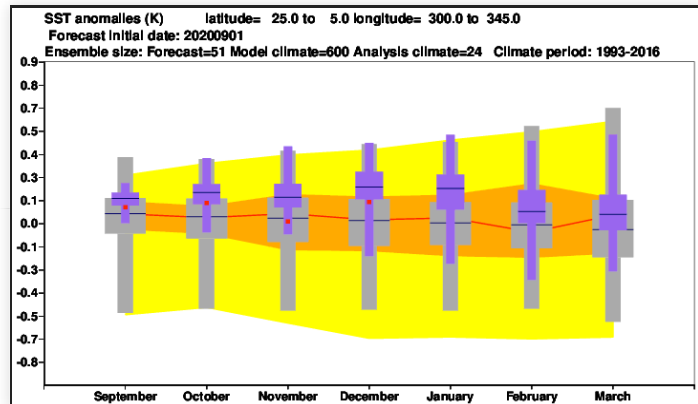
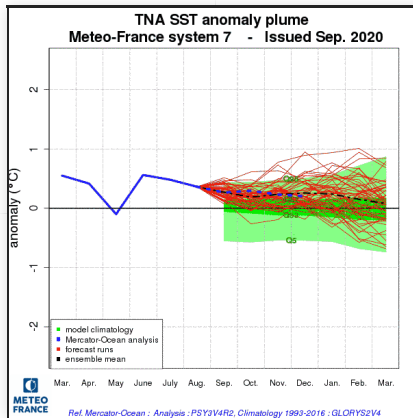


- 1 - The observation is well in the plume, although in the lowest part
- 2 - The observation temporarily left the plume

Oceans : tropical Atlantic and Indian Ocean index

Both models had very similar forecasts :

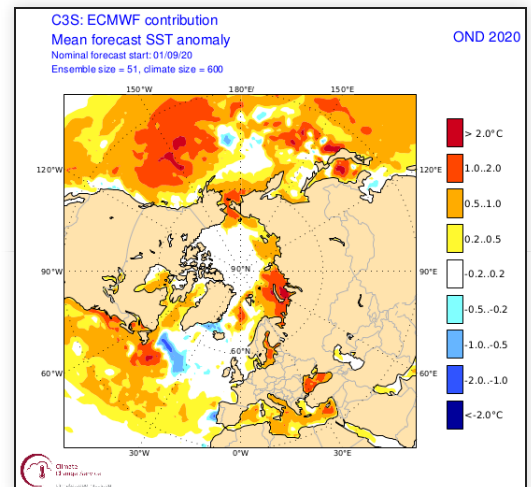
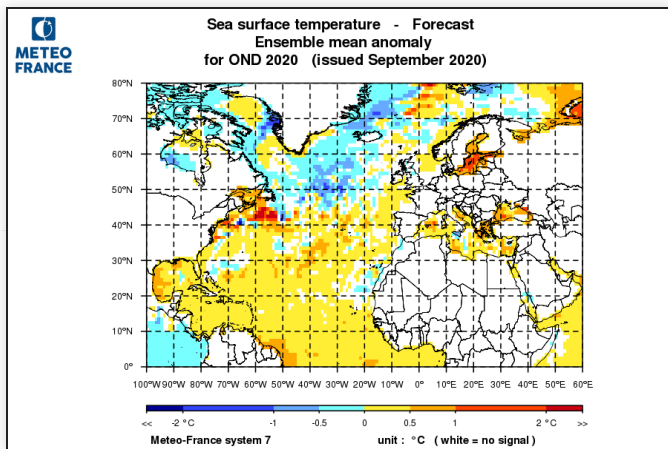
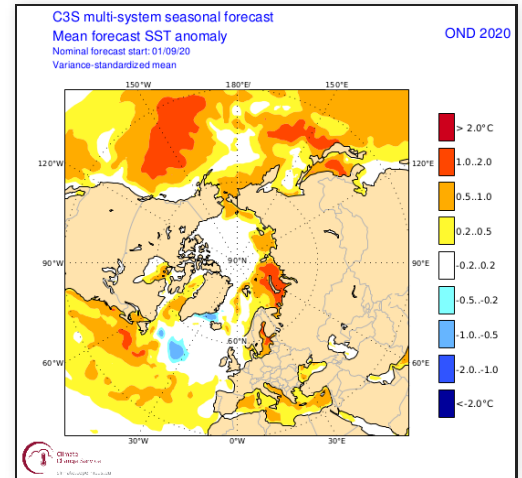
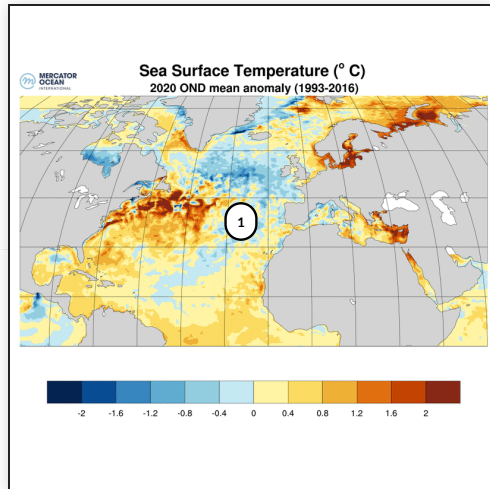
- TNA : The hot anomaly is well predicted by MF-S7 and a little overestimated by ECMWF-SEAS5.
- DMI : The forecast of the negative DMI anomaly was overestimated in particular by MF7



