

VERIFICATION BULLETIN

JANUARY - FEBRUARY - MARCH 2022

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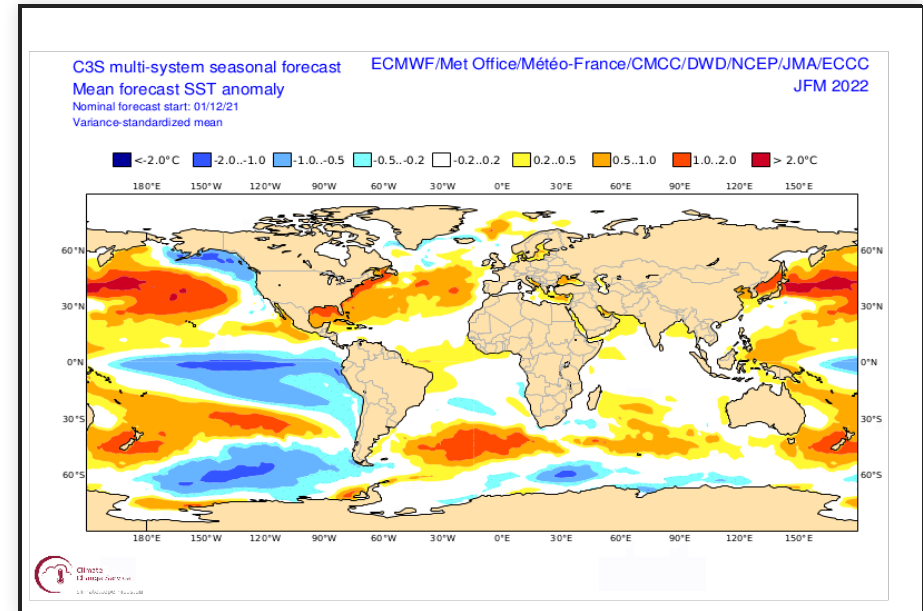
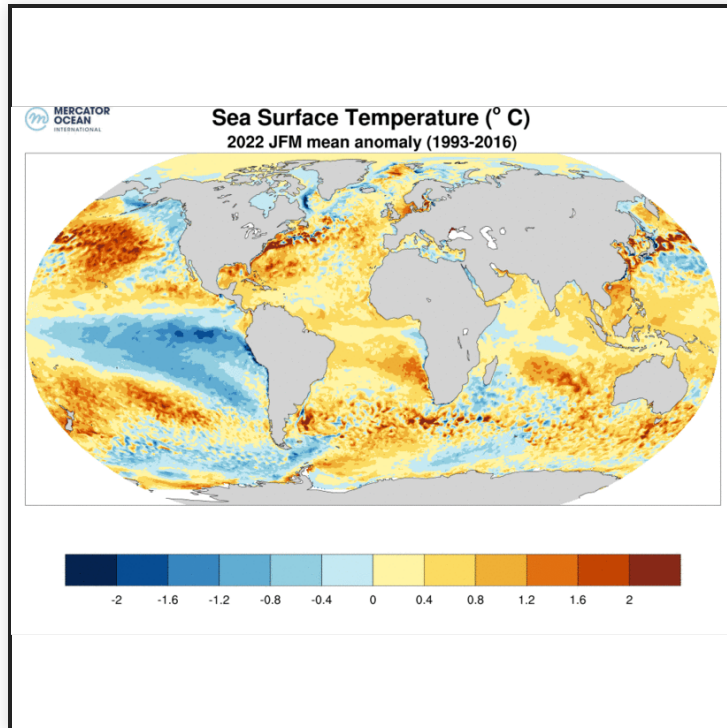
Introduction : Objective

- 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.

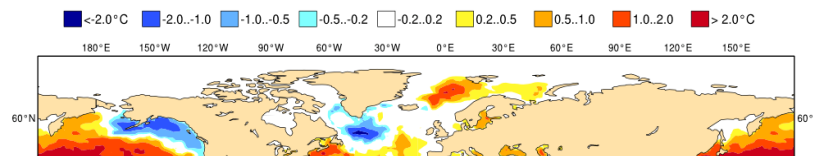
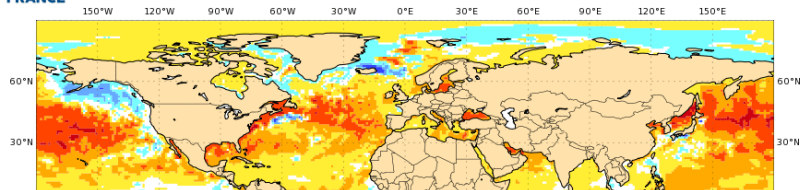
Oceans : surface temperature anomalies

The main patterns are well predicted over Pacific (La Nina and PDO-). Elsewhere in the tropics anomalies remained weak in good agreement with forecasts.

Warm anomalies over the southeast Atlantic and southern Indian Ocean were not well anticipated.



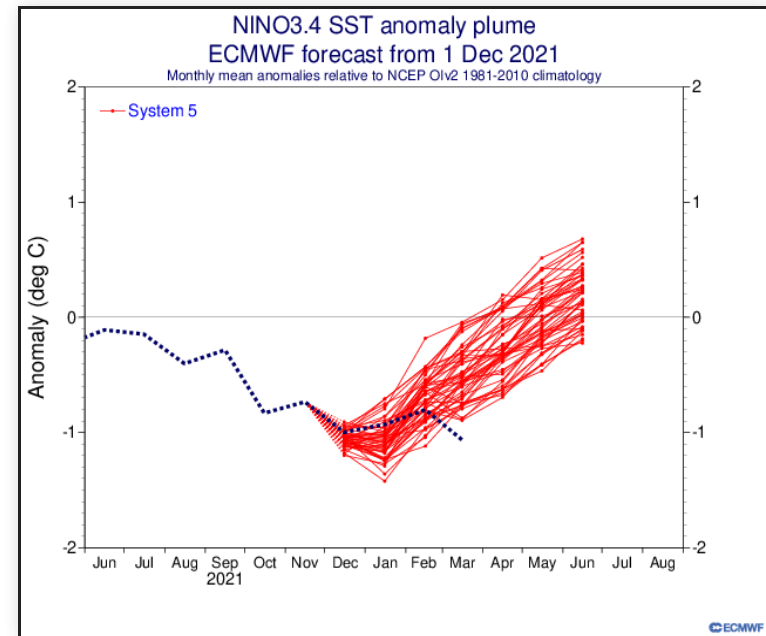
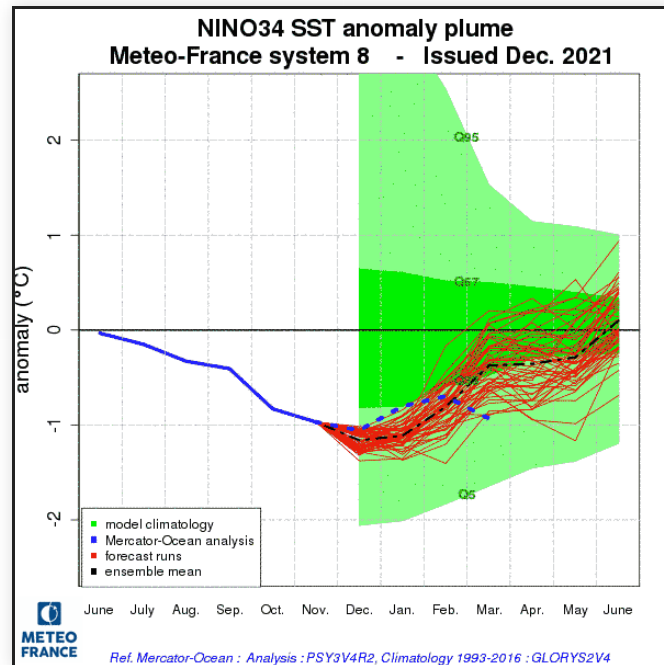
Meteo-France system 8 - Forecast
For JFM 2022 (issued December 2021)



Oceans : ENSO

CAUTION : reference analyses differ between MF-S8 (Mercator-Ocean 1993-2016) and ECMWF-SEAS5 (NCEP 1981-2010).

