

VERIFICATION BULLETIN

JANUARY - FEBRUARY - MARCH 2021

Table of Content

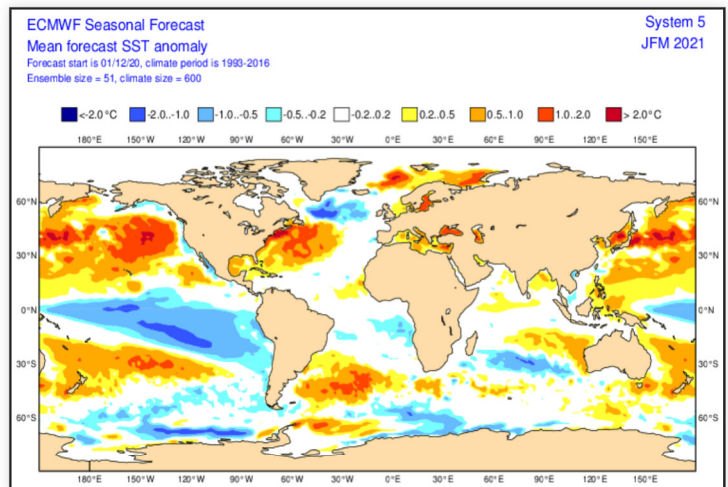
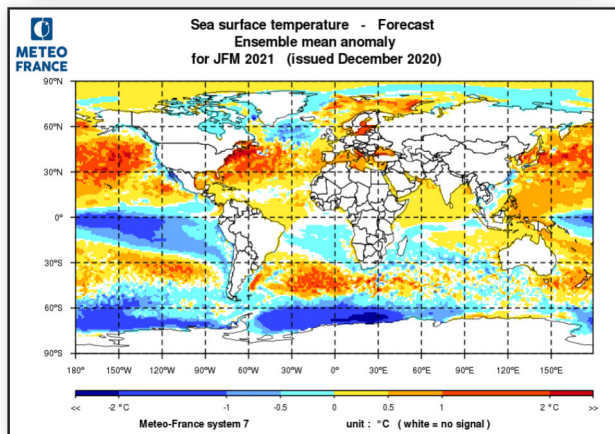
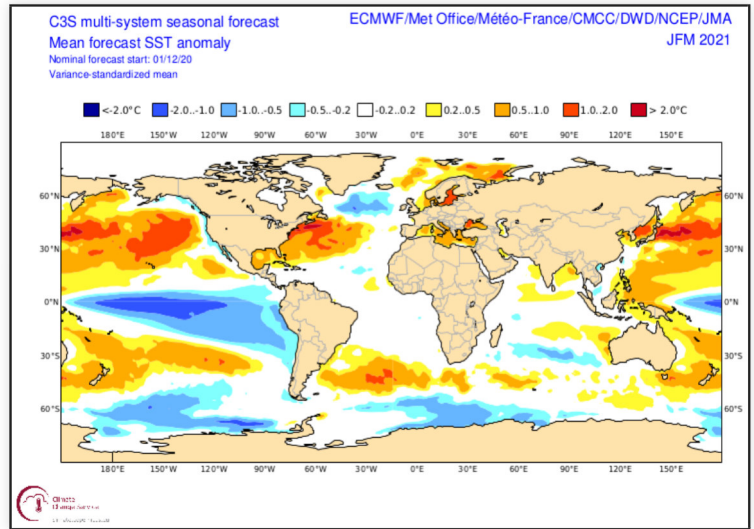
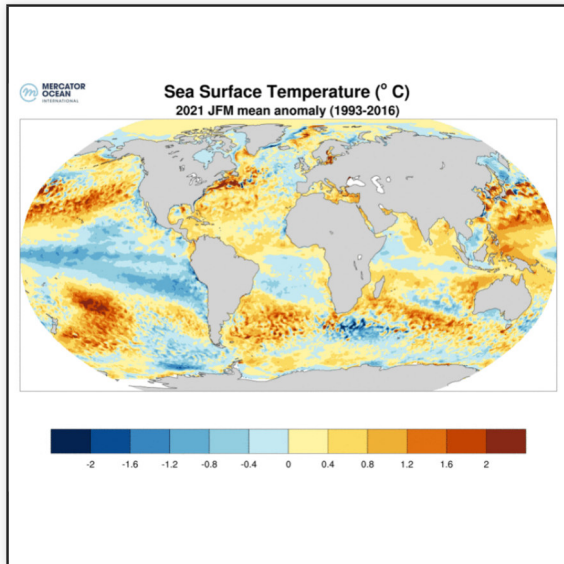
1. Introduction	
1. Objective	3
2. Oceans	
1. surface temperature anomalies	4
2. ENSO	5
3. tropical Atlantic and Indian Ocean index	6
4. North Atlantic SST	7
3. Atmospheric circulation	
1. Global teleconnection	8
2. 500hPa Geopotential height	9
3. Modes of variability	10
4. Modes verification	11
5. Winter 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 JFM 2021	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

Good SST anomaly forecast in tropical zone and fairly good at temperate latitudes except in South Indian Ocean from South Africa to Tasmania, and up to New-Zealand where anomalies were not well forecasted.

