

VERIFICATION BULLETIN

JUNE - JULY - AUGUST 2021

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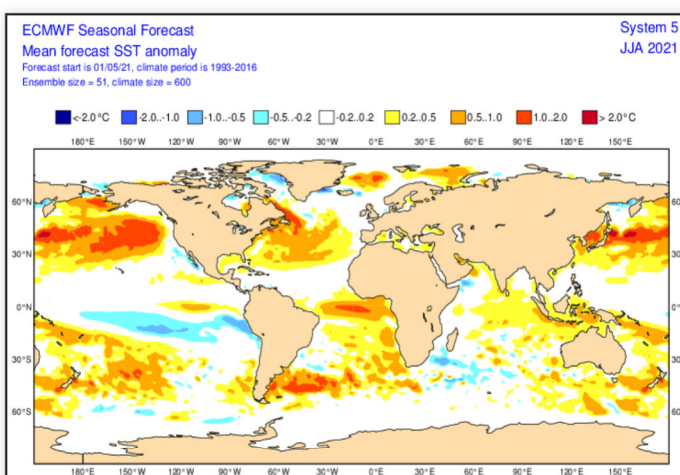
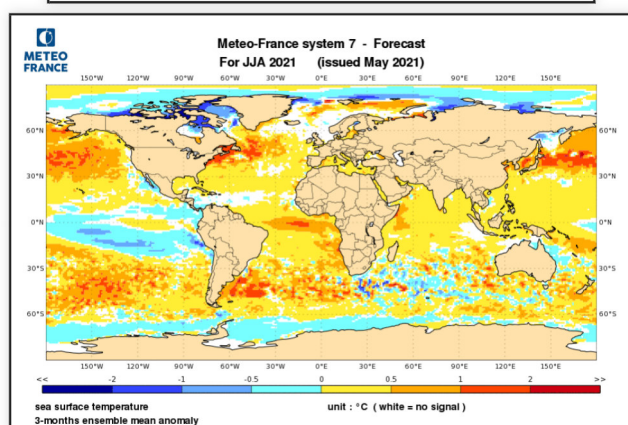
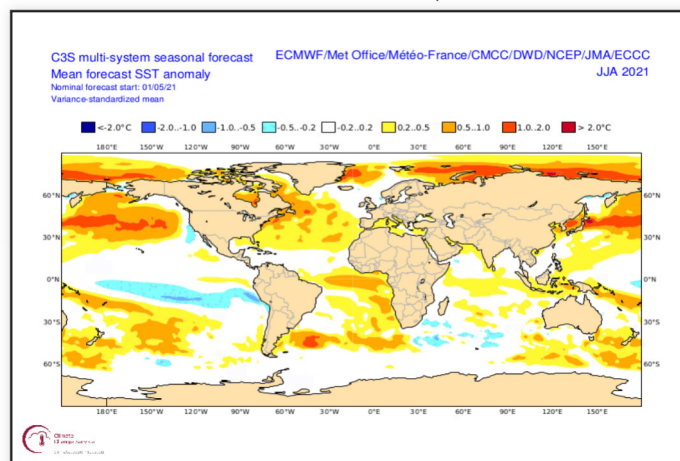
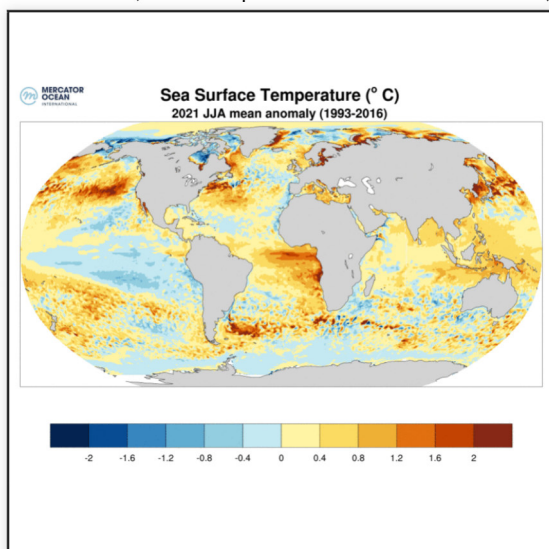
Introduction : Objective

- 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 areas. The extension of the warm anomaly along equatorial Atlantic was rather well forecasted but values have been underestimated.

At mid-latitudes, the main patterns were well forecasted (in particular on the North Pacific and North Atlantic)

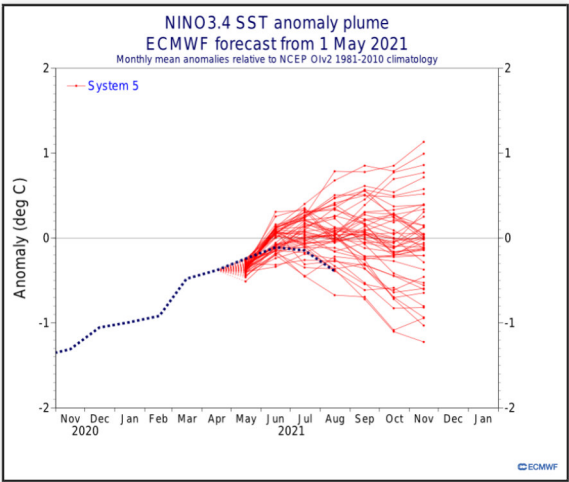
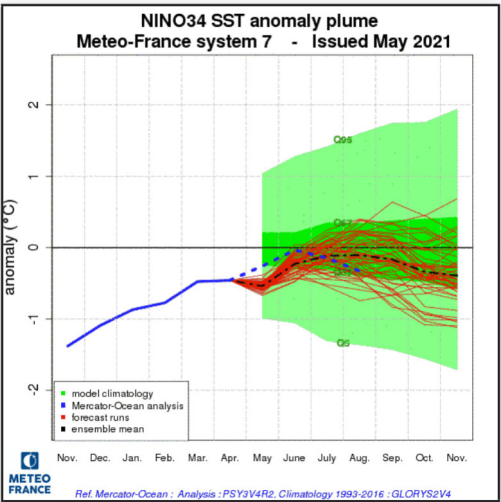