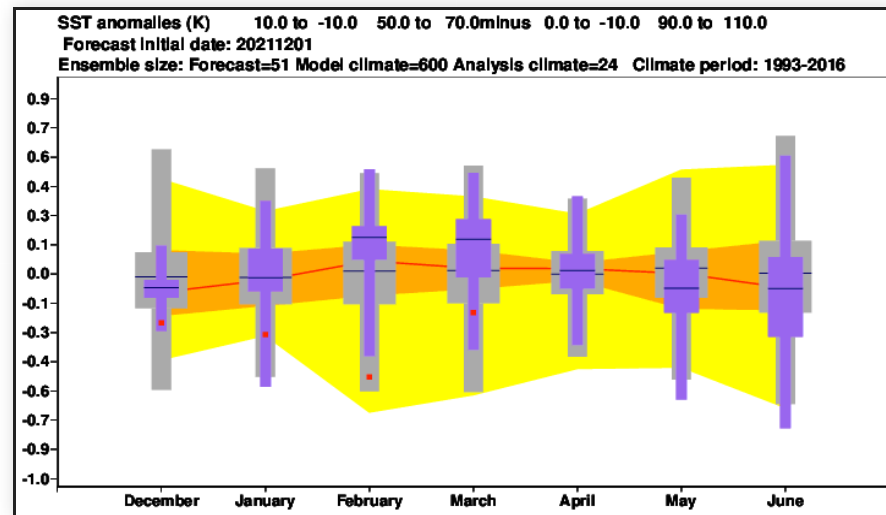
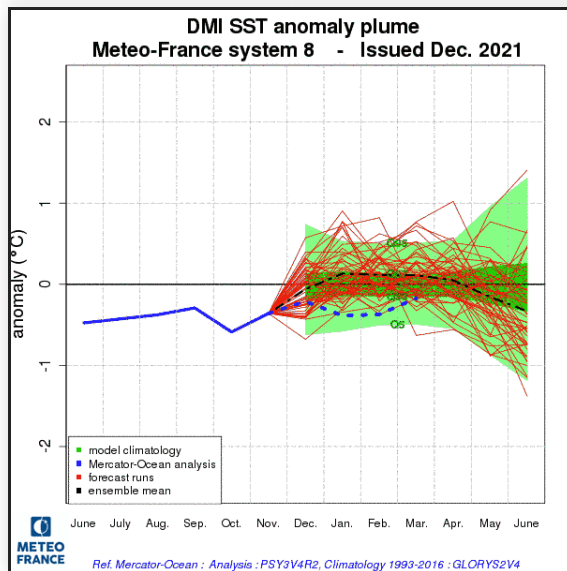
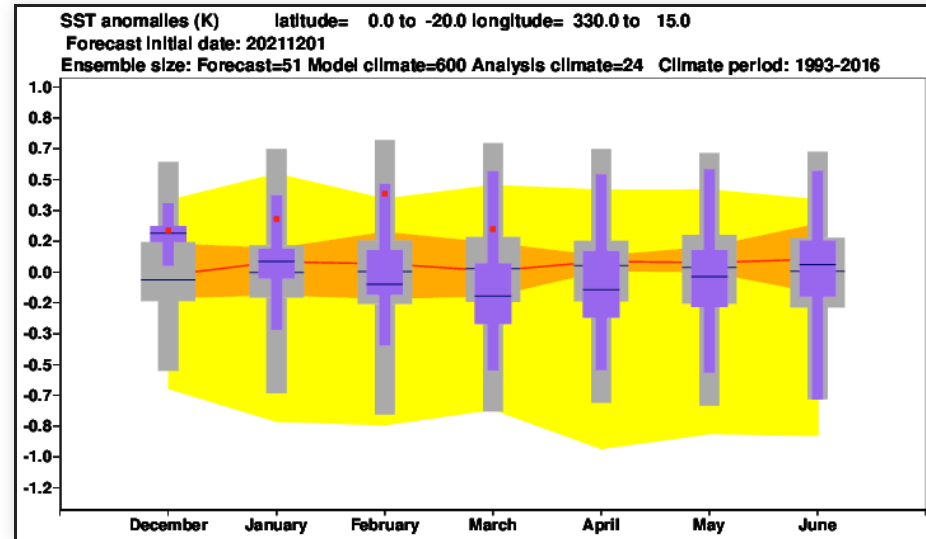
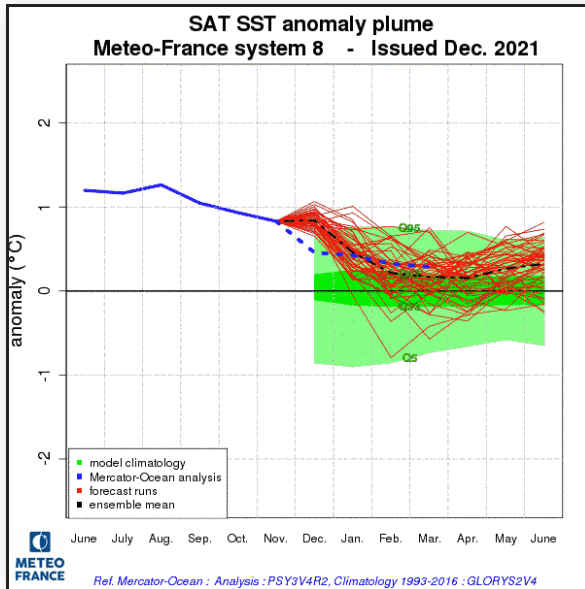
The cooling in the month of March was not foreseen by the models



Oceans : tropical Atlantic and Indian Ocean index

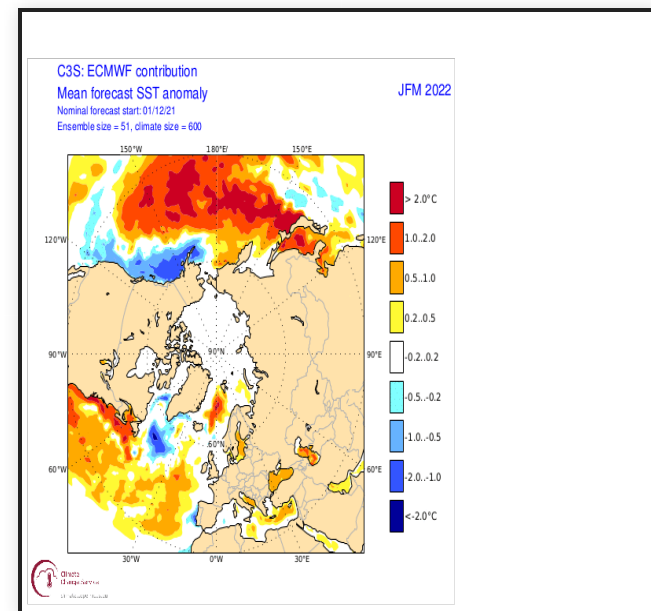
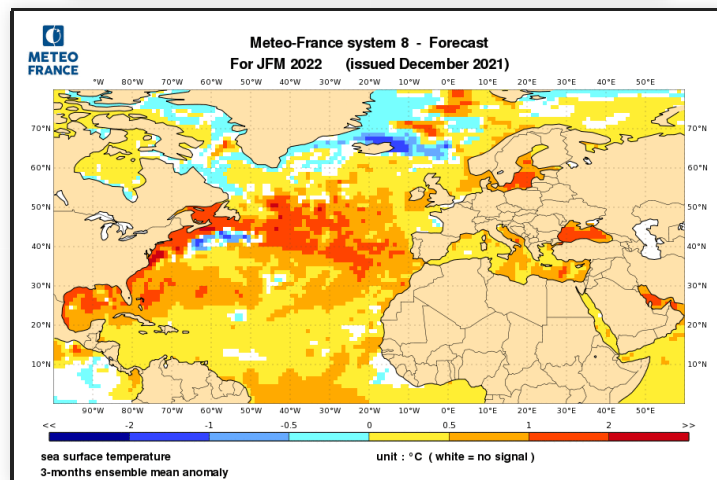
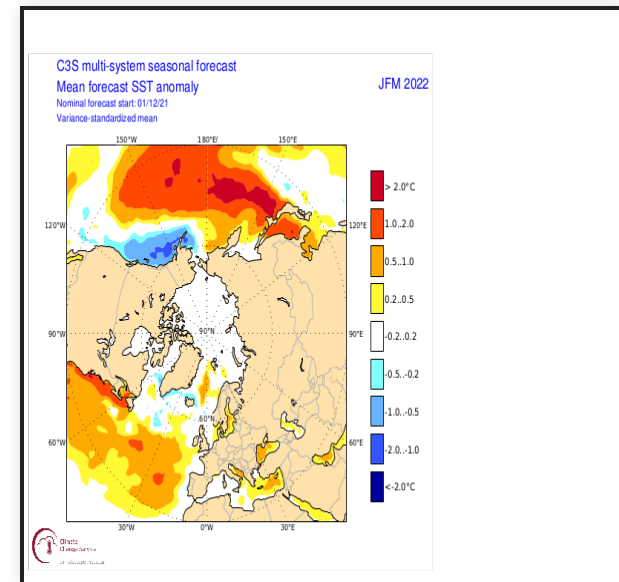
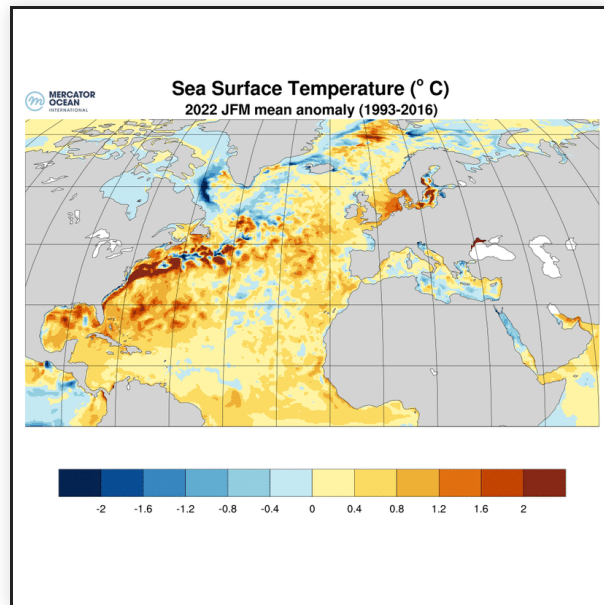
SAT : This index returns to low values as expected. Note the differences in analysis between this two models.

