

VERIFICATION BULLETIN

NOVEMBER - DECEMBER - JANUARY 2020-2021

Table of Content

1. Introduction	
1. Objective	3
2. Oceans	
1. surface temperature anomalies	4
2. ENSO	5
3. tropical Atlantic and Indian Ocean index	6
4. North Atlantic SST	7
3. Atmospheric circulation	
1. Global teleconnection	8
2. 500hPa Geopotential height	9
3. Modes of variability	10
4. Modes verification	11
5. Winter SLP weather regimes	12
4. Climatic parameters	
1. temperature on the globe	13
2. temperature over Europe	14
3. Precipitations over the globe	15
4. Precipitations over Europe	16
5. General summary	
1. for the period OND 2020	17

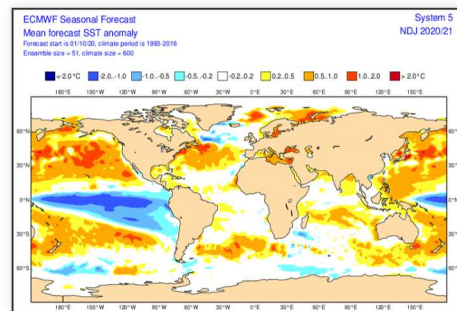
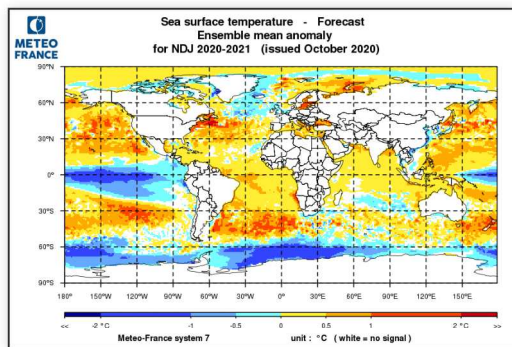
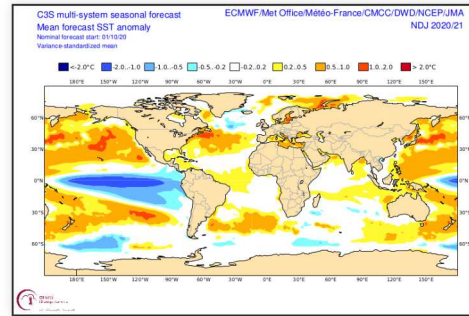
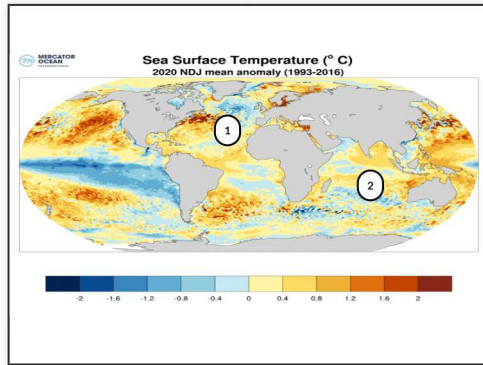
Introduction : Objective

- 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 SEAS5 (bottom right)

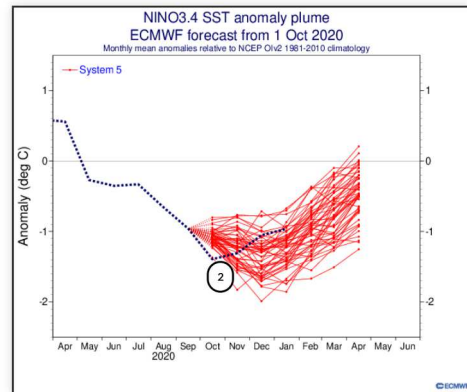
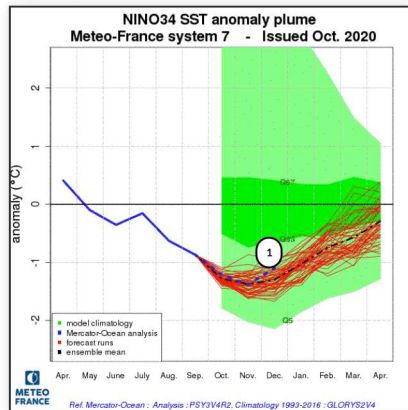
- 1 - This cold water band was not forecasted by the models
- 2 - Underestimated hot anomaly

Oceans : ENSO

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

Perfect trajectory for MF-S7. Note the very small spread of the ensemble forecast.

