

Météo-France Seasonal Forecast Bulletin

JULY - AUGUST - SEPTEMBER 2020

Table of Content

| | |
|--|----|
| 1. General synthesis | |
| 1. JAS 2020 | 3 |
| 2. Oceanic analysis of May 2020 | |
| 1. SST anomalies | 4 |
| 2. Pacific vertical section | 5 |
| 3. Hovmöller diagram of the 20°C isotherm | 6 |
| 4. Pacific Ocean - Nino3.4 index history | 7 |
| 5. Indian Ocean - DMI index history | 8 |
| 6. Atlantic Ocean - SAT index history | 9 |
| 3. Oceanic forecast | |
| 1. SST anomaly | 10 |
| 2. NINO1+2 Plume diagrams | 11 |
| 3. NINO3.4 Plume diagrams | 12 |
| 4. C3S Nino3.4 re-scaled plume diagrams | 13 |
| 5. Synthesis from IRI | 14 |
| 6. Indian ocean - DMI evolution | 15 |
| 7. Atlantic ocean - SAT evolution | 16 |
| 4. Atmospheric circulation forecasts | |
| 1. velocity potentiel and stream function at 200hPa | 17 |
| 2. 500 hPa Geopotential anomalies | 18 |
| 3. Z500 anomalies in C3S models | 19 |
| 4. Z500 anomalies multi-systems | 20 |
| 5. Normalised MSLP | 21 |
| 6. MSLP probabilities | 22 |
| 7. MSLP probabilities multi-systems | 23 |
| 5. Modes of variability | |
| 1. forecast | 24 |
| 6. Weather regimes | |
| 1. summer MSLP | 25 |
| 2. Impacts | 26 |
| 3. Impacts | 27 |
| 7. Forecast of climatic parameters | |
| 1. Temperature probabilities | 28 |
| 2. T2M probabilities over Europe in C3S models | 29 |
| 3. Precipitation | 30 |
| 4. Precipitation probabilities over Europe in C3S models | 31 |
| 5. Heat waves | 32 |
| 6. Tropical Storm Frequency | 33 |
| 8. Monthly forecast of 20200615 | |
| 1. Z500 | 34 |
| 2. MSLP | 35 |
| 3. temperature | 36 |
| 4. precipitation | 37 |
| 9. Synthesis map for Europe | |
| 1. Temperature | 38 |
| 2. Precipitation | 39 |

General synthesis : JAS 2020

A) Oceanic forecast :

- **neutral ENSO situation**, but with negative anomalies close to the La Nina threshold. The decrease observed since May will continue but more slowly during the summer, the anomalies should then return to near-zero values in the fall.
- **IOD** : strong decrease in next 3 months, toward a strong negative IOD situation. Starting to go up in the longer term.

B) Atmospheric circulation :

- Upward velocity potential anomaly over the Indian Ocean Pacific. Downward potential velocity anomaly over Pacific with a maximum in the western part. Response in Stream-function, but trapped in the tropics for the Northern hemisphere.
- over the North Atlantic and Europe : positive anomaly over Near Atlantic and the western facade of Europe. Weak pressure field on the far North Atlantic towards Scandinavia.

=> Most likely conditions :

- Wet conditions over Maritime Continent and Australia. Dry over southern Africa. Likely dry over West Africa and wet on the other side of the basin over the north of South America.
- **over Europe** : warm over south of Europe, and cold in regions close to the North Sea. Drier than normal in the western and southern part of Europe. Wet probabilities over Scandinavia and nearby.

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| Next bulletin : scheduled on July 21th |
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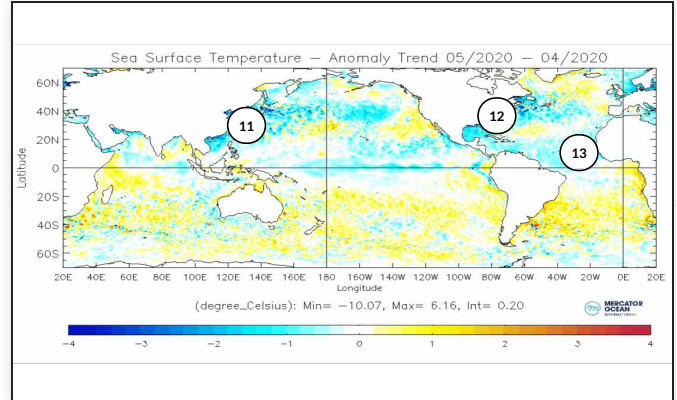
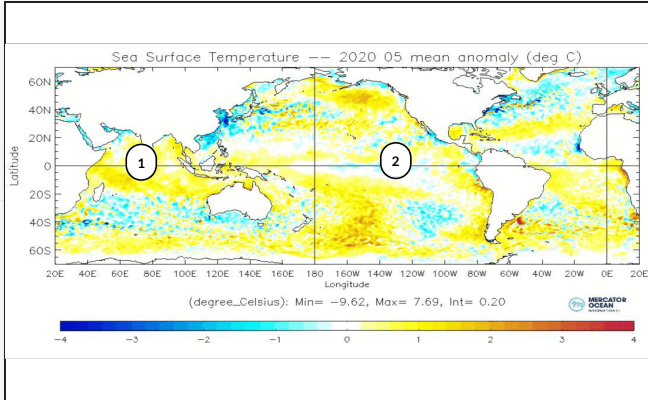
Oceanic analysis of May 2020 : SST anomalies

Current ENSO situation : neutral conditions.

The tropical oceans present weak anomalies.

The Atlantic and the Pacific have cooled along the equator and in the northern hemisphere, particularly in the western part of the basin.

The Indian Ocean is still warmer than normal, north of 20°S with a slightly reinforced east-west gradient

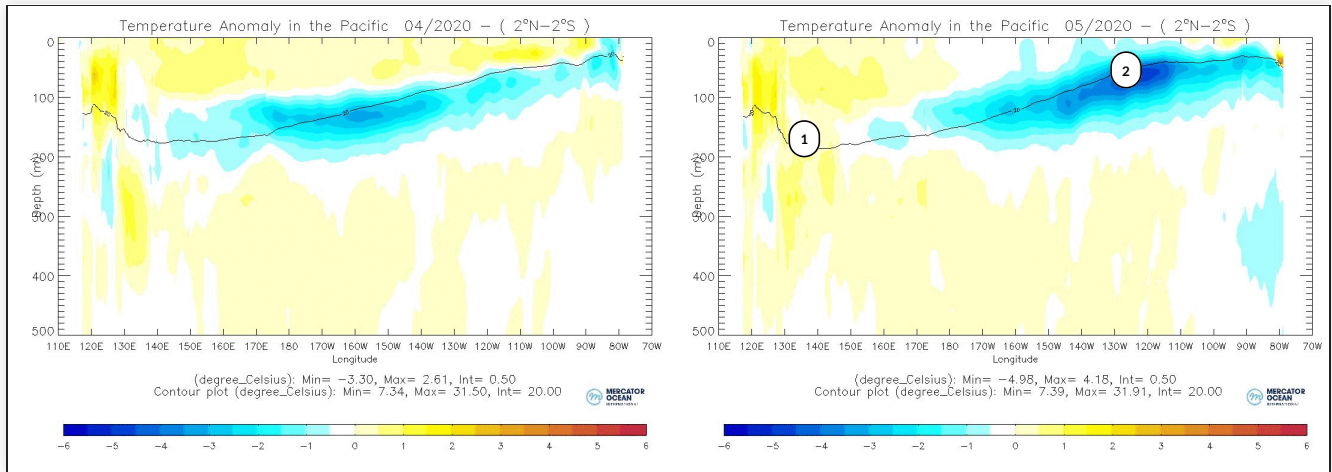


SST Anomalies and trend with the previous month (c) Mercator-Ocean

- 1 - warm Indian Ocean with slight positive DMI
- 2 - weak anomalies
- 11 - strong cooling
- 12 - strong cooling
- 13 - Strong cooling

Oceanic analysis of May 2020 : Pacific vertical section

The cold kelvin wave visible since March reached the eastern part of the basin while strengthening. It causes a net cooling up to the surface. At the rear, no marked anomaly in the western part likely to indicate a later development.



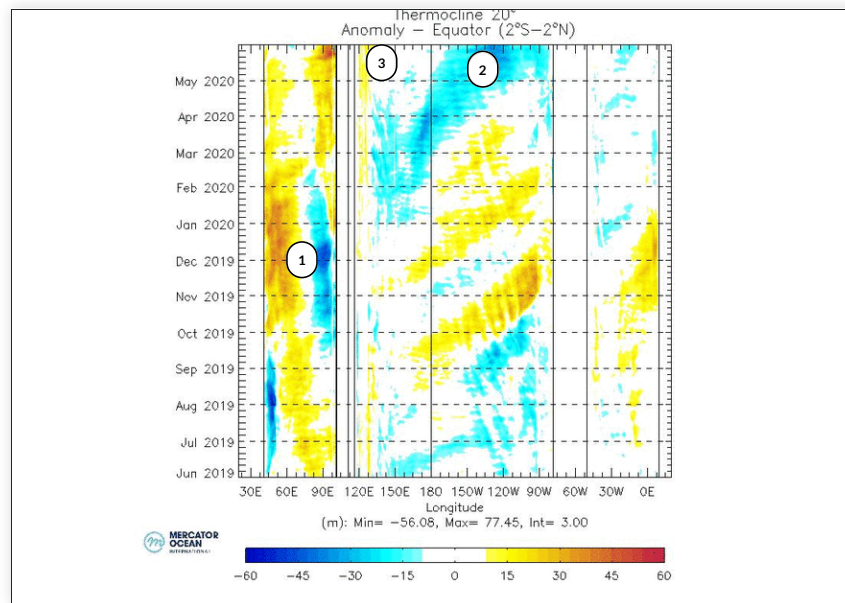
Ocean temperature anomalies in the first 500 meters of the equatorial Pacific basin, monthly average. (c) Mercator-Ocean

1 - No marked anomaly in the western part

2 - With the strong cold anomaly, the 20 °C isotherm rises very close to the surface

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

In the Pacific, one can clearly follow the propagation of the cold anomaly from the West to the East part of the basin.



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

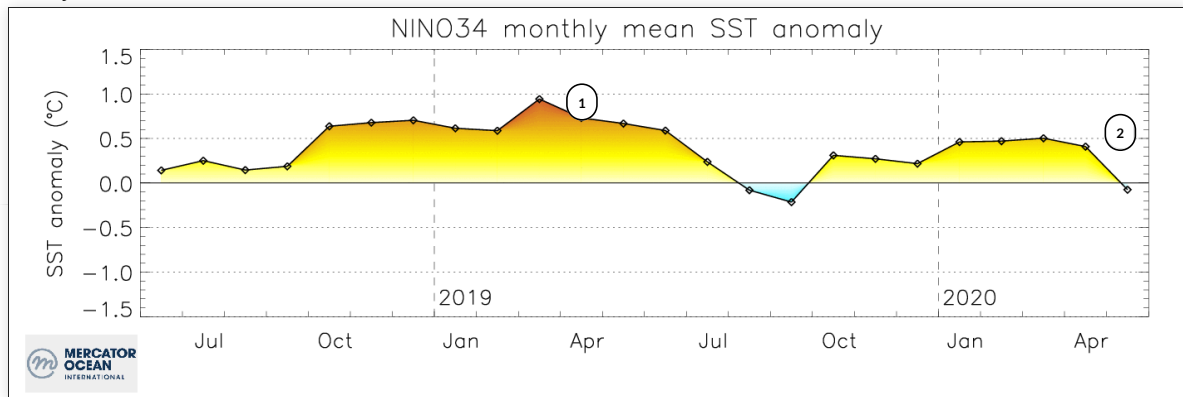
- 1 - Strong IOD of the end of 2019
- 2 - The cold wave reaches the eastern part of the Pacific basin
- 3 - No anomaly at the rear

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

Nino3.4 index issued from Mercator Ocean PSYV4R2 analysis : -0.1 °C

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

Weak anomaly in Nino3.4 box. Neutral ENSO conditions.