DMI : the positive trend is too strong with both models.



Oceans : North Atlantic SST

The main patterns are well forecasted

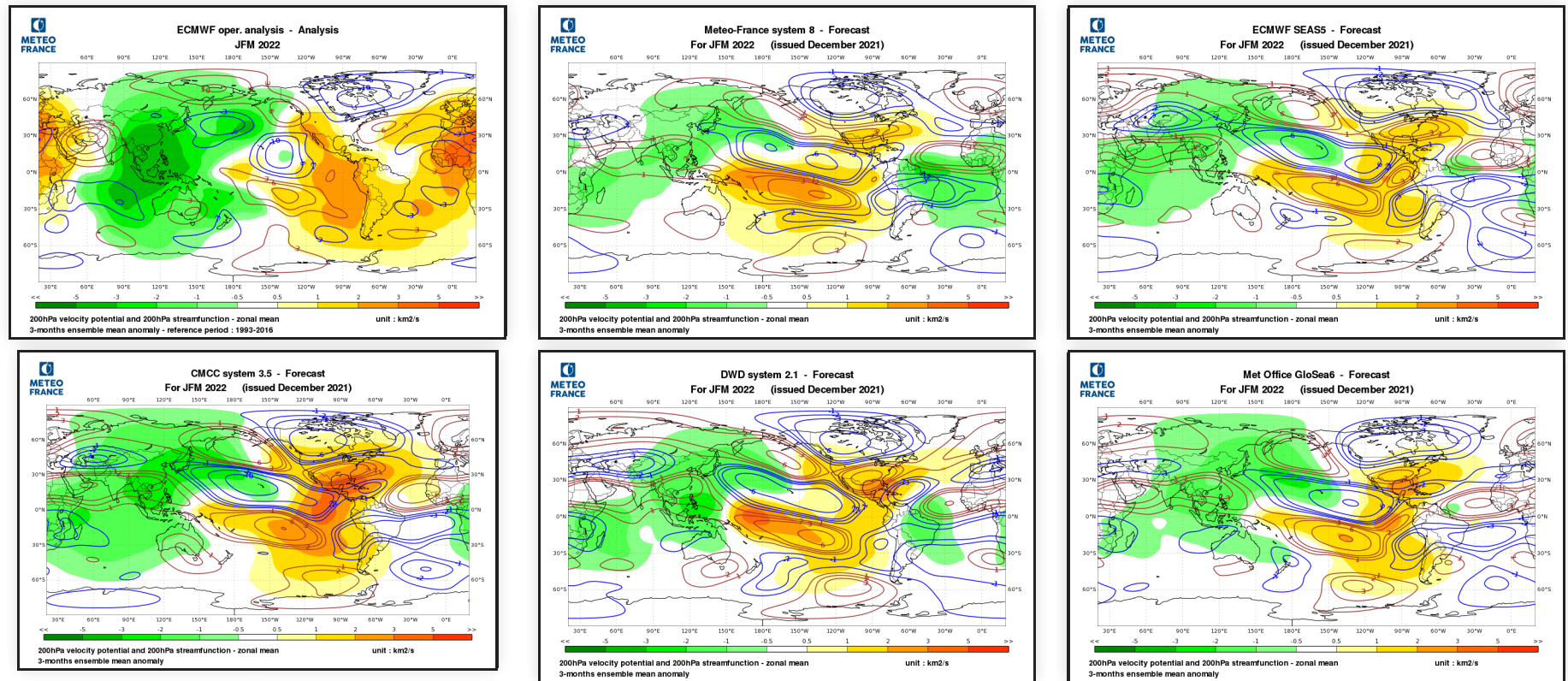


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S8 (bottom left) and ECMWF SEAS5 (bottom right)

Atmospheric circulation : Global teleconnection

VP : The effects of the "La Niña" phenomenon are clearly visible: an upward anomaly near the Maritime Continent and a downward anomaly over the Pacific Ocean. However, this upward extend widely over the Indian Ocean , in line with an MJO in 2th 3th sectors in February/March. The upward anomaly on the Western Equatorial Atlantic was underestimated by the models while the downward anomaly over Africa was not forecasted by models

SF : There is indeed a teleconnexion to north America which looks like a PNA- with a shift to the west compared to the models. Over the Atlantic, there are similarities between the teleconnections forecasted by models and the analysis.

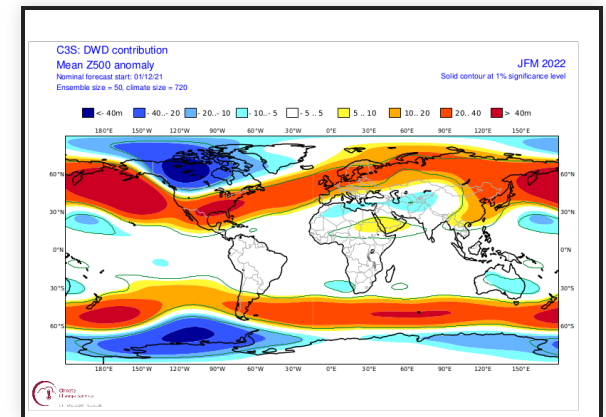
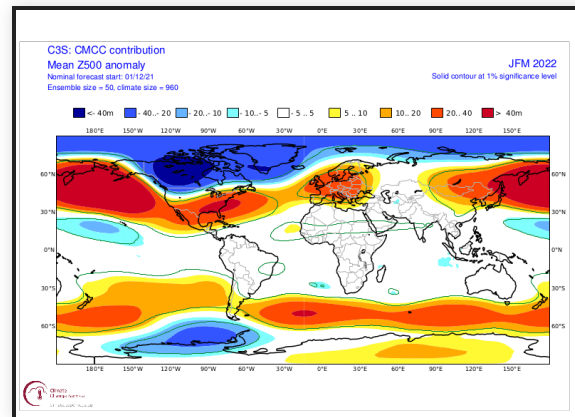
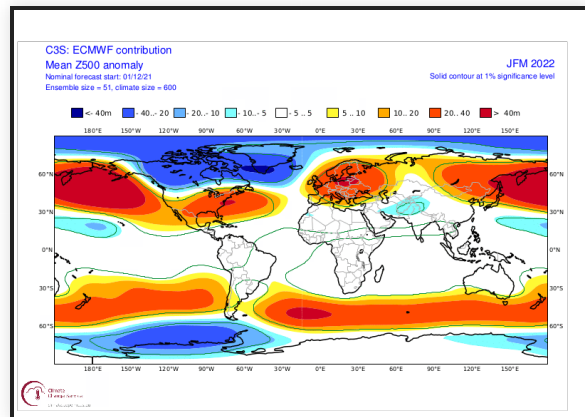
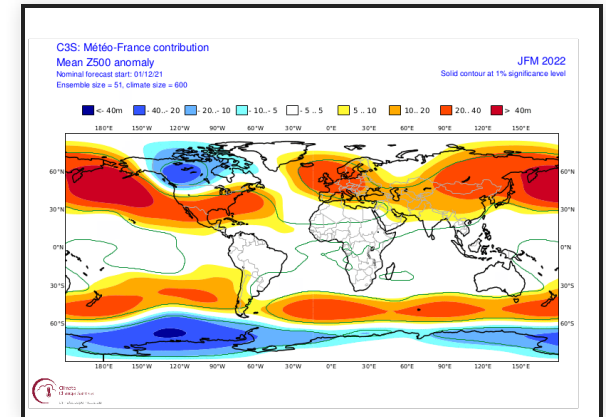
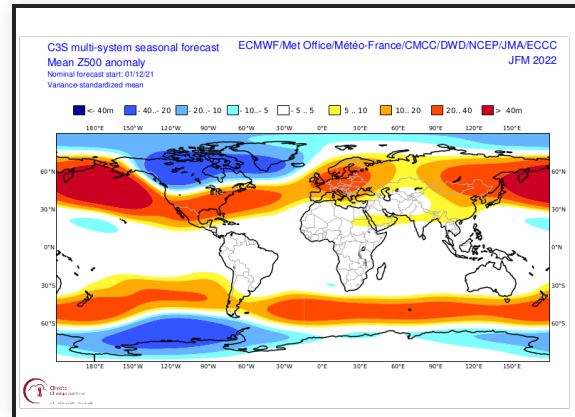
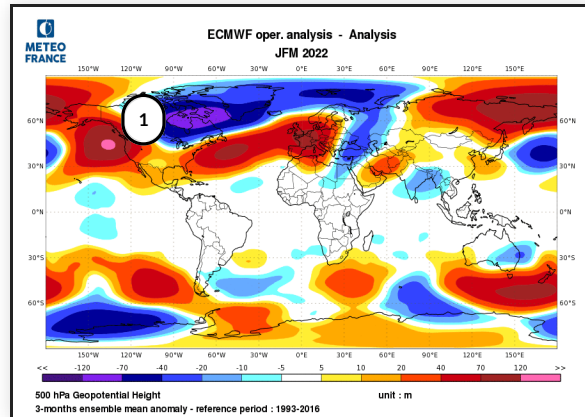


ECMWF analysis, MF-S8, ECMWF-SEAS5, CMCC, DWD and JMA 200hPa velocity potential anomalies (color range, green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

Atmospheric circulation : 500hPa Geopotential height

North America : The PNA- pattern linked to La Nina, shifted to the west.

