

VERIFICATION BULLETIN

DECEMBER - JANUARY - FEBRUARY 2020-2021

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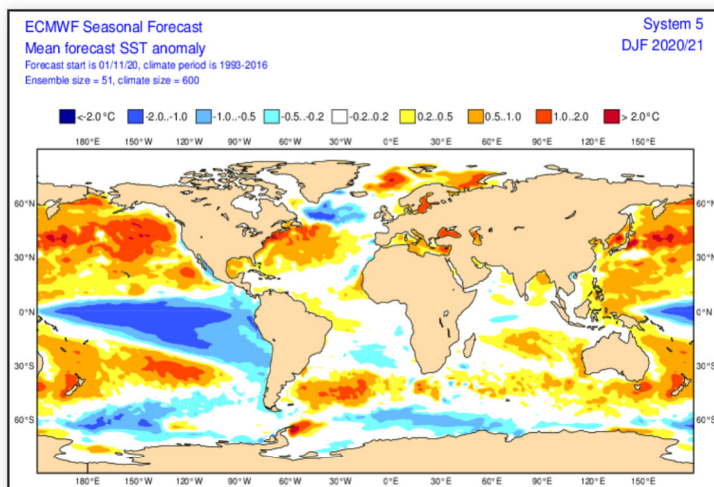
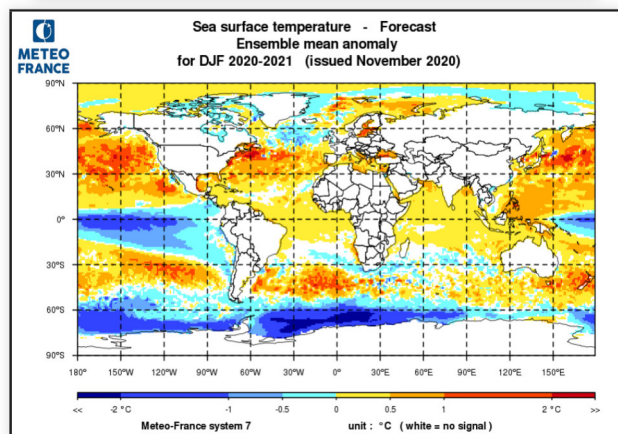
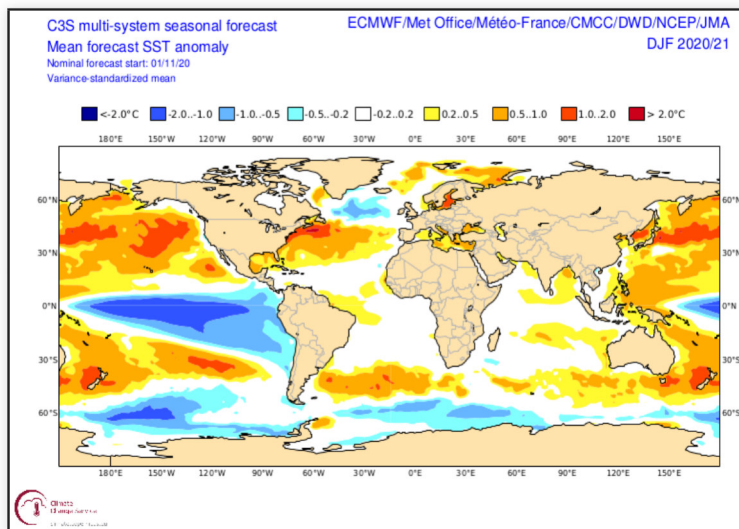
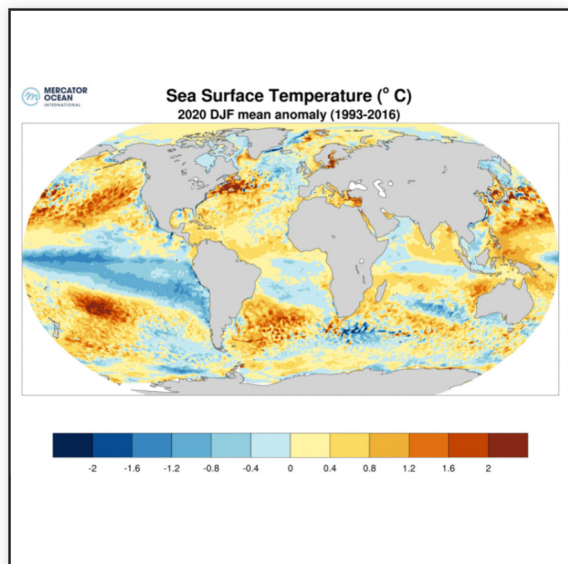
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Introduction : Objective

- 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

Good SST anomaly forecast in tropical zone and fairly good at temperate latitudes except in South Pacific near Australia where warm anomalies were forecasted but not observed.

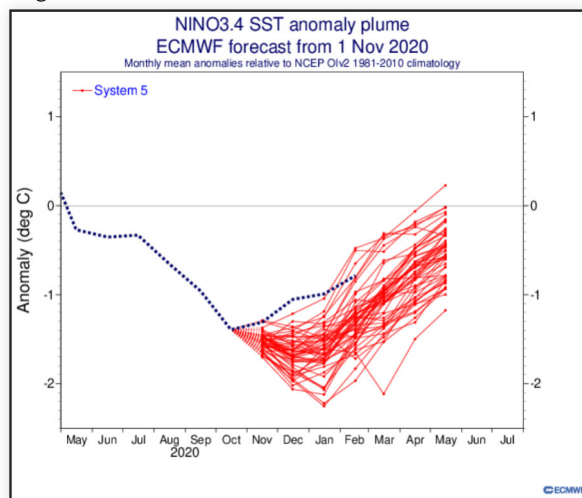
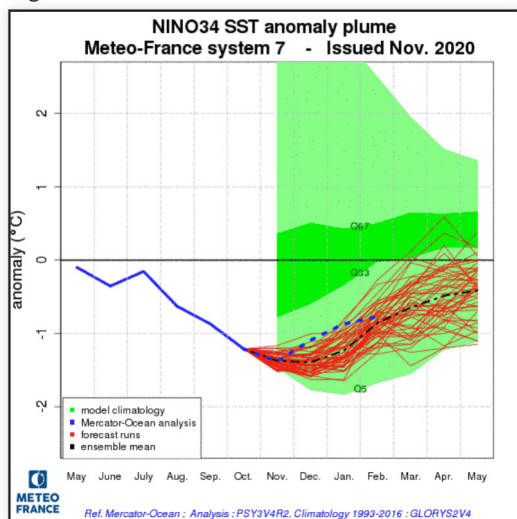


