

Météo-France Seasonal Forecast Bulletin

AUGUST - SEPTEMBER - OCTOBER 2021

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General synthesis : ASO 2021

Good agreement between models in the tropics. The La Nina phenomenon is now over. However, the impacts of La Niña would still be present, due to the persistence of dipole of SST anomaly close to La Nina pattern. A major pole of upward motion anomaly (see VP200) would dominate in the tropics from the Maritime continent to Africa, and its influence could spread up to the Mediterranean basin (see MSLP maps). On the North Atlantic and Europe, no signal in terms of circulation.

A) Oceanic forecast :

- ENSO : neutral phase.
- IOD : small negative anomaly. neutral or negative phase next quarter

B) Drivers :

No drivers identified

C) Atmospheric circulation :

- over the North Atlantic and Europe : no privileged circulation.

D) Most likely conditions :

- **West African Monsoon** : wet signal on the coastal countries
- **over Europe and the Mediterranean Basin** : warm tercile privileged on southern Europe including half part of France. Dry tercile privileged from Eastern Mediterranean to Middle East.

Next bulletin : scheduled on August 20nd

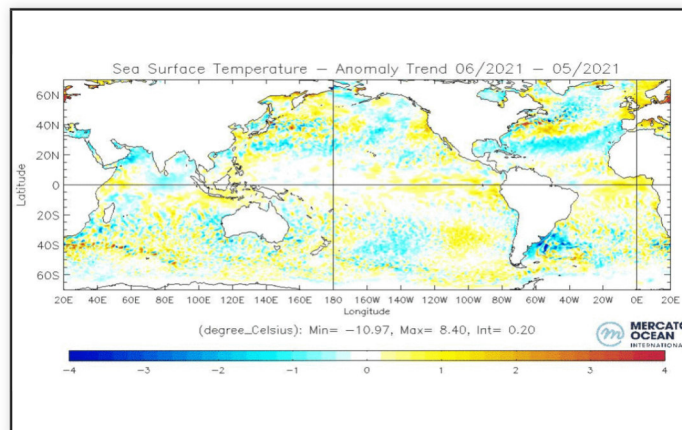
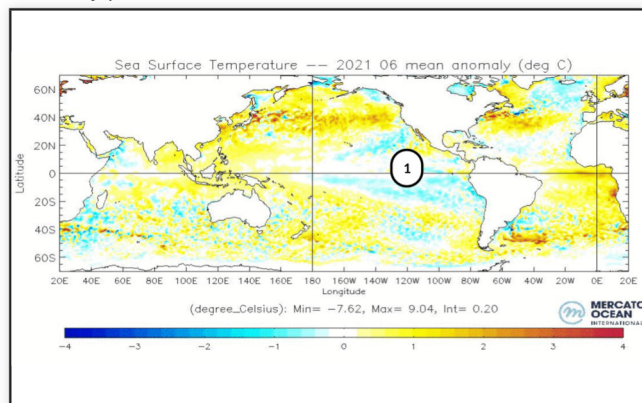
Oceanic analysis of June 2021 : SST anomalies

Current ENSO situation : neutral conditions

In the Pacific Ocean : The La Niña phenomenon is now over even if a slight cold anomaly persists from centre to east of the equatorial Pacific. In the North hemisphere, the warm anomaly is weakening.

In the Indian Ocean : Low warm anomalies on the east of the basin and near normal to the west.

In the Atlantic Ocean : Marked warming of the Angolan coasts in the Gulf of Guinea. In the Northern hemisphere, the large positive anomaly pattern between 20°N and 45°N is maintained.



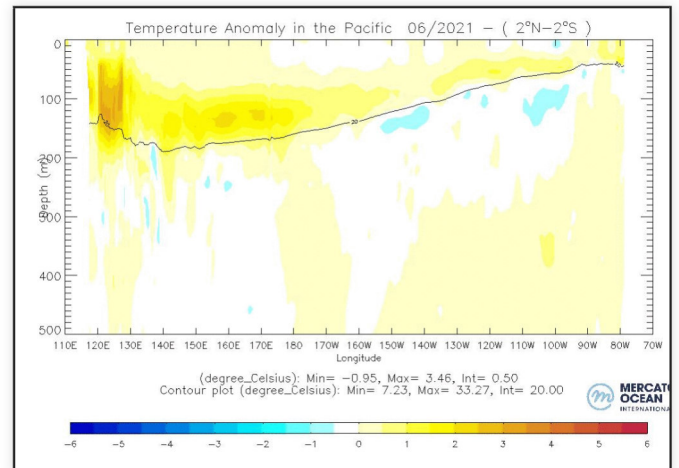
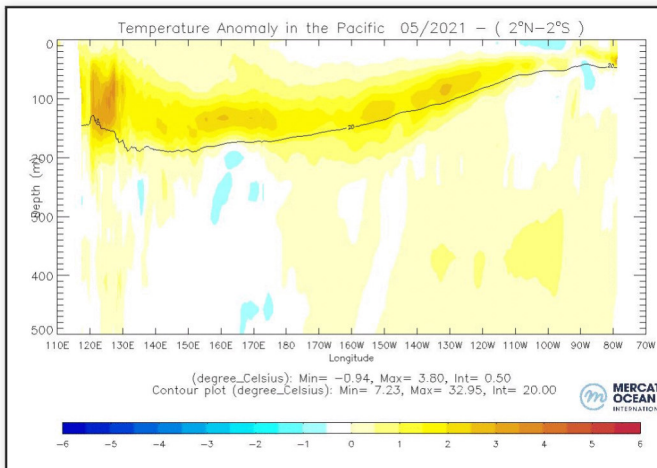
SST Anomalies and trend with the previous month (c) Mercator-Ocean

1 - La Nina cold anomaly

Oceanic analysis of June 2021 : Pacific vertical section

In subsurface anomalies remains low.

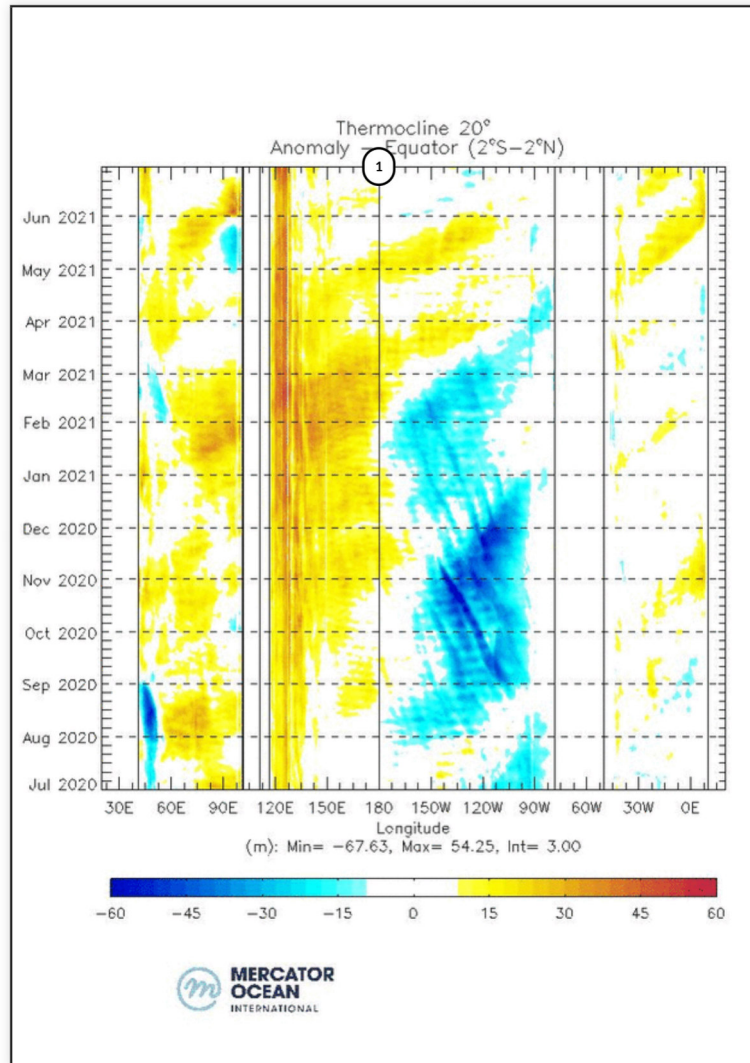
In depth, warm anomalies are noted on the west of the basin.



Ocean temperature anomalies in the first 500 meters of the equatorial Pacific basin, monthly average. (c) Mercator-Ocean

Oceanic analysis of June 2021 : Hovmöller diagram of the 20°C isotherm

In the Pacific Ocean, the thermocline has returned to a "close to normal" depth.



Evolution of the anomalies of depth of the thermocline (m) (materialized by the 20 °C isotherm) (c) Mercator-Ocean

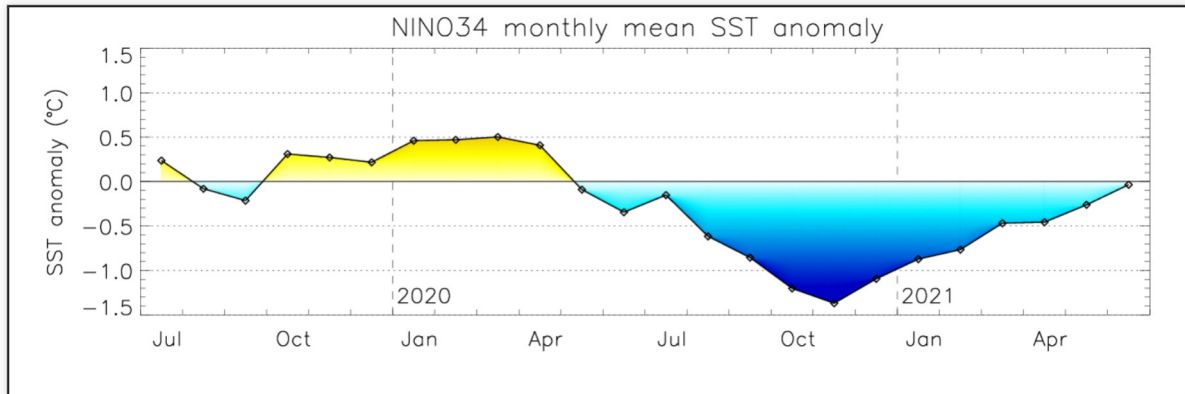
1 - Close to normal depth

Oceanic analysis of June 2021 : Pacific Ocean - Nino3.4 index history

Nino3.4 index issued from Mercator Ocean PSYV4R2 analysis : close to 0°C

(see BOM site for weekly values : http://www.bom.gov.au/climate/enso/monitoring/nino3_4.png)

Return to neutrality.