From the Atlantic to Eurasia the multimodel forecast is correct except from western Russia to Turkey where the negative anomaly was not forecast (models predicted weakness further east from the Urals to Iran)

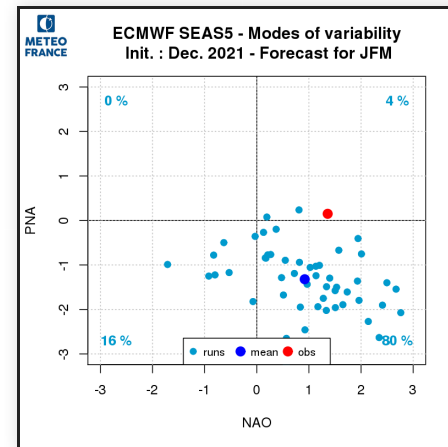
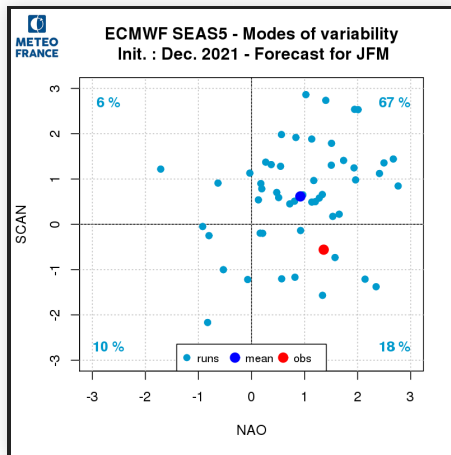
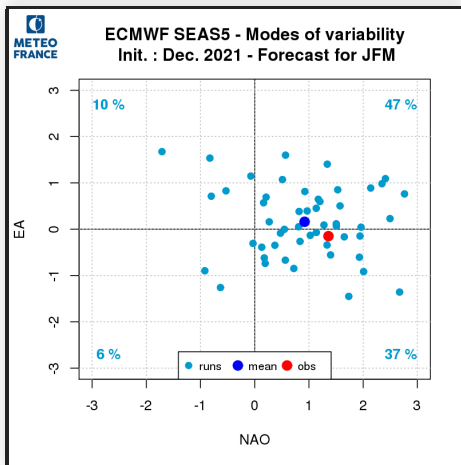
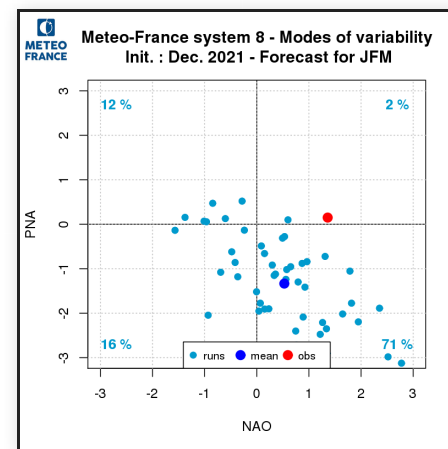
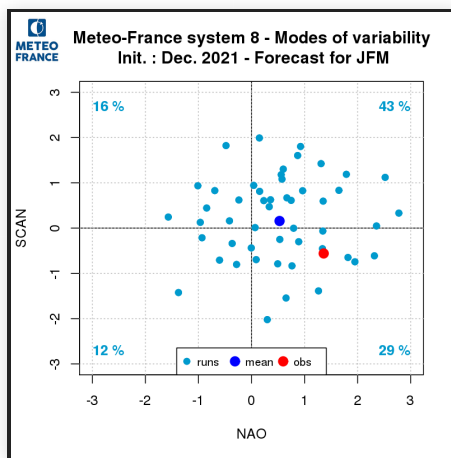
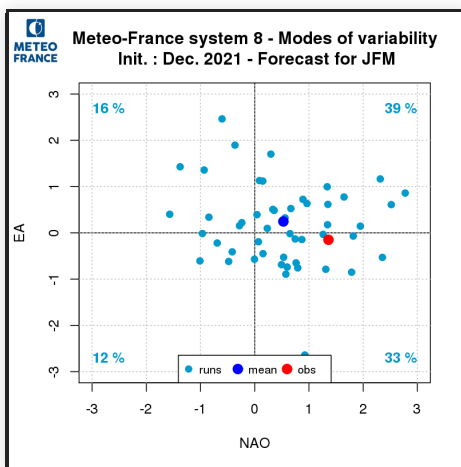


ECMWF analysis, C3S multi-system, MF-S8, ECMWF-SEAS5, CMCC and DWD 500hPa geopotential height anomalies.

1 - Look like PNA -

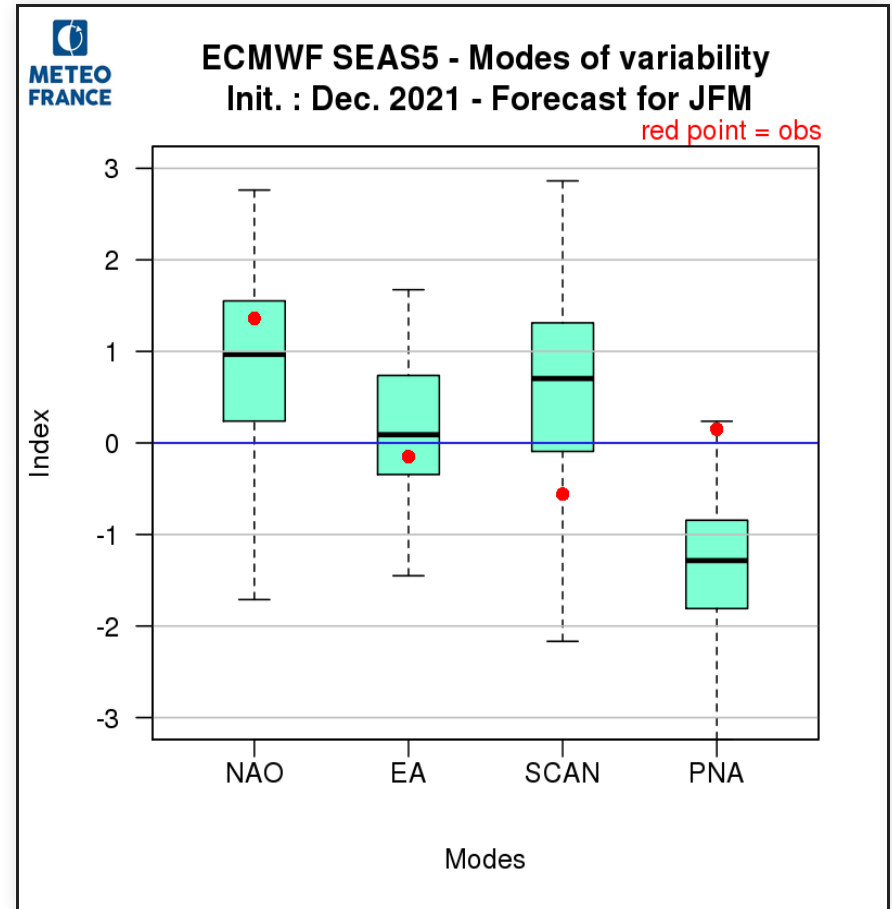
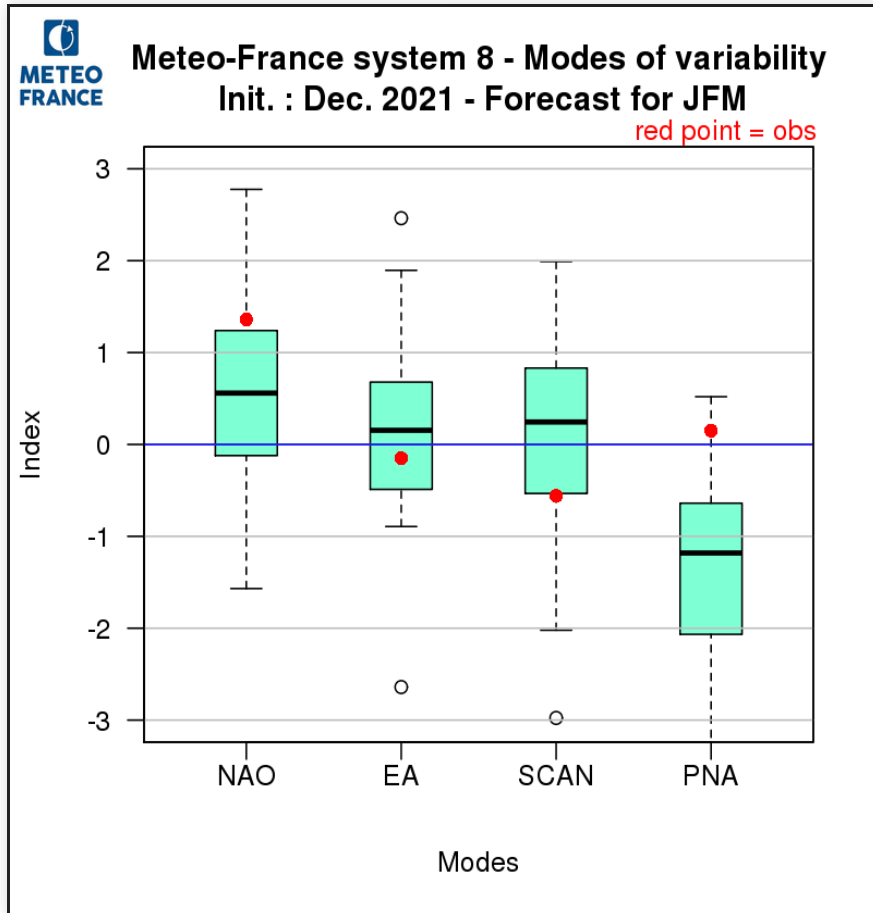
Atmospheric circulation : Modes of variability