Rather good prediction for ECMWF-SEAS5.



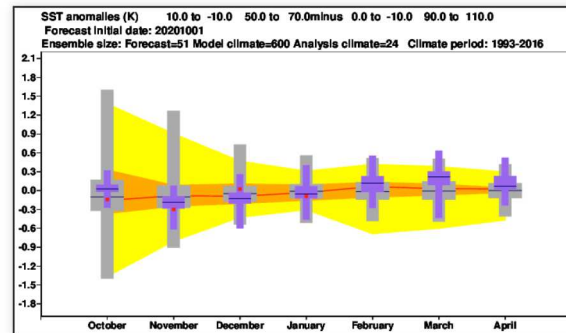
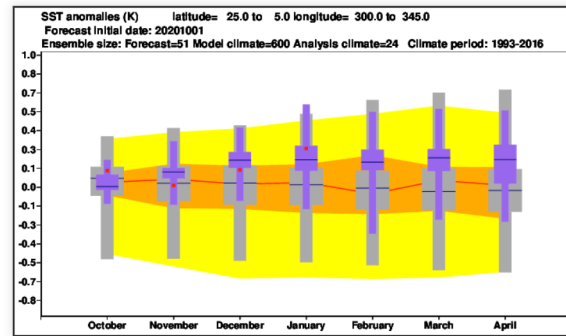
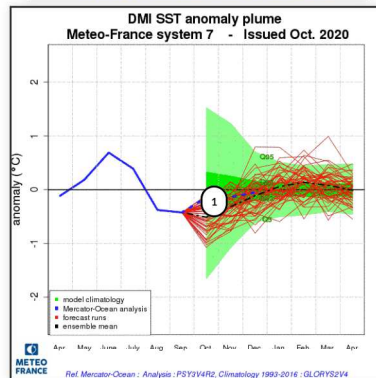
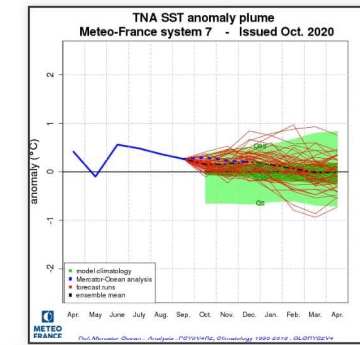
- 1 - The observation is well in the plume, although in the lowest part
- 2 - The observation temporarily left the plume

Oceans : tropical Atlantic and Indian Ocean index

Both models had very similar forecasts :