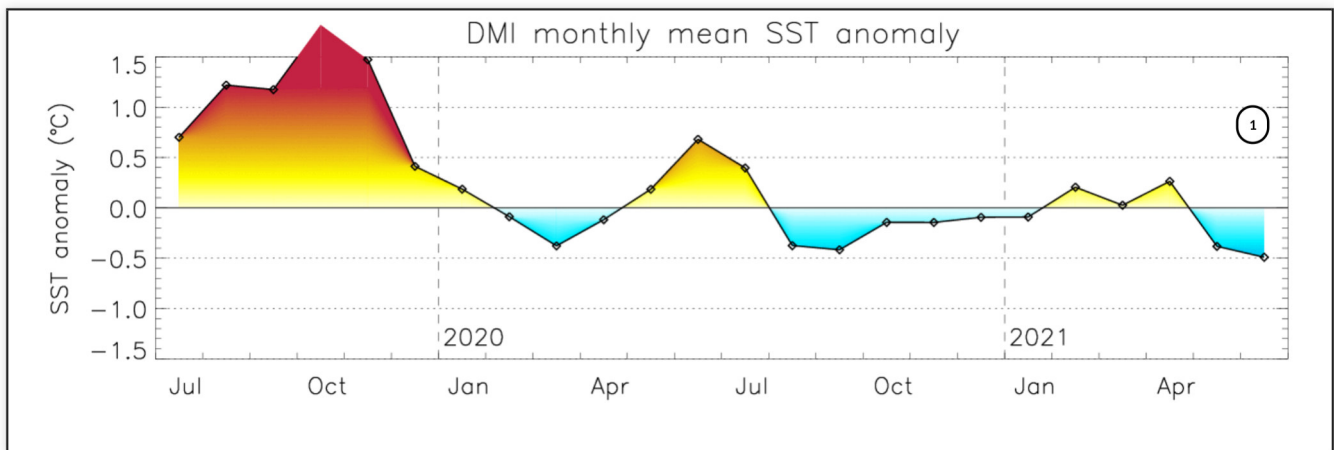
Evolution of SST in the NINO3.4 box (c) Mercator-Ocean

Oceanic analysis of June 2021 : Indien Ocean - DMI index history

DMI Index issued from Mercator Ocean PSYV4R2 analysis : -0.5°C

(see BOM site for weekly values : <http://www.bom.gov.au/climate/enso/monitoring/iod1.png>)

Persistence of slight cold anomaly



Evolution of SST in the DMI box (c) Mercator-Ocean

1 - Sharp rise in this index which becomes positive

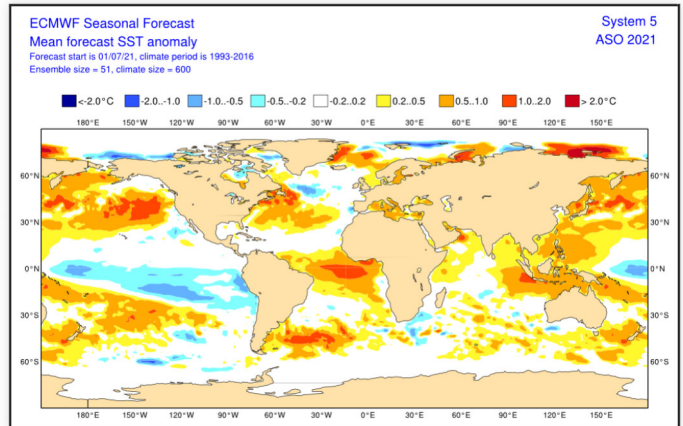
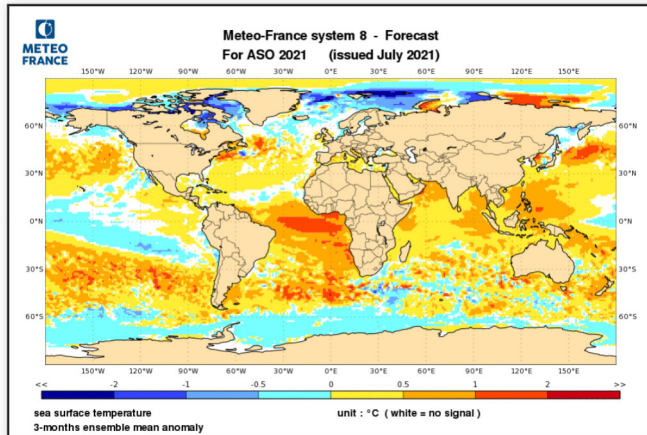
Oceanic forecast : SST anomaly

Good agreement between MF-S8 and ECMWF-SEAS5 in all oceans.

In the Pacific Ocean : the cold anomaly pattern associated to La Niña is still present in the forecasts but weakening. Its extension to the South-East (up to South America) is similar in both models. Good agreement on the warm anomaly patterns in mid-latitudes (Northern and Southern hemisphere).

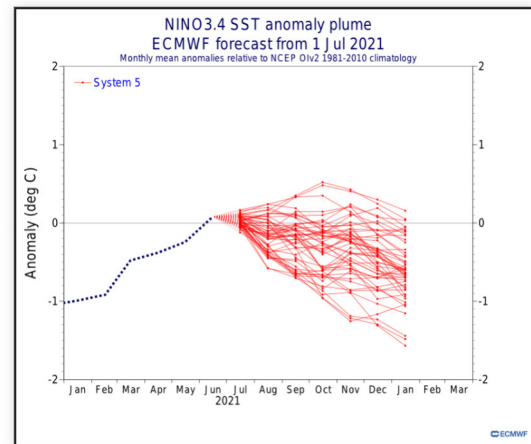
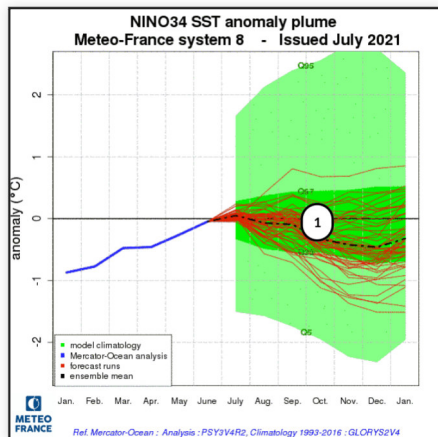
In the Indian Ocean : Predominance of positive anomalies. The east/west contrast is more marked with ECMWF-SEAS5

In the Atlantic Ocean : Persistence of strong warm anomaly near the equator, on the southern tropical Atlantic and off the North American coasts . North of Iceland, great difference between the two models : cold anomaly for MF-S8 vs warm anomaly for ECMWF-SEAS5.



Oceanic forecast : NINO3.4 Plume diagrams

ECMWF-SEAS5 and MF-S8 : both models are similar and they forecast the most likely neutral conditions in the next quarter before the possible return of La Nina.

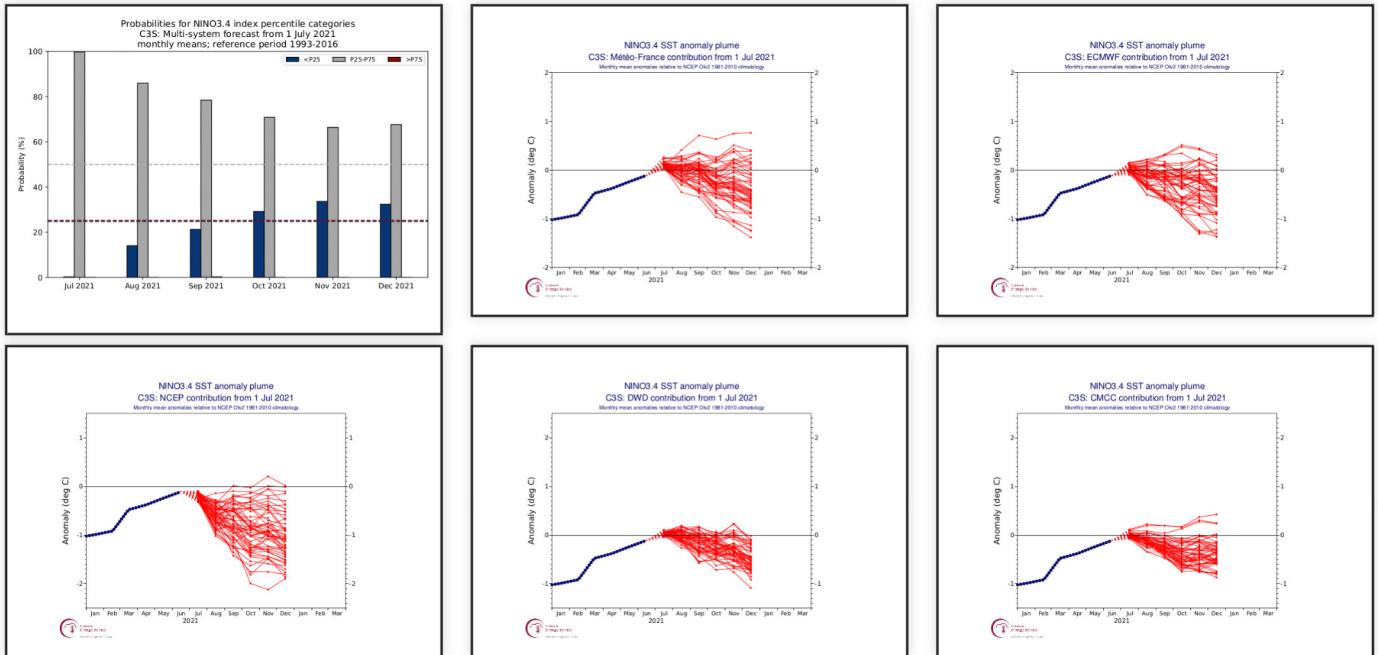


1 - Close to neutrality

Oceanic forecast : C3S Nino3.4 re-scaled plume diagrams

All the models agree on near normal or slightly negative conditions.

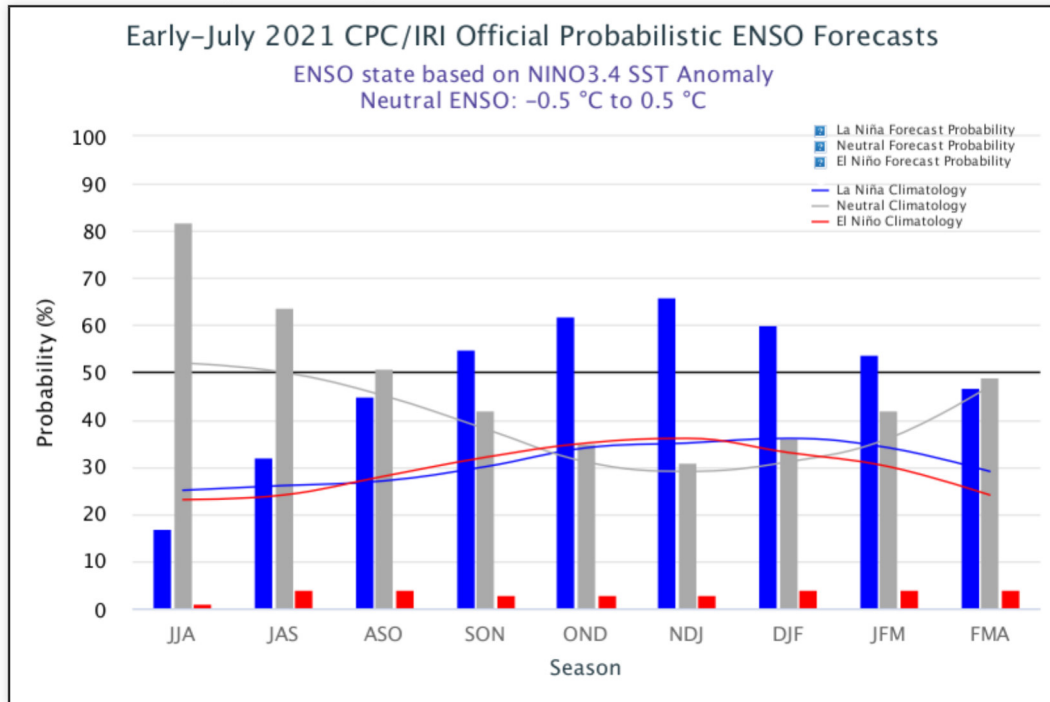
Expected Phase for the next three months : neutral.