1 - DMI index starts to grow much earlier than forecast

Oceans : North Atlantic SST

The forecast is generally good, except for the cold anomaly in the vicinity of Europe which stretches towards the center of the tropical Atlantic.



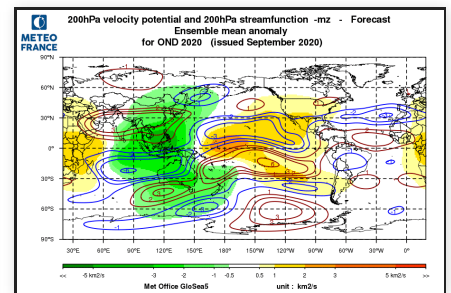
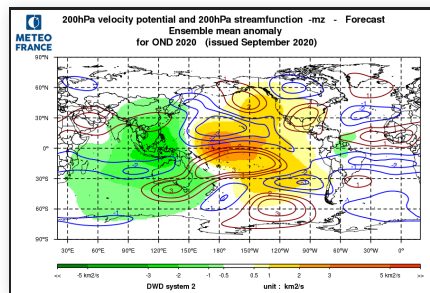
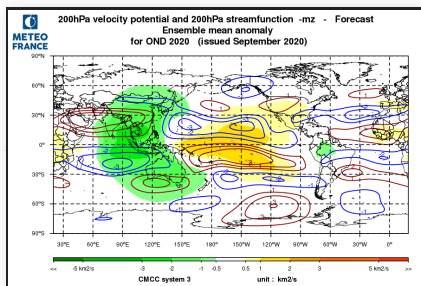
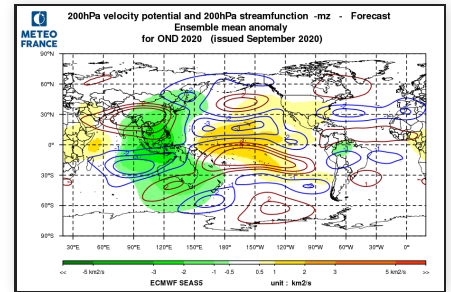
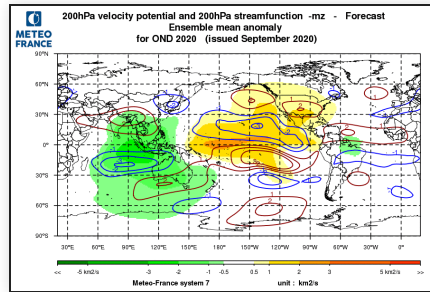
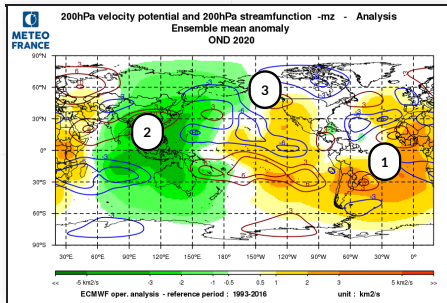
SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S7 (bottom left) and ECMWF SEAS5 (bottom right)

1 - This cold anomaly was not expected

Atmospheric circulation : Global teleconnection

VP : The position of the structures was well forecasted, but the main downware motion anomaly over the Atlantic, South America and Africa, was largely underestimated by all the models.