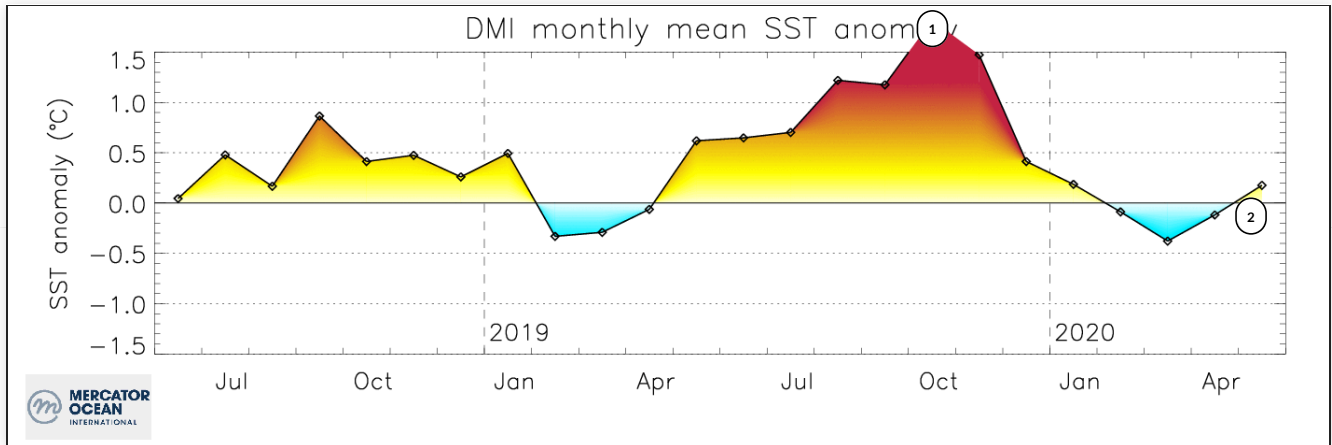
Evolution of SST in the NINO3.4 box (c) Mercator-Ocean

- 1 - Weak El Niño during winter 2018-2019 and spring 2019
- 2 - Current neutral conditions

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

DMI Index issued from Mercator Ocean PSYV4R2 analysis : +0.2°C

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



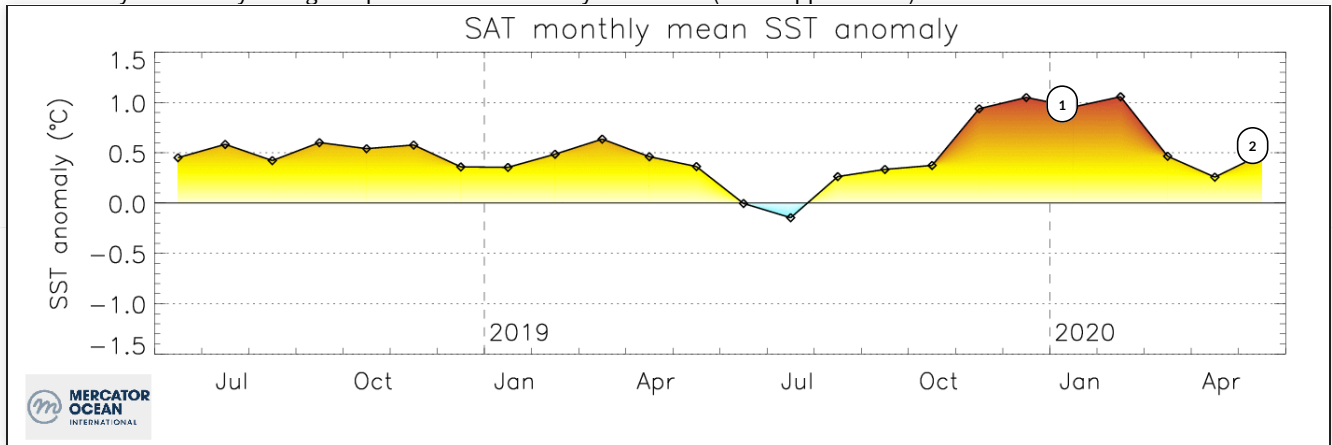
Evolution of SST in the DMI box (c) Mercator-Ocean

- 1 - IOD on record in october
- 2 - Near neutral condition

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

SAT index issued from Mercator Ocean PSYV4R2 analysis : $+0.5^{\circ}\text{C}$

This anomaly is relatively strong compared to the variability in this area (in the upper tercile).



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

- 1 - Very strong deviation from normal
- 2 - Quite strong anomaly for the area

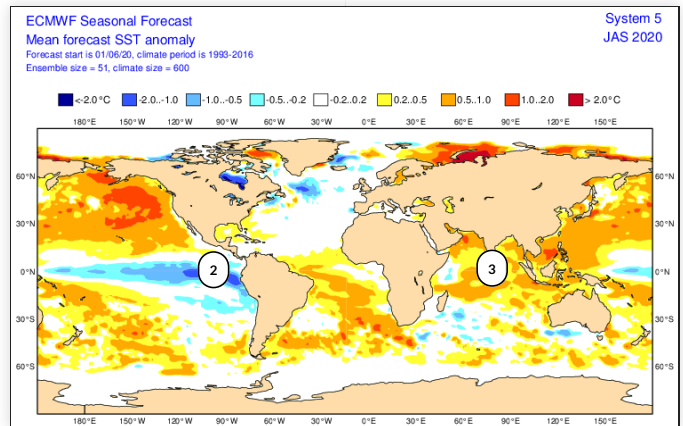
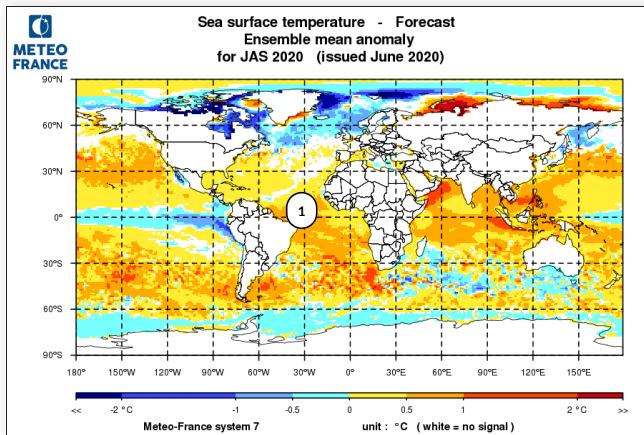
Oceanic forecast : SST anomaly

Good agreement between MF-S7 and ECMWF-SEAS5, MF7 is slightly colder in the middle and high latitudes while SEAS5 is colder in the tropics belt.

In the Pacific Ocean : the cooling forecasted in Eastern equatorial Pacific is quite strong for the next 3 months (see next slides for further development). Elsewhere, the Pacific Ocean is expected to be warmer than normal especially the northeast quarter.

In the Indian Ocean : warm anomalies forecasted north of 20°S. Along the equator, MF7 is a little warmer but the West-East gradient (IOD) is very similar in both models.

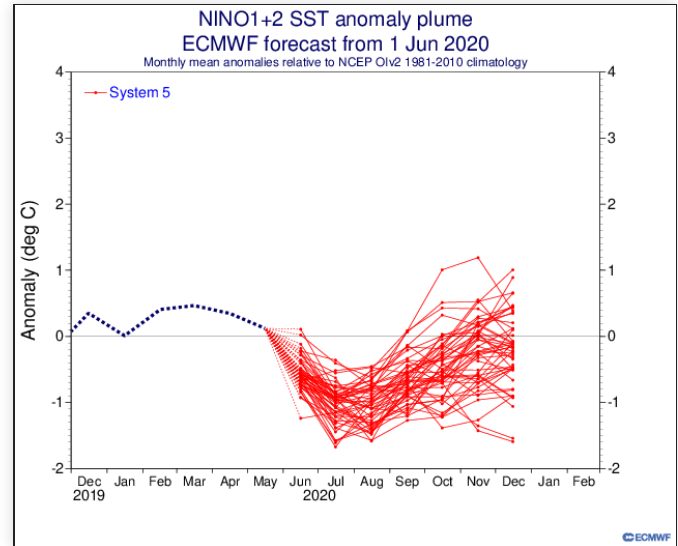
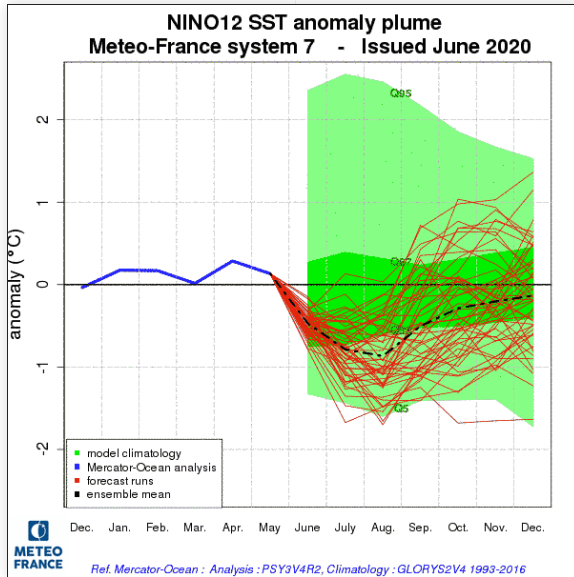
In the Atlantic Ocean : warmer than normal along the equator and in the southern hemisphere. Weak anomalies in the northern hemisphere up to 45°N. Colder than normal above 45°N.



- 1 - warmer than normal
- 2 - cold anomaly in the eastern part along the equator
- 3 - ECMWF-SEAS5 colder than MF-S7 but West-East gradient is similar

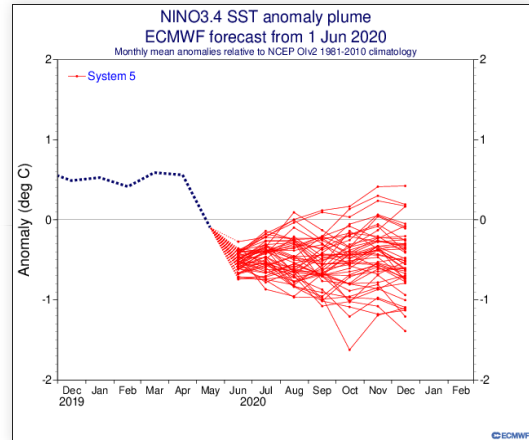
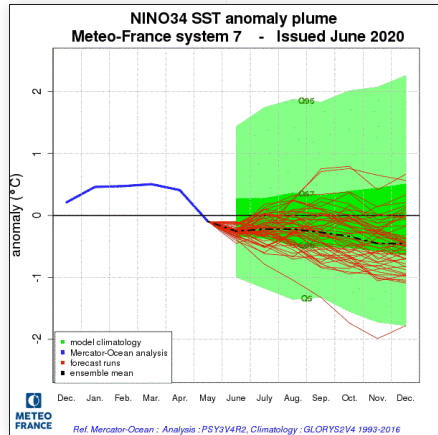
Oceanic forecast : NINO1+2 Plume diagrams

Near the coasts of South America, the two models show the same evolution: the decrease observed since May, with the arrival of a cold Kelvin wave, will continue but more slowly during the summer, the anomalies should then return to near-zero values in the fall.



