

VERIFICATION BULLETIN

APRIL - MAY - JUNE 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. Summer 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 AMJ 2021	17

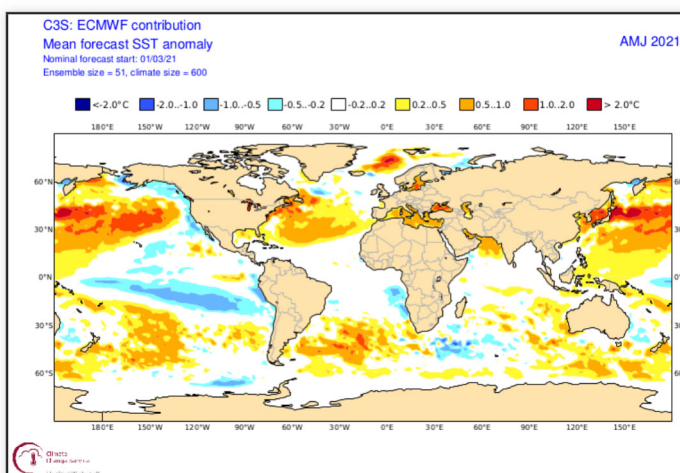
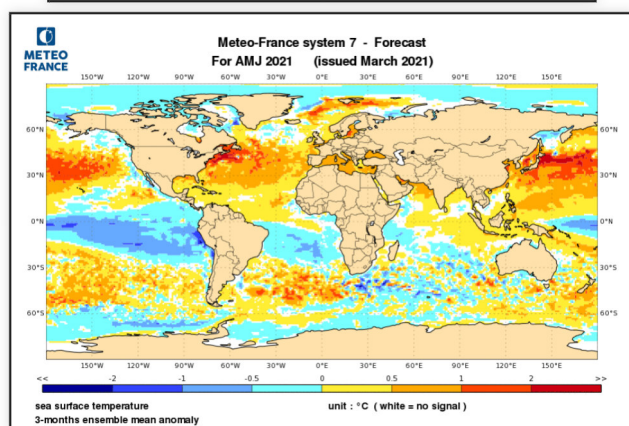
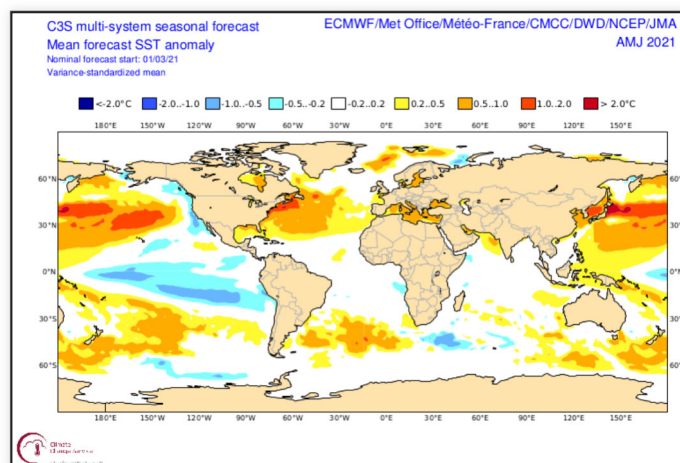
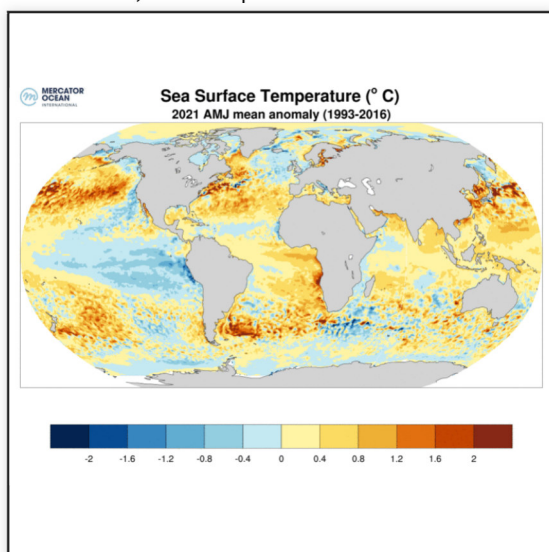
Introduction : Objective

- 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 areas with the exception of the warm anomaly of the Angolan coast in the gulf of Guinea which was not anticipated by the models.

At mid-latitudes, the main patterns were well forecasted.

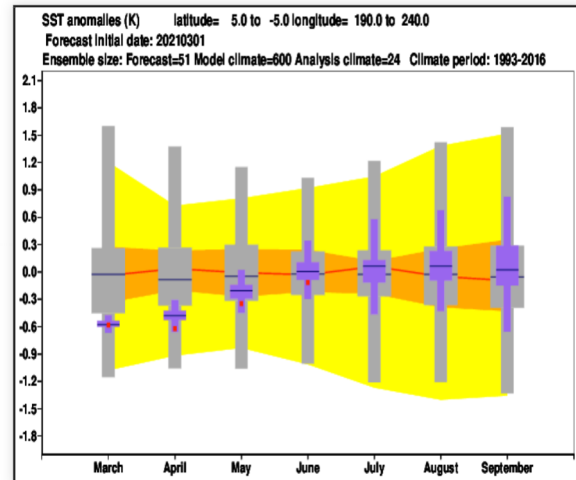
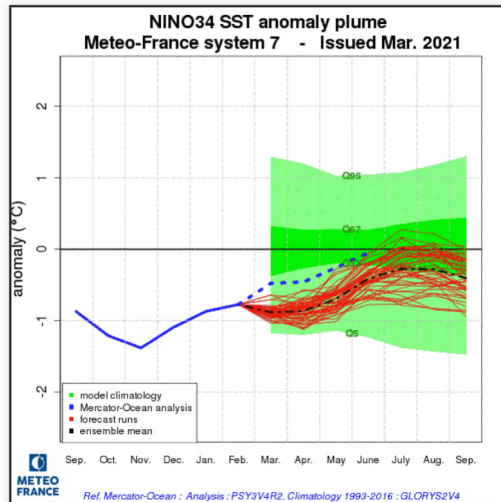