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S7 (bottom left) and SEAS5 (bottom right)

Oceans : ENSO

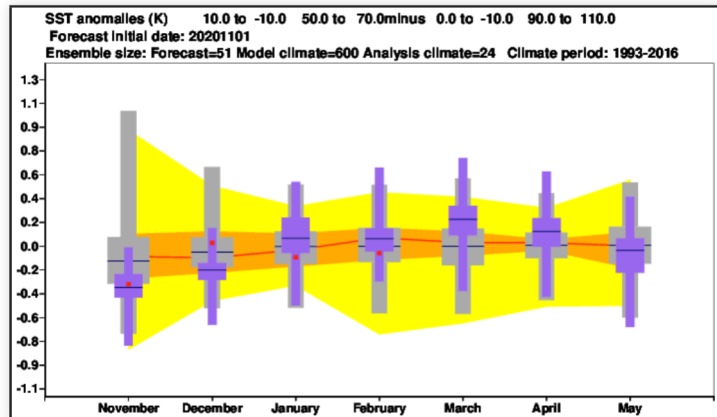
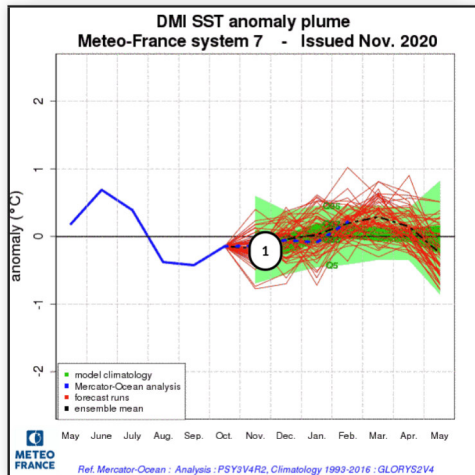
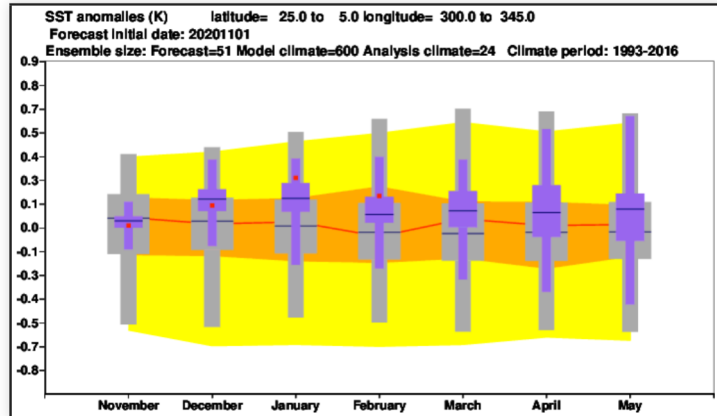
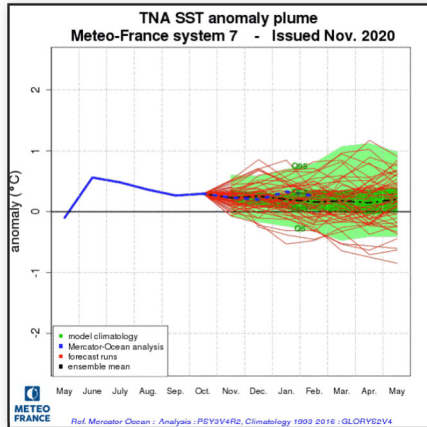
CAUTION : reference analyses differ between MF-S7 (Mercator-Ocean 1993-2016) and ECMWF-SEAS5 (NCEP 1981-2010).

Rather good forecast for MF-S7. ECMWF-SEAS5 has a cold bias but trend is good.