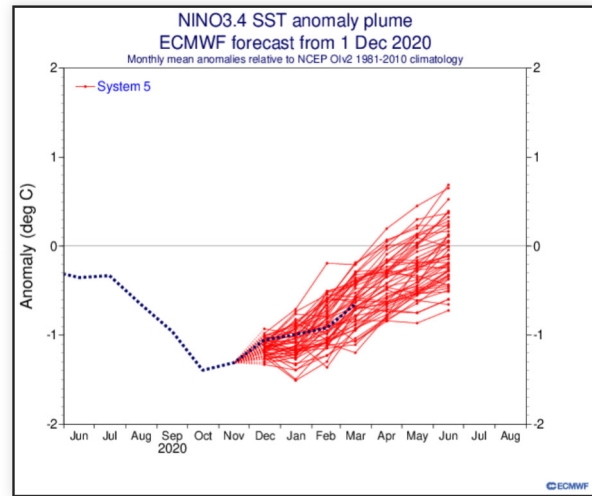
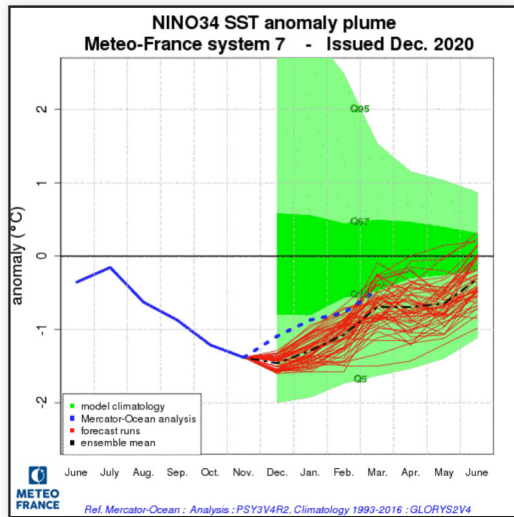


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S7 (bottom left) and SEAS5 (bottom right)

Oceans : ENSO

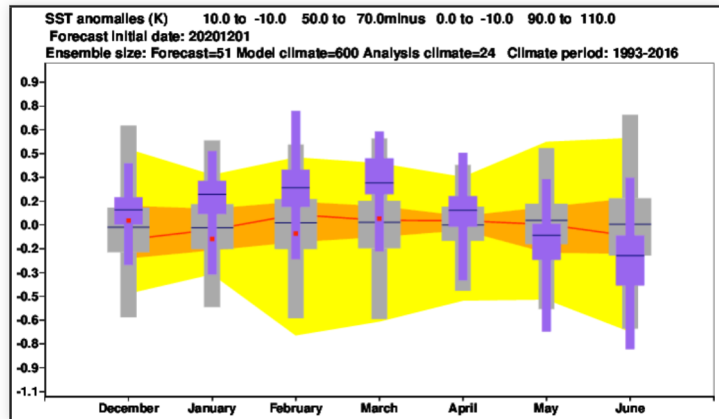
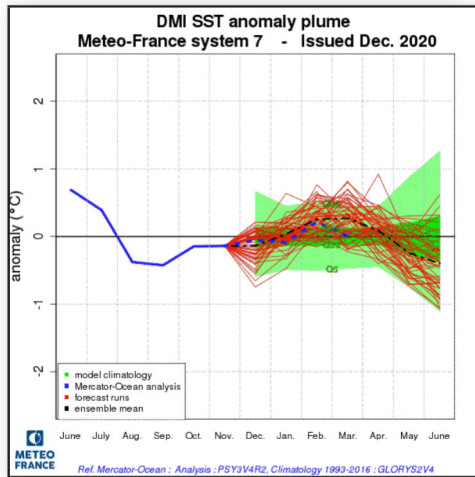
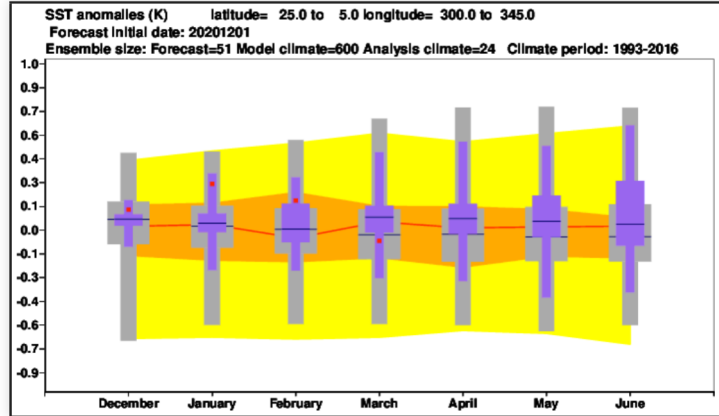
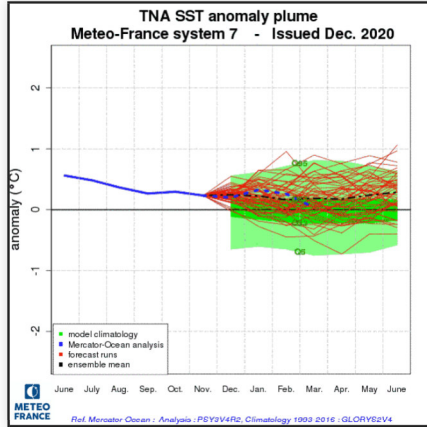
CAUTION : reference analyses differ between MF-S7 (Mercator-Ocean 1993-2016) and ECMWF-SEAS5 (NCEP 1981-2010).