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S7 (bottom left) and SEAS5 (bottom right)

Oceans : ENSO

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

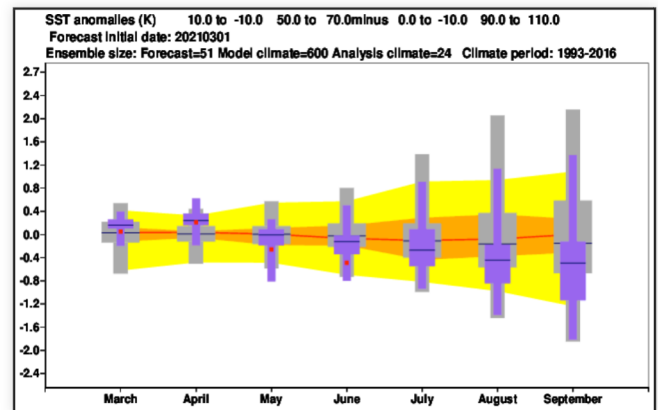
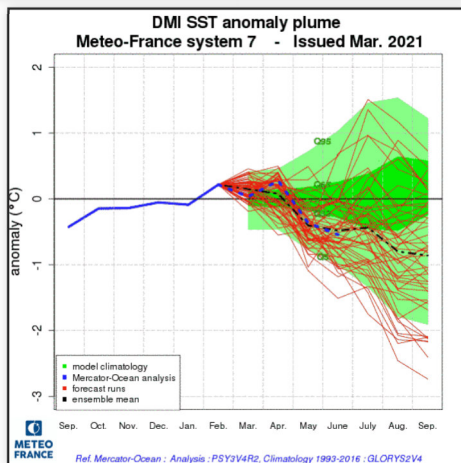
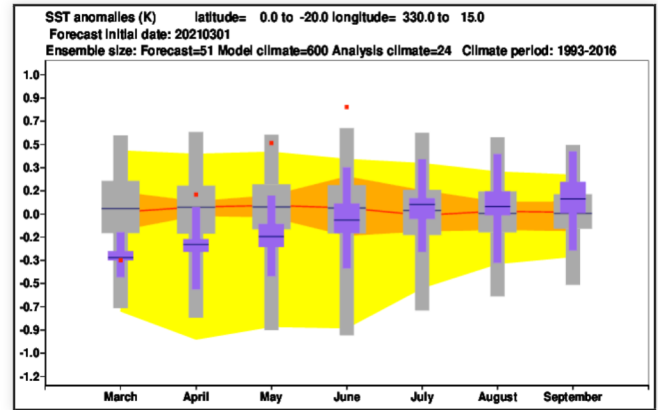
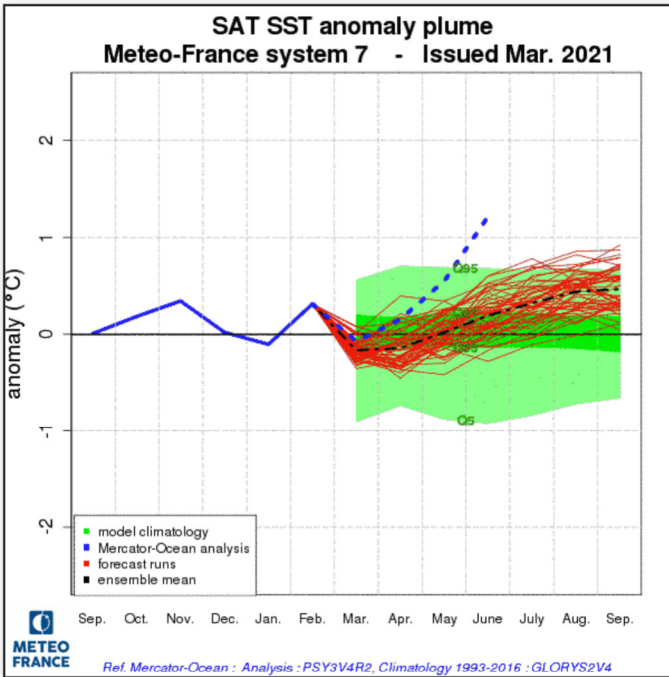
MF-S7 forecast was too cold from the 1st month of simulations (mean error around 0.5°C), but the trend was correct. Good forecast for ECMWF-SEAS5.



Oceans : tropical Atlantic and Indian Ocean index

SAT : The rapide rise in sea surface temperature on the south Atlantic box wasn't predicted by the models.