SF : The positioning of the activity centers in the Pacific/Indian zone was correctly forecasted. Teleconnection to North America also, more or less marked depending on the model.

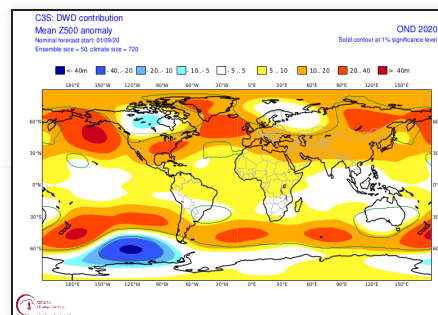
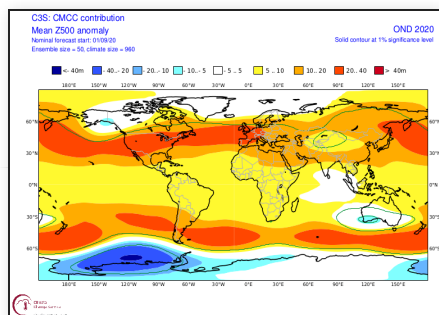
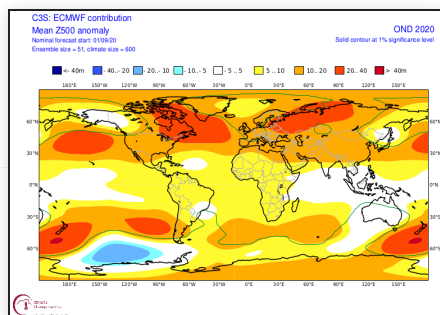
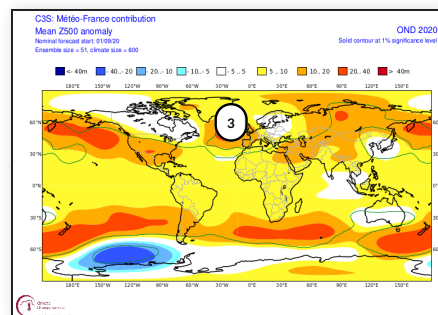
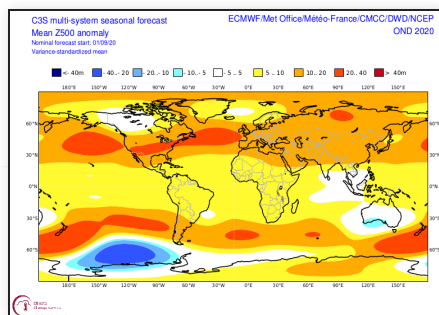
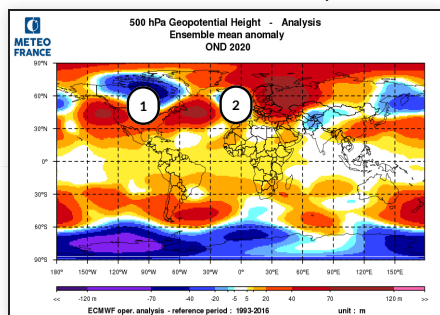


ECMWF analysis, MF-S7, ECMWF-SEAS5, CMCC, DWD and JMA 200hPa velocity potential anomalies (color range, green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

- 1 - poor forecast of this very strong downward motion anomaly
- 2 - stronger than expected upward motion anomaly
- 3 - PNA teleconnection

Atmospheric circulation : 500hPa Geopotential height

In North America, the field was well planned in connection with the PNA. On the other hand, in the North Atlantic/Europe, the low value zone was not at all anticipated.