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S7 (bottom left) and SEASS (bottom right)

Oceans : ENSO

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

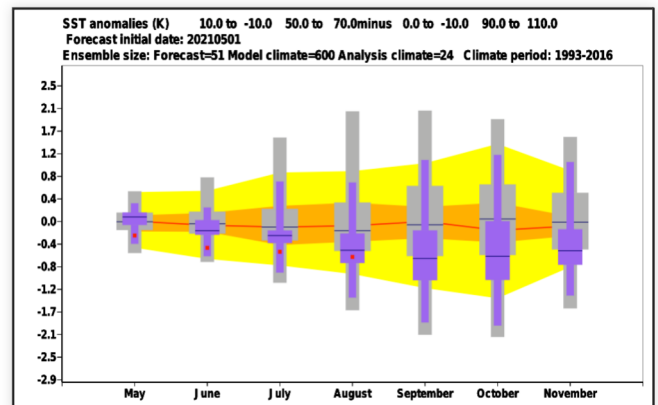
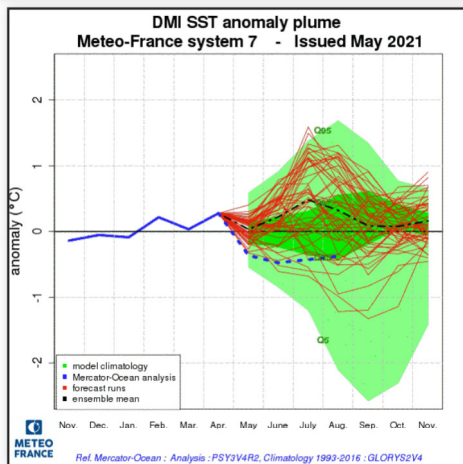
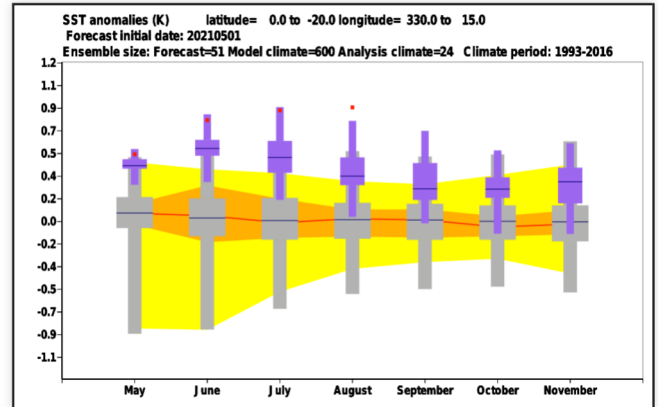
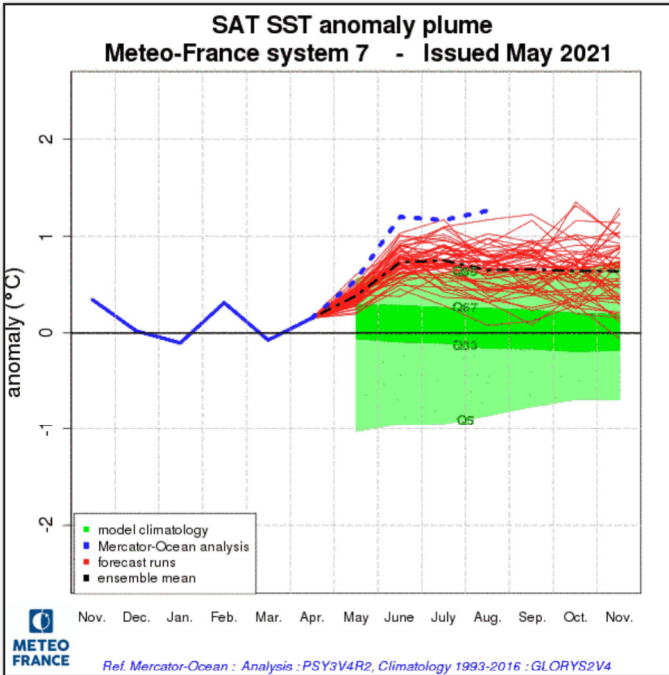
Correct prediction of this index which remained close to zero



Oceans : tropical Atlantic and Indian Ocean index

SAT : the positive trend was correctly forecasted, but the magnitude of the anomaly was underestimated (not any run to predict such an extreme event).