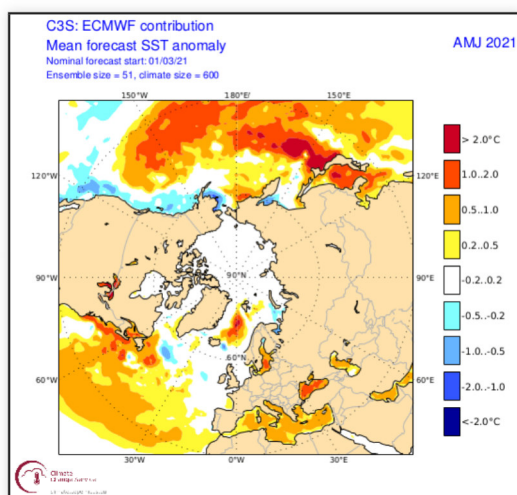
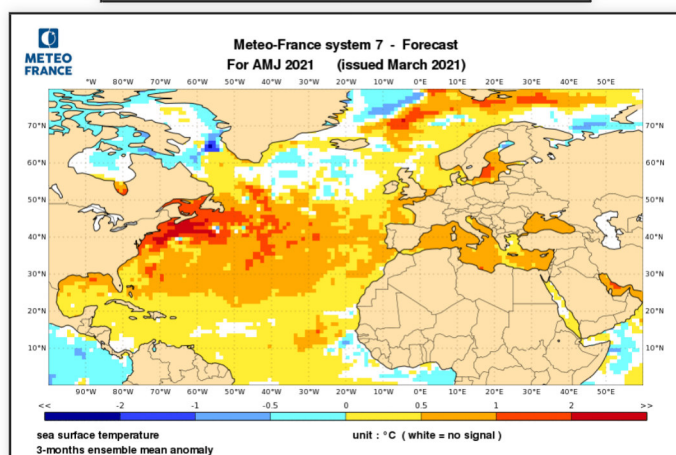
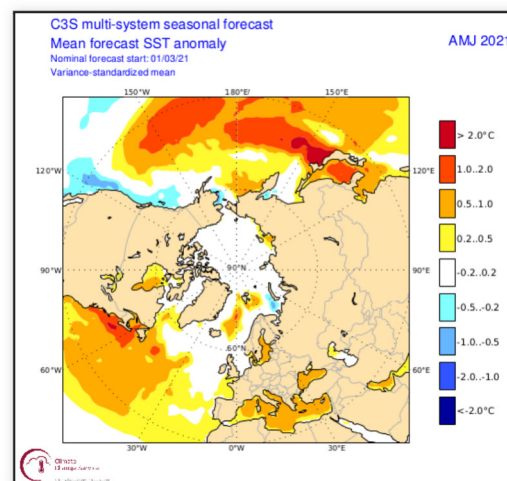
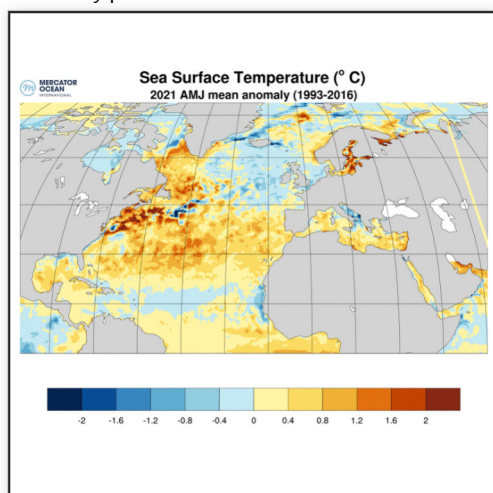
DMI : Globally, MF-S7 and ECMWF-SEAS5 are close to observation.



Oceans : North Atlantic SST

The strong positive anomaly in the western part of the Ocean (close to North America) is correct, as well as the warm anomaly extending from Florida to Spain.

The negative anomaly pattern between Greenland and Ireland is suggested by models but a little underestimated.

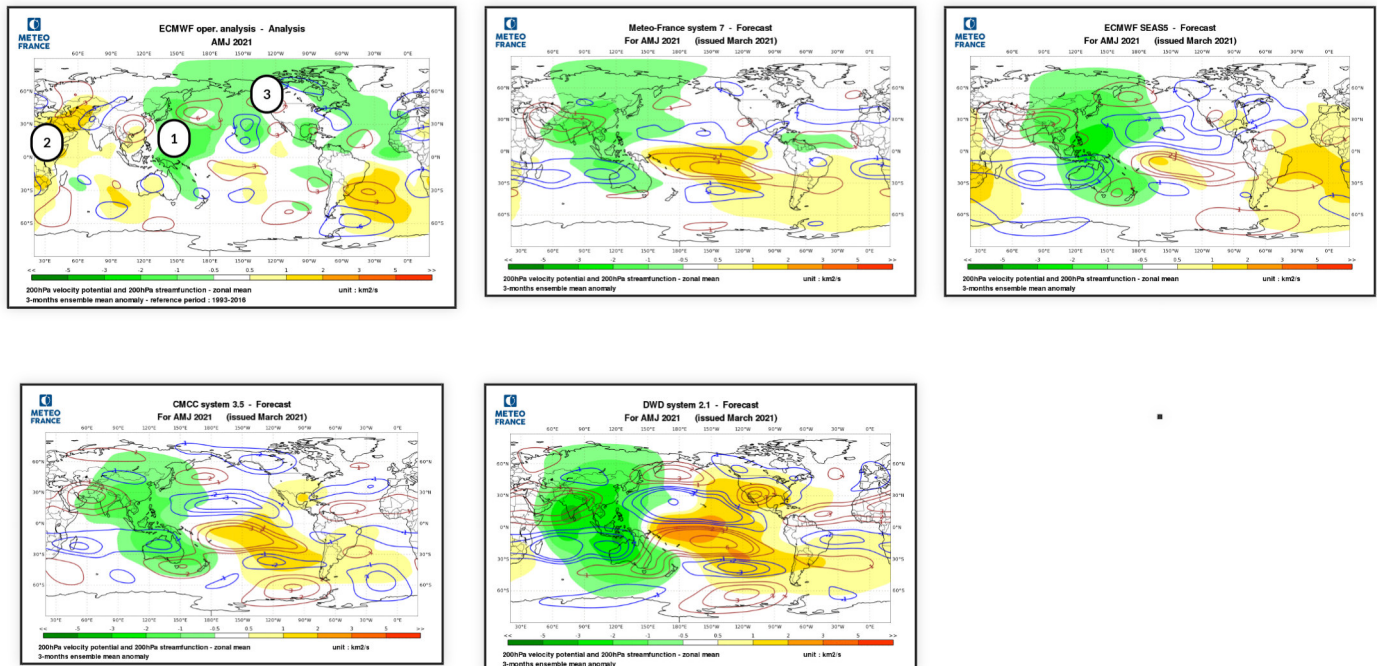


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S7 (bottom left) and ECMWF SEASS (bottom right)