C3S multi-system probability forecast (top left figure) and C3S plume diagrams re-scaled from the variance of observations for the period 1981-2010.

Oceanic forecast : Synthesis from IRI

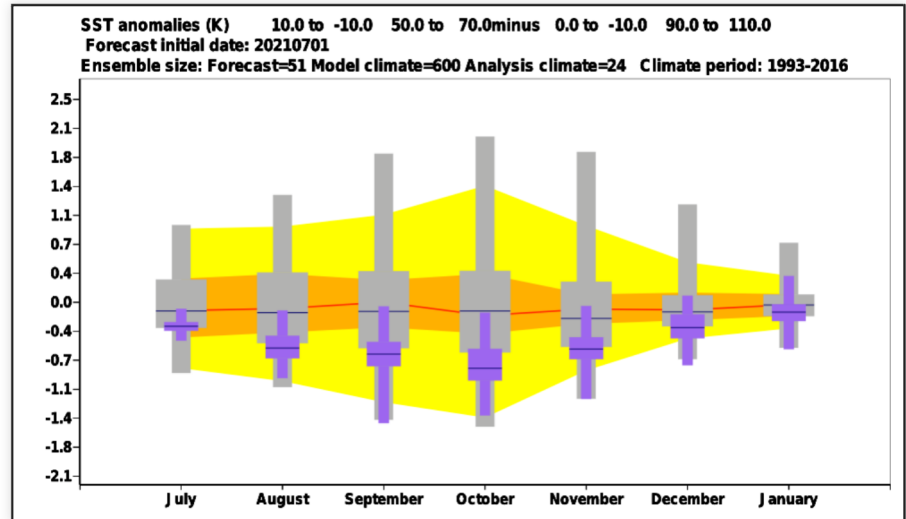
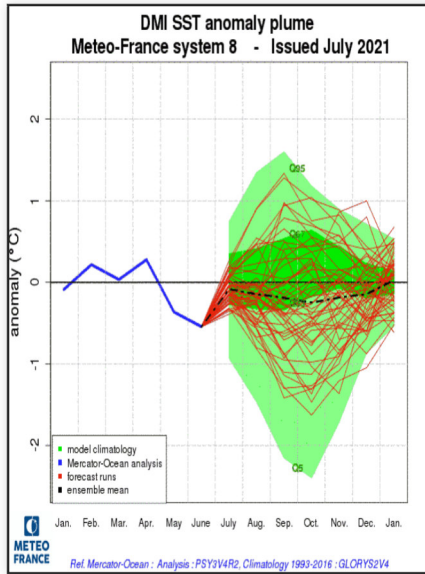
Neutral conditions are the more likely for the next quarter before the return of la Nina in the winter



Probability of Niño, Niña, and neutral phases for the next 8 quarters. source <http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/>

Oceanic forecast : Indian ocean - DMI evolution

Some differences between the two models: the DMI moves between neutrality and negative values (with large spread) during the period with MF-S8 while it would be clearly maintained negative with ECMWF-SEAS5.

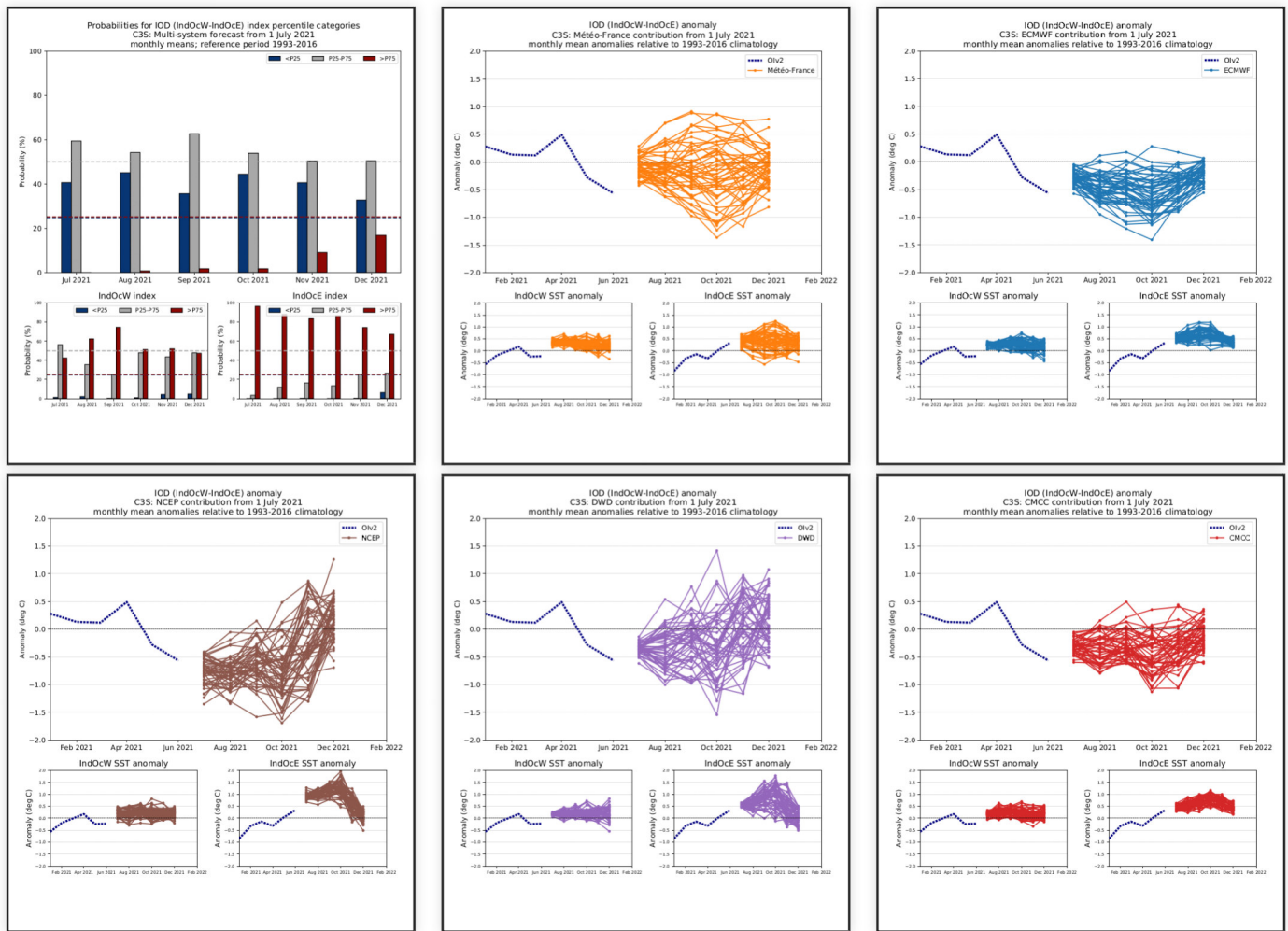


DMI index : analysis, forecasts and model climatology with MF-S7 on the left and ECM-SEAS5 on the right

Oceanic forecast : C3S IOD re-scaled plume diagrams

Fairly strong dispersion of models (incertanty on the box in the east)

Expected Phase for the next three months : negative or neutral.

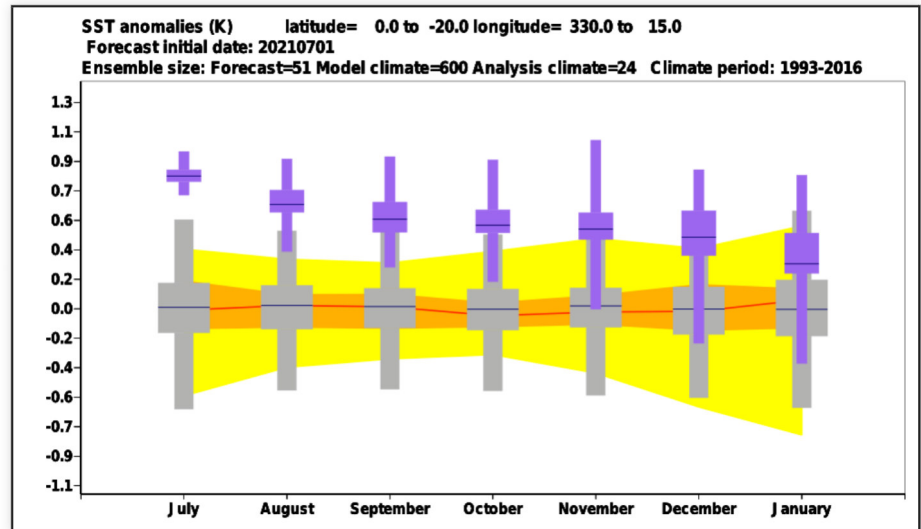
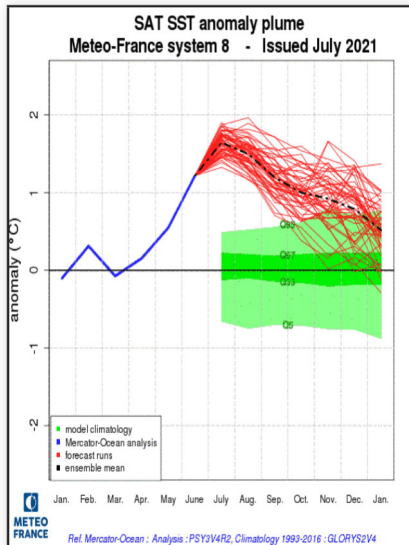


C3S multi-system probability forecast (top left figure) and C3S plume diagrams re-scaled from the variance of observations for the period 1981-2010.

Oceanic forecast : Atlantic ocean - SAT evolution

The strong hot anomaly persists beyond the next quarter.

The TASI ([see here MF-S8](#)) would then be significantly negative, a factor that is favourable to rainfall in coastal countries (north of Gulf of Guinea) and unfavourable to the activity of the west African monsoon in the Sahel.