Oceanic forecast : NINO3.4 Plume diagrams

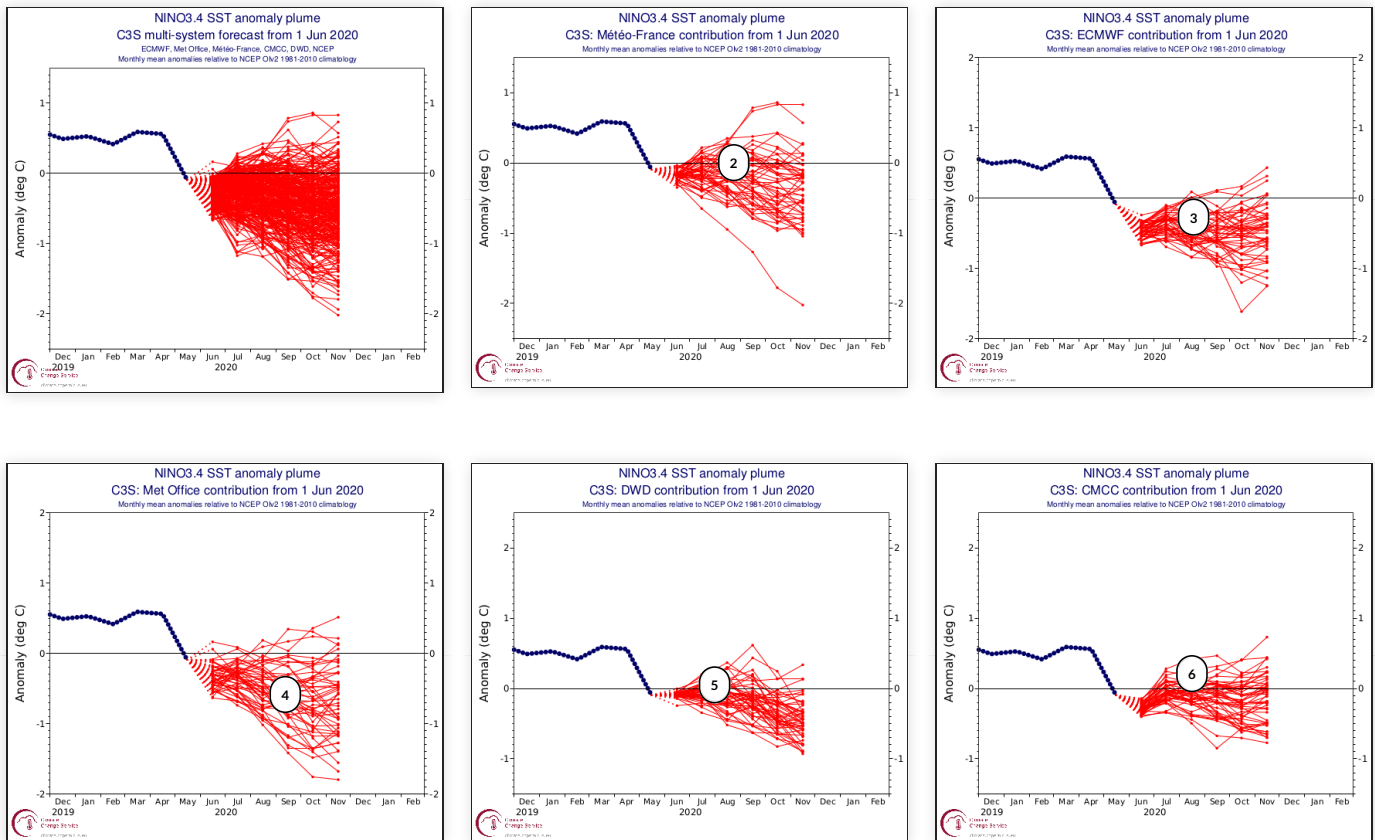
The sharp fall in SST observed in May (see analysis) is not expected to continue in the coming months. As expected in the analysis, there is no cold reservoir after this drop and the anomalies should remain at slightly negative values at the La Nina threshold limit.



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

A majority of multimodel simulations give slightly negative values. However, the dispersion is strong and increases in the fall.

Forecasted Phase for the next three months : neutral conditions

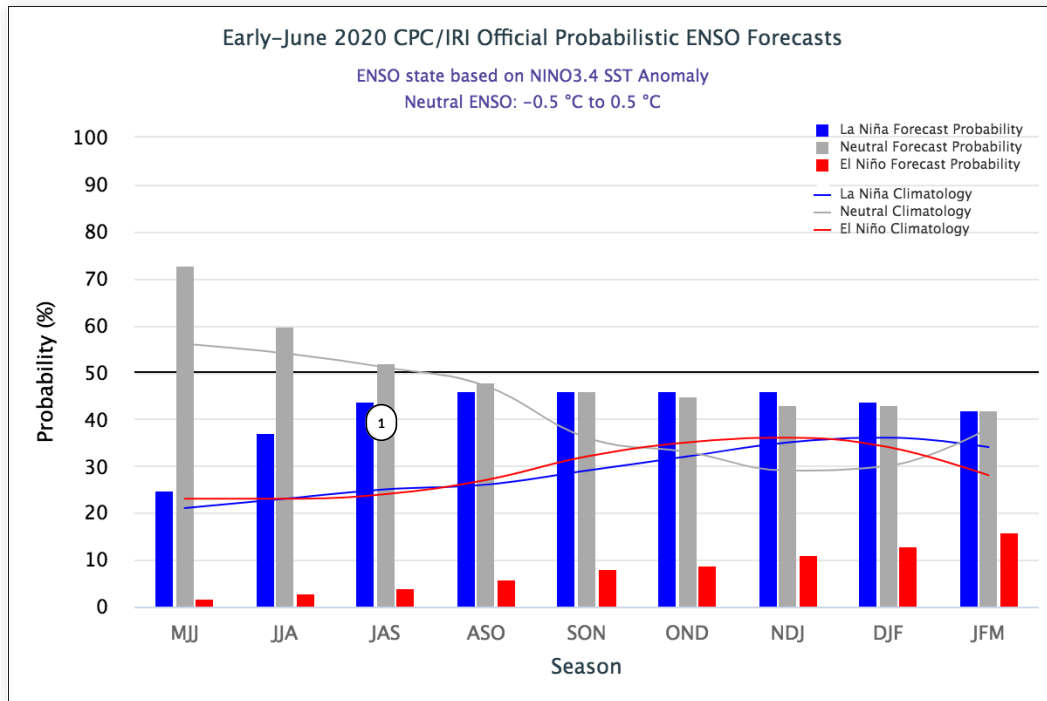


C3S plume diagrams re-scaled from the variance of observations for the period 1981-2010.

- 2 - Quite strong dispersion with some atypical runs
- 3 - stable around -0.5 °C
- 4 - large dispersion probably linked to the model initialization method
- 5 - Little dispersion, just below zero
- 6 - CMCC has the warmer option

Oceanic forecast : Synthesis from IRI

Neutral conditions are slightly more likely than La Nina for JAS and become equally likely for the next quarters.

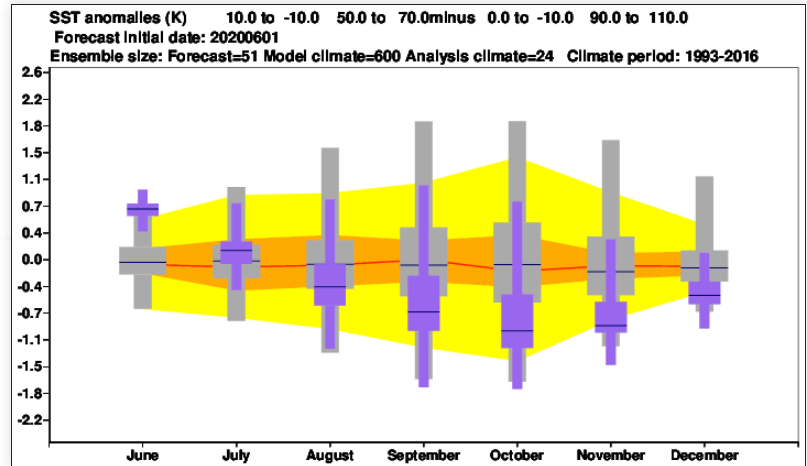
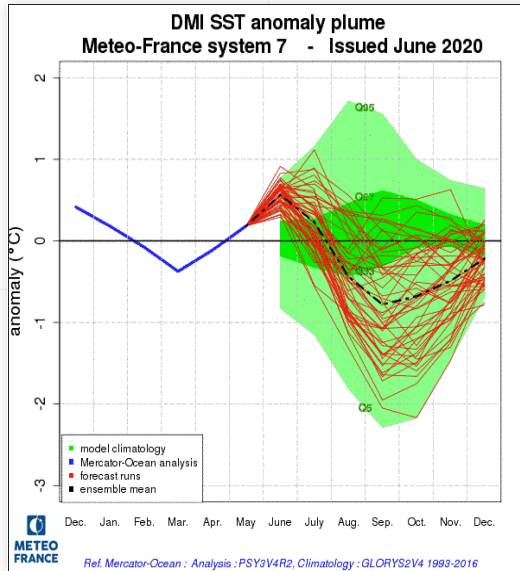


Probability of Niño, Niña, and neutral phases for the next 8 quarters. source <http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/>

1 - neutral forecast slightly more likely than La Nina

Oceanic forecast : Indian ocean - DMI evolution

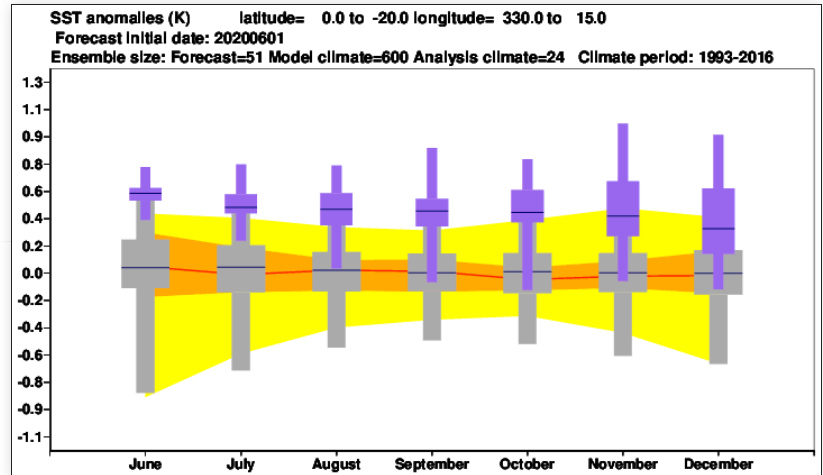
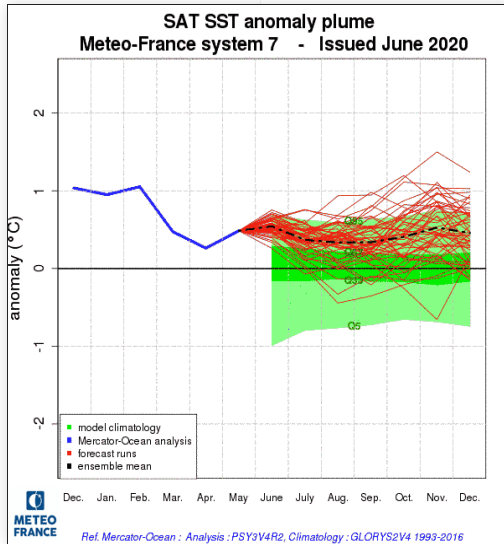
Very good agreement between both models in the Indian Ocean. The DMI is expected to fall sharply in next 3 months, toward a strong negative IOD situation, before starting to go up in the longer term.



DMI index : analysis, forecasts and model climatology with M7 on the right and SEAS5 on the left

Oceanic forecast : Atlantic ocean - SAT evolution

Continuation of relatively strong positive anomaly compared to the weak climatological variability of the area (most members in the upper tercile).

