

VERIFICATION BULLETIN

JULY - AUGUST - SEPTEMBER 2021

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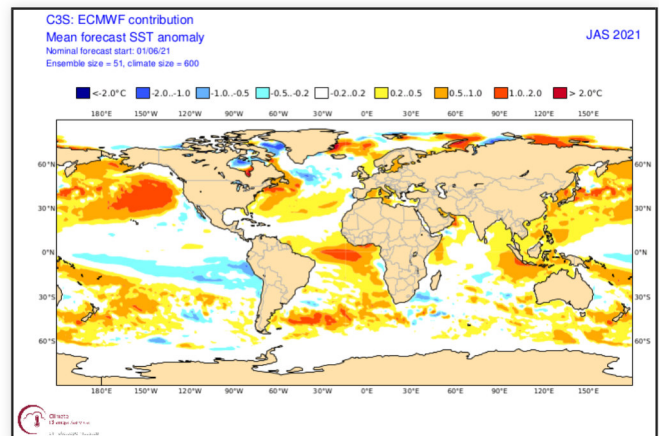
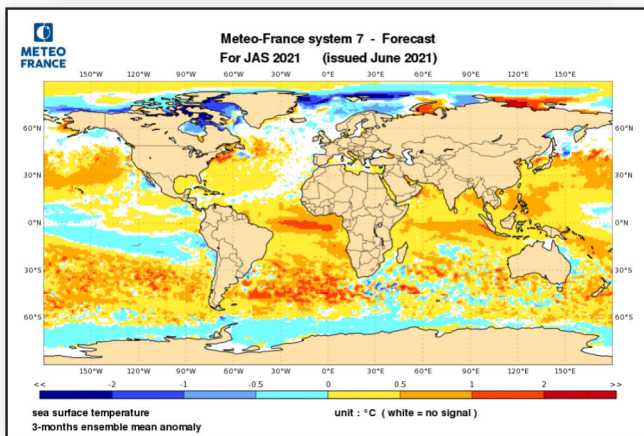
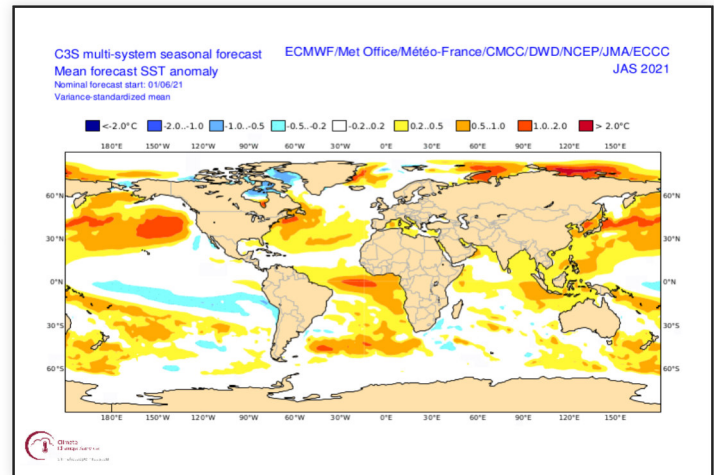
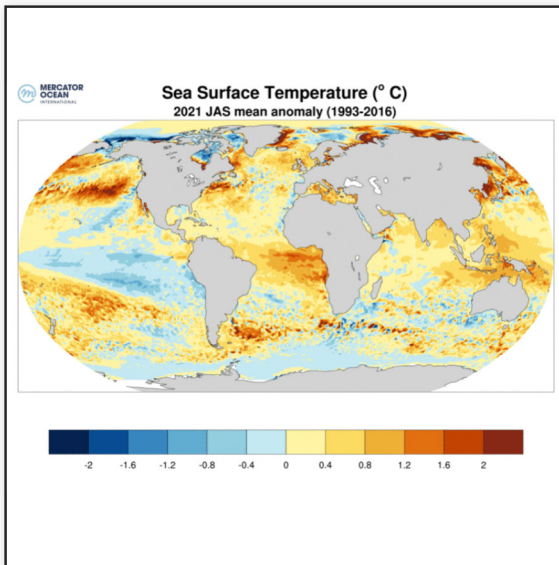
Introduction : Objective

- 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

SST anomalies are well forecast in tropical areas, in Atlantic and Indian oceans. In the Pacific ocean, the cold anomaly zone is not extended enough towards the equator and is underestimated.

At mid-latitudes, the main patterns were well forecasted (in particular on the North Pacific and North Atlantic). But with MF_S7, the warm anomaly in North Pacific is too weak.

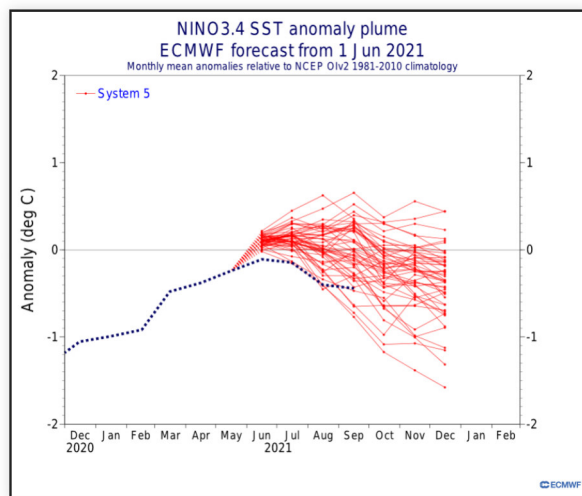
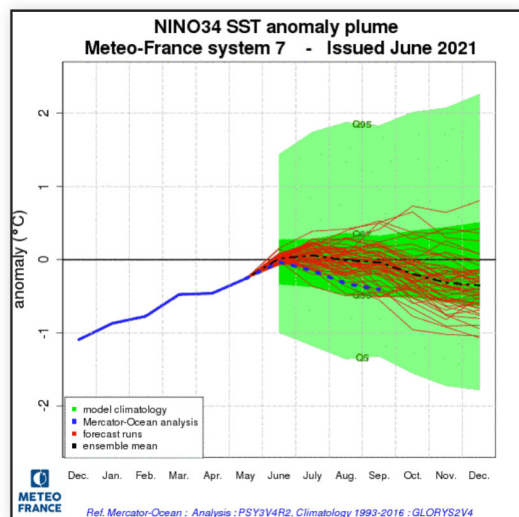