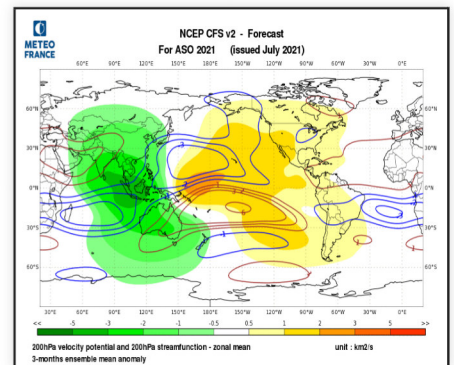
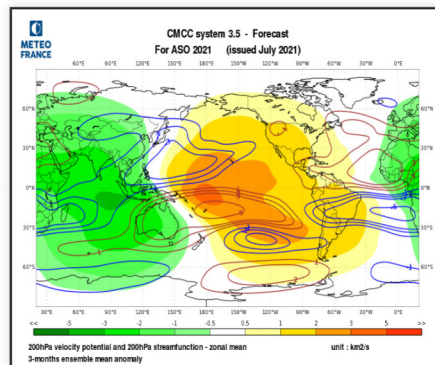
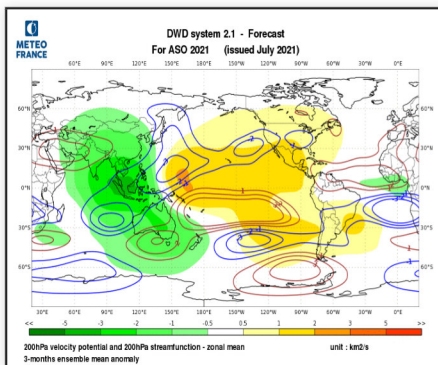
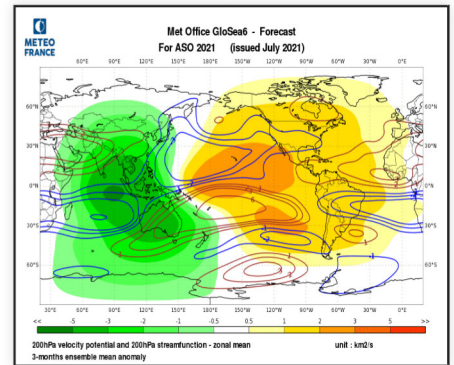
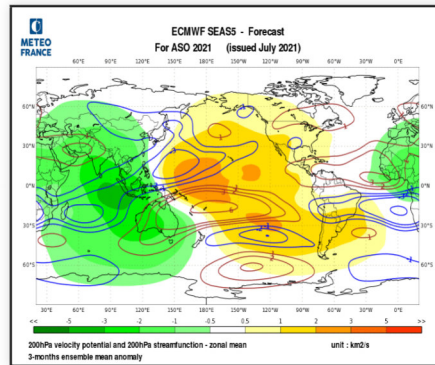
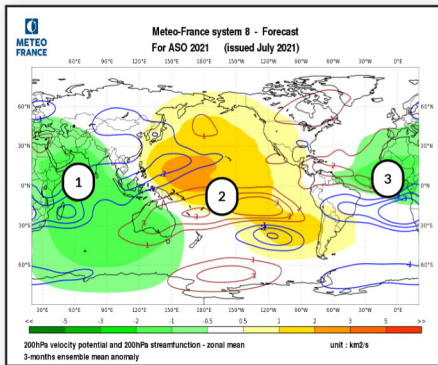
Anomaly on the SAT box : analysis, forecasts and model climatology with MF7 on the left and SEAS5 on the right

Atmospheric circulation forecasts : velocity potentiel and stream function at 200hPa

Good agreement between models in the tropics, low signals in mid latitudes of the northern hemisphere.

Velocity Potential : despite the weakening of La Nina, there is still a dipole pattern in the models corresponding to a La Nina response. That means a downward motion anomaly over the Central/East Pacific and an upward motion anomaly over the Maritime Continent extending to the Indian Basin. Over Africa, most of the models forecast a upward motion anomaly whereas on the South America subsidences are most likely.

Streamfunction : The signal seems to be trapped in the tropics, no trace of teleconnexion toward mid-latitudes of the northern hemisphere in the models.



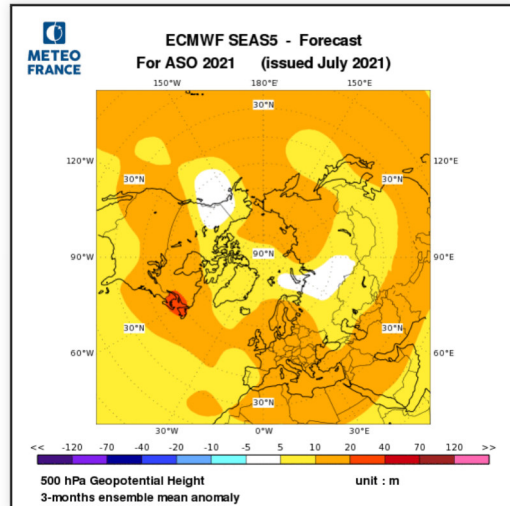
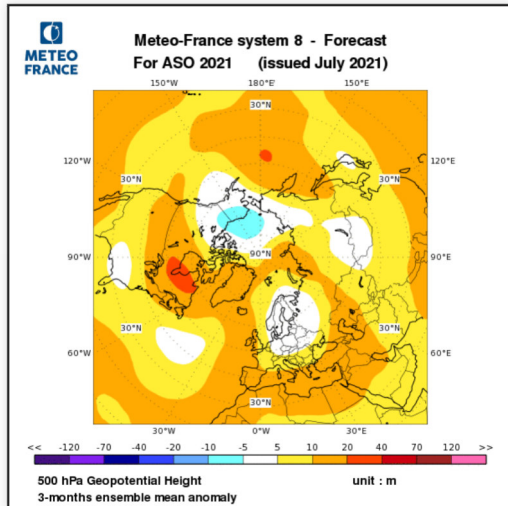
MF8,SEAS5, UKMO, DWD, CMCC and NCEP 200hPa velocity potential anomalies (color range, green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

- 1 - VP : large area of upward motion anomaly
- 2 - VP : downward motion anomaly related to La Nina
- 3 - VP : upward motion anomaly in all the models

Atmospheric circulation forecasts : 500 hPa Geopotential anomalies

Positive anomalies are dominant, due to the positive trend induced by global warming.

The anomaly structures are different except the negative anomaly near Alaska and the positive anomaly around Quebec.

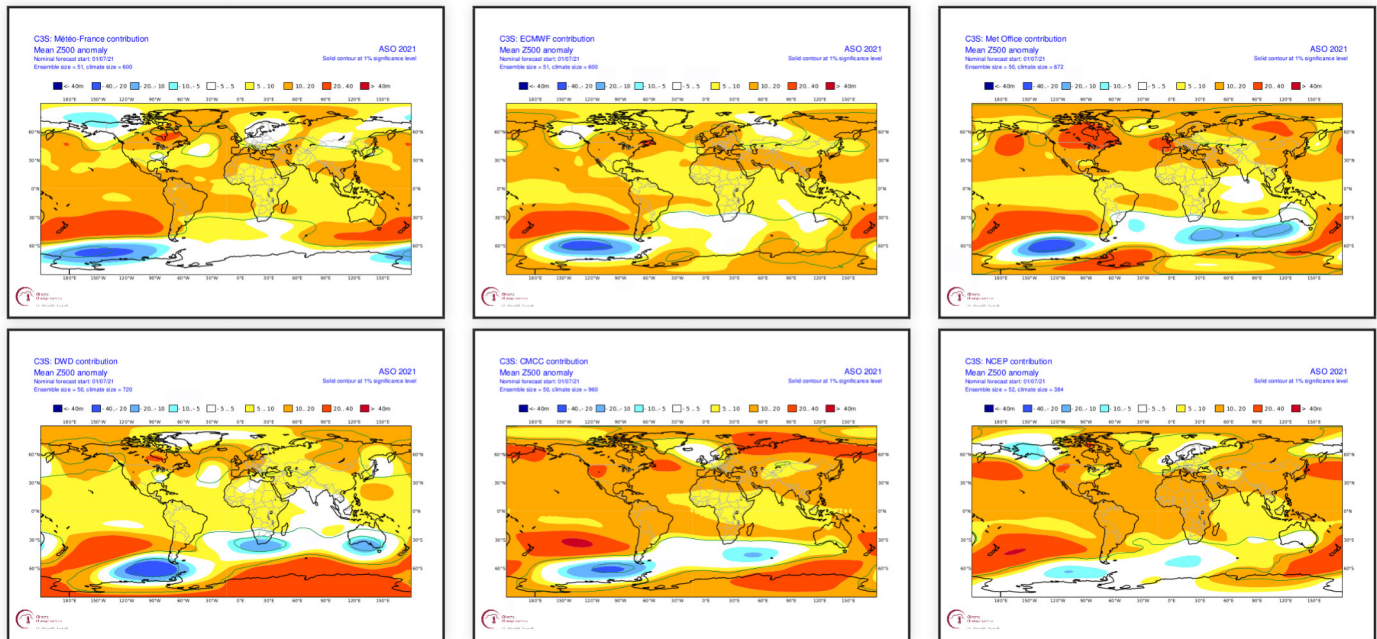


polar projection of MF8 and SEAS5 500hPa geopotential height anomalies.

Atmospheric circulation forecasts : Z500 anomalies in C3S models

On North America models highlight dipole : negative to Alaska/positive around Quebec.

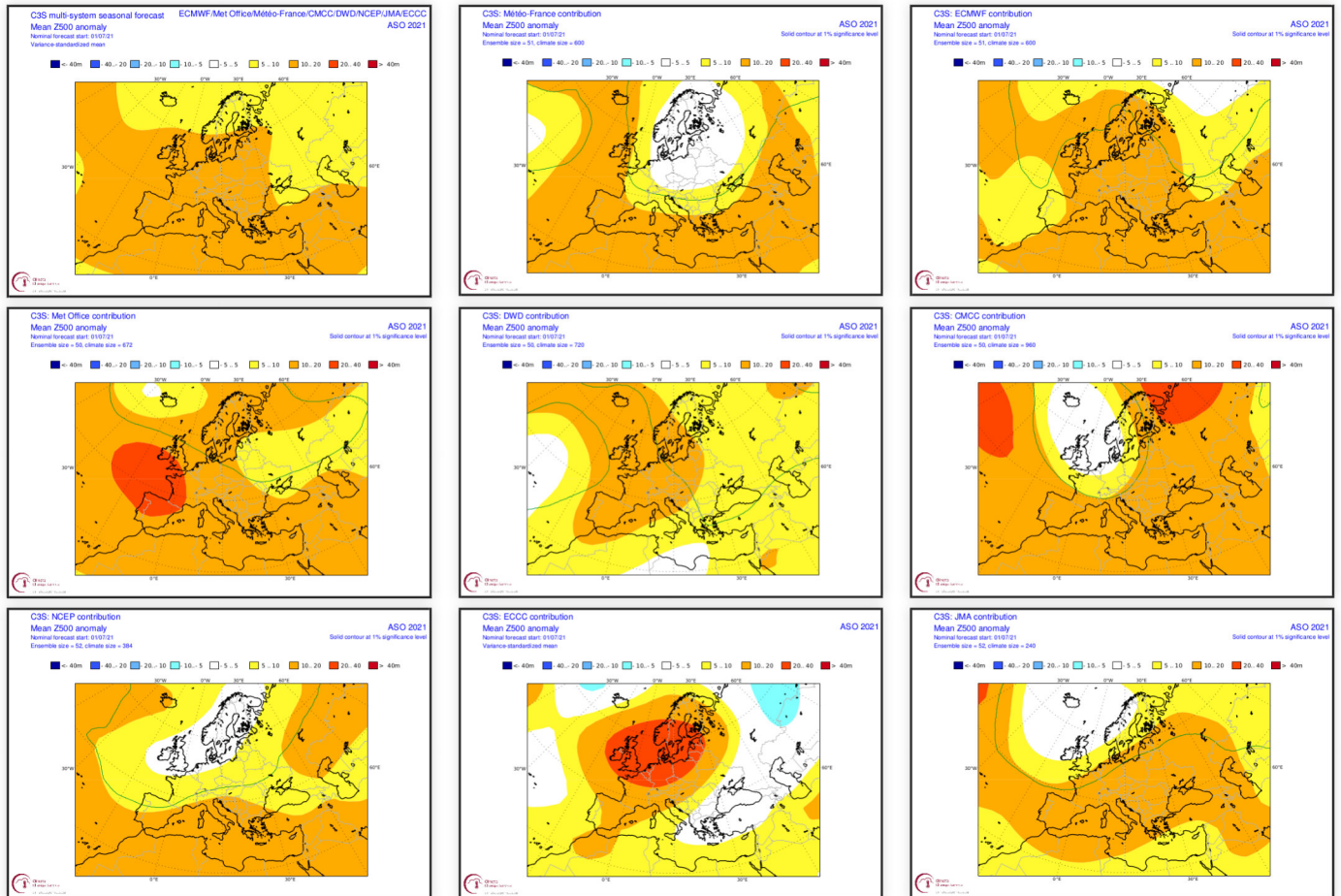
Over North Atlantic and Eurasia the forecasts are different from one model to another.