- TNA : good forecast of both models in terms of 3-month mean

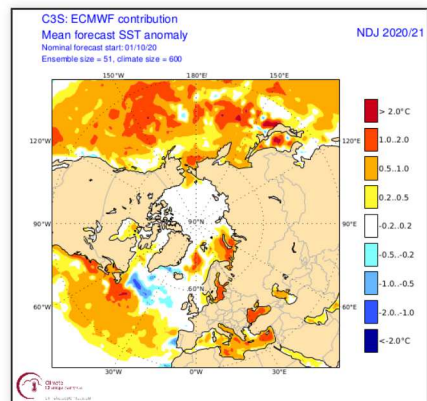
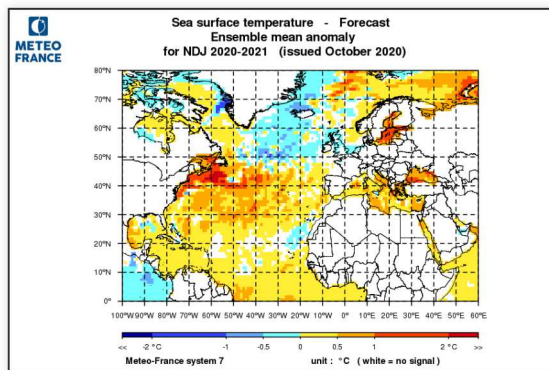
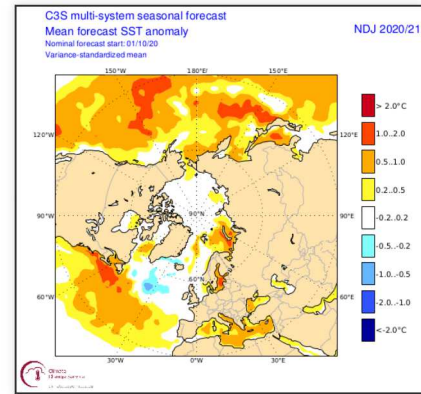
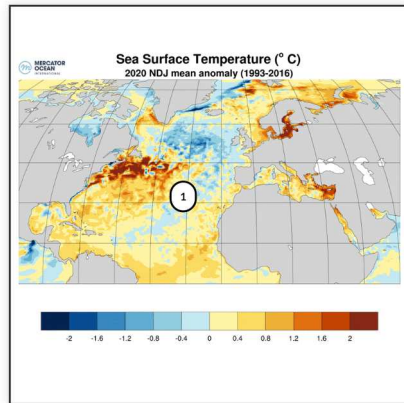
- DMI : The forecast of the negative DMI anomaly was slightly overestimated in particular by MF7



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.



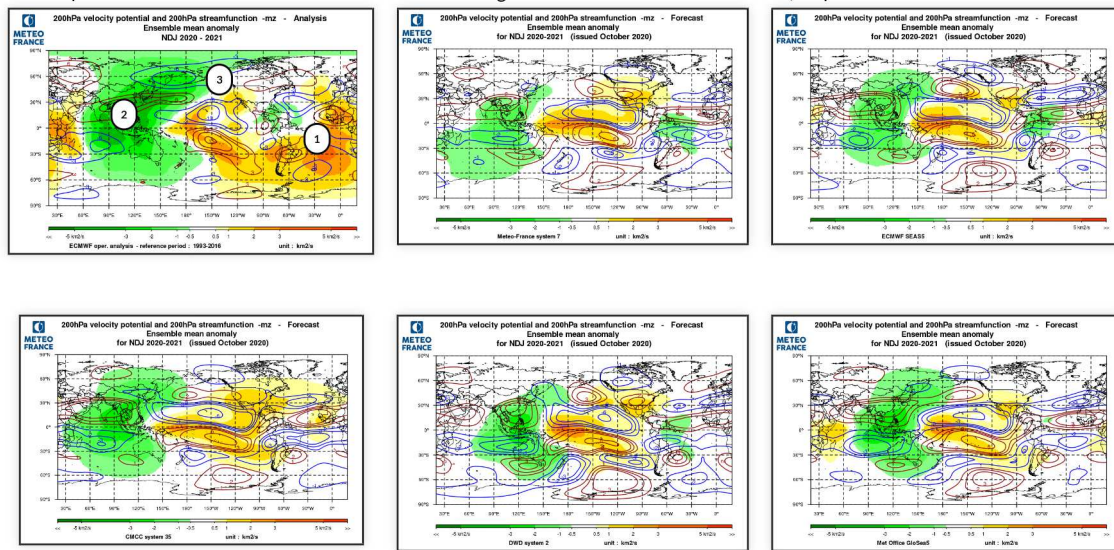
SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S7 (bottom left) and ECMWF SEAS5 (bottom right)

1 - This cold anomaly was not foreseen

Atmospheric circulation : Global teleconnection

VP : very good forecast of the patterns associated to La Niña (centred on the Pacific and the Indian Ocean). The secondary dipole over both sides of the Atlantic was present in models, but underestimated.

SF : The positioning of the activity centres in the Pacific/Indian zone was correct, but not perfect. Globally, SF forecasts were good in the tropics. Teleconnection to North America was too strong in models. And over North Atlantic, SF patterns were too zonal.



