

VERIFICATION BULLETIN

FEBRUARY - MARCH - APRIL 2020

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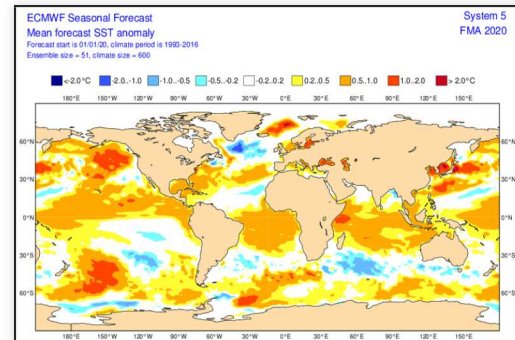
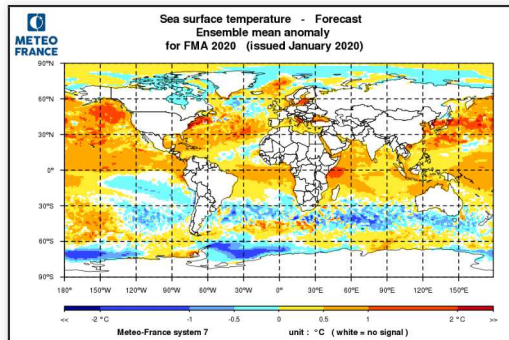
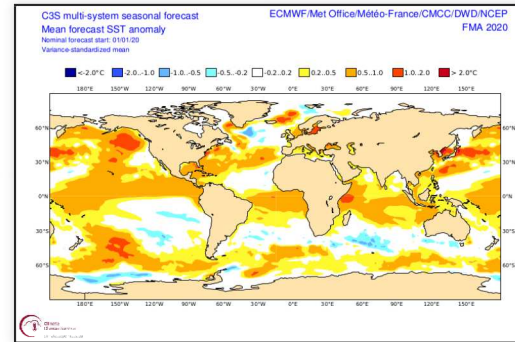
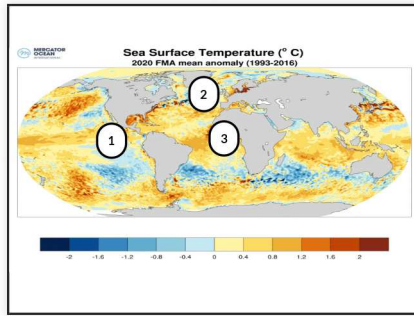
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Introduction : Objective

- 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 SST patterns were very well captured.



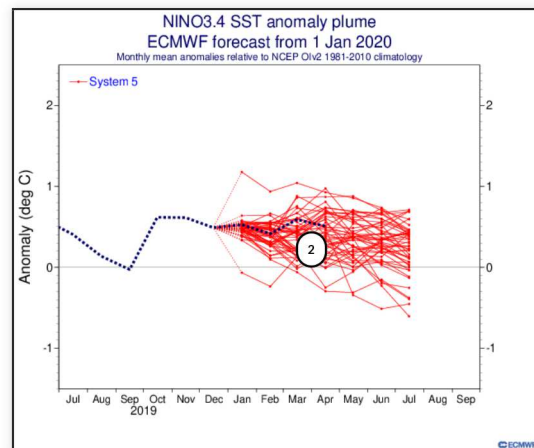
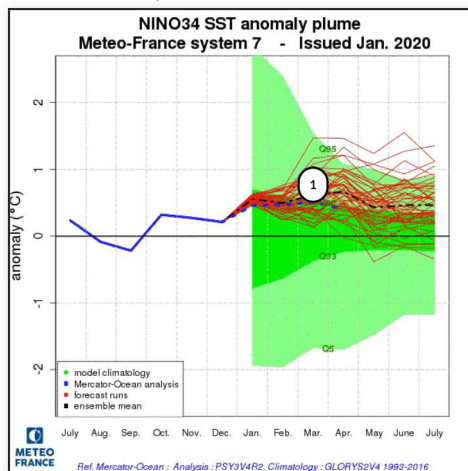
SST anomalies in the analysis from Mercator (top left), C3S multi-models (top right), MF-S7 (bottom left) and SEAS5 (bottom right)

- 1 - Cold anomaly correctly foreseen by models
- 2 - Correct pattern over North Atlantic
- 3 - East-West gradient not clearly visible in the models. Models were generally too warm in the Gulf of Guinea

Oceans : ENSO

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

In both models, a majority of the runs forecasted a slightly colder anomaly than what happened, but without influence on the good choice of the neutral phase.

