

Météo-France Seasonal Forecast Bulletin

AUGUST - SEPTEMBER - OCTOBER 2020

Table of Content

1. General synthesis	
1. ASO 2020	3
2. Oceanic analysis of June 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. Indian Ocean - WTIO index history	9
3. Oceanic forecast	
1. SST anomaly	10
2. NINO4 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
4. Atmospheric circulation forecasts	
1. velocity potential and stream function at 200hPa	16
2. 500 hPa Geopotential anomalies	17
3. Z500 anomalies in C3S models	18

General synthesis : ASO 2020

A) Oceanic forecast :

- **neutral ENSO situation**, but with negative anomalies close to the La Nina threshold. The decrease observed since May will stop during the summer. In the autumn a further decline is likely and Nina conditions could be installed.
- **IOD** : It has become positive again but a strong decrease is expected in next 3 months, toward a negative IOD situation more or less accentuated according to the models.

B) Atmospheric circulation :

- Upward velocity potential anomaly over the Indian Ocean. 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 west Africa and from northern Africa to the Mediterranean basin and the Middle east.
- **over Europe** : warm over south and east of Europe. Drier than normal in the southern part of Europe. Wet probabilities over Scandinavia and nearby.

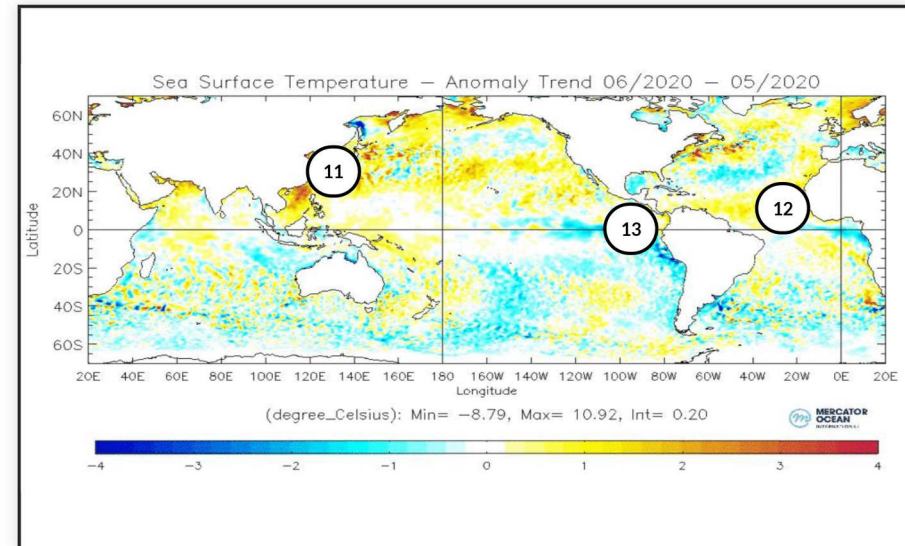
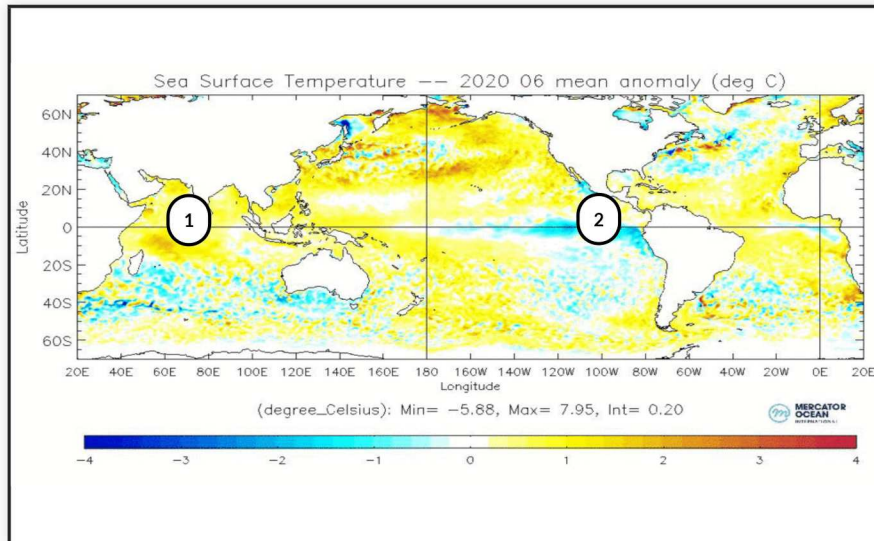
Next bulletin : scheduled on August 21th

Oceanic analysis of June 2020 : SST anomalies

Current ENSO situation : neutral conditions.

The Atlantic and the Pacific have cooled along the equator in the western part of the basin. The tropical North Atlantic is, on the contrary, strongly warmed.

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

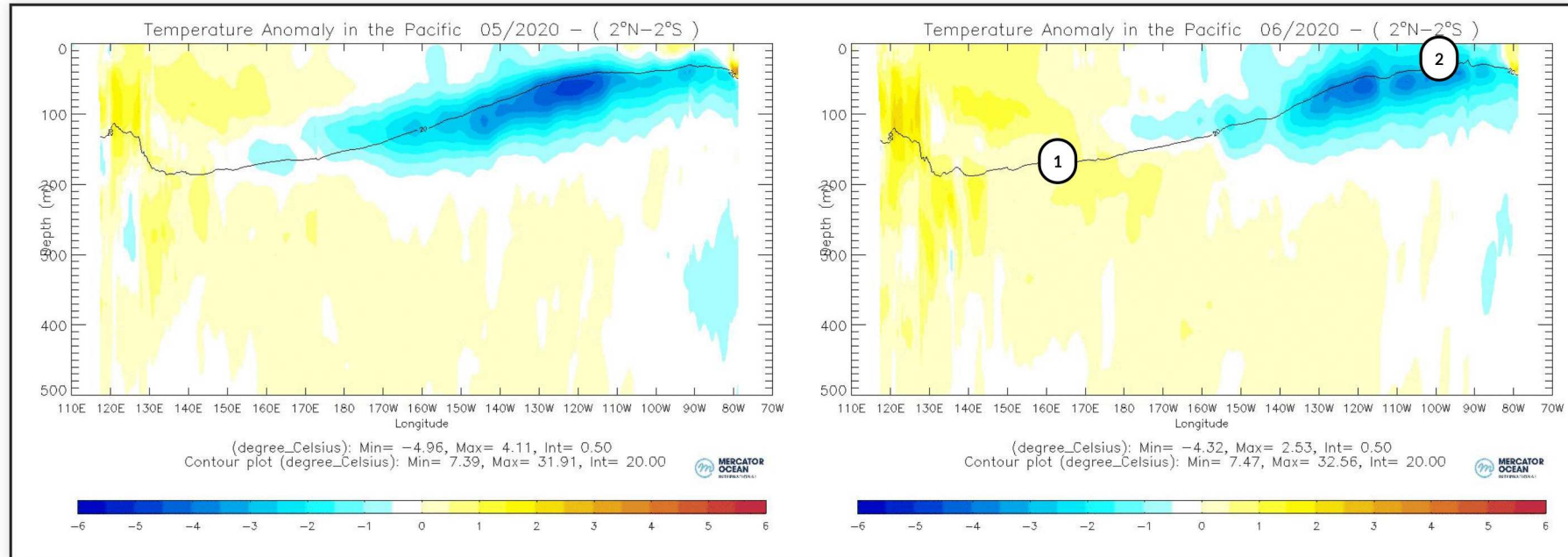


SST Anomalies and trend with the previous month (c) Mercator-Ocean

- 1 - warm Indian Ocean with positive DMI
- 2 - The cold anomalies were well accentuated
- 11 - strong warming
- 12 - Strong warming
- 13 - Strong Cooling

Oceanic analysis of June 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.

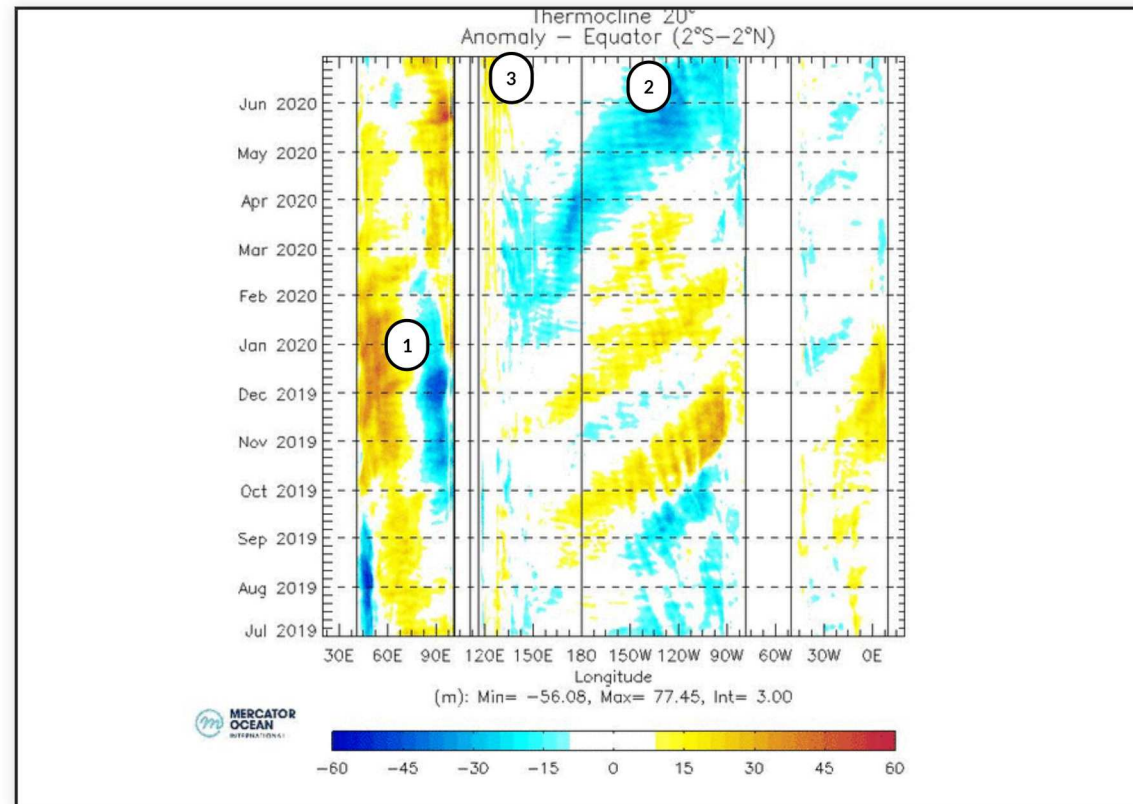


Ocean temperature anomalies in the first 500 meters of the equatorial Pacific basin, monthly average. (c) Mercator-Ocean

- 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 June 2020 : Hovmöller 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

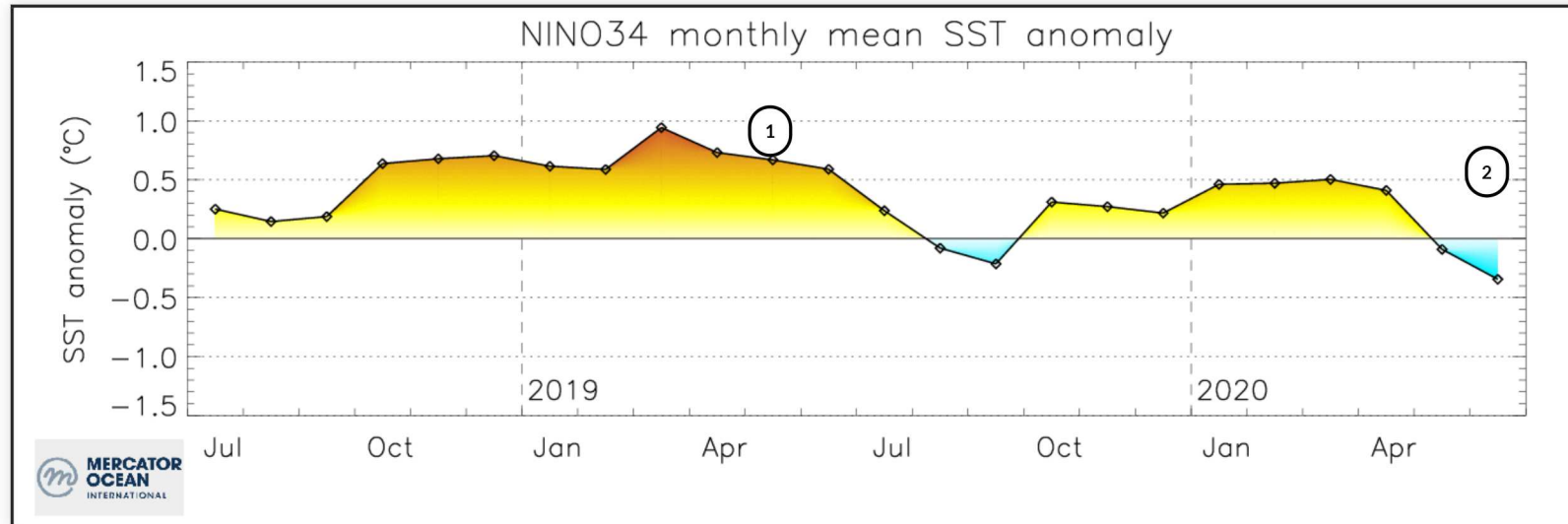
- 1 - Strong IOD of the end of 2019
- 2 - The cold wave reaches the eastern part of the Pacific basin
- 3 - No anomaly at the rear

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

Nino3.4 index issued from Mercator Ocean PSYV4R2 analysis : -0.4 °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.