Both models predicted a NAO+ and a neutral EA. The negative SCAN was not predicted as well as neutral PNA.



Atmospheric circulation : Modes verification

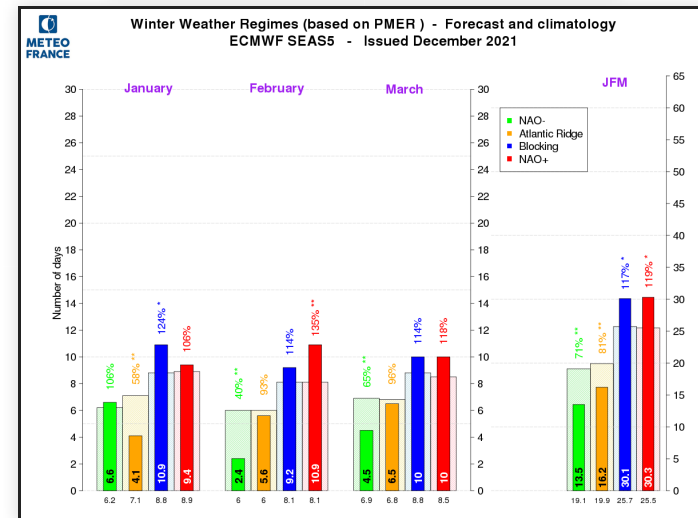
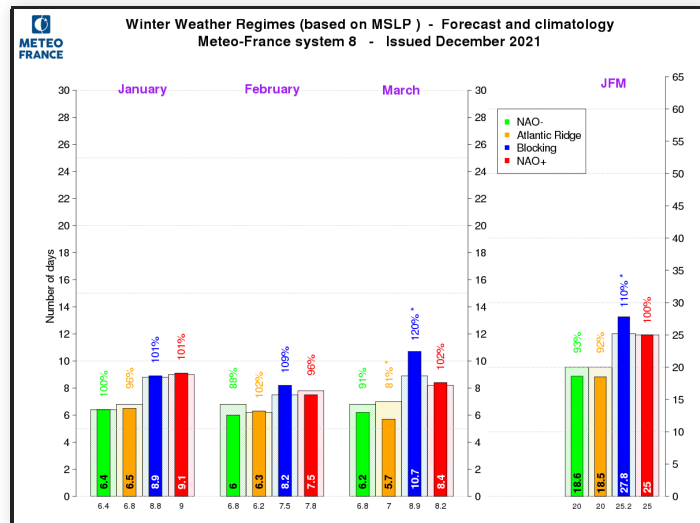
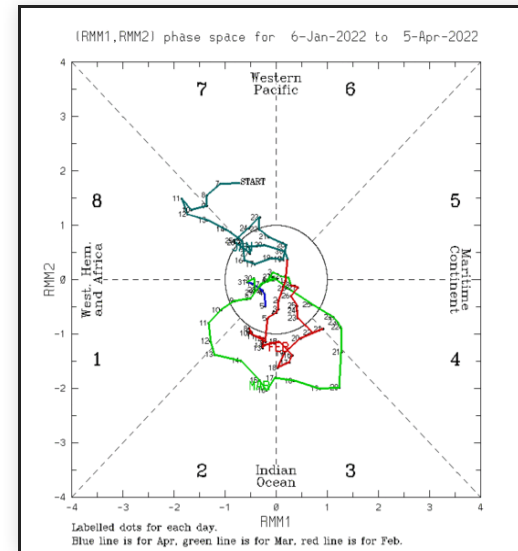
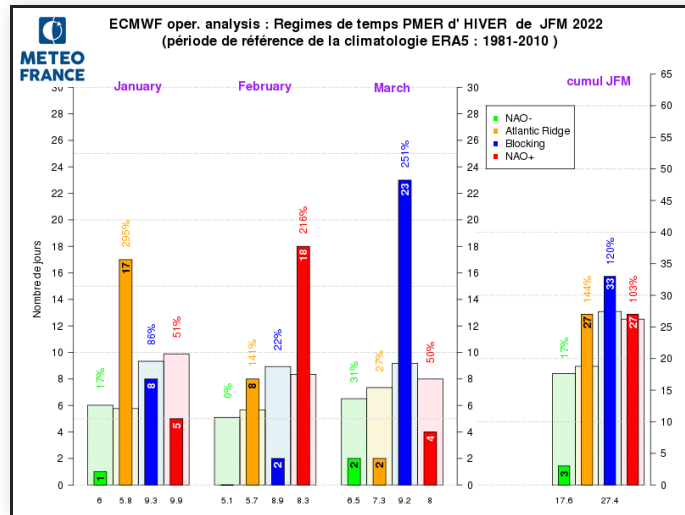
Same observation as for the previous slide



Atmospheric circulation : Winter SLP weather regimes

Strong interseasonal variability but, over the quarter, Blocking is more frequent at the expense of the NAO-.

Models favored Blocking

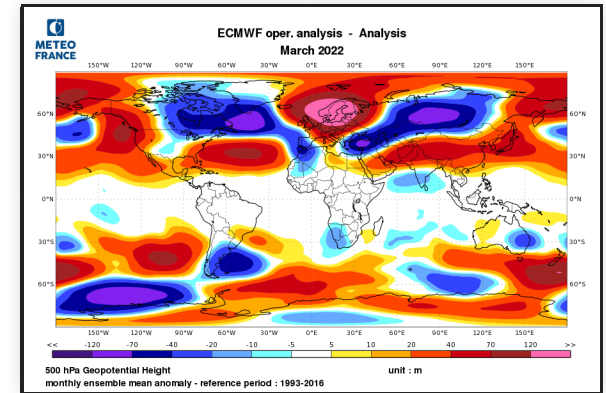
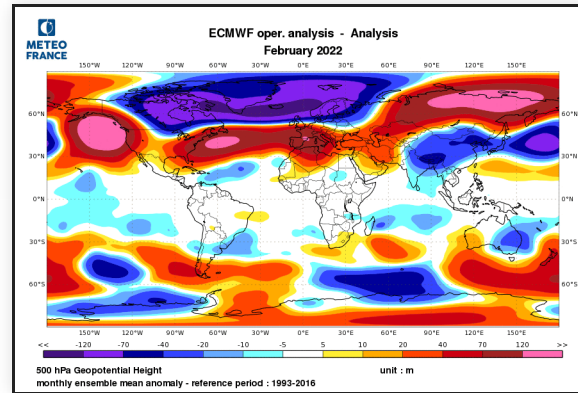
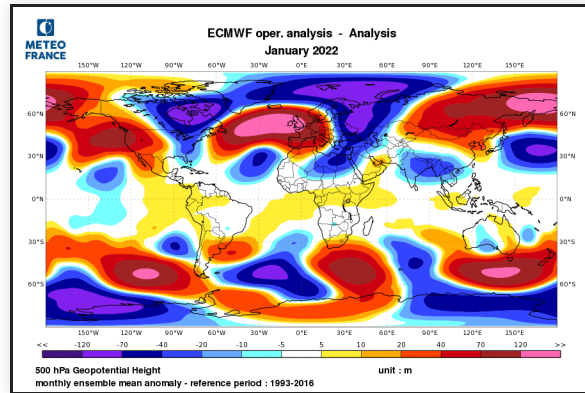


weather regime : ECMWF analysis top left, MF8 and ECMWF forecasts at the bottom. MJO phase top right

