Météo-France Seasonal Forecast Bulletin

MAY - JUNE - JULY 2021

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General synthesis : MJJ 2021

Good agreement between models in the tropics and globally in mid latitudes, in regions with strong signal. This is mainly linked to the impact of La Niña on global climate. On the North Atlantic, week signal in VP and SF, but the zonal regime weather seems to emerge.

A) Oceanic forecast :

- **ENSO : weakening La Niña, evolution toward neutral phase.**
- **IOD** : close to normal

B) Drivers :

- La Niña impacts still present

C) Atmospheric circulation :

- classical response to "La Niña" in the tropics (upward motion anomaly over the Maritime Continent, downward motion anomaly over Central Pacific). Negative PNA teleconnection to North America.

- over the North Atlantic and Europe : Zonal regime weather is more likely than normal

D) Most likely conditions :

- In the tropics, excess rainfall over northern South America but approaching normal over the Maritime Continent. Rains in deficit on the western United States, the Caribbean as well as around the Mediterranean Basin.

- **over Europe** : Warm scenario on the South-East of the domain, but no preferred scenario elsewhere . Wet scenario over Scandinavia and dry from Southern Europe to the Caucasus.

Next bulletin : scheduled on May 20th

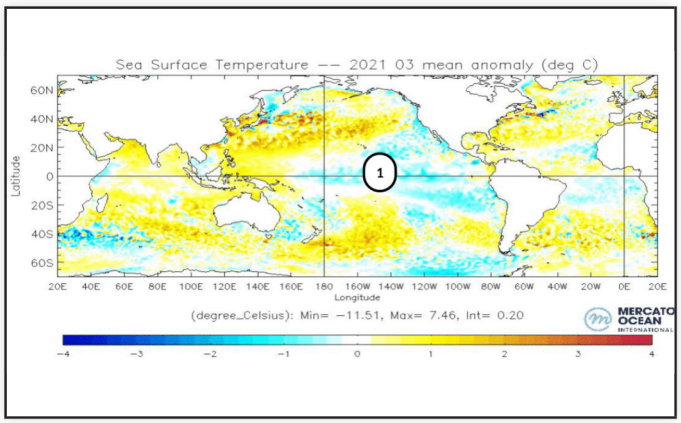
Oceanic analysis of March 2021 : SST anomalies

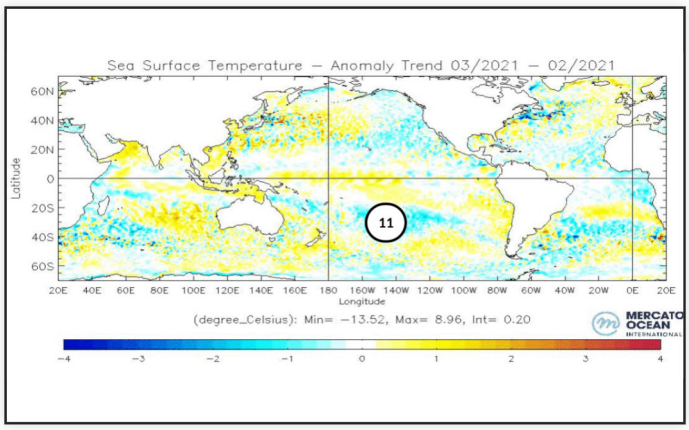
Current ENSO situation : La Niña

In the Pacific Ocean : The La Niña phenomenon is still present, but in attenuation. The cold anomaly in the central Pacific persists, but the warm anomaly in the South Pacific is much less marked.

In the Indian Ocean : As the south-eastern basin warms off Australia, SST conditions become neutral or slightly positive.

In the Atlantic Ocean : in the Northern hemisphere, the east/west contrast faded in March. In the Northern tropics, a sligth positive anomalie is maintened despite cooling.





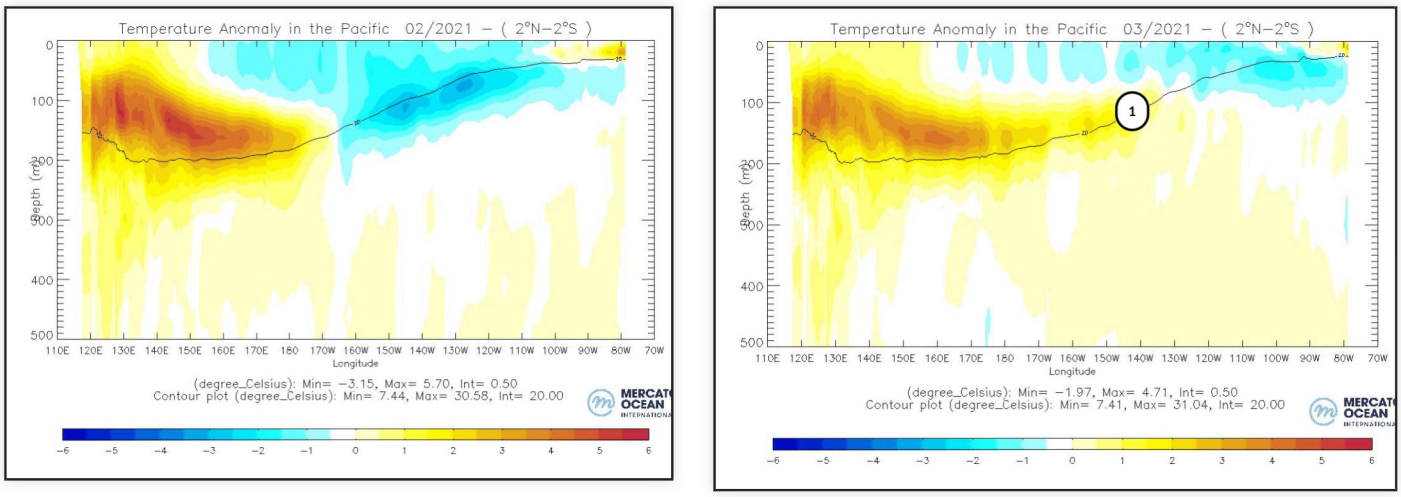
SST Anomalies and trend with the previous month (c) Mercator-Ocean

1 - La Nina cold anomaly
11 - clear attenuation of the hot anomaly

Oceanic analysis of March 2021 : Pacific vertical section

In subsurface, the conditions change. Partly east, the cold anomaly has almost disappeared. In the west, the hot reservoir is no longer strengthening.

Near the surface, conditions are now close to neutral.



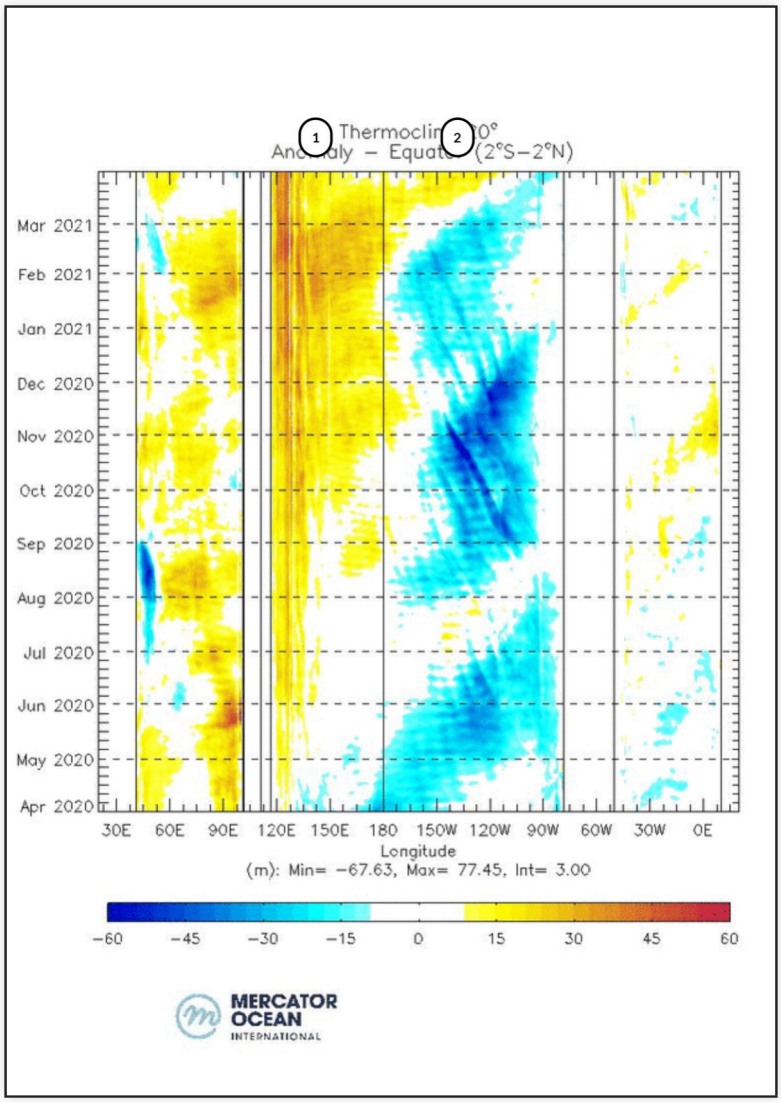
Ocean temperature anomalies in the first 500 meters of the equatorial Pacific basin, monthly average. (c) Mercator-Ocean

1 - No more cold anomaly.

Oceanic analysis of March 2021 : Hovmüller diagram of the 20°C isotherm

In the Pacific Ocean, end of the contrast in the subsurface. The cold anomaly has completely disappeared and the positive anomaly has decreased.

Neutral conditions in the Indian and Atlantic Oceans.