SST anomalies in the analysis from Mercator (top left), C3S multi models (top right), MF-S7 (bottom left) and SEAS5 (bottom right)

Oceans : ENSO

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

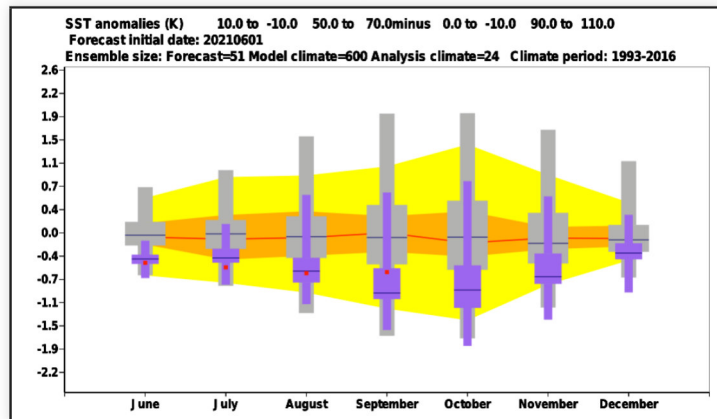
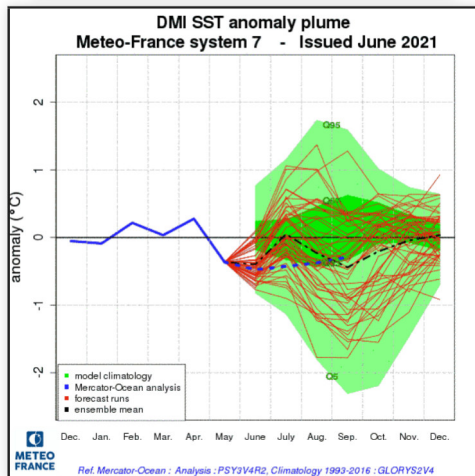
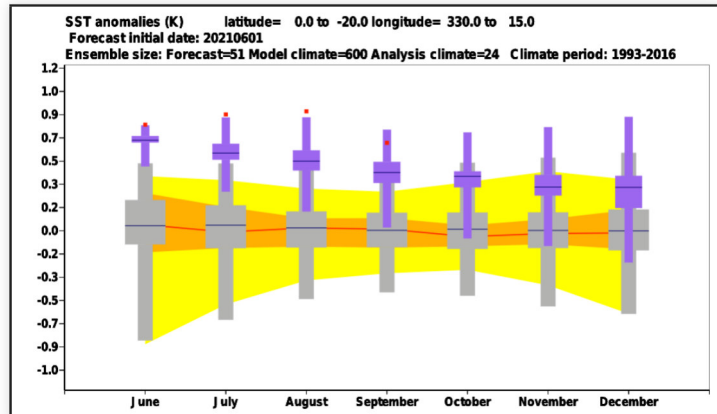
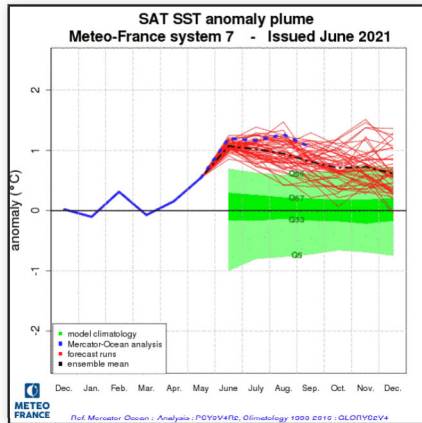
The forecasts of the two models are a little too hot. But MF-S7 is closer to observation than ECMWF-S5.



Oceans : tropical Atlantic and Indian Ocean index

SAT : The positive trend was well anticipated. However, the amplitude is underestimated by the two models, even if MF-S7 has adjusted much better than ECMWF-S5.