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



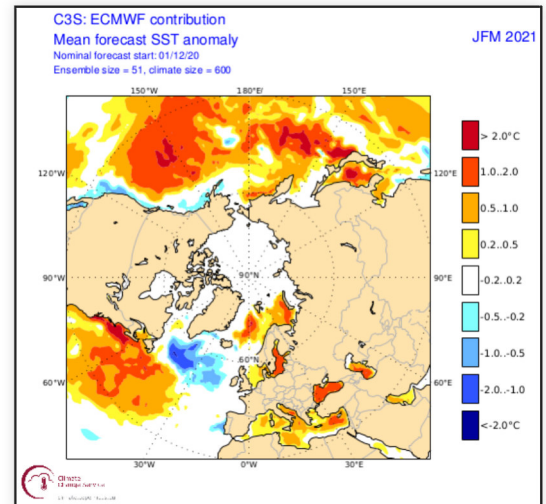
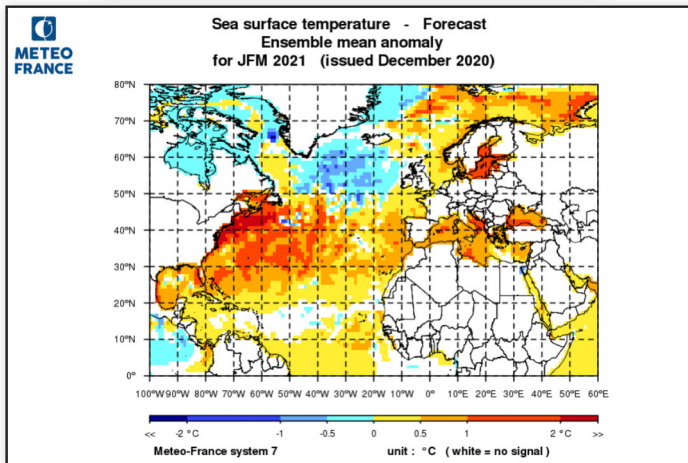
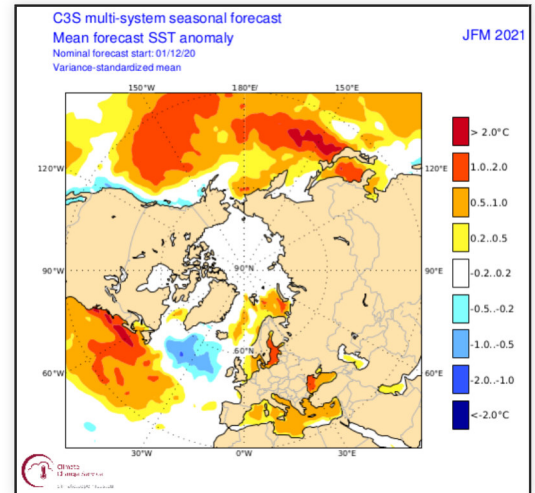
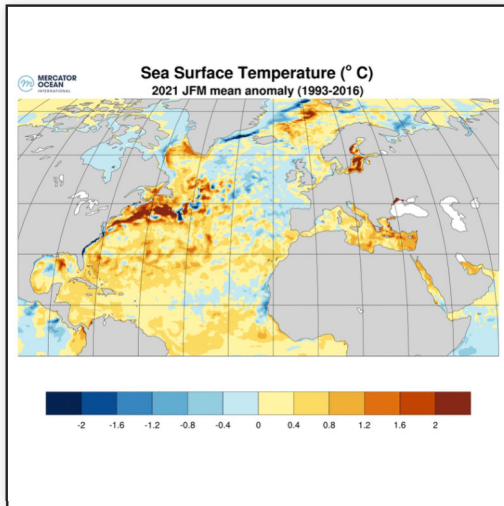
Oceans : tropical Atlantic and Indian Ocean index

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



Oceans : North Atlantic SST

The forecast is generally good, with the main anomalies well positioned. but a little too marked. For MF-S7, the hot anomaly extends too far towards France.

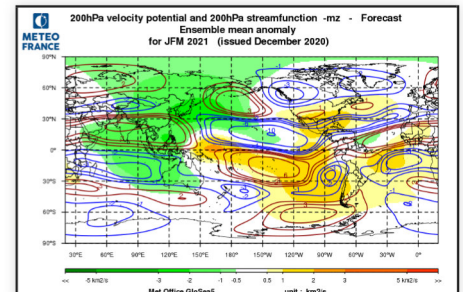
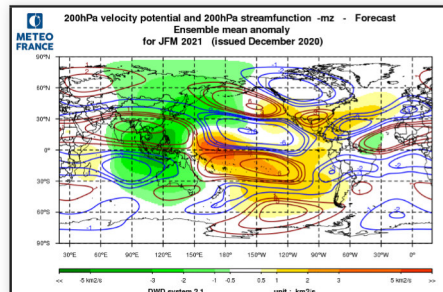
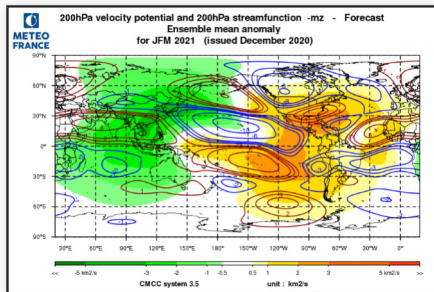
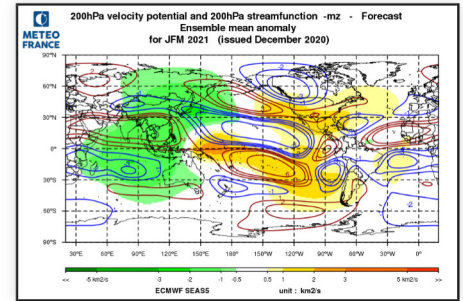
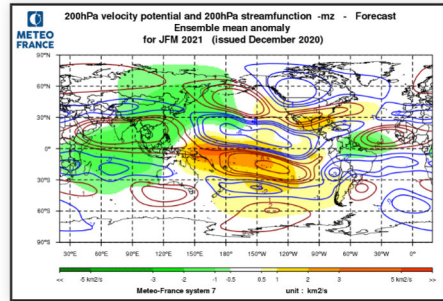
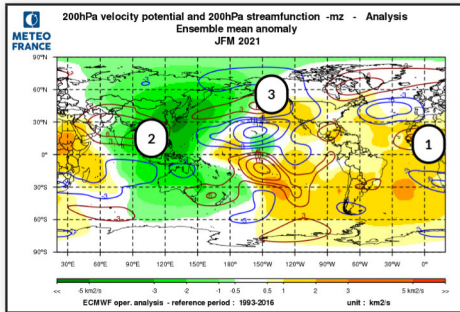


