Météo-France Seasonal Forecast Bulletin

MAY - JUNE - JULY 2020

Table of Content

General synthesis : MJJ 2020

A) Oceanic forecast :

- **neutral ENSO situation** for the coming 3 months. Cold anomaly over the southeastern Pacific. Warmer than normal elsewhere.

- **IOD close to neutral** in the context of a general increase of SST north of 20°S. The Indian Ocean will still be the main active area for the next 3 months.

- **South tropical Atlantic** still significantly warmer than climatology. ECMWF forecasts a cold water tongue but not MF7.

B) Atmospheric circulation :

- Upward velocity potential over the Indian Ocean Pacific. Downward potential velocity over Western Pacific.

- Little signal over the northern hemisphere. High geopotential values from Siberia to Bering Strait.

- Weak and inconsistent signal over the North Atlantic and Europe.

=> Most likely conditions :

- Wet conditions over Maritime Continent and Australia. Dry over southern Africa and Madagascar.

- Beginning of African monsoon below normal over the Gulf of Guinea

- **over Europe** : no scenario over western and northwestern Europe. Rather hot on the rest of the continent. Little signal for the precipitation.

Next bulletin : scheduled on May 20th

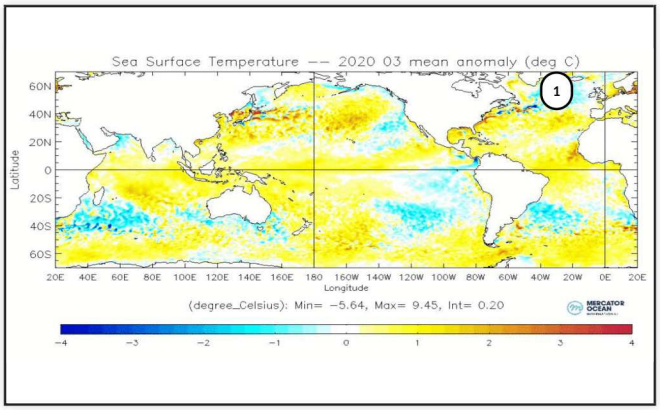
Oceanic analysis of March 2020 : SST anomalies

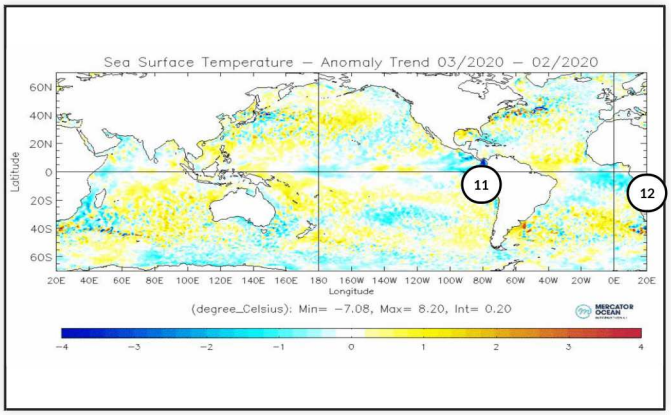
Current ENSO situation : neutral conditions.

The tropical oceans present weak anomalies, generally warm with the exception of the eastern Pacific where the cooling in progress leads to a weak cold anomaly.

The Indian Ocean rebalanced in March. The weak warm anomaly is uniform in the tropical band.

Also returning to values slightly above normal in the Atlantic, but the variations are climatologically small.

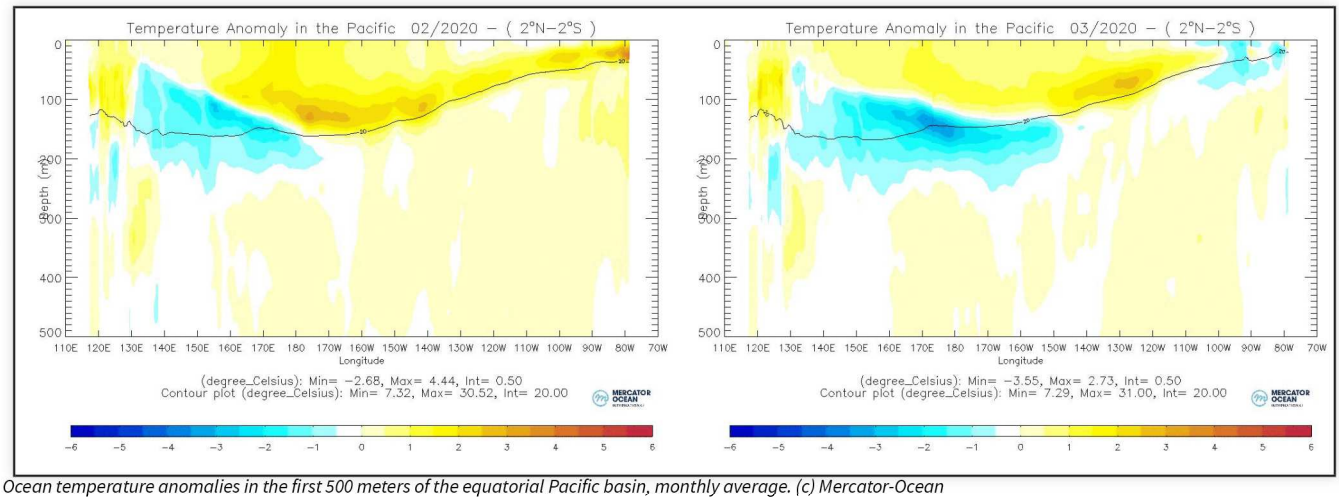




SST Anomalies and trend with the previous month (c) Mercator-Ocean
1 - slight strengthening of the cold anomaly
11 - strong upwelling in March
12 - quite strong cooling in March

Oceanic analysis of March 2020 : Pacific vertical section

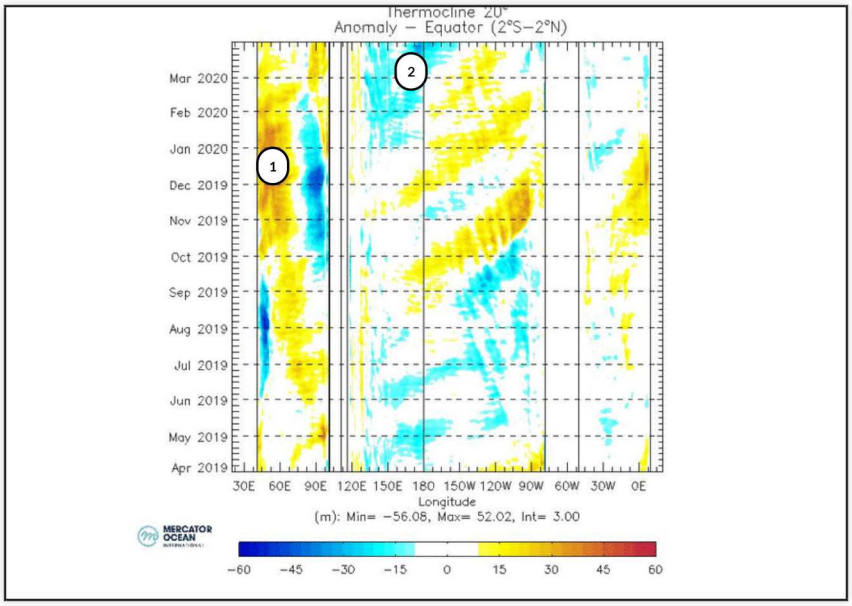
the cold anomaly between 100 and 200m deep has strengthened and spread to the east. It can be a precursor of a later evolution towards a Nina situation



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

Oceanic analysis of March 2020 : Hovmüller diagram of the 20°C isotherm

In the Pacific, a deep cold water reservoir seems to set up in the western part of the basin.

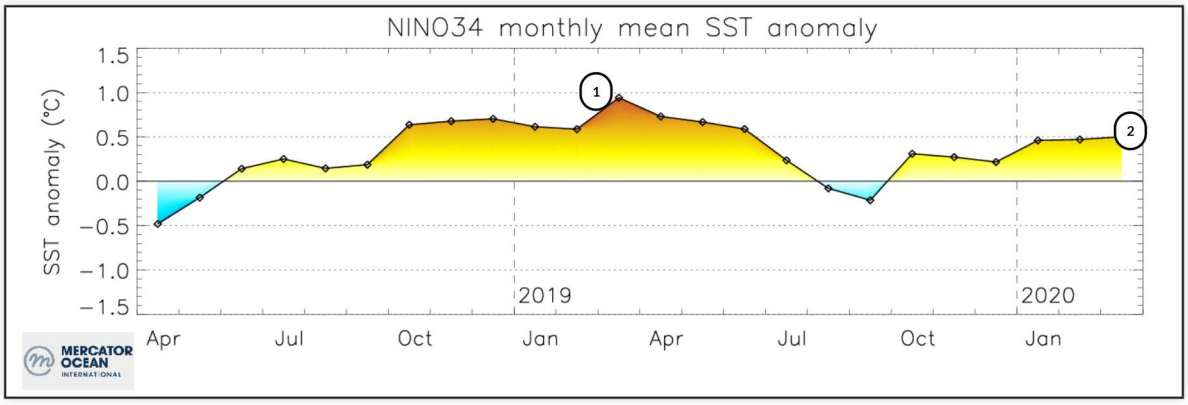


Evolution of the anomalies of depth of the thermocline (m) (materialized by the 20 ° C isotherm) (c) Mercator-Ocean
1 - Strong IOD of the end of 2019
2 - Establishment of a deep cold water reservoir in the western part of the Pacific basin

Oceanic analysis of March 2020 : Pacific Ocean - Nino3.4 index history

Nino3.4 index issued from Mercator Ocean PSYV4R2 analysis : +0.5 °C
(see BOM site for weekly values : http://www.bom.gov.au/climate/enso/monitoring/nino3_4.png)

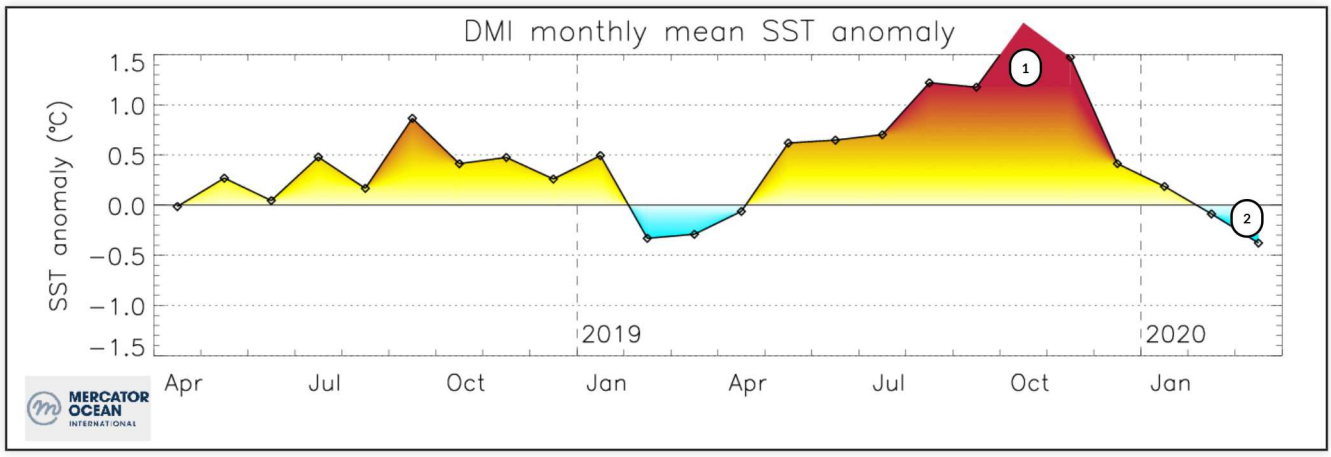
Weak warm anomaly in Nino3.4 box. The index is just below El Niño threshold. the SST anomaly pattern along the equator is not compatible with an El Niño event. ENSO remains in neutral conditions.