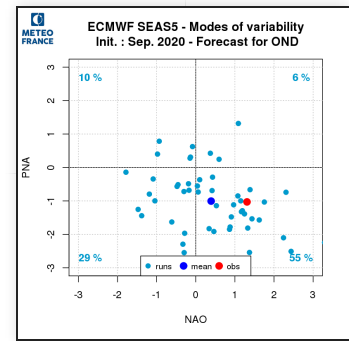
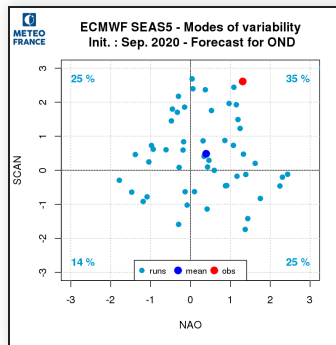
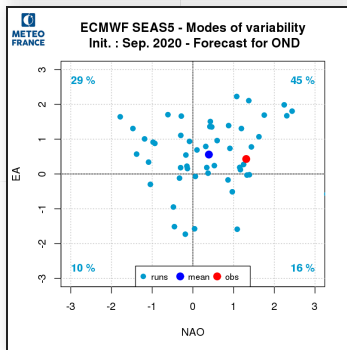
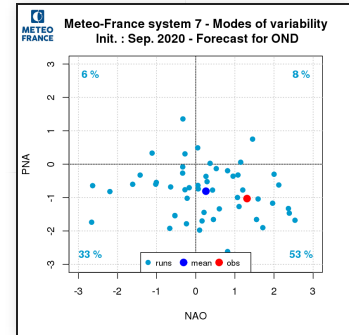
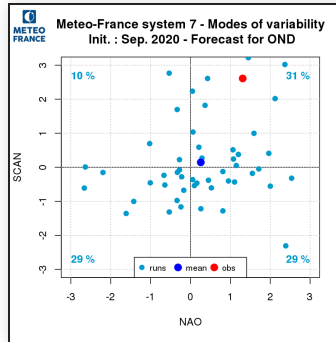
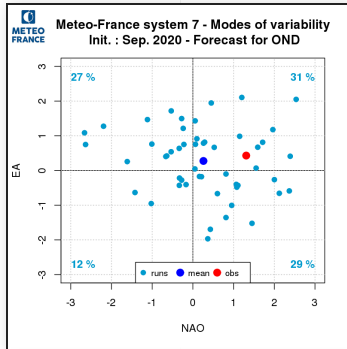


ECMWF analysis, C3S multi-system, MF-S7, ECMWF-SEAS5, CMCC and DWD 500hPa geopotential height anomalies.

- 1 - PNA- generally well forecast
- 2 - Poor prediction of anomalies on Europe
- 3 - MF-S7 is not good at all from Quebec to Europe

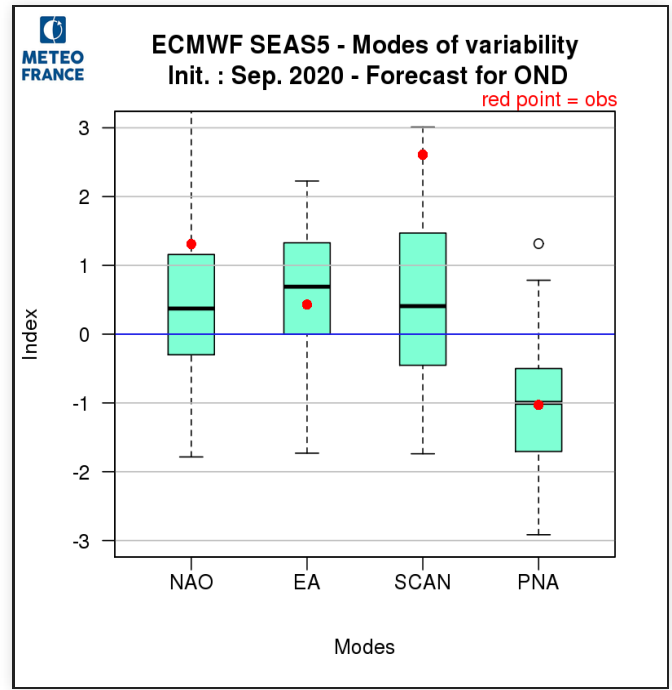
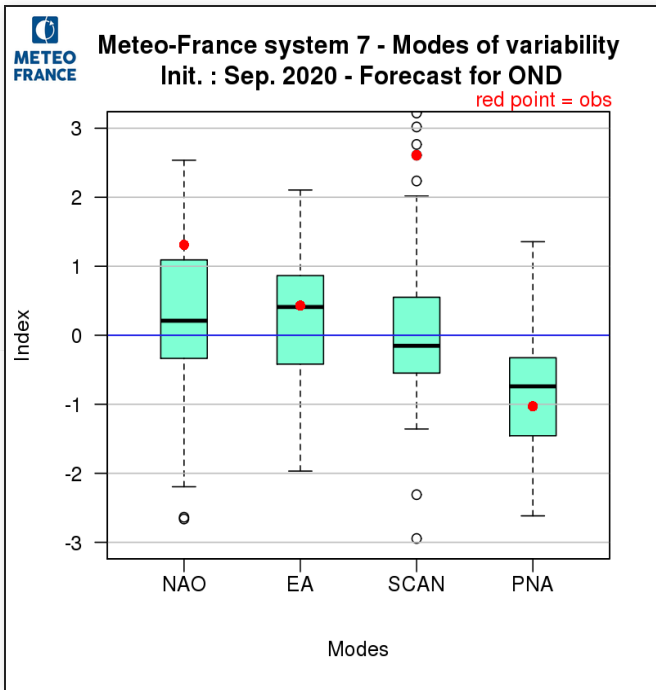
Atmospheric circulation : Modes of variability