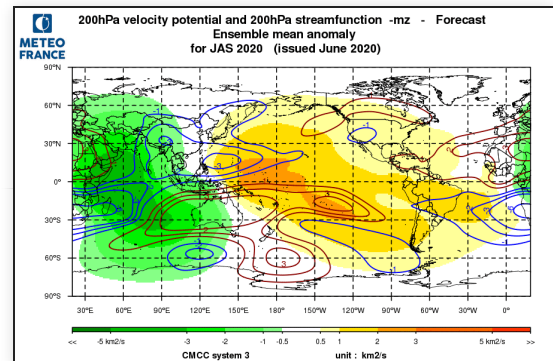
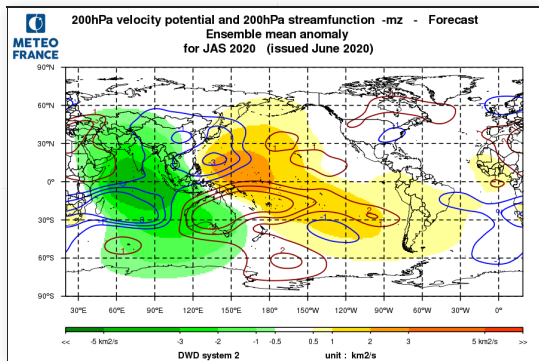
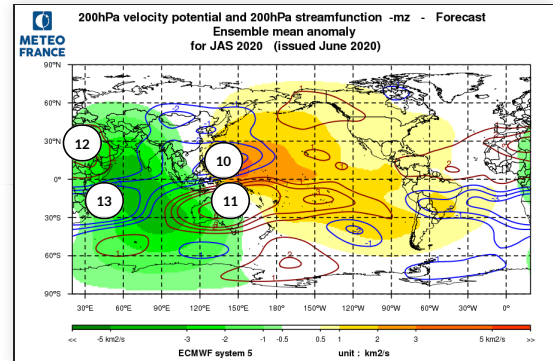
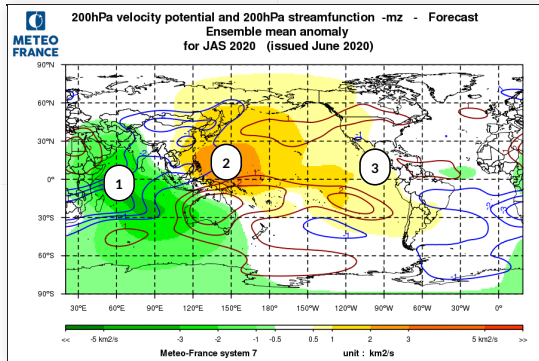


Anomaly on the SAT box : analysis, forecasts and model climatology with MF7 on the right and SEAS5 on the left

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

Velocity Potential : The models are in good agreement concerning the main anomalies : an upward motion anomaly area over the Indian Ocean, consistent with the warm SST anomaly, and a downward motion anomaly over the Western Pacific extending to the all basin with weaker value and even to America in some models (ECMWF and CMCC). Anomalies are weak over the Altantic.

Streamfunction : The models are in good agreement concerning the quadripole of anomalies around the Indian Ocean is consistant with the dipole anomaly pattern of VP 200.

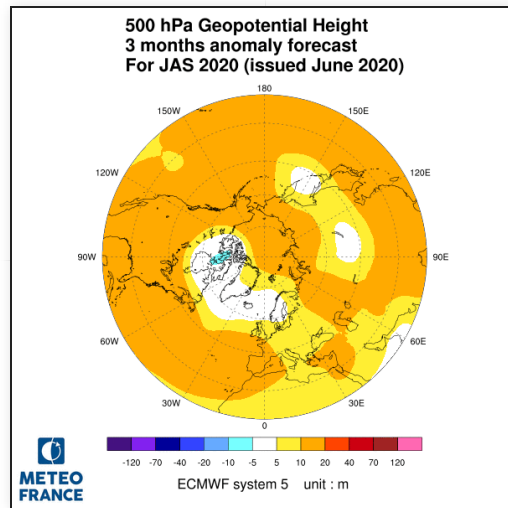
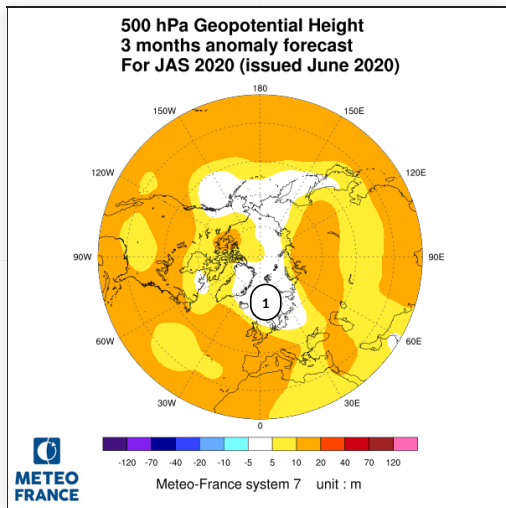


MF7, SEAS5, DWD and CMCC 200hPa velocity potential anomalies (color range, green : ascending, orange : subsidence) and stream function anomalies (isolines, red : anticyclonic in the northern hemisphere, blue : cyclonic in the northern hemisphere).

- 1 - VP : Huge area of upward motion anomaly
- 2 - VP : main downward motion anomaly
- 3 - PV : extension to the East Pacific with weak value
- 10 - SF : cyclonic area of the quadripole
- 11 - SF : cyclonic area of the quadripole (south hemisphere)
- 12 - SF : anticyclonic area of the quadripole
- 13 - SF : anticyclonic area of the quadripole (south hemisphere)

Atmospheric circulation forecasts : 500 hPa Geopotential anomalies

Rather good consistency between the 2 models over the Atlantic, Europe, Mediterranean Sea and Middle-East. Strong average values over western and southwestern Europe as well as from Russia to the Middle East. Conversely, low values on the Norwegian Sea and Scandinavia



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

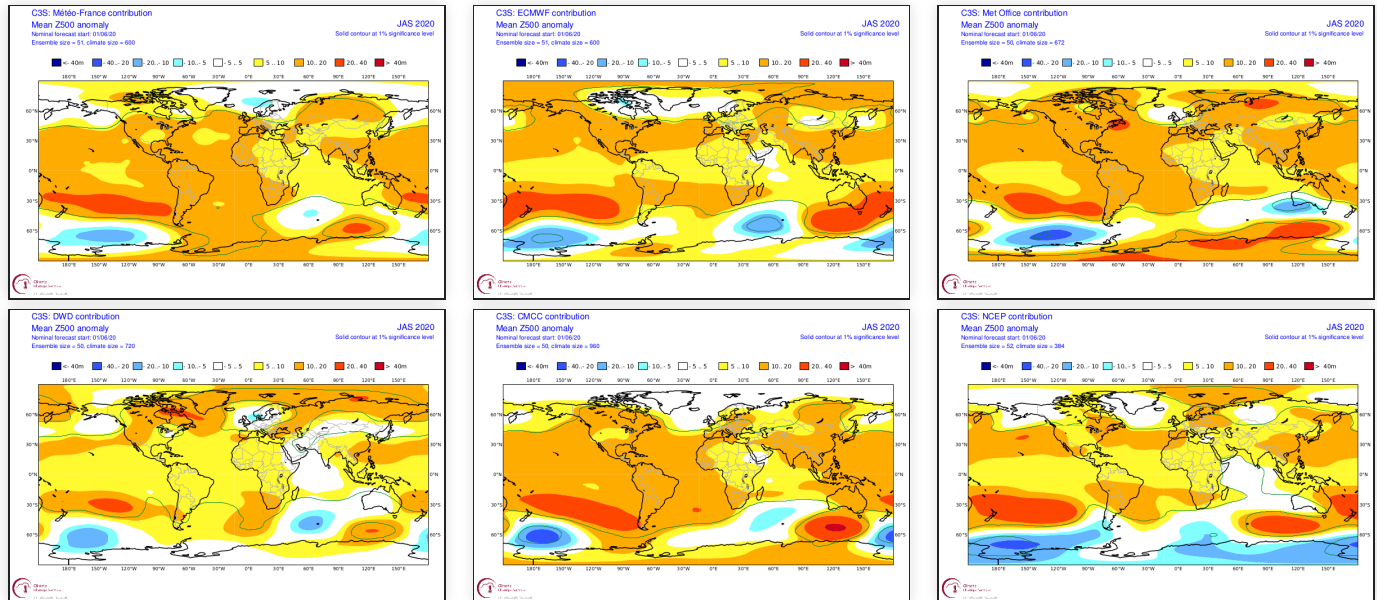
1 - MF7 is a little more hollow, resulting in a stronger gradient in the North Sea

Atmospheric circulation forecasts : Z500 anomalies in C3S models

For the North Atlantic and Europe, the general pattern is fairly well shared. With high values over a large southern and eastern part of the continent and around the Mediterranean basin. Low values are expected over the far north of the Atlantic with a more or less pronounced extension towards Scandinavia.

The relative weakness on the Indian Ocean is also more or less marked in all the models with a variable extension towards the Arabian peninsula

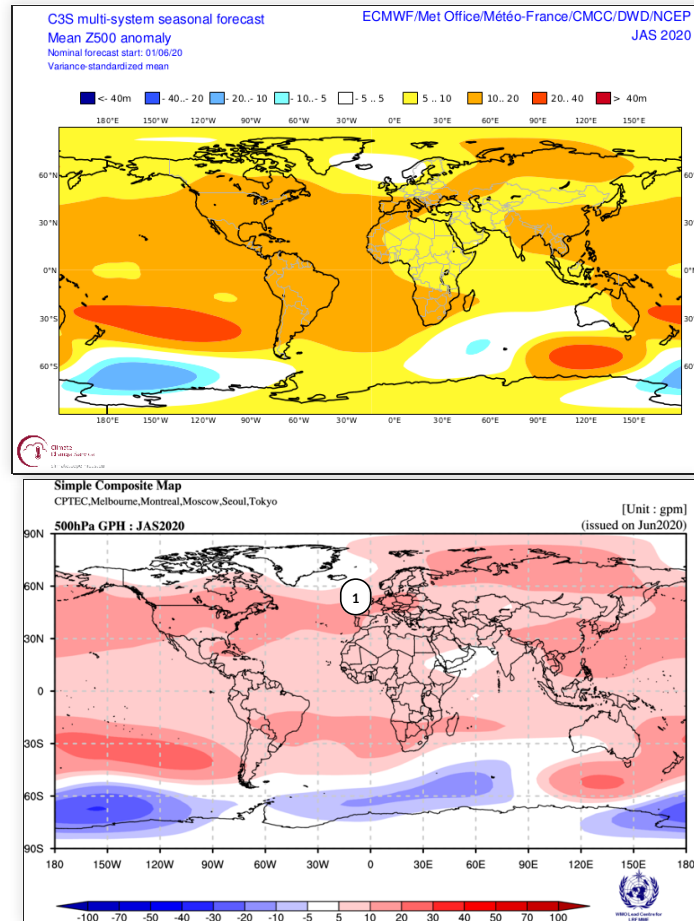
The consistency is less good over the rest of the high latitudes of the northern hemisphere.