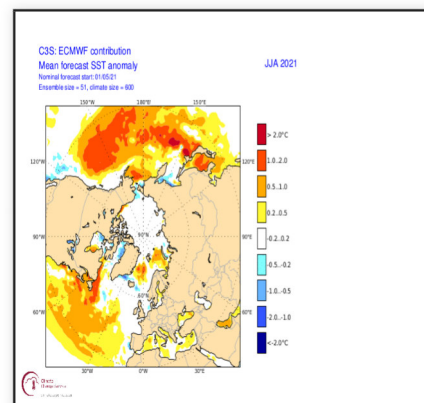
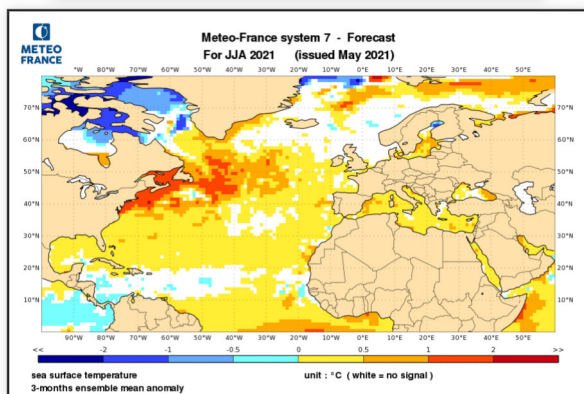
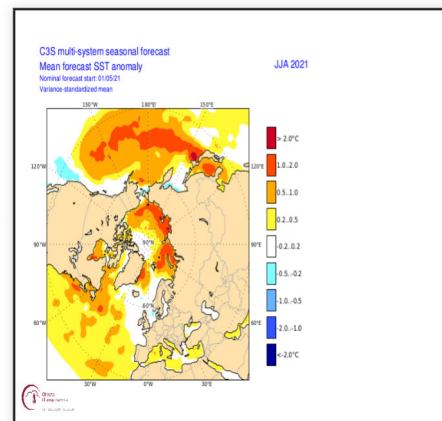
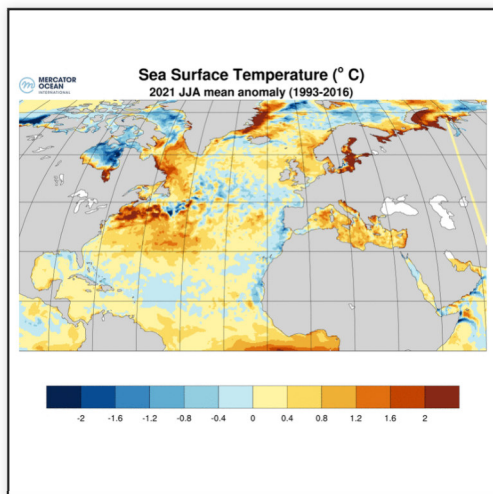
DMI : average forecast from MF-S7 is at the opposite of the observation , ECMWF-SEAS5 give the indication of the negative trend



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.

Underestimation of the cold area that extends around 50°N and extends along the west European and west African coasts.

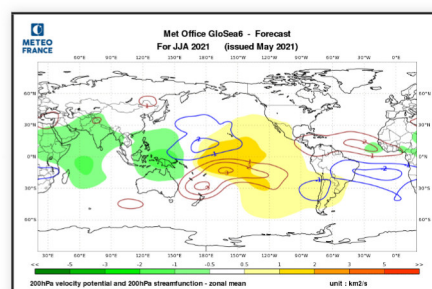
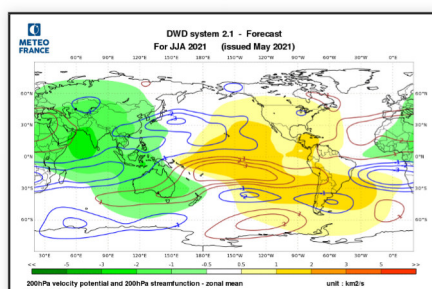
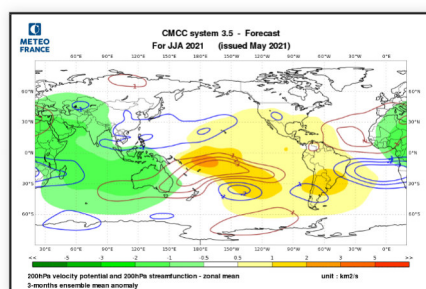
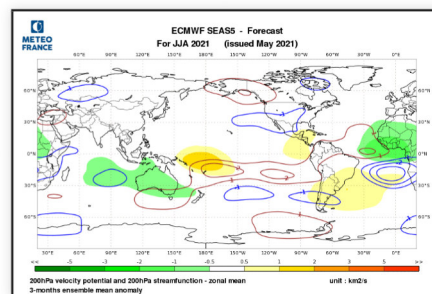
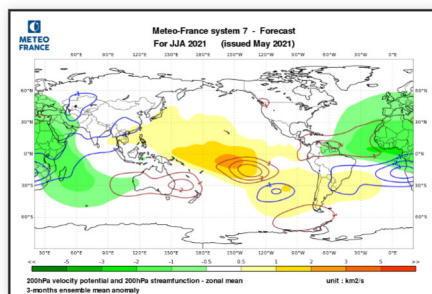
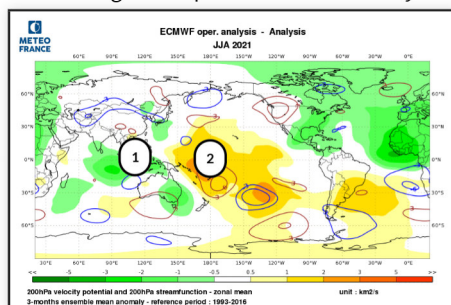


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S7 (bottom left) and ECMWF SEAS5 (bottom right)

Atmospheric circulation : Global teleconnection

VP : The upward anomaly centred over the Maritime Continent and the downward anomaly over Central and West Pacific , associated to La Niña, were globally well predicted. The dipole subsidence over southern America and ascendant over western Africa was well anticipated. The MJO, very active during the period, probably influenced VP anomaly field.