Good EA and PNA forecast. The positive NAO and above all the positive SCAN, planned around neutrality, was in fact strongly positive.



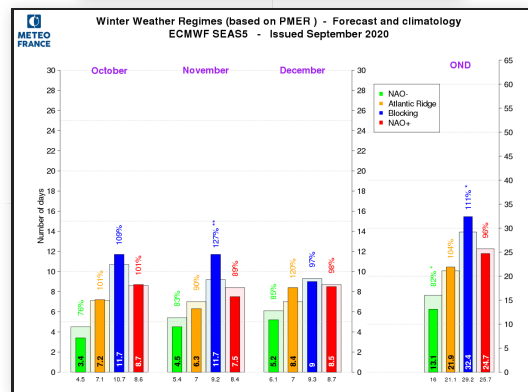
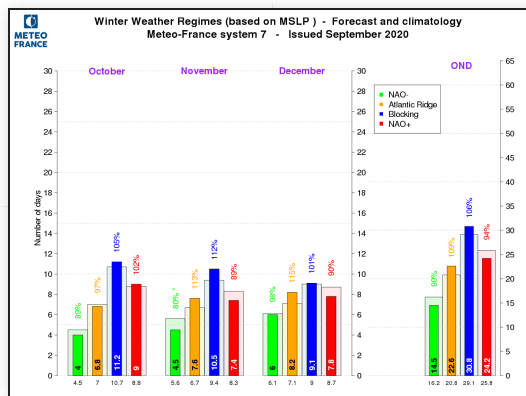
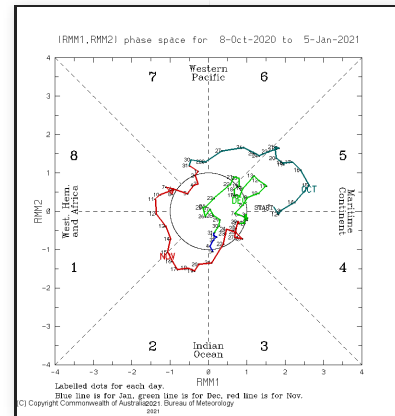
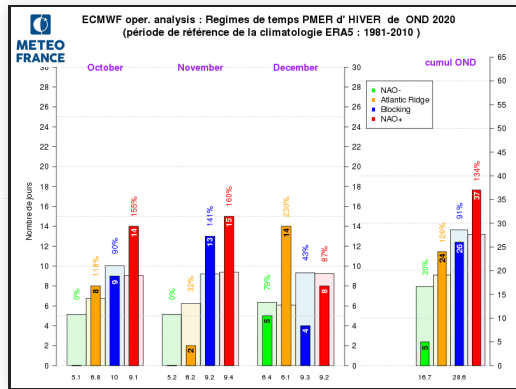
Atmospheric circulation : Modes verification