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

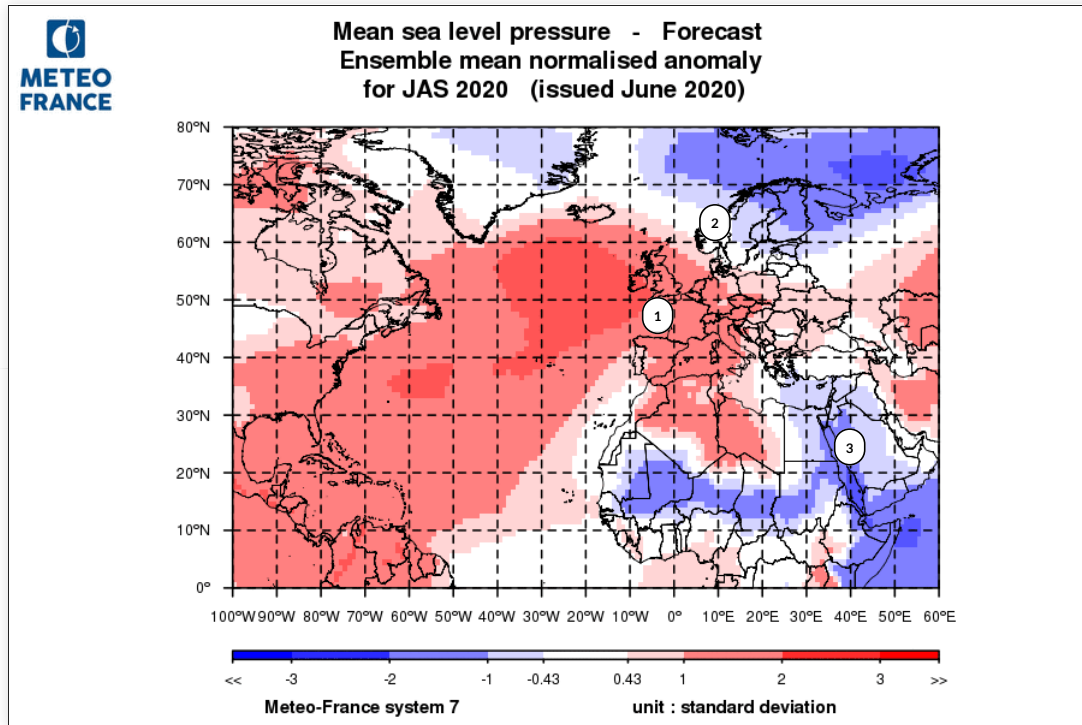
Atmospheric circulation forecasts : Z500 anomalies multi-systems

Consistent general scheme but the low values on the North Atlantic are more widespread towards Scandinavia with the C3S multi-model



Atmospheric circulation forecasts : Normalised MSLP

this field is only available for MF7

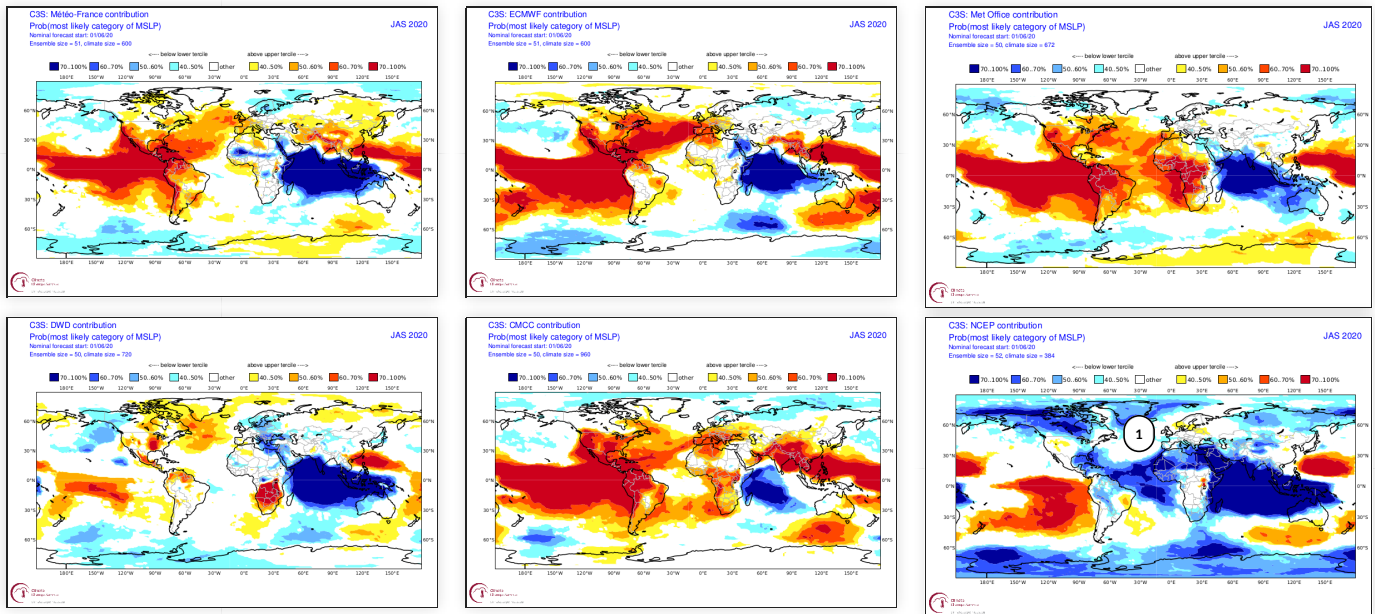


- 1 - High values on Western Europe
- 2 - Strong gradient due to low values on north.
- 3 - Low values linked with Indian Ocean situation

Atmospheric circulation forecasts : MSLP probabilities

Strong dipole between the Indian Ocean and the Pacific in the tropics, in links with the VP200 anomalies.

Most models forecast a positive anomaly across North Atlantic extending over Western Europe, and a East-West gradient over the Mediterranean sea.

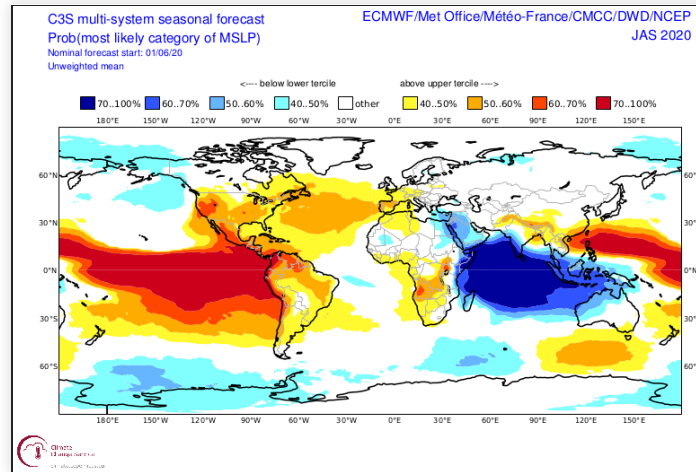


MF-S7, SEAS5, UKMO, DWD, CMCC and NCEP models probability maps.

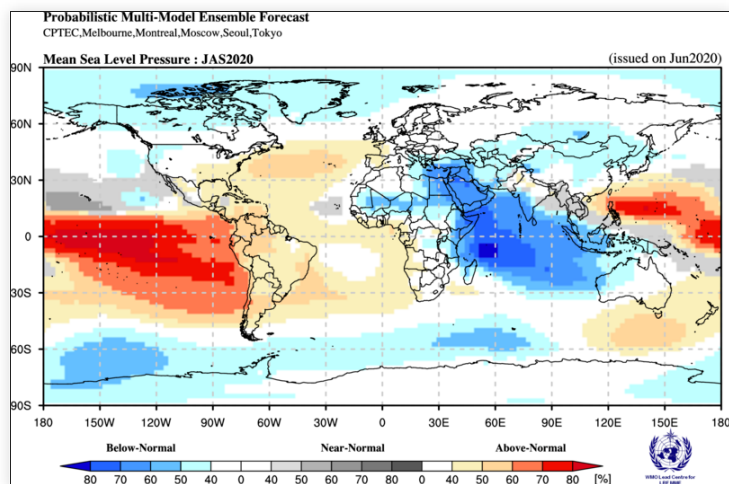
1 - the NCEP model is out of standard for this forecast

Atmospheric circulation forecasts : MSLP probabilities multi-systems

Fairly good agreement between the two multi-models. On the North Atlantic, the pattern is very close to the Summer Zonal weather regime.



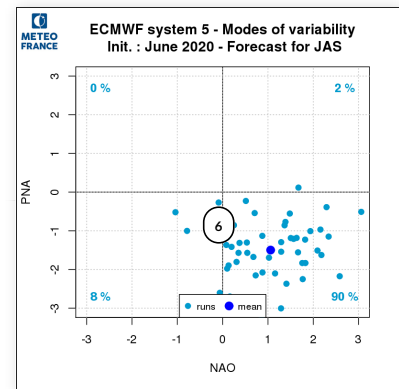
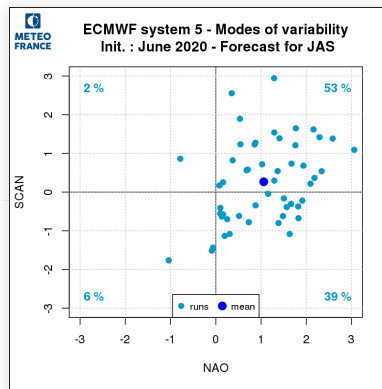
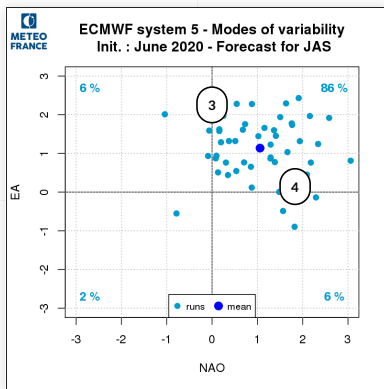
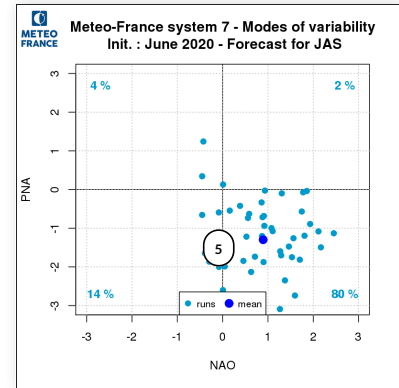
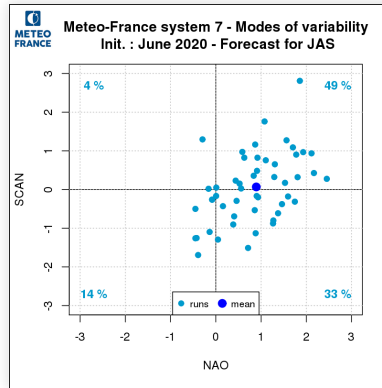
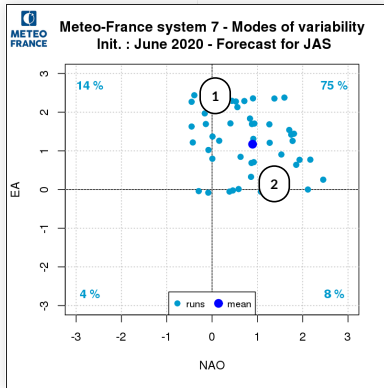
C3S multi-models.



Others models of WMO multi-models.