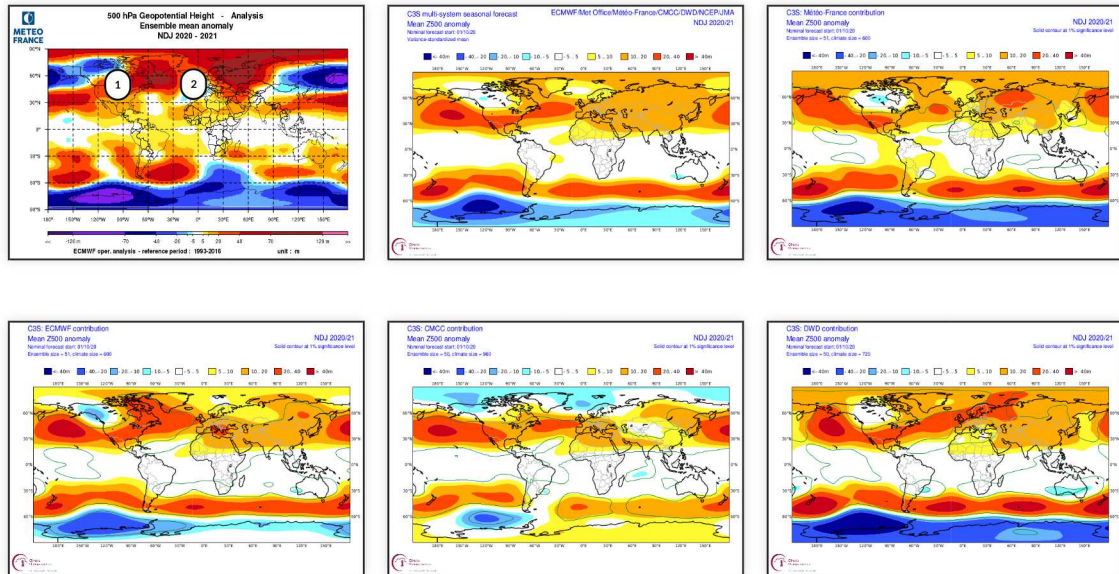
ECMWF analysis, MF-S7, ECMWF-SEAS5, CMCC, DWD and JMA 200hPa velocity potential anomalies (color range, green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

- 1 - strong downward motion anomaly, not foreseen by models
- 2 - Good positioning, but stronger than expected upward motion anomaly
- 3 - Not clear PNA teleconnection in the analysis

Atmospheric circulation : 500hPa Geopotential height

In North America, shift in the patterns of PNA-.

In North Atlantic/Europe, the negative anomaly was too small to be captured by models. Note that MF-S7 suggested it, but shifted Eastward.



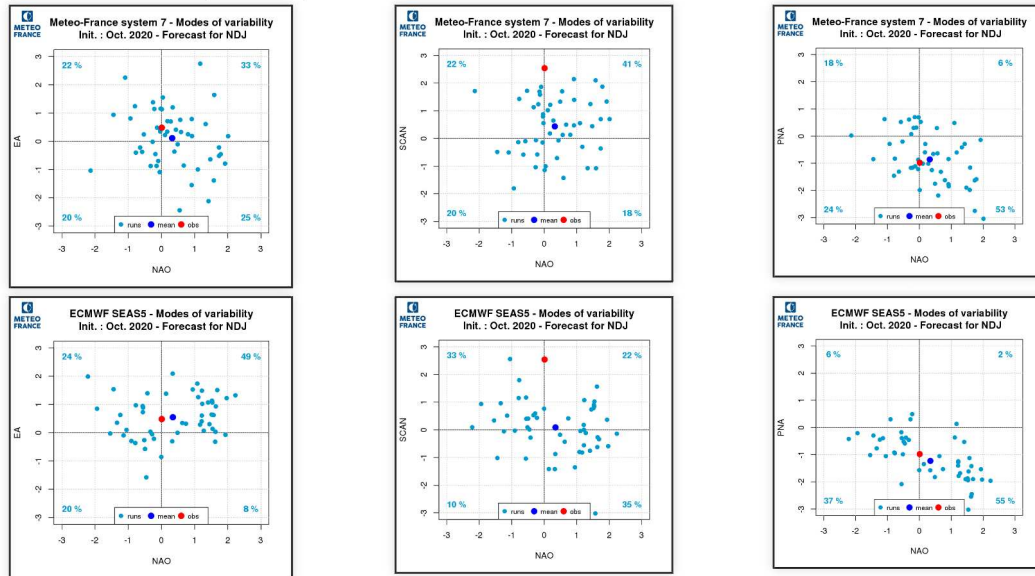
- 1 - PNA- shifted
- 2 - "Deep" negative anomaly , not really predicted (MF-S7 suggested this possibility)

Atmospheric circulation : Modes of variability

Good PNA forecast, despite the shift in the pattern.