Oceans : tropical Atlantic and Indian Ocean index

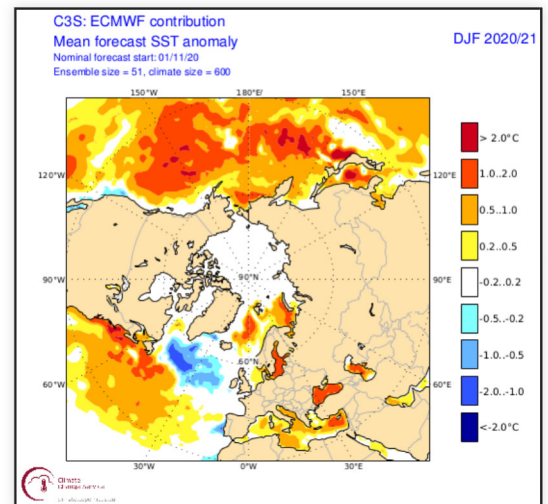
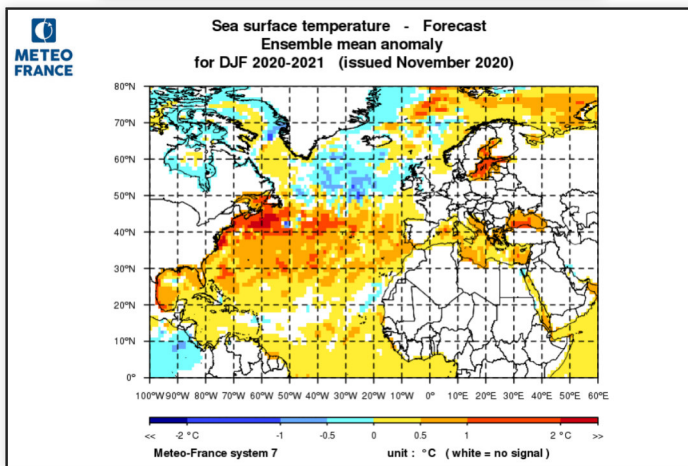
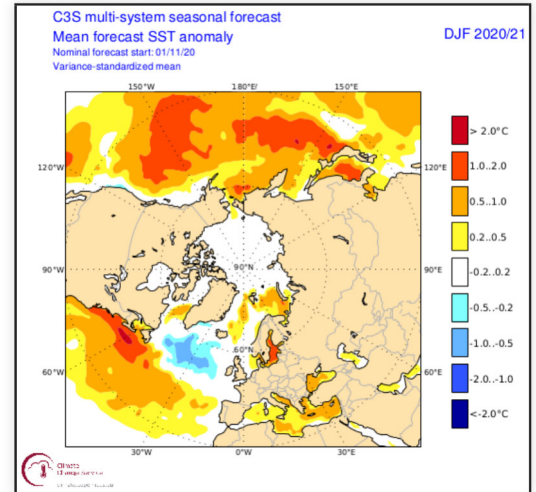
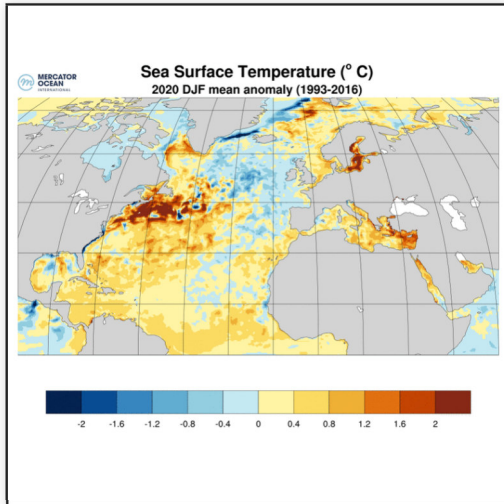
These index have remained low. Good forecast of both models.



1 - DMI index starts to grow much earlier than forecast

Oceans : North Atlantic SST

The forecast is generally good, with the main anomalies well positioned.

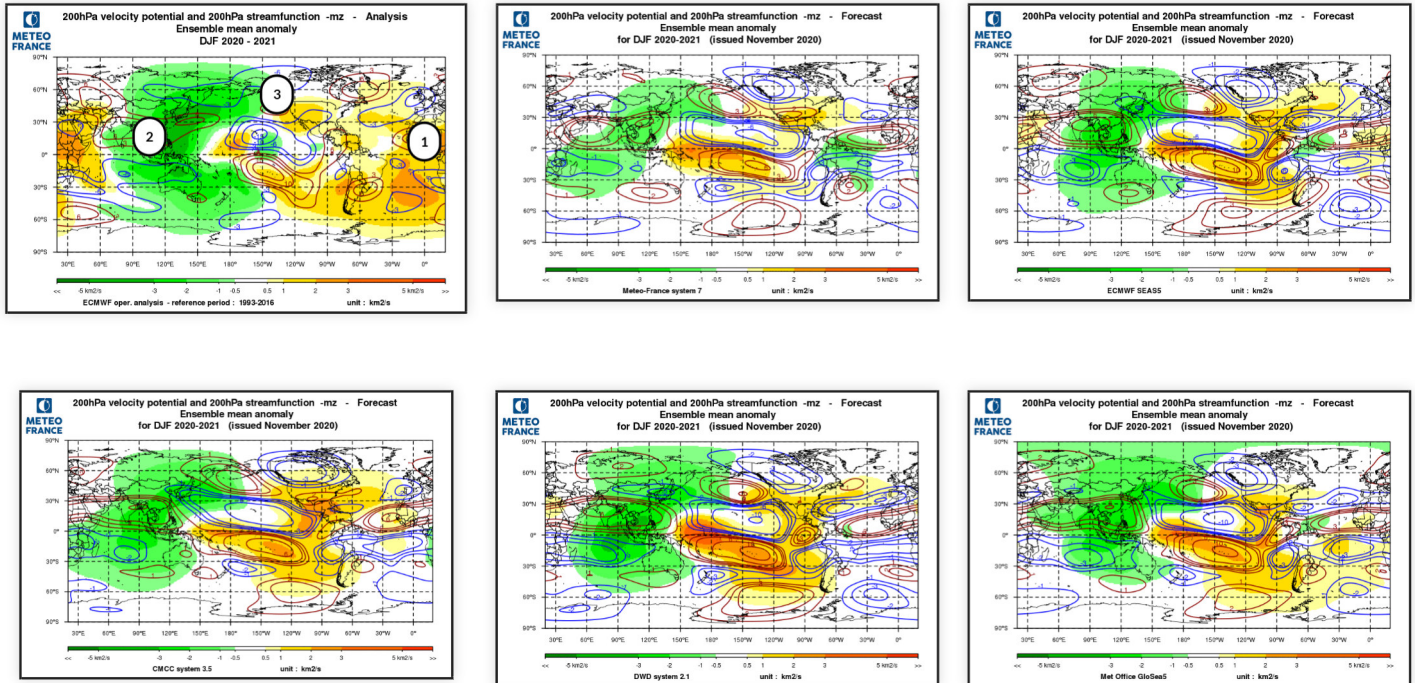


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S7 (bottom left) and ECMWF SEAS5 (bottom right)

Atmospheric circulation : Global teleconnection

VP : very good forecast of the patterns associated to La Niña (centred on the Pacific and the Indian Ocean). Subsidence over Africa and South Atlantic wasn't predicted by most models. However it is suggested by ECMWF.