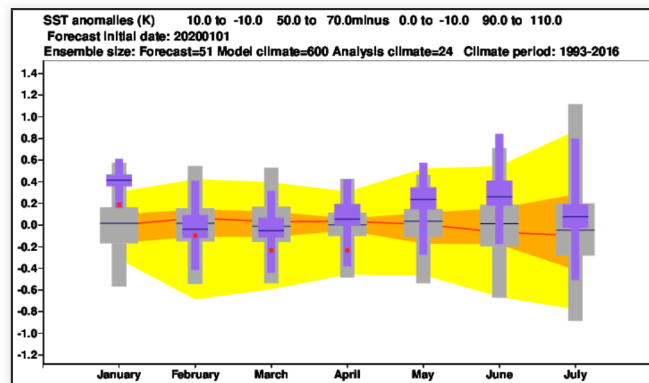
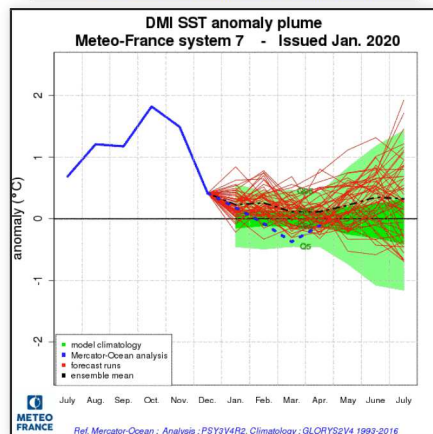
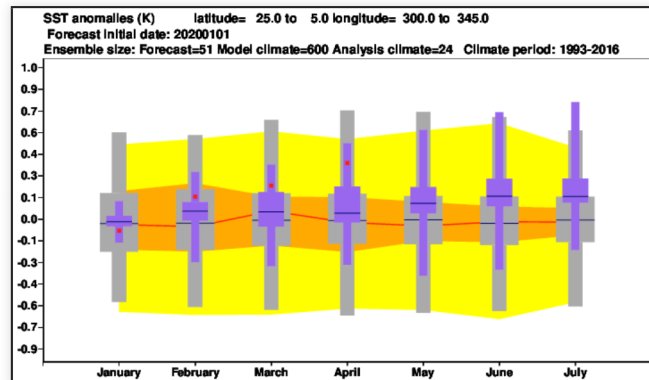
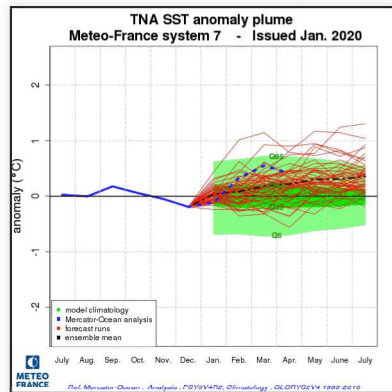


- 1 - Good forecasts, close to analysis
- 2 - Hot anomaly underestimated by most SEAS5 runs

Oceans : tropical Atlantic and Indian Ocean index

Both models had very similar forecasts :