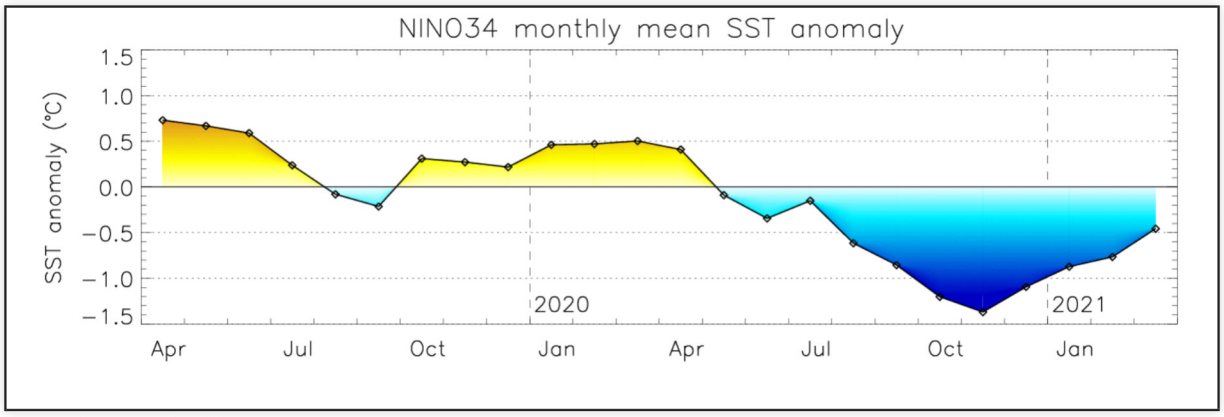
Evolution of the anomalies of depth of the thermocline (m) (materialized by the 20 ° C isotherm) (c) Mercator-Ocean

1 - Weakening warm anomaly in the west part
2 - No more cold anomaly in eastern Pacific

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

Nino3.4 index issued from Mercator Ocean PSYV4R2 analysis : -0.45 °C
(see BOM site for weekly values : http://www.bom.gov.au/climate/enso/monitoring/nino3_4.png)

Continued reduction of the negative anomaly, as foreseen last month.

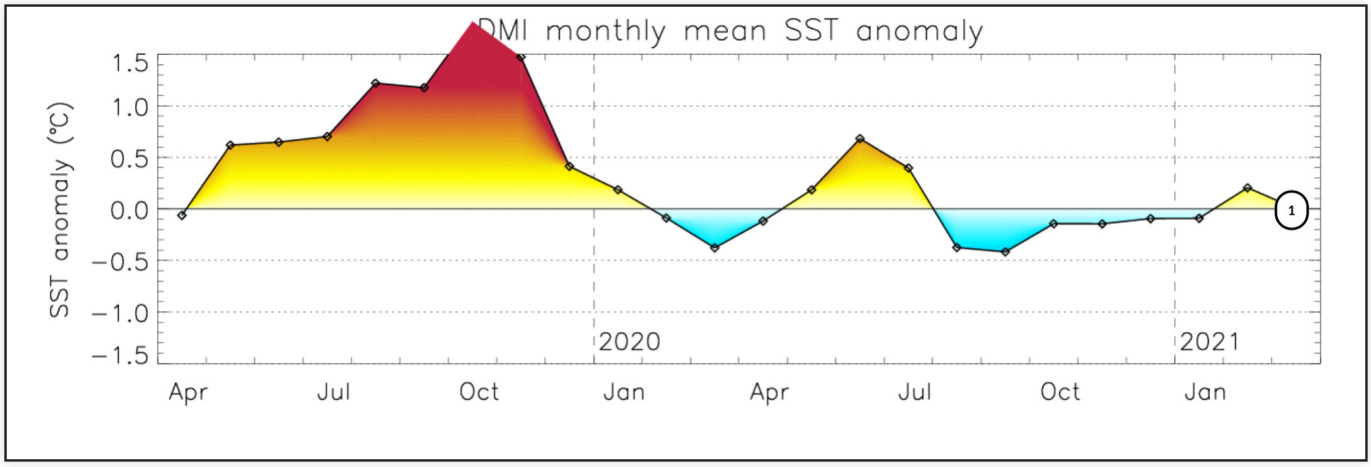


Evolution of SST in the NINO3.4 box (c) Mercator Ocean

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

DMI Index issued from Mercator Ocean PSYV4R2 analysis : 0°C
(see BOM site for weekly values : http://www.bom.gov.au/climate/enso/monitoring/iod1.png)

Near neutral conditions



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

1 - Near neutral conditions

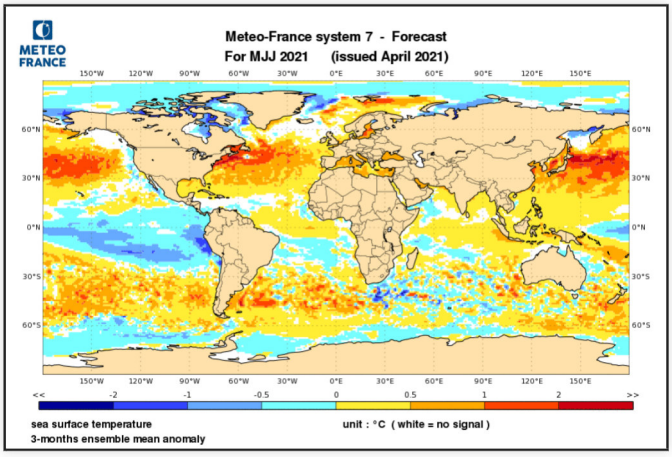
Oceanic forecast : SST anomaly

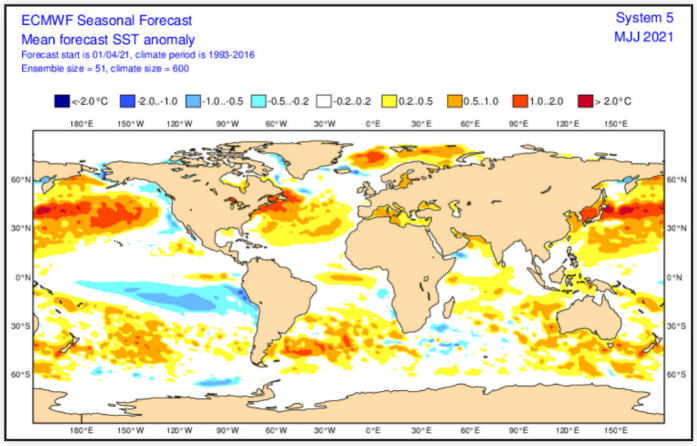
Good agreement between MF-S7 and ECMWF-SEAS5 in all oceans.

In the Pacific Ocean : the cold anomaly pattern associated to La Niña is still present in the forecasts. Its intensity is a little bit stronger in MF-S7 than in ECMWF-SEAS5. 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 : Very little contrast on the whole basin.

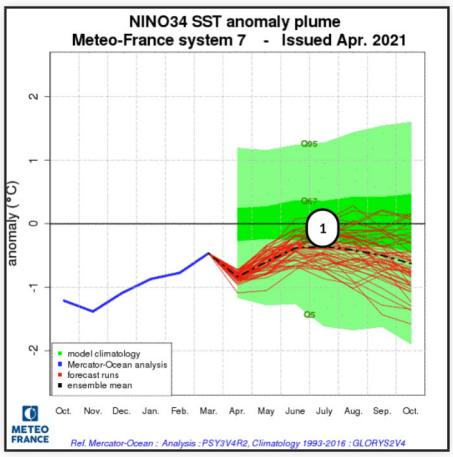
In the Atlantic Ocean : For both models, the warm anomaly in the North Atlantic decreases.

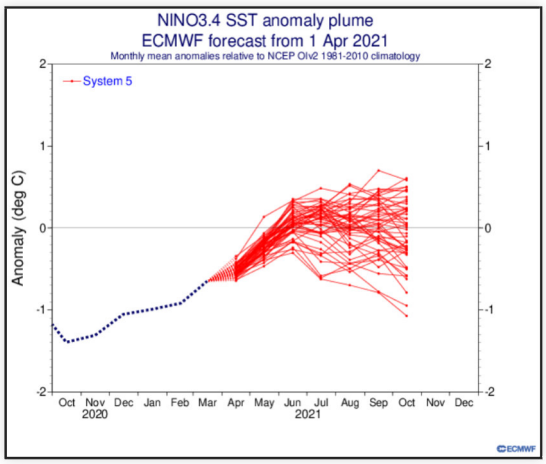




Oceanic forecast : NINO3.4 Plume diagrams

ECMWF-SEAS5 and MF-S7 : both models predict a gradual attenuation of the cold anomaly over the next months. The MF-S7 model generally predicts cooler anomalies than the model ECMWF-SEAS5.