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S7 (bottom left) and ECMWF SEAS5 (bottom right)

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.



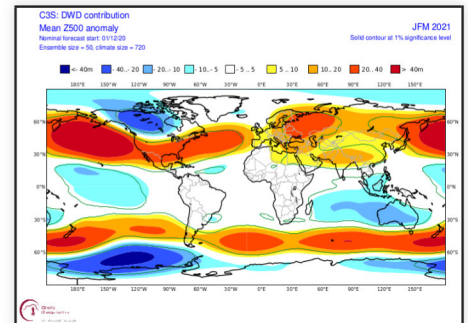
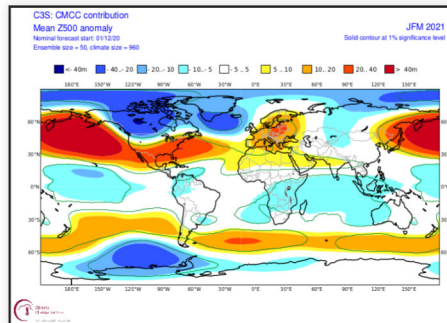
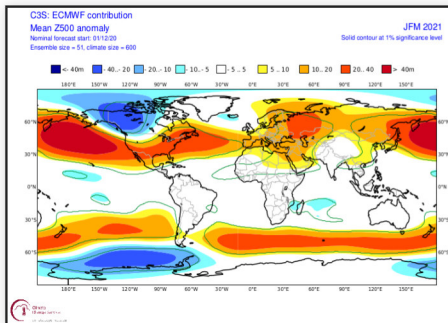
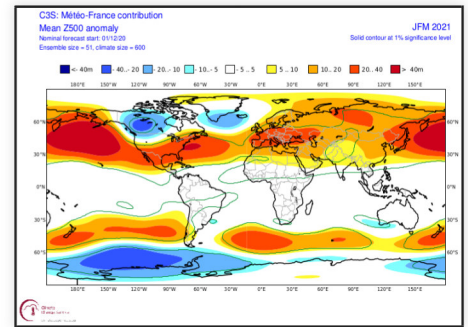
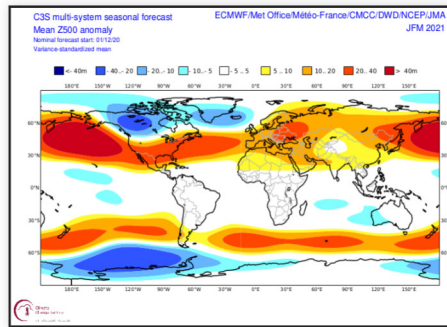
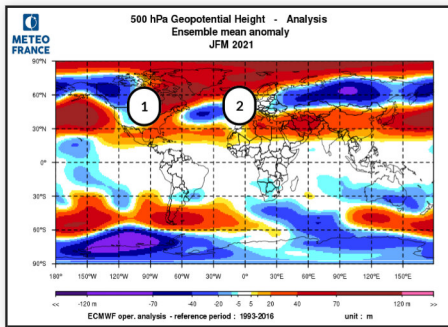
ECMWF analysis, MF-S7, ECMWF-SEAS5, CMCC, DWD and JMA 200hPa velocity potential anomalies (color range, green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

- 1 - strong downward motion anomaly, not foreseen by models
- 2 - Good positioning of the main upward motion
- 3 - Good 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 anomaly because of a strong positive anomalie around Greenland.

This positive anomaly was not at all foreseen. On the North Atlantic and as far as Siberia, the forecasts show an inverse pattern of the analysis, which shows strong positives anomalies beyond the polar circle and strong negative anomalies at temperate latitudes.