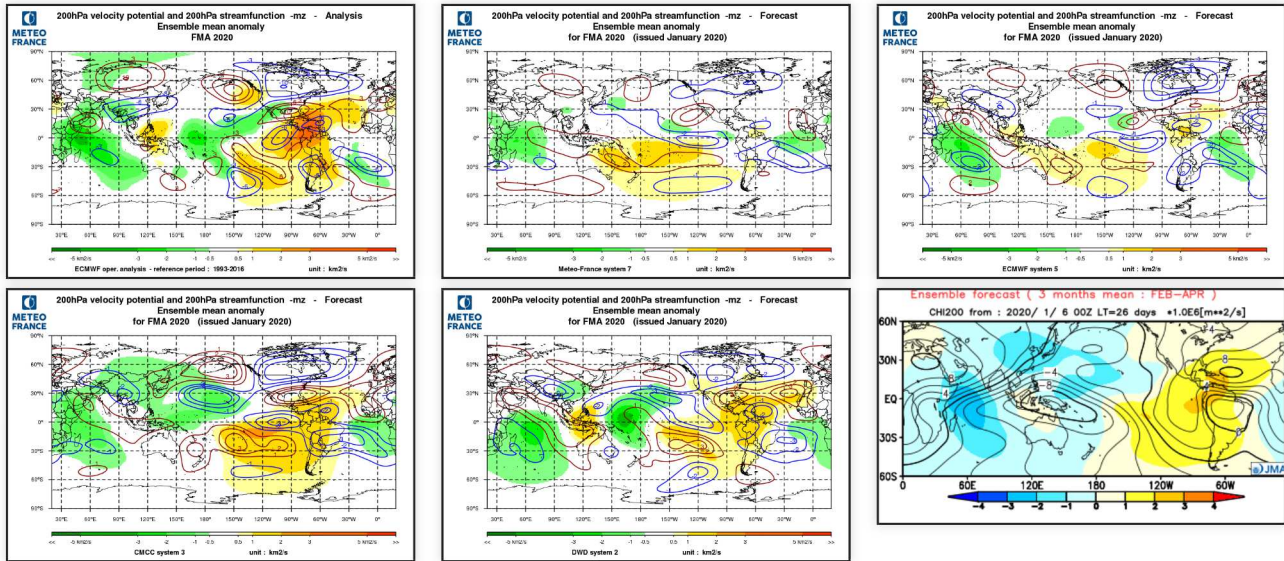
- TNA : good sign, but underestimation
- DMI : foreseen neutral, but actually was significantly negative



Atmospheric circulation : Global teleconnection

P 200hPa : the downward motion anomaly of the Indian Ocean dipole was generally too weak, except with ECMWF and DWD. The forecast was more difficult on the Pacific Ocean, but except for MF it was rather well foreseen. The Central America subsidence anomaly pole was anticipated by models, but too weak with MF and ECMWF. In the Atlantic, all the models agreed to a negative anomaly, this was a bas forecast. On this forecast in the tropics, DWD was remarkably good.

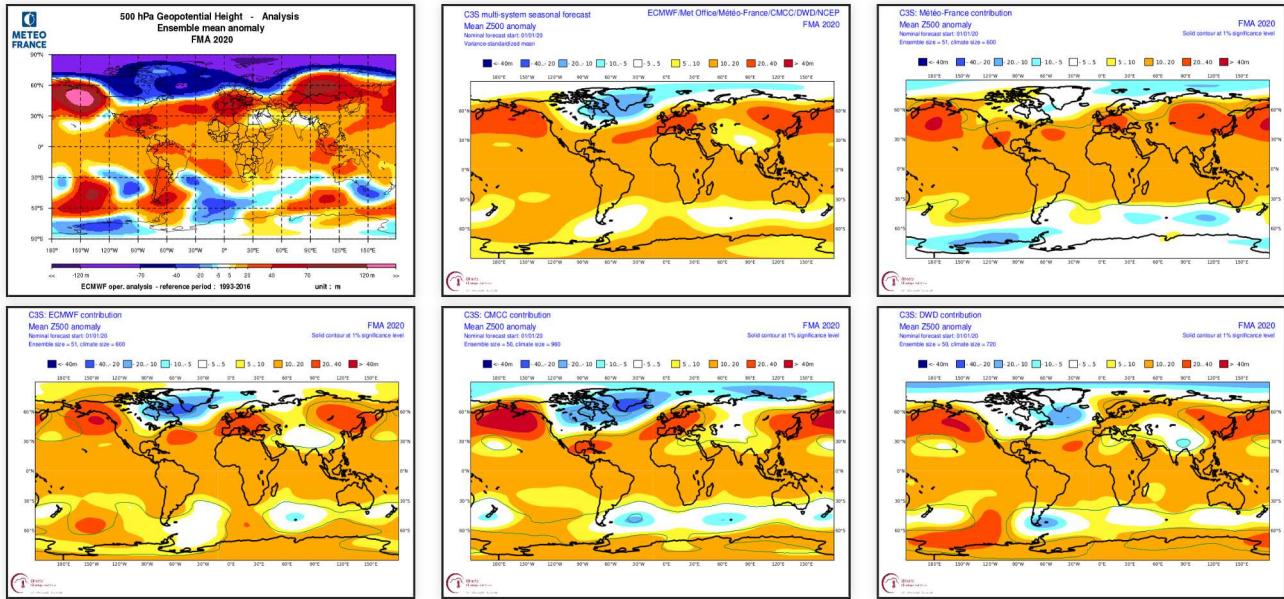
SF 200 hPa : the main patterns in the Northern hemisphere were quite well predicted by most of the models, except MF.