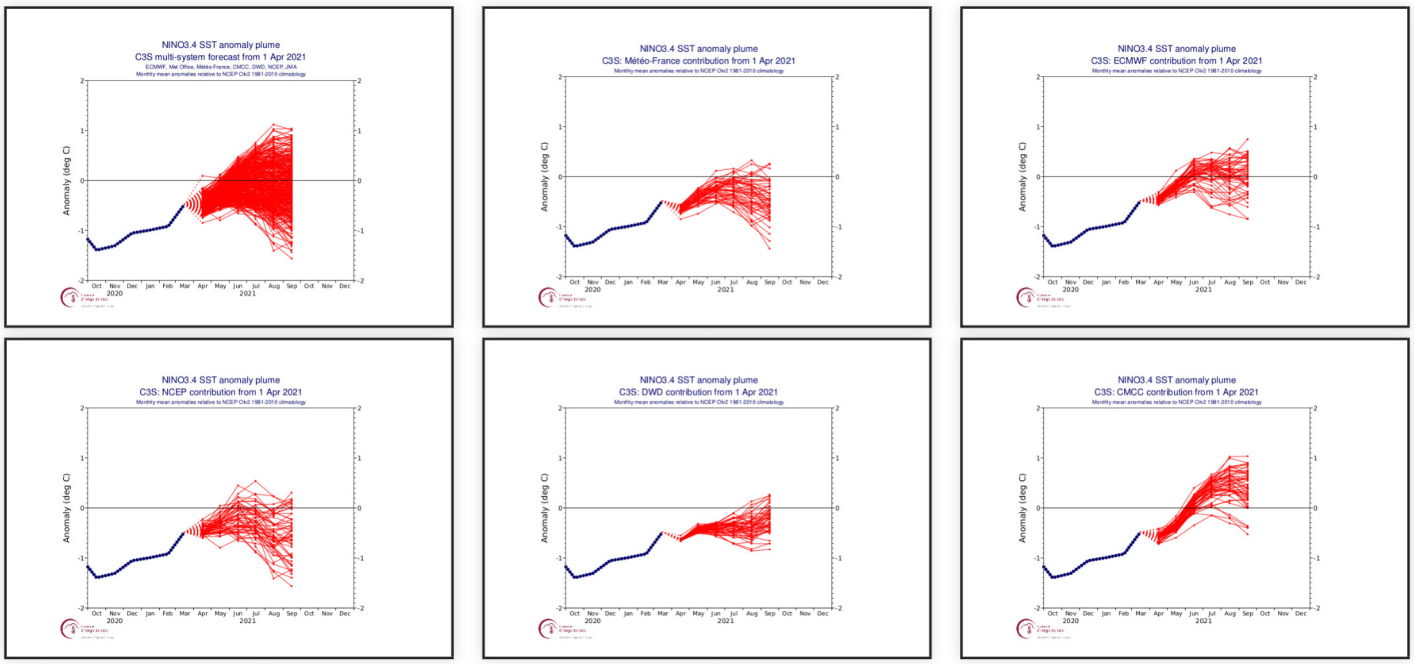


1 - Close to neutrality

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

All the models agree on a gradual warming, with however two trends. DWD, MF-S7 and NCEP remain negative while ECM-SEAS5, Met Office and CMCC warm more.

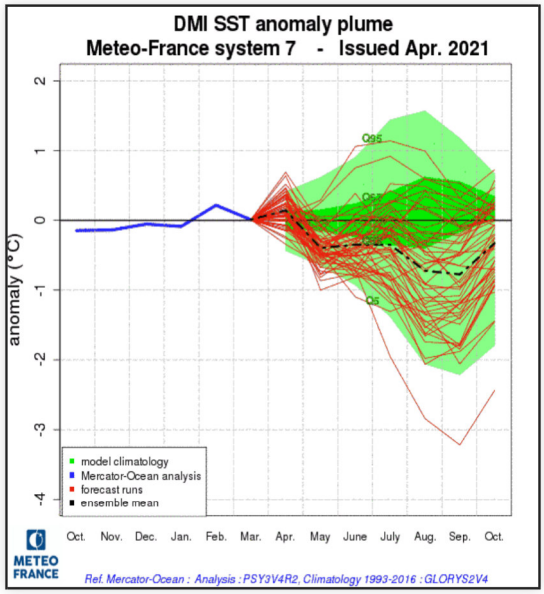
Expected Phase for the next three months : mitigation of the La Nina phenomenon and probable return close to neutral during MJJ quarter.

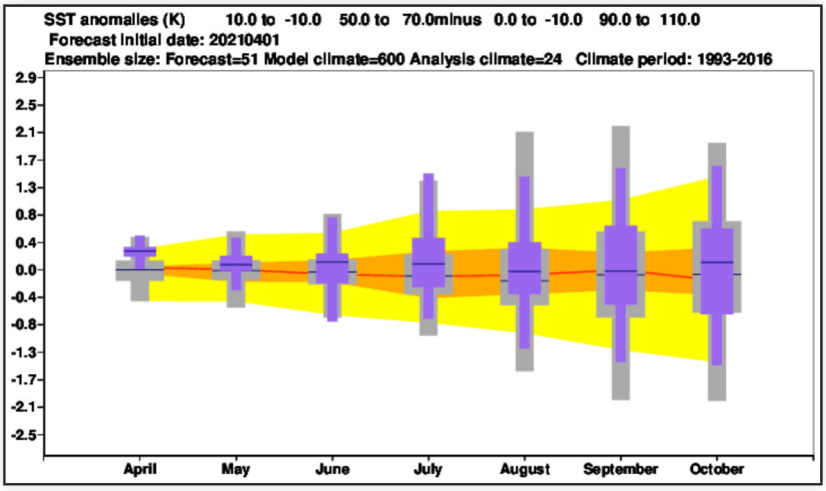


C3S plume diagrams re-scaled from the variance of observations for the period 1981-2010.

Oceanic forecast : Indian ocean - DMI evolution

Some differences between the two models: the DMI becomes negative during the period with MF-S7 while it remains neutral with ECM-SEAS5. But for both, the dispersion is great.

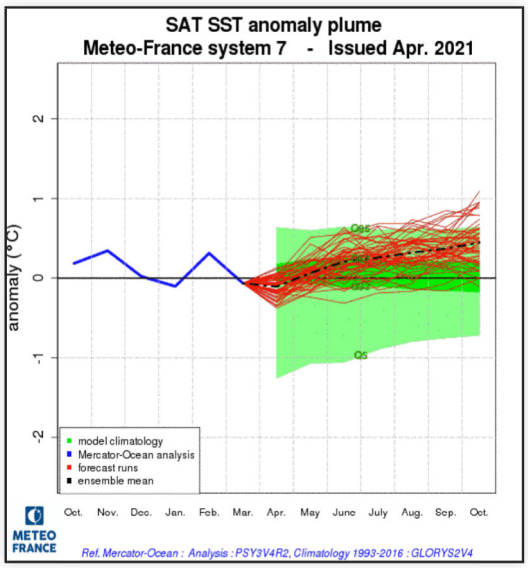


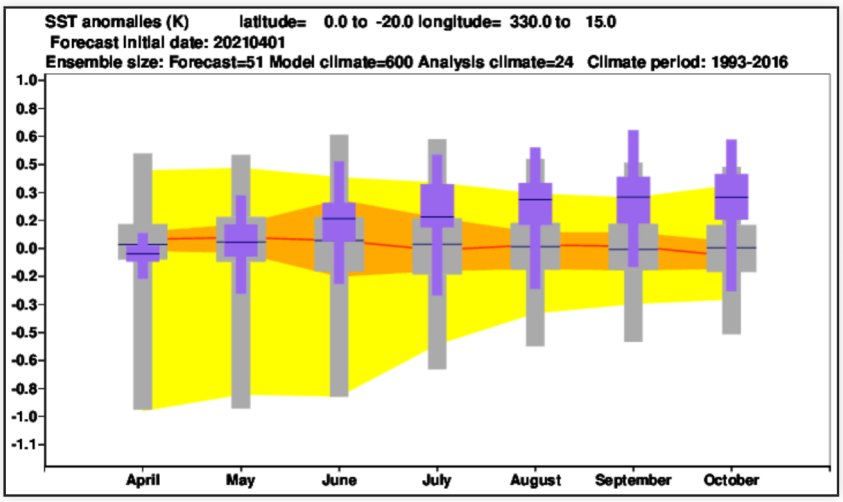


DMI index : analysis, forecasts and model climatology with MF-S7 on the left and ECM-SEAS5 on the right

Oceanic forecast : Atlantic ocean - SAT evolution

Both models predict a slight warming, which could persist beyond the next quarter.





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

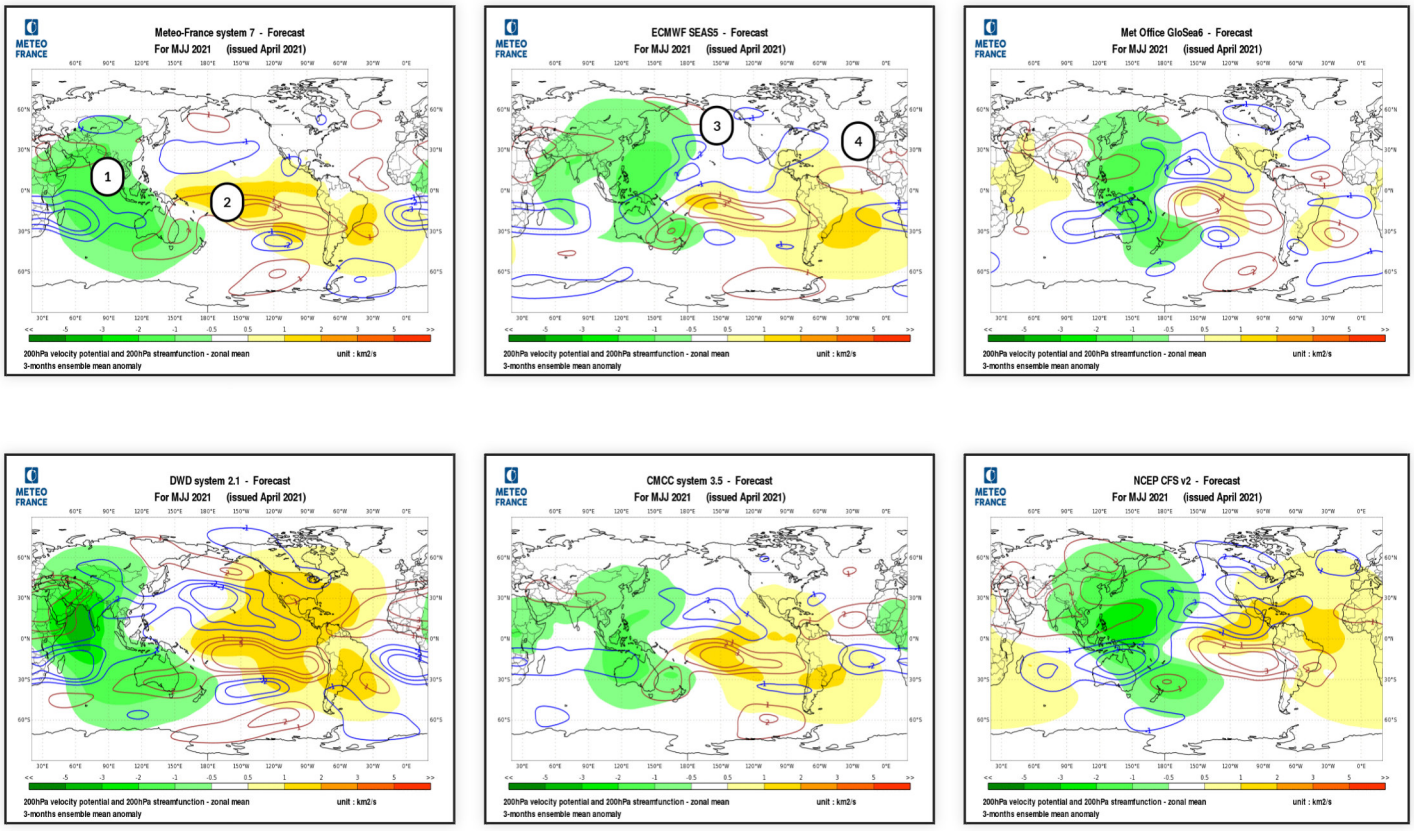
Atmospheric circulation forecasts : velocity potentiel and stream function at 200hPa