MF-S8, SEAS5, UKMO, DWD, CMCC and NCEP 500hPa geopotential height anomalies.

Atmospheric circulation forecasts : Z500 anomalies in C3S models

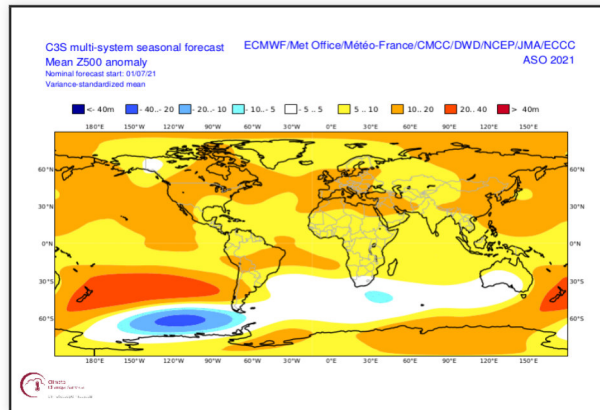
Over Europe the forecasts are different from one model to another.



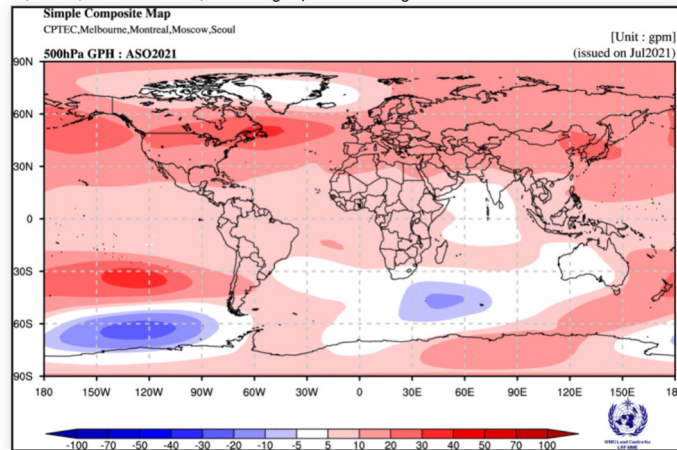
multi-models 500hPa geopotential height anomalies

Atmospheric circulation forecasts : Z500 anomalies multi-systems

From North Atlantic to Eurasia there is no significant signal with C3S multi-models whereas others models of WMO suggests a "NAO+" scenario.



C3S multi-models (MF-S7, SEASS, UKMO, DWD, CMCC, NCEP and JMA) 500hPa geopotential height anomalies.

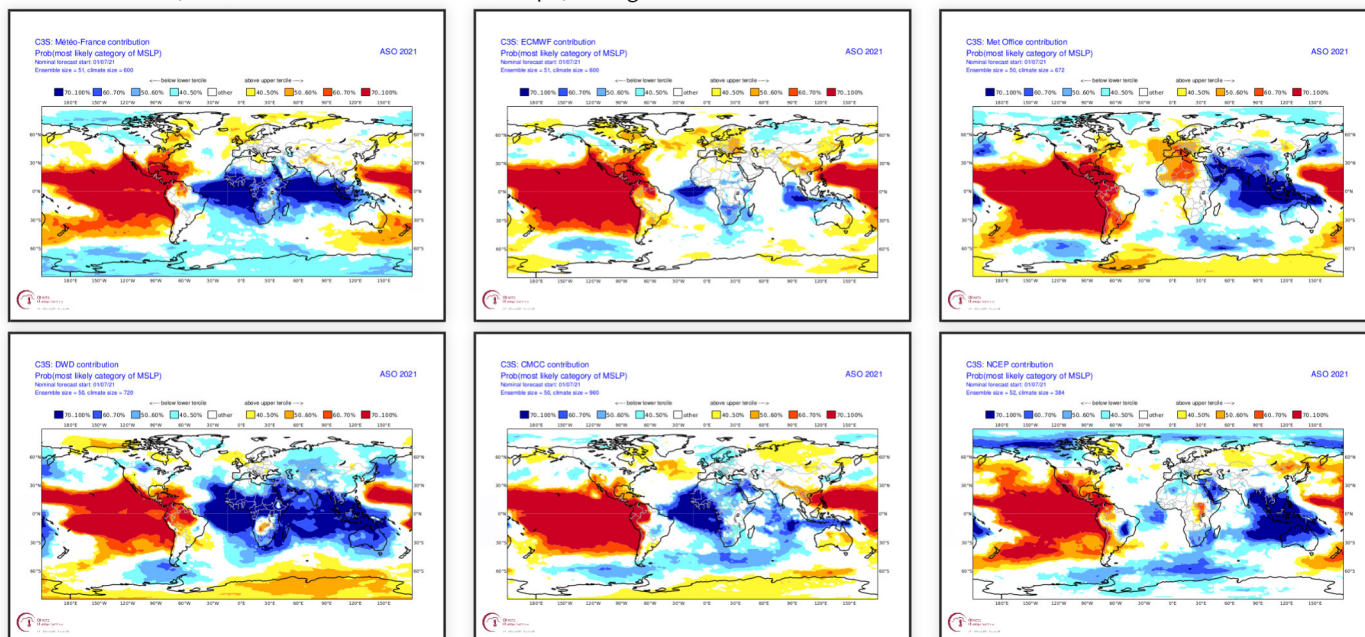


Others models of WMO multi-models 500hPa geopotential height anomalies.

Atmospheric circulation forecasts : MSLP probabilities

In the tropics, in link with VP200 anomalies, impacts are clearly visible : the highest tercile is almost certain accross the Pacific. In the Indian Ocean, in Africa and in Eastern Atlantic, the lowest tercile is the most probable but the signal is more or less marked according to the models.

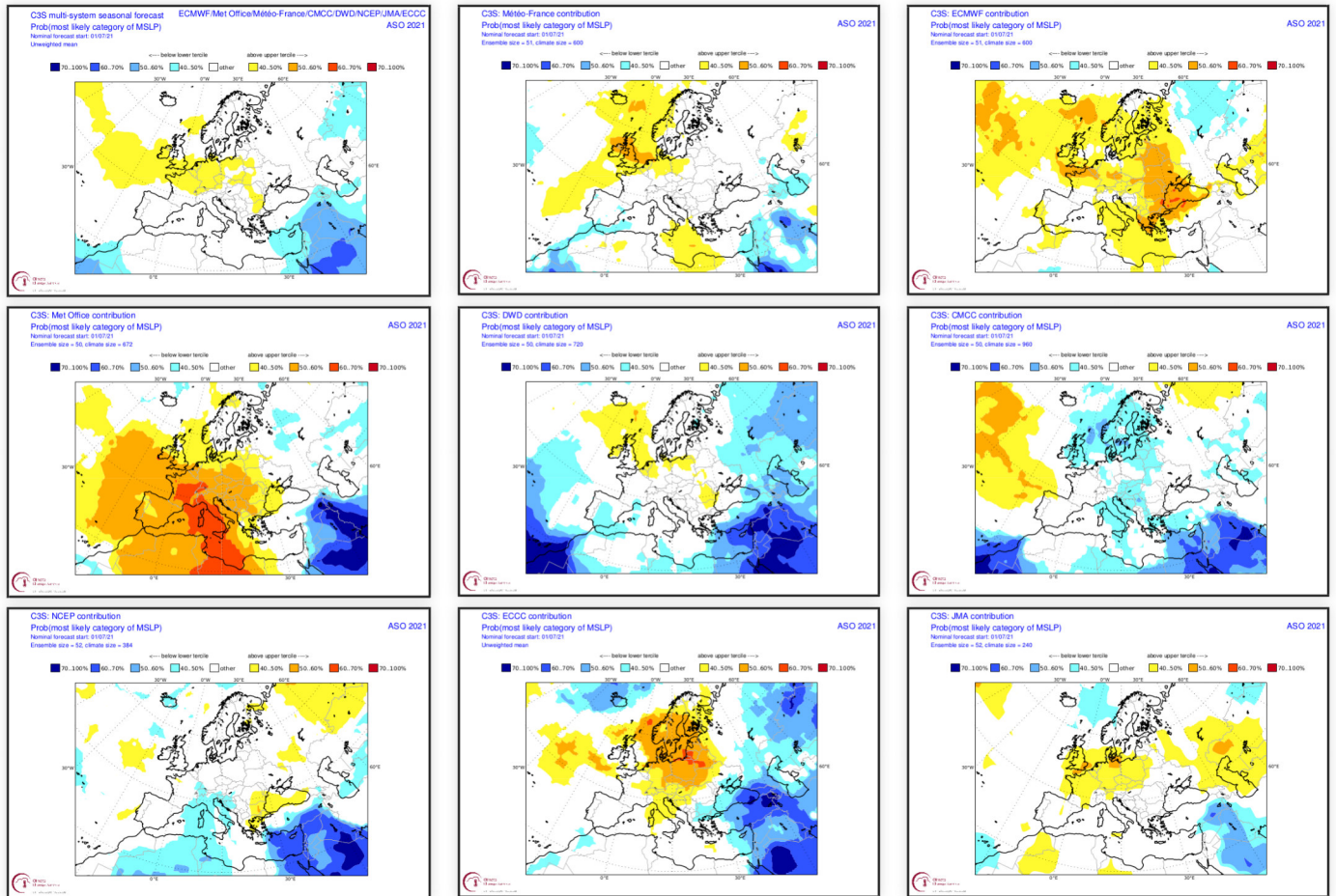
In mid-latitudes, in the North Atlantic and over Europe, the signal is weak.



MF-S8, SEAS5, UKMO, DWD, CMCC and NCEP models probability maps.

Atmospheric circulation forecasts : MSLP anomalies in C3S models

Over Europe the forecasts are different from one model to another.