SF : no organised pattern of SF anomaly.



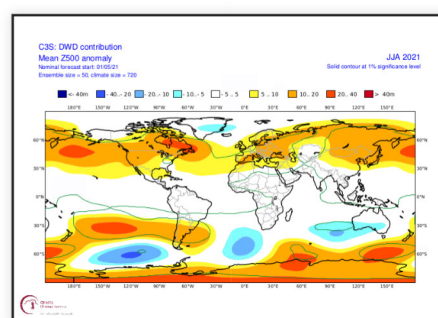
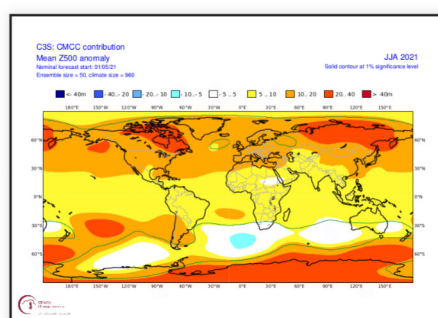
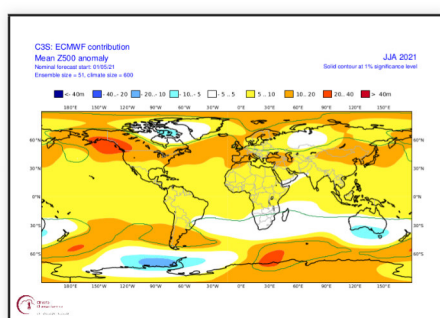
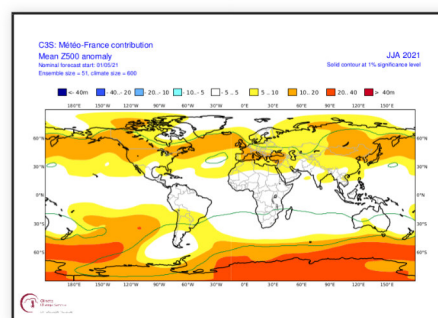
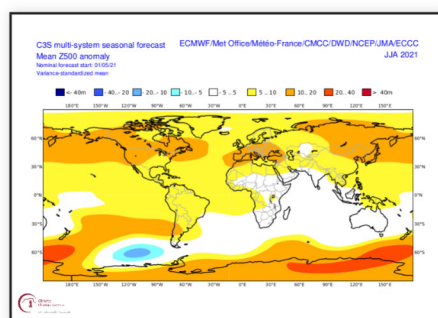
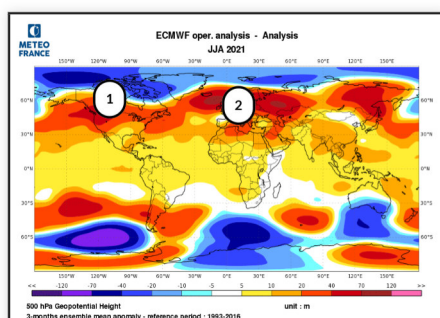
ECMWF analysis, MF-S7, ECMWF-SEAS5, CMCC, DWD and JMA 200hPa velocity potential anomalies (color range, green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

- 1 - upward motion anomaly, response to La Niña
- 2 - Main downward anomaly

Atmospheric circulation : 500hPa Geopotential height

On North America and North Atlantic forecast is correct with ECMWF and MF7 unlike other models. The observed structure is suggested by the multi-model.

On Europe, the positive anomaly in the north (blocking pattern) was not forecasted by the models which generally gave a higher probability of positive anomaly in the south.

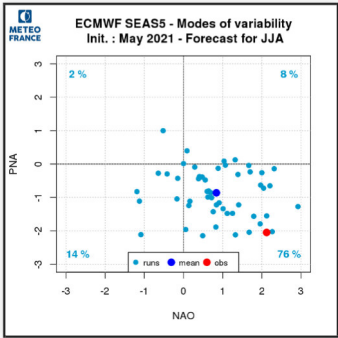
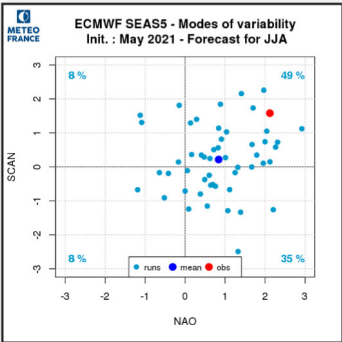
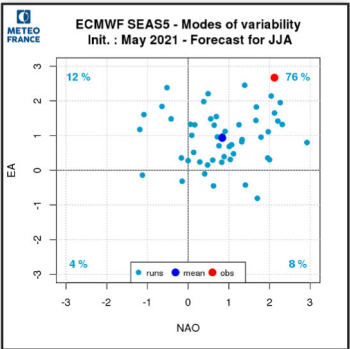
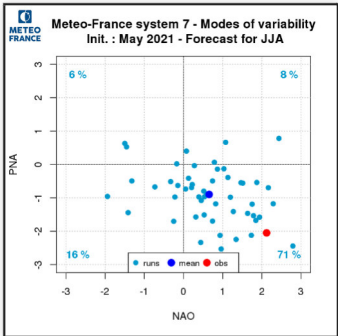
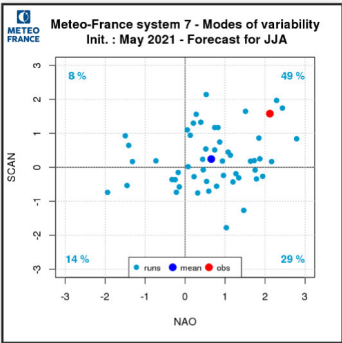
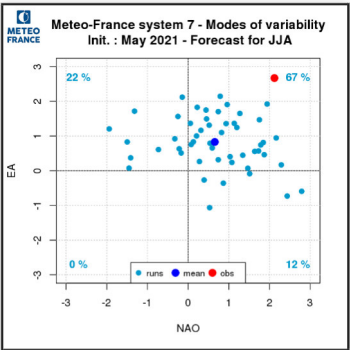