Good agreement between models in the tropics and globally in mid latitudes. On the North Atlantic week signal in VP and SF.

Velocity Potential : In connection with the La Nina situation, the models always foreseen a dipole in the Pacific-Indian zone, with upward motion anomaly over the Maritime Continent extending to the South East Asia and large downward motion anomalies over the Pacific. However, the intensity decreases, in connection with the attenuation of the Niña. Only the NCEP model extends the downward motion anomalies zone to Africa and the western Indian Ocean, and to western Europe.

Streamfunction : The quadrupole over the Pacific and Indian Oceans is still visible, but it is less marked than in previous months. Teleconnection to the negative PNA is also weaker.

In the North Atlantic, Most models indicate a positive SF between Guyana and West Africa. Further north, the signal is very weak.



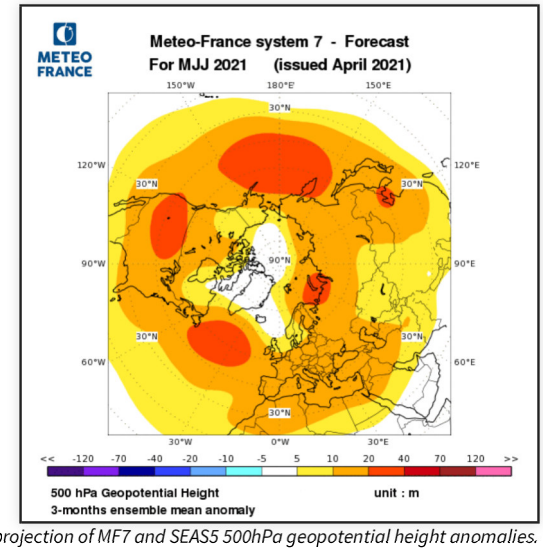
MF7,SEAS5, UKMO, DWD, CMCC and NCEP 200hPa velocity potential anomalies (color range, green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

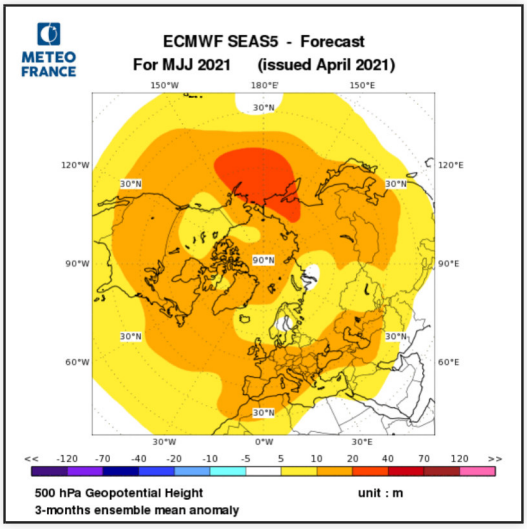
1 - VP : large area of upward motion anomaly
2 - VP : large downward motion anomaly
3 - SF : pattern of negative PNA
4 - SF : cyclonic circulation anomalies at 200hPa

Atmospheric circulation forecasts : 500 hPa Geopotential anomalies

Good agreement for the negative PNA, even if it weakens.

Over Eurasia, the two models have a similar scenario of positive Z500 anomaly, despite differences in the anomaly pattern. However, these postive anomalies at temperatures latitudes are partly due to climate change.



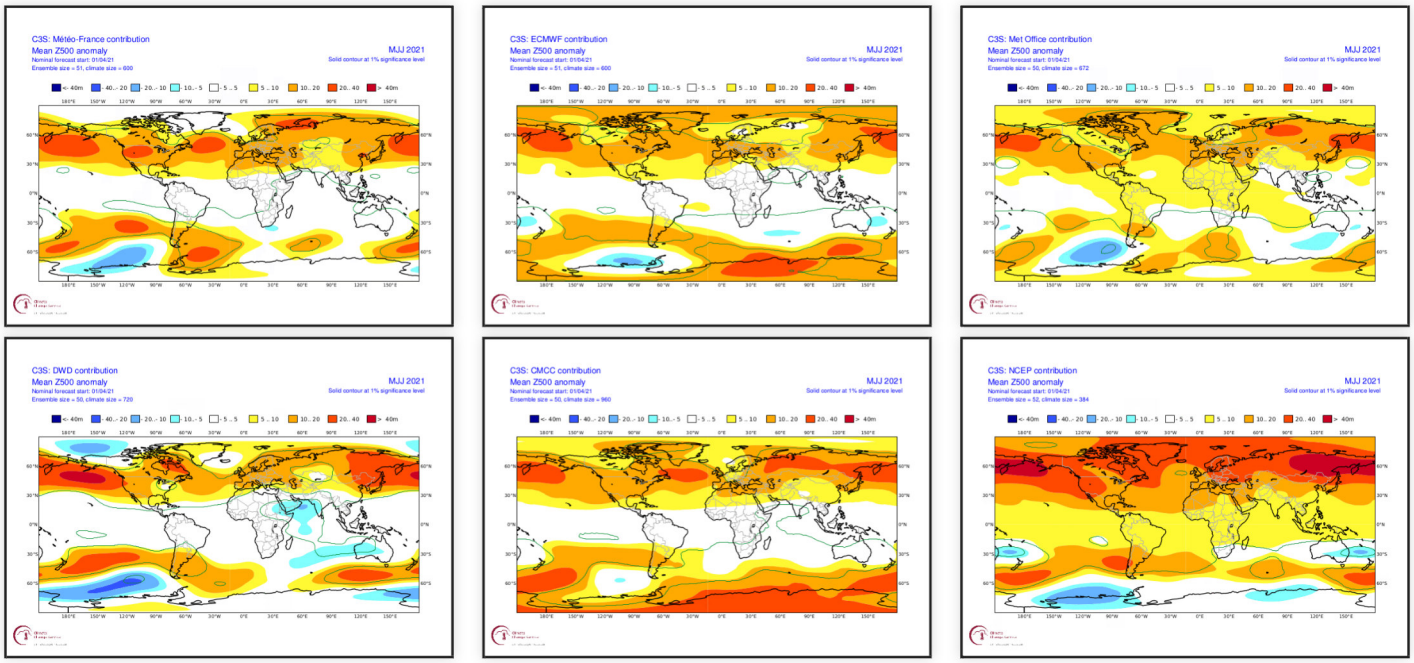


polar projection of MF7 and SEAS5 500hPa geopotential height anomalies.

Atmospheric circulation forecasts : Z500 anomalies in C3S models

All C3S models agree on a weakening negative PNA, as already seen on PV-FC200.

Over North Atlantic and Europe, the models tend to agree on a positive anomaly stretching for USA to Europe, and Eastwardly to Asia.

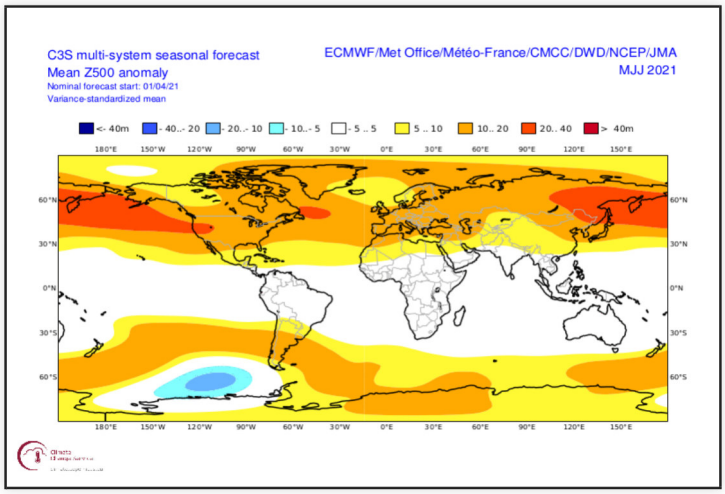


MF-S7, SEAS5, UKMO, DWD, CMCC and NCEP 500hPa geopotential height anomalies.