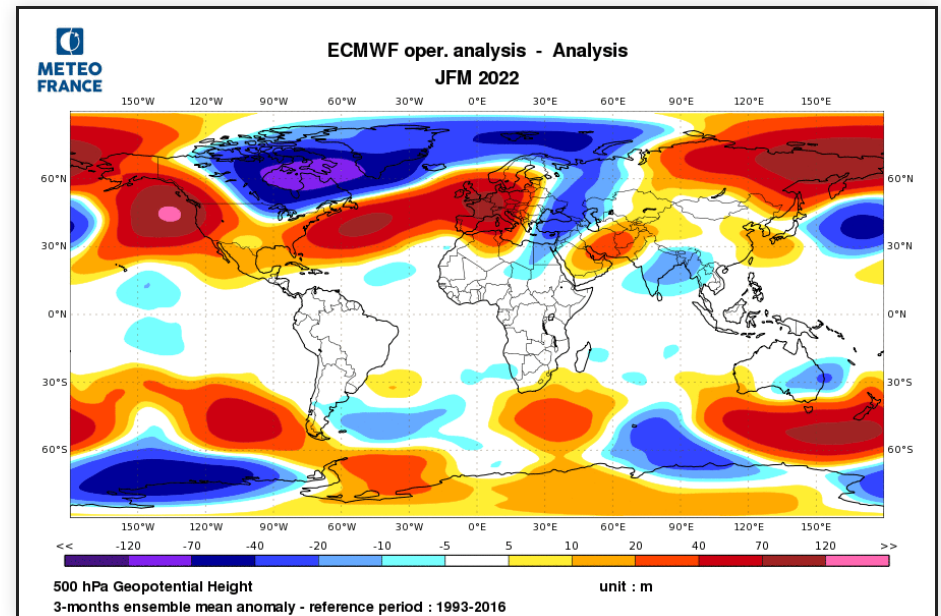
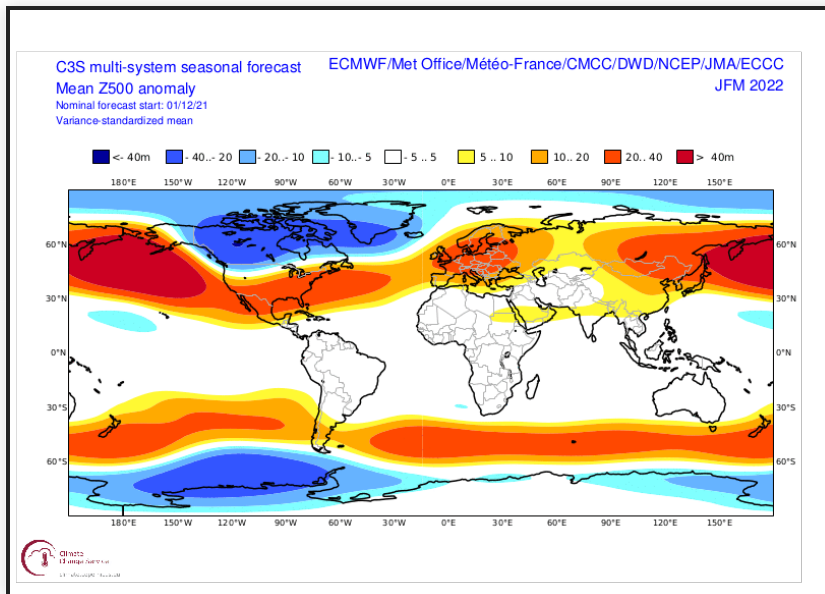
Atmospheric circulation : Variability within the quarter

The atmospheric circulation was different for each month of the quarter : Atlantic Ridge for January, NAO+ for February and Blockage for March.

Nevertheless the averaged circulation over the quarter was well predicted by the multi-model.



ECMWF analysis : January, February and March 500 geopotential height anomalies

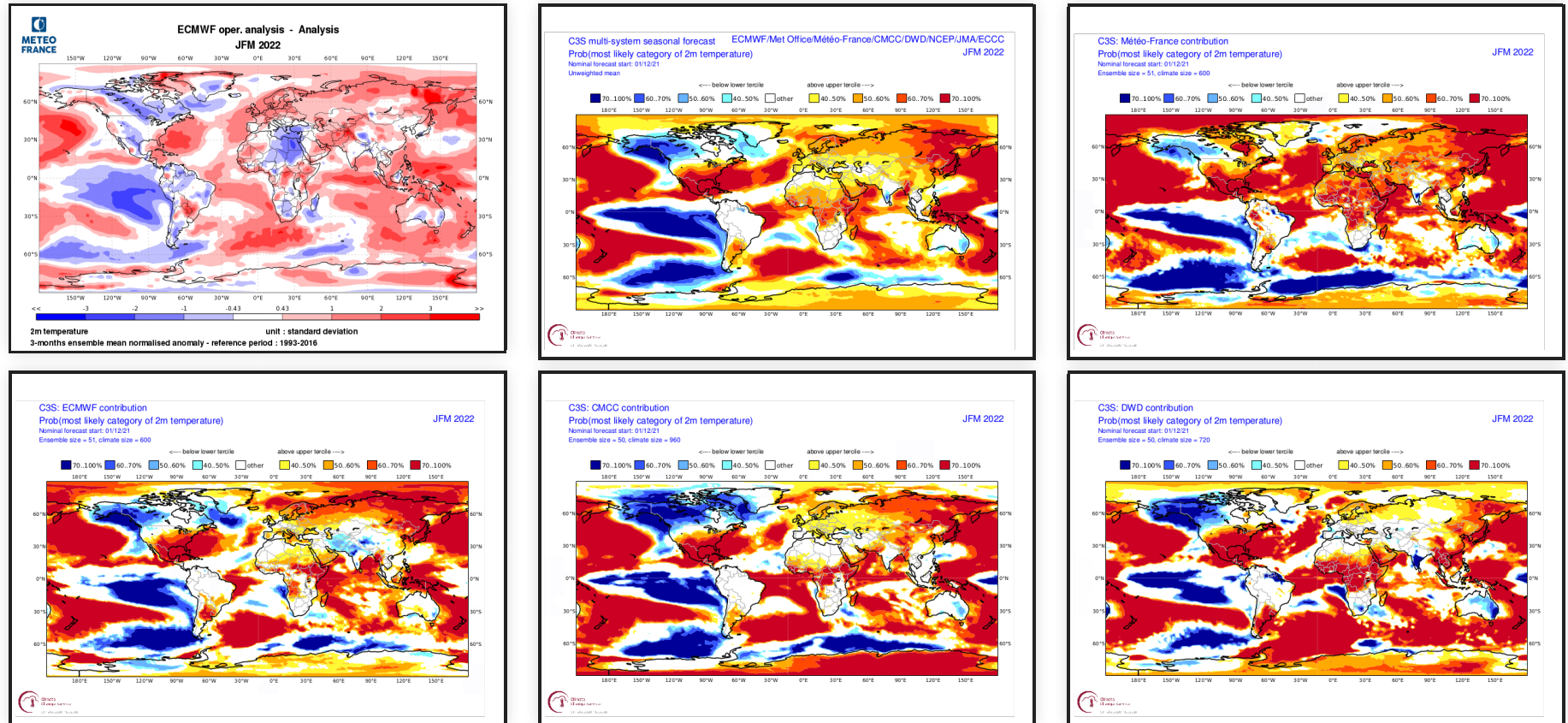


C3S multi-sytem forecast and ECMWF analysis 500 geopotential height anomalies for JFM

Climatic parameters : temperature on the globe

The main anomalies in the equatorial areas were correctly forecasted.