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

Atmospheric circulation : 500hPa Geopotential height

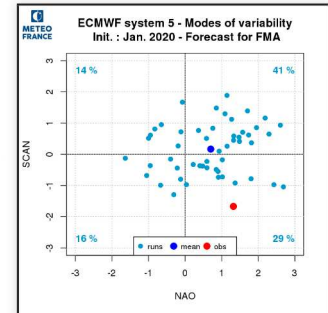
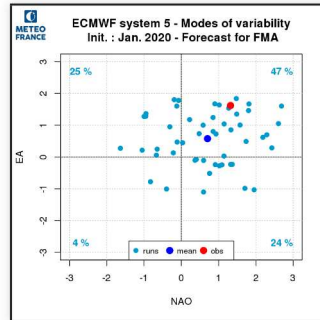
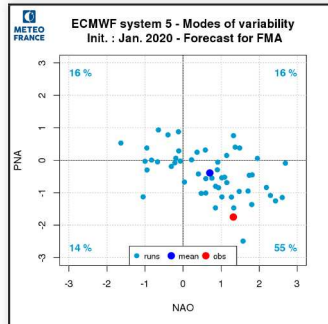
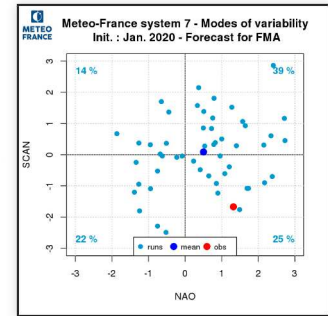
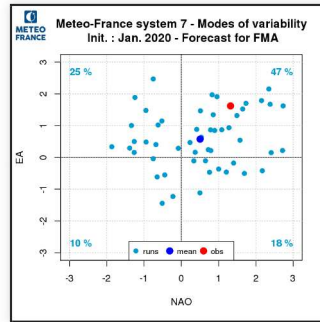
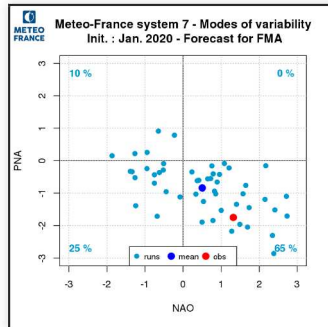
For the northern hemisphere, the general pattern was well anticipated by all the models. However the relative low anomaly over northern India was not present in MF.