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, the dipole on the east of the basin is rather well anticipated while the positive anomaly around Greenland is poorly forecasted.



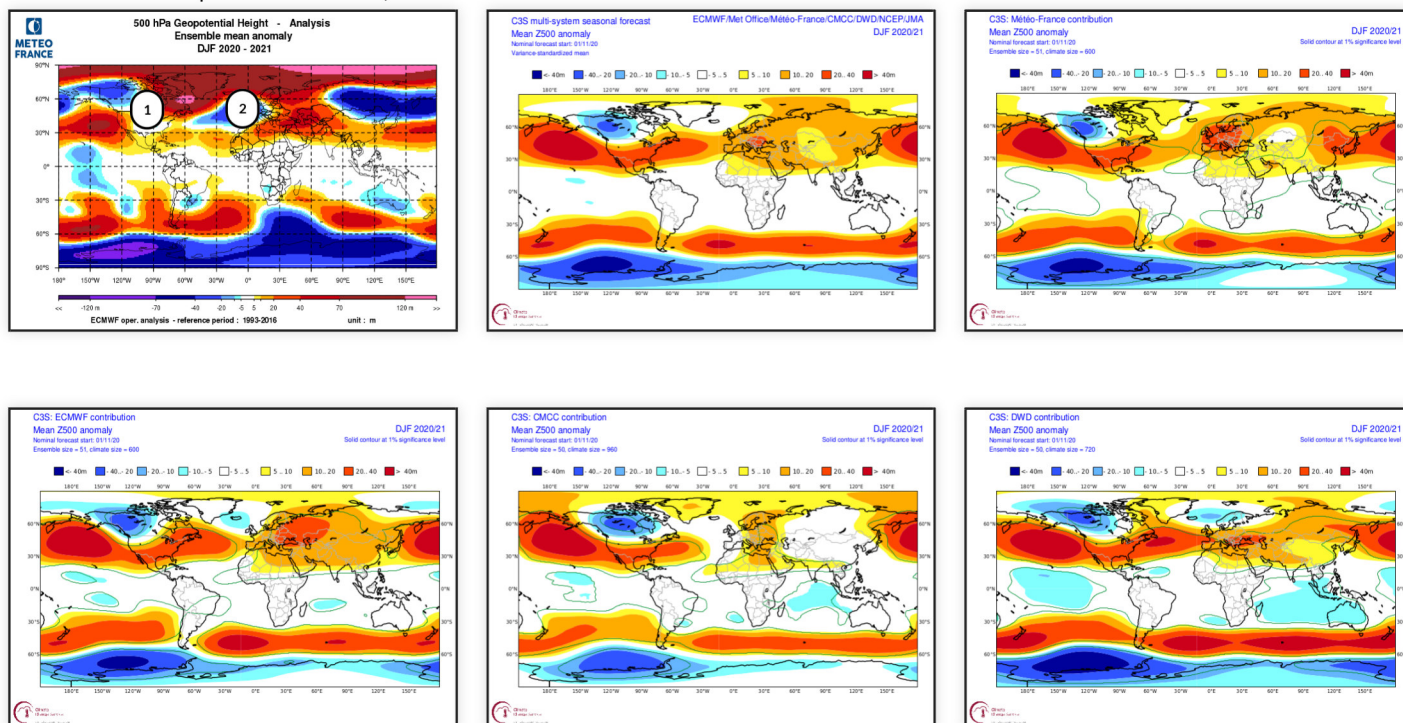
ECMWF analysis, MF-S7, ECMWF-SEAS5, CMCC, DWD and JMA 200hPa velocity potential anomalies (color range, green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

- 1 - strong downward motion anomaly, not foreseen by models
- 2 - Good positioning of the main upward motion
- 3 - Not clear PNA teleconnection in the analysis

Atmospheric circulation : 500hPa Geopotential height

In North America the patterns of PNA- is well forecasted. Compared to the forecast, there is a shift of the negative anomalie to the northwest and an underestimation of positive anomalie around Greenland

On North Atlantic the pattern is reversed between the analysis, which shows positives anomalies beyond the polar circle and negative anomalies at temperature latitudes, and forecasts.