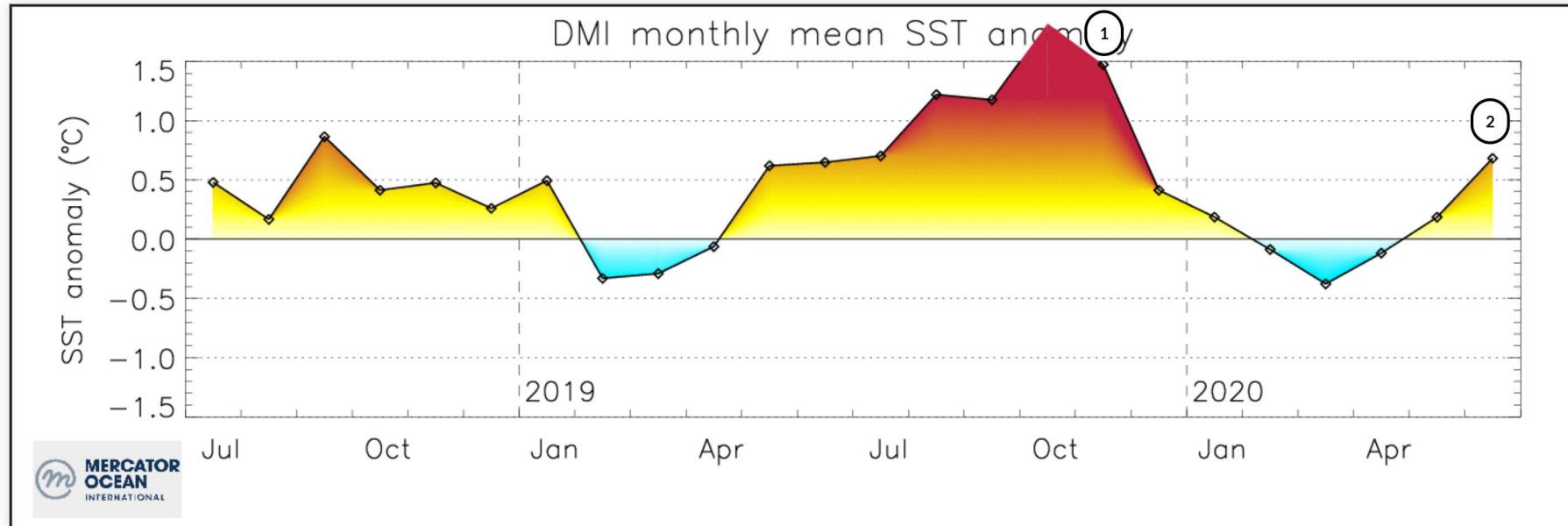
Evolution of SST in the NINO3.4 box (c) Mercator-Ocean

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

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

DMI Index issued from Mercator Ocean PSYV4R2 analysis : +1.2°C

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



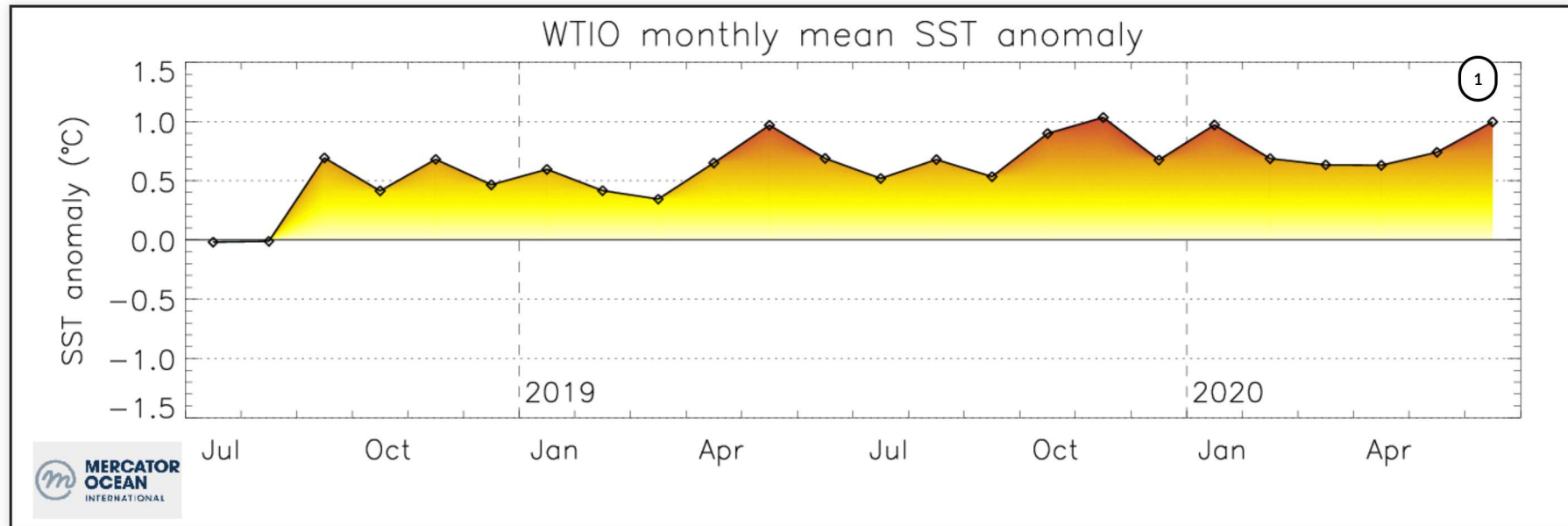
Evolution of SST in the DMI box (c) Mercator-Ocean

- 1 - IOD on record in october
- 2 - Return to positive phase

Oceanic analysis of June 2020 : Indian Ocean - WTIO index history

WTIO index issued from Mercator Ocean PSYV4R2 analysis : $+1.0^{\circ}\text{C}$

This anomaly remains strong compared to the variability in this area (in the last decile).



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

1 - Very strong deviation from normal

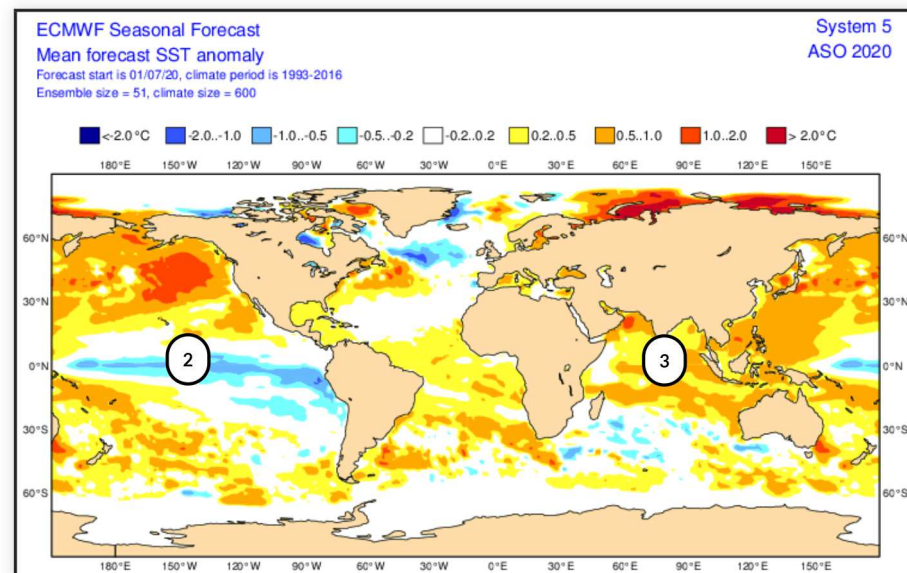
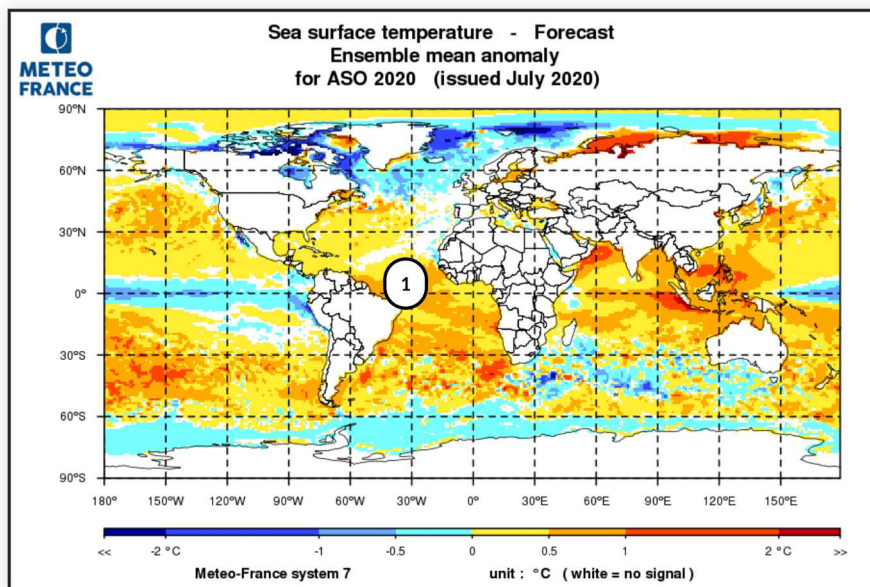
Oceanic forecast : SST anomaly

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 : Along the equator cooling extends west beyond the date change line. 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 similar in both models.

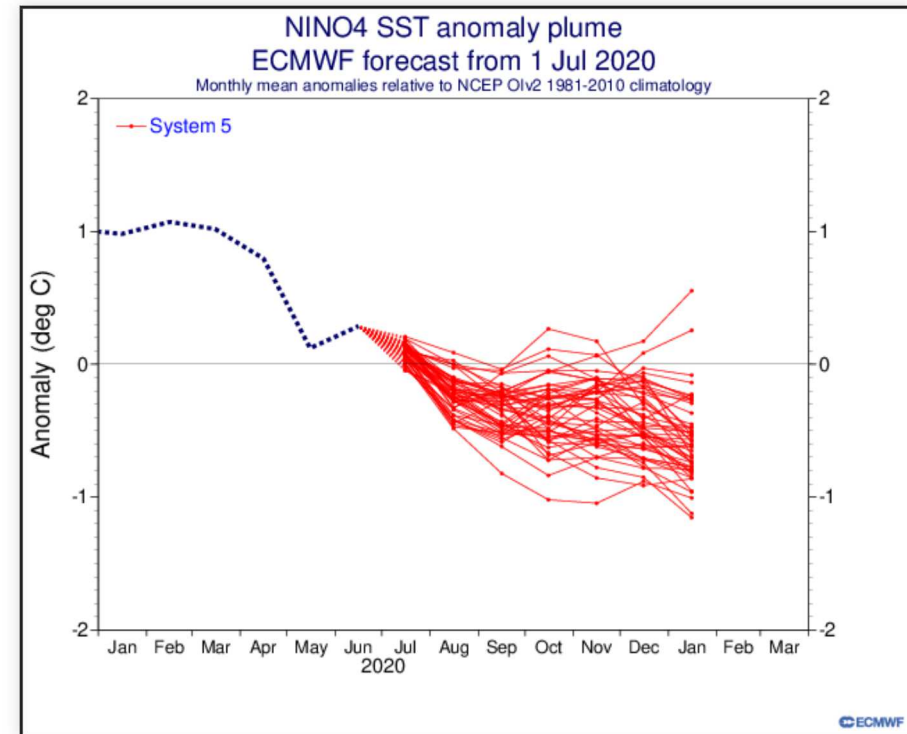
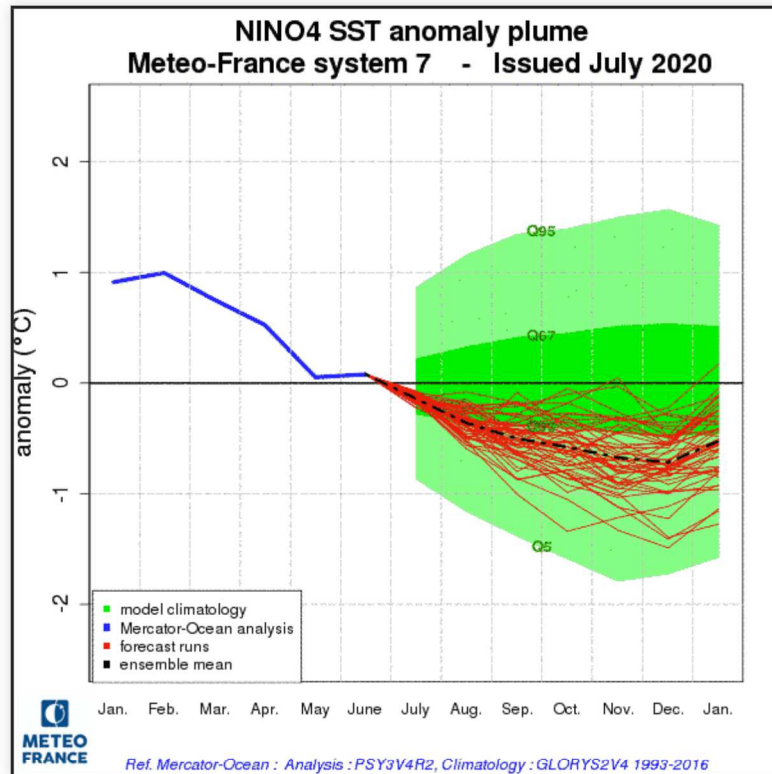
In the Atlantic Ocean : warmer than normal along the equator and in the southern hemisphere. Weak anomalies in the northern hemisphere up to 45°N. Colder than normal above 45°N.