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

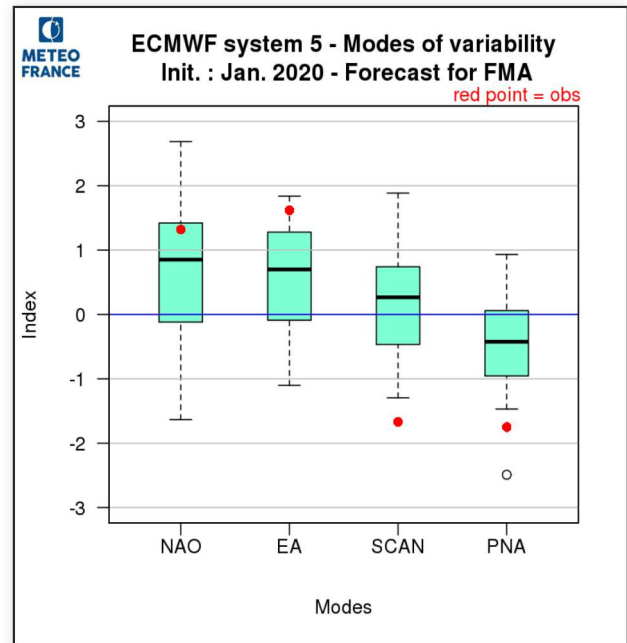
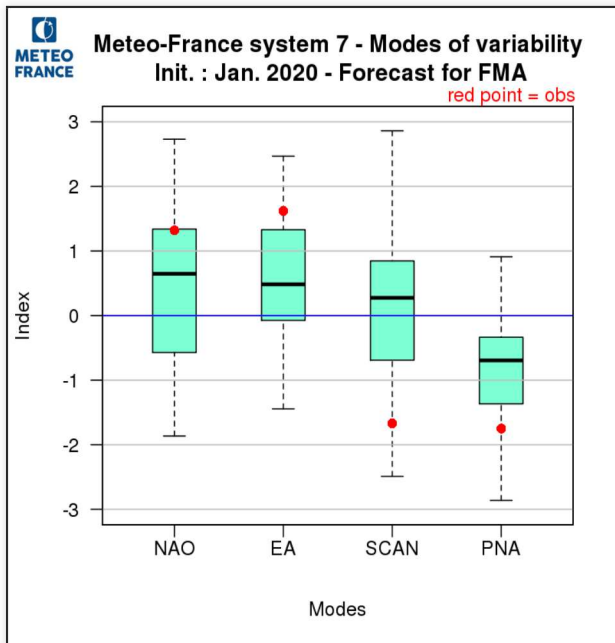
Atmospheric circulation : Modes of variability

Good forecast of NAO, EA and PNA modes, the strong positive SCAN was not foreseen.



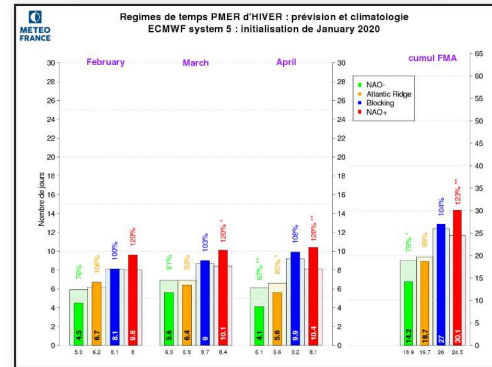
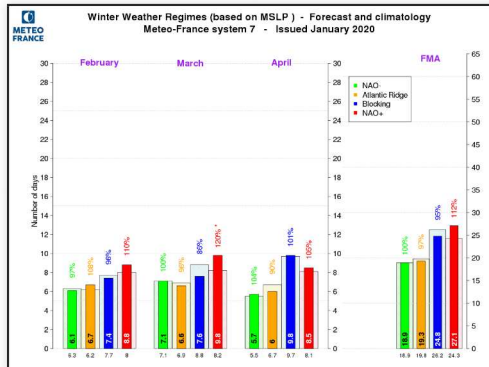
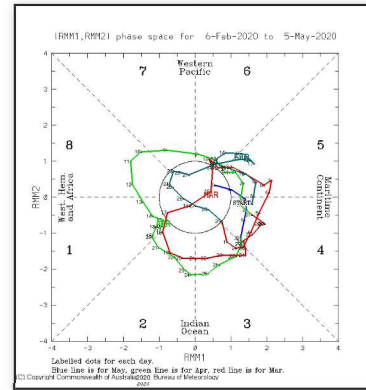
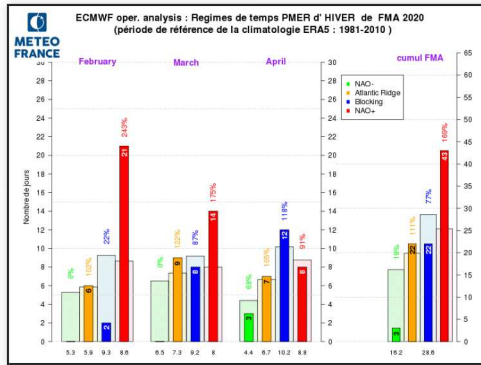
Atmospheric circulation : Modes verification

Same remark as for the slide above.