Same observation as for the previous slide



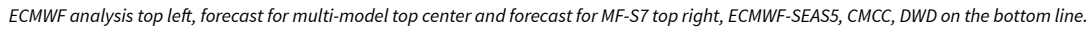
Atmospheric circulation : Winter SLP weather regimes

The models did not detect the dominant trend to NAO + (due to October and November) and Atlantic Ridge (due to december).



weather regime : ECMWF analysis top left, M7 and ECMWF forecasts at the bottom. MJO phase top right

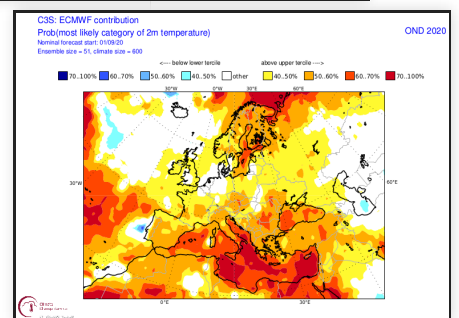
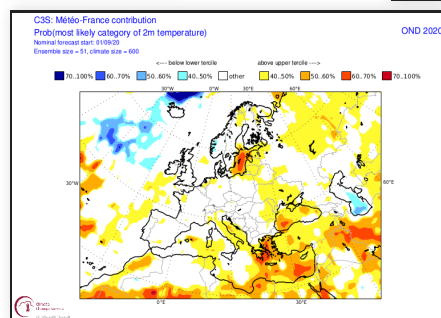
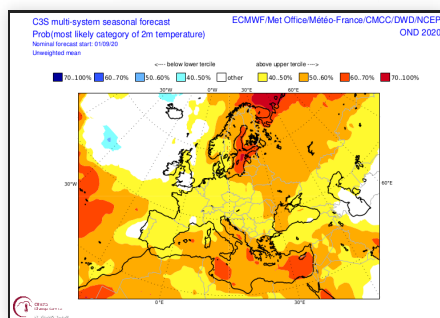
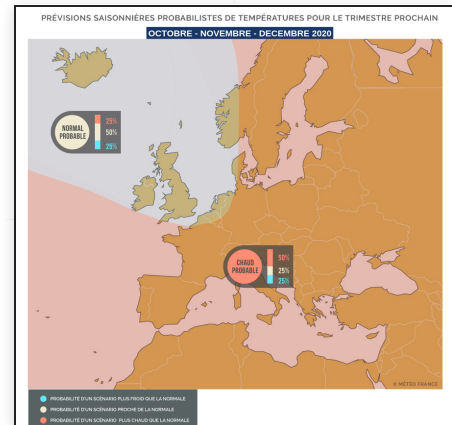
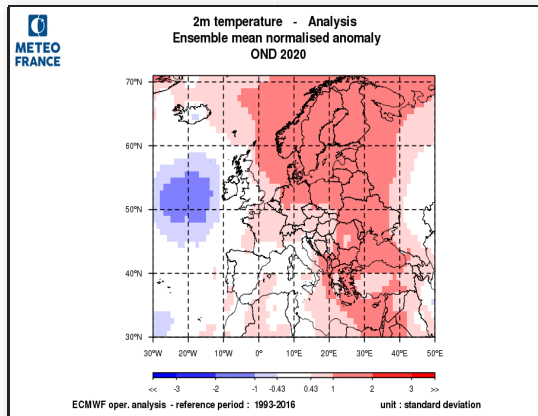
Outside of Europe, the forecast of temperature trends was correct over most areas of the globe. See maps for local details.



1 - Warm forecasts were predominant over central and northeastern North America.
2 - Good trend of ECMWF probabilities. Not all models anticipated it.