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

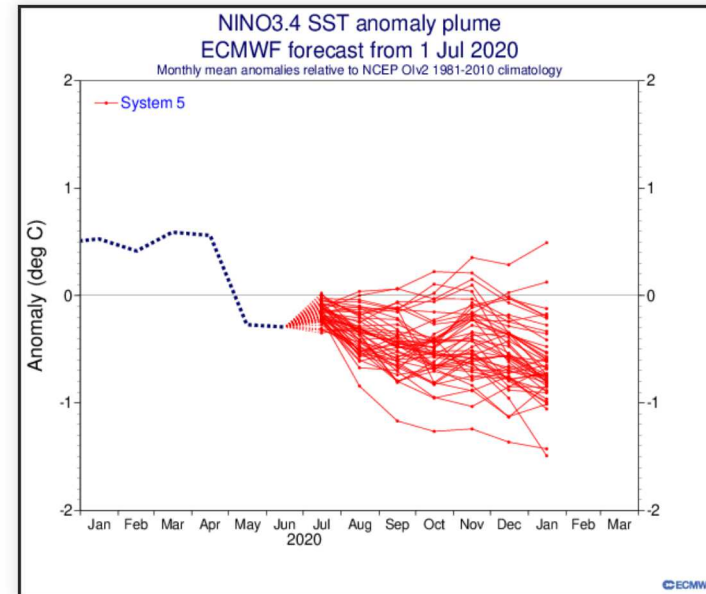
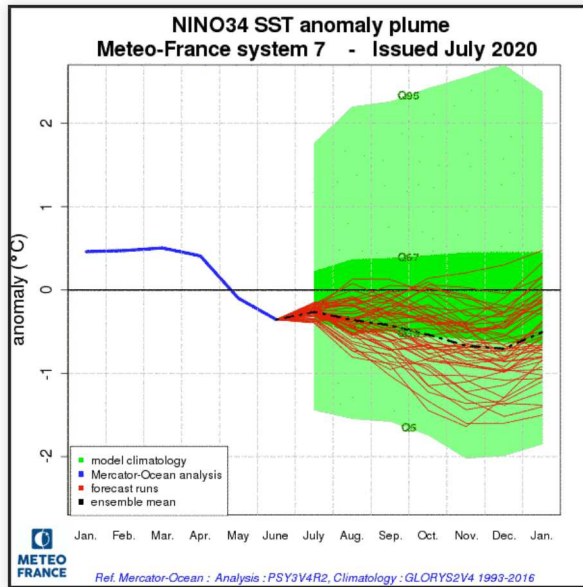
Oceanic forecast : NINO4 Plume diagrams

Cooling extend west of pacific basin



Oceanic forecast : NINO3.4 Plume diagrams

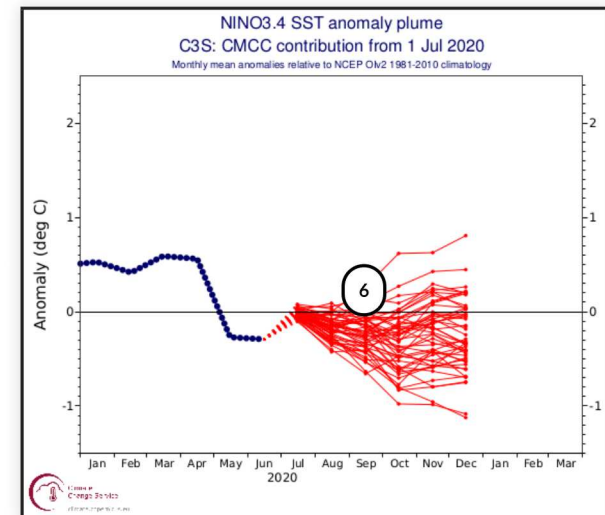
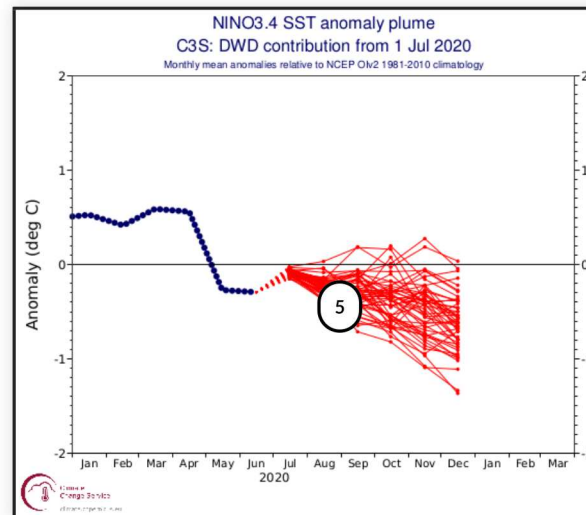
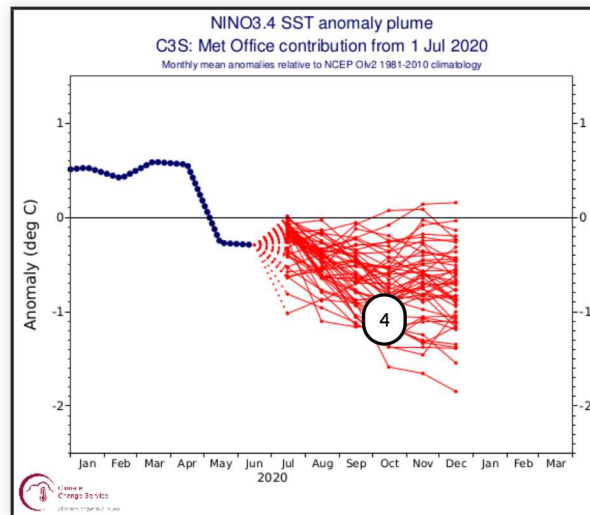
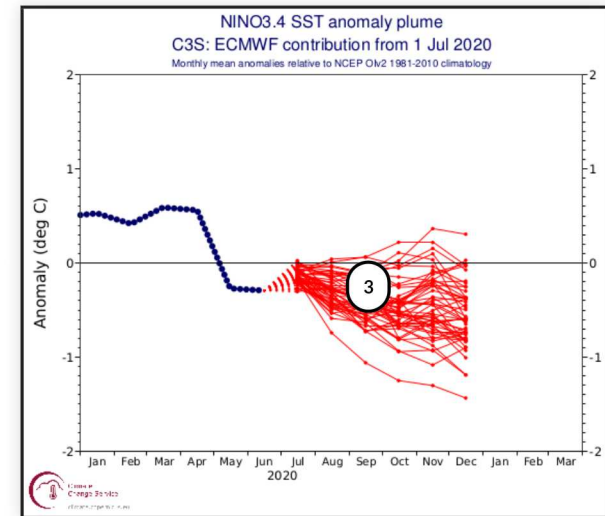
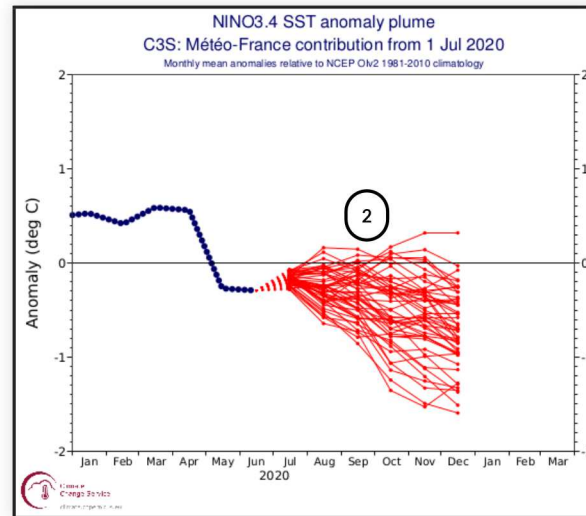
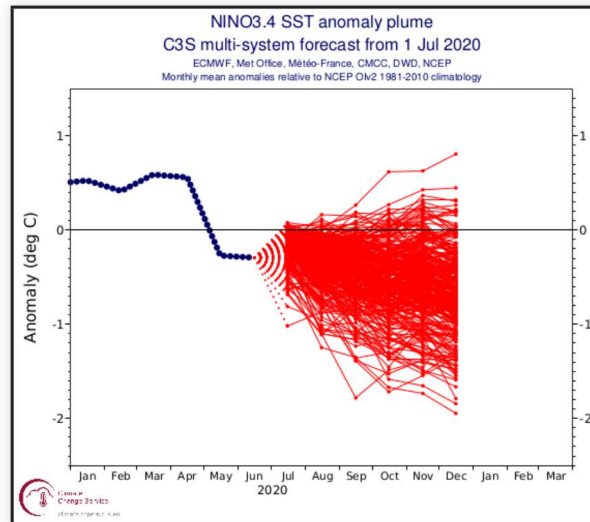
For the next month the values stabilize in the absence of cold reservoir west of the basin. For the autumn a further decline is likely and La Nina conditions could be installed.



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.

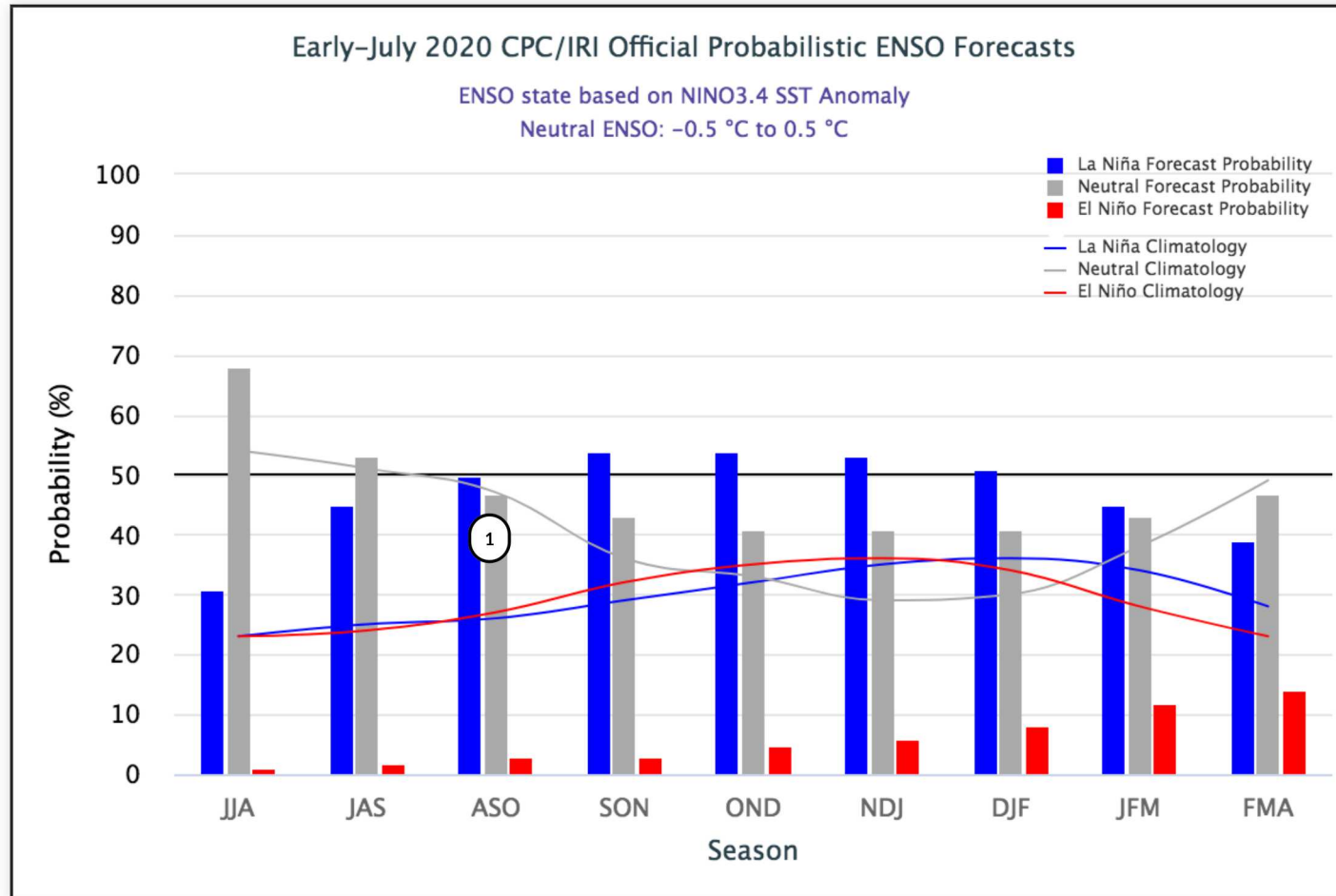
Forecasted Phase for the next three months : La Nina or neutral conditions



- 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

La Nina conditions are slightly more likely than normal for ASO.