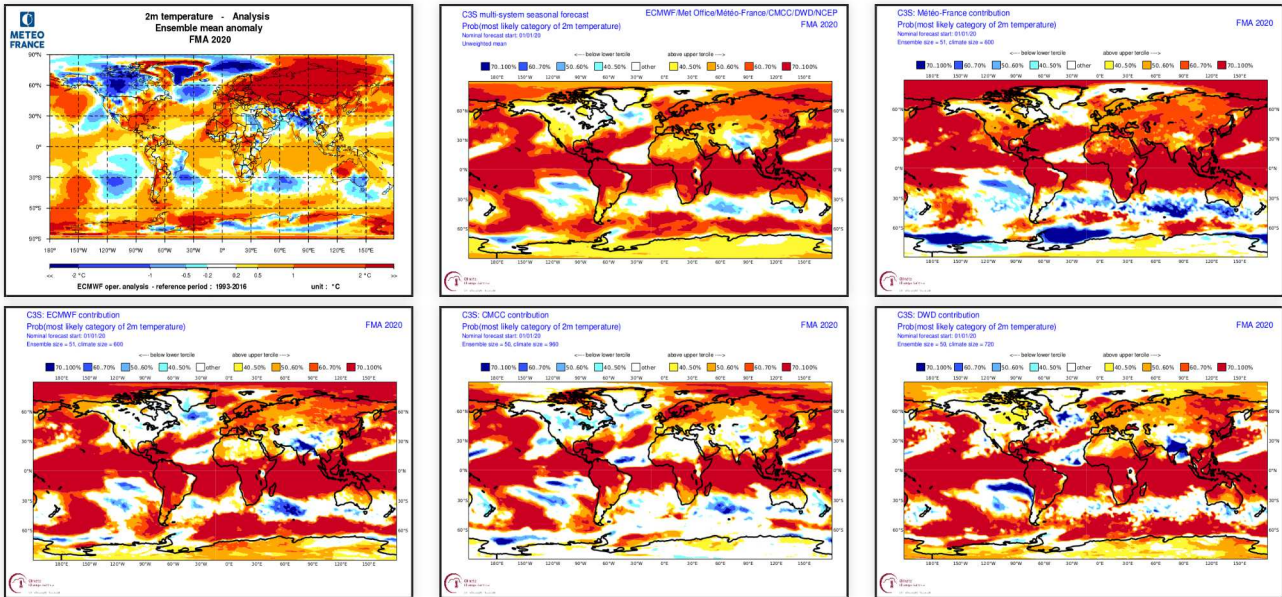
Atmospheric circulation : Winter SLP weather regimes

Very large excess of NAO+ and practically no NAO- in the analysis. ECMWF predicted this trend, not MF.



Climatic parameters : temperature on the globe

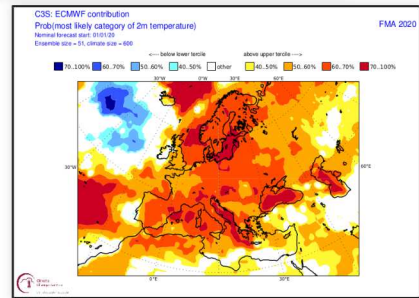
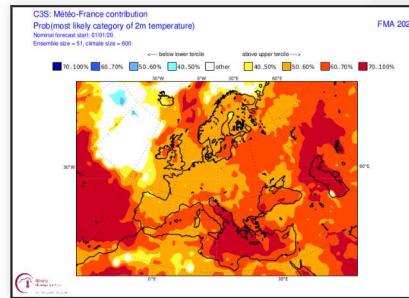
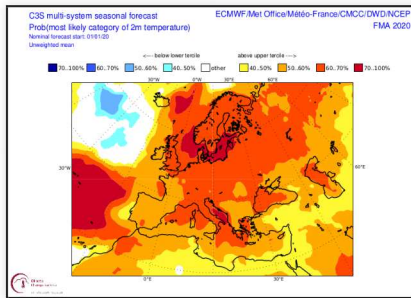
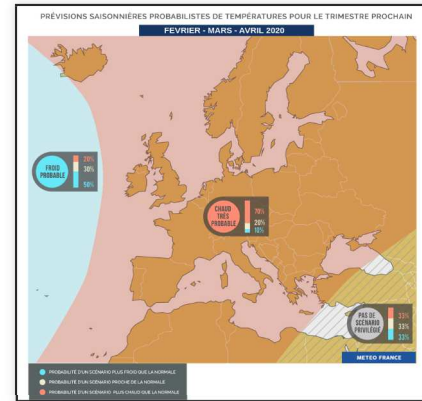
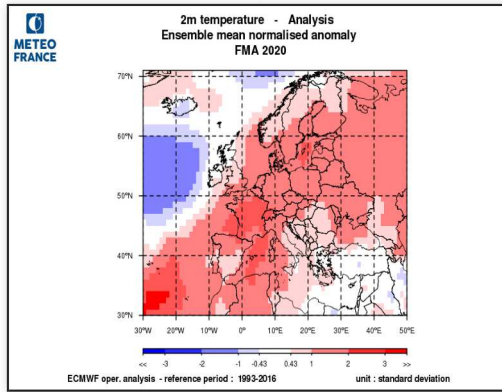
The forecast was generally good all over the world, except in North America where only CMCC model had predicted the negative signal. Over Indian, MF didn't predict the negative anomaly.