Atmospheric circulation : Global teleconnection

VP : The upward anomaly over western Pacific, associated to La Niña, was well predicted, even if it was centred over the Maritime Continent (too westward compared to analysis). The downward anomaly over Africa was not predicted by most models. The MJO, very active during the period, probably influenced VP anomaly field.

SF : the PNA- teleconnection to North America forecasted by models hasn't been observed as structures on the Pacific and tropical Indian Ocean.



ECMWF analysis, MF-S7, ECMWF-SEASS, 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).

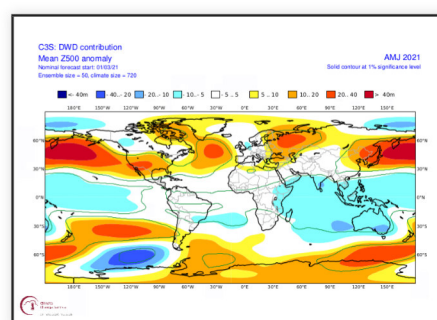
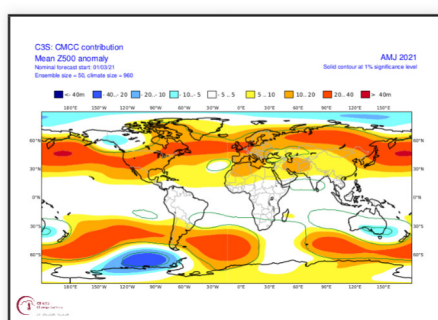
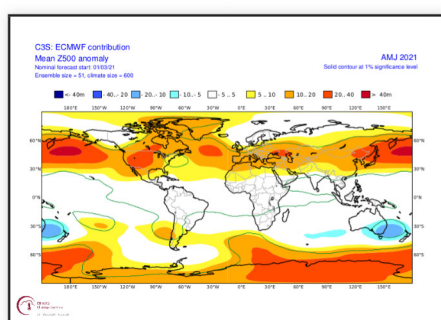
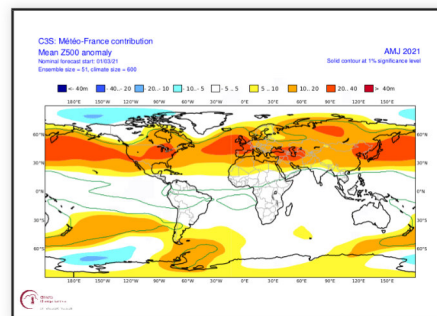
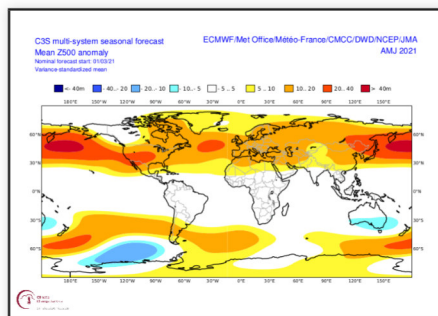
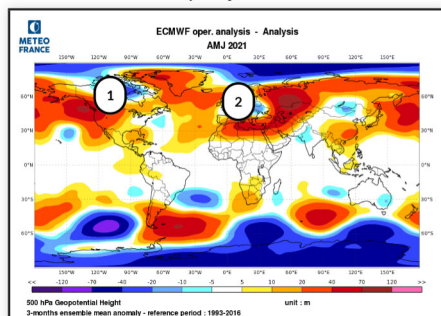
- 1 - upward motion anomaly, main response to La Niña
- 2 - Main downward anomaly
- 3 - PNA teleconnection is suggested in the analysis

Atmospheric circulation : 500hPa Geopotential height

The PNA- pattern is forecasted by all the models but analysis is shifted eastward

On the North Atlantic the high values at temperate latitudes and the lowest at polar latitudes were rather well forecasted.

On the Eurasia the forecast is poor for most models : the dipole negative anomaly on Europe /positive anomaly on western Russia was not forecast except by the DWD.