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

1 - PNA- shifted

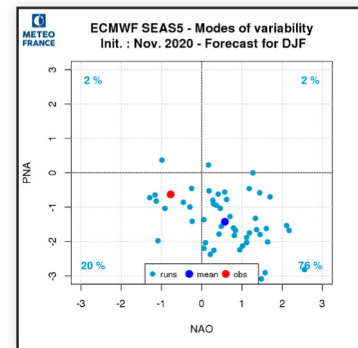
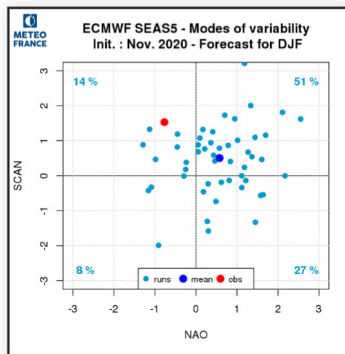
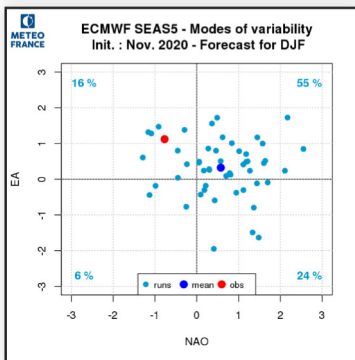
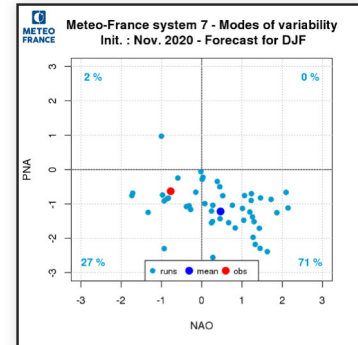
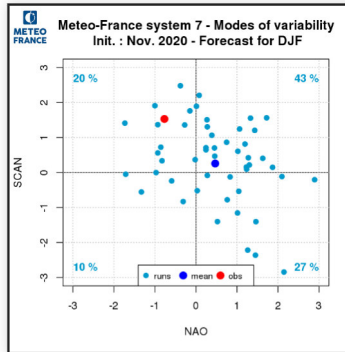
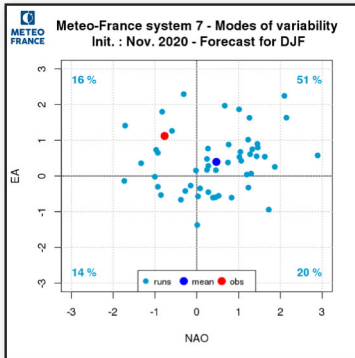
2 - "Deep" negative anomaly , not really predicted (MF-S7 suggested this possibility)

Atmospheric circulation : Modes of variability

Good forecast of the EA and SCAN mode sign but the intensity is underestimated.

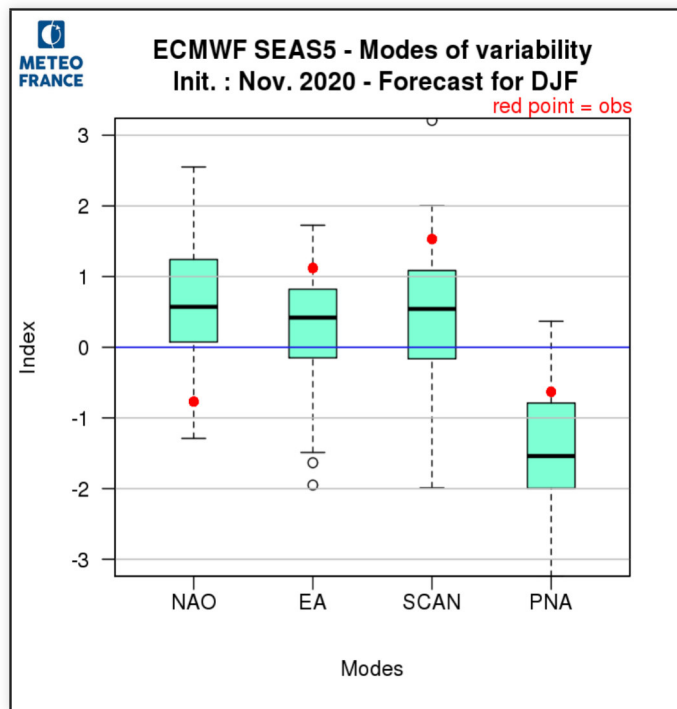
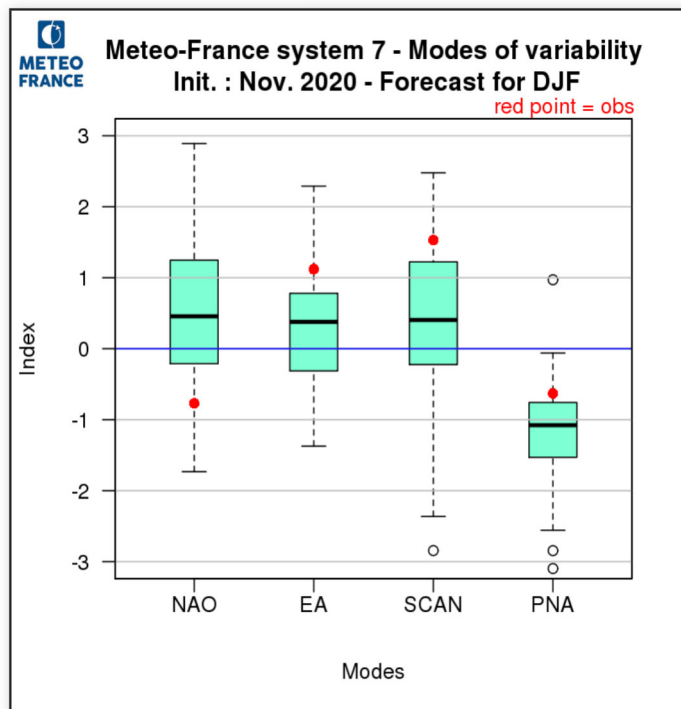
Good PNA forecast, despite the shift in the pattern.