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

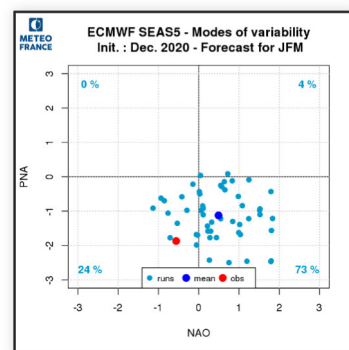
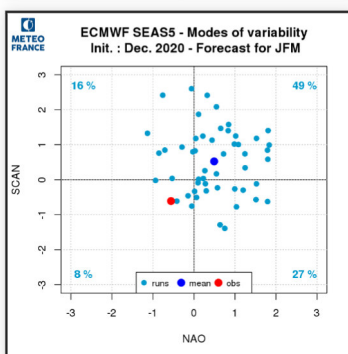
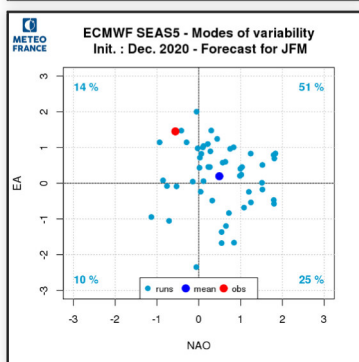
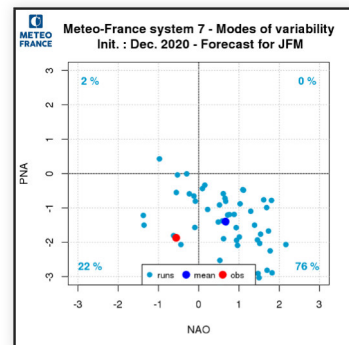
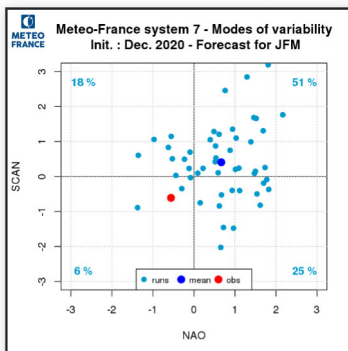
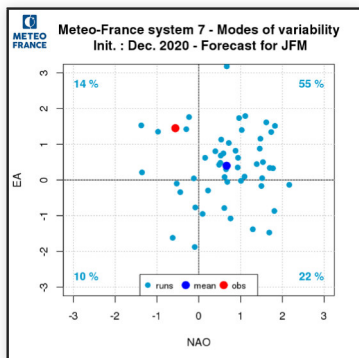
- 1 - PNA- shifted
- 2 - "Deep" negative anomaly , not really predicted (MF-S7 suggested this possibility)

Atmospheric circulation : Modes of variability

Good forecast of the EA mode sign even if the intensity is underestimated.

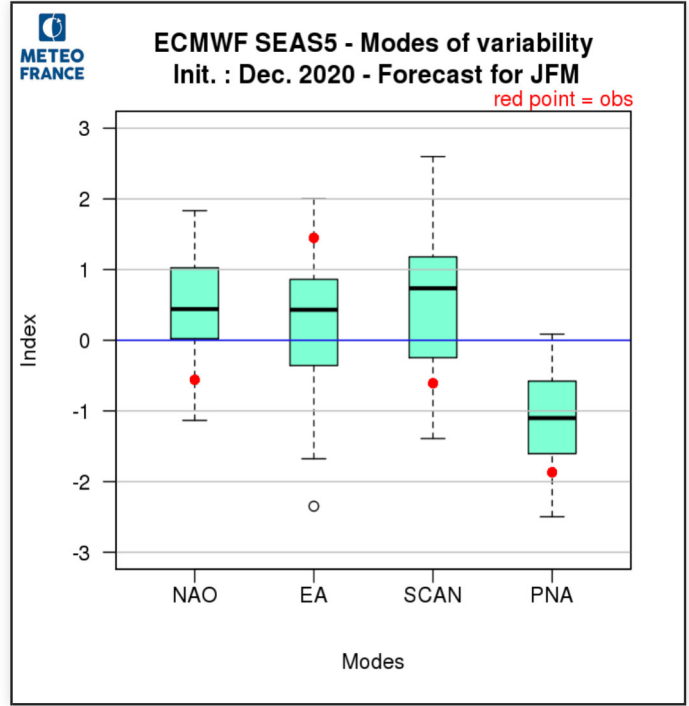
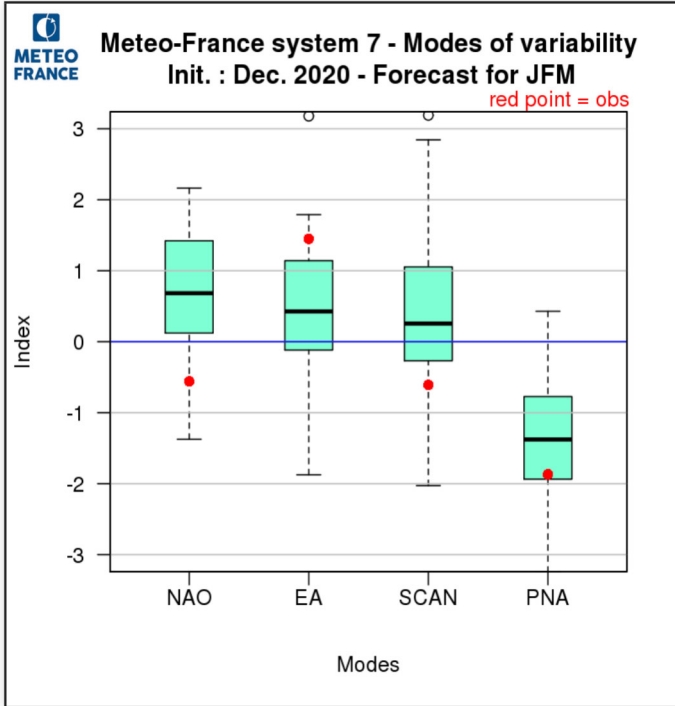
Good PNA forecast, despite the shift in the pattern.

The NAO and the SCAN indexes were negative while positive indexes were expected.