Evolution of SST in the NINO3.4 box (c) Mercator-Ocean
1 - Weak El Niño during winter 2018-2019 and spring 2019
2 - Current neutral conditions

Oceanic analysis of March 2020 : Indien Ocean - DMI index history

DMI Index issued from Mercator Ocean PSYV4R2 analysis : -0.4°C
(see BOM site for weekly values : http://www.bom.gov.au/climate/enso/monitoring/iod1.png)

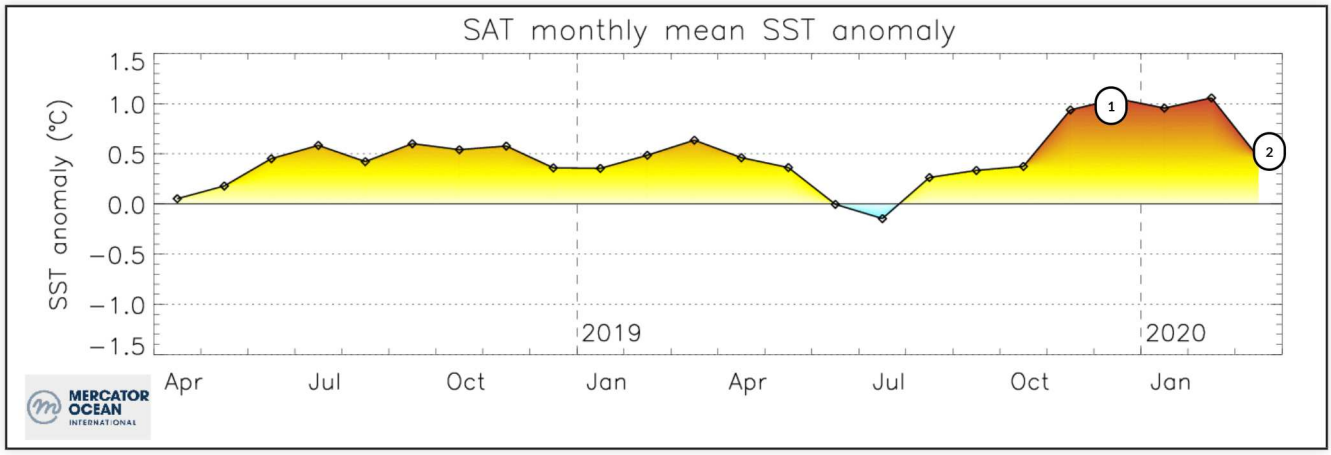


Evolution of SST in the DMI box (c) Mercator-Ocean
1 - IOD on record in october
2 - Weak negative anomaly in March

Oceanic analysis of March 2020 : Atlantic Ocean - SAT index history

SAT index issued from Mercator Ocean PSYV4R2 analysis : +0.5°C

This positive anomaly is still a strong deviation from normal.



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

1 - Very strong deviation from normal
2 - Current value is still a strong deviation from normal

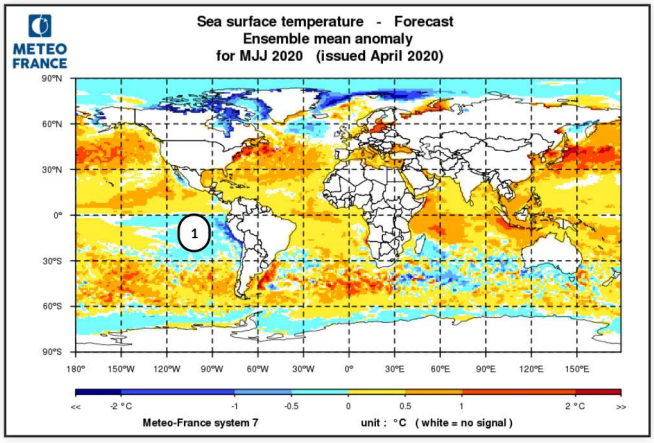
Oceanic forecast : SST anomaly

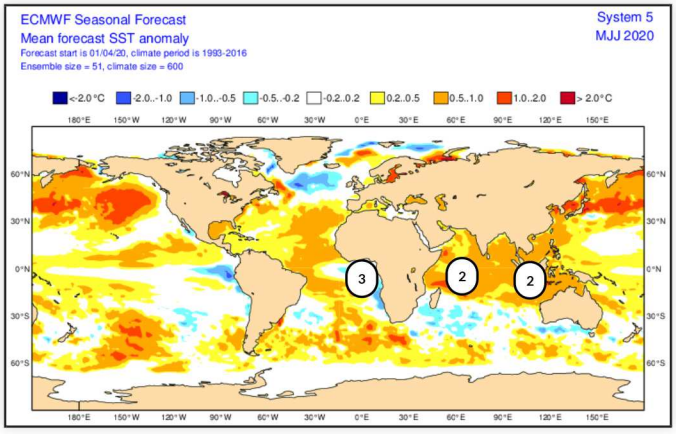
Generally good agreement between MF-S7 and ECMWF-SEAS5 except for south tropical Atlantic and south tropical Pacific oceans

In the Pacific Ocean : the cold anomaly over the southeast quarter should persist (it is more extended with MF-S7 than SEAS5). Elsewhere the ocean is expected to be warmer than normal. The average anomaly over the Nino3.4 box, straddling the equator, should be close to zero.

In the Indian Ocean : Generalized warm anomaly forecasted north of 30°S. Very warm anomlies are forecasted along the equator, in the western basin, north of Madagascar, and in the eastern basin near Indonesia.
Colder than normal south of 30°S.

In the Atlantic Ocean : Generally warmer than normal except in the south of Iceland in the "cold blob" area.
ECMWF deploys a cold water tongue from Namibia to the equator, while MF7 predicts a hot anomaly over the entire area.
We find in the C3S models all the intermediate options between these two extremes.

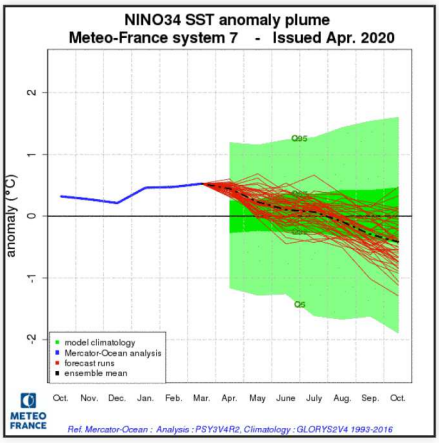


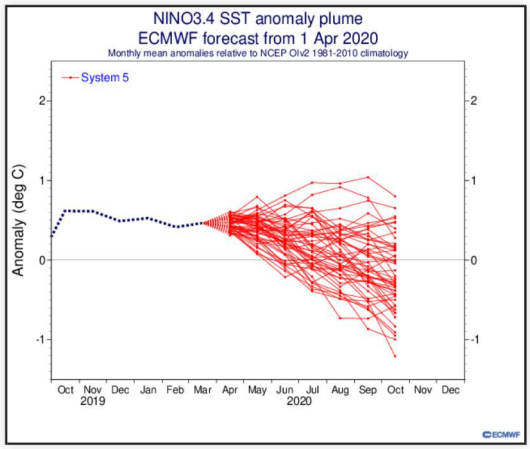


1 - Cold anomaly more extended than with ECMWF
2 - very hot anomaly
2 - very hot anomaly
3 - cold water tongue

Oceanic forecast : NINO3.4 Plume diagrams

The anomalies along the equator in the Pacific will decrease in the coming months and should become negative during the summer. However, the values remain low and Nino conditions are expected to be neutral for the next 3 months.

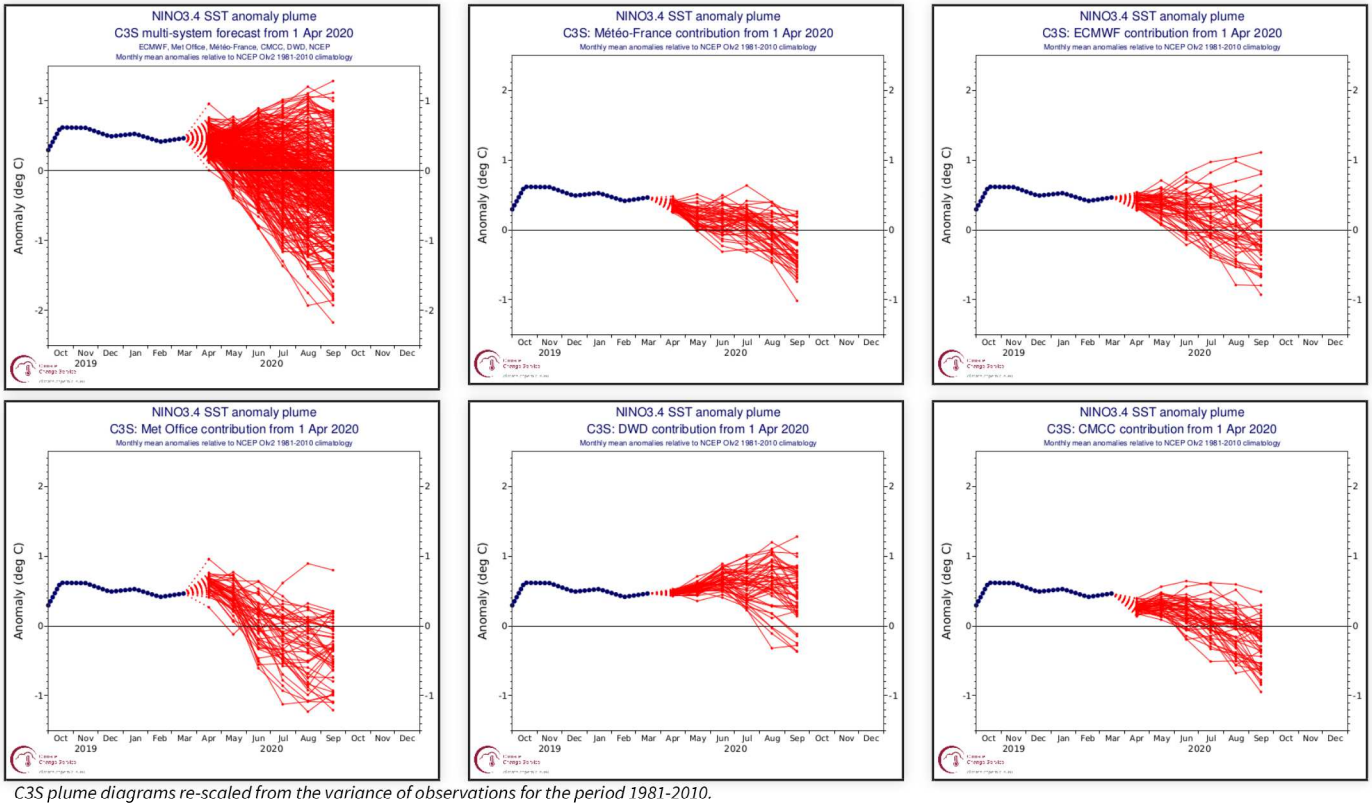




Oceanic forecast : C3S Nino3.4 re-scaled plume diagrams

Good agreement between the models, except DWD which is the only one to maintain weak positive anomalies in the long term. Most members forecast a weak decreasing anomalie. Neutral El Nino conditions are most likely for the coming months.