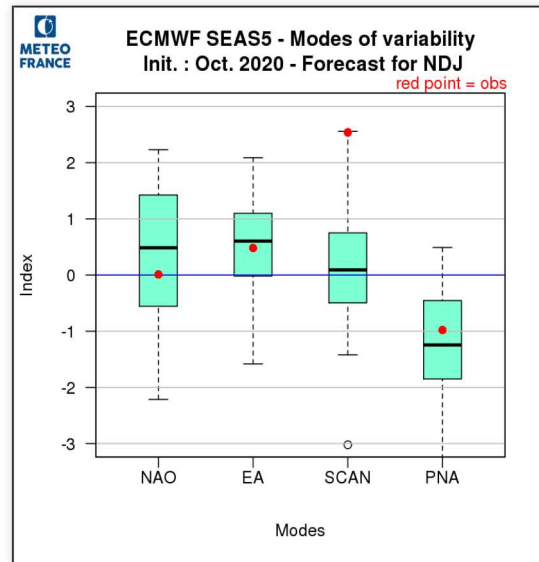
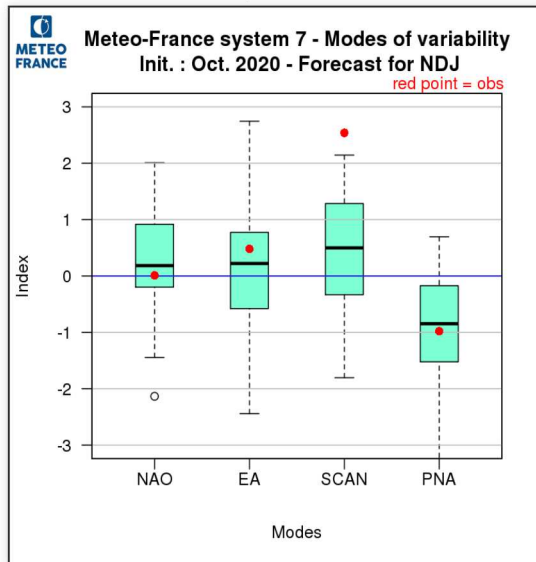
Seasonal NAO was neutral, but in fact it changed a lot within the quarter (very positive in Nov., neutral in Dec., very negative in January). The forecast was quite good finally.

The positive EA was correctly foreseen by ECMWF-SEAS5



Atmospheric circulation : Modes verification

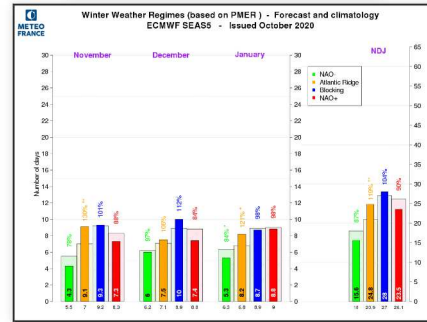
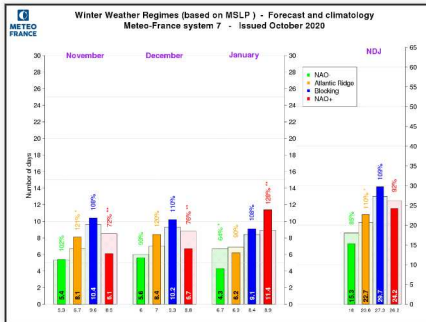
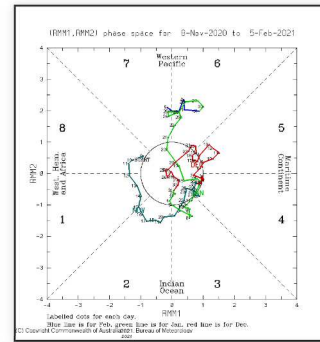
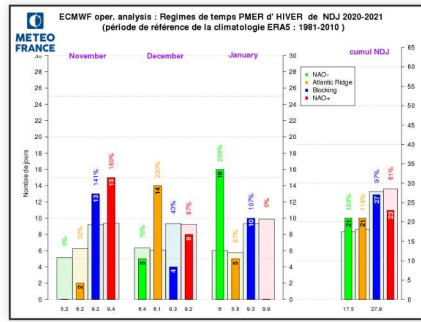
Same observation as for the previous slide