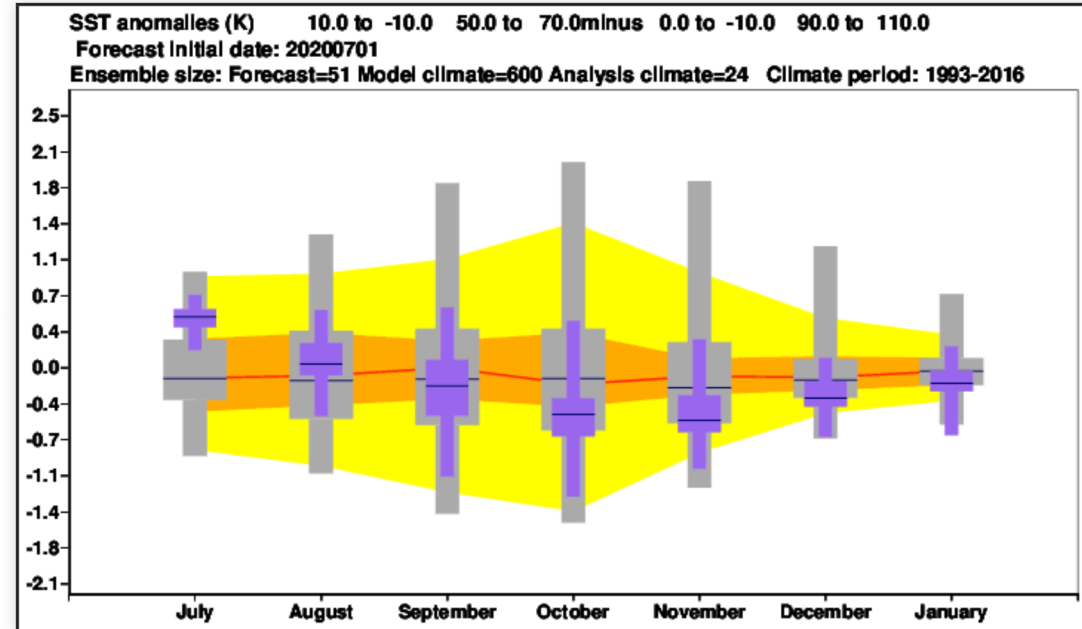
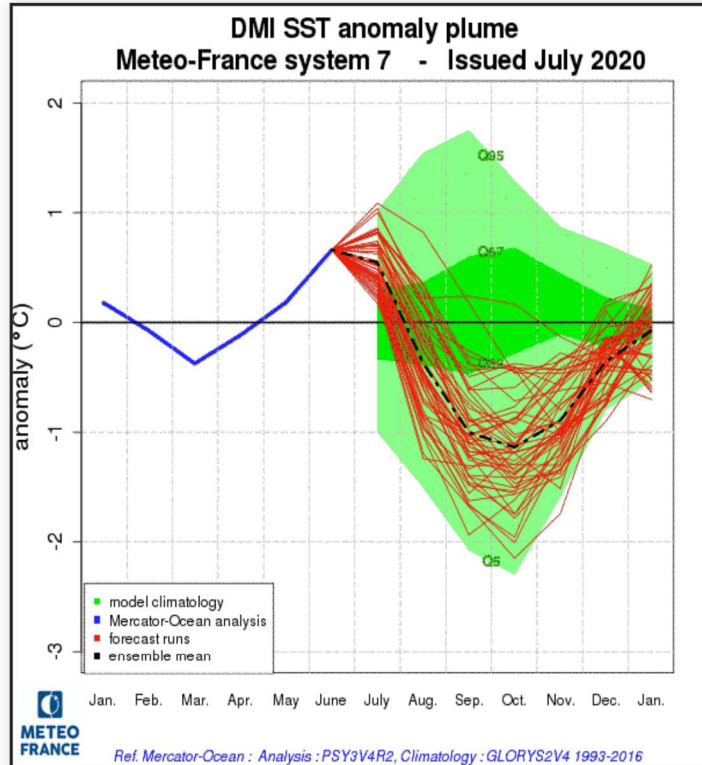


Probability of Niño, Niña, and neutral phases for the next 8 quarters. source <http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/>

1 - La Nina forecast slightly more likely than normal

Oceanic forecast : Indian ocean - DMI evolution

Good agreement between both models in the Indian Ocean. The DMI is expected to fall sharply in next 3 months, toward a negative IOD situation, stronger with MF7.

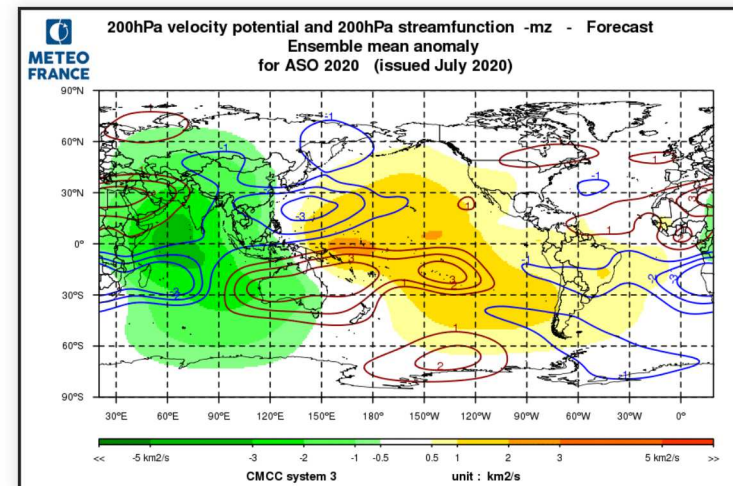
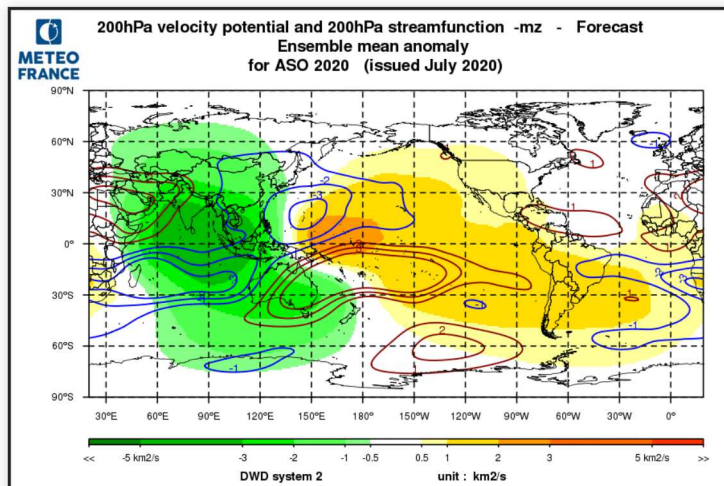
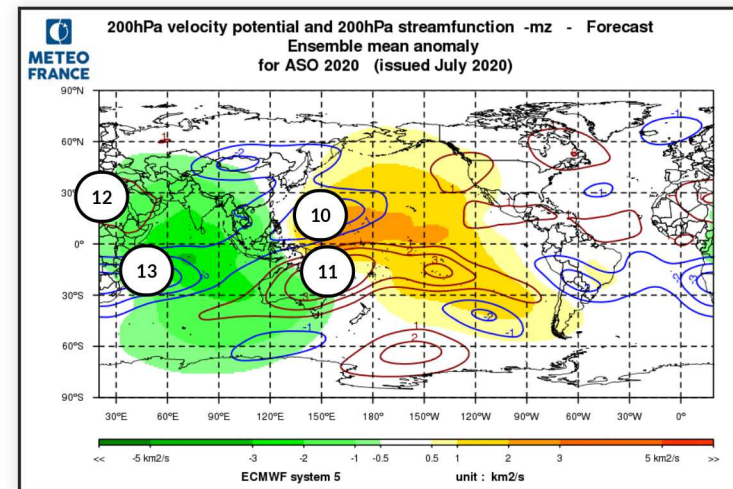
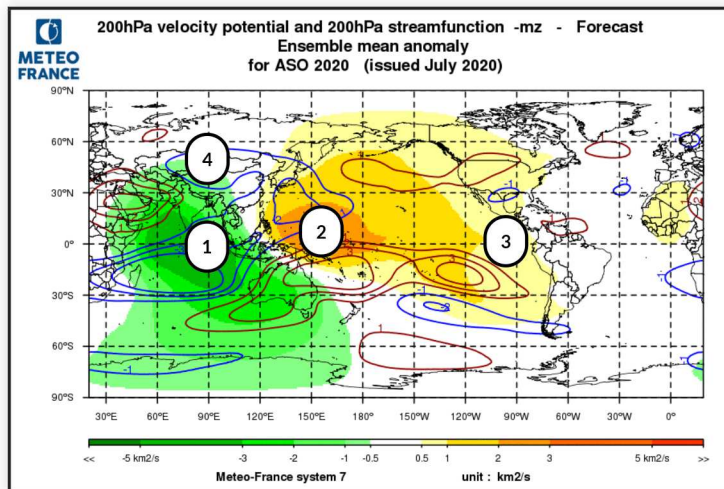


DMI index : analysis, forecasts and model climatology with MF7 on the right and SEAS5 on the left

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

Velocity Potential : The models are in good agreement 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 (DWD and CMCC). Anomalies are weak over the Atlantic.

Streamfunction : The models are in good agreement concerning the quadripole of anomalies around the Indian Ocean is constant with the dipole anomaly pattern of VP 200. The cyclonic pole on the center of Asia (MF7 and ECMWF) could be generated by a teleconnexion from the Arabian peninsula.

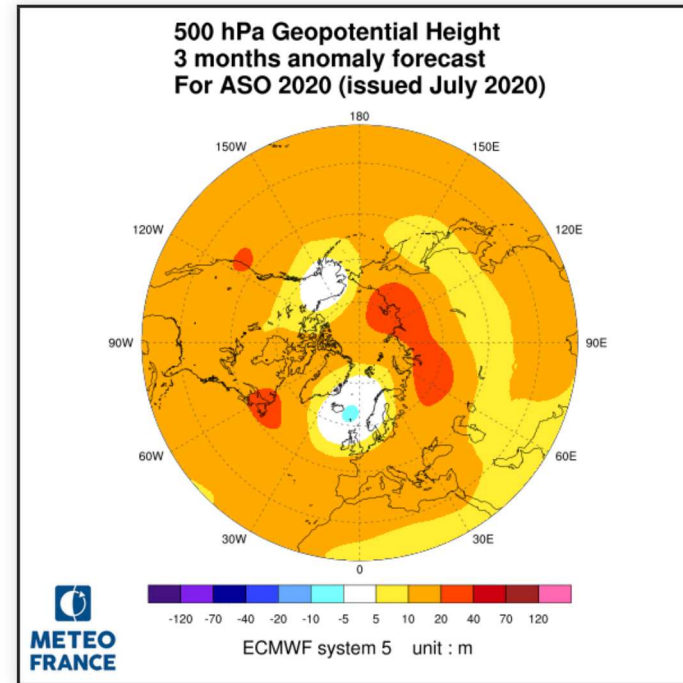
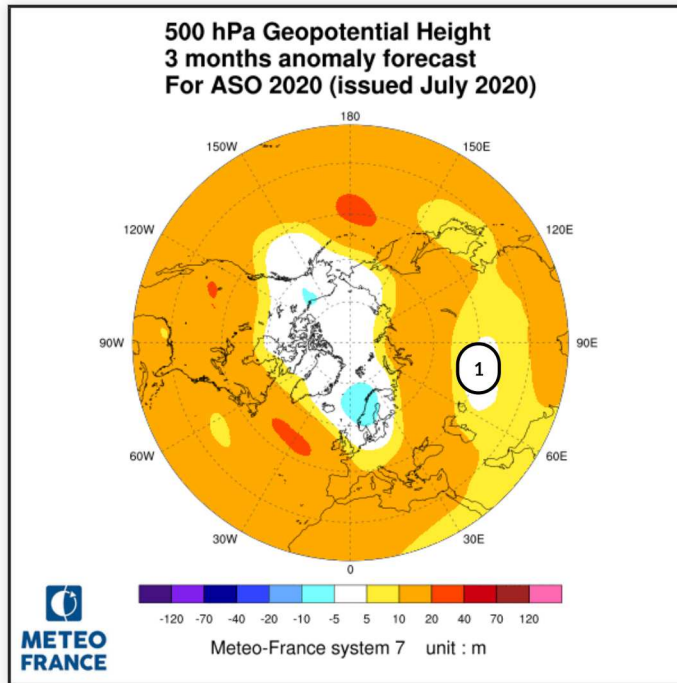


MF7, SEAS5, DWD and CMCC 200hPa velocity potential anomalies (color range, green : ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

- 1 - VP : Huge area of upward motion anomaly
- 2 - VP : main downward motion anomaly
- 3 - PV : extension to the East Pacific with weak value
- 4 - Cyclonic pole
- 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. On the North Atlantic the minimum is shifted west with ECMWF