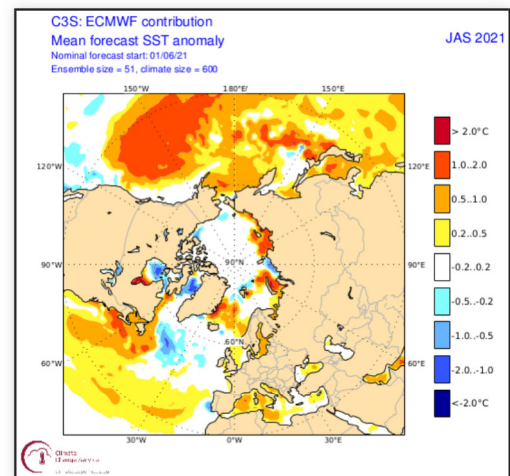
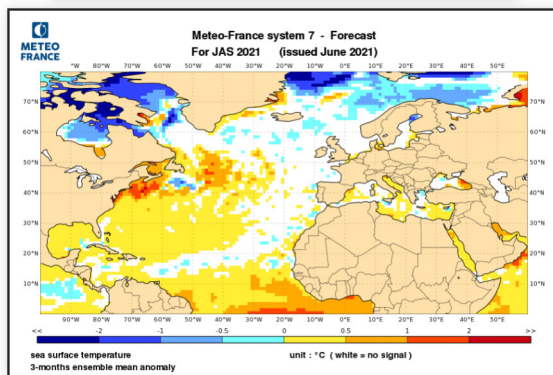
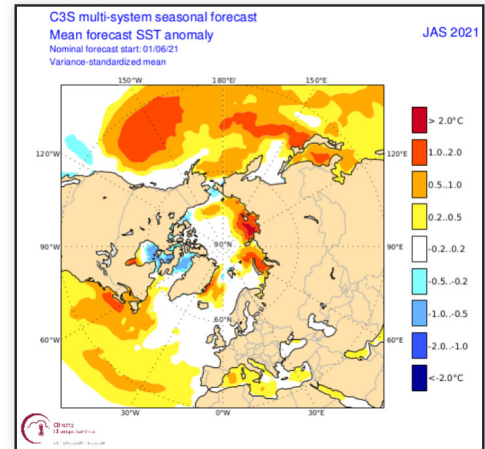
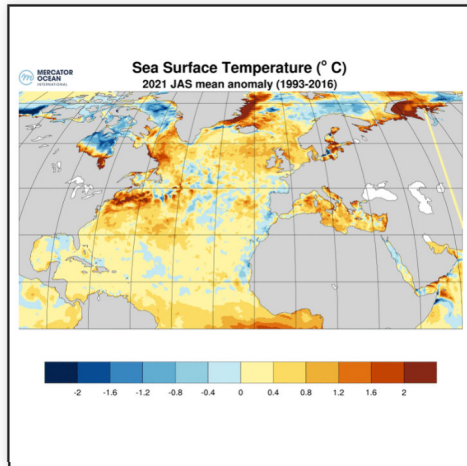
DMI : Both models give a negative trend, but ECMWF-S5 was closer to observation. Dispersion is important for MF-S7.



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 warm anomaly from Iceland to southern Scandinavia and the British Isles is partially seen by ECMWF-S5 and not at all by MF-S7.

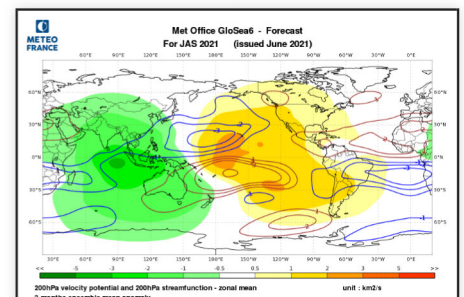
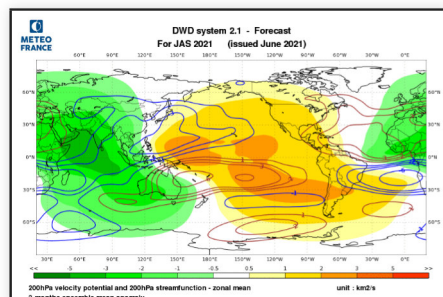
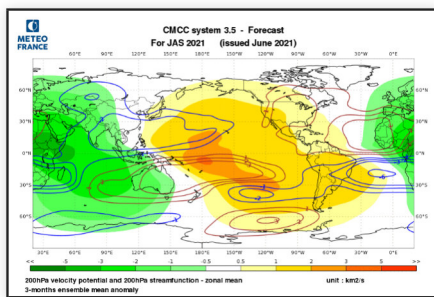
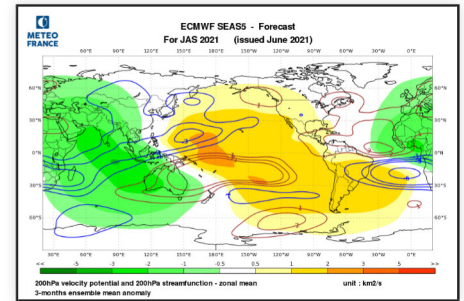
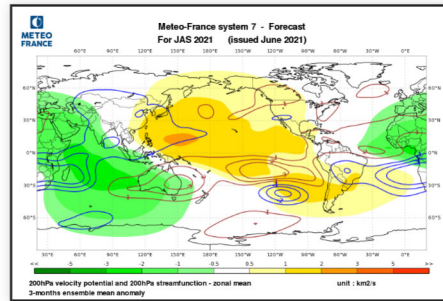
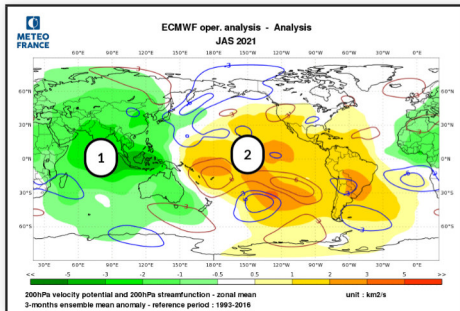


SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S7 (bottom left) and ECMWF SEAS5 (bottom right)

Atmospheric circulation : Global teleconnection

VP : The upward anomaly centred over the Indian Ocean extended to Africa and the downward anomaly over Pacific Ocean extended to the southern America, associated to La Niña, were globally well predicted.

SF : no organised pattern of SF anomaly.