The NAO index was negative while we expected positive index



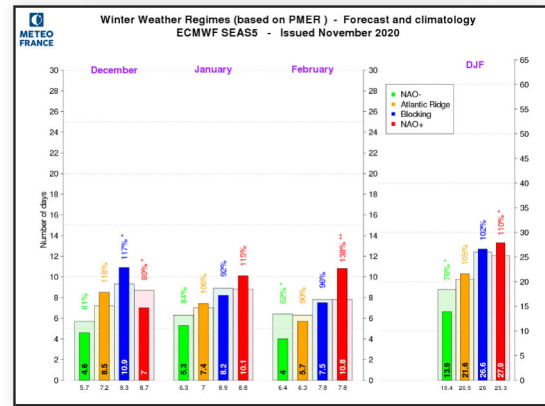
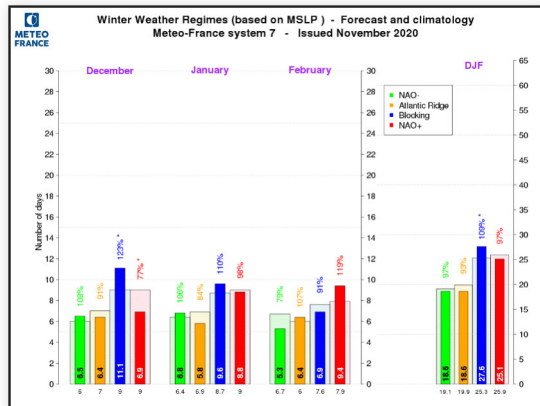
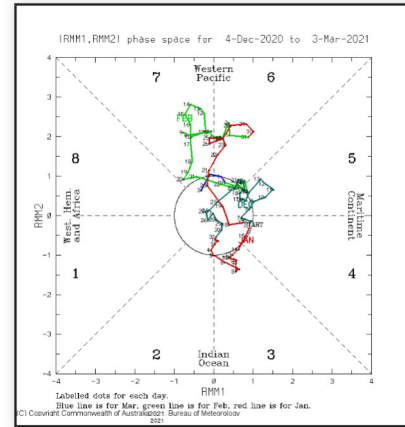
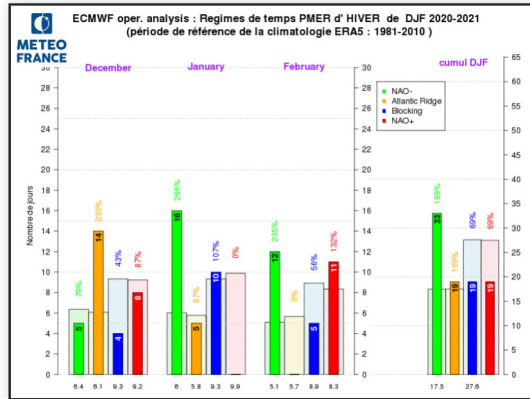
Atmospheric circulation : Modes verification

Same observation as for the previous slide



Atmospheric circulation : Winter SLP weather regimes

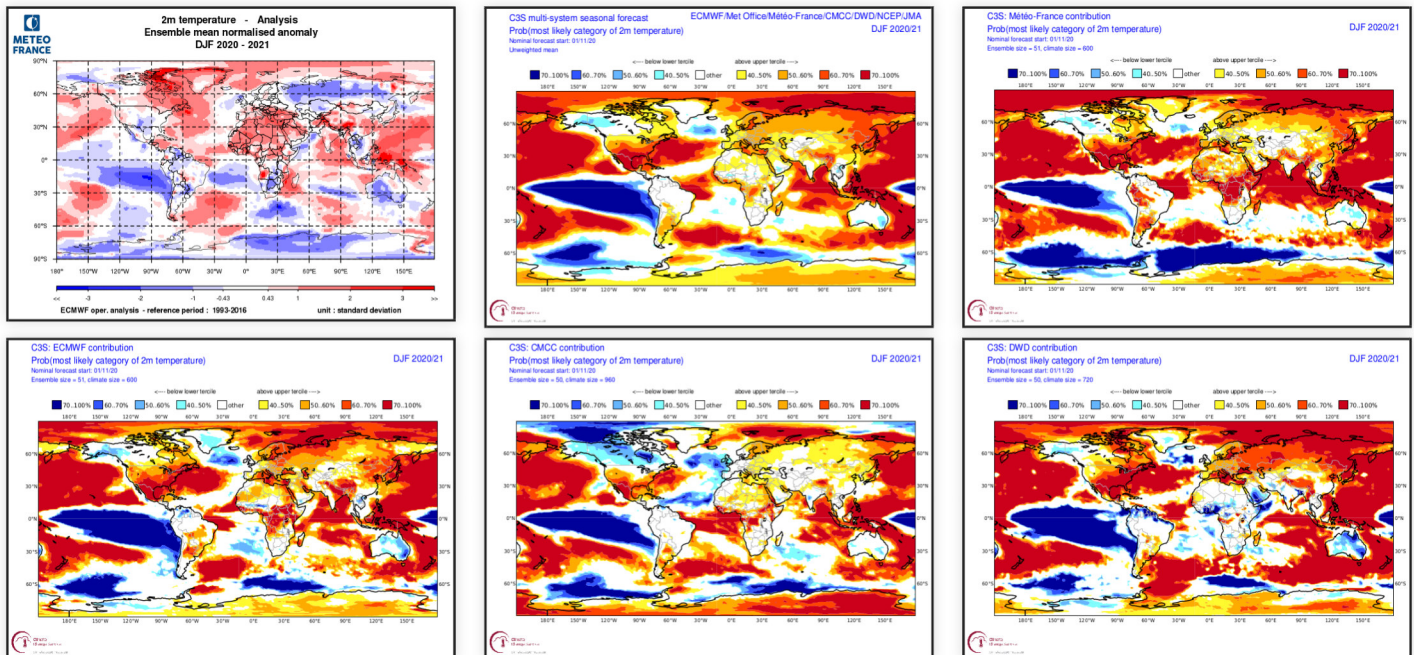
NAO- regime was the most frequent this quarter. Forecasts are poor because MF7 favors Blocking regime and ECMWF the NAO+ regime