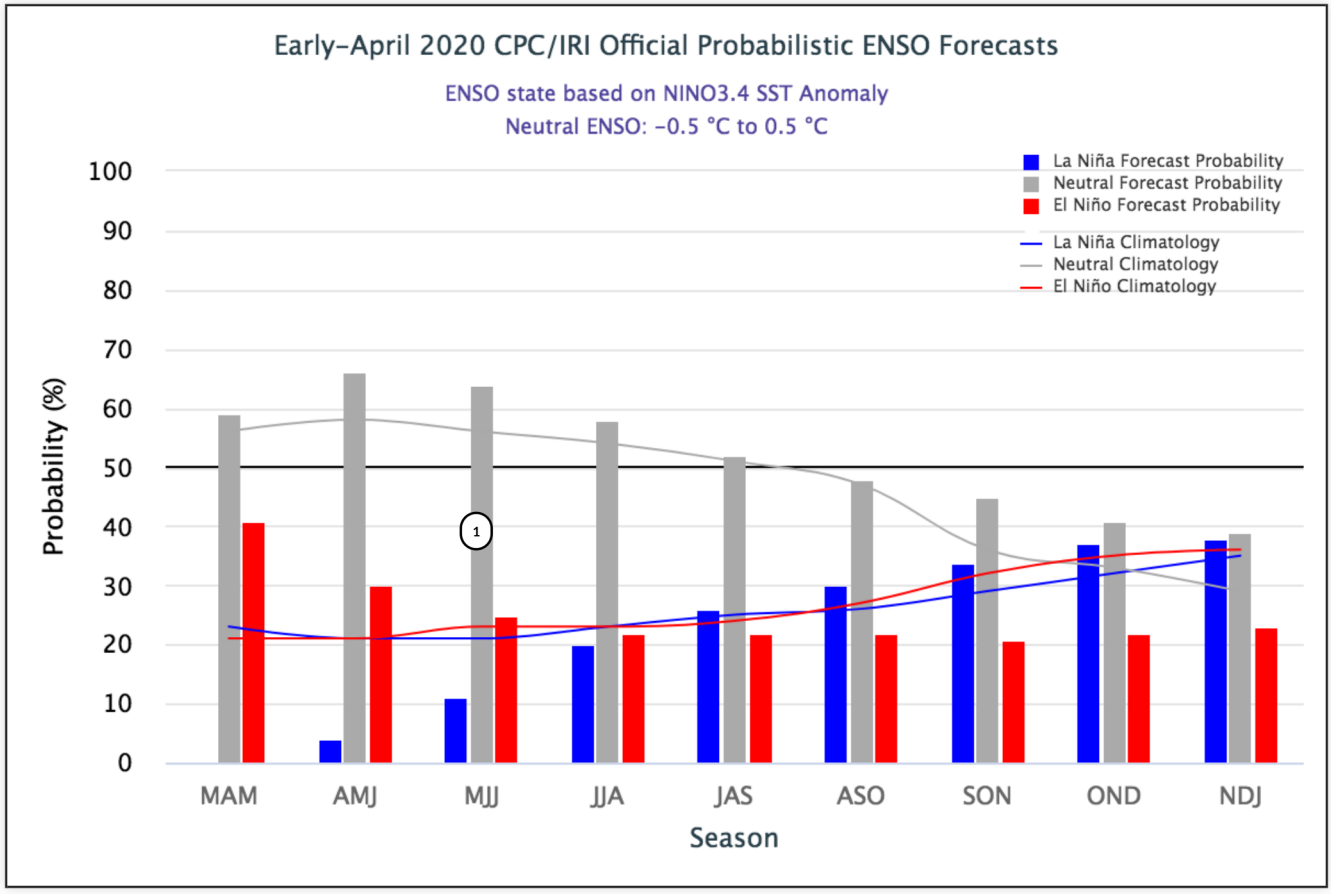
Forecasted Phase : neutral conditions



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

Oceanic forecast : Synthesis from IRI

Neutral conditions are most likely (above 60 %) for MJJ

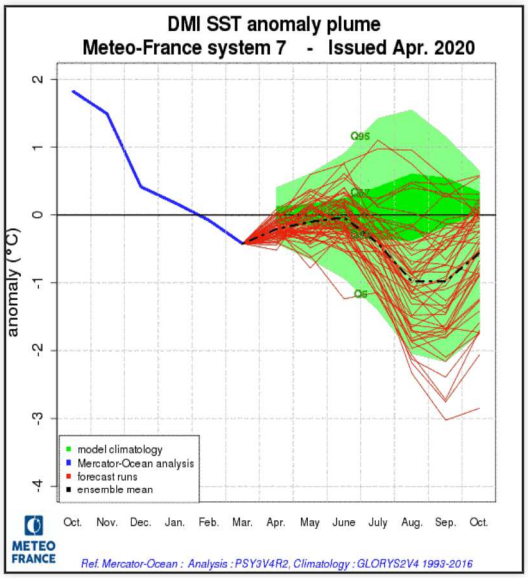


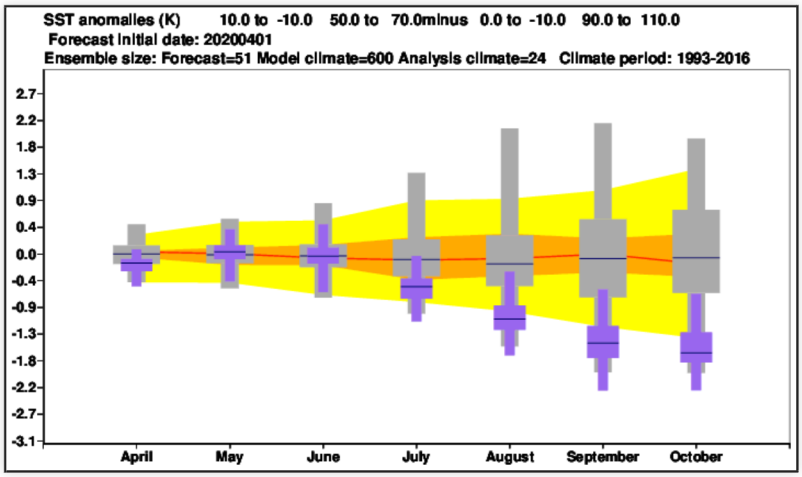
Probability of Niño, Niña, and neutral phases for the next 8 quarters. source http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/

1 - neutral forecast above 60%

Oceanic forecast : Indian ocean - DMI evolution

Very good agreement between both models in the Indian Ocean. The DMI is expected to stay close to the normal during the fisrt two months and then start decreasing in July.



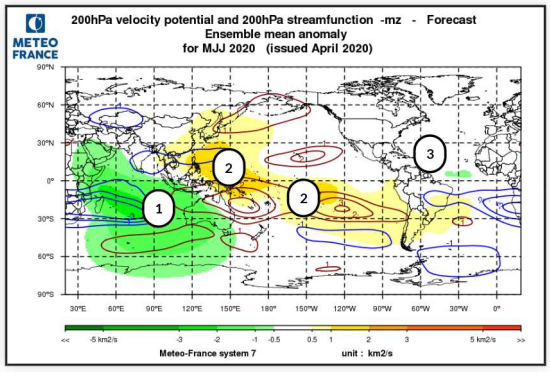


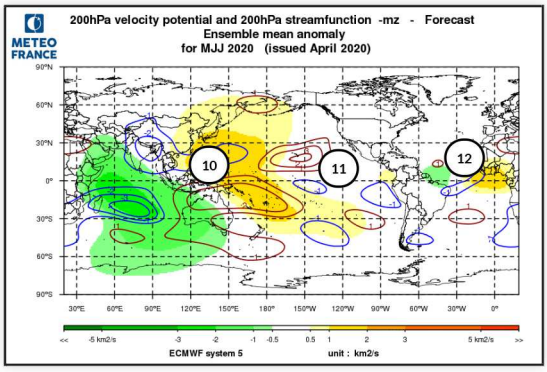
DMI index : analysis, forecasts and model climatology with MF7 on the right and SEAS5 on the left

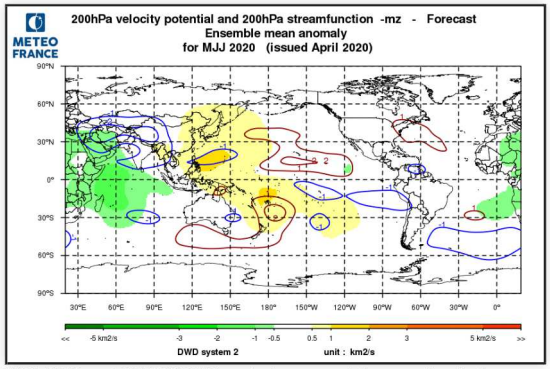
Atmospheric circulation forecasts : velocity potentiel and stream function at 200hPa

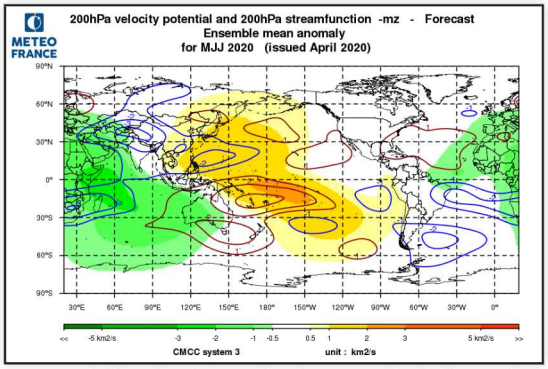
Velocity Potential : The models are in good agreement on the Indian Ocean and the Pacific Ocean. Conversely, they are inconsistent on the Atlantic. DWD forecasting is less dynamic than other models, and CMCC is the most dynamic. All agree on a upward motion anomaly area over the Indian Ocean, consistent with the warm SST anomaly, and a downward motion anomaly pole over western and southern Pacific Ocean.

Streamfunction : The anomalies are weak in the northern hemisphere, with a rather cyclonic area from the Middle East to India and Southeast Asia. And a rather anticyclonic area over the Pacific. No signal over the Atlantic.







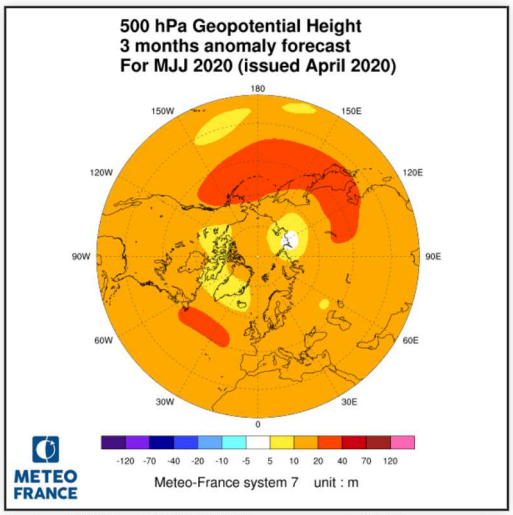


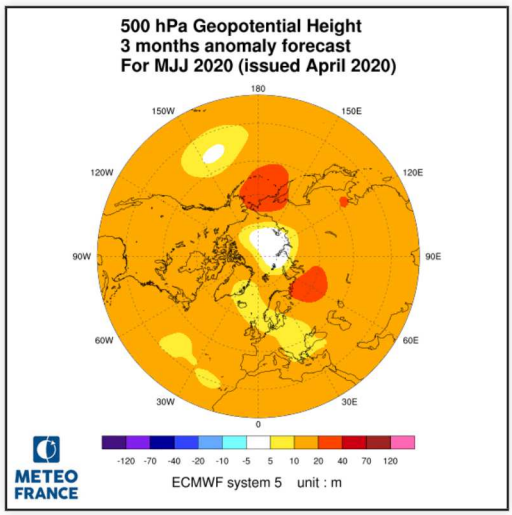
MF7,SEAS5, DWD and CMCC 200hPa velocity potential anomalies (color range, green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

1 - VP : Huge area of upward motion anomaly
2 - VP : downward motion anomaly
2 - VP : downward motion anomaly
3 - weak and inconsistent signal
10 - FC : weak cyclonic anomaly
11 - FC : weak anticyclonic anomaly
12 - FC : No signal

Atmospheric circulation forecasts : 500 hPa Geopotential anomalies

Almost no signal. No consistency in the little that appears.

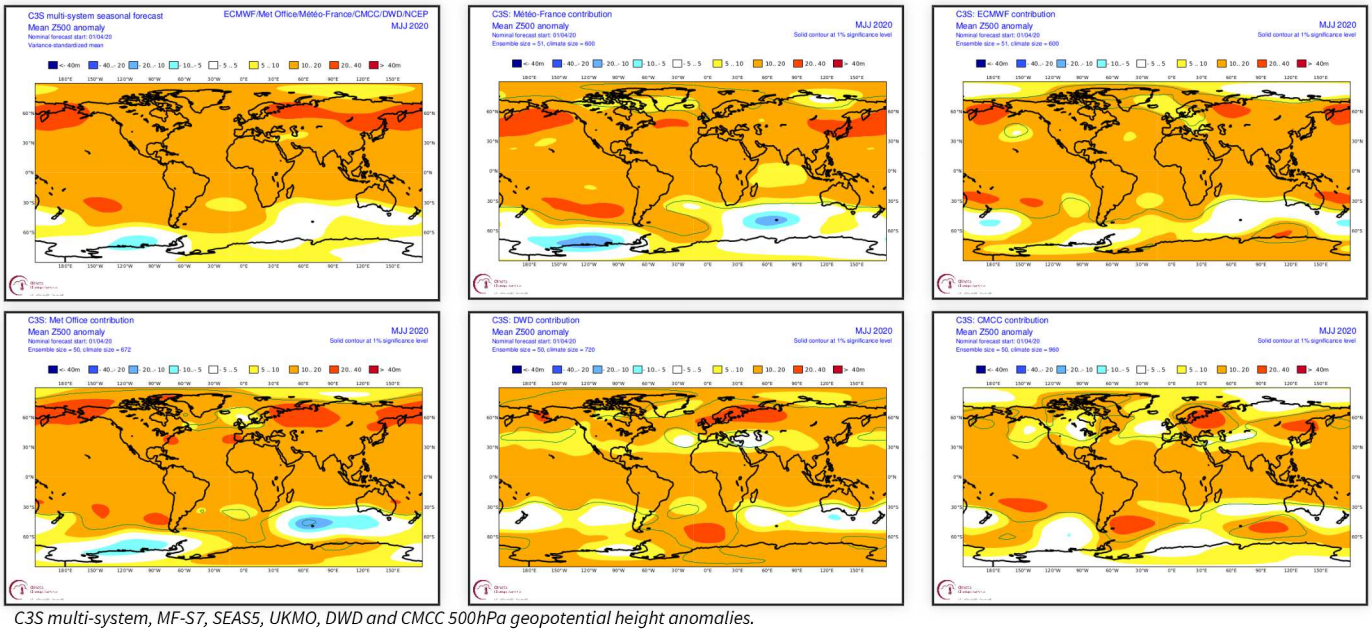




polar projection of MF7 and SEAS5 500hPa geopotential height anomalies.