Atmospheric circulation : Winter SLP weather regimes

Complex quarter with a lot of intra-seasonal variability. Again, NAO was very positive in Nov., neutral in Dec., very negative in January. At the end, almost a climatological distribution of weather regimes.

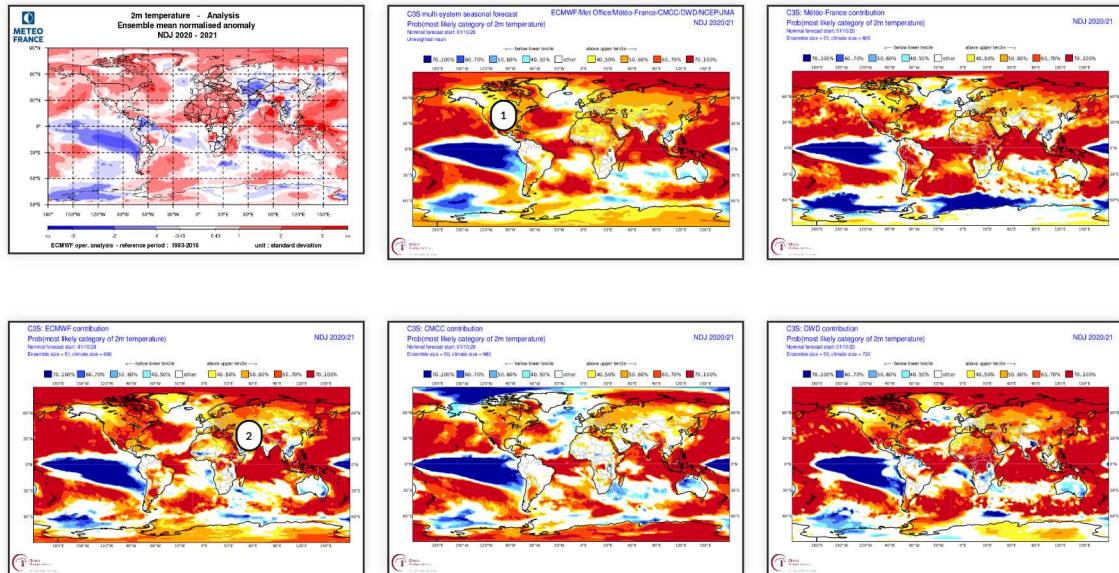
The models are not able to forecast such a complex evolution. For the only regime with significant difference to climatology (enhanced Atl. Ridge frequency) ,the forecasts were correct.



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

Climatic parameters : temperature on the globe

Outside of Europe, the forecast of temperature was correct over continental regions, except North of South America, Australia and in many countries in Asia (vast cold anomaly not foreseen)