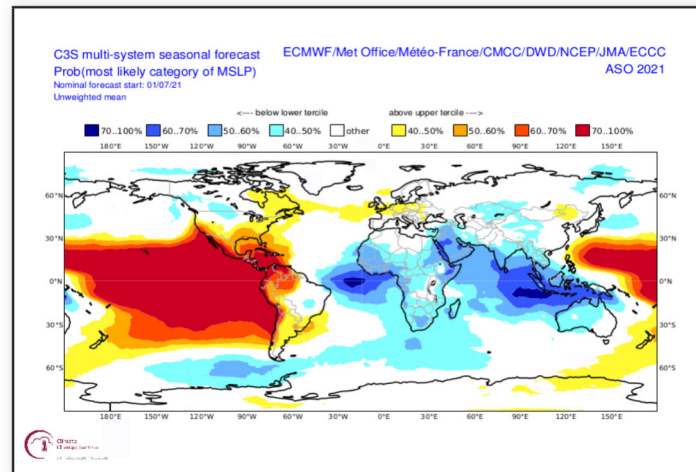


multi-models 500hPa geopotential height anomalies

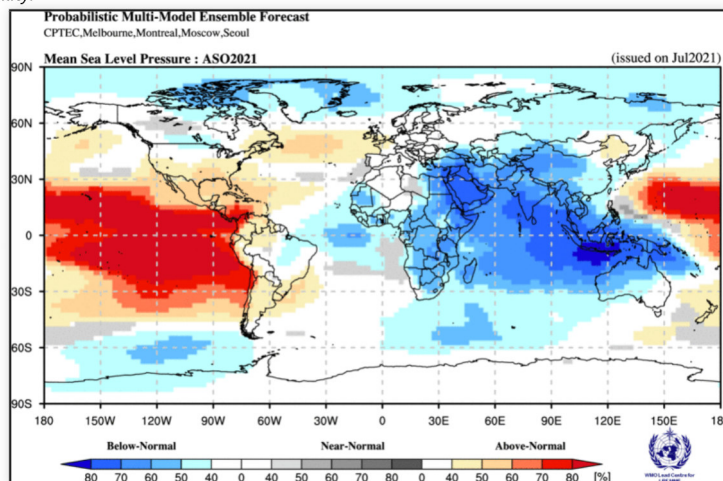
Atmospheric circulation forecasts : MSLP probabilities multi-systems

Very good agreement between the two multi-models in the tropical zone.

On Northern Atlantic other models of WMO highlights NAO+ pattern. With C3S multi-models signal is much weaker but we find a weak positive signal to the 50N.



C3S multi-models MSLP terciles probability.

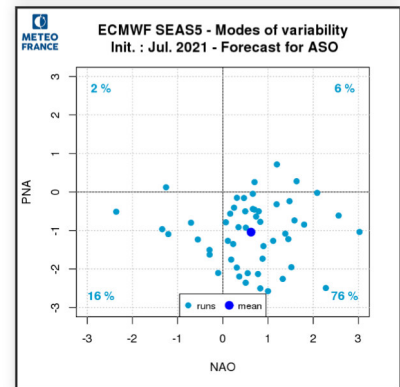
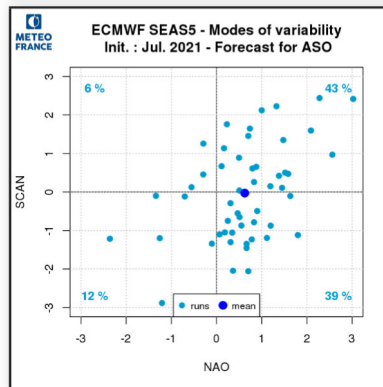
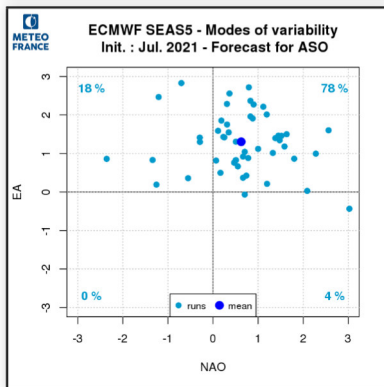
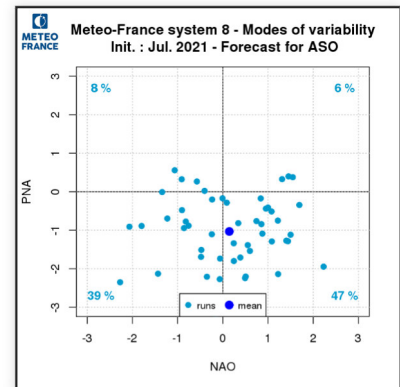
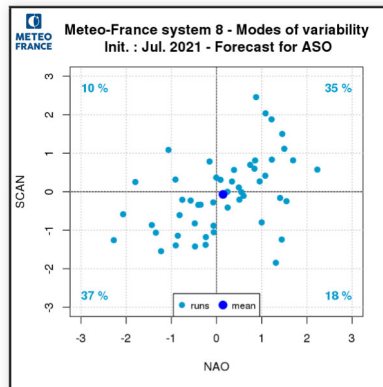
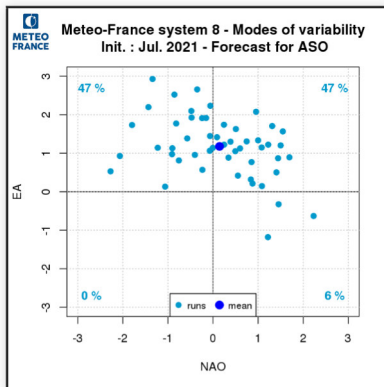


Others models of WMO multi-models MSLP terciles probability.

Modes of variability : forecast

Good confidence in a negative PNA and positive EA.

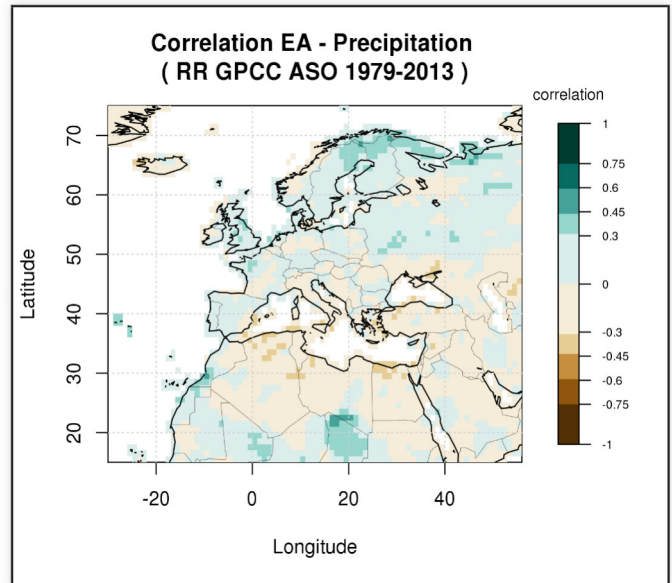
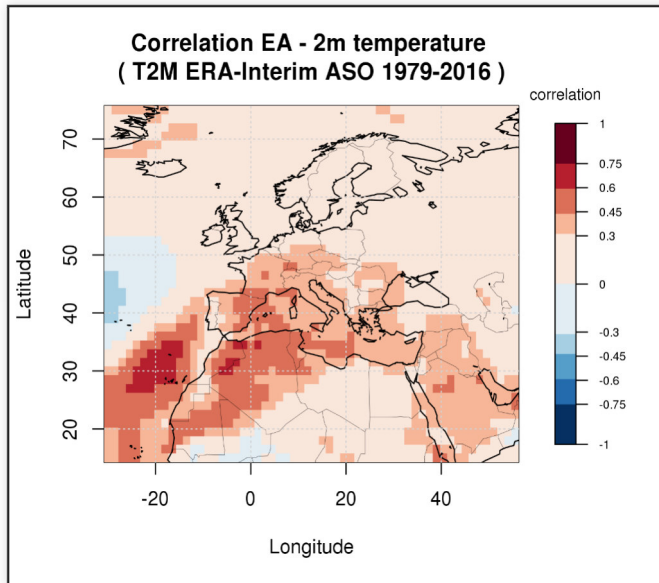
A positive NAO is probable. However, the impact of global warming on Z500 fields may have polluted the signal.



[See the modes of variability patterns](#)

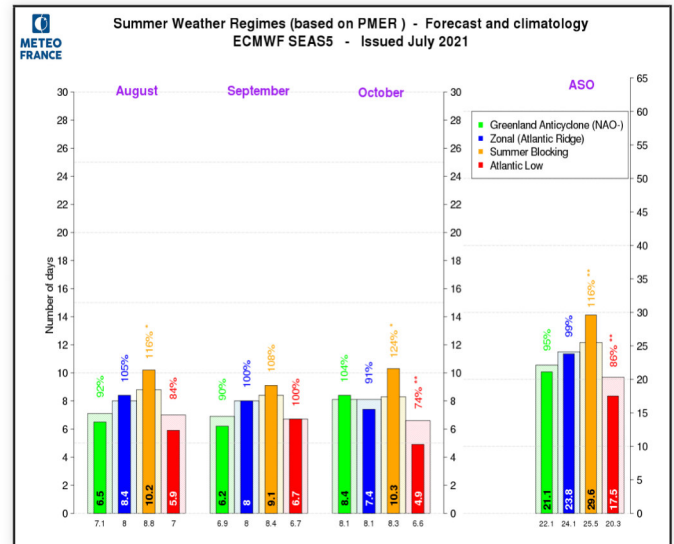
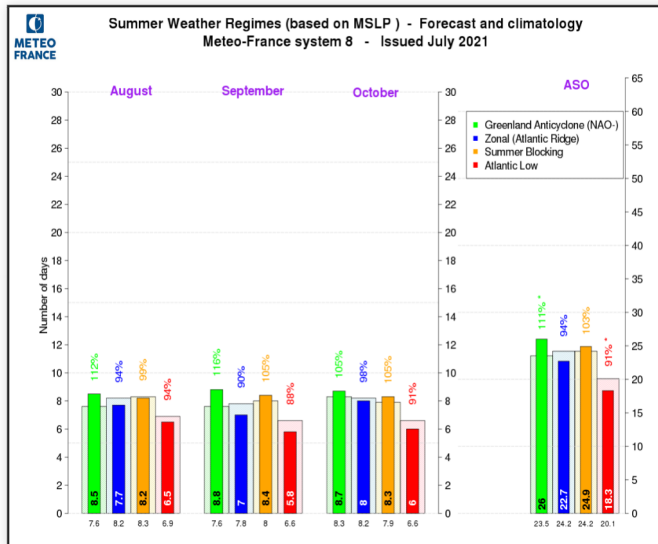
Modes of variability : EA impacts

EA mode has a strong influence in particular on the temperature on the south-west of Europe.