Atmospheric circulation forecasts : Z500 anomalies in C3S models

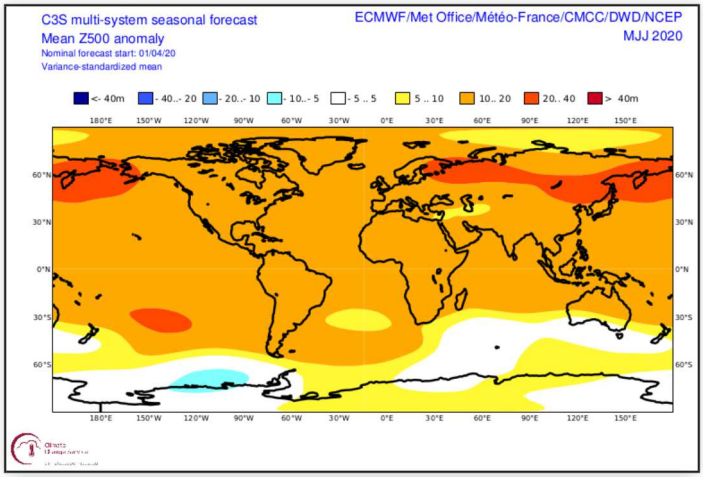
Little signal in the northern hemisphere, probable high values from Siberia to the Bering Strait. A certain trend towards high values is also visible in the northeast of Europe. No consistency over the North Atlantic.

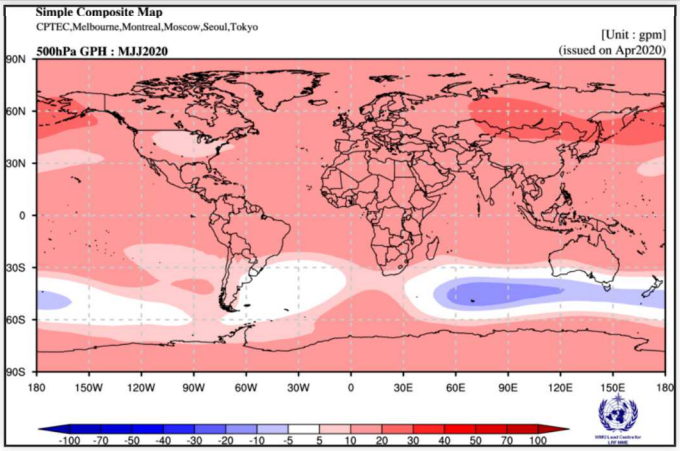


C3S multi-system, MF-S7, SEAS5, UKMO, DWD and CMCC 500hPa geopotential height anomalies.

Atmospheric circulation forecasts : Z500 anomalies multi-systems

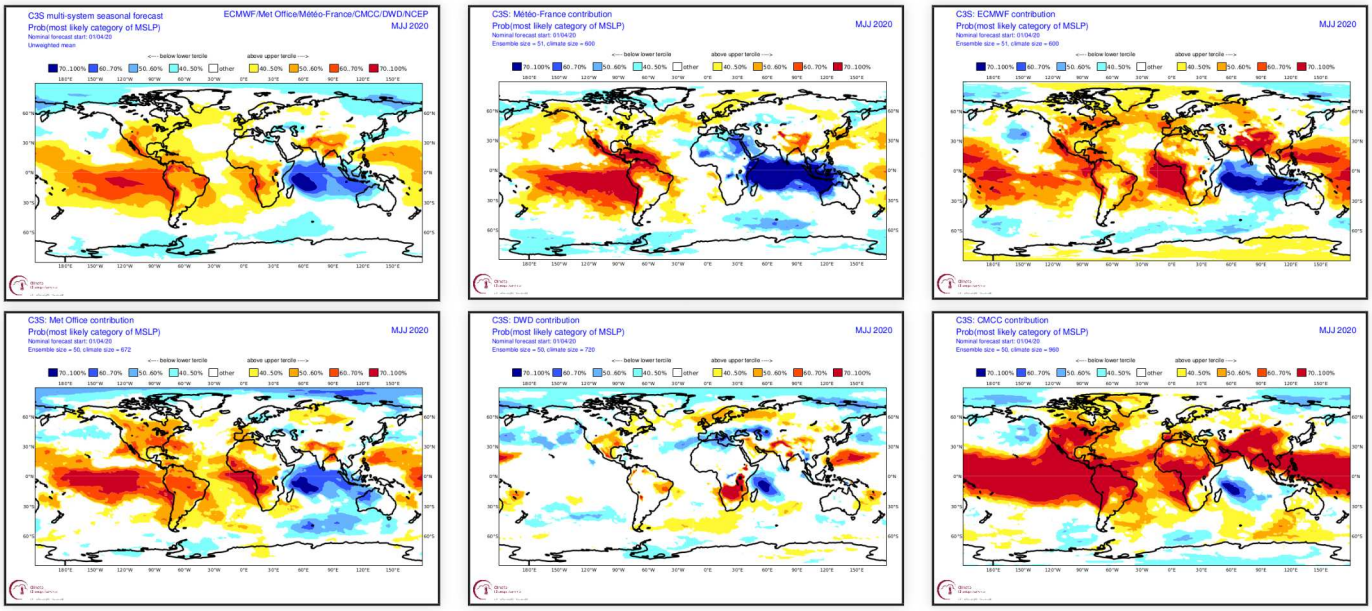
Almost no signal in the two synthesis. The high values from Siberia to the Bering Strait are consistent.





Atmospheric circulation forecasts : MSLP probabilities

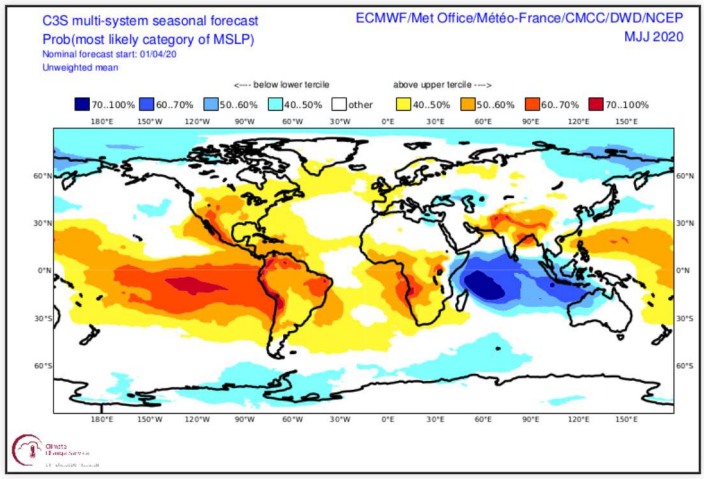
Despite fairly strong divergences, the synthesis of models highlights a high field over the North Atlantic and the British Isles and a weakness in the south-east of the Mediterranean.



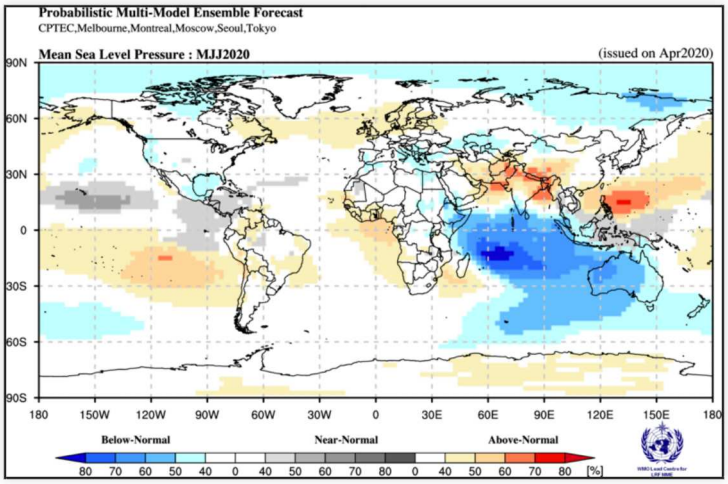
C3S multi-models probability map (top left) and MF-S7, SEAS5, UKMO, DWD, CMCC models.

Atmospheric circulation forecasts : MSLP probabilites multi-systems

The multi-models are in fairly good agreement, except in America. They are in particular in good agreement on the North Atlantic and Europe.



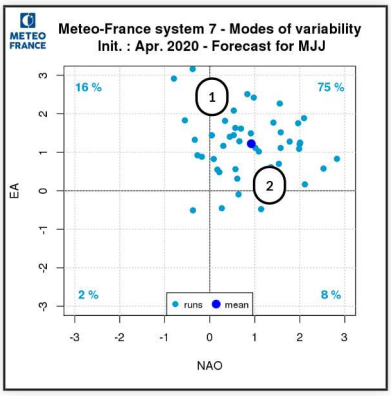
C3S multi-models.

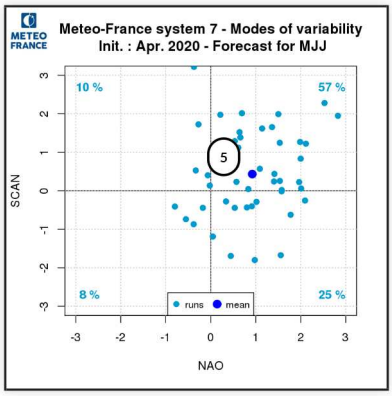


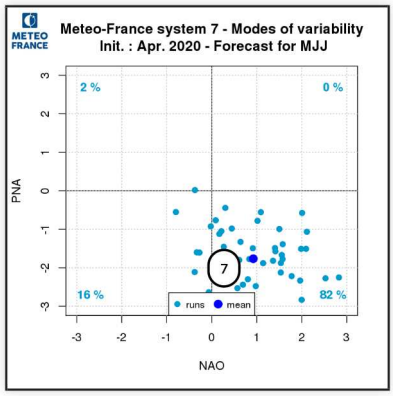
Others models of WMO multi-models.

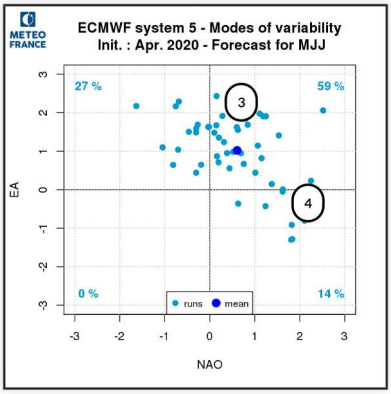
Modes of variability : forecast

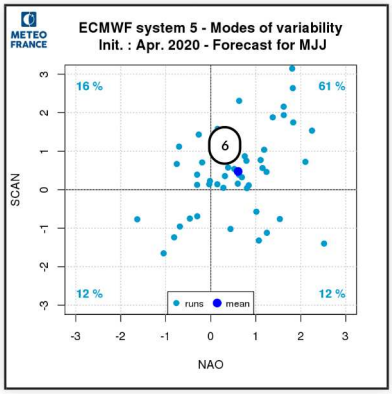
Both models suggest a high probability of positive NAO mode (probably linked to climate change), positive EA mode (high values of normalised fields). Positive SCAN is also favored but this mode has poor scores for April initialisation.