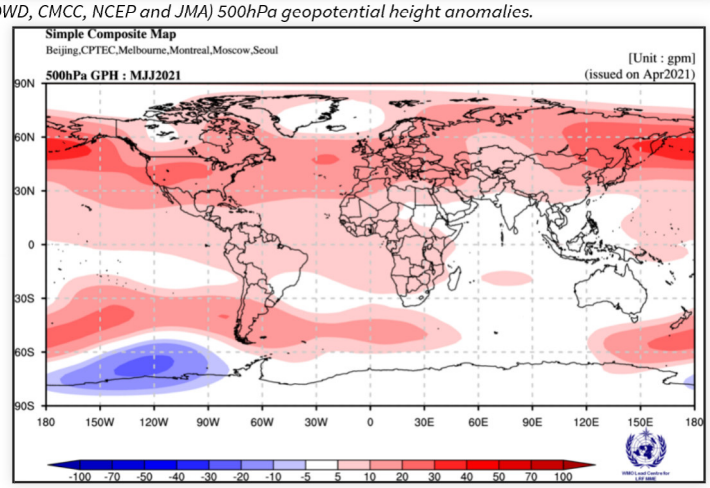
Atmospheric circulation forecasts : Z500 anomalies multi-systems

The two multi-models charts look similar for North Atlantic and Eurasia.

Almost all C3S models agree on a "NAO+" scenario.



C3S multi-models (MF-S7, SEAS5, UKMO, DWD, CMCC, NCEP and JMA) 500hPa geopotential height anomalies.

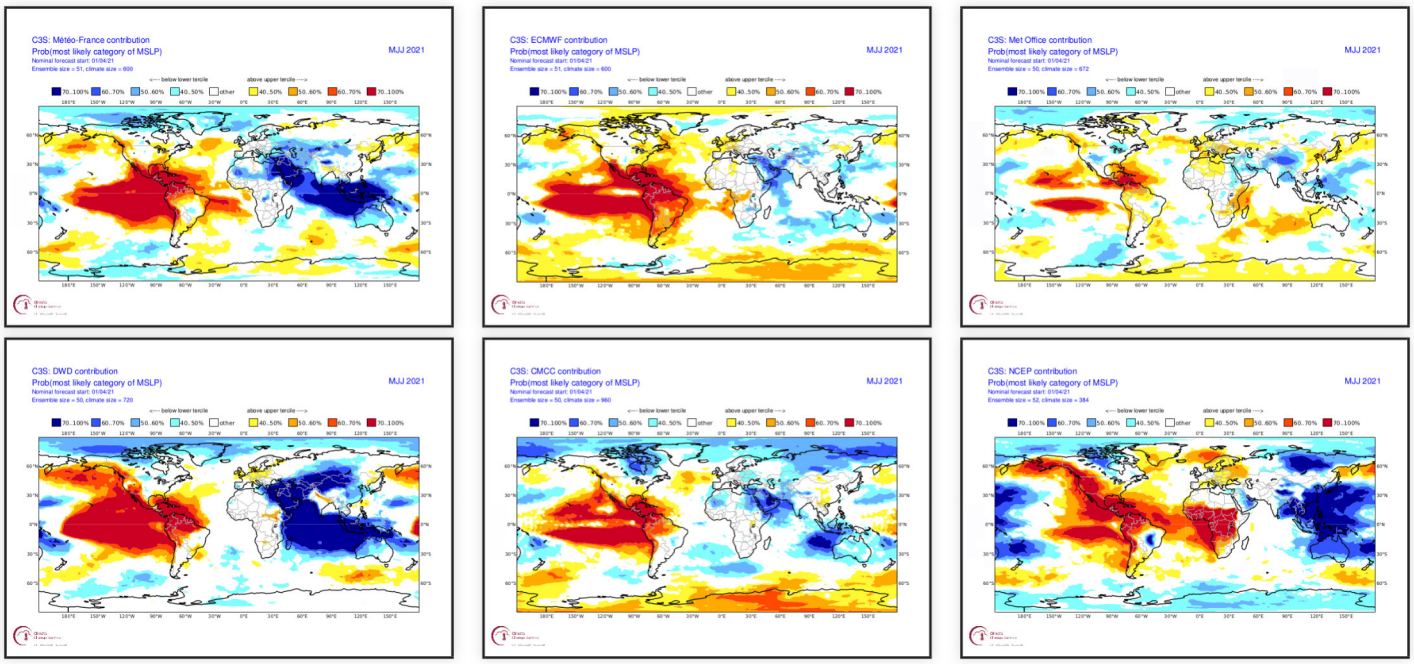


Others models of WMO multi-models 500hPa geopotential height anomalies.

Atmospheric circulation forecasts : MSLP probabilities

Strong dipole between on the one hand the Maritime Continent and the Indian Ocean and on the other hand the Pacific in the tropics, in links with the VP200 anomalies for three models (MF-S7, DWD et NCEP).For the others, the negative anomaly is very attenuated.

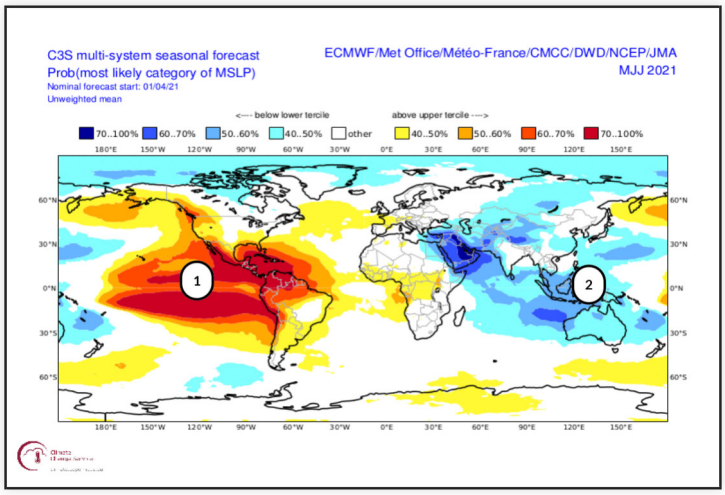
Most models predict a positive anomaly in the North Atlantic to Western Europe. No consensus emerges on Central Europe.



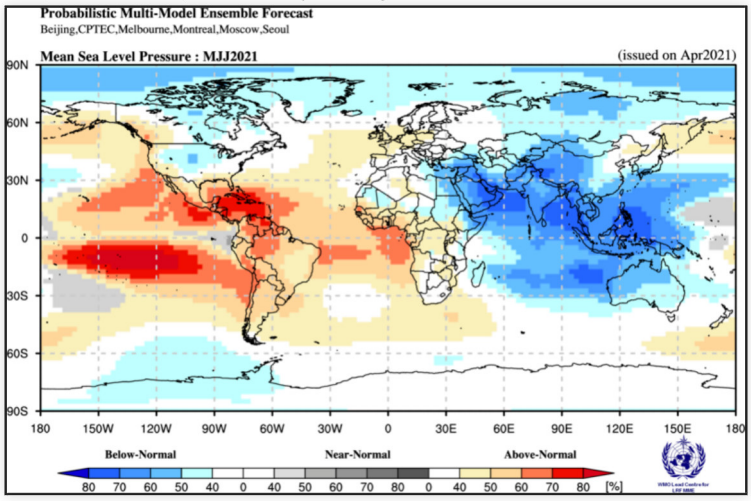
MF-S7, SEAS5, UKMO, DWD, CMCC and NCEP models probability maps.

Atmospheric circulation forecasts : MSLP probabilites multi-systems

Fairly good agreement between the two multi-models. High field likely over Western Europe. High probability of below normal pressures on the Arabian Peninsula.



C3S multi-models (MF-S7, SEAS5, UKMO, DWD, CMCC and NCEP) MSLP terciles probability.



Others models of WMO multi-models MSLP terciles probability.

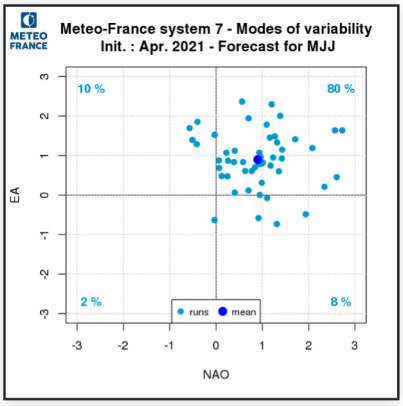
1 - High probable values related with La Nina situation
2 - low probable values related to La Nina

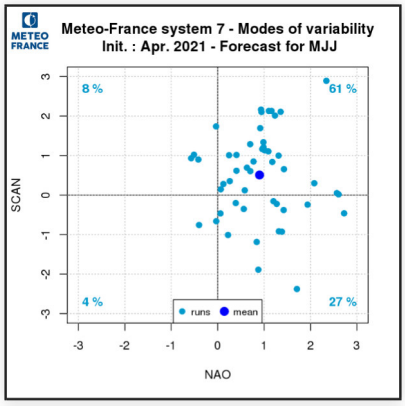
Modes of variability : forecast

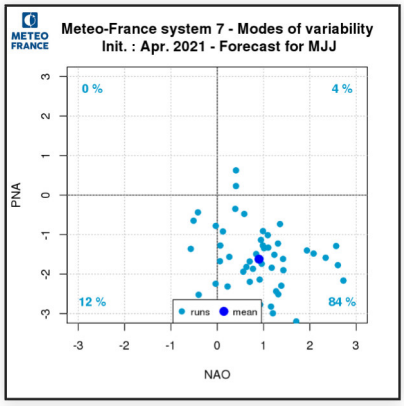
Unsurprisingly, almost all the individual members of each ensemble forecast negative PNA.