ECMWF analysis, C3S multi-system, MF-S7, ECMWF-SEAS5, CMCC and DWD 500hPa geopotential height anomalies.

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

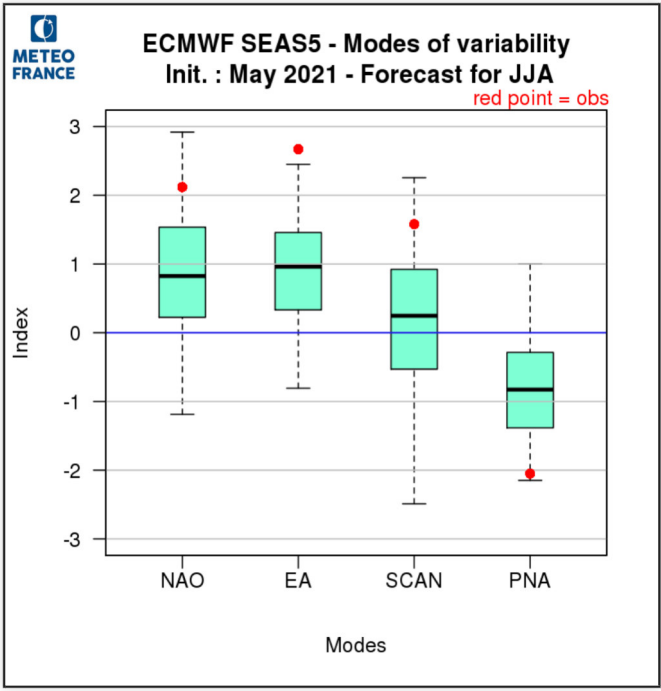
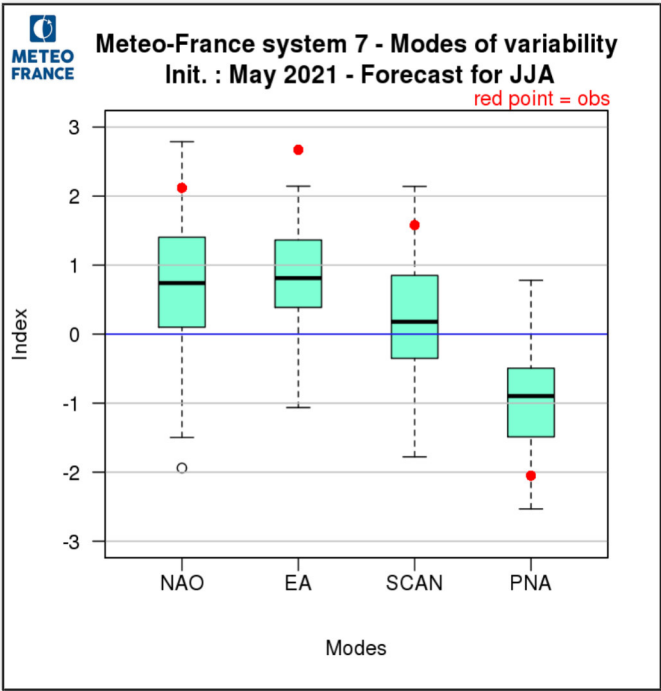
Atmospheric circulation : Modes of variability

The signs of the modes of variability were correctly forecasted.