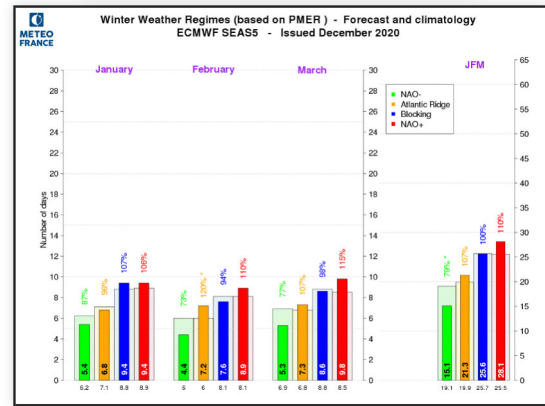
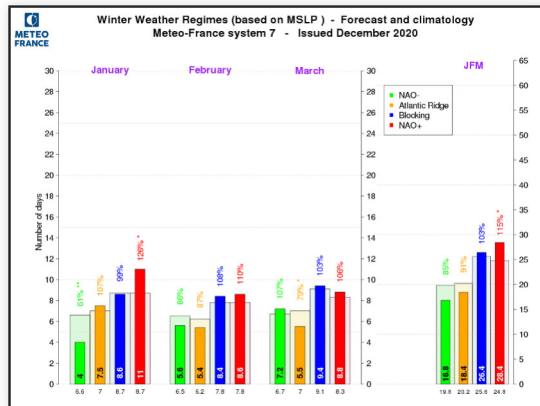
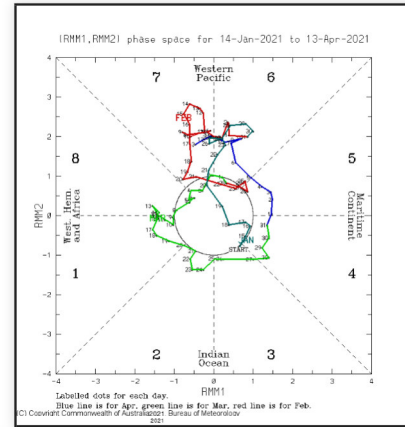
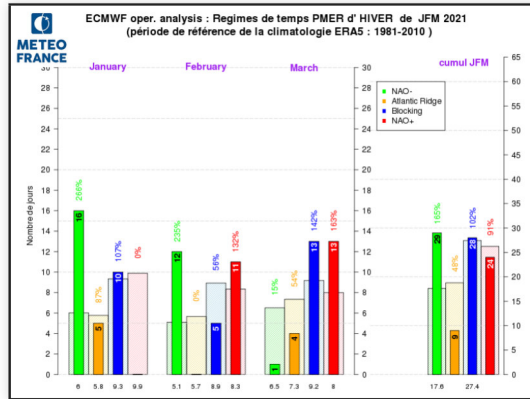
Atmospheric circulation : Modes verification

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 and ECMWF favored the NAO+ regime.

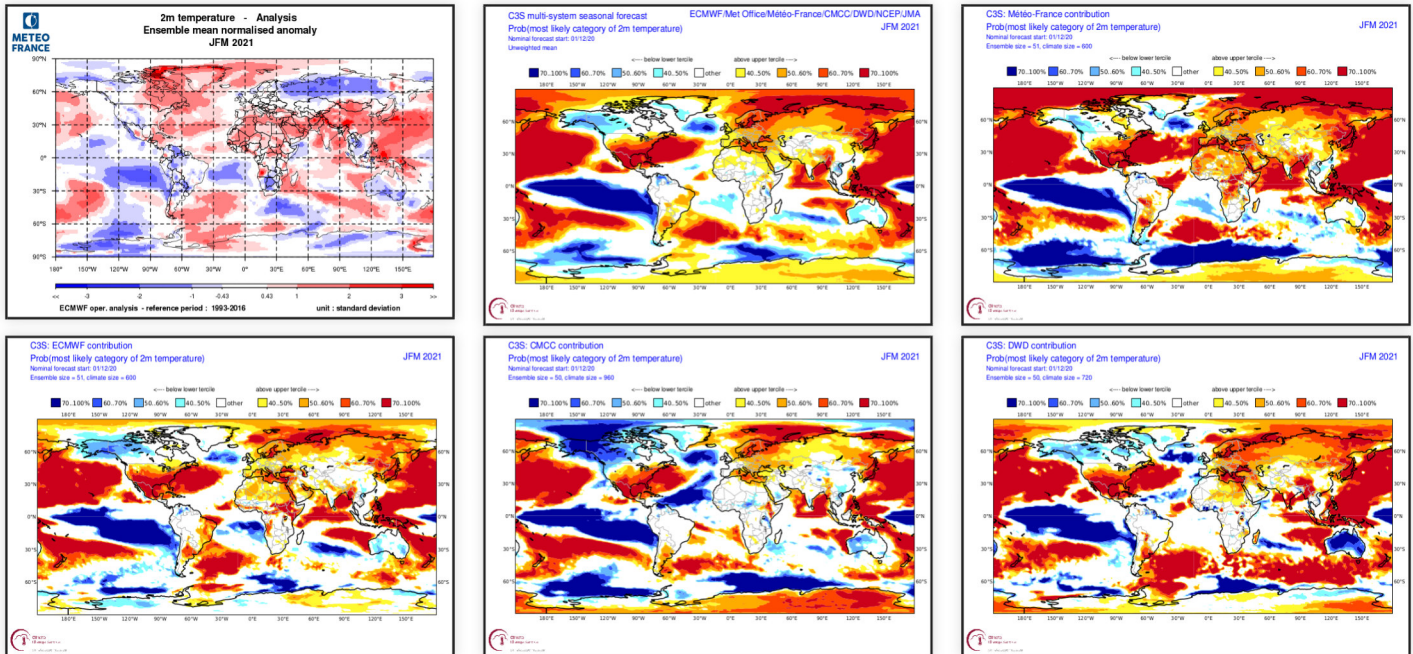


weather regime : ECMWF analysis top left, MF7 and ECMWF forecasts at the bottom. MJO phase top right