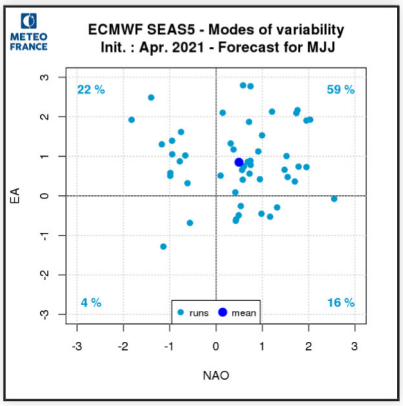
A positive NAO is probable (more than 75% of the ensemble, for the two models).

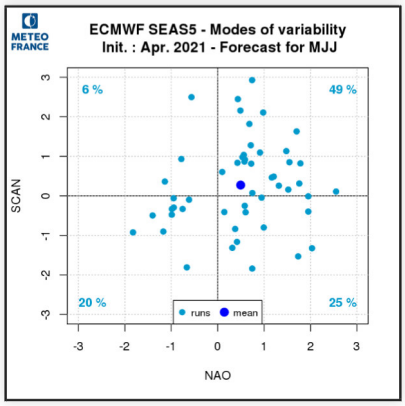
Positive EA and positive SCAN are the most likely

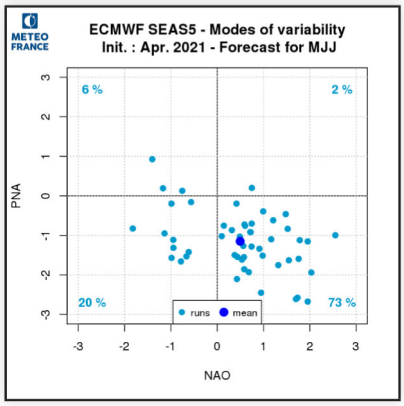








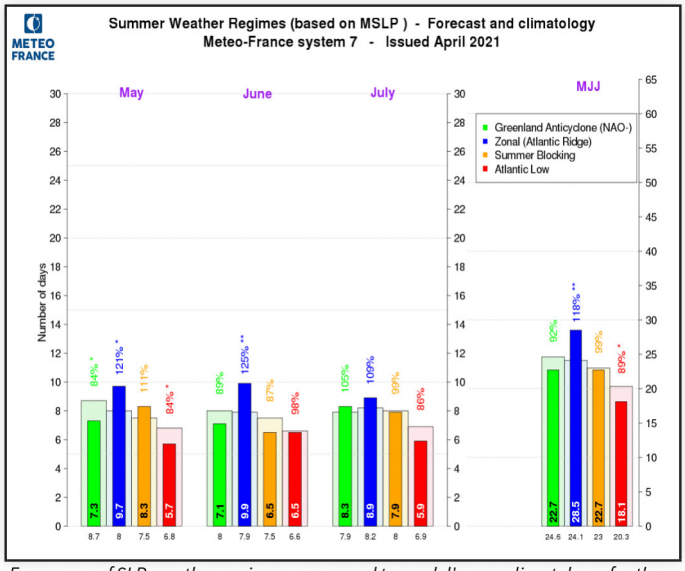


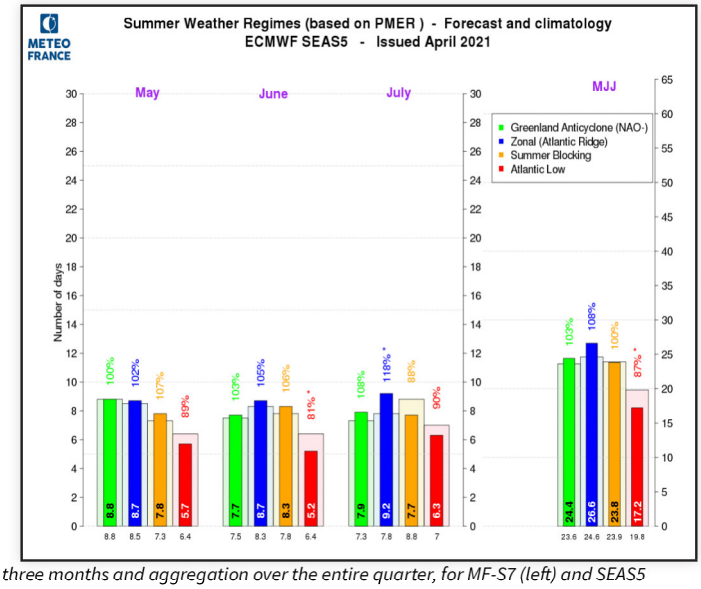


See the modes of variability patterns

Weather regimes : summer MSLP

Both models foreseen higher frequencies for the Zonal regime and lower frequency of Atlantic Low (consistent with the 3-month mean of MSLP).

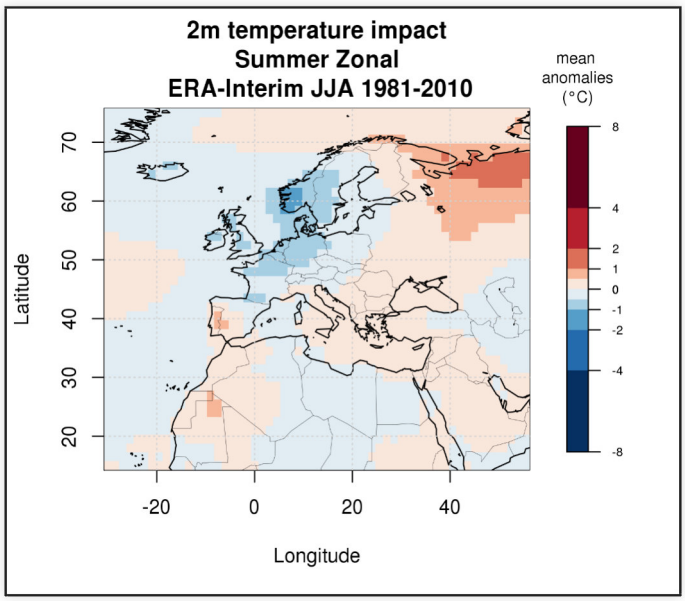


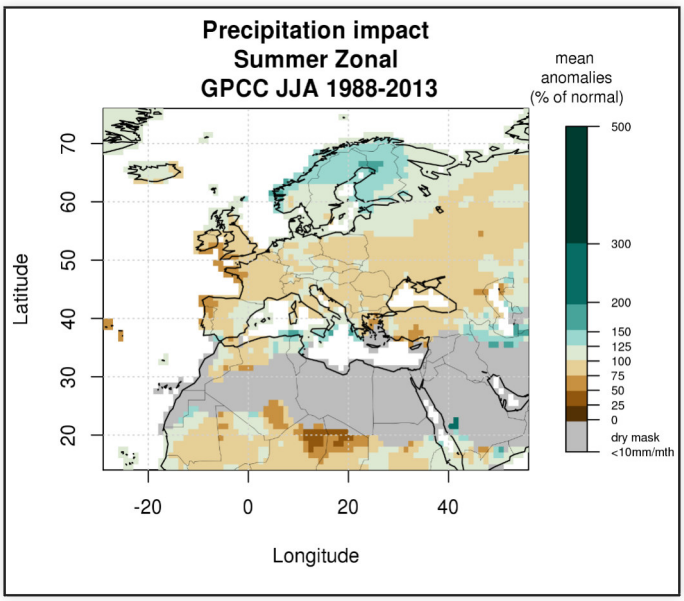


Frequency of SLP weather regimes, compared to model's own climatology, for the next three months and aggregation over the entire quarter, for MF-S7 (left) and SEAS5 (right).

Weather regimes : Impacts

Summer Zonal weather regime is favored





Impact of Summer Blocking weather regimes on temperature and precipitation. (ref ERA-interim 1981-2010)

Forecast of climatic parameters : Temperature probabilities

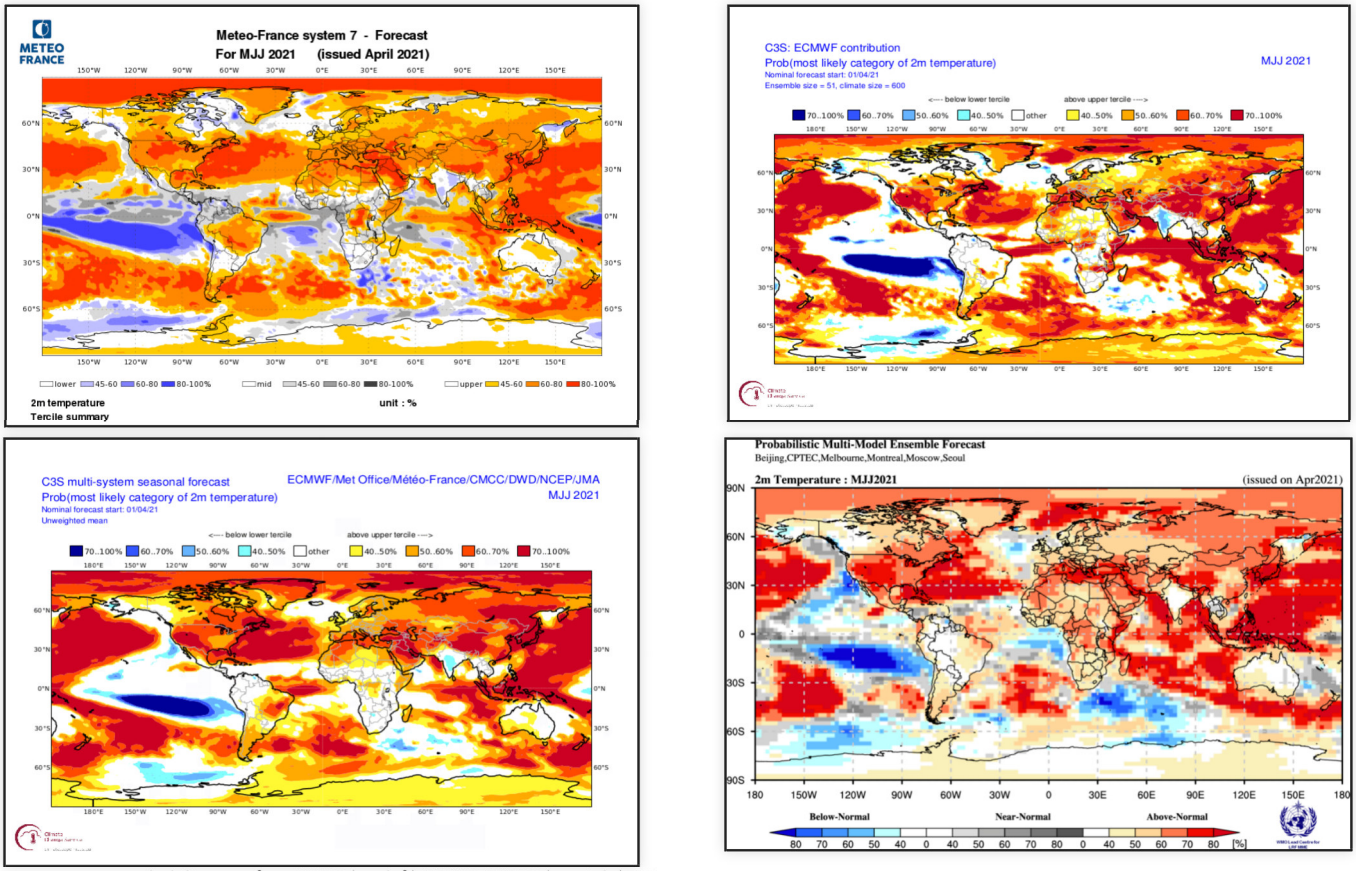
In a situation constrained by the La Niña in the Pacific and around.