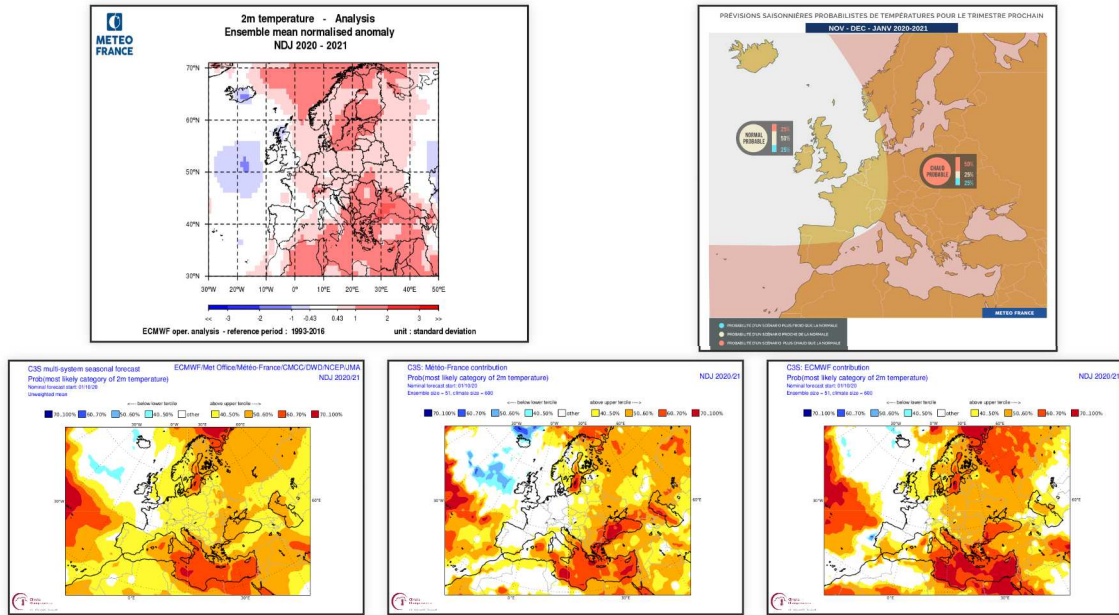


ECMWF analysis top left, forecast for multi-model top center and forecast for MF-S7 top right, ECMWF-SEAS5, CMCC, DWD on the bottom line.

- 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

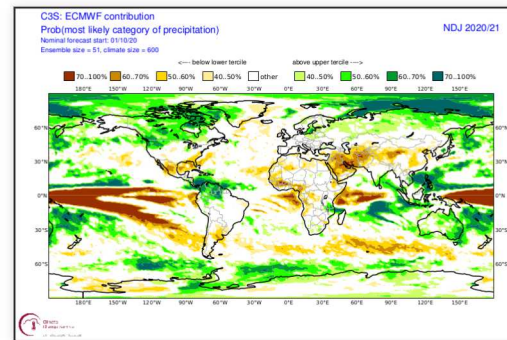
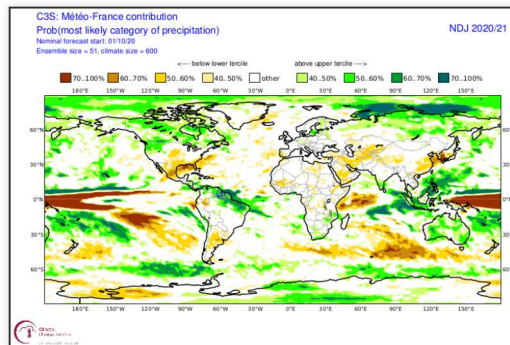
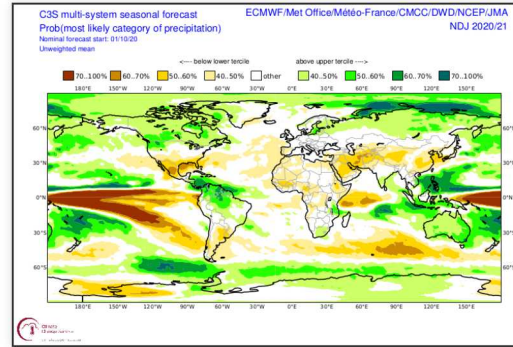
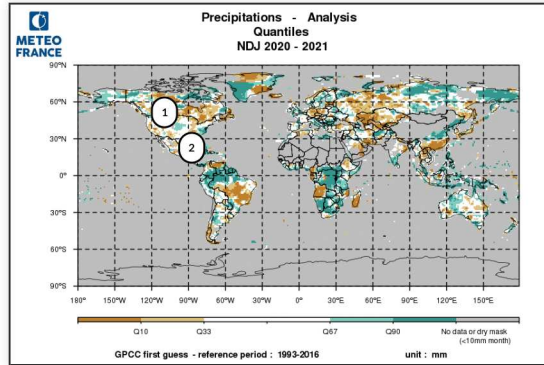
Despite some important differences in the circulation forecasts, temperature maps were quite consistent. And their forecasts were fairly good.