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

Climatic parameters : temperature on the globe

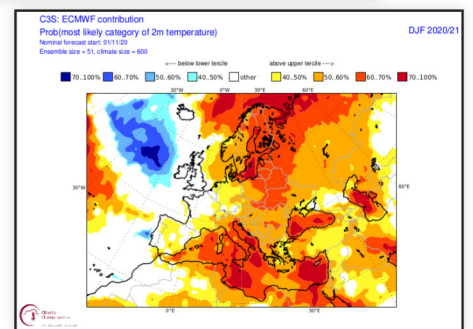
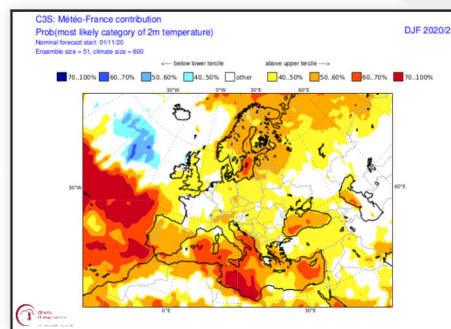
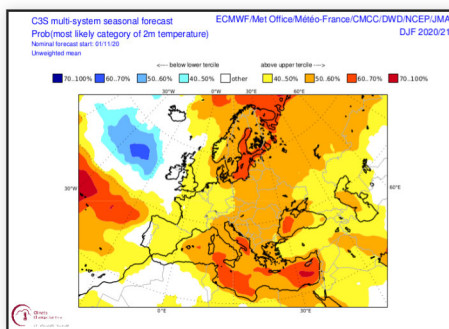
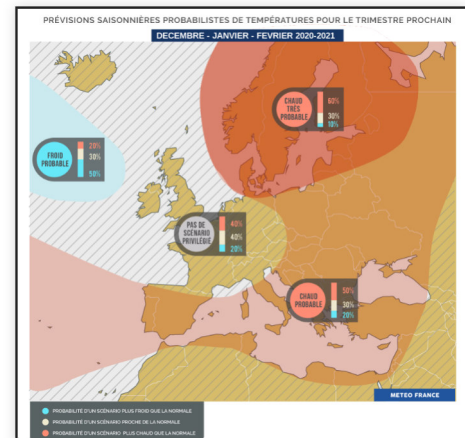
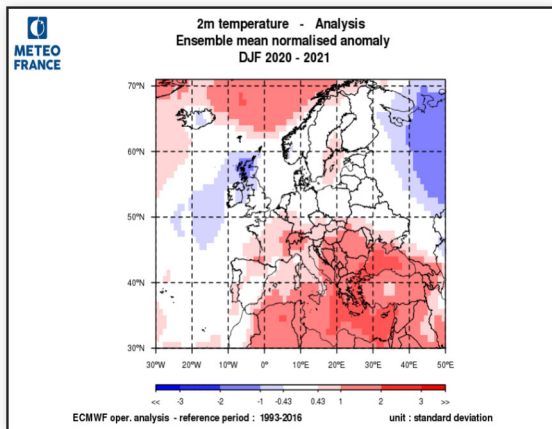
On the northern hemisphere poor forecasts of the main anomalies : warm anomalies from Quebec to Greenland and cold anomalies over Russia.



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

Correct forecast over the Mediterranean basin and south-eastern Europe and poor forecast around Scandinavia where warm conditions were expected.

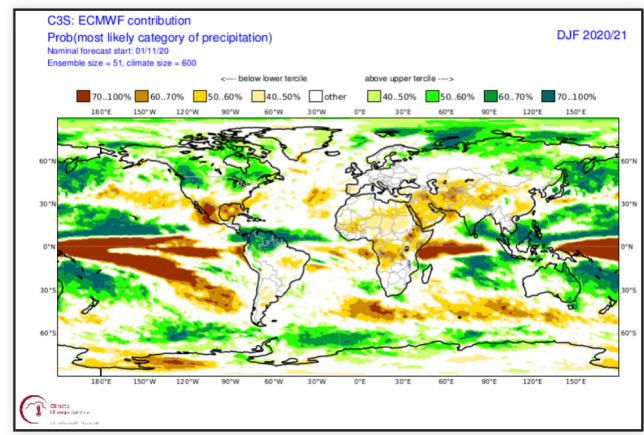
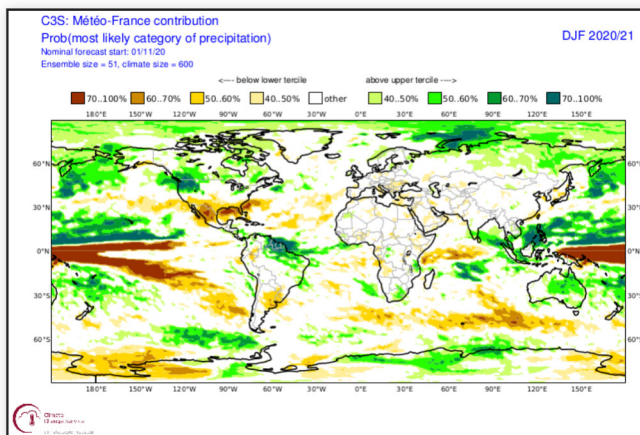
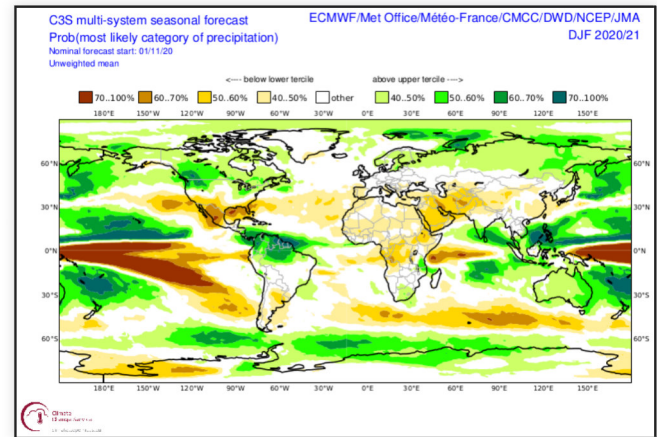
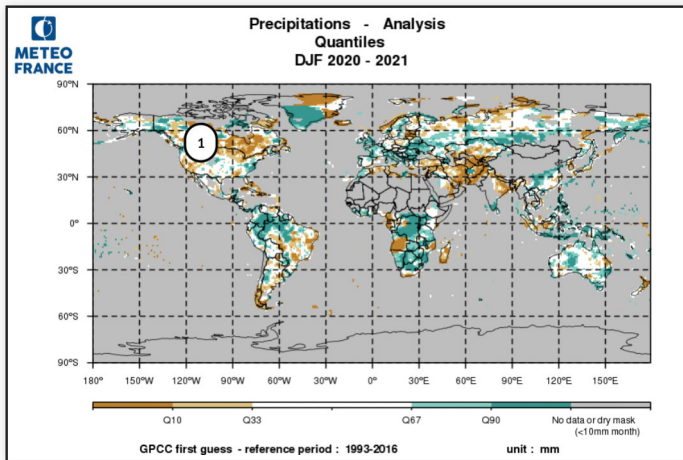