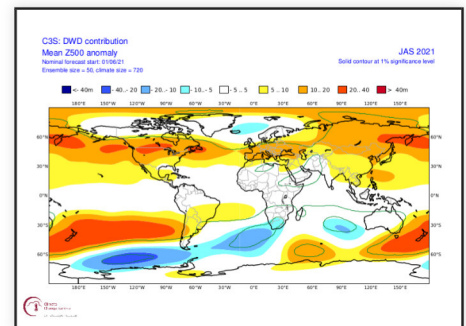
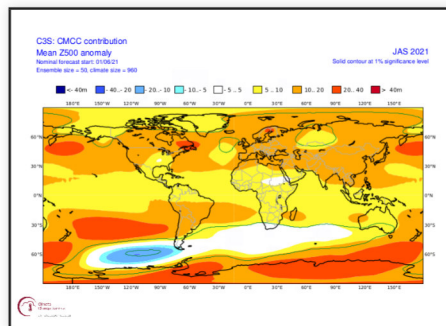
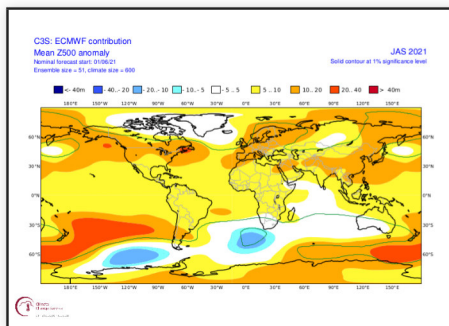
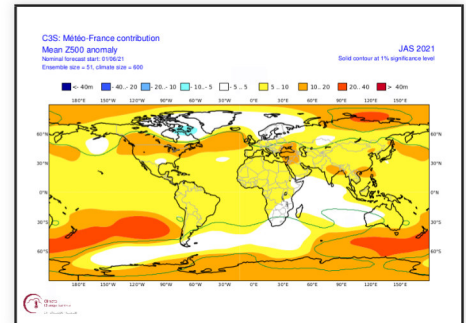
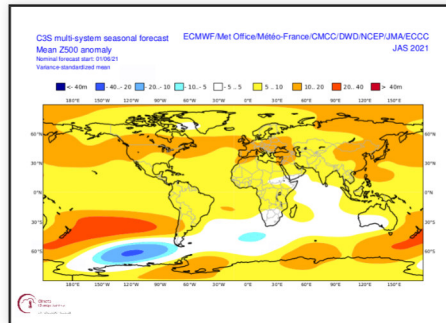
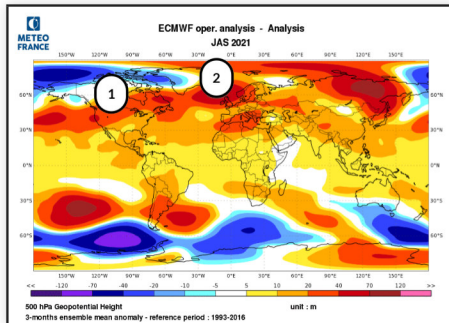
ECMWF analysis, MF-S7, ECMWF-SEAS5, CMCC, DWD and JMA 200hPa velocity potential anomalies (color range, green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

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

Atmospheric circulation : 500hPa Geopotential height

From North America to Western Europe, the observed structure is well suggested by the multi-model, even if the positive anomaly on Northern Europe is underestimated..

On the Mediterranean Sea, the positive anomaly was forecasted by models. However, the positive anomaly in the north (blocking pattern) was not seen correctly by the models.

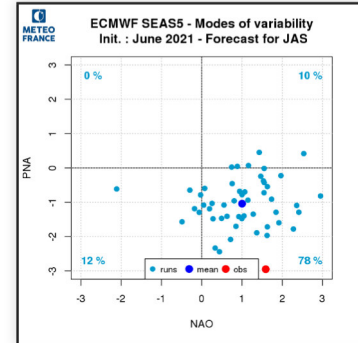
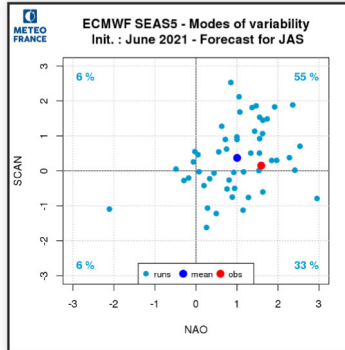
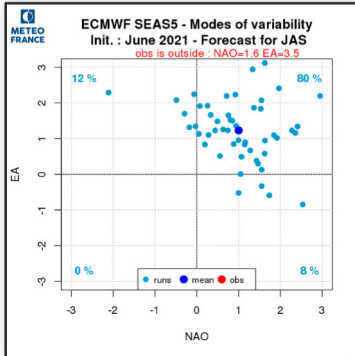
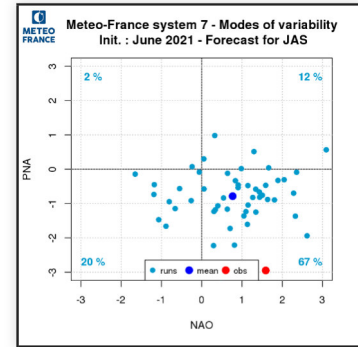
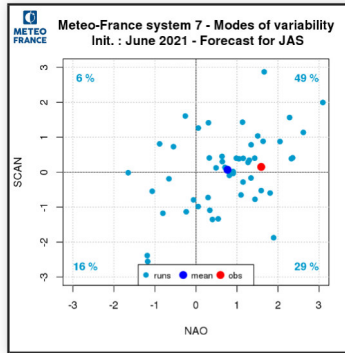
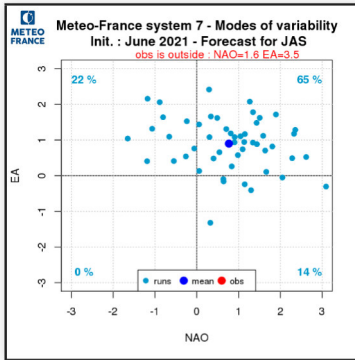


ECMWF analysis, C3S multi-system, MF-S7, ECMWF-SEASS, CMCC and DWD 500hPa geopotential height anomalies.