Atmospheric circulation : Modes verification

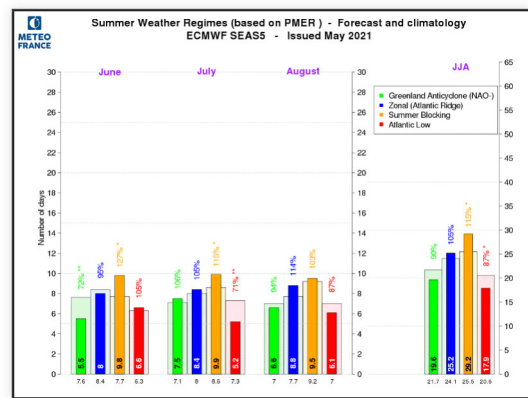
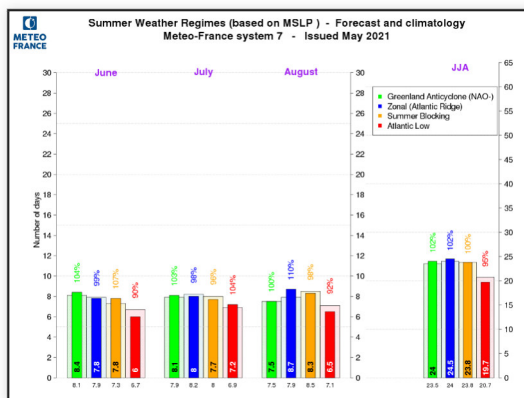
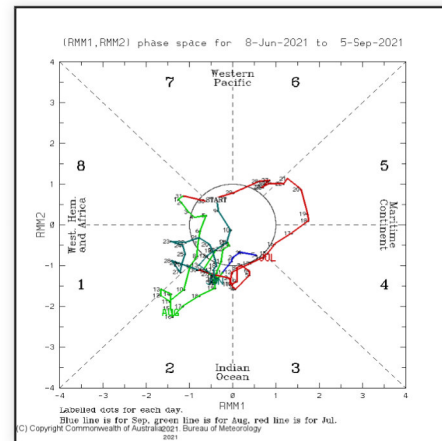
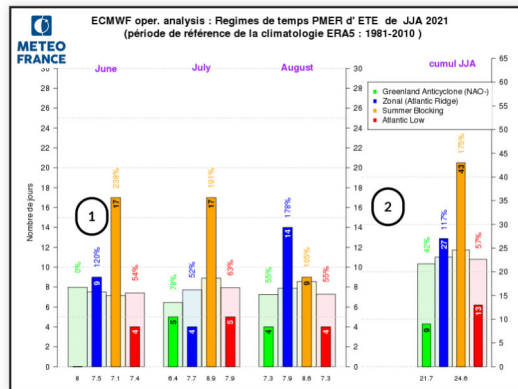
Same observation as for the previous slide



Atmospheric circulation : Summer SLP weather regimes

In the quarterly analysis, the Summer Blocking is much more frequent than normal

ECMWF-SEAS5 is closer to analysis than MF-S7.



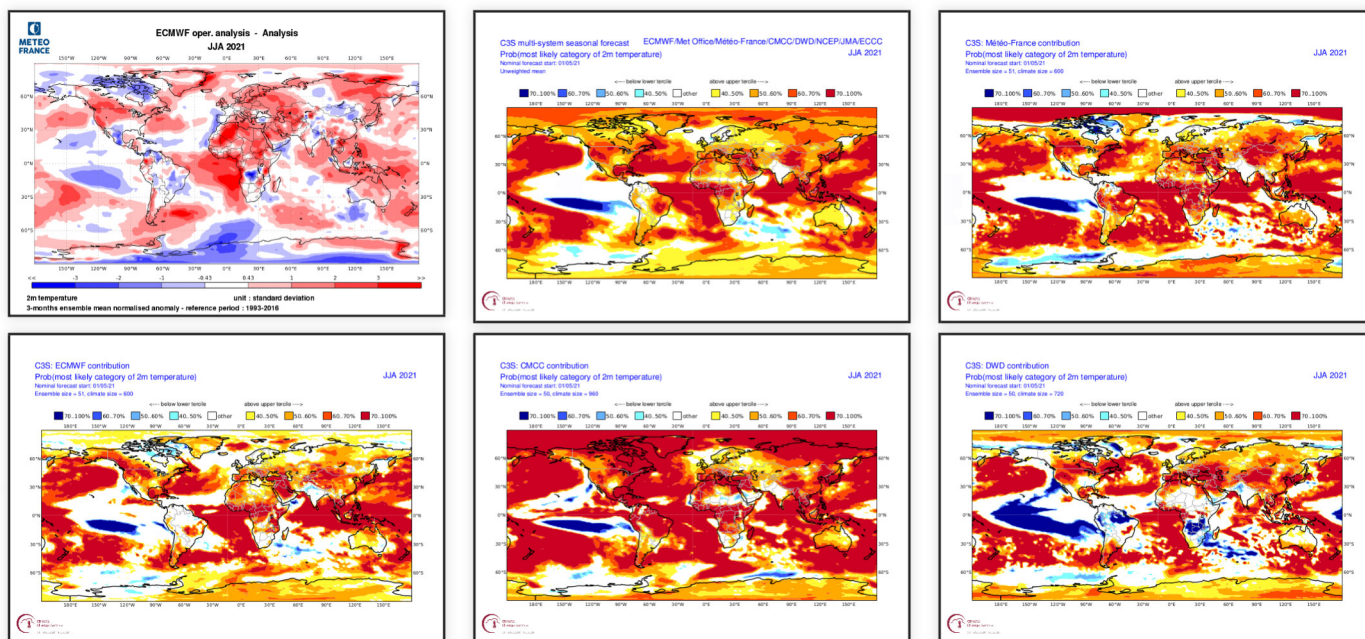
weather regime : ECMWF analysis top left, MF7 and ECMWF forecasts at the bottom. MJO phase top right

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

Climatic parameters : temperature on the globe

On the tropics the main warm anomalies are well forecast (maritime continent, middle east, equatorial Africa) as well as regions close to normal (south America, south Africa, India).

At temperature latitude the forecast is rather correct on the North of America unlike Eurasia.