Climatic parameters : temperature over Europe

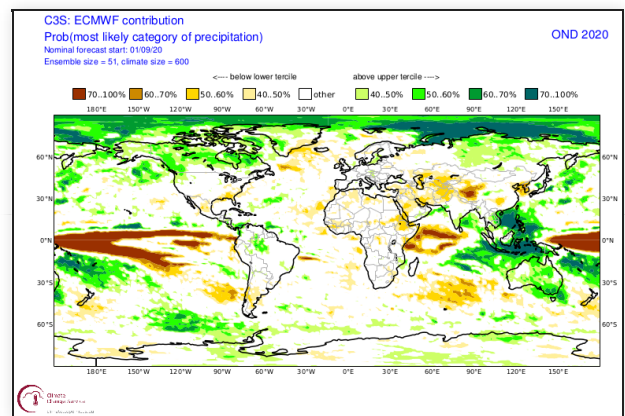
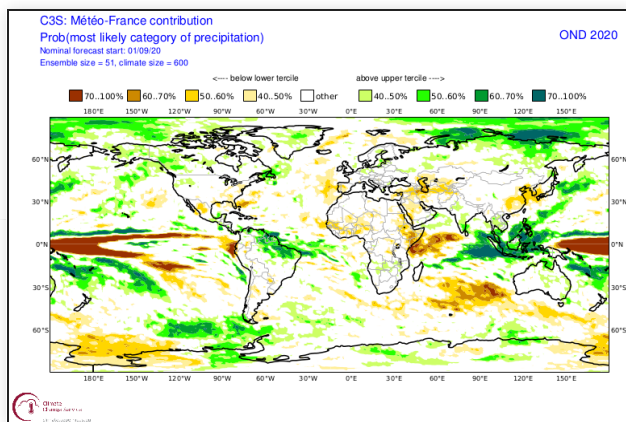
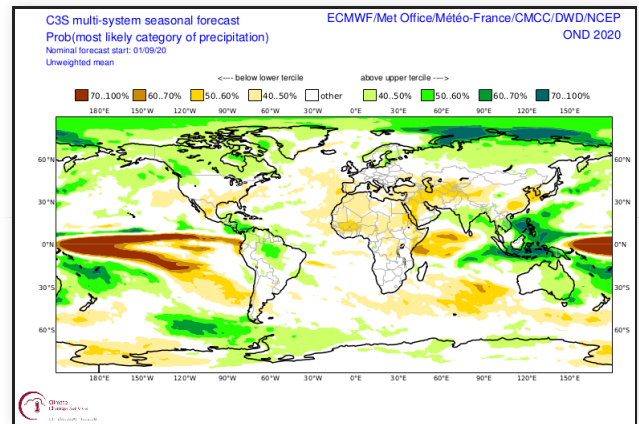
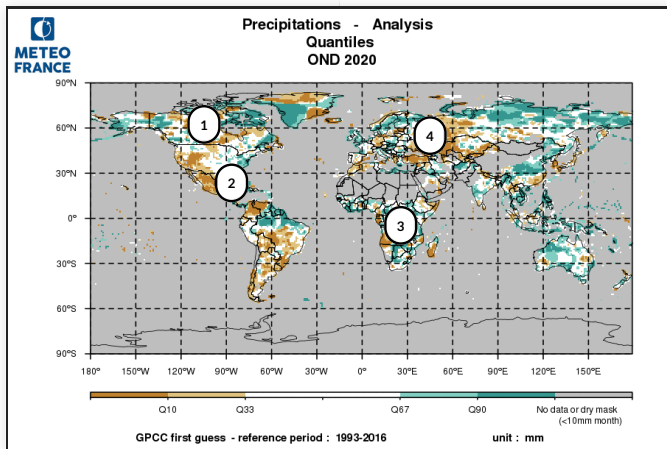
The models had not predicted the minimum which positioned itself over the Northwest of the continent and which produced an average north-westerly flow to the Mediterranean and a dominant southern flow over Eastern Europe. Consequently, the warm trend was good in Eastern Europe, Although underestimated. On the other hand, the warm trend forecasted for the Iberian Peninsula and the western Mediterranean did not occur.



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

The effects of La Nina have on the whole been well taken into account, even if the great variability of precipitation cannot be apprehended on a seasonal scale. Precipitation over Africa and central Canada was not well forecast, as was the deficit over western Asia.