- North America : strong signal in link with La Niña.

- South America : close to normal

- North of Africa and Middle East : consistent signal of warmer than normal

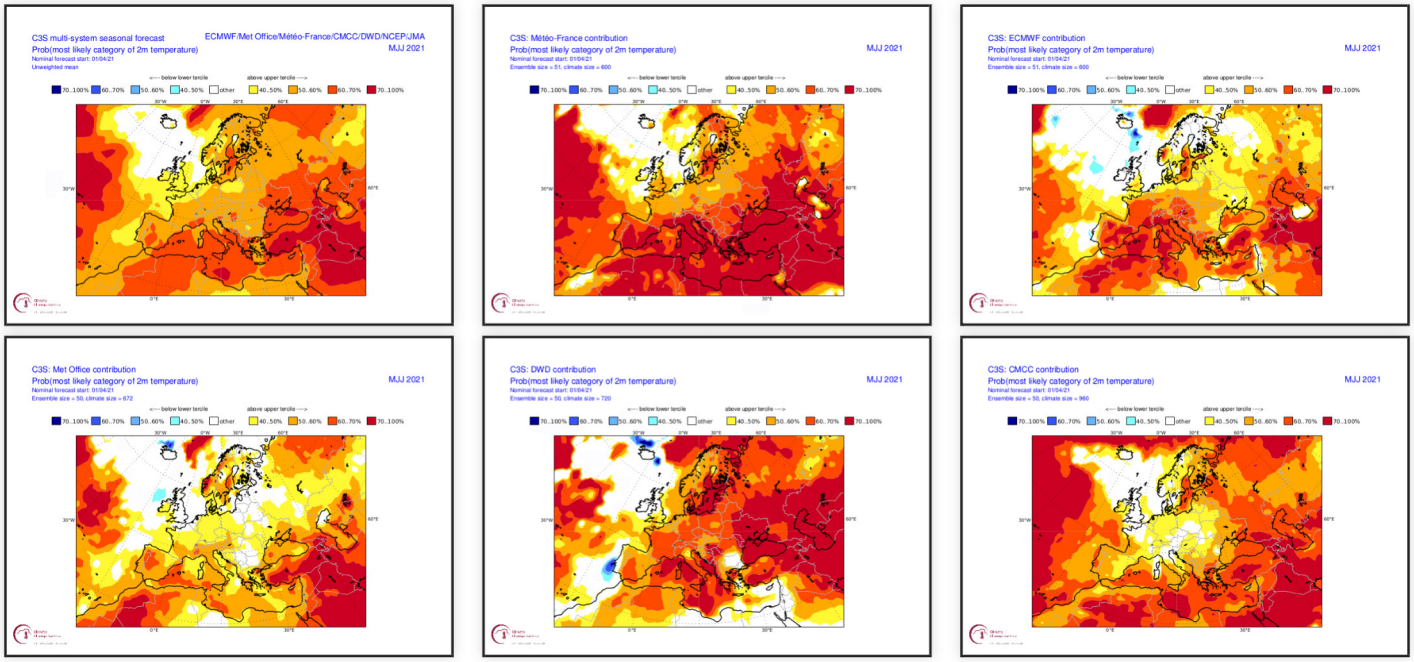
- Asia : warmer than normal with the exception of extreme south.



2m temperature probability map from MF-S7 (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

The "warmer than normal" scenario seems most likely across Europe, except from the UK to Iceland where no trend can be seen. However, uncertainties remain from Scandinavia to Central Europe.

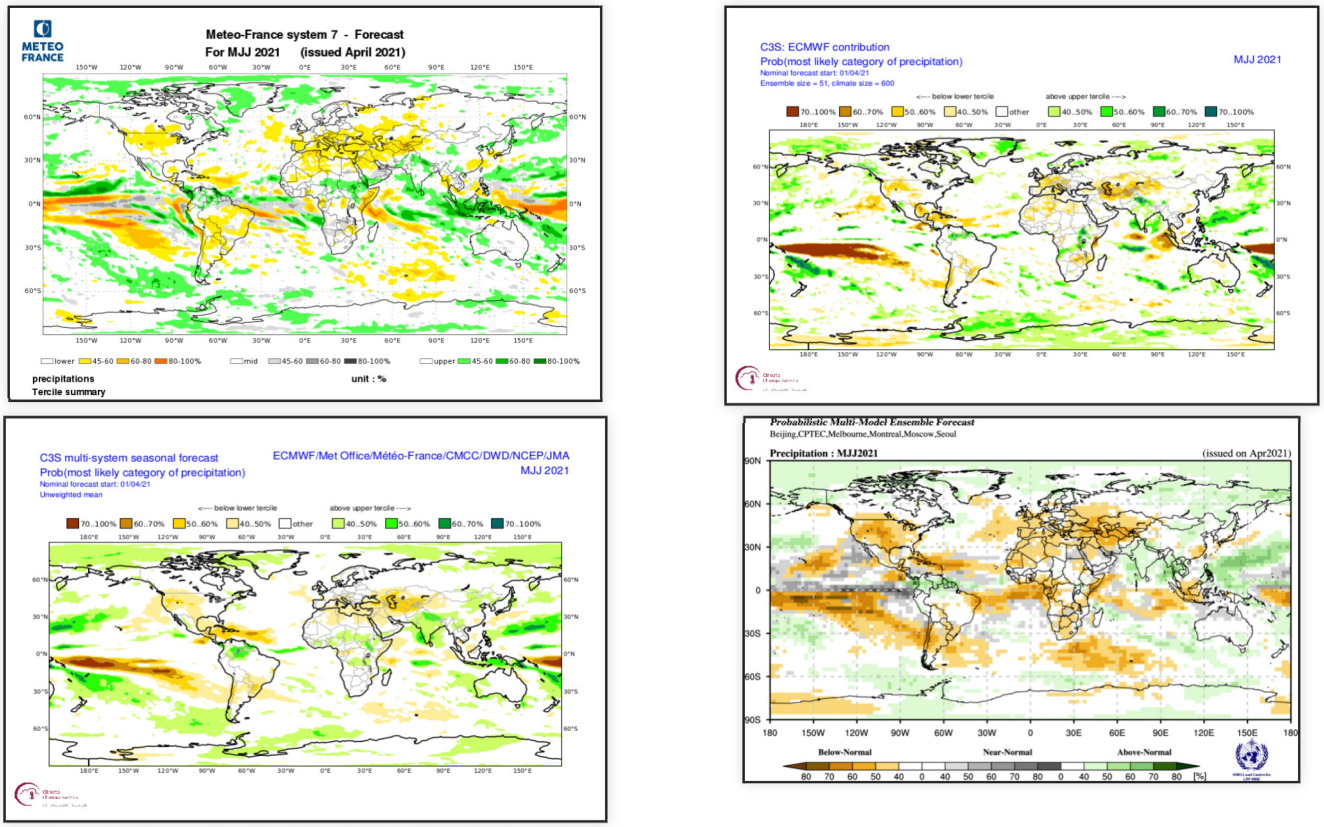


C3S multi-models probability map (top left) and MF-S7, ECMWF-SEAS5, UKMO , DWD, CMCC models.

Forecast of climatic parameters : Precipitation

Thanks to La Niña, models are consistent in the tropics and up to mid-latitudes over North and South America, but also over South Asia (wet pattern). The main divergence is over the Maritime Continent, where MF-S7 is much wetter than ECMWF-SEAS5.

Over Middle East, a "drier than normal" pattern is clearly foreseen by the models.