- 1 - Look like PNA- shift eastward
- 2 - strong positive anomaly

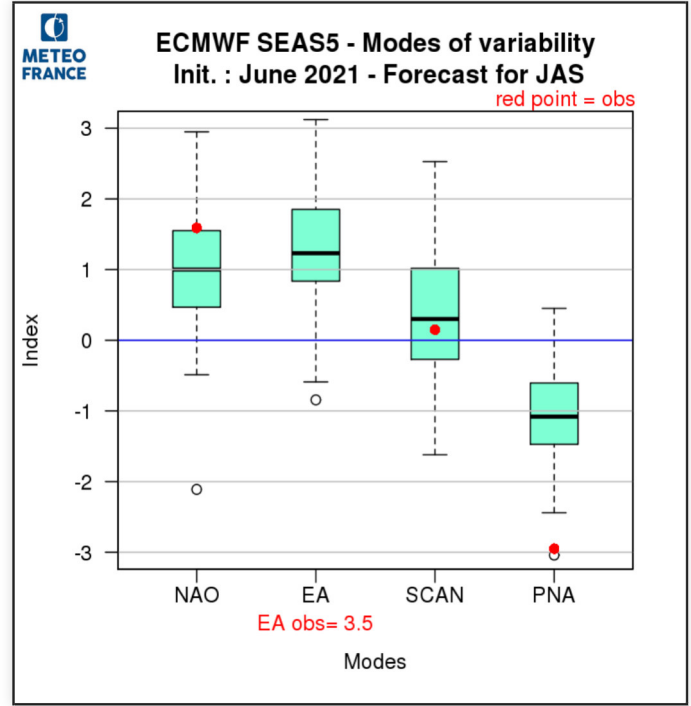
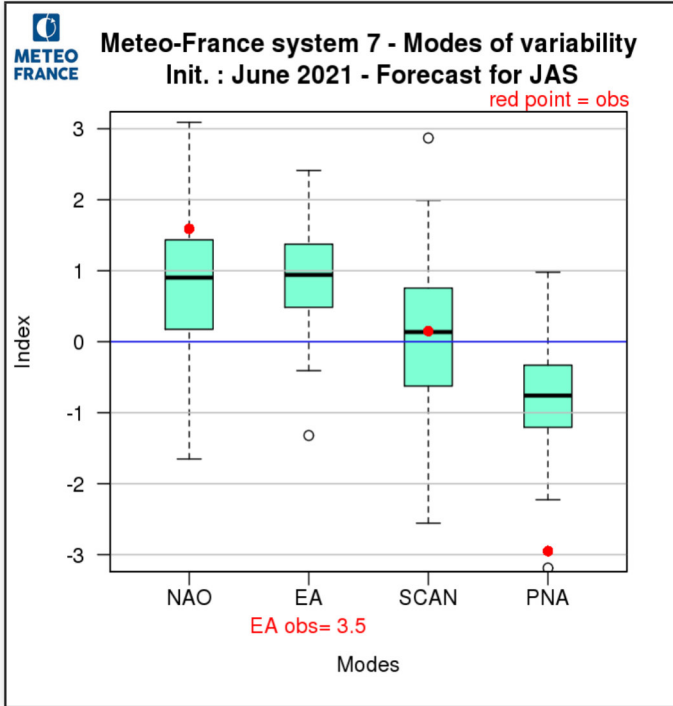
Atmospheric circulation : Modes of variability

The signs of the modes of variability were correctly forecasted.



Atmospheric circulation : Modes verification

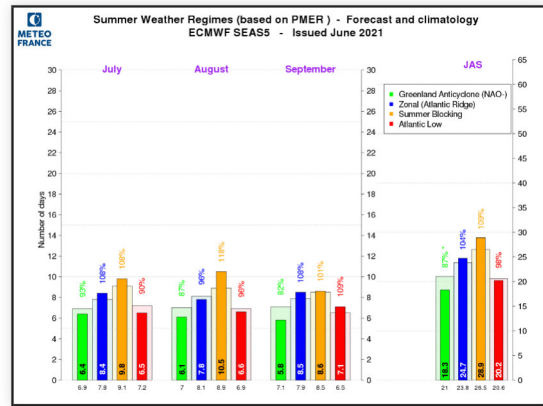
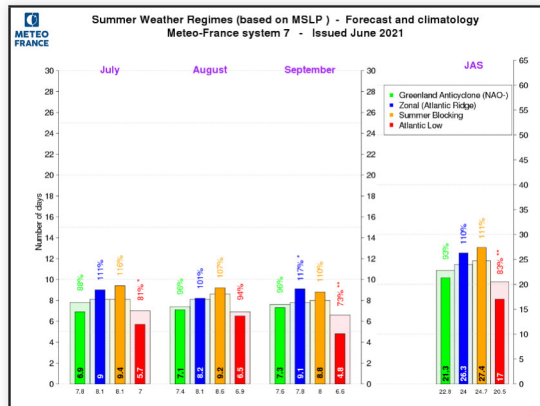
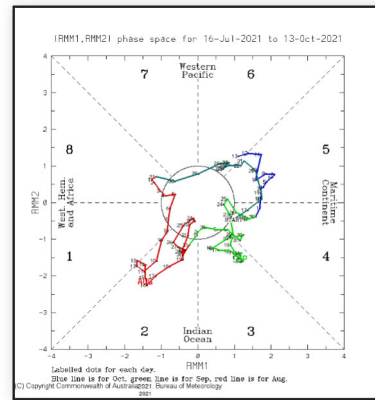
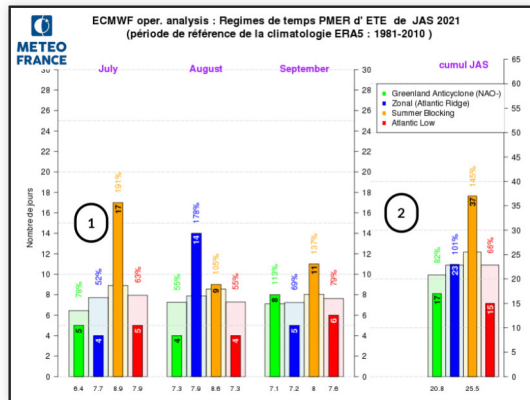
Same observation as for the previous slide