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

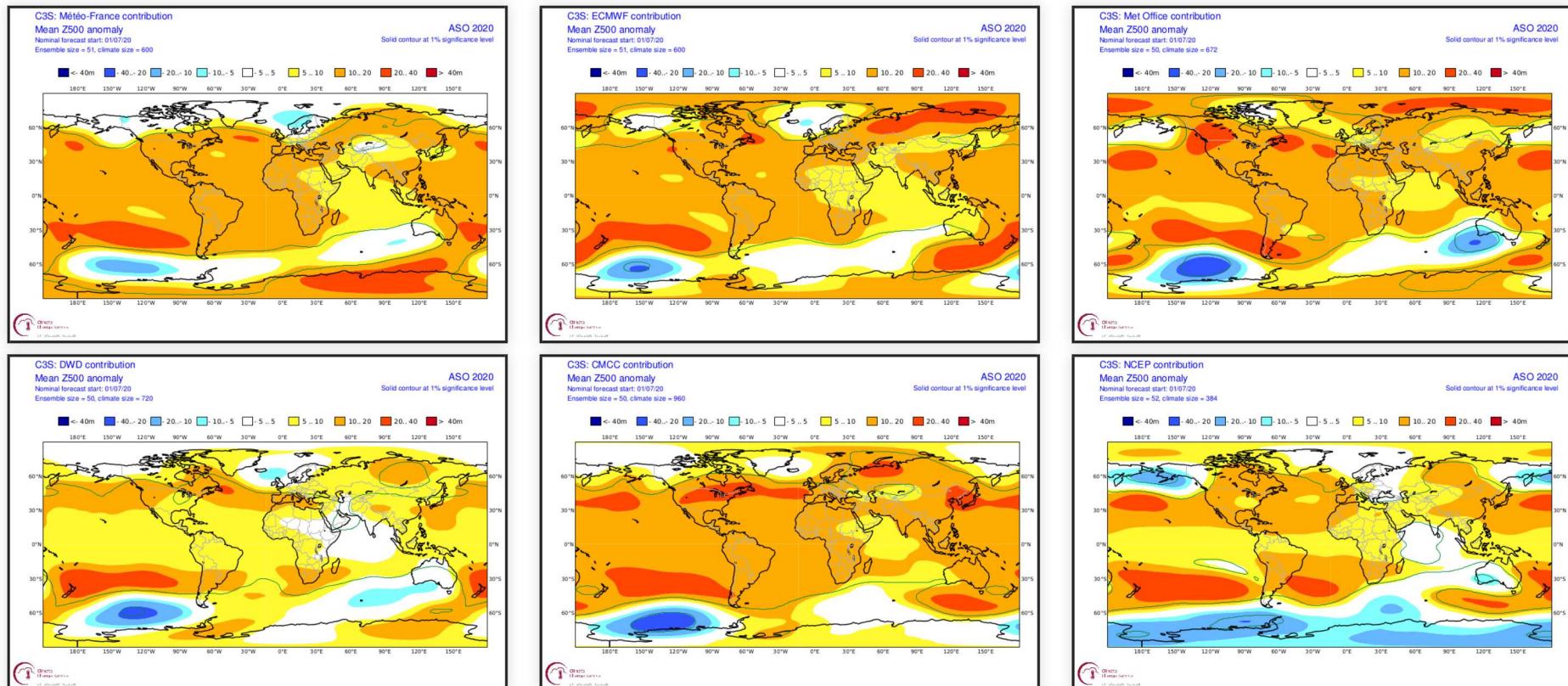
1 - Negative anomaly related to the streamfunction anomaly

Atmospheric circulation forecasts : Z500 anomalies in C3S models

For the North Atlantic and Europe, the general pattern is fairly well shared. With high values from Quebec to northern Russia via 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 and Central Asia are also more or less marked in all the models.

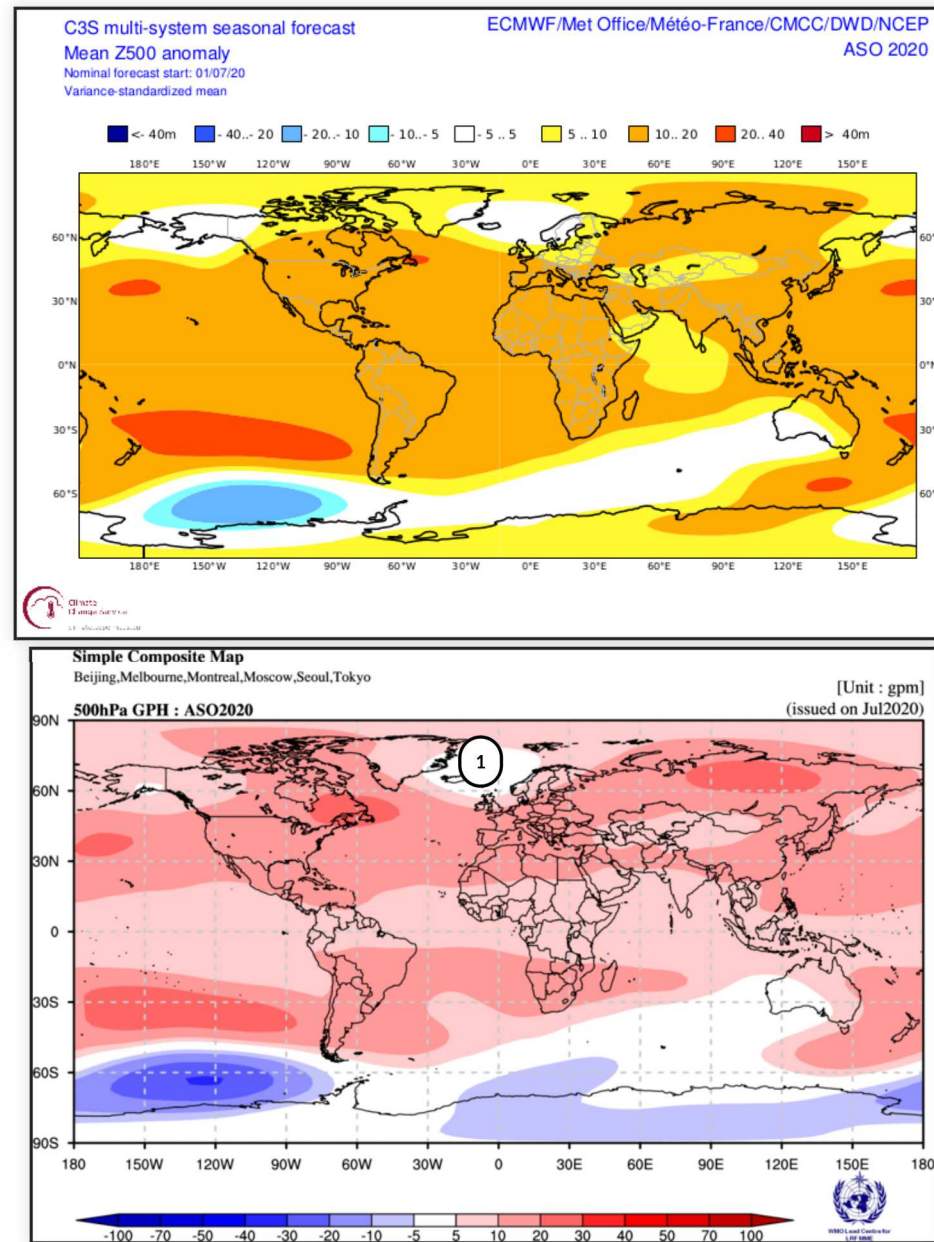
The consistency is less good over the rest of the high latitudes of the northern hemisphere.



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

Atmospheric circulation forecasts : Z500 anomalies multi-systems

Consistent general scheme particularly on the relative minimum on the North Atlantic.

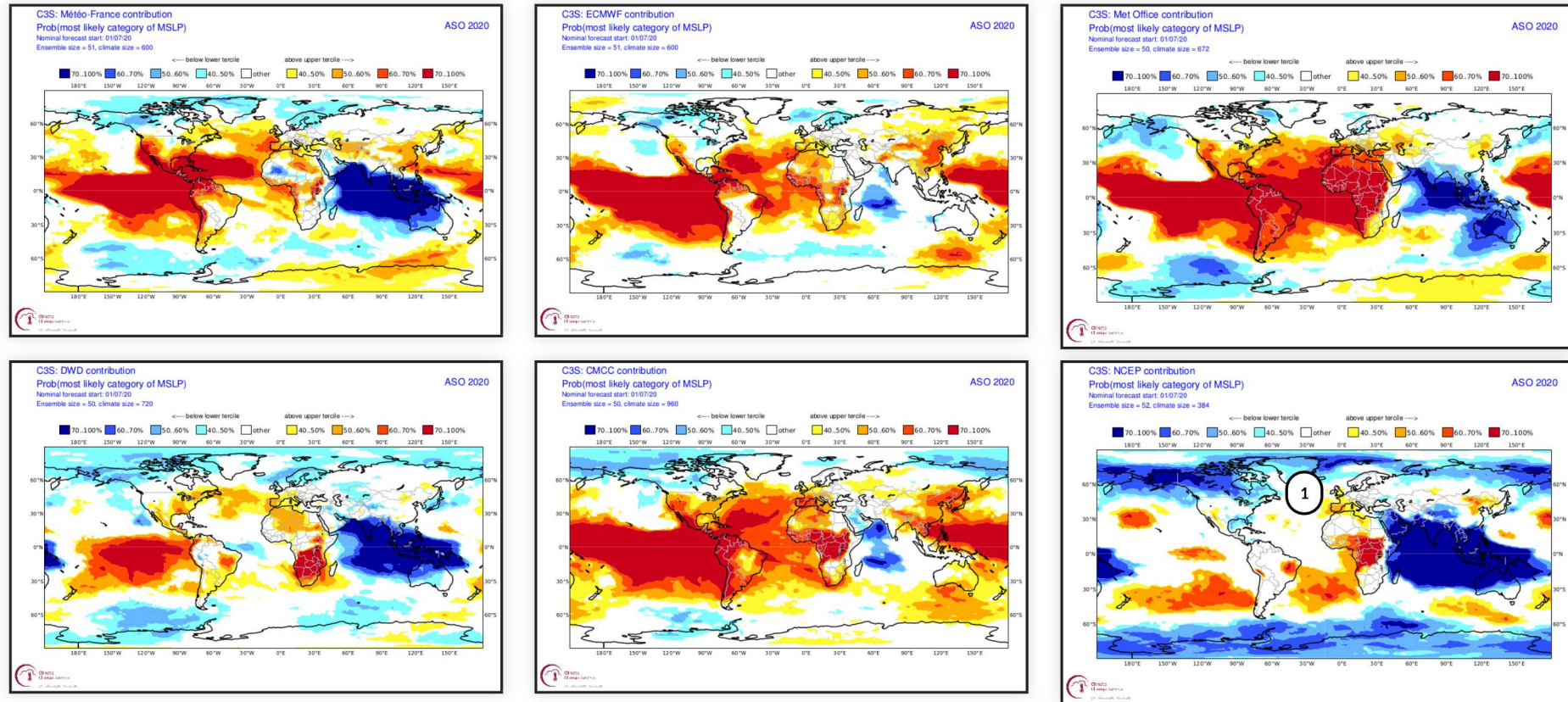


1 - Forecast close to the C3S multimodel in particular on the position of this relative minimum

Atmospheric circulation forecasts : MSLP probabilities

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

Most models forecast a positive anomaly accross North Atlantic extending to the southwest of Europe.

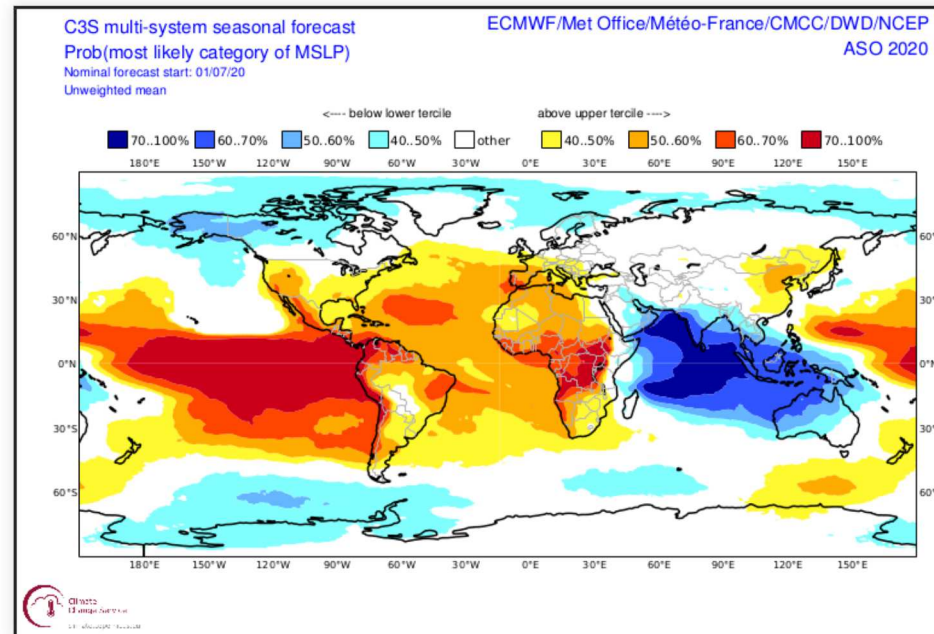


MF-S7, SEAS5, UKMO, DWD, CMCC and NCEP models probability maps.

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.

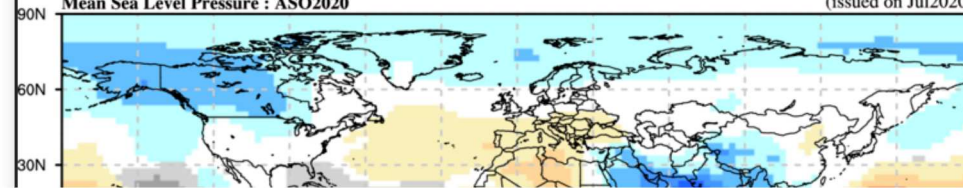


C3S multi-models.