Weather regimes : summer MSLP

Disagreement between models : MF8 favors Greenland Anticyclone whereas ECMWF over-presents Summer Blocking



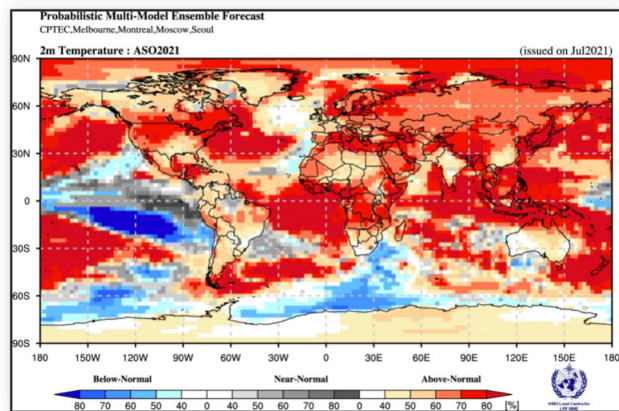
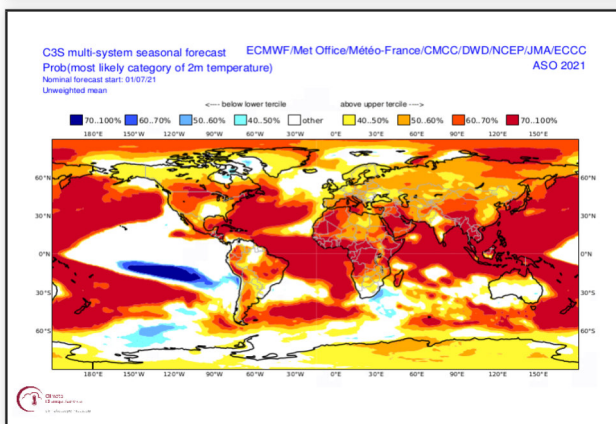
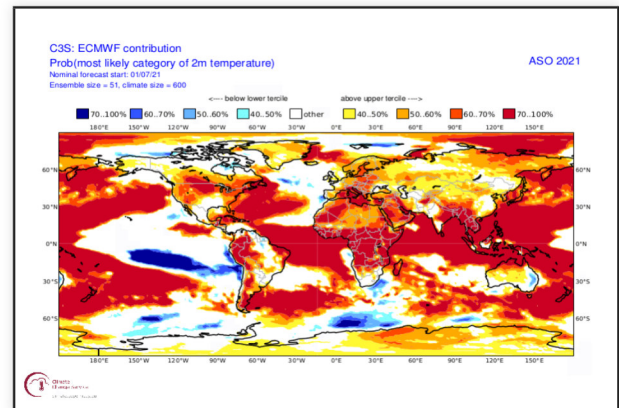
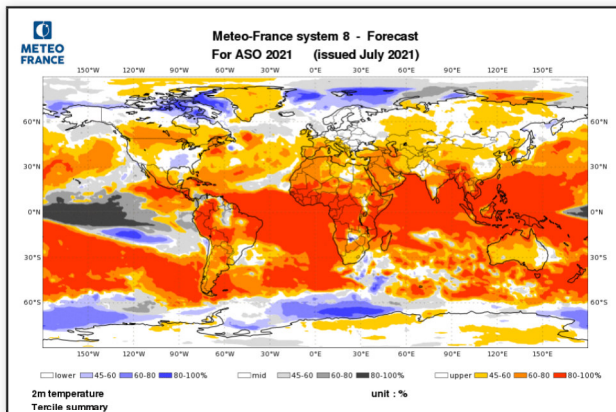
Frequency of SLP weather regimes, compared to model's own climatology, for the next three months and aggregation over the entire quarter, for MF-S8 (left) and SEAS5 (right).

Forecast of climatic parameters : Temperature probabilities

Over the continents, positive anomalies almost everywhere, partly attributable to global warming.

In North America, good agreement between models with a higher probability of warm anomaly toward 50N.

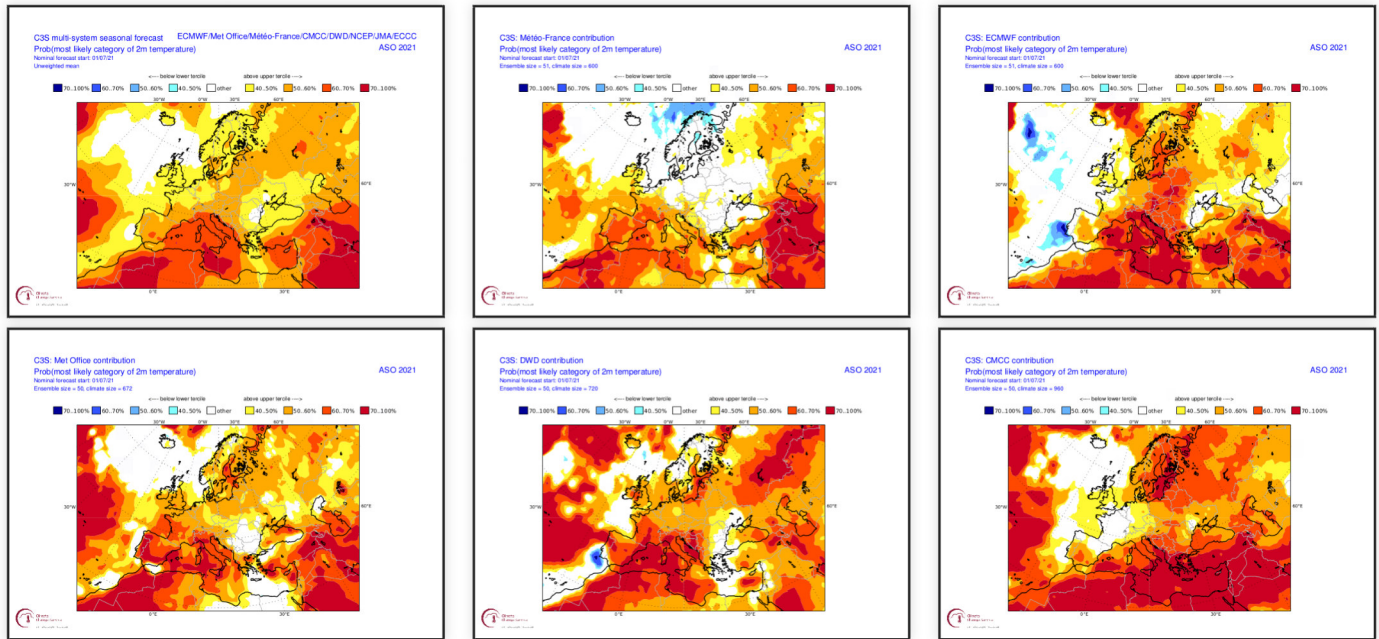
Over Europe and the Mediterranean basin, North-South contrast exists with MF-S8 and C3S multi-models but not with ECMWF-SEAS5 and the WMO multi-models.



2m temperature probability map from MF-S8 (top left), ECMWF-SEAS5 (top right), C3S multi-models(bottom left) and others models of WMO multi-models (bottom right)

Forecast of climatic parameters : T2M probabilities over Europe in C3S models

All the models forecast the highest probability for the "warmer than normal" tercile around the Mediterranean Basin

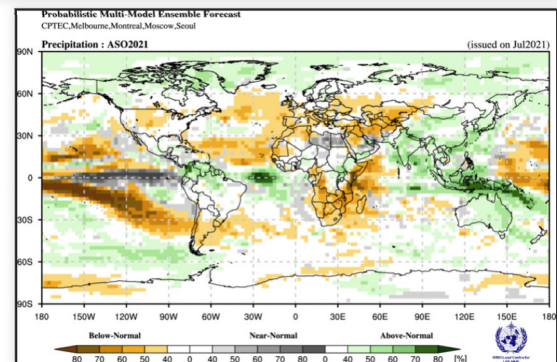
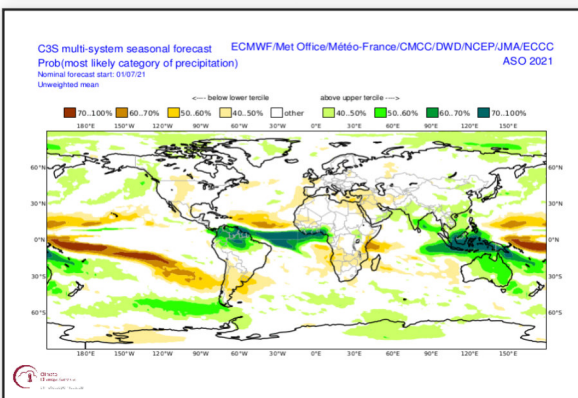
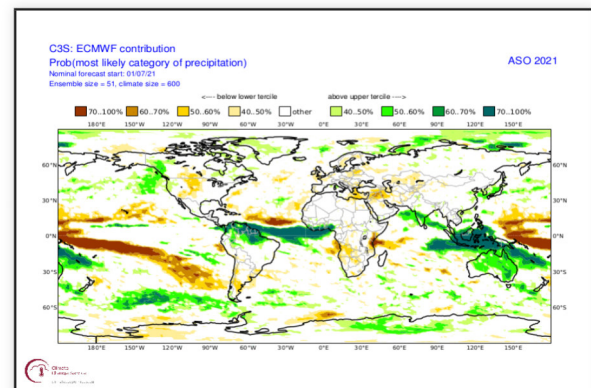
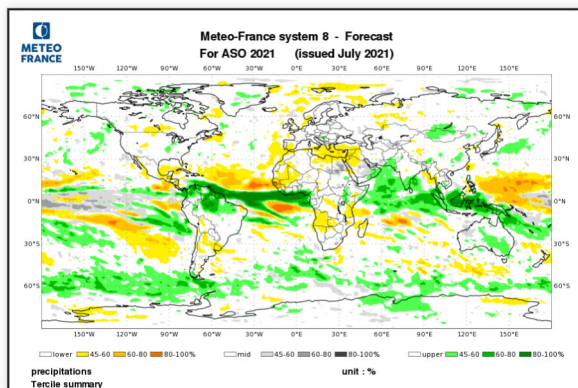


C3S multi-models probability map (top left) and MF-S8, ECMWF-SEAS5, UKMO, DWD, CMCC models.

Forecast of climatic parameters : Precipitation

Models are consistent in the tropics and up to mid-latitudes over South America and Africa (dry) , South Asia (wet pattern) and Middle East (dry).

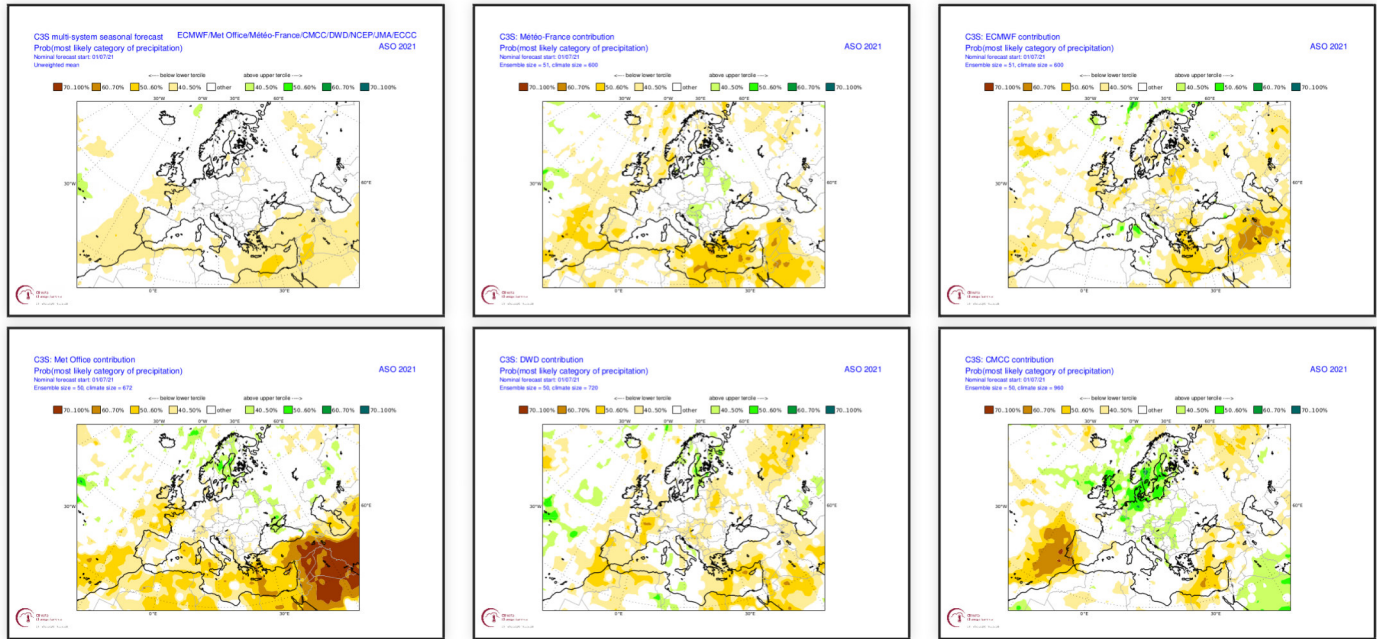
Concerning the West African Monsoon, the wet signal on the coastal countries (C3S models) is consistent with the negative TASI, so can be considered as a robust signal.