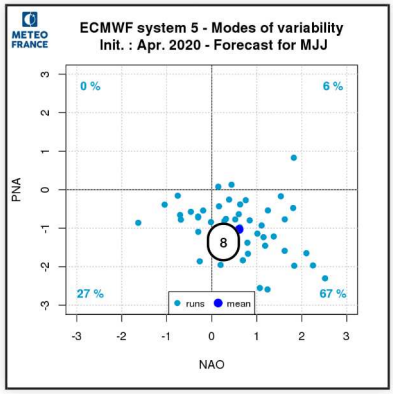










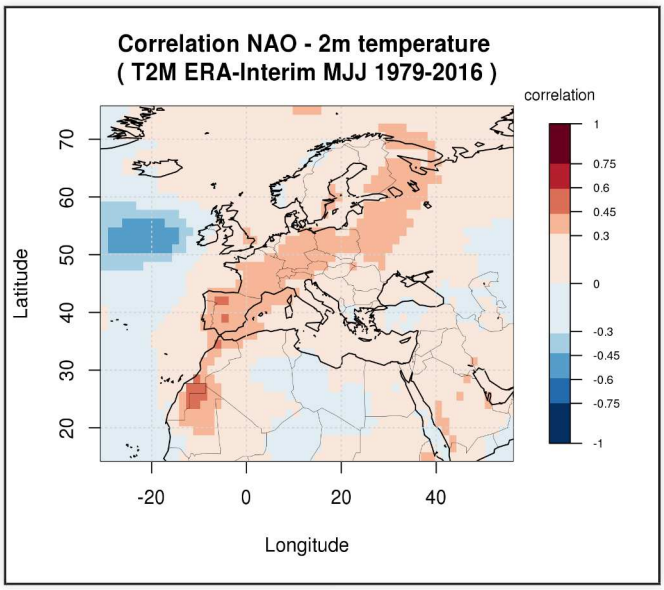


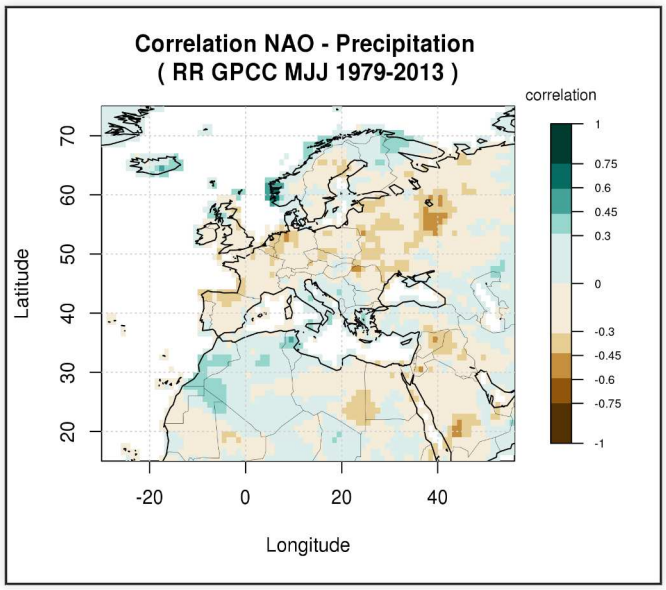
1 - positive EA for 91% of runs.
2 - positive NAO for 83% of runs.
3 - positive EA for 86% of the runs
4 - positive NAO for 73% of the runs
5 - positive SCAN for 67% of runs
6 - positive SCAN for 76% of runs
7 - practically all runs in negative PNA
8 - practically all runs in negative PNA

see the modes of variability patterns

Modes of variability : NAO impacts

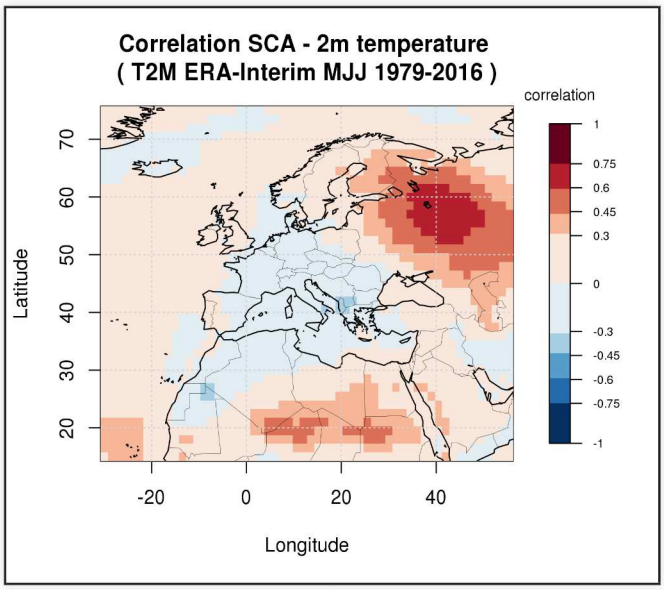
NAO mode has a low impact for this 3-month period

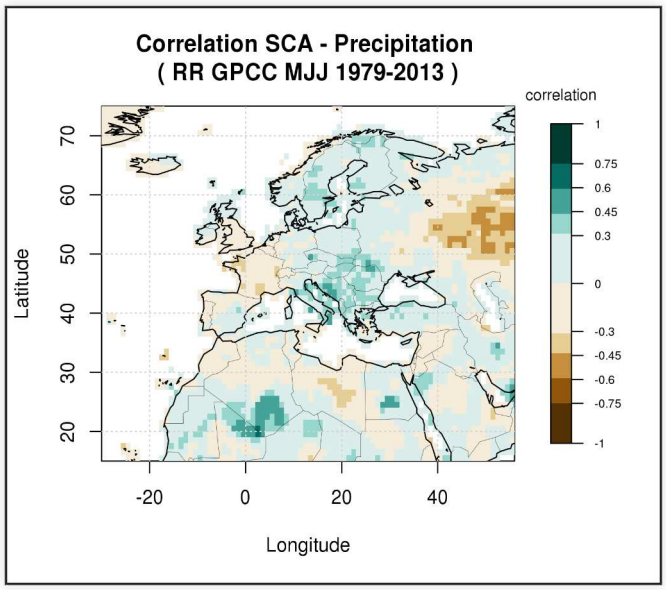




Modes of variability : SCA impacts

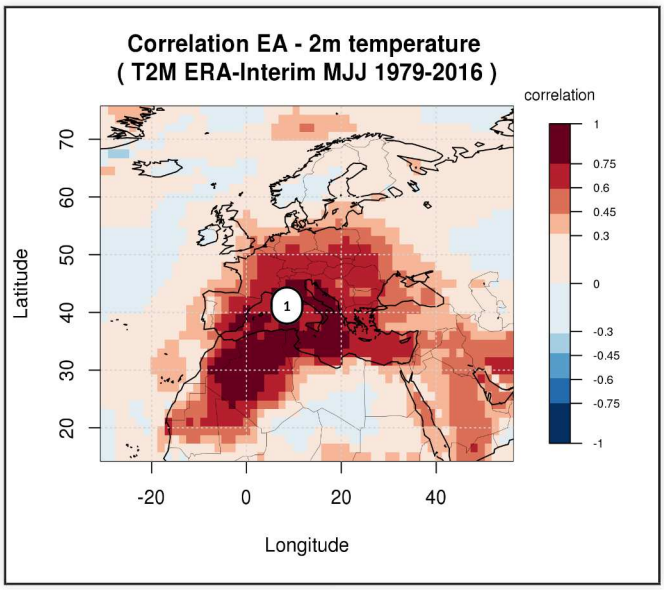
The SCAN influence is rather the opposite of NAO and EA on Western Europe

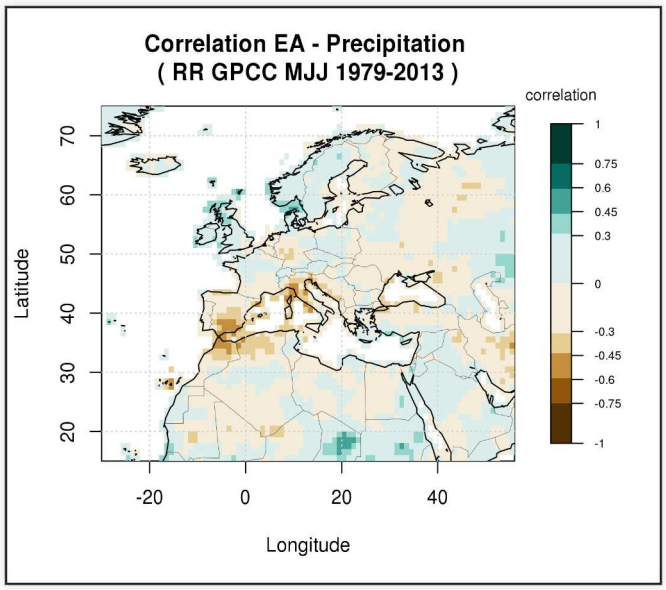




Modes of variability : EA impacts

The occurrence of EA is difficult to link with expected Z500 field. It would have a strong influence in particular on the temperature

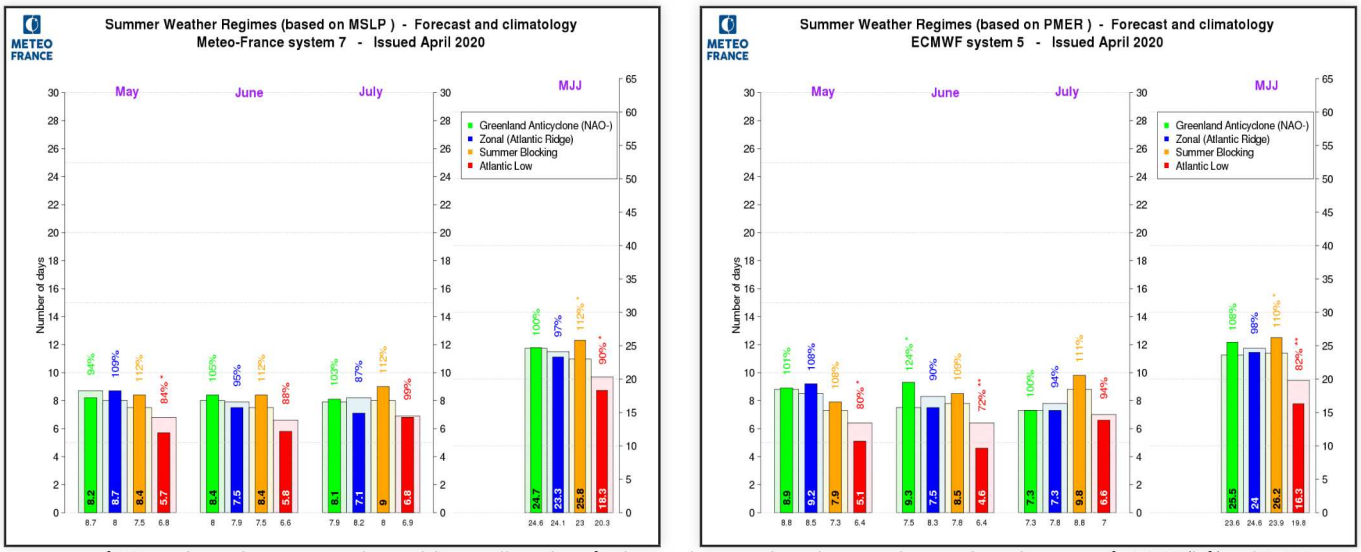




1 - high correlation with the temperature anomaly

Weather regimes : summer MSLP

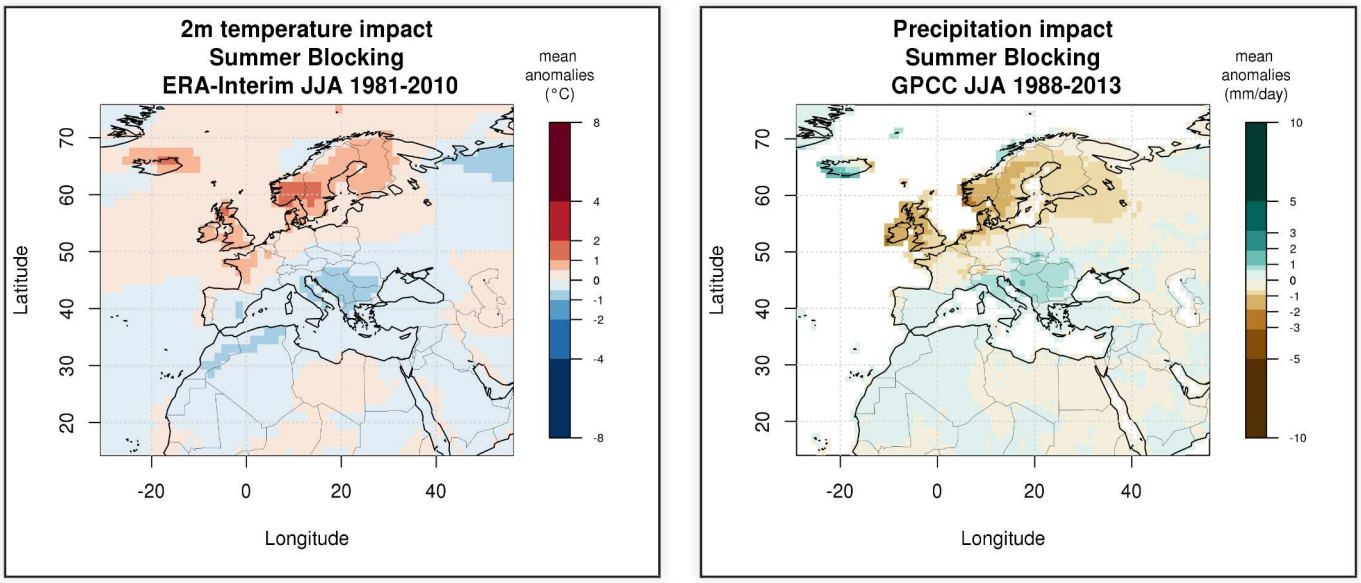
Consitent with there MSLP field, both models favor summer blocking at the expense of Atlantic low.