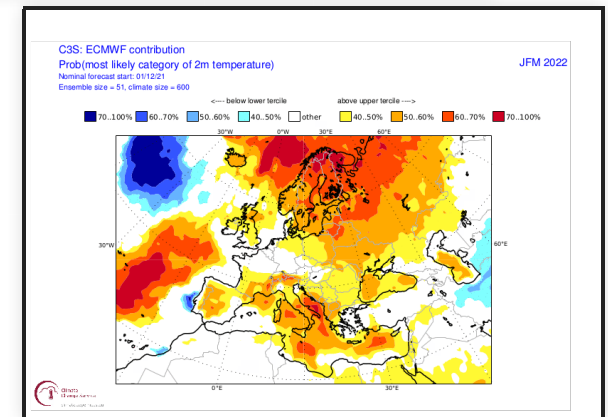
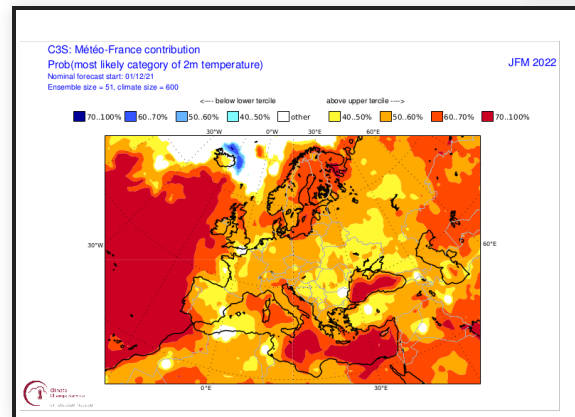
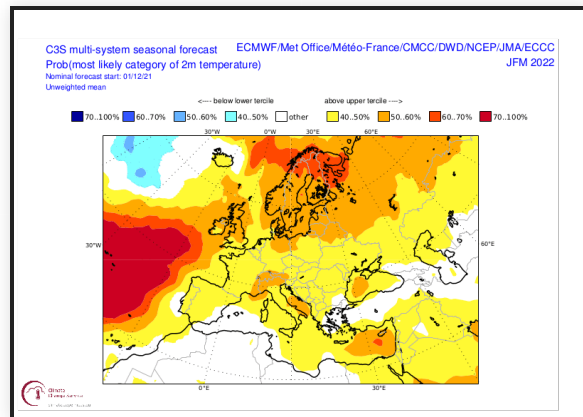
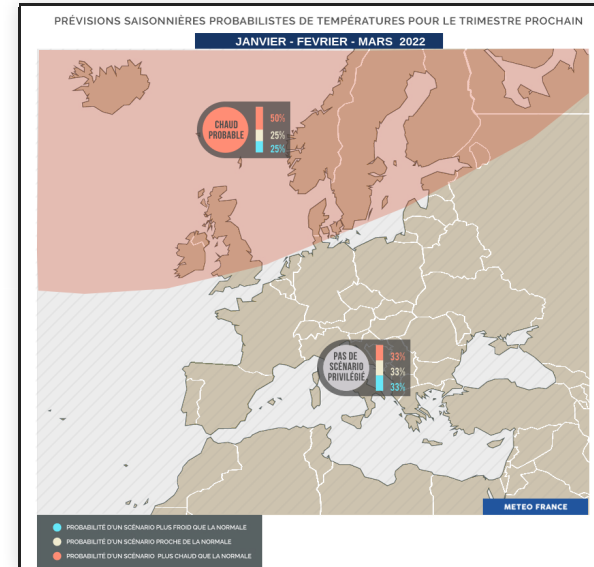
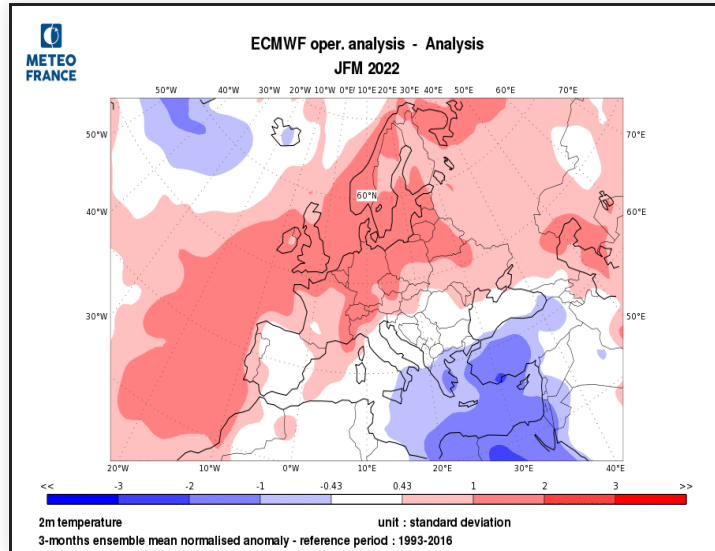
At the mid-latitudes, the warm anomalie from eastern Russia to the north of Pacific have been well forecasted. The cold/warm dipole over Canada/southern United States was forecast too far west.



ECMWF analysis top left, forecast for multi-model top center and forecast for MF-S8 top right, ECMWF-SEAS5, CMCC, DWD on the bottom line.

Climatic parameters : temperature over Europe

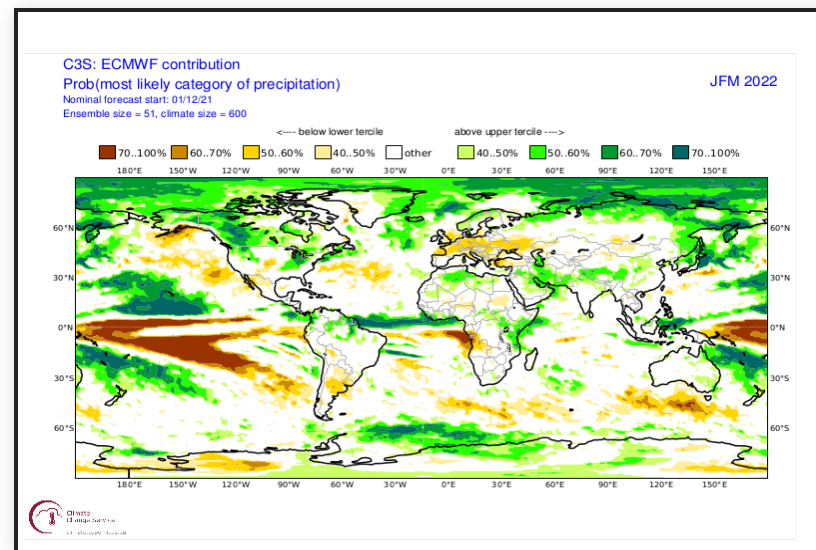
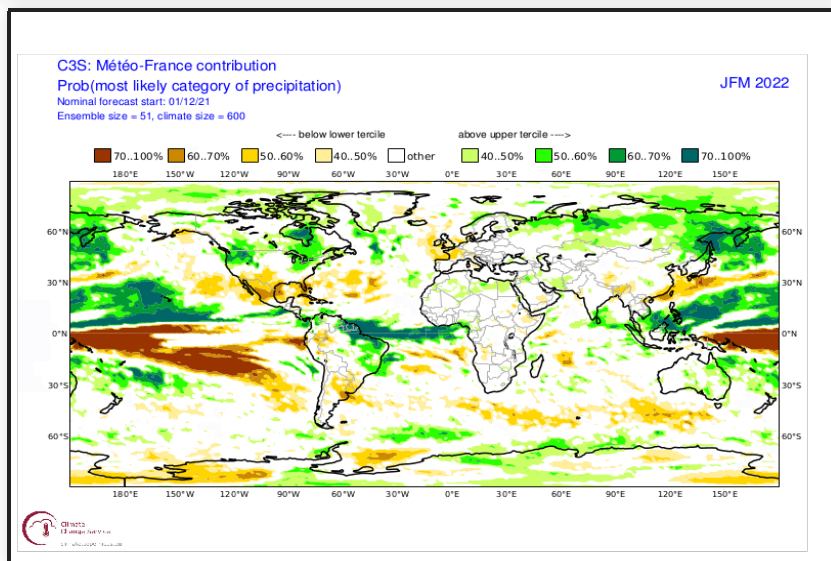
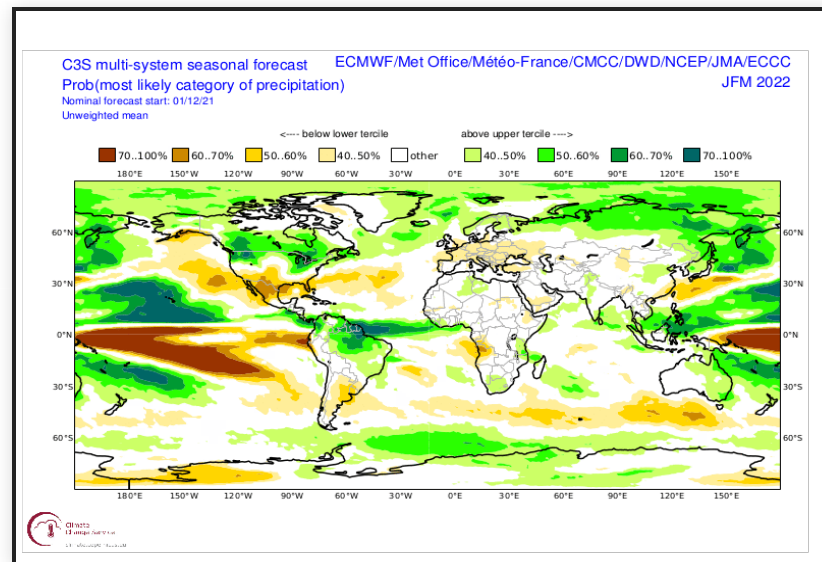
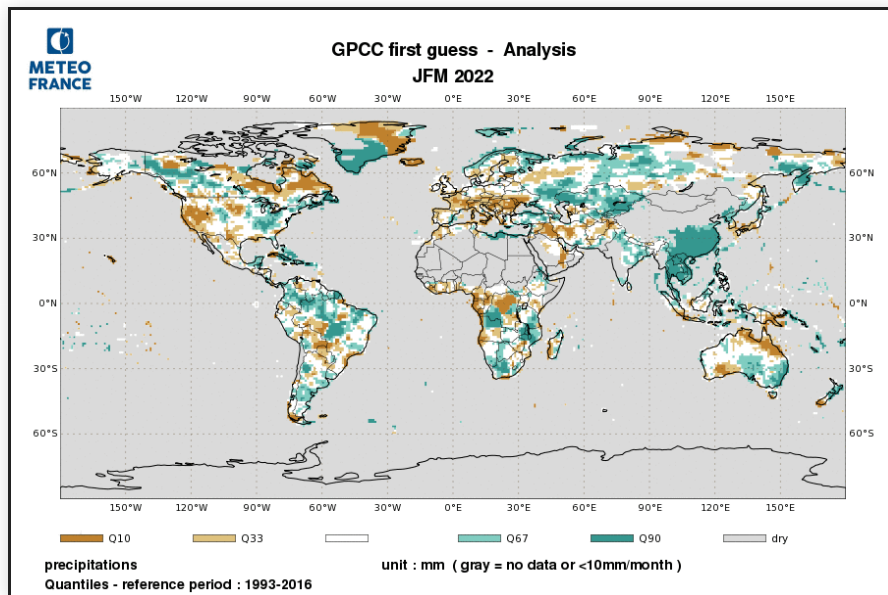
Good forecasts of warm anomalies over the northwest of the domain related to NAO+. Cold anomalies over the eastern Mediterranean basin were not forecast.