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

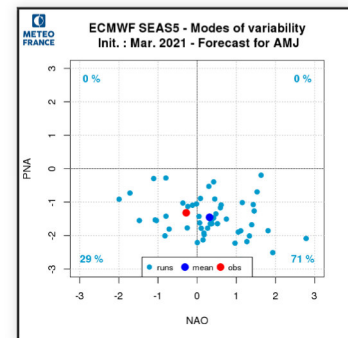
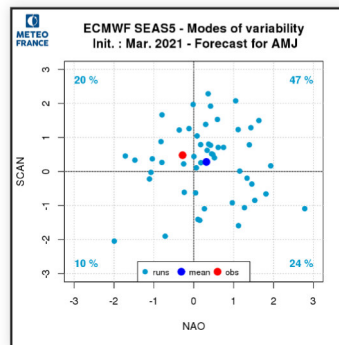
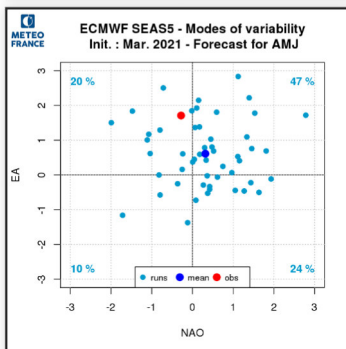
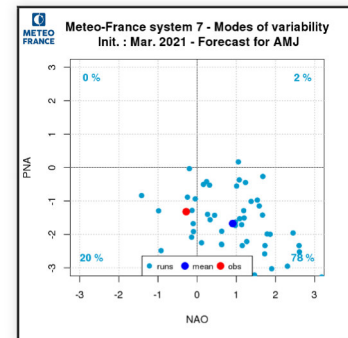
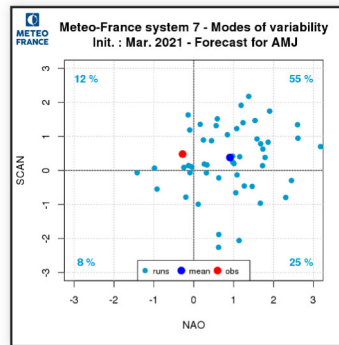
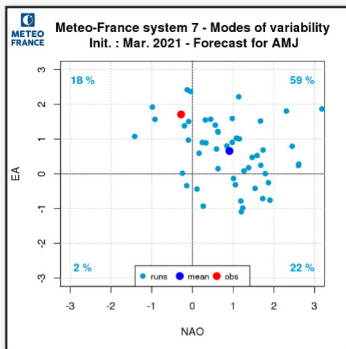
- 1 - Look like PNA- shift eastward
- 2 - unexpected negative anomaly

Atmospheric circulation : Modes of variability

Good forecast of the sign of EA mode.

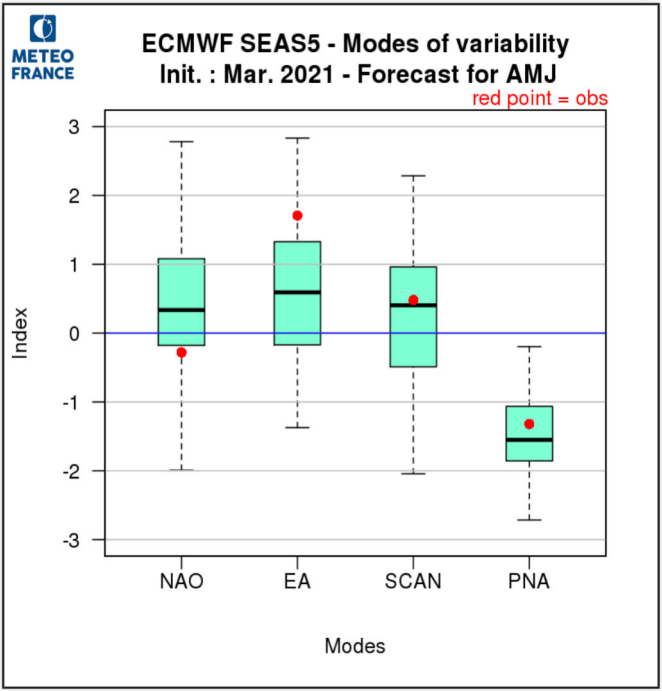
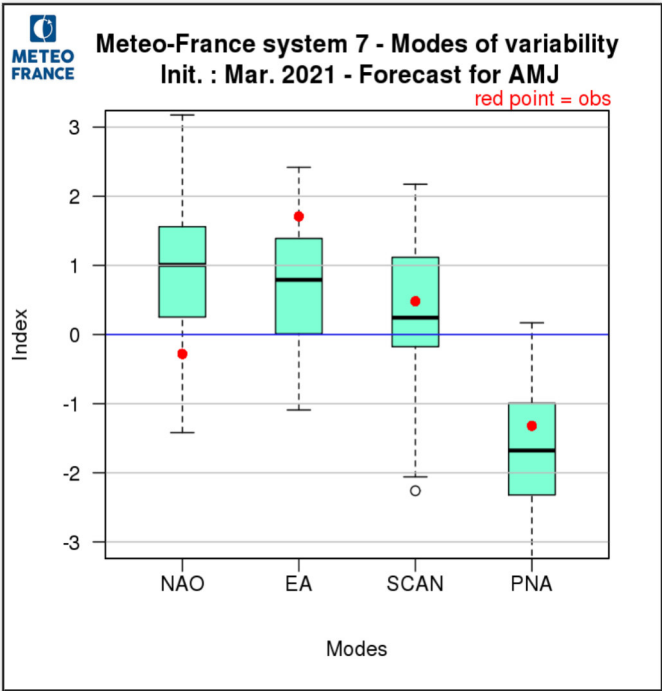
Good PNA and SCAN forecast.

The NAO mode were not well predicted by both models.