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

Good temperature forecast for Europe.



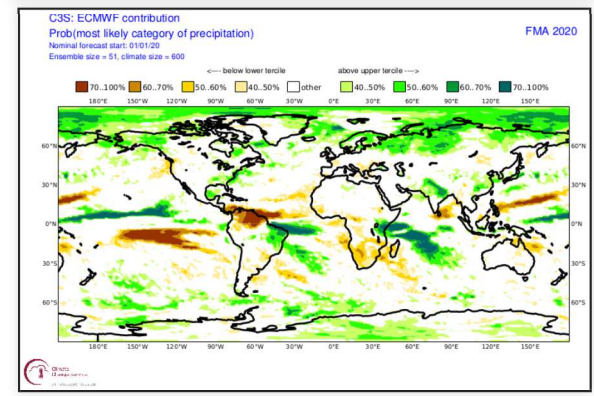
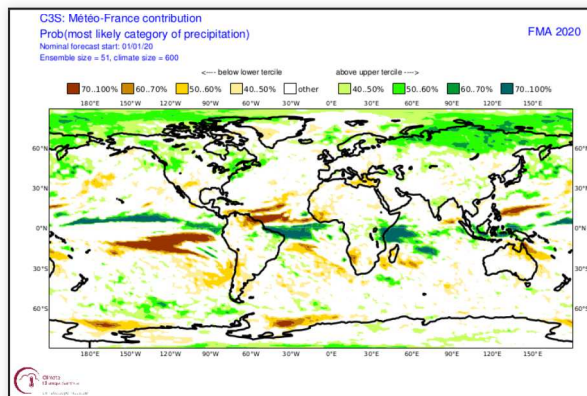
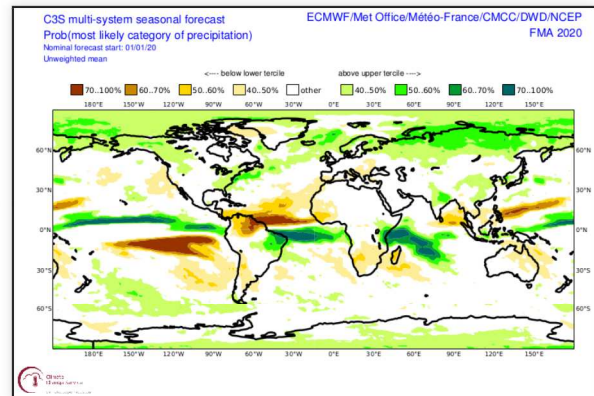
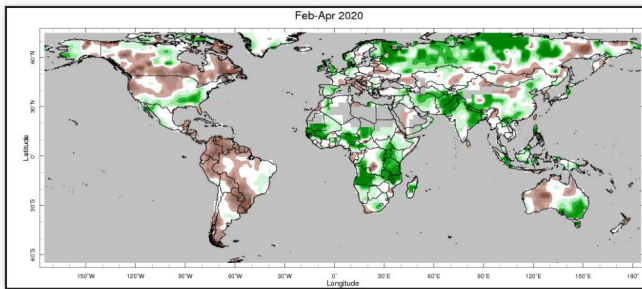
ECMWF analysis top left, synthetic forecast map top right. Forecast for multi-system, MF-S7 and SEAS5 on the bottom line.