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.



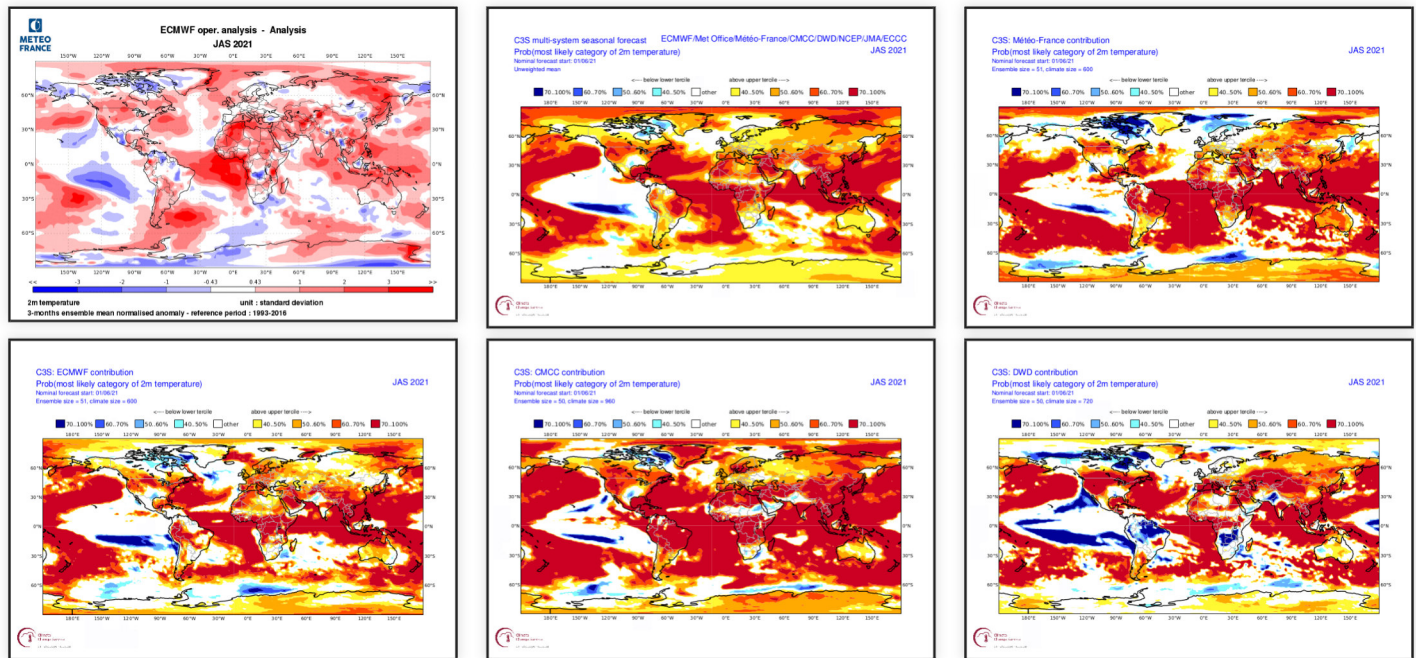
weather regime : ECMWF analysis top left, MF7 and ECMWF forecasts at the bottom. MJO phase top right

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

Climatic parameters : temperature on the globe

On the tropics the main anomalies are well forecasted (pacific ocean, maritime continent, middle east, equatorial Africa).

At temperate latitudes, the forecast is rather correct in North America and Asia. On Europe; the warm anomaly around the Mediterranean Sea is well forecasted,