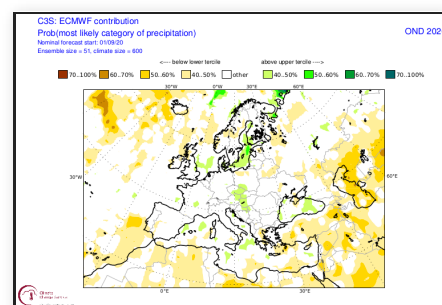
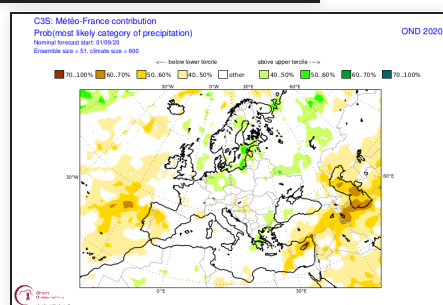
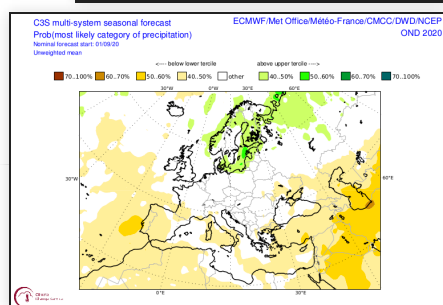
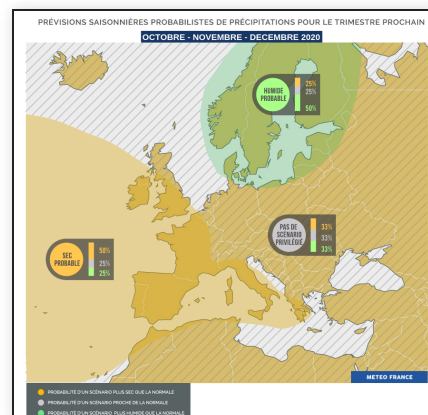
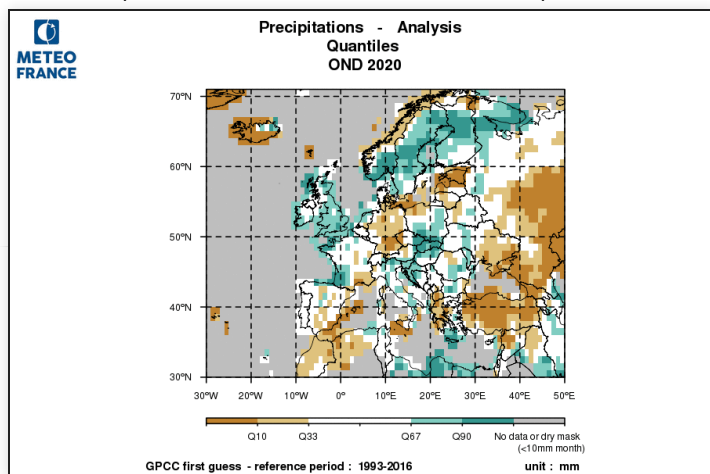


Standardized Precipitation Index analysed by IRI top left, forecast for multi-model top right and MF-S7 and SEAS5 on the bottom line.

- 1 - The forecast was more wet than what append
- 2 - The excess precipitation around the Gulf of Mexico was not expected
- 3 - this wet general tendency was not foreseen
- 4 - The extent and intensity of this dry area was not predicted

Climatic parameters : Precipitations over Europe

On a European scale, the surplus of precipitation on Scandinavia was expected, but in connection with the bad forecast of the general situation, the surpluses on the Atlantic area were not anticipated.



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 OND 2020

1) Oceans :

SST was generally well forecasted. The peak of the La Nina cold anomaly was slightly underestimated

2) Large scale atmospheric circulation :

VP at 200hPa : The main pattern of subsidence anomaly over the Atlantic and Africa was not forecasted. The upward motion anomaly over the Maritime Continent was underestimated.

FC at 200hPa : centers of activity in the Pacific/Indian and the teleconnection to North America were correctly planned.

Z500 : The PNA- structure was well anticipated. The geopotential low on northwestern Europe was not at all anticipated.

3) Climatic parameters over Europe :

On a global scale, the major trends linked to the La Nina phenomenon were well foreseen. On Europe, the poor forecast of the general situation has repercussions on the forecast of climatic parameters: (precipitation on the Atlantic fringe and temperature on the southwest of the continent)