Atmospheric circulation : Modes verification

Same observation as for the previous slide

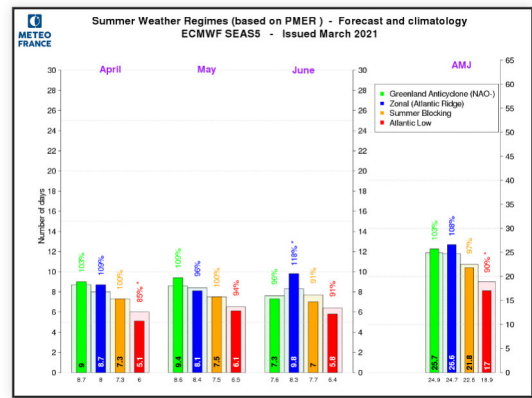
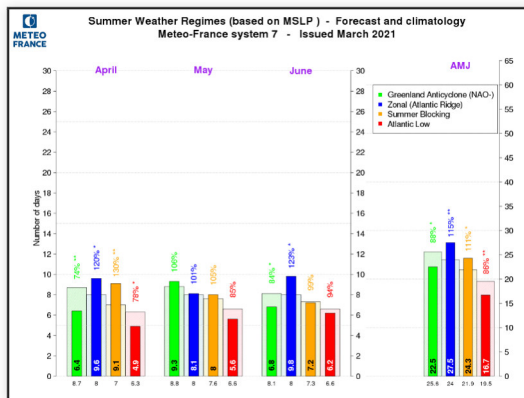
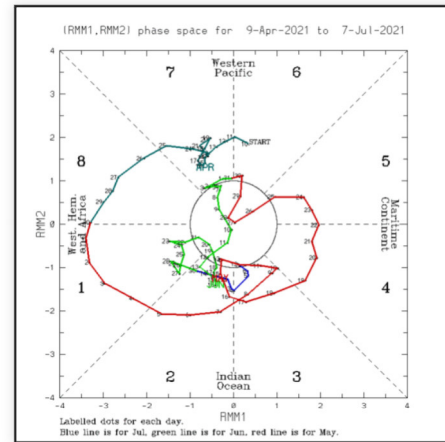
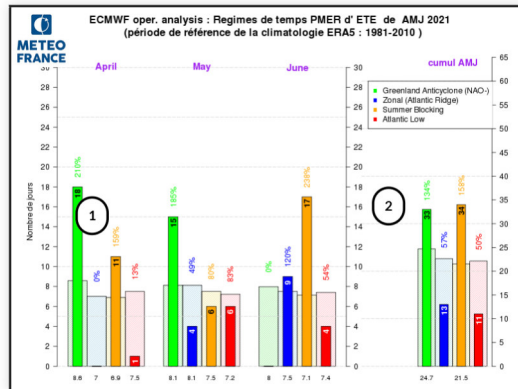


Atmospheric circulation : Summer SLP weather regimes

In the quarterly analysis, Greenland Anticyclone and Zonal are more frequent than normal.

This is not anticipated by models.

The active MJO in April and May have played a role in the frequency of regimes



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

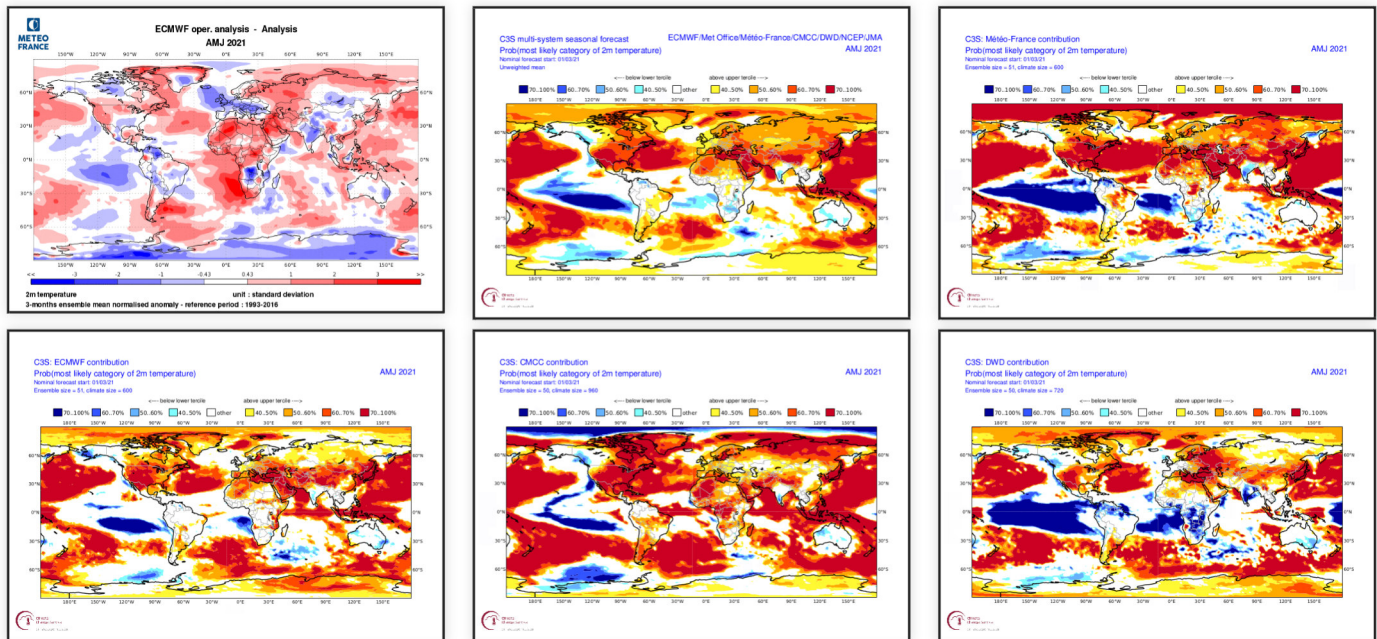
- 1 - very strong predominance of the zonal regime in September
- 2 - Predominance of zonal regime last quarter

Climatic parameters : temperature on the globe

Tropical zone and southern hemisphere : large anomalie structure are fairly well predicted.