Modes of variability : forecast

Both models suggest a high probability of positive NAO mode and positive EA mode (A part of this probably is linked to climate change),

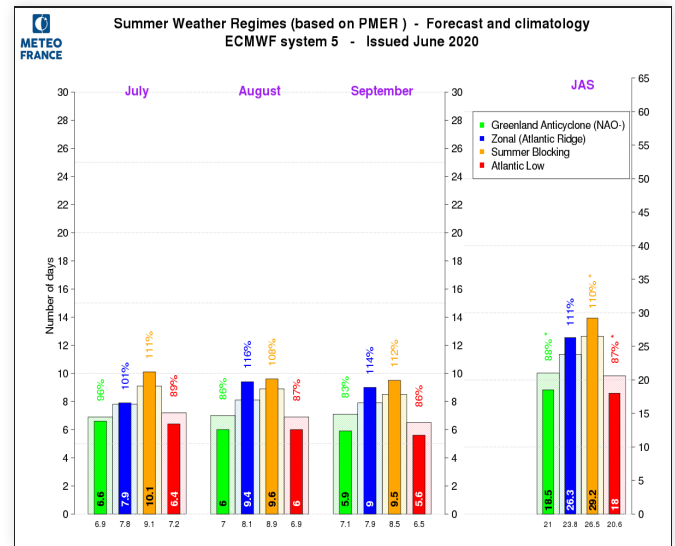
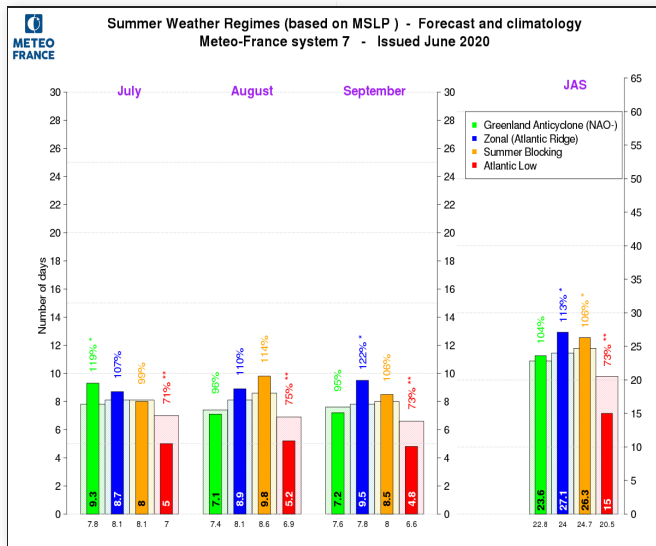


[see the modes of variability patterns](#)

- 1 - positive EA for 91% of runs.
- 2 - positive NAO for 83% of runs.
- 3 - positive EA for 92% of the runs
- 4 - positive NAO for 92% of the runs
- 5 - practically all runs in negative PNA
- 6 - practically all runs in negative PNA

Weather regimes : summer MSLP

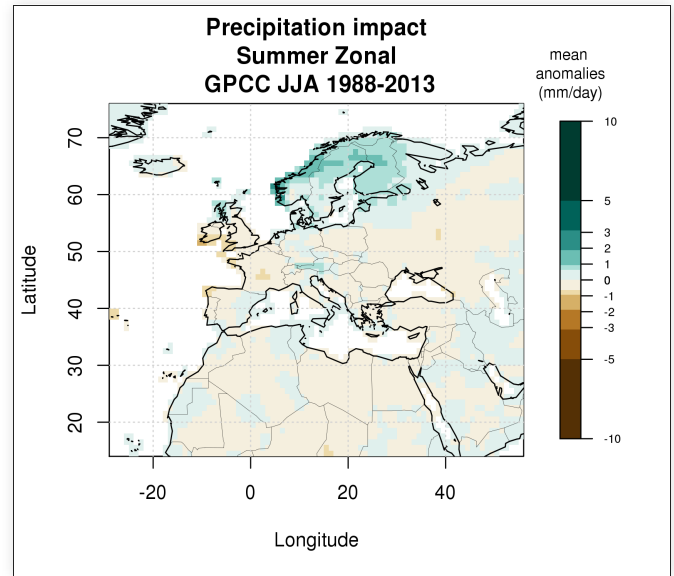
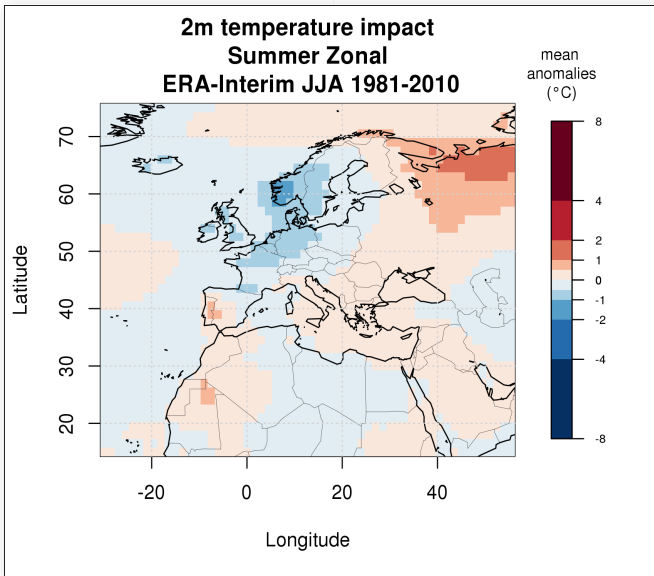
Both models benefit the Zonal and Summer Blocking regimes at the expense of the Atlantic Low regime.



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

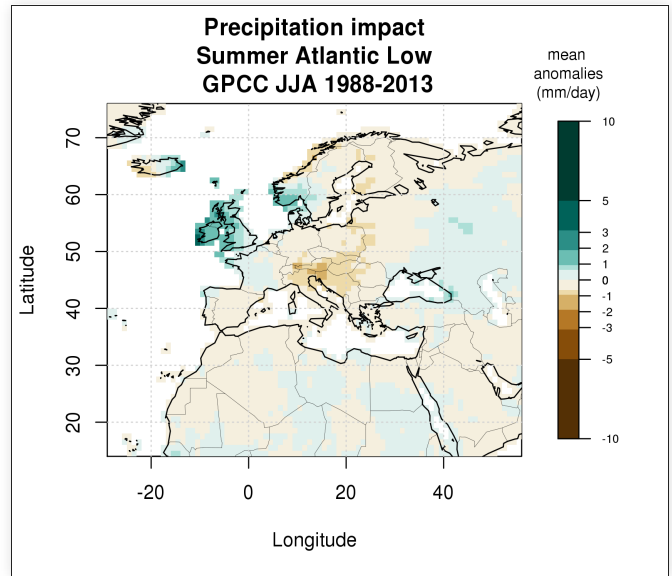
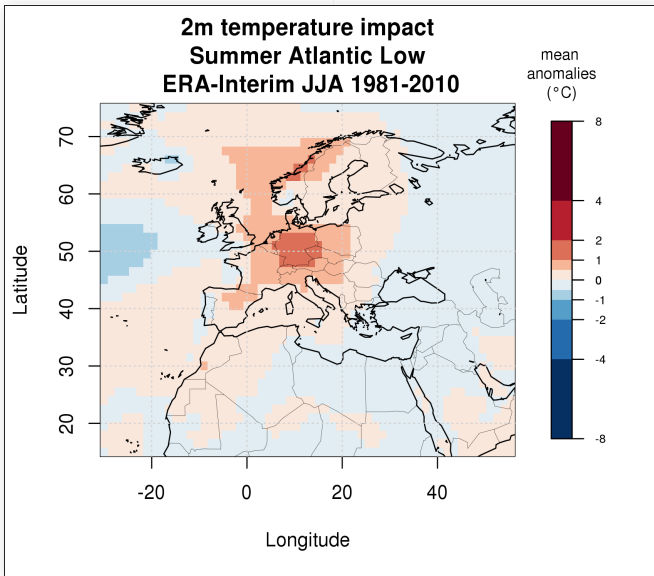
Summer Zonal weather regime should favored



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

Weather regimes : Impacts

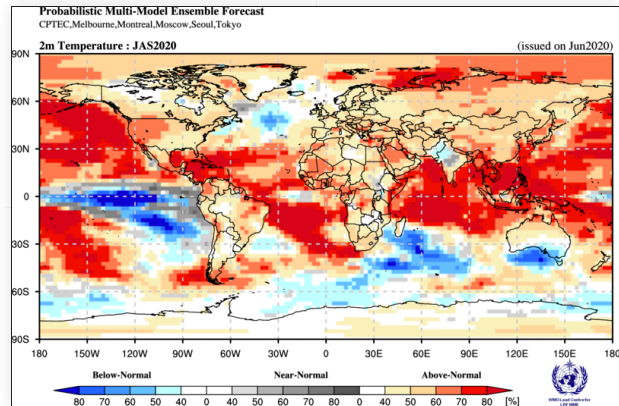
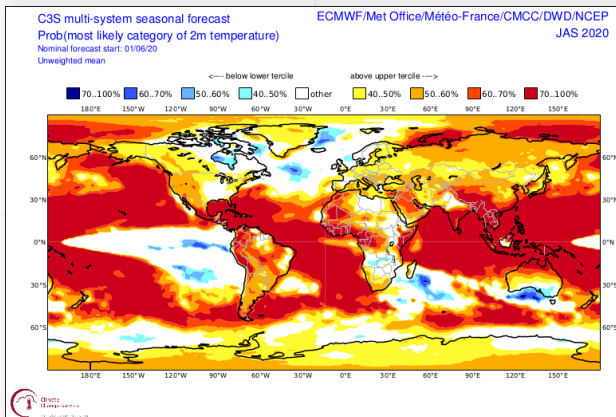
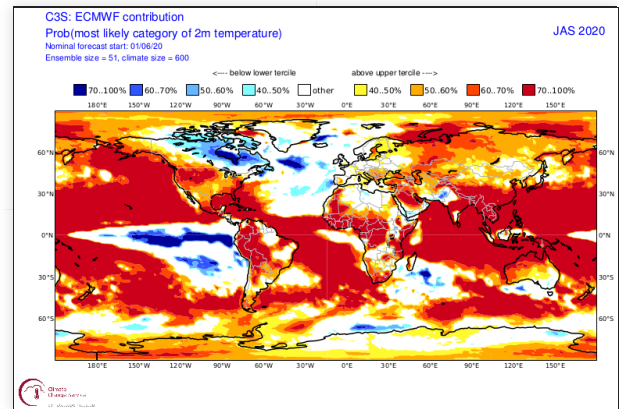
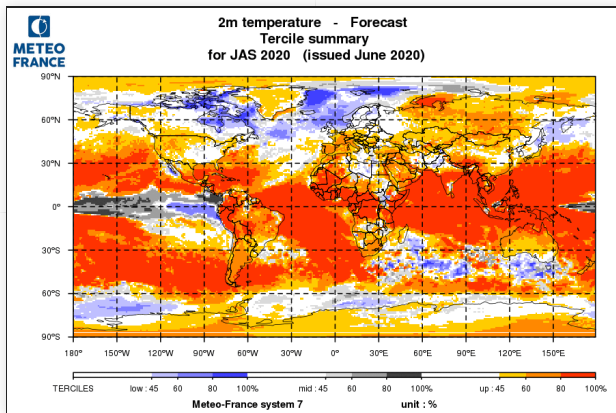
Atlantic Low weather regime should be less frequent than normal favoring the opposite of these charts.



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

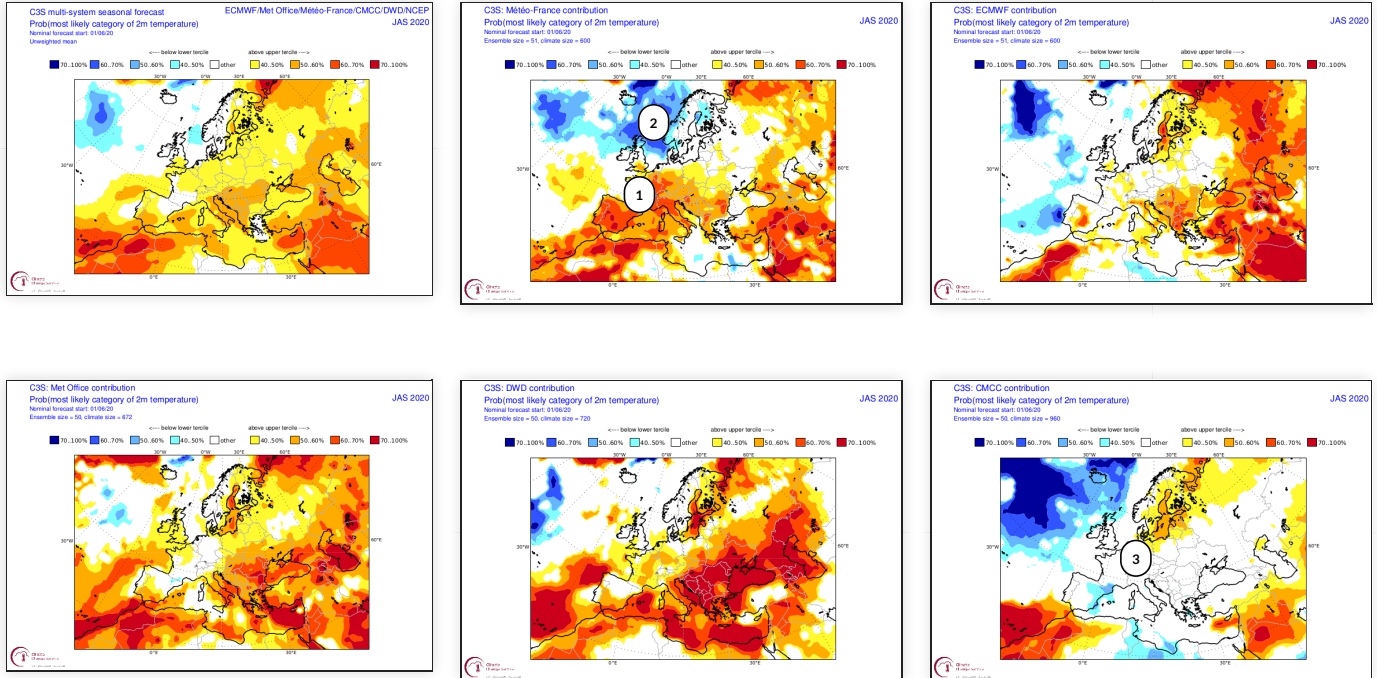
The general trend towards positive anomalies in continental areas is linked to climate change. This trend is attenuated in regions around the North Atlantic due to colder than normal ocean temperatures.