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

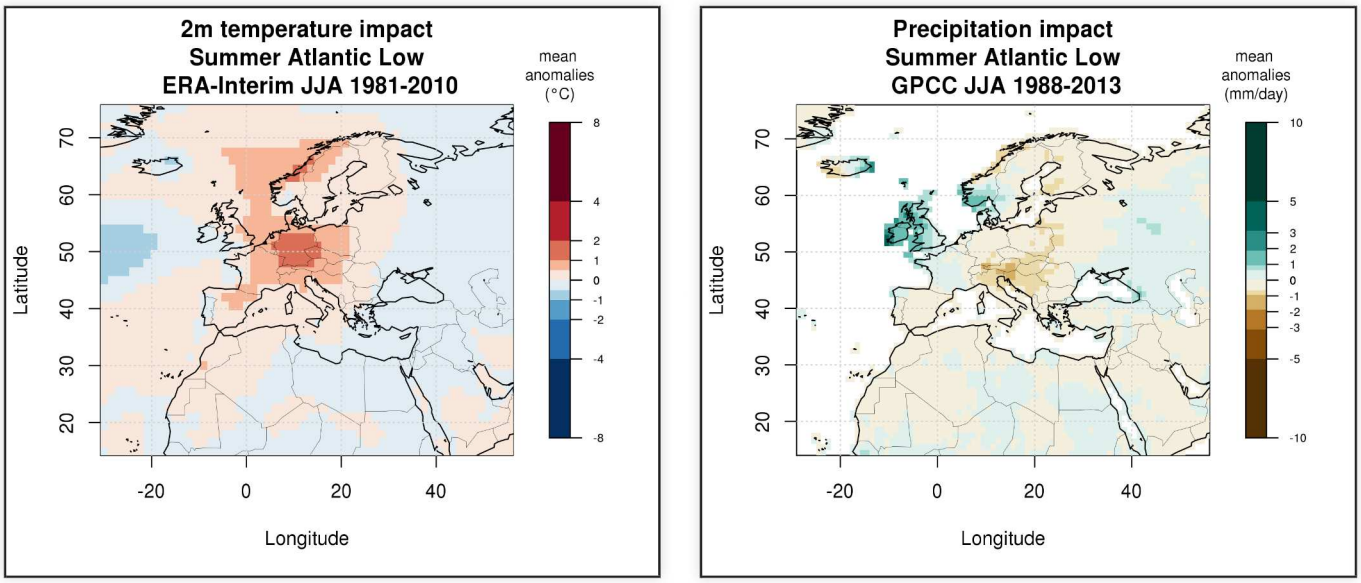
Summer Blocking weather regime should be more frequent than normal



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

Weather regimes : Impacts

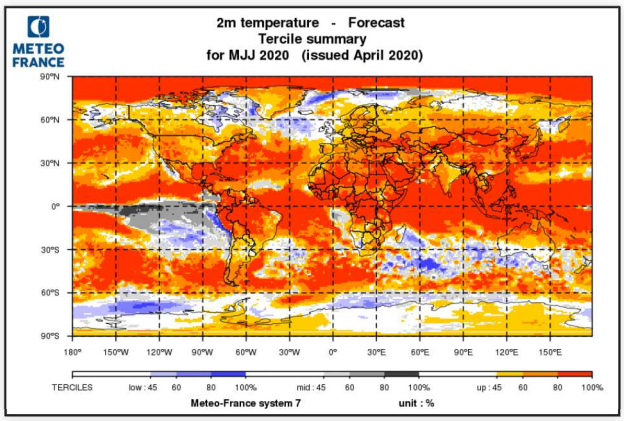
Atlantic Low weather regime should be less frequent than normal favoring the reverse impacts of the maps below.

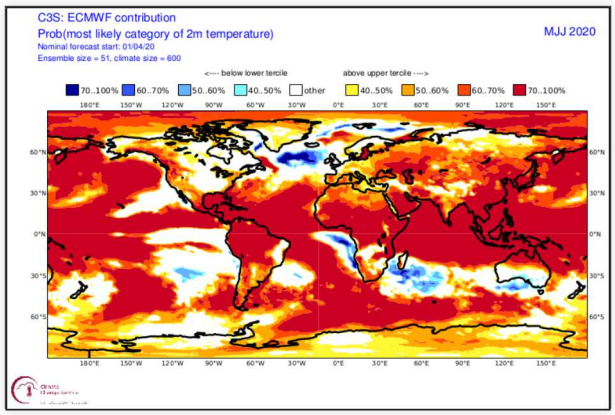


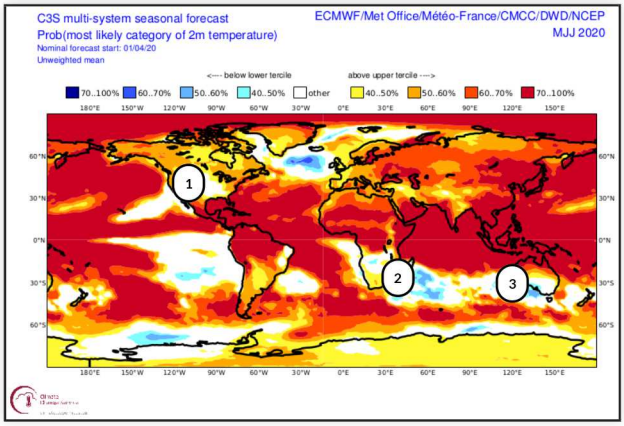
Impact of Summer Atlantic Low weather regime on temperature and precipitation. (ref ERA-interim 1981-2010 and GPCC 1988-2013)

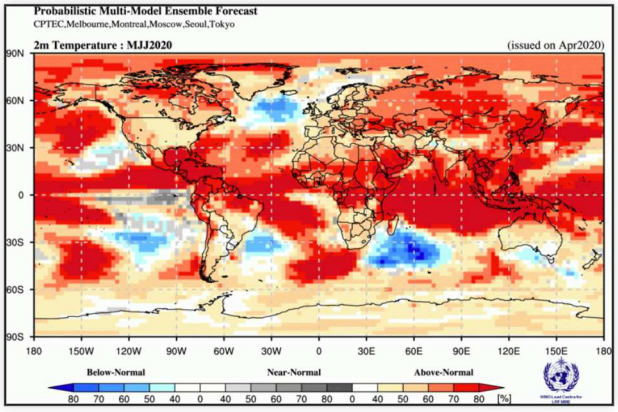
Forecast of climatic parameters : Temperature probabilities

Good agreement between models. Hot anomalies are largely dominant due to climate change.







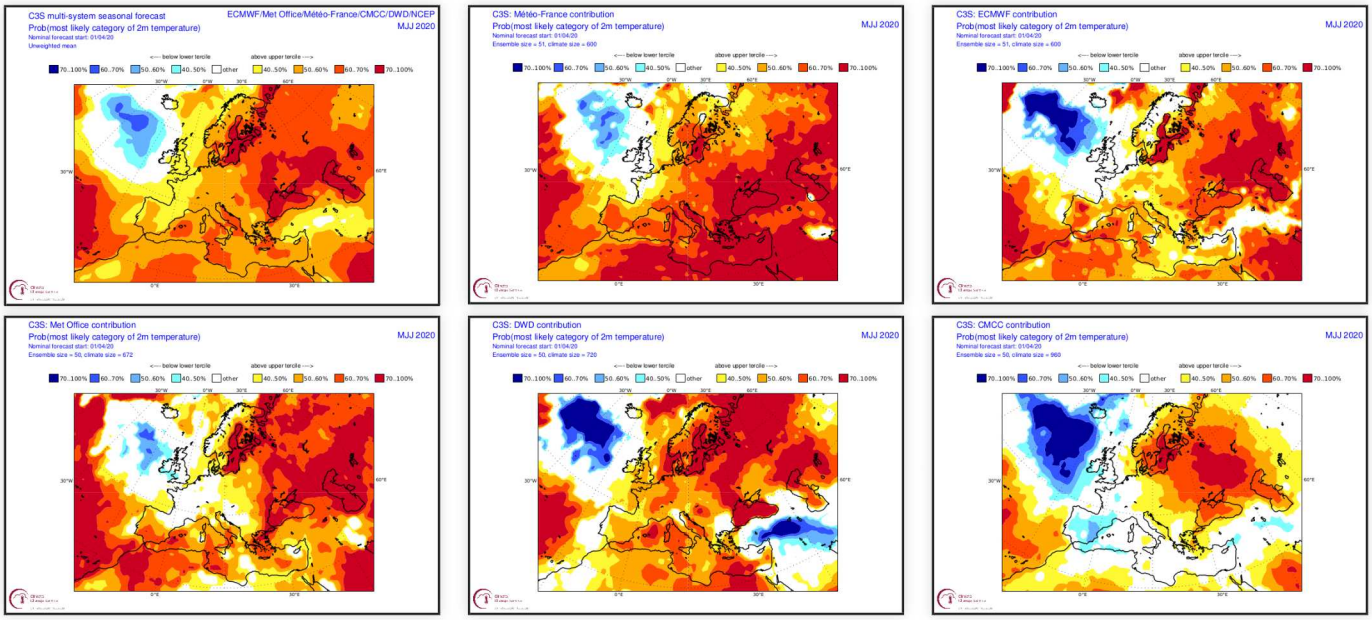


2m temperature probability map from MF-S7 (top left), ECMWF-SEAS5 (top right), C3S multi-models(bottom left) and others models of WMO multi-models (bottom right)

1 - shared forecast (No marked warm signal in any case)
2 - cold signal
3 - cold signal

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

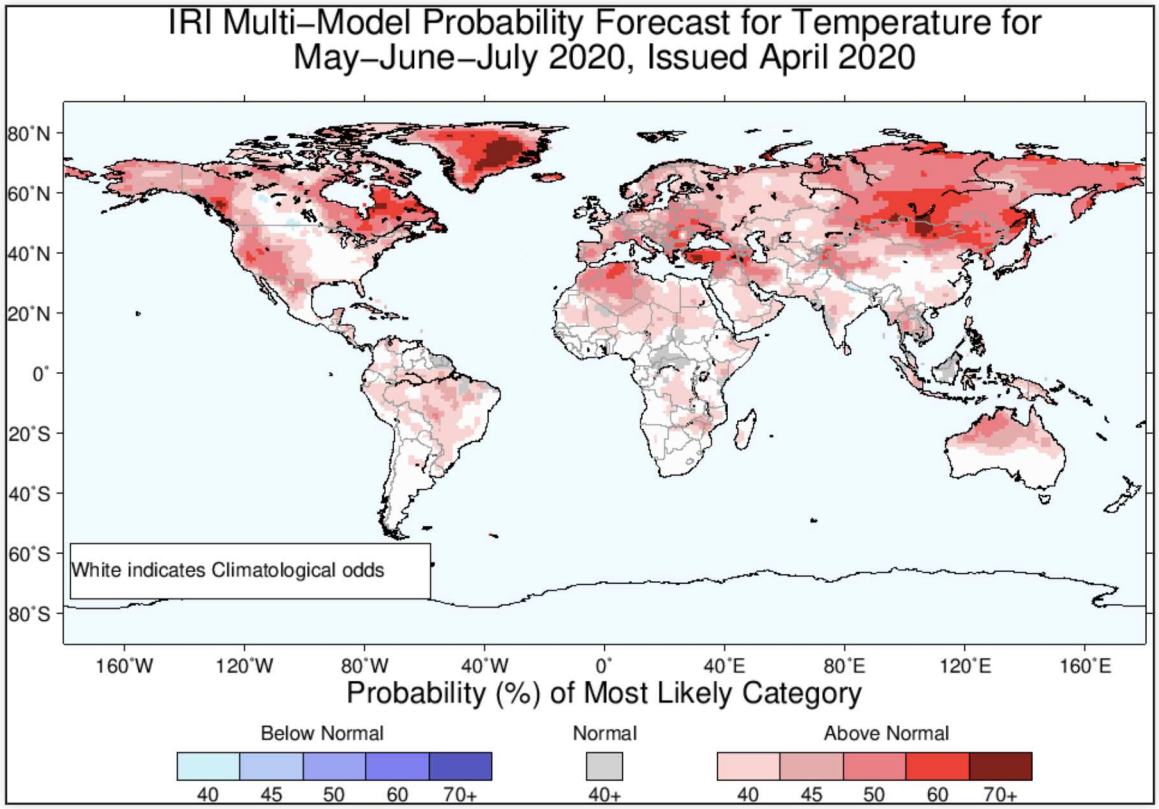
All the models favor a warm option over Eastern Europe and the Mediterranean basin (except CMCC). The models are more divided for the west and the northwest of the continent where there is no clear hot signal



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

Forecast of climatic parameters : Température synthèse de l'IRI

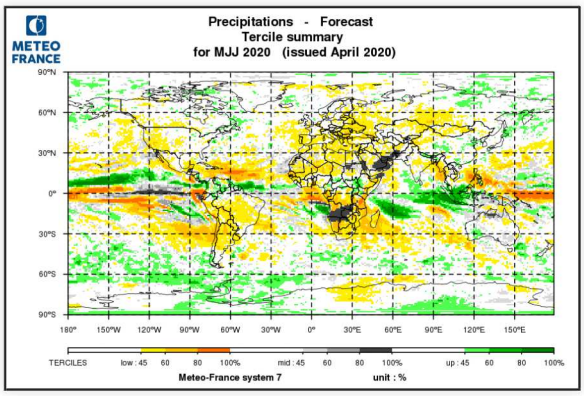
The multi-model synthesis of IRI is consistent with other ensemble systems.