North America : Good forecast over Alsaka (PNA-), but too strong signal from Eastern Canada to USA

Europe : cold/hot dipole not expected in connexion with poor forecast of geopotential anomalies. DWD has a better forecast in relation to his better general circulation forecast (see above)



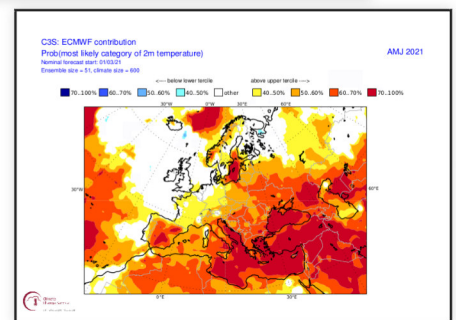
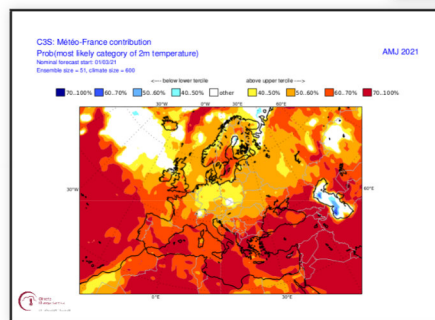
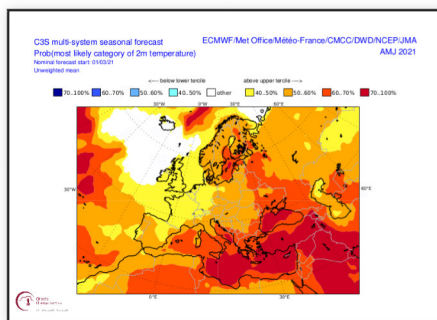
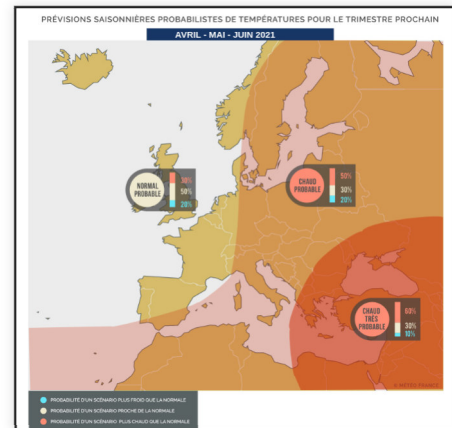
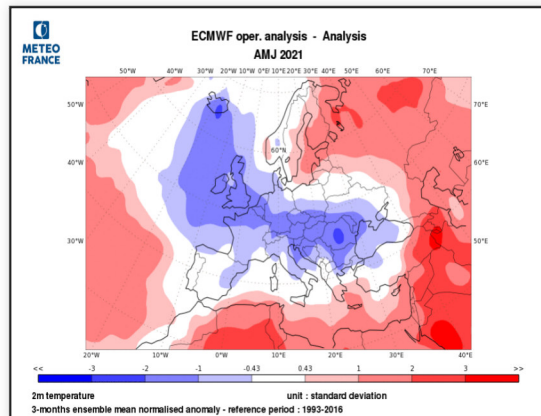
ECMWF analysis top left, forecast for multi-model top center and forecast for MF-S7 top right, ECMWF-SEAS5, CMCC, DWD on the bottom line.

Climatic parameters : temperature over Europe

Quite cold conditions on most european countries, and warm anomalies from western Russian to Middle East.

This cold signal was not expected by the models

On the other hand the large scale east/west gradient proposed on the synthesis map was rather correct

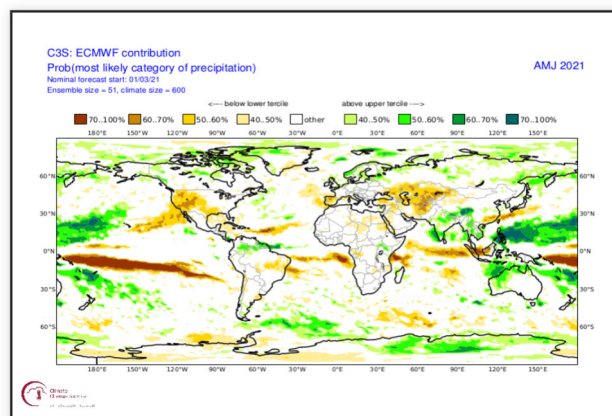
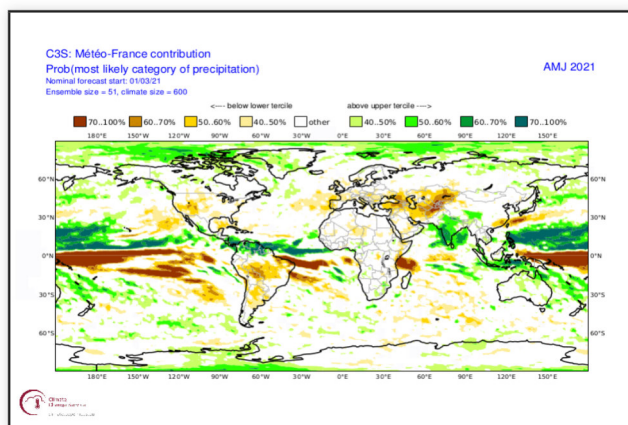
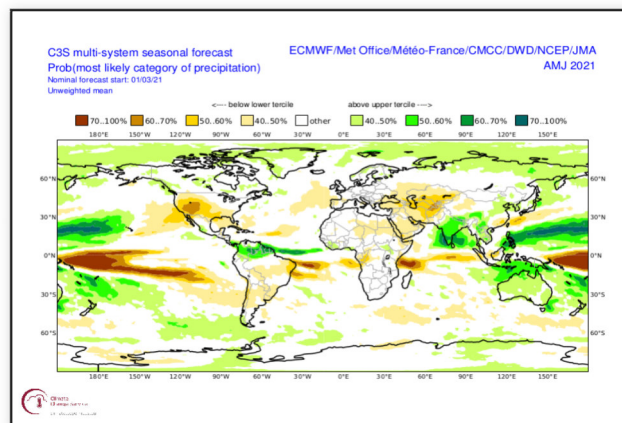
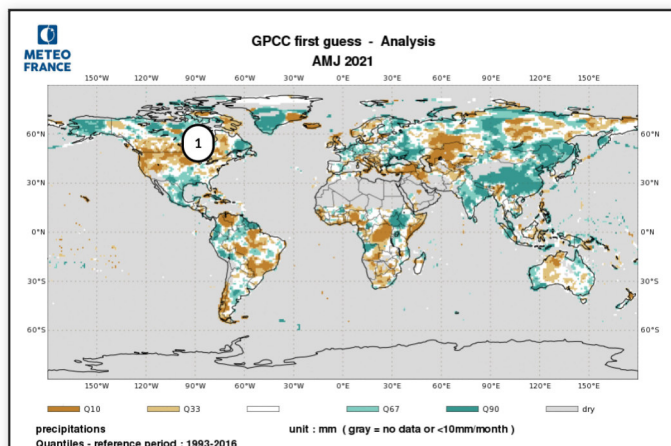