Probabilistic Multi-Model Ensemble Forecast
Melbourne, Montreal, Moscow, Seoul, Tokyo

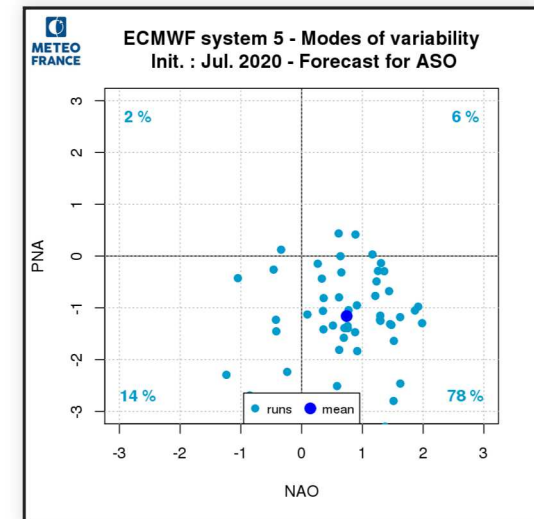
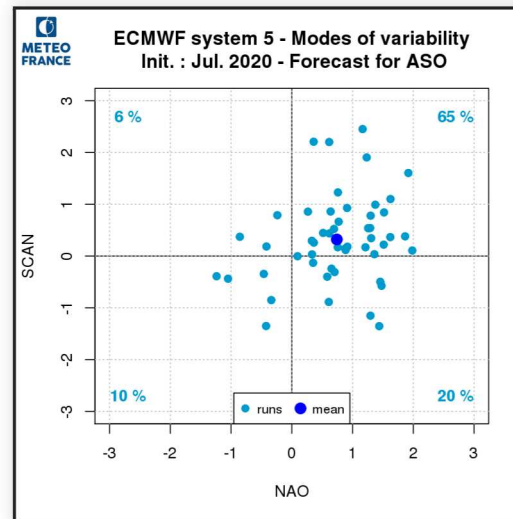
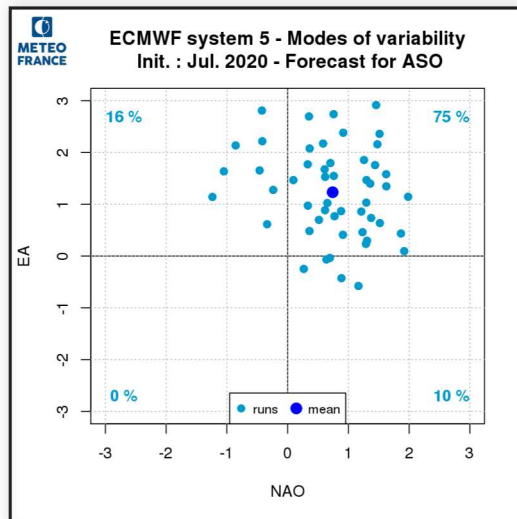
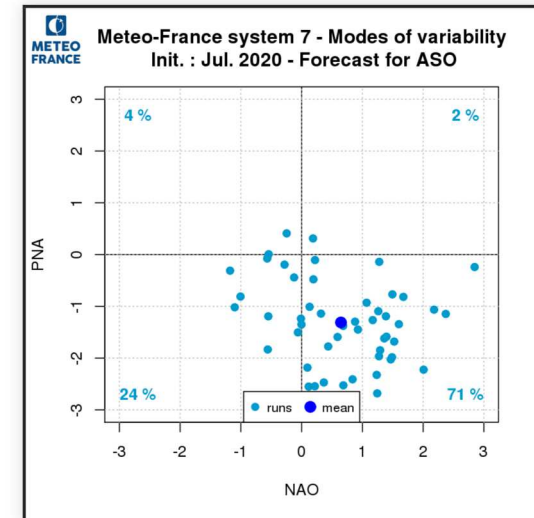
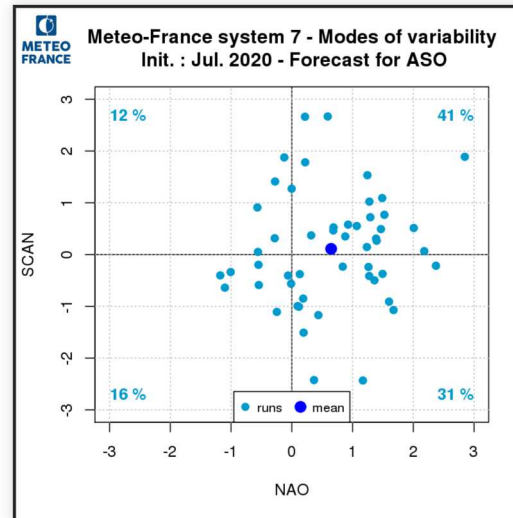
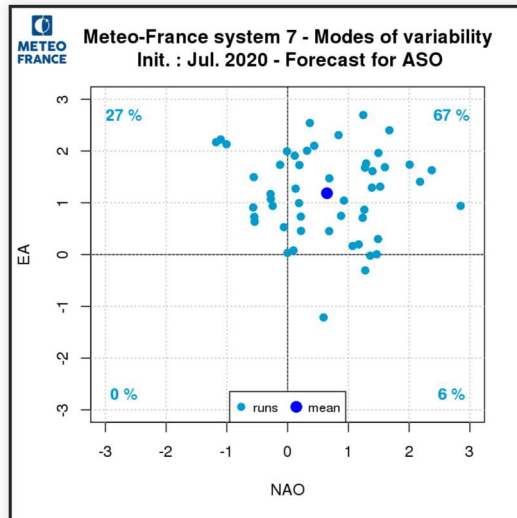
Mean Sea Level Pressure : ASO2020

(issued on Jul2020)



Modes of variability : forecast

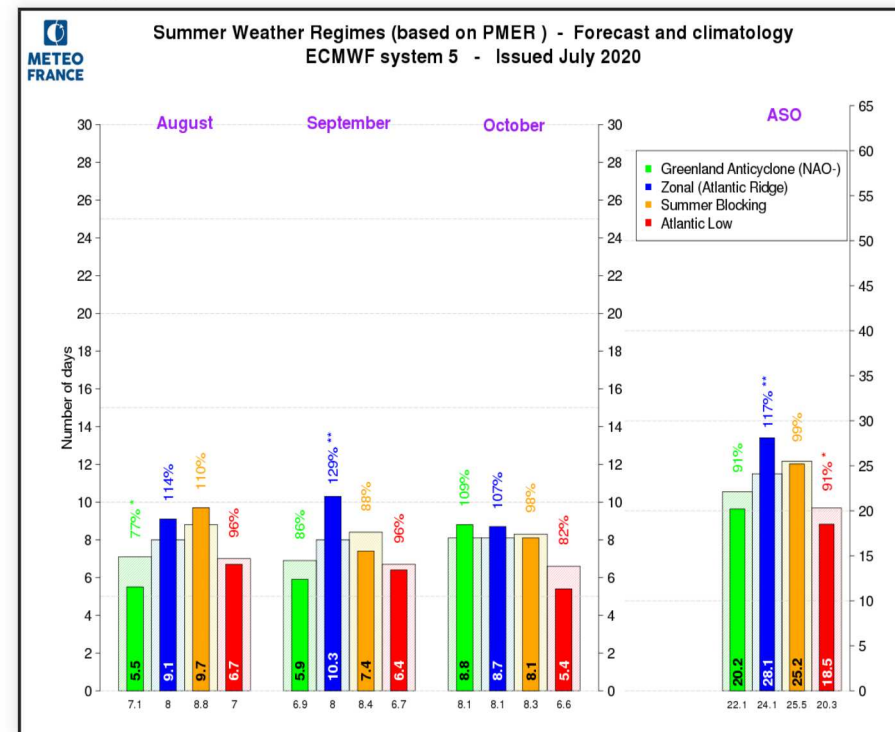
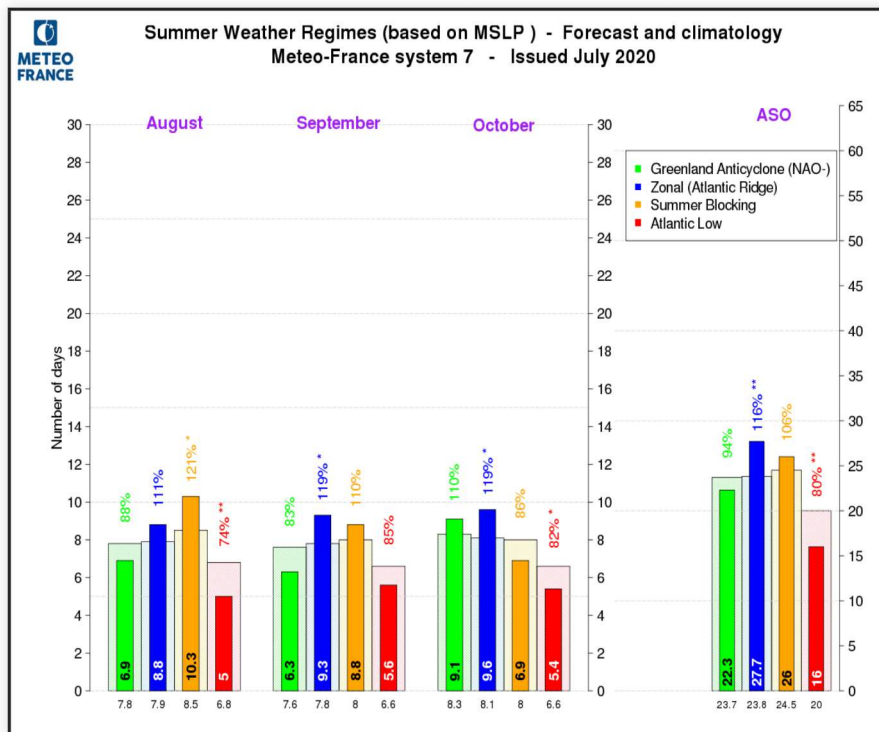
Both models suggest a high probability of positive NAO mode and positive EA mode (A part of this probably is linked to climate change). They also forecast high probability of negative PNA mode.



see the modes of variability patterns

Weather regimes : summer MSLP

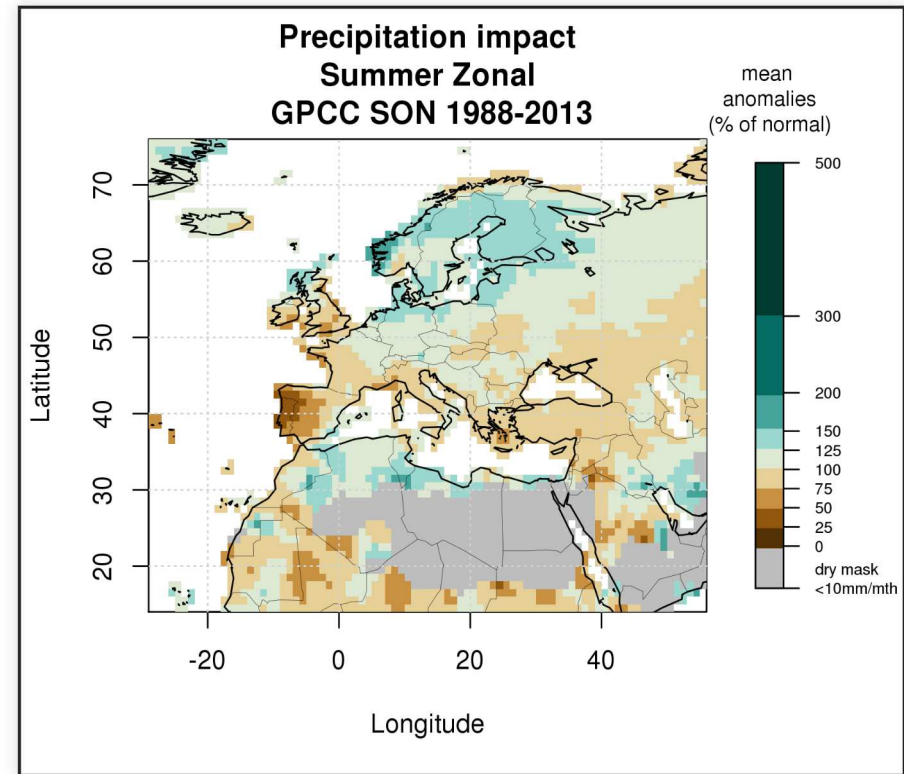
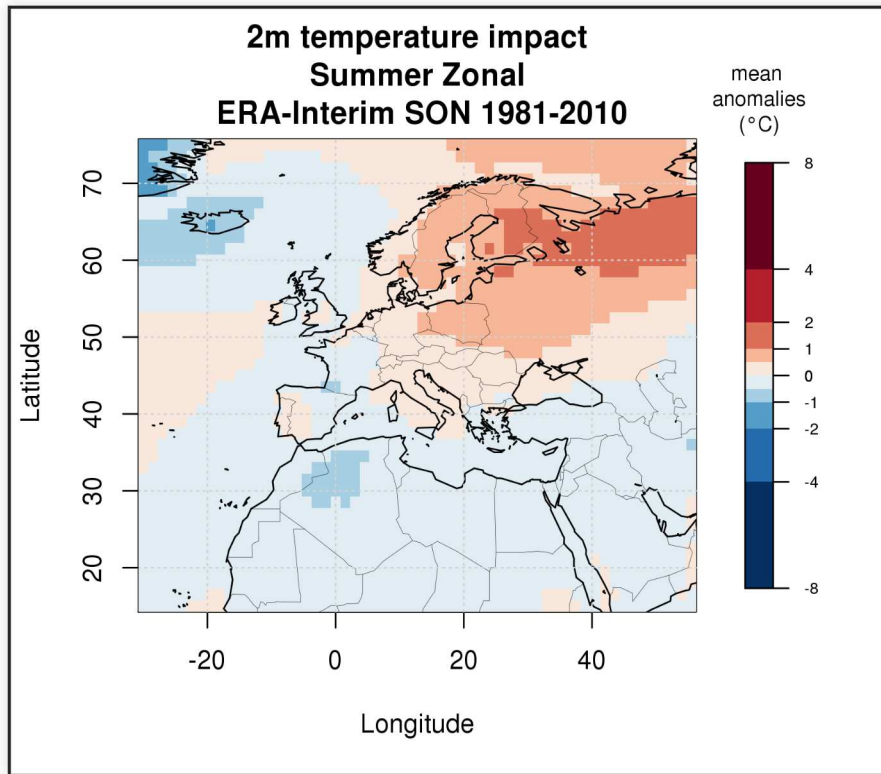
Both models benefit the Zonal regimes at the expense of the Atlantic Low regime.