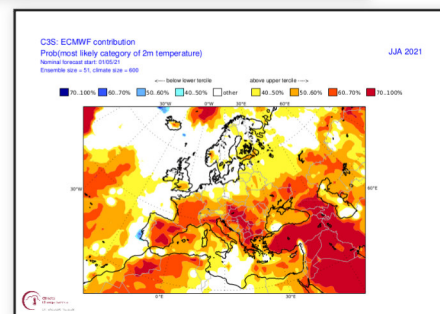
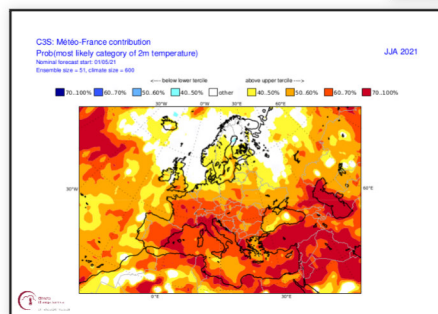
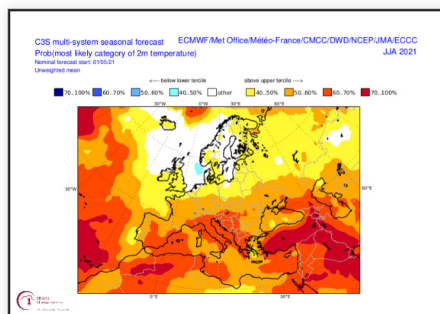
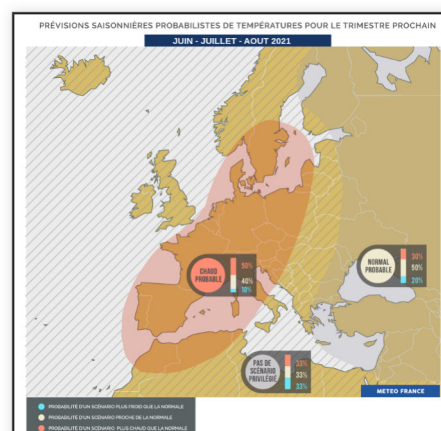
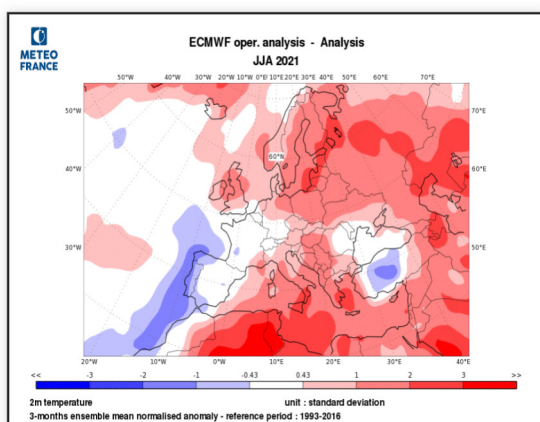


ECMWF analysis top left, forecast for multi-model top center and forecast for MF-S7 top right, ECMWF-SEASS, CMCC, DWD on the bottom line.

Climatic parameters : temperature over Europe

On Europe model predictions are opposed to the analysis (hot privileged in the south while one is rather neutral; no privileged scenario from Scandinavia to western Russia whereas this is where the anomalies are more marked).

The synthetic forecast map, based on the privileged blocking regime, slightly improved compared to the models (warm extended towards the Baltic, normal around the Black sea) but still far from the analysis in general.

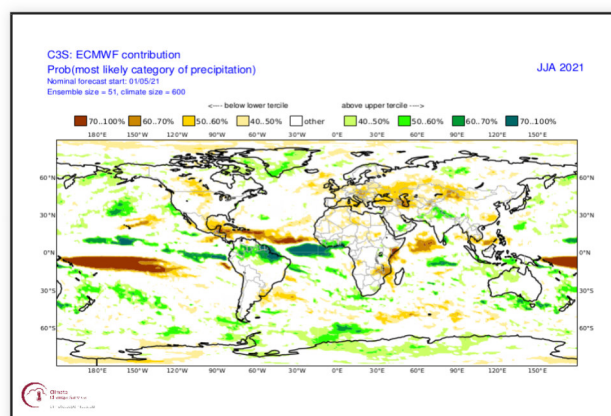
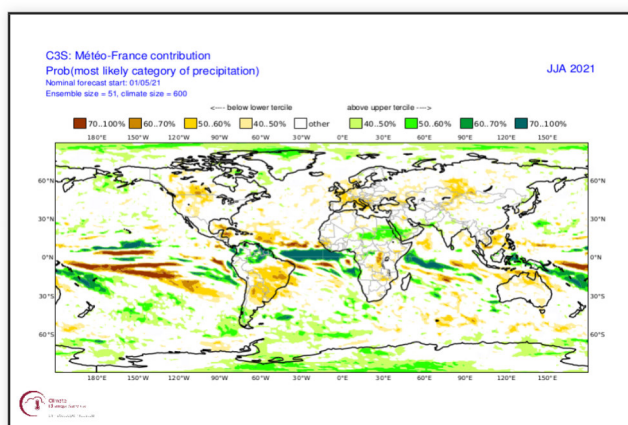
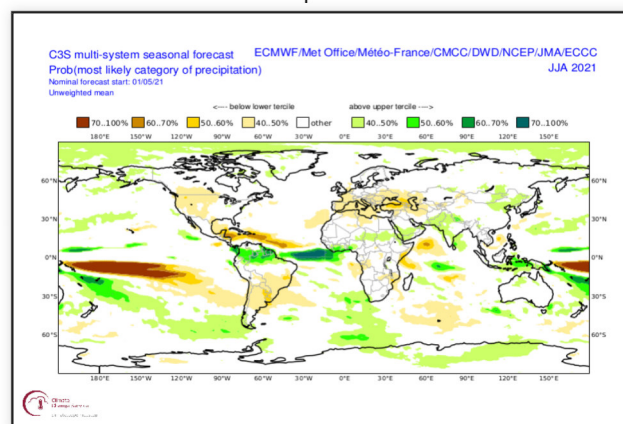
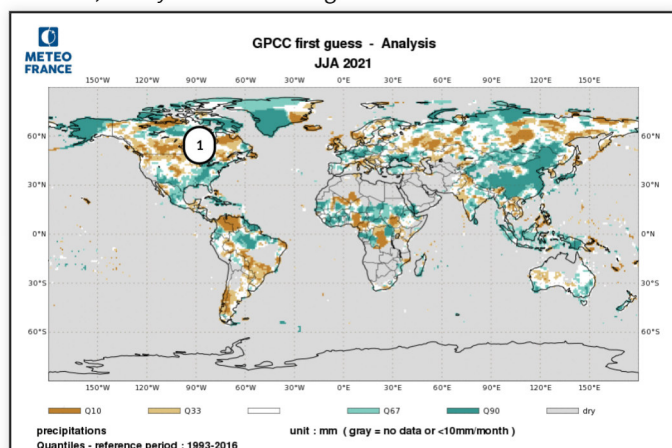