Climatic parameters : temperature on the globe

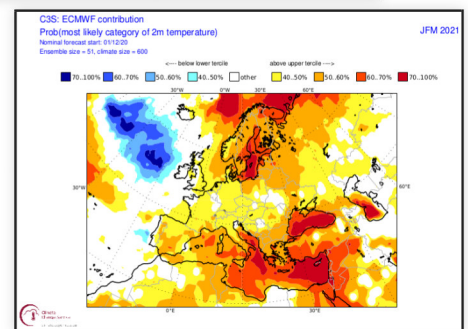
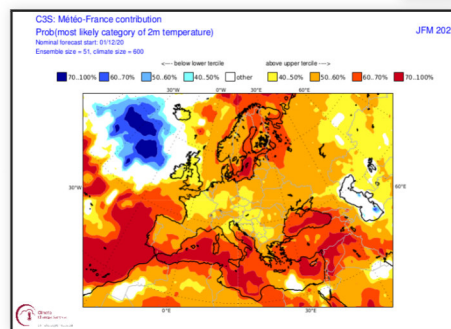
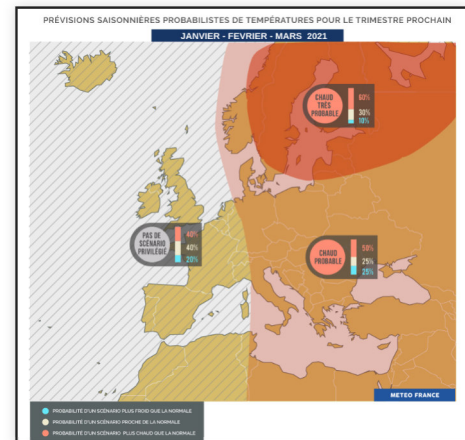
In the Southern hemisphere and up to the Nothren Tropic, forecasts are pretty good.

Beyond the Northern Tropic, 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-SEASS, CMCC, DWD on the bottom line.

Correct forecast over the Eastern Mediterranean Basin and South-Eastern Europe and poor forecast around Scandinavia where warm conditions were expected.



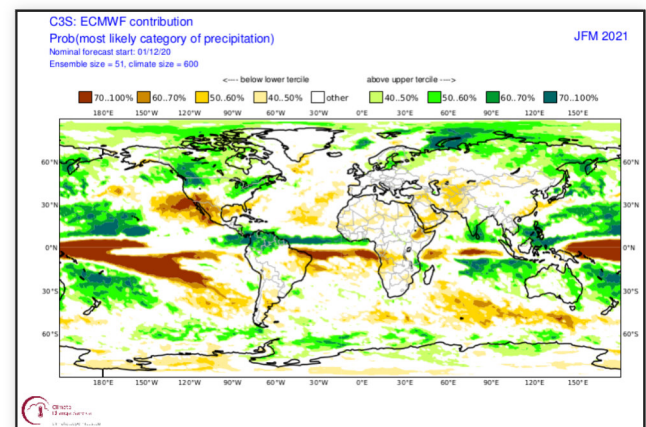
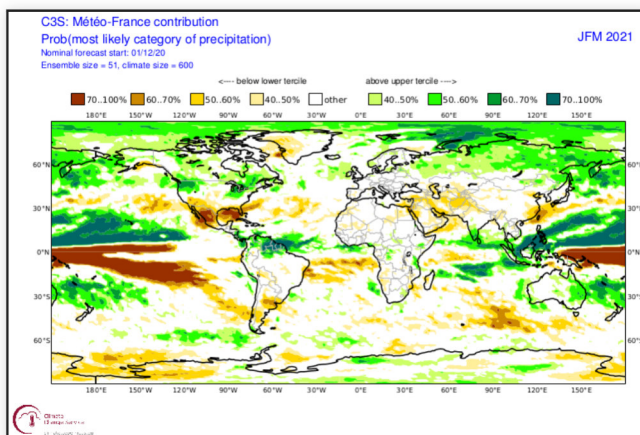
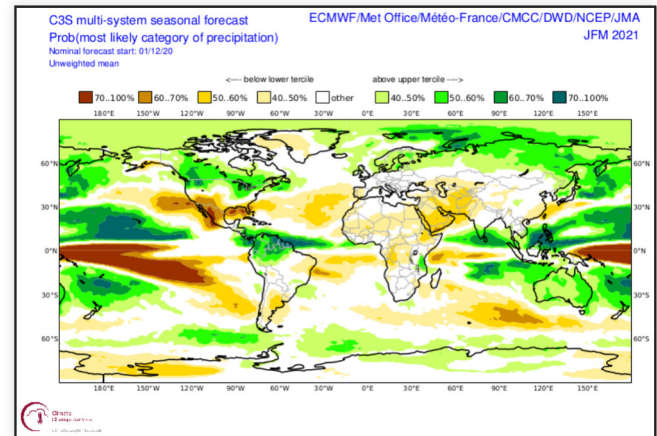
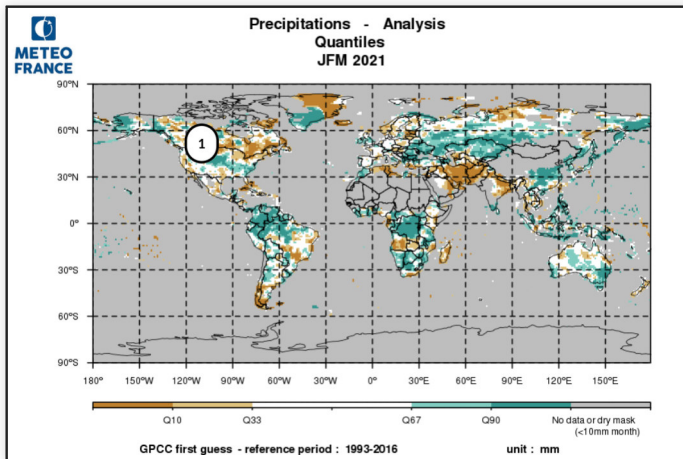
ECMWF analysis top left, synthetic forecast map top right. Forecast for multi-system, MF-S7 and SEAS5 on the bottom line.