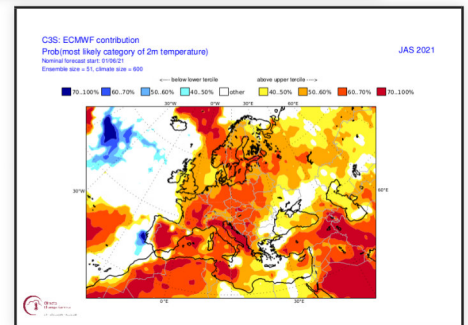
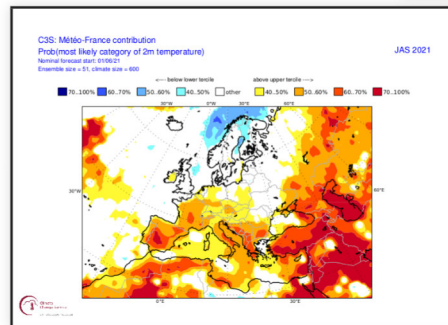
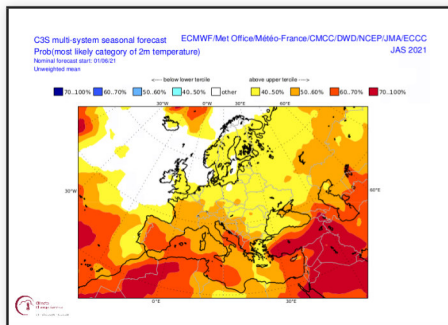
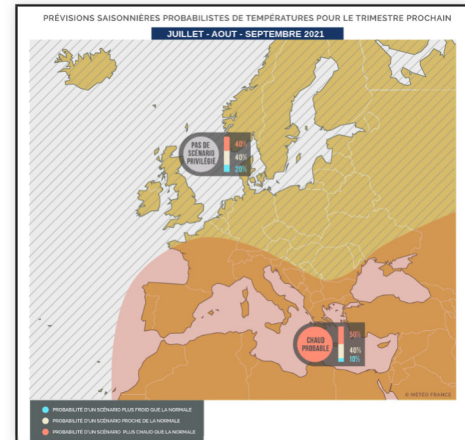
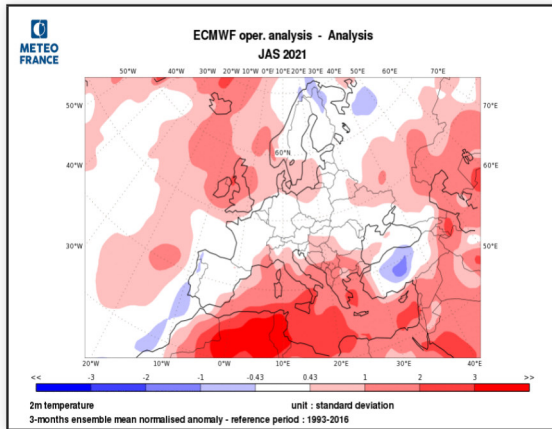


ECMWF analysis top left, forecast for multi-model top center and forecast for MF-S7 top right, ECMWF-SEAS5, CMCC, DWD on the bottom line.

Climatic parameters : temperature over Europe

The summary map used this hot anomaly zone for the whole of the Mediterranean basin. Farther north, the models were divergent and no weather regime emerged.

We do find this warm anomaly on analysis even if it extends less to the north. Further north, on the other hand, the "Blocking" pattern is visible on analysis.

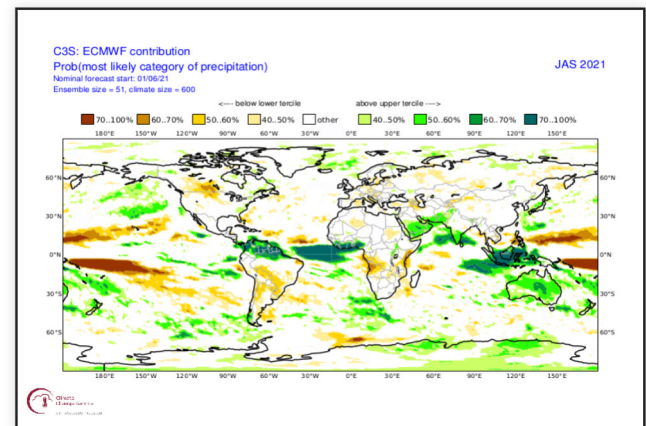
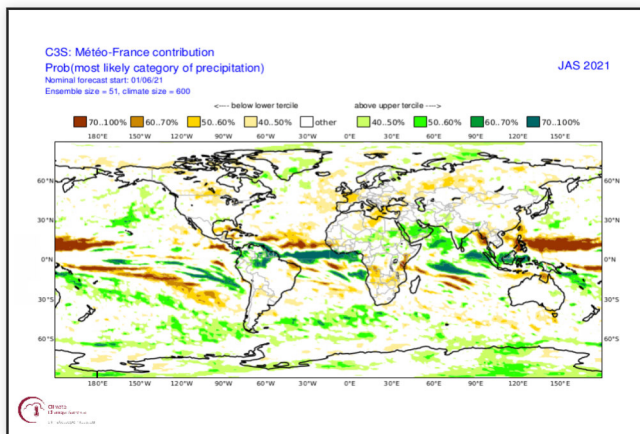
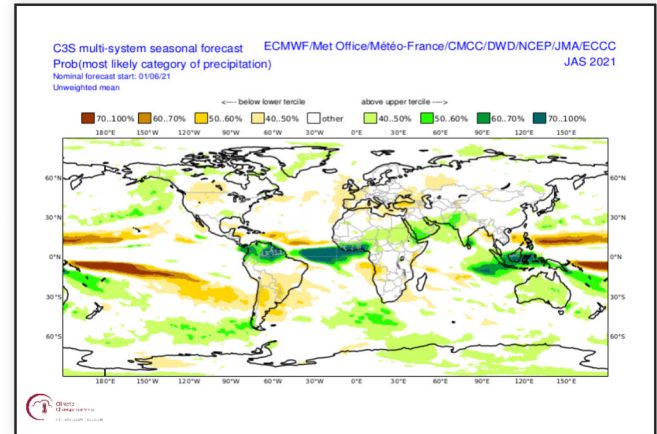
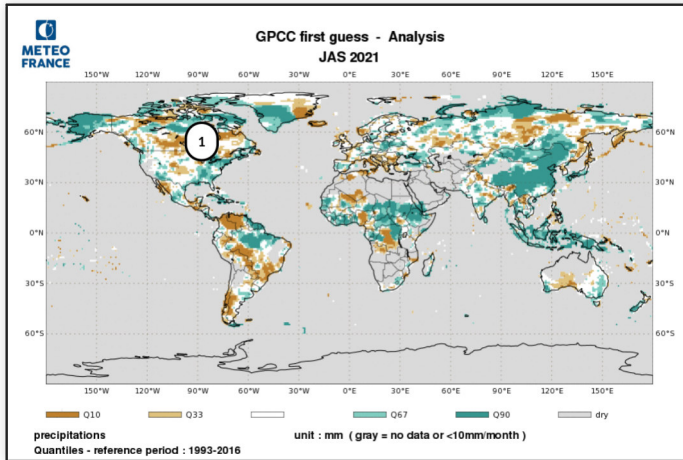