ECMWF analysis top left, synthetic forecast map top right. Forecast for multi-system, MF-S7 and SEAS5 on the bottom line.

Climatic parameters : Precipitations over the globe

The effects of la Nina were well forecasted by models at tropical latitudes : excess precipitations over maritime continent and northern south America; precipitations deficit in the Middle East

The precipitation forecast is poor over North America because of the shift of the PNA pattern, and over Eurasia, due to the poor prediction of NAO modes

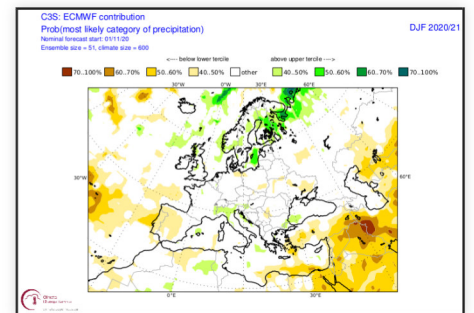
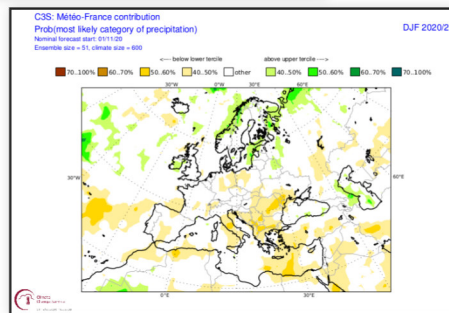
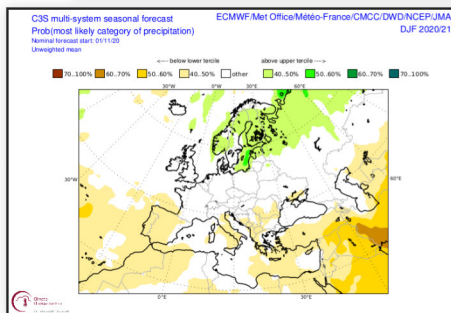
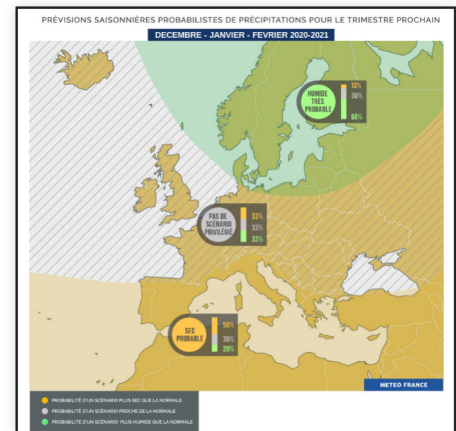
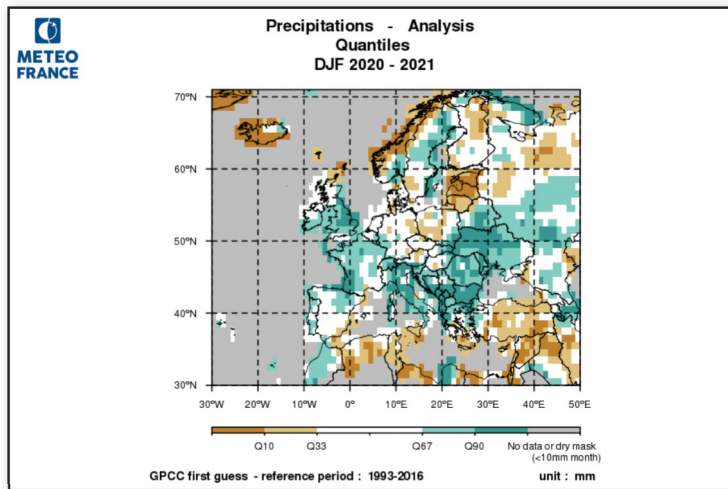


Standardized Precipitation Index analysed by IRI top left, forecast for multi-model top right and MF-S7 and SEAS5 on the bottom line.

1 - Unusual precipitation forecast for a La Niña situation, due too a shift in the main circulation patterns.

Climatic parameters : Precipitations over Europe

Same remark as previously : the NAO- regime responsible for excess precipitations on southern Europe and deficit in the north wasn't foreseen by the models.



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 DJF 2020-2021

1) Oceans :

SST was generally well forecasted.

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). Subsidence over Africa and South Atlantic wasn't predicted by most models .

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, positive anomalies around Greenland weren't be forecasted by models.

Z500 : The PNA- structure was well anticipated, but patterns were shifted. The NAO- regime was not anticipated.

3) Climatic parameters over Europe :

Poor forecast.