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

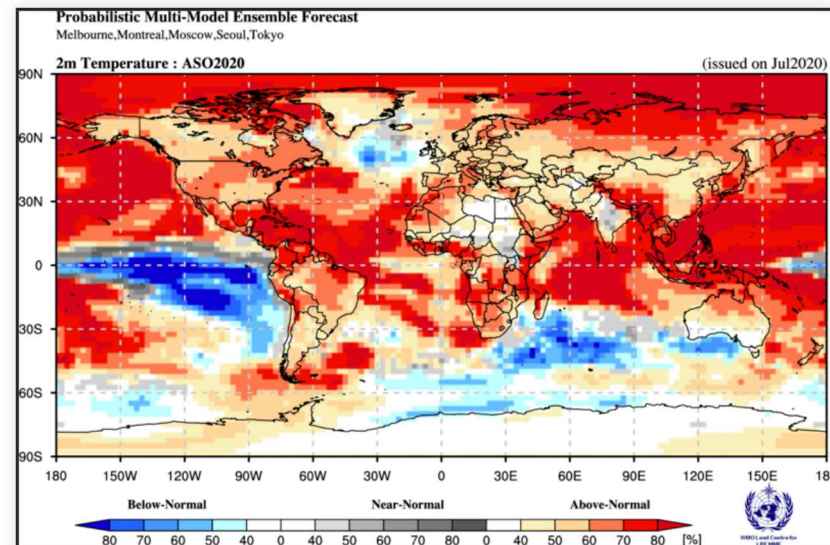
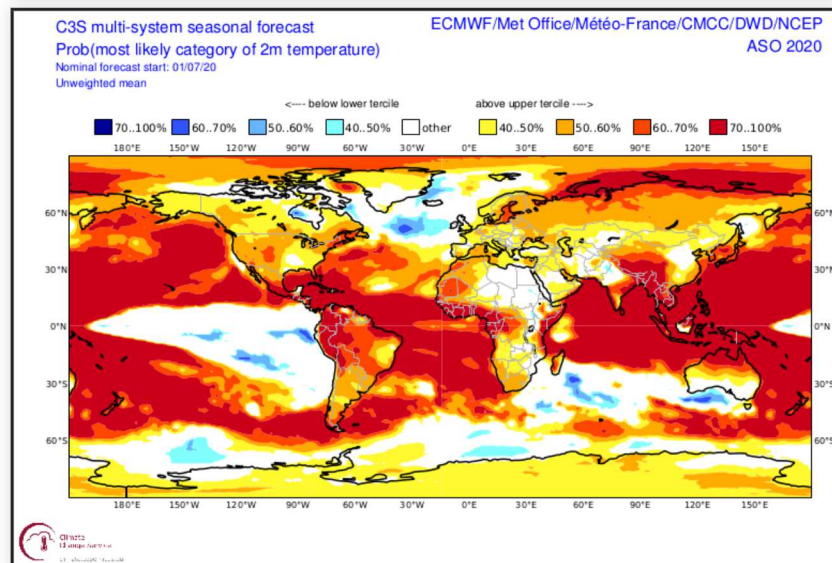
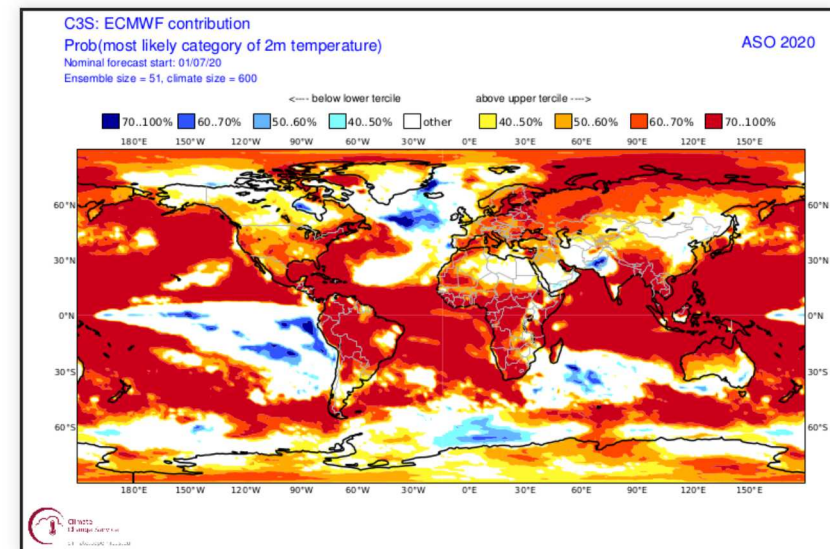
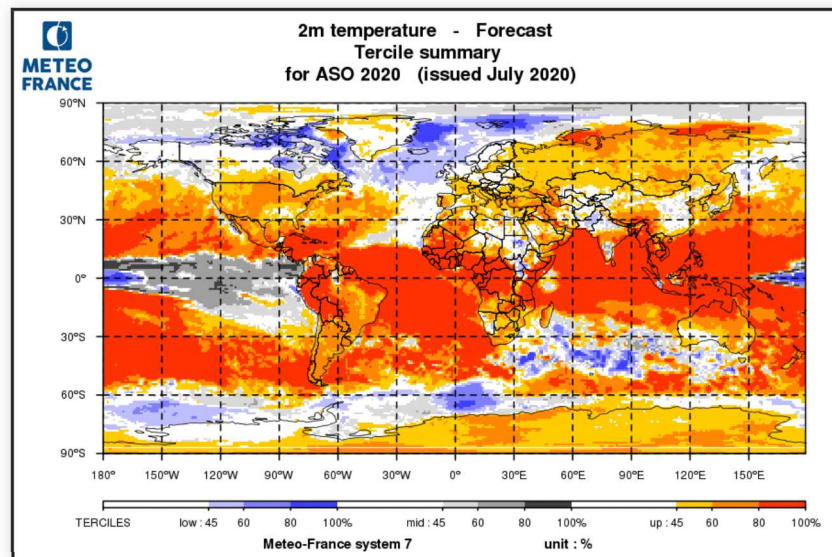
Summer Zonal weather regime should be favored



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

Forecast of climatic parameters : Temperature probabilities

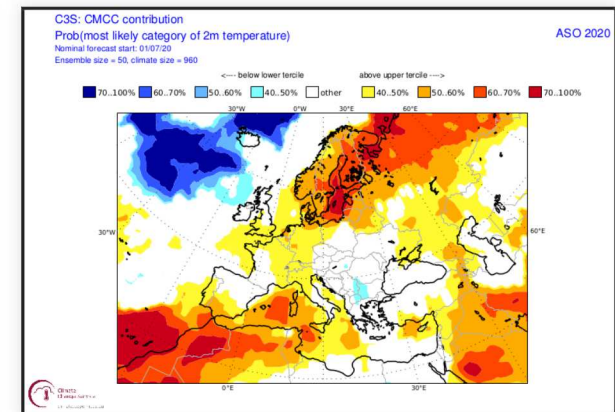
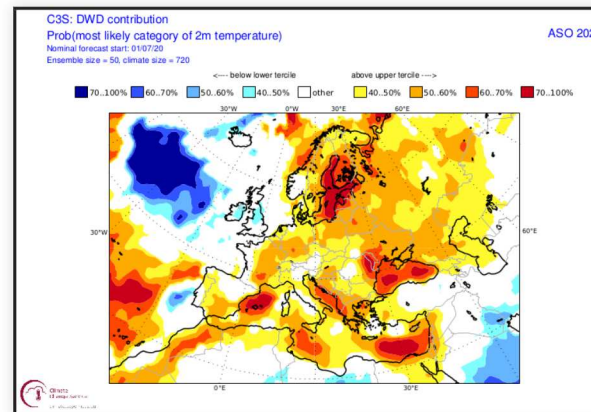
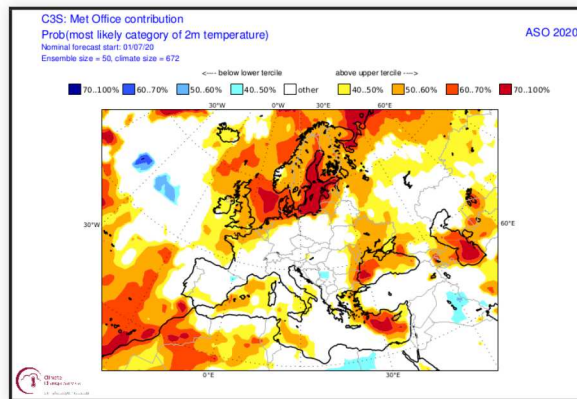
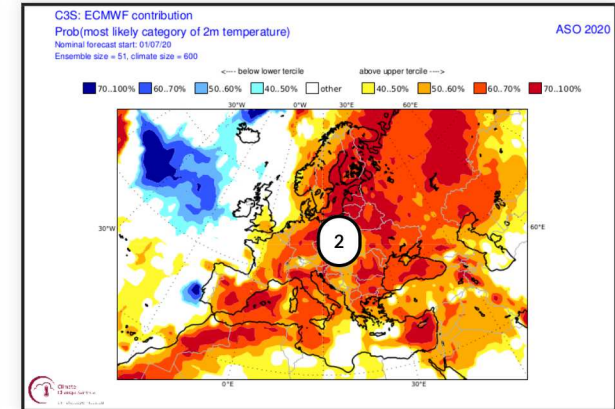
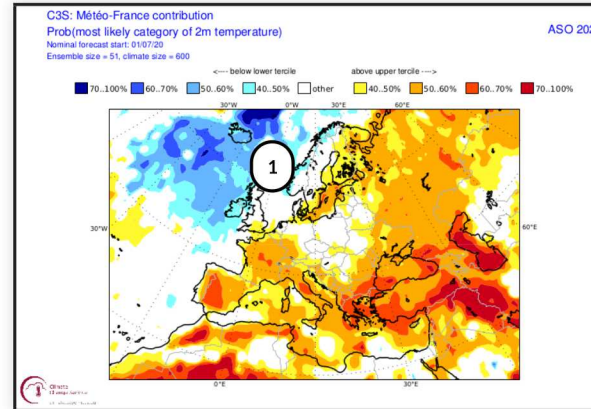
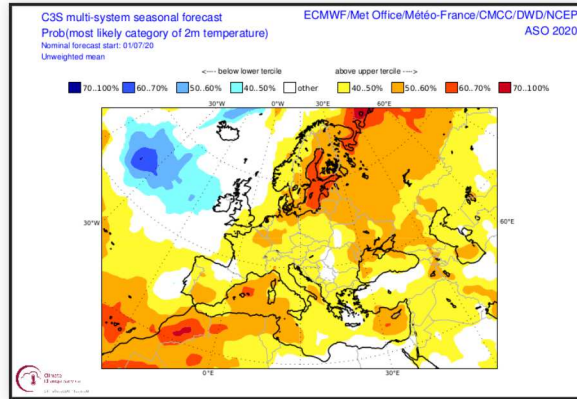
The general trend towards positive anomalies in continental areas is linked to climate change. This trend is attenuated in regions around the North Atlantic due to colder than normal ocean temperatures.



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 from the Black Sea to Scandinavia to Russia consistent with the effects of the zonal regime and also linked to high SST anomalies on the Baltic Sea and Arctic Ocean.