precipitation probability map from MF-S8 (top left), ECMWF-SEA55 (top right), C3S multi-models (bottom left) and others models of WMO multi-models (bottom right)

Forecast of climatic parameters : Precipitation probabilities over Europe in C3S models

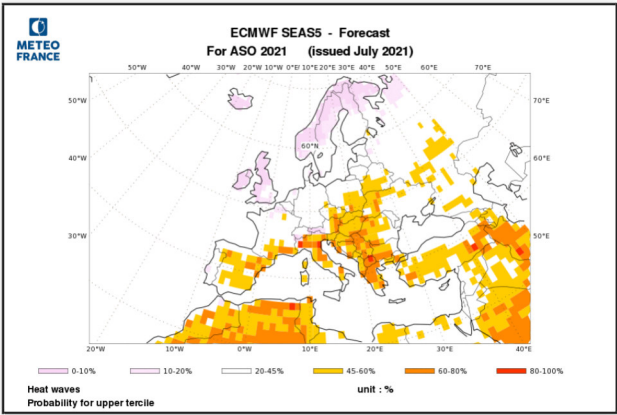
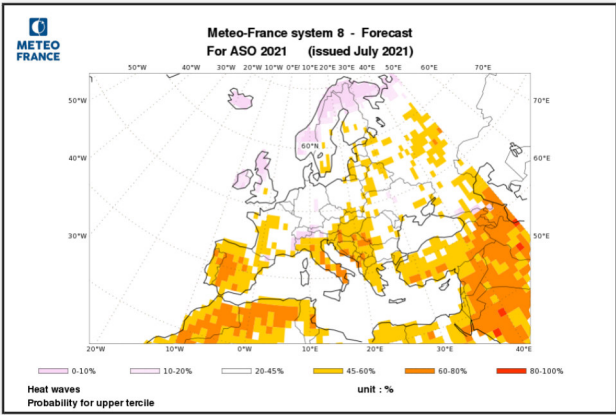
A scenario slightly drier than normal dominates on the countries around the east of the Mediterranean basin. As for Z500 and T2m, the climate trend probably explains a part of the dry signal.



C3S multi-models probability map (top left) and MF-S8, SEAS5, UKMO, DWD, CMCC models.

Forecast of climatic parameters : Heat waves

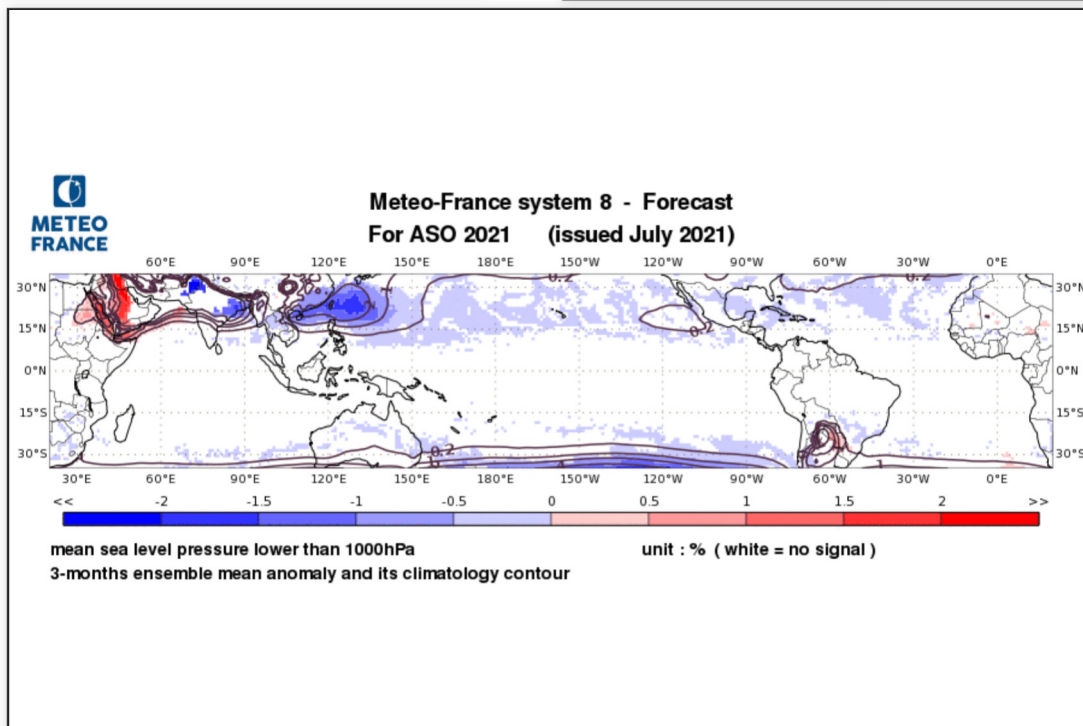
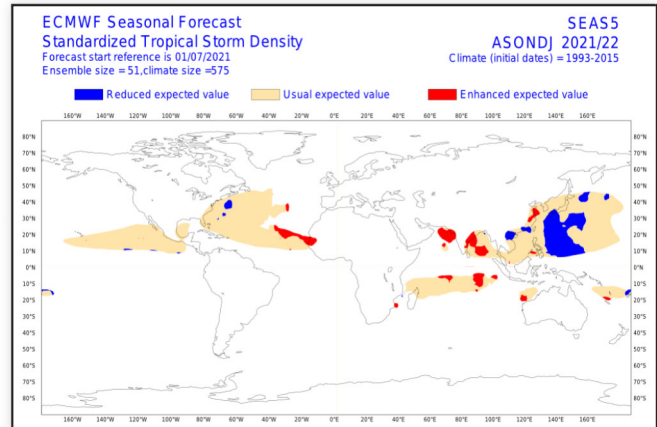
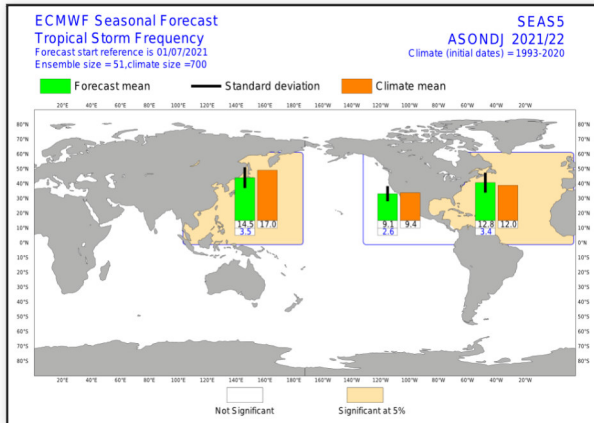
The enhanced probability of heat waves is similar in the 2 models, it would affect all the countries of the domain south of 45°N.



Heat wave probability for MF8 (right) and ECMWF (left). A heat wave is detected if the corrected $T2M$ is above the daily 90th percentile and a fixed 20°C threshold. [more details here](#)

Forecast of climatic parameters : Tropical Storm Frequency

The cyclone risk is likely to decrease in eastern Pacific. On the Atlantic the signal is low and shared : risk a little stronger globally with ECMWF and lower with MF8.

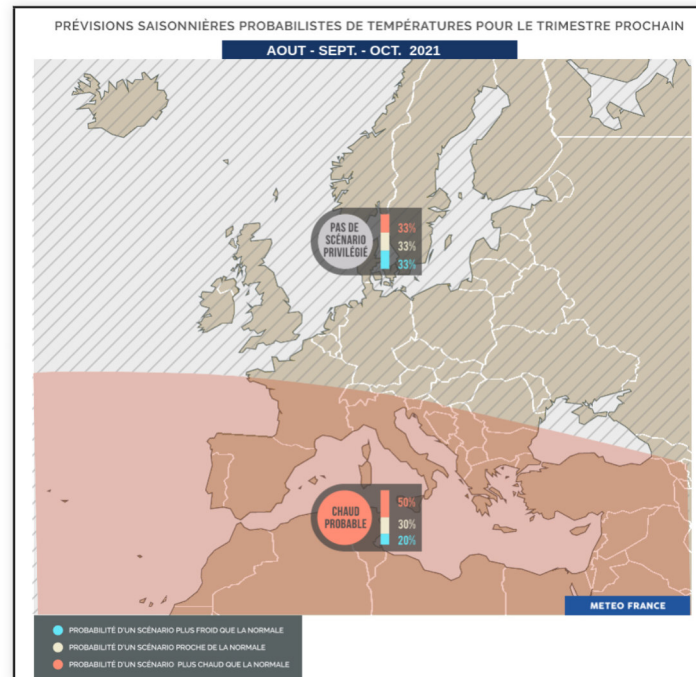


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Synthesis map for Europe : Temperature

No consensus between models on a privileged circulation over Europe.

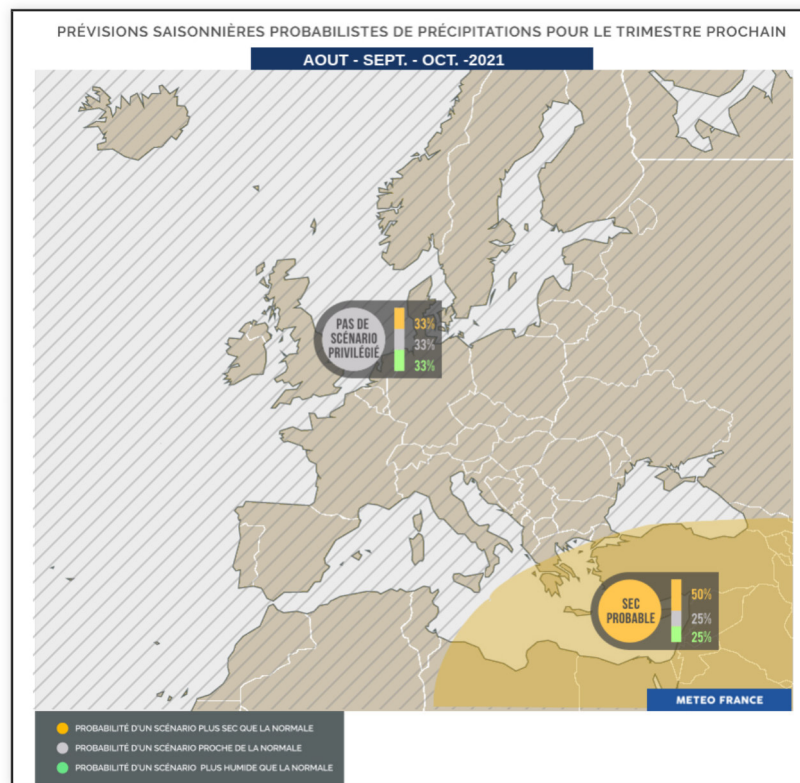
On the other hand, they point to a higher probability of warming in southern Europe, possibly linked to climate change and EA positive mode.



Synthesis map of probabilistic forecast for Europe. (c) Météo-France/DCSC/AVH

Synthesis map for Europe : Precipitation

Different signal according to the models except from the eastern Mediterranean to the Middle East where the dry signal is most likely.



Synthesis map of probabilistic forecast for Europe. (c) Météo-France/DCSC/AVH