ECMWF analysis top left, synthetic forecast map top right. Forecast for multi-system, MF-S7 and SEAS5 on the bottom line.

Climatic parameters : Precipitations over the globe

The large structures in connection with La Nina were fairly well forecasted : Dry anomaly to Central Asia and the wet anomaly from India to China. Dry anomaly over the western USA and the south of South America and wet anomalie over north of South America.

Elsewhere the forecasts are not informative.

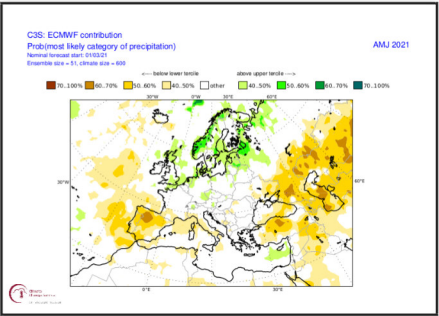
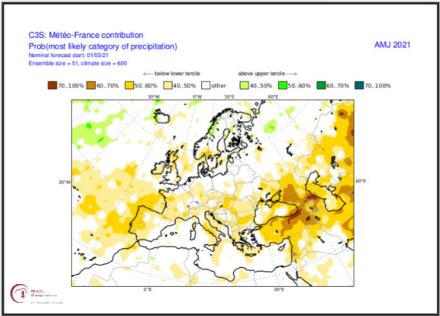
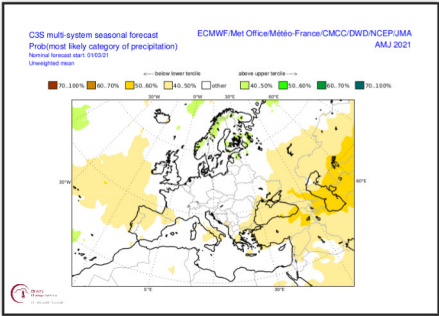
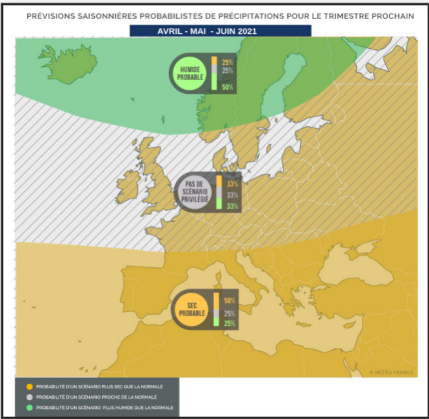
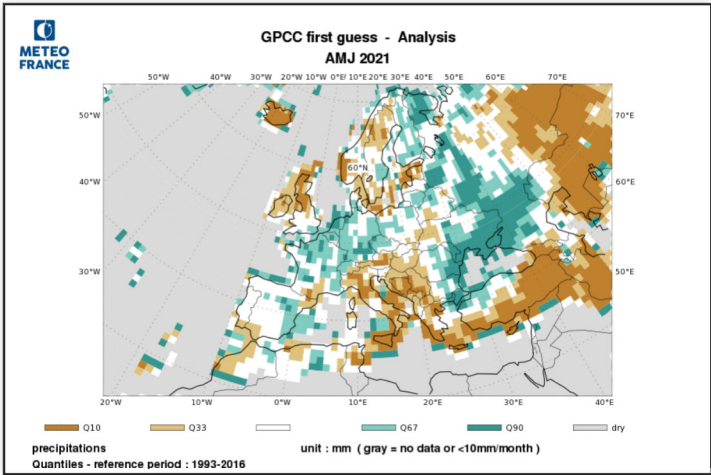


Standardized Precipitation Index analysed by IRI top left, forecast for multi-model top right and MF-S7 and SEAS5 on the bottom line.

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

Climatic parameters : Precipitations over Europe

Poor forecast



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 AMJ 2021

1) Oceans :

The main patterns were well predicted by models. Rather good forecast of ENSO evolution. Poor anticipation of rapid warming in the tropical South Atlantic.

2) Large scale atmospheric circulation :

VP 200 hPa : The patterns linked to La Niña were not clearly visible in the analysis, probably due to perturbations caused by the active MJO.

SF 200 hPa : There aren't expected structures on the analysis

Z500 : The PNA- look like pattern was well predicted. The main anomalies around Europe were not well forecasted.

3) Climatic parameters over Europe :

Temperatures : On the synthesis map, good forecast for the East/west gradient, but with a too warm signal.

Precipitations : Poor forecast.