ECMWF analysis top left, synthetic forecast map top right. Forecast for multi-system , MF-S7 and SEAS5 on the bottom line.

Climatic parameters : Precipitations over the globe

Good forecast near equator. At mid-latitudes, the patterns predicted by the models are correctly located but underestimated

The observed anomalies are much stronger than predictions.



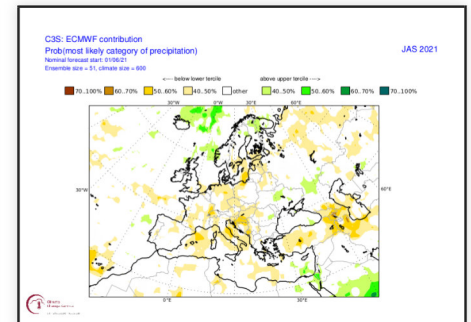
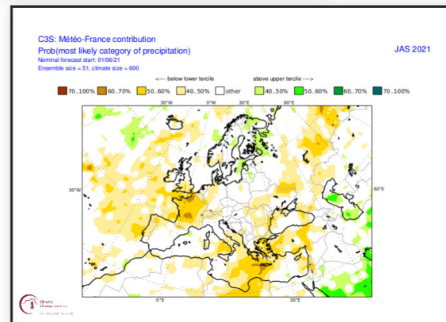
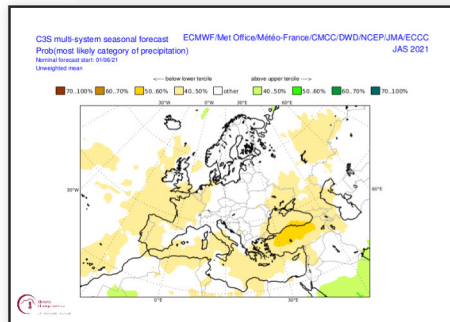
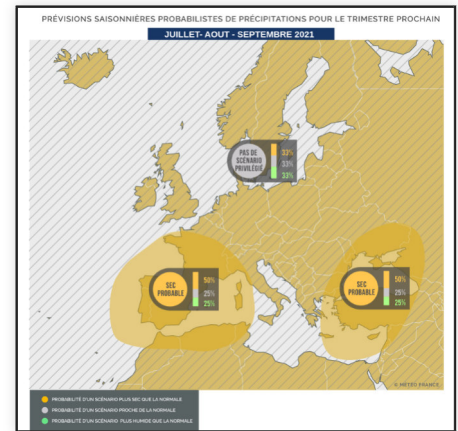
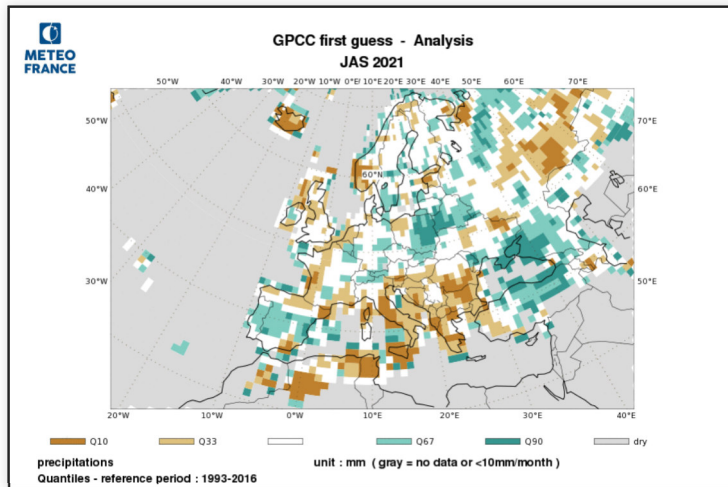
Standardized Precipitation Index analysed by IRI top left, forecast for multi-model top right and MF-S7 and SEAS5 on the bottom line.

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

Climatic parameters : Precipitations over Europe

Overall, the models predicted a dry trend in Europe, more or less marked depending on the region. The summary map highlights two drier areas, around Spain and the Black Sea.

On analysis, it is difficult to define a zoning. A wet area emerges around the Black Sea (drier than normal trend prediction). There is indeed a drier area near the Mediterranean, but from Tunisia to Italy and Greece, and not further west or further east.



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 JAS 2021

1) Oceans :

The main patterns were well predicted by models. Correct forecast of ENSO evolution. The warm anomaly in the tropical South Atlantic was better predicted than last month.

2) Large scale atmospheric circulation :

VP 200 hPa : the main patterns are correct.

SF 200 hPa : weak signal, usual for this period.

Z500 : the positive anomaly over northern Europe was not well positioned.

3) Climatic parameters over Europe :

Temperatures : Warm anomaly well seen over the Mediterranean Sea.

Precipitations : Poor forecast over Europe