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

There is no consensus for Europe. An increased probability of warmer than normal is emerging on the south and east of the domain in the majority of models.

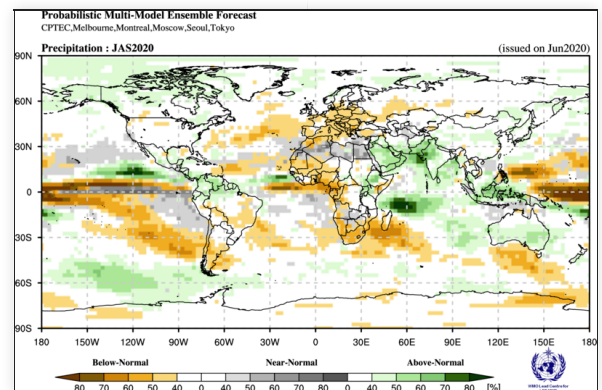
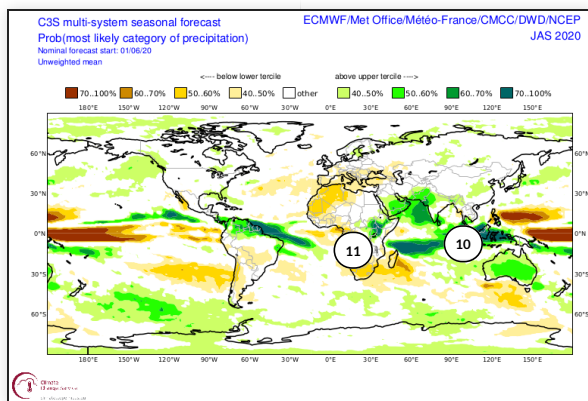
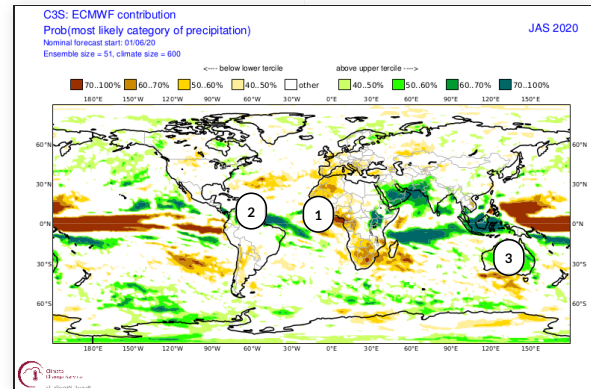
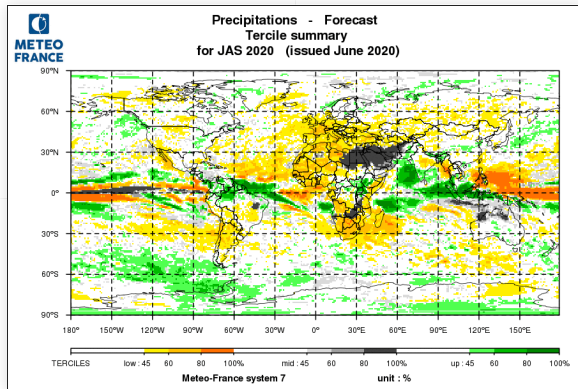


C3S multi-models probability map (top left) and MF-S7, ECMWF-SEAS5, UKMO (bottom left), DWD, CMCC models.

- 1 - MF7 has the highest probability of warm over western Europe.
- 2 - MF7 has the highest probability of cold on North Sea
- 3 - The CMCC forecast has the coldest option

Forecast of climatic parameters : Precipitation

Good consistency of models in the tropical belt where the forecast is a continuation of previous months.



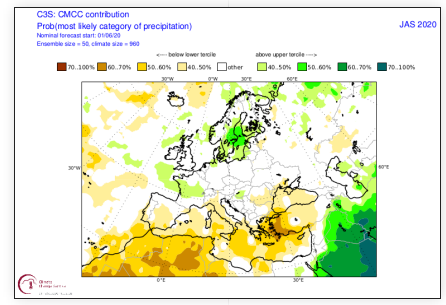
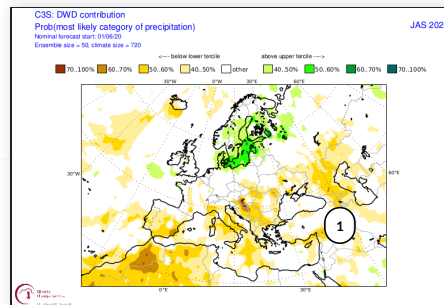
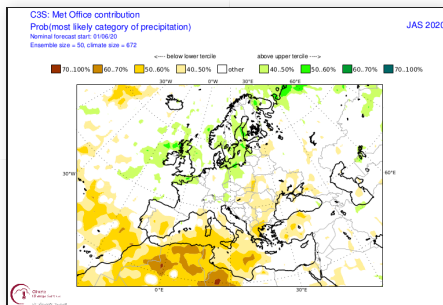
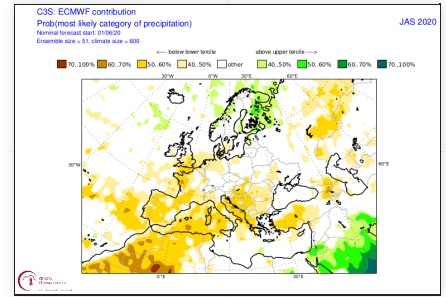
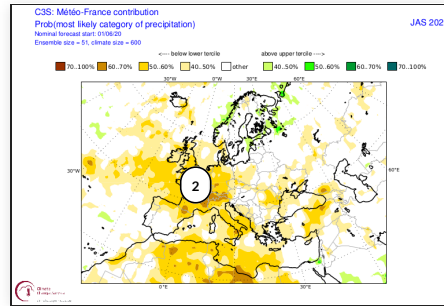
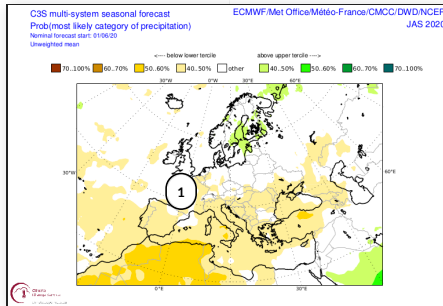
precipitation probability map from MF-S7 (top left), ECMWF-SEAS5 (top right), C3S multi-models (bottom left) and others models of WMO multi-models (bottom right)

- 1 - dry signal
- 2 - wet signal
- 3 - continuation of the wet signal (negative IOD)
- 10 - Strong wet signal
- 11 - dry signal

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

The models agree on a drier than normal scenario for the Mediterranean area. Good consensus on the wet probability over Scandinavia

With the high pressure fields expected on the west of the continent, dry conditions should prevail. This trend is not evident in all models.



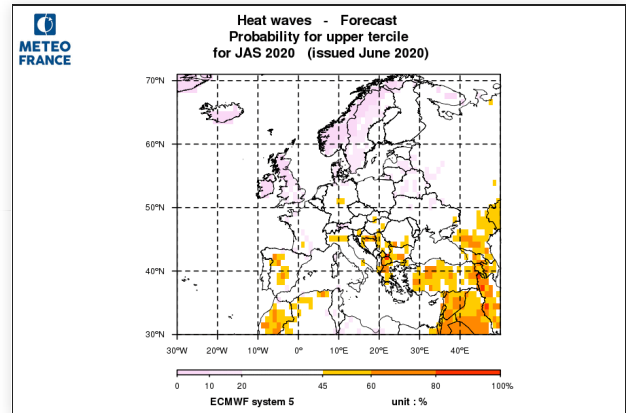
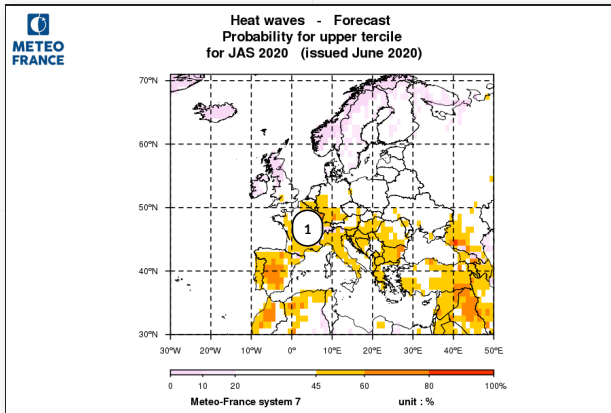
C3S multi-models probability map (top left) and MF-S7, SEAS5, UKMO, DWD, CMCC models.

- 1 - weak dry signal
- 1 - this wet forecast seems unrealistic and strongly influences the multi-model
- 2 - MF7 has the most drier scenario for Western Europe

Forecast of climatic parameters : Heat waves

The probability of heat waves is very high in MF-S7 for the south and western Europe. ECMWF is more moderate and limits the risk to the Mediterranean area.

At the contrary, it is low over Northern Europe (lower than normal).

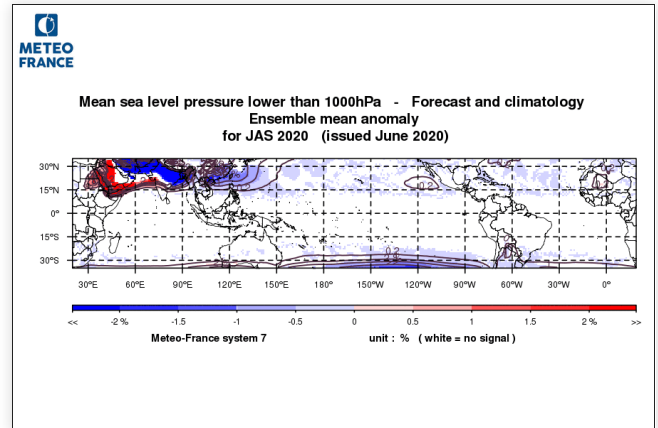
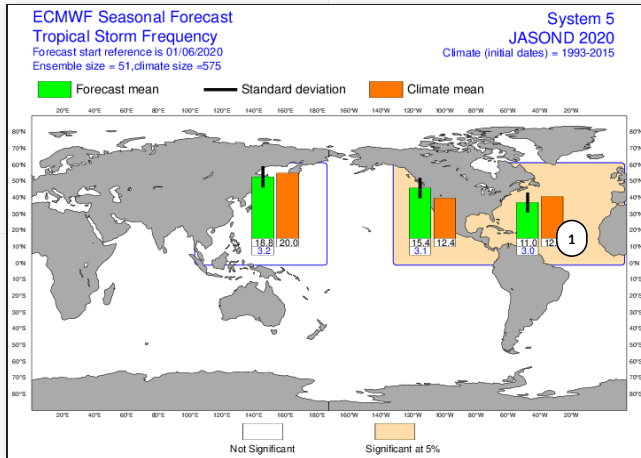