Climatic parameters : Precipitations over the globe

In the Southern hemisphere and up to the Northern Tropic, forecasts are pretty good : excess precipitations over Maritime Continent and Northern South America; precipitation deficit in the Middle East.

Beyond the Northern Tropic, poor forecasts of the main anomalies : warm anomalies from Quebec to Greenland and cold anomalies over Russia.

The rainfall forecast is the opposite of the analyse over North America, Greenland and Eurasia, due to the poor prediction of NAO modes

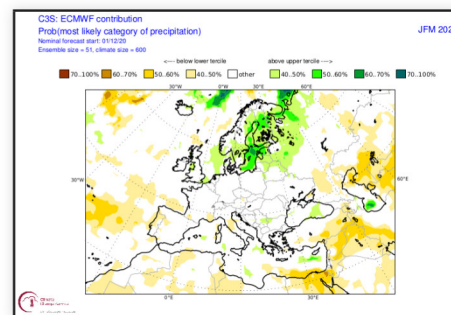
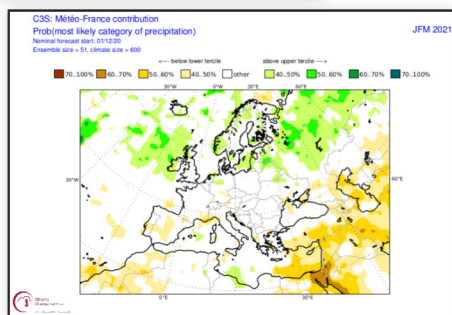
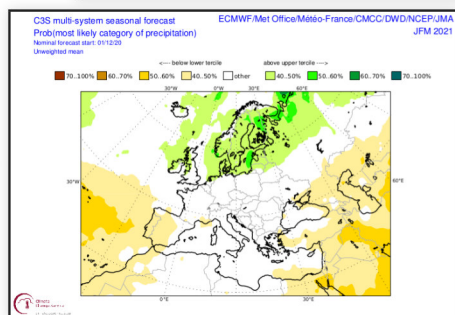
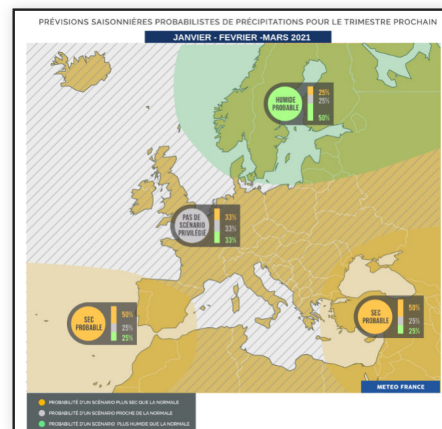
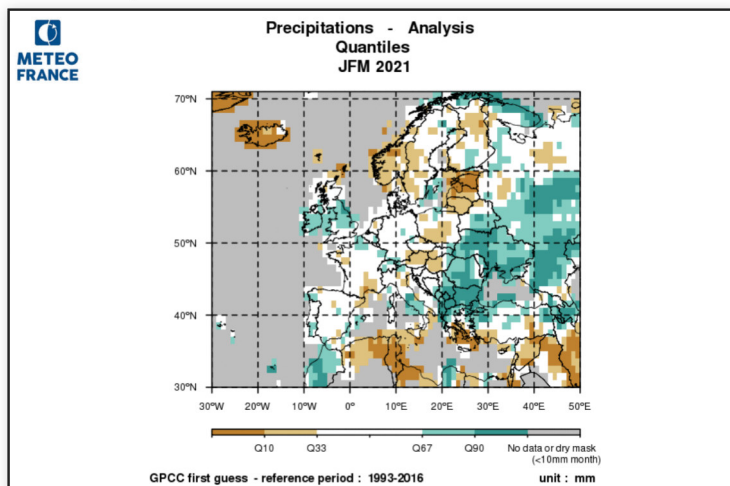


Standardized Precipitation Index analysed by IRI top left, forecast for multi-model top right and MF-S7 and SEAS5 on the bottom line.

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 south-eastern 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 JFM 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, the strong positive anomalies around Greenland wasn't foreseen by the 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.

The SSW phenomenon which occurred in January and February was probably a major driver in the northern hemisphere, from temperate latitudes to the pole.