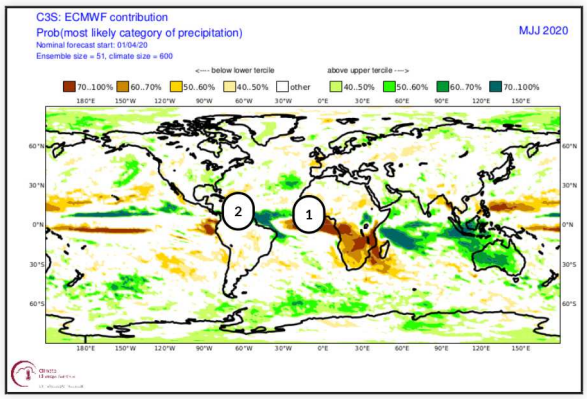


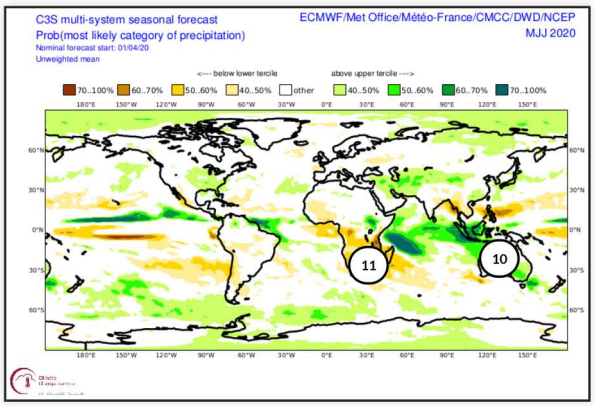
https://iri.columbia.edu/our-expertise/climate/forecasts/

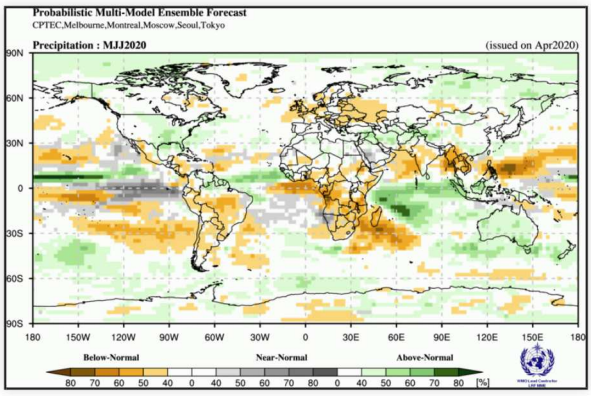
Forecast of climatic parameters : Precipitation

In coherence with SST and VP, the anomalies are most marked around the Indian Ocean. Also marked dipole on the equatorial Atlantic.







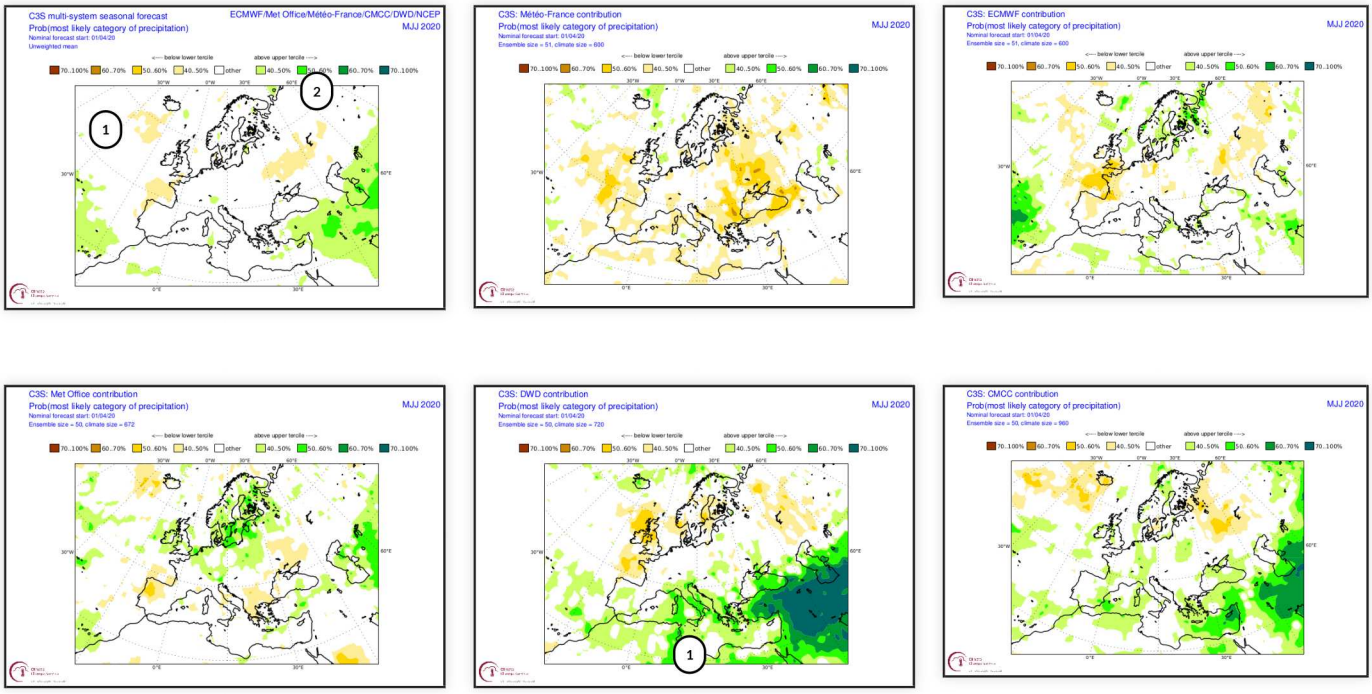


precipitation probability map from MF-S7 (top left), ECMWF-SEAS5 (top right), C3S multi-models (bottom left) and others models of WMO multi-models (bottom right)

1 - dry signal for the start of the monsoon
2 - wet signal
10 - Strong wet signal
11 - dry signal

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

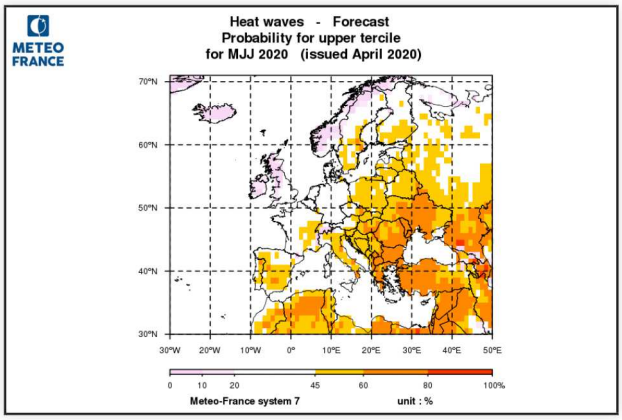
The models are not very consistent. A dry signal could emerge on the far west of the continent. A dry trend seems logical for Eastern Europe.

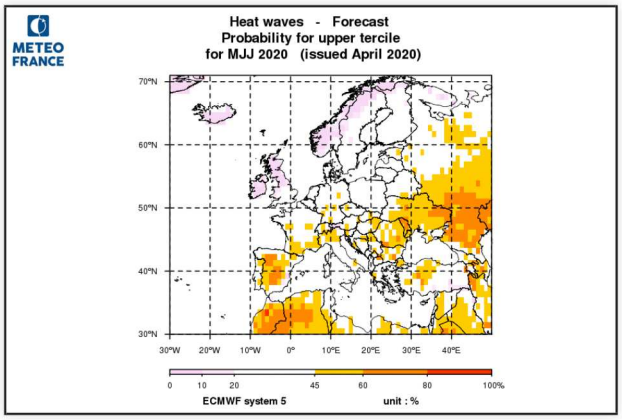


C3S multi-models probability map (top left) and ME-S7, SEAS5, UKMO, DWD, CMCC models

Forecast of climatic parameters : Heat waves

The probability of heat waves is very high in MF7 for the southeastern Europe. It is more limited with ECMWF.
Both models agree for a moderate probability of heat wave on southwestern of the continent

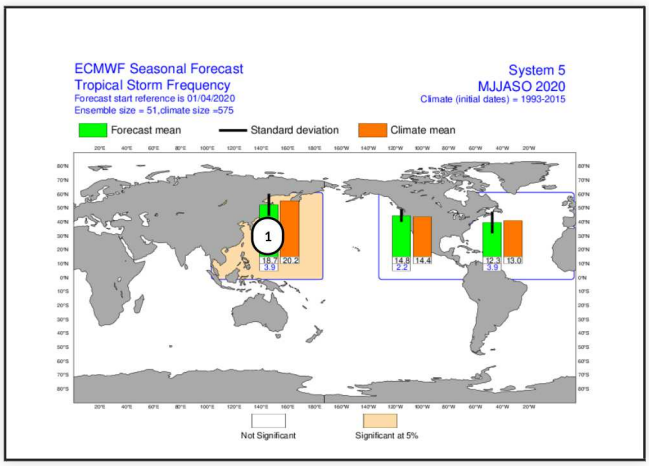


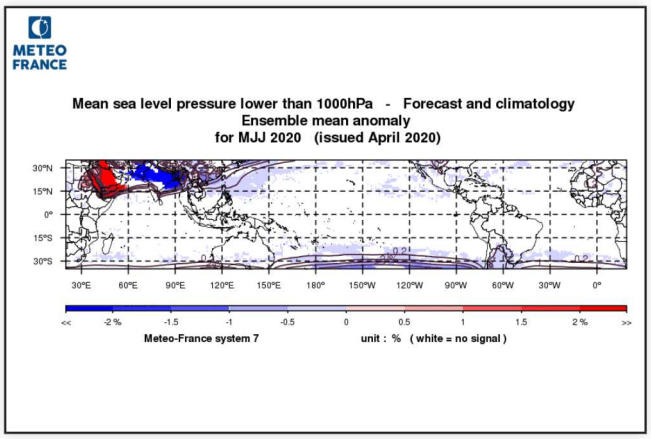


Heat wave probability for MF7 (right) and ECMWF (left). A heat wave is detected if the corrected T2M is above the daily 90th percentile and a fixed 20°C threshold. *more details here*

Forecast of climatic parameters : Tropical Storm Frequency

Cyclone season activity may be less intense than normal in the Pacific Northwest. No significant deviation from normal elsewhere.