Heat wave probability for MF7 (right) and ECMWF (left). A heat wave is detected if the corrected T2M is above the daily 90th percentile and a fixed 20°C threshold. [more details here](#)

1 - In the logic of MF7 forecast, the risk of heat waves is strong over western Europe

Forecast of climatic parameters : Tropical Storm Frequency

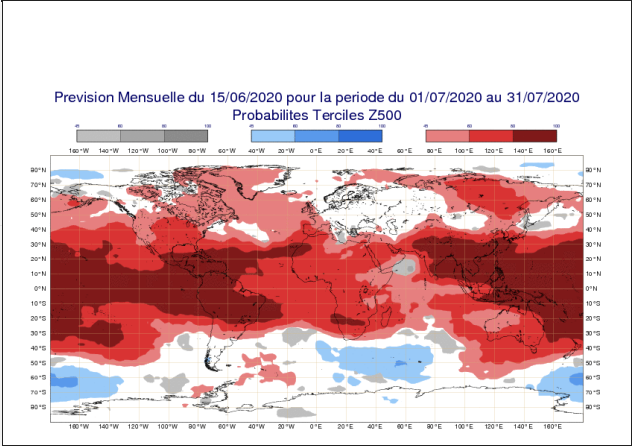
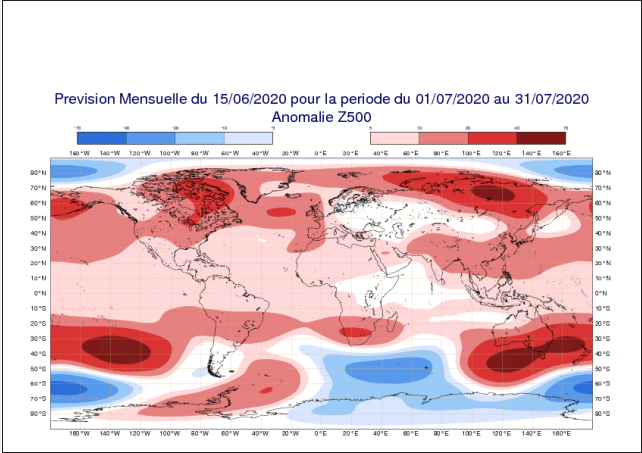
Cyclone season activity may be less intense than normal in the Atlantic (in both methods). ECMWF forecast a higher than normal activity in eastern Pacific which seems contradictory with ocean temperatures on the equatorial pacific.



1 - less intense than normal

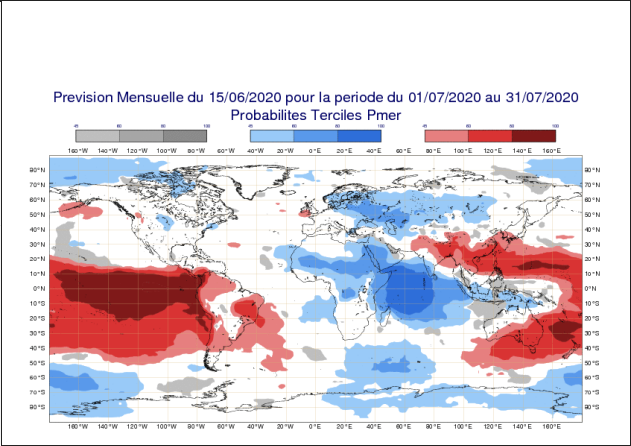
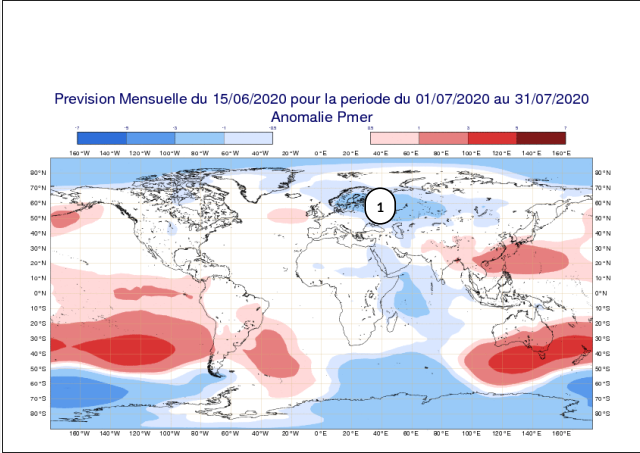
Monthly forecast of 20200615 : Z500

The high geopotential on the near Atlantic and the western facade of Europe are present from the first month



Monthly forecast of 20200615 : MSLP

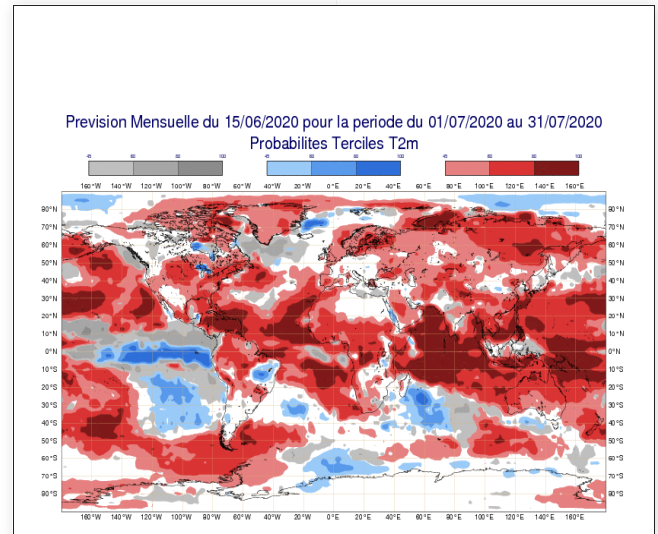
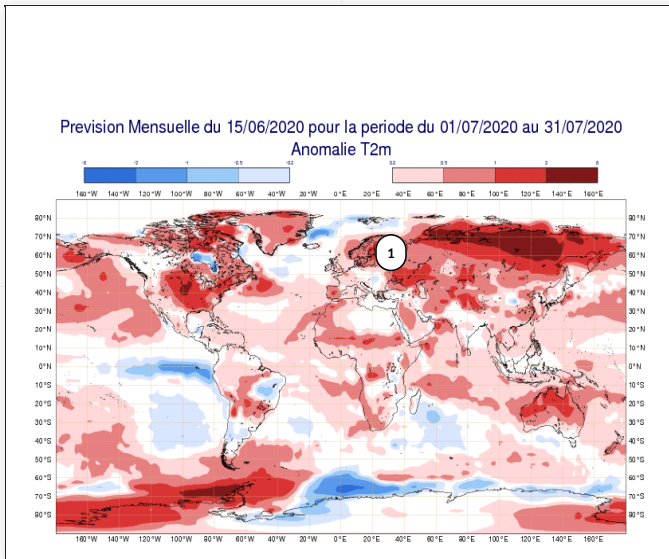
High perssure on the near Atlantic, low pressure in Northeastern Europe and a significant gradient on the North Sea



1 - low pressure anomaly

Monthly forecast of 20200615 : temperature

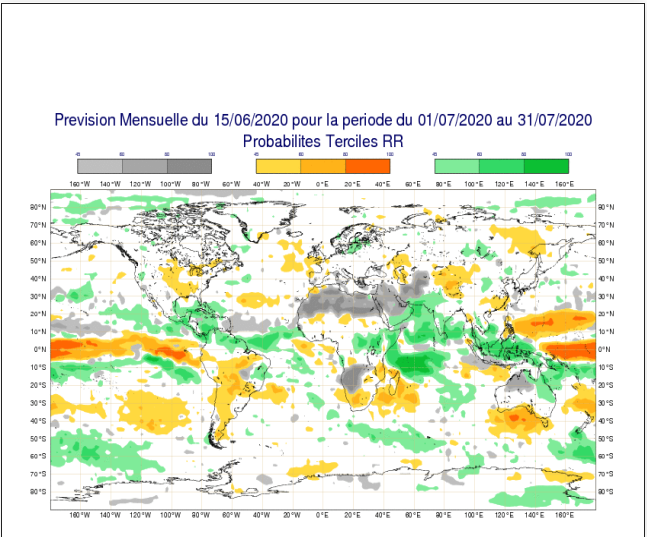
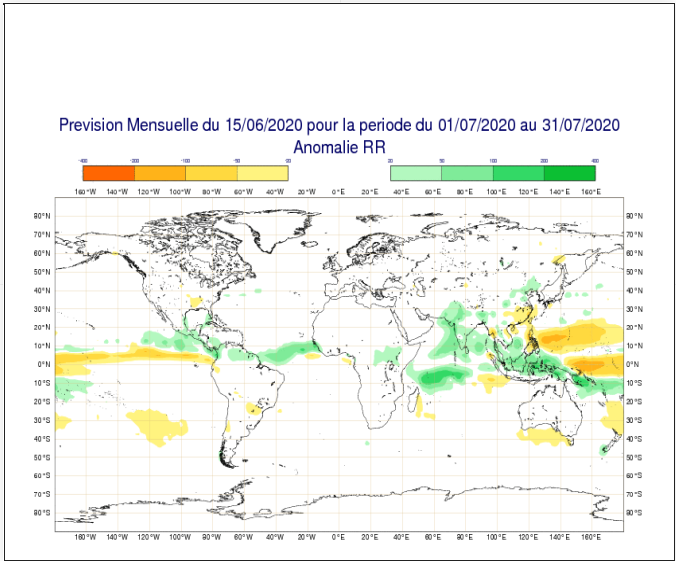
The pattern of the first month in Europe looks like the seasonal forecasts.



1 - warm anomaly for the month on the northeastern Europe In line with low pressures.

Monthly forecast of 20200615 : precipitation

Weak dry signal over near Atlantic, wet little signal on the Baltic Seas.

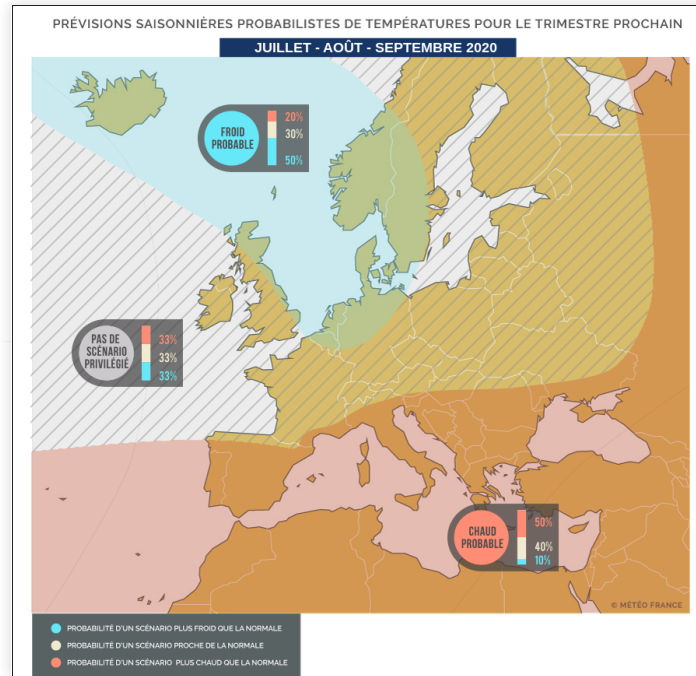


Synthesis map for Europe : Temperature

The warm area follows the increased probability of warmer than normal emerging from the models on the south of Europe.

In a context of favored zonal regime, the cold zone corresponds to the north-west flow reinforced in the strongest gradient.

No scenario elsewhere.



Synthesis map for Europe : Precipitation

The high pressure values on the Atlantic coast should limit the frequency of precipitation. Further to the east, the increased northwest flow should favor precipitation over Scandinavia and the neighboring regions of the North Sea and, conversely, decrease it over the south of the continent.