Climatic parameters : Precipitations over the globe

Rather good forecast around the Indian Ocean : east of Africa, India, the Maritime Continent and North of Australia.

Very wet conditions well foreseen on Russia. Partially good on South America.

Bad forecast on the rest of Africa, North America.

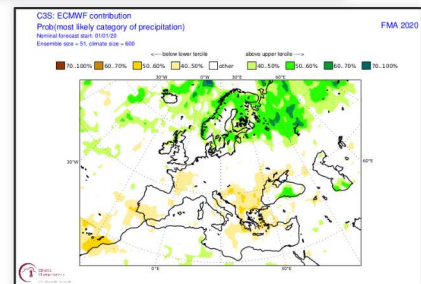
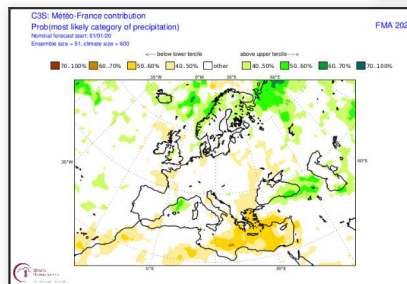
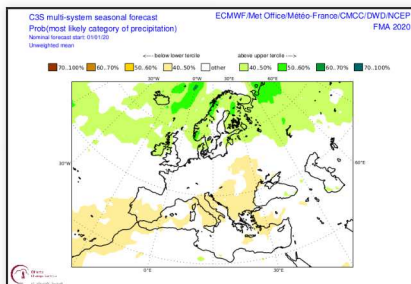
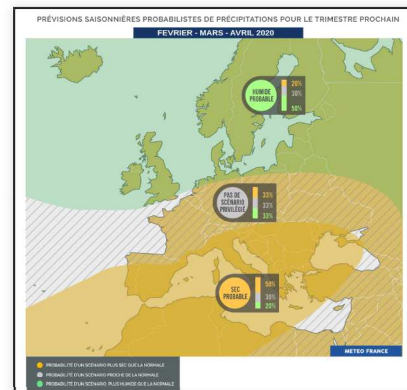
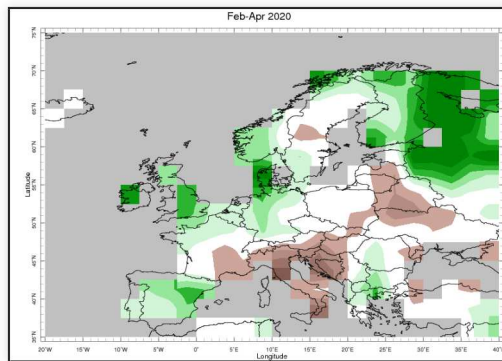


Standardized Precipitation Index analysed by IRI top left, forecast for multi-model top right and MF-S7 and SEAS5 on the bottom line.

Climatic parameters : Precipitations over Europe

Very good forecast for the gradient, wet to the north, dry in the Mediterranean.

In details, the iberia peninsula and the Balkans were wetter than normal, so the forecast was wrong there. Anyway the Mediterranean dry pattern was correct.



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 FMA 2020

1) Oceans :

SST patterns were generally very well captured by the models.

2) Large scale atmospheric circulation :

VP and SF 200hPa : The Indian Ocean dipole was generally well predicted, despite a weakness of its eastern part in some models. The forecast was more difficult on the Pacific Ocean. The Central America subsidence anomaly pole was rather well anticipated by models.

Z500 : The general pattern of the northern hemisphere was well anticipated. With low values over northern India and an extremely marked NAO + configuration over the North Atlantic.

The sign of NAO, EA and PNA modes was well anticipated.

3) Climatic parameters over Europe :

For temperature at large scale, very good forecast all over the world, except in North America where only one C3S model had predicted the cold scenario.

Regarding precipitation, Very good forecast around the Indian Ocean : east of Africa, India, the Maritime Continent and North of Australia. Less successful on the rest of Africa and America.

Over Europe and the Mediterranean basin, the synthesis maps were very relevant.