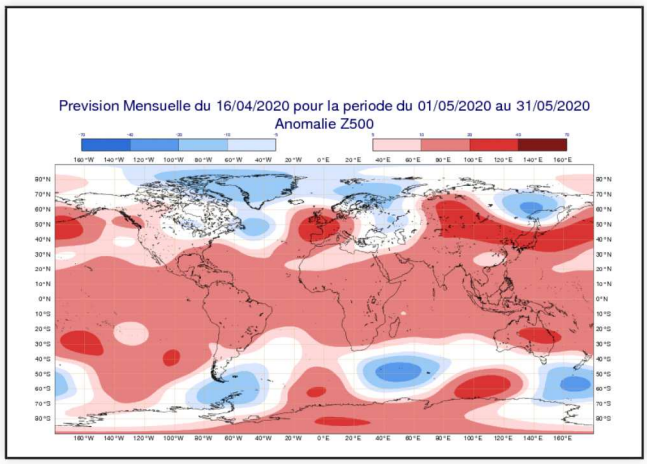


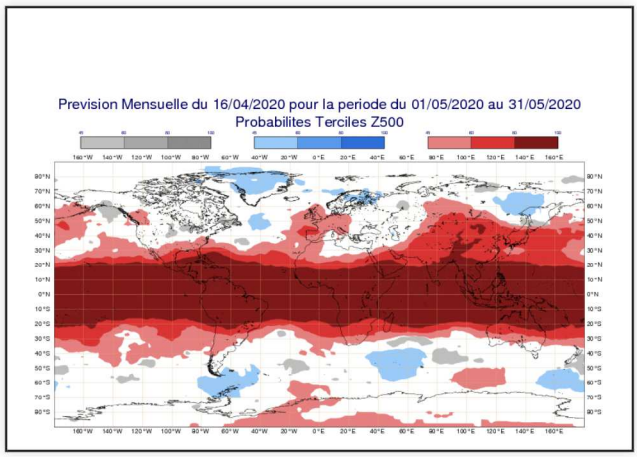


1 - less intense than normal

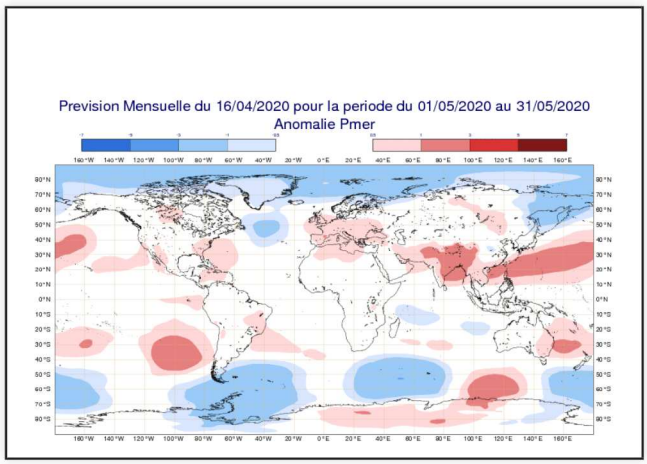
Monthly forecast of 20200416 : Z500

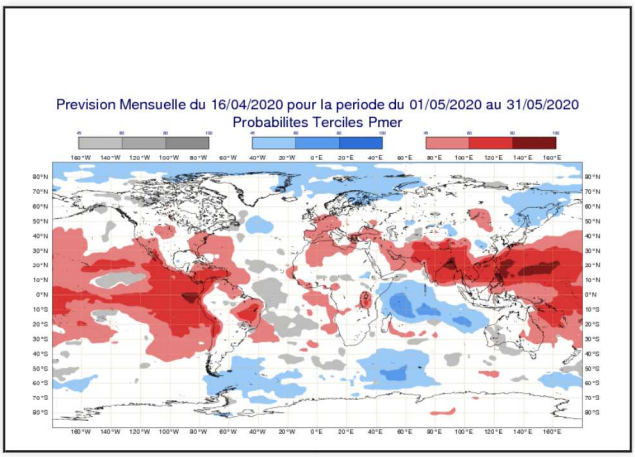
Strong value in Western Europe for the first month of the period





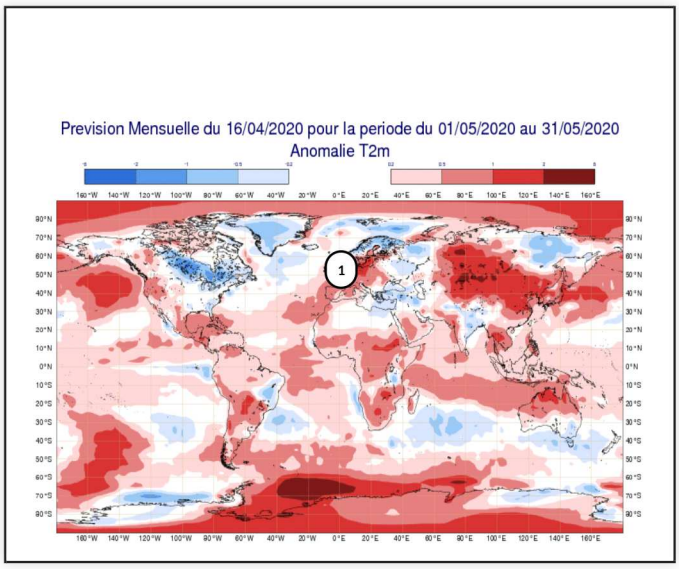
Monthly forecast of 20200416 : MSLP

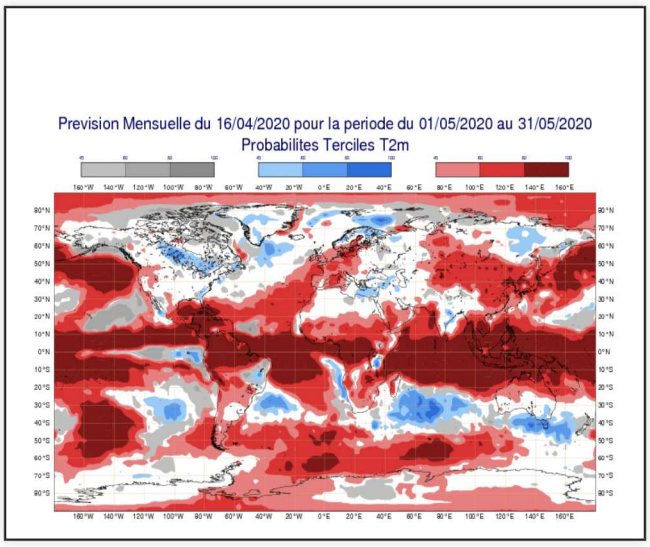




Monthly forecast of 20200416 : temperature

The pattern of the first month in Western Europe is much more marked in temperature than the seasonal forecasts.

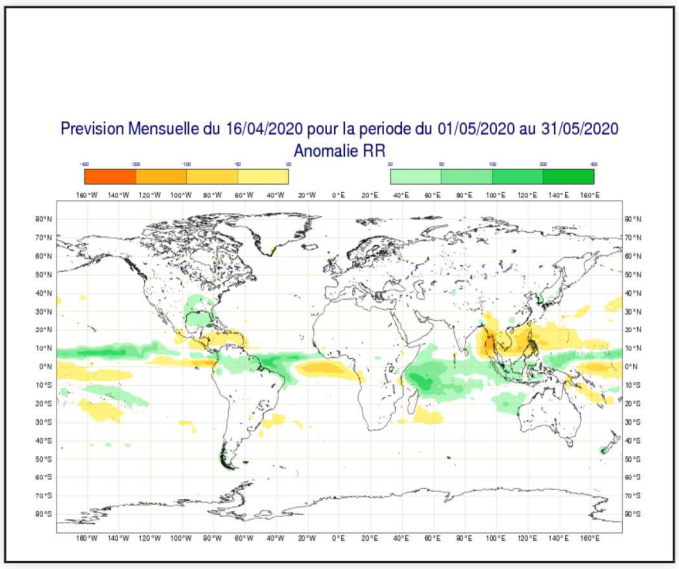


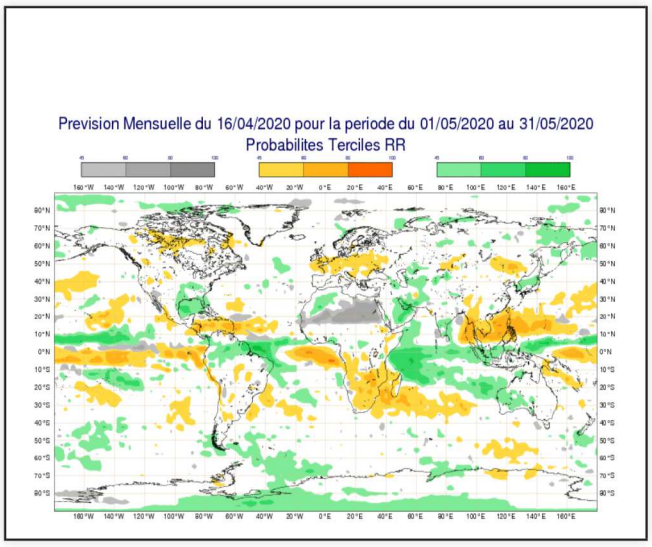


1 - warm anomaly for the month on all Europe, except Northern and eastern part.

Monthly forecast of 20200416 : precipitation

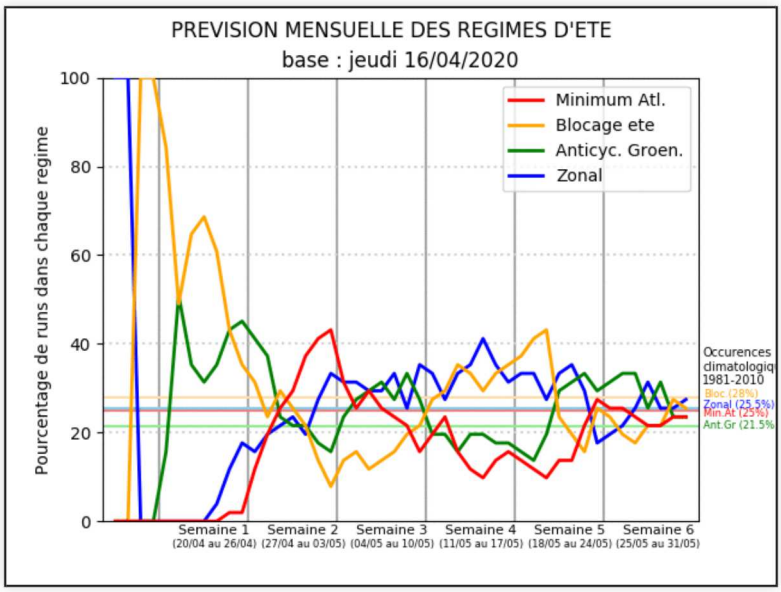
Weak dry signal over Europe.





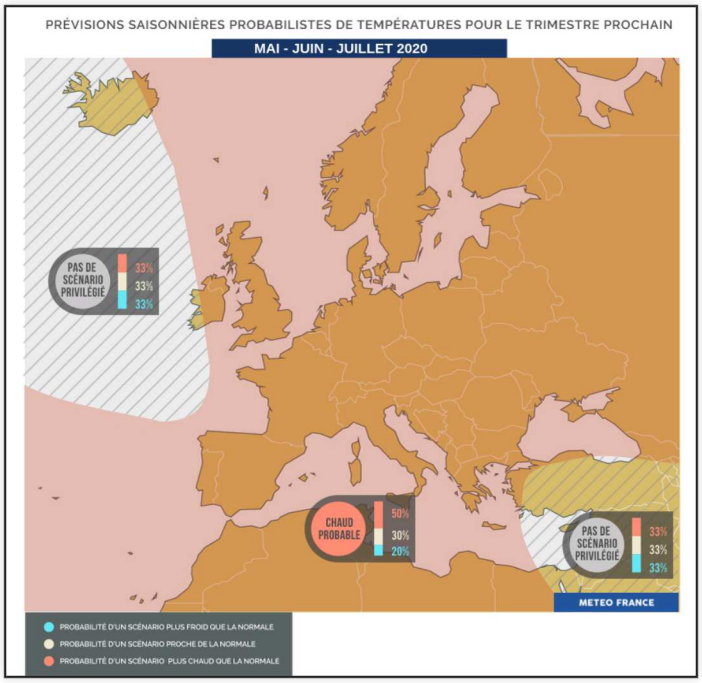
Monthly forecast of 20200416 : summer SLP weather regimes

no dominant weather regime for next month



Synthesis map for Europe : Temperature

The blocking summer regime which should dominate associated with the climate change context should lead to a warmer than normal quarter on the continent.



Synthesis map for Europe : Precipitation

By following a pattern of high MSLP values on the British Isles (summer blockage weather regime), the northwest of the continent could experience a drier than normal period. Elsewhere, diverse influences do not lead to any dominant scenario.