ECMWF analysis top left, synthetic forecast map top right. Forecast for multi-system , MF-S7 and SEAS5 on the bottom line.

Climatic parameters : Precipitations over the globe

The patterns forecasted by models were correct almost everywhere.

However, many areas with strong observed anomalies were not forecasted : for instance Western Europe or Alaska



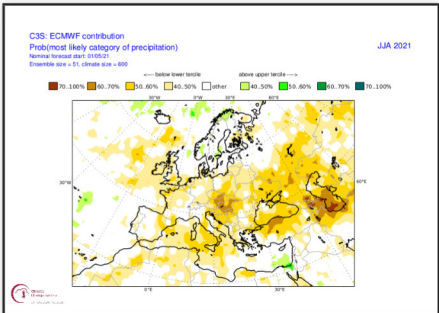
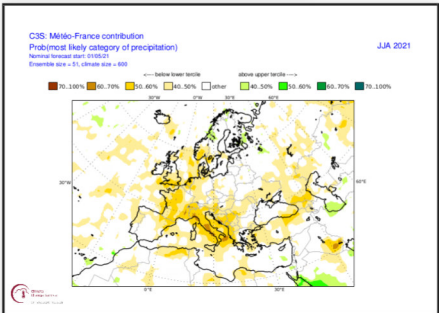
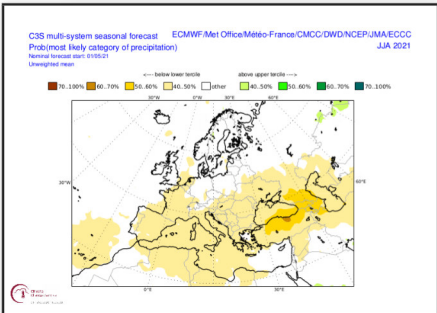
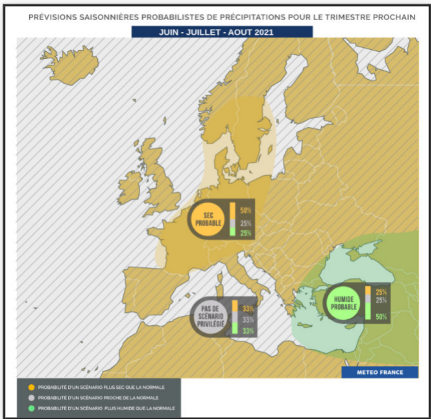
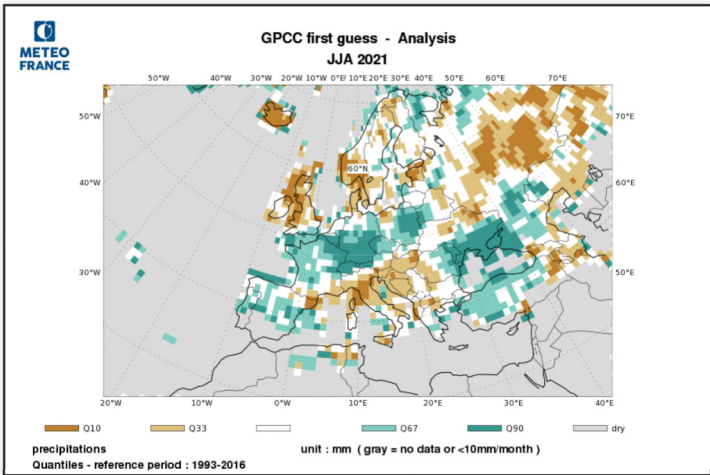
Standardized Precipitation Index analysed by IRI top left, forecast for multi-model top right and MF-S7 and SEAS5 on the bottom line.

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

Climatic parameters : Precipitations over Europe

Poor prediction of models (more likely dry scenario over southern and western Europe when it was rather wet).

Synthetic forecast map improve forecast around Black sea.



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 JJA 2021

1) Oceans :

The main patterns were well predicted by models. Correct forecast of ENSO evolution. The warming in the tropical South Atlantic was anticipated, even if its intensity was underestimated.

2) Large scale atmospheric circulation :

VP 200 hPa : the main patterns are correct despite the perturbations caused by the active MJO.

SF 200 hPa : very "flat" 3-month observed field, due to a strong intra-seasonal variability (see [see monthly analysis of PV/FC 200 hPa](#))

Z500 : The main anomaly pattern around Europe were not forecasted.

3) Climatic parameters over Europe :

Temperatures and Precipitations : Poor forecast over Europe