ECMWF analysis top left, synthetic forecast map top right. Forecast for multi-system, MF-S8 and SEAS5 on the bottom line.

Climatic parameters : Precipitations over the globe

The wet scenario over northern South America and the dry scenario over Europe were well anticipated. Elsewhere the models are not very informative.

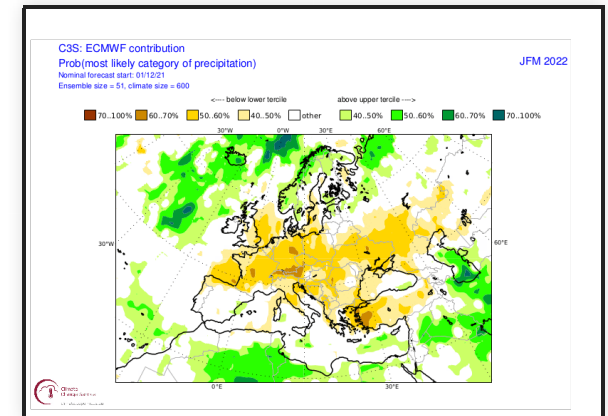
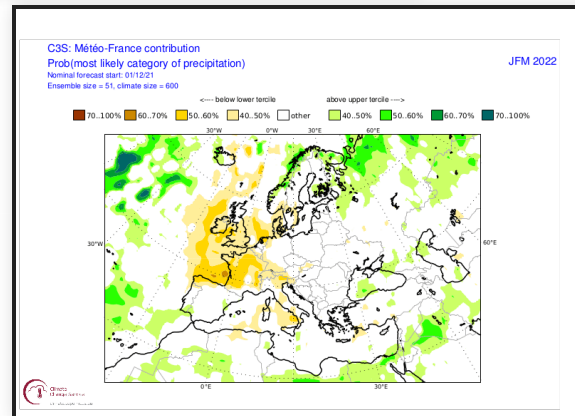
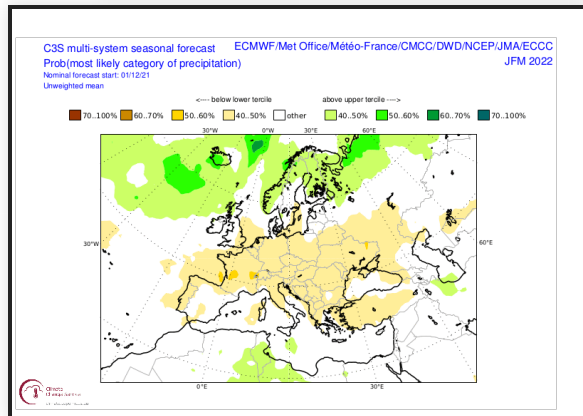
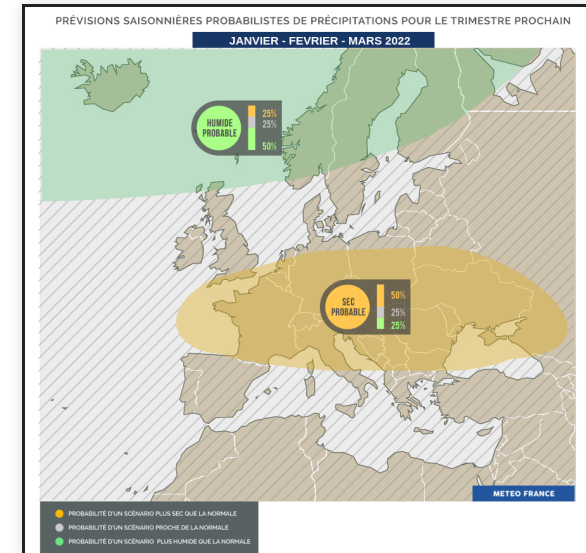
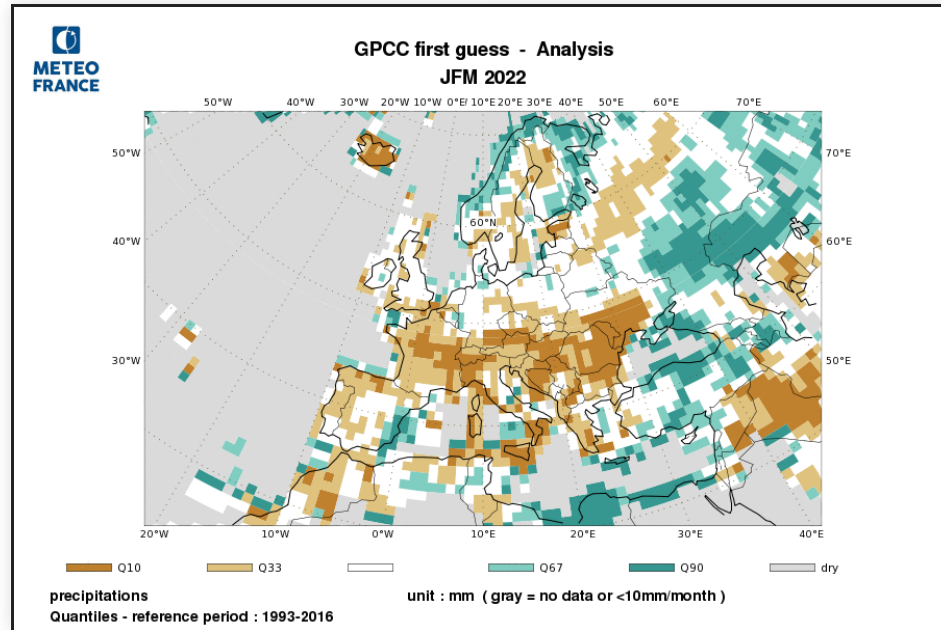


Standardized Precipitation Index analysed by IRI top left, forecast for multi-model top right and MF-S8 and SEAS5 on the bottom line.

Climatic parameters : Precipitations over Europe

The dry conditions from west to central Europe were well predicted.

On the other hand, the wet conditions from western Russia to Turkey were not anticipated.



Precipitation anomalies analysed by IRI (top left). Synthetic forecast map for precipitation (top right) and forecast for multi-model, MF-S8 and SEAS5 (on the bottom line).

General summary : for the period JFM 2022

1) Oceans :

The main anomalies were well predicted by models.

2) Large scale atmospheric circulation :

VP 200 hPa : The main patterns were quite well forecasted, but shifted to the west. This is probably due to the MJO frequently in phase2/3 in February and March.

SF 200 hPa : The PNA teleconnexion is shifted to the west compared to the forecasts.

Z500 : The PNA- pattern is shifted to the west compared to the forecasts. The pattern NAO+ and the positive anomaly over western Europe were correctly predicted.

3) Climatic parameters over Europe :

Temperatures : Good forecasts of warm anomalies over the northwest of the domain related to NAO+. Cold anomalies over the eastern Mediterranean basin were not forecast.

Precipitations : The dry conditions from west to central Europe were well predicted. On the other hand, the wet conditions from western Russia to Turkey were not anticipated.