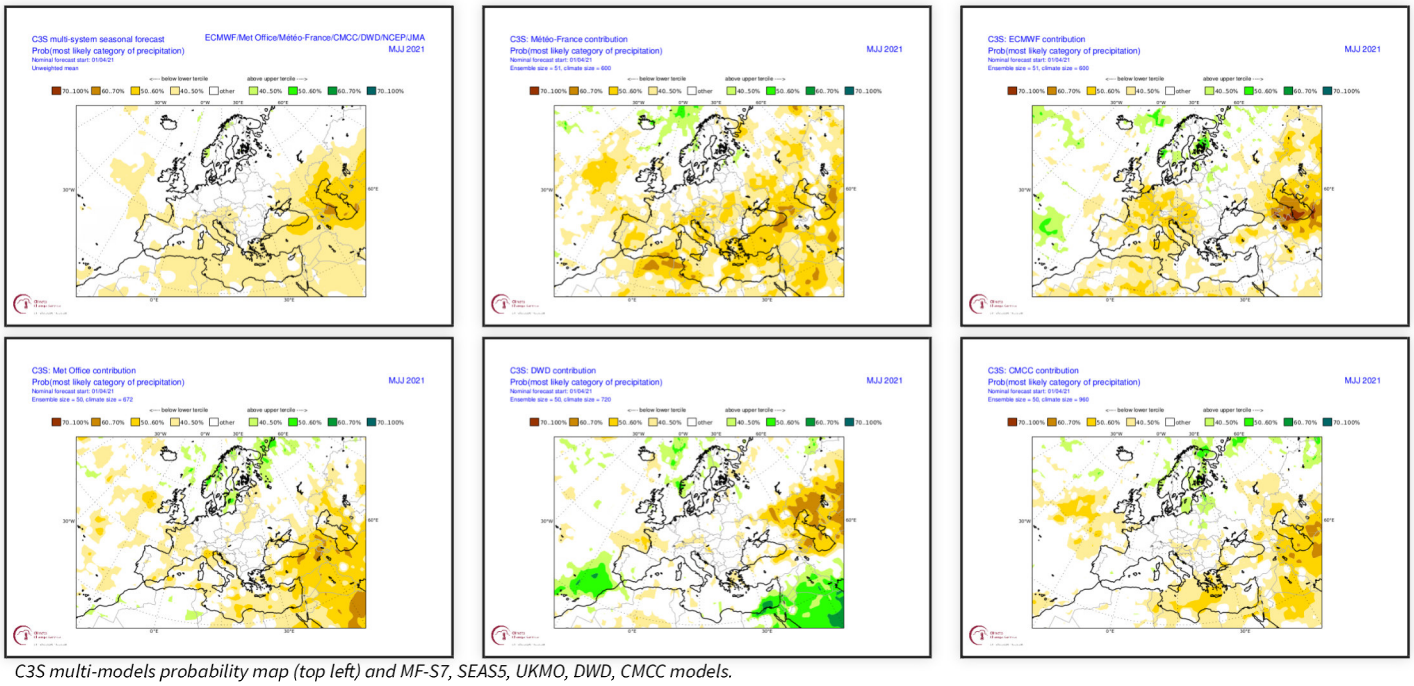


precipitation probability map from MF-S7 (top left), ECMWF-SEAS5 (top right), C3S multi-models (bottom left) and others models of WMO multi-models (bottom right)

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

A "drier than normal" scenario dominates from the Atlantic to the Caspian Sea, with nuances: strong signal around the Caspian Sea, more variable elsewhere.

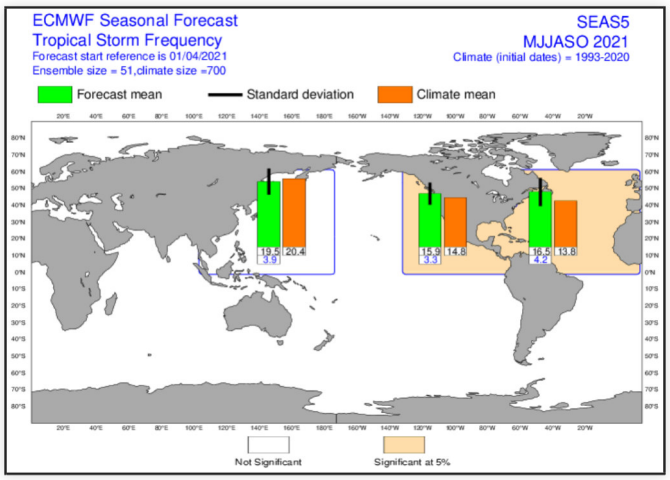
No scenario emerges in the North of Russia.

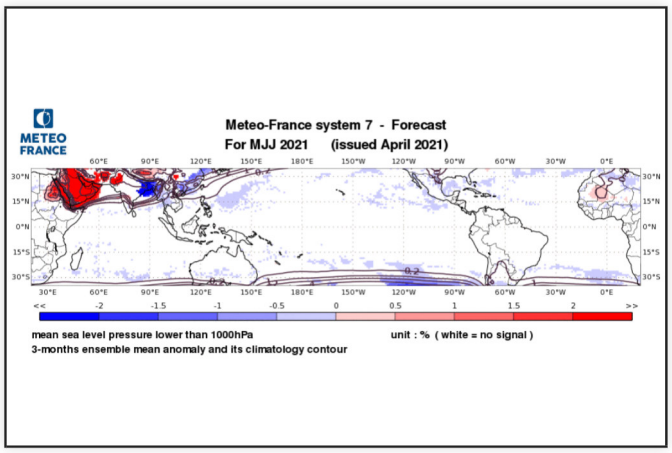


C3S multi-models probability map (top left) and MF-S7, SEAS5, UKMO, DWD, CMCC models.

Forecast of climatic parameters : Tropical Storm Frequency

The cyclone risk is likely to increase in eastern Pacific and Atlantic





Synthesis map for Europe : Temperature

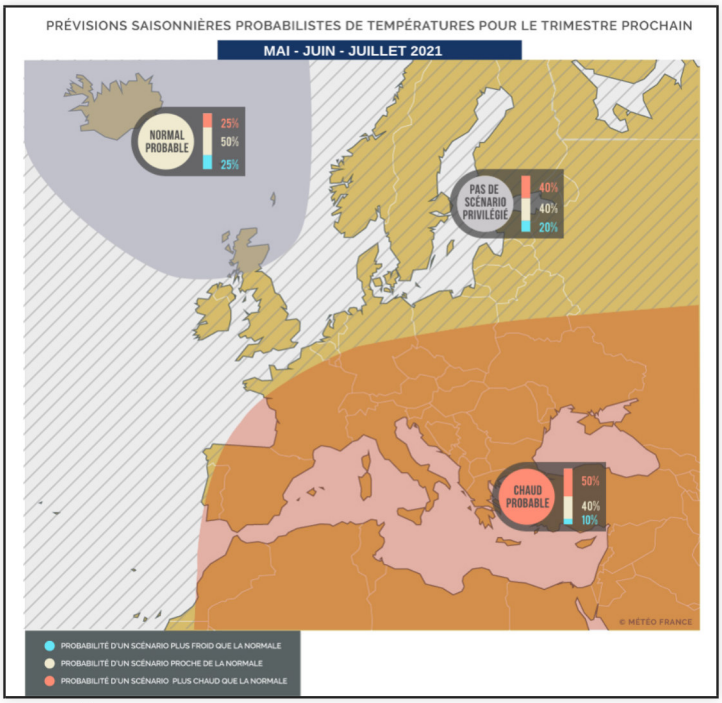
We take into account the C3S 's scenario of a dominant zonal regime weather.

As a result :

- the regions of the Mediterranean basin should experience warmer than normal temperature,

- form the north UK to Iceland, the scenario would be normal,

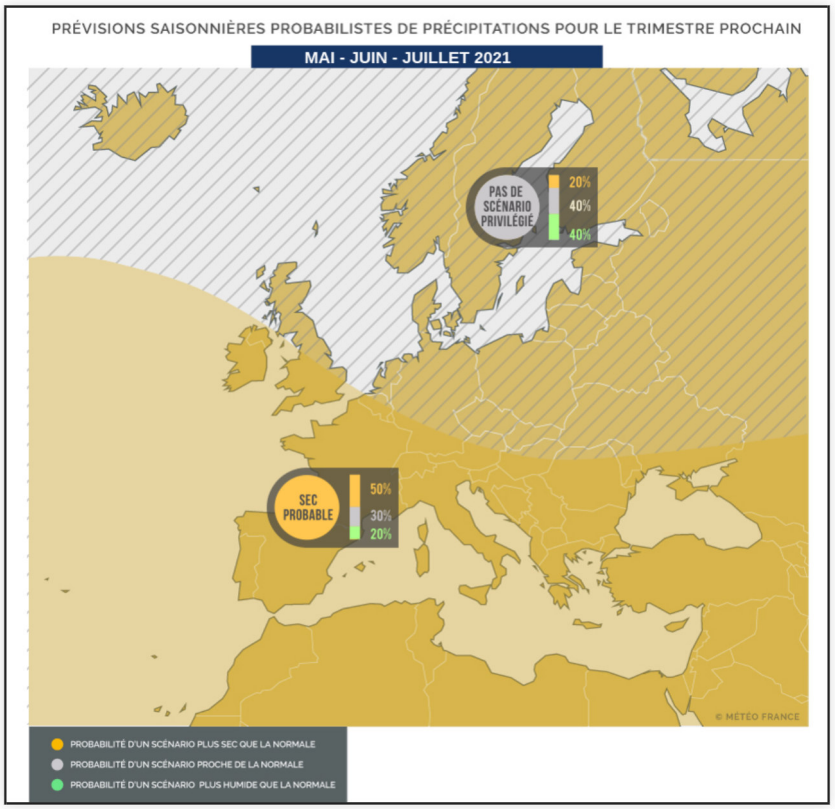
- no scenario elsewhere



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

Synthesis map for Europe : Precipitation

No emerging scenario, between normal and wet, in the northern countries and a driest one in southern Europe in connection with zonal regime weather.



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