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. Anyway over North America, because of the shift in the PNA patterns, the precipitation forecast is poor. Noticeable bad forecast also over Australia (not as wet as expected).



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

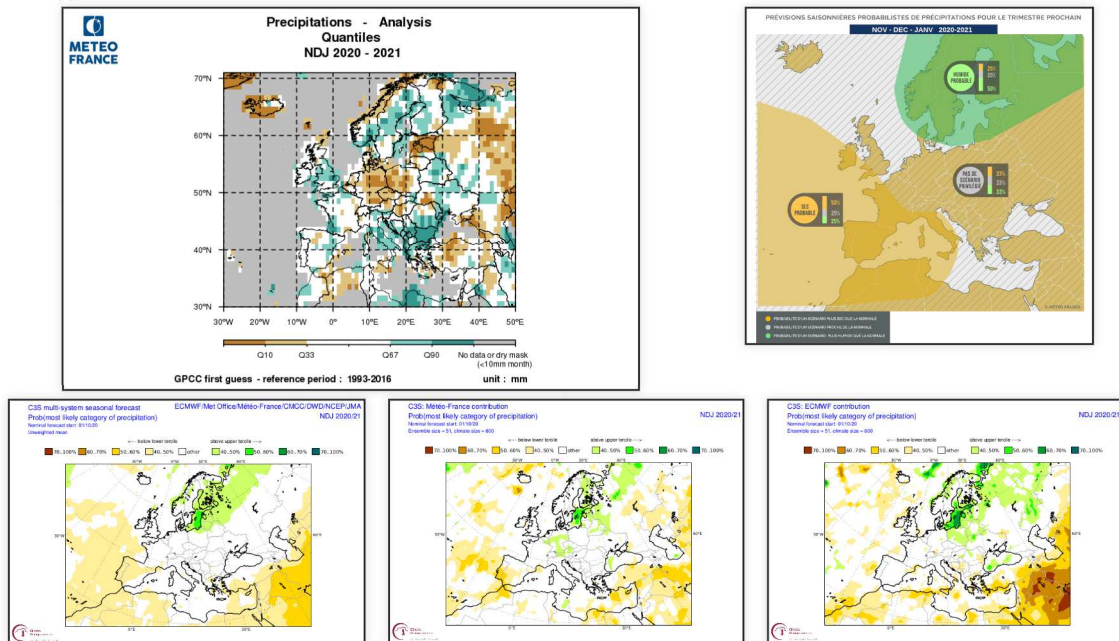
- 1 - Unusual precipitation forecast for a La Niña situation, due too a shift in the main circulation patterns.
- 2 - The excess precipitation around the Gulf of Mexico was not expected

Climatic parameters : Precipitations over Europe

Complex patterns of precipitation, partly due to a high intra-seasonal variability.

The "above normal" precipitation foreseen on Scandinavia was correct.

The "below normal" zone over South-Western Europe did not really occur. At large scale, the 3-month accumulation observed was quite the opposite.



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 other main patterns were well foreseen.

2) Large scale atmospheric circulation :

VP 200 hPa : very good forecast of the patterns associated to La Niña (centred on the Pacific and the Indian Ocean). The secondary dipole over both sides of the Atlantic was present in models, but underestimated.

SF 200 hPa : the positioning of the activity centres in the Pacific/Indian zone was correct, but not perfect. Globally, SF forecasts were good in the tropics. Teleconnection to North America was too strong in models. And over North Atlantic, SF patterns were too zonal.

Z500 : The PNA- structure was well anticipated, but patterns were shifted. The geopotential low on Western Europe was not really anticipated.

3) Climatic parameters over Europe :

Quite a good temperature Forecast. For precipitation, the wet conditions over Sandinavia were correctly foreseen, whereas the dry area expected over Soutwestern Europe didn't occur.