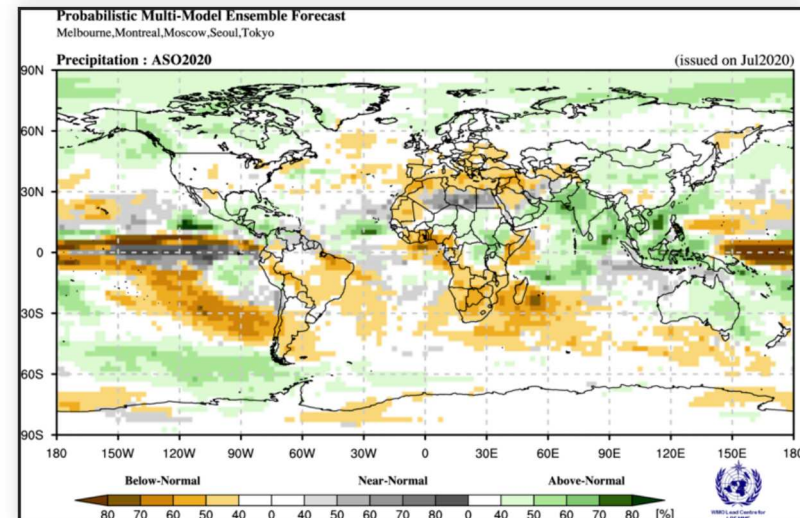
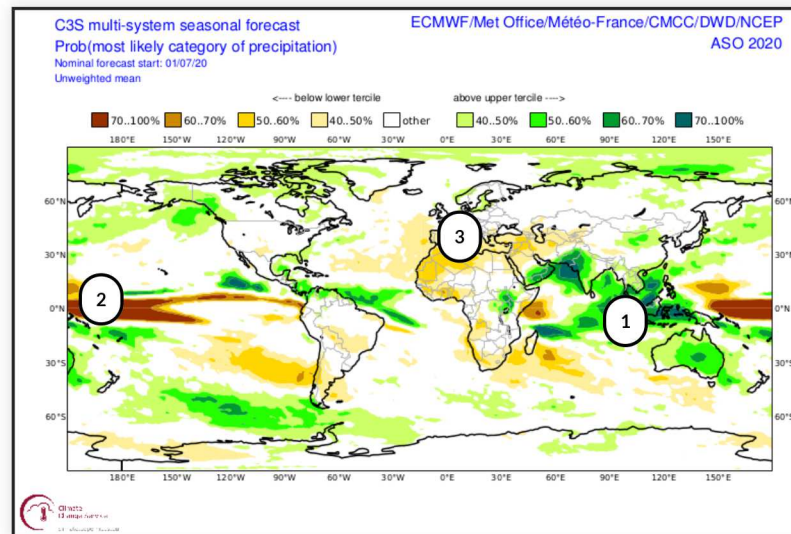
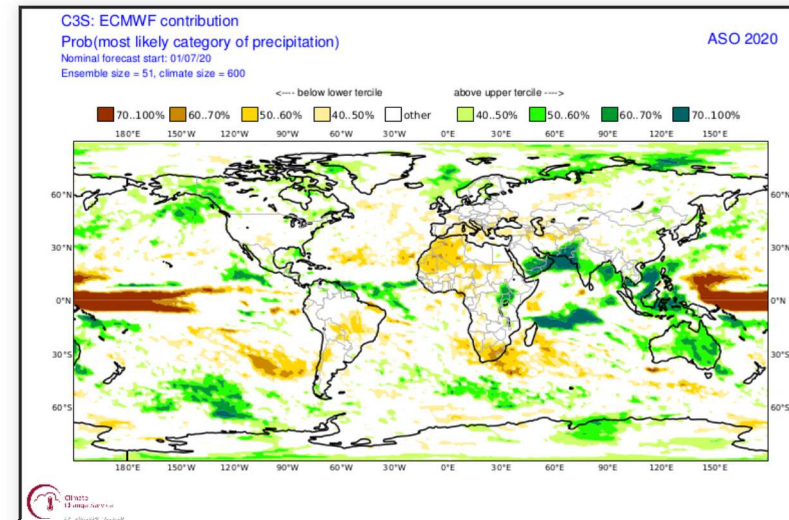
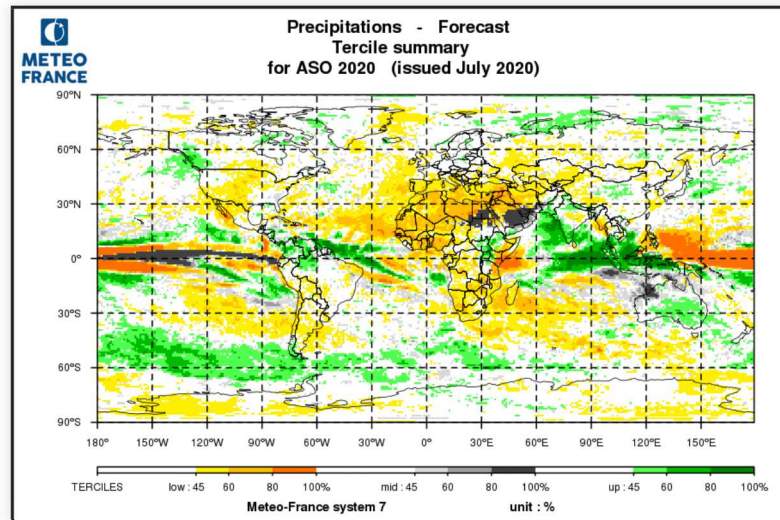


C3S multi-models probability map (top left) and MF-S7, ECMWF-SEAS5, UKMO (bottom left), DWD, CMCC models.

- 1 - MF7 has the highest probability of cold on North Sea
- 2 - ECMWF has the highest probability of warm on Europe

Forecast of climatic parameters : Precipitation

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



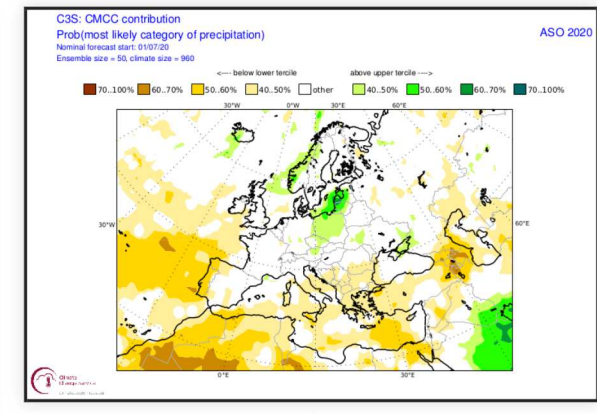
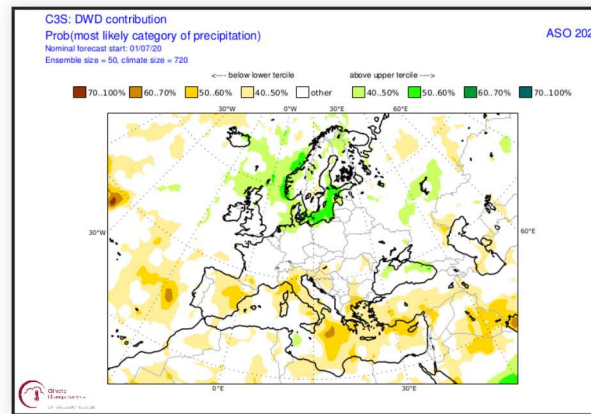
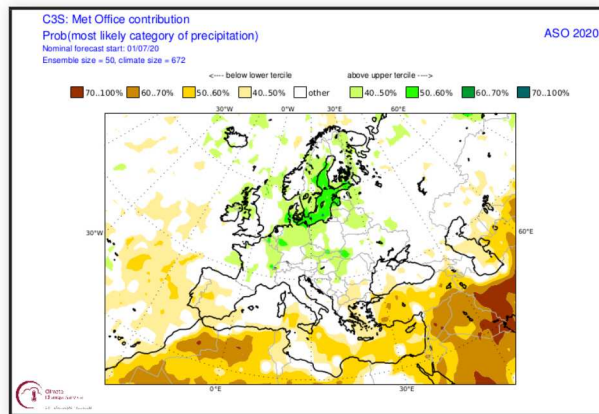
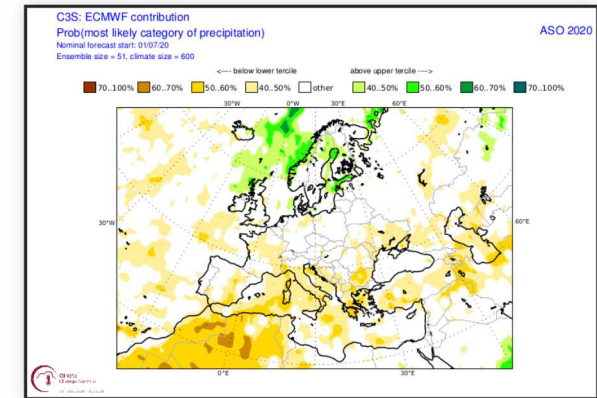
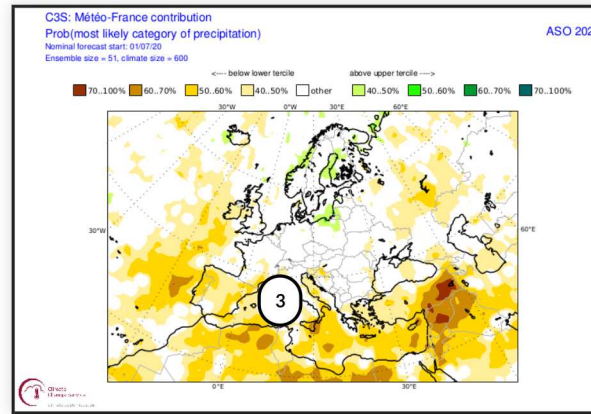
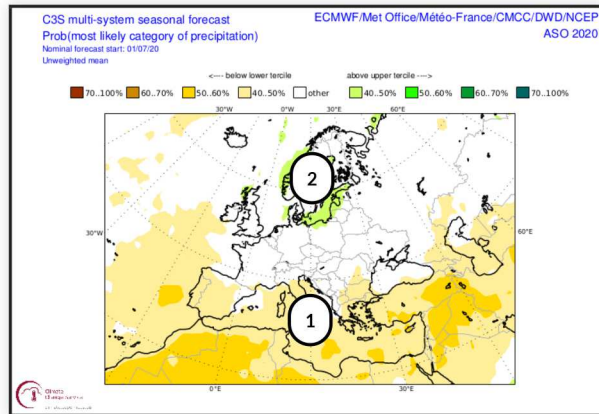
precipitation probability map from MF-S7 (top left), ECMWF-SEAS5 (top right), C3S multi-models (bottom left) and others models of WMO multi-models (bottom right)

- 1 - Strong wet signal (negative IOD)
- 2 - Dry signal linked to the Nina
- 3 - 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.

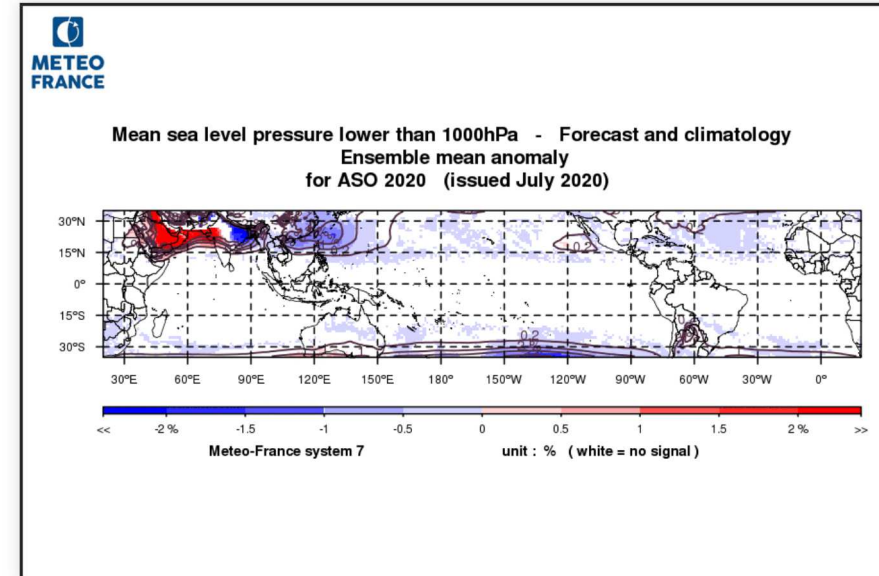
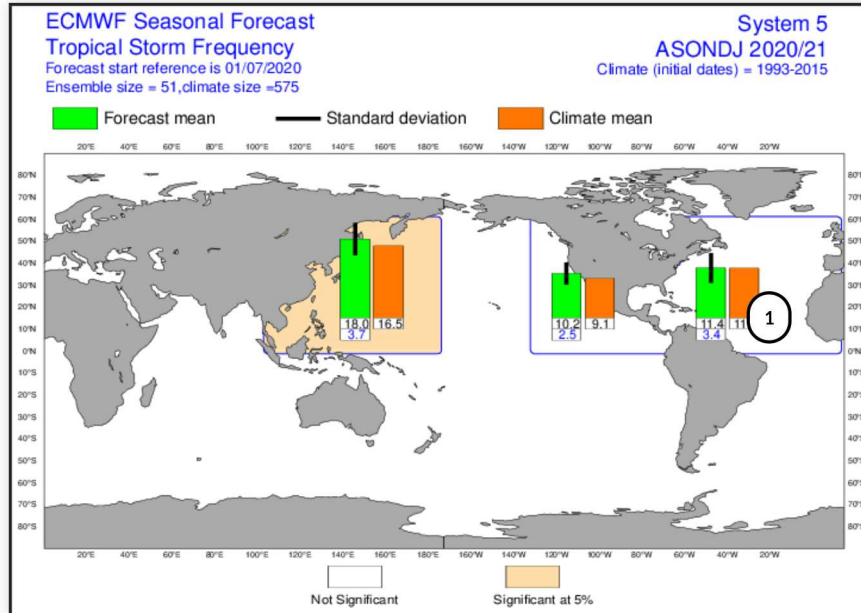


C3S multi-models probability map (top left) and MF-S7, SEAS5, UKMO, DWD, CMCC models.

- 1 - large-scale dry signal
- 2 - weak wet signal
- 3 - MF7 has the most drier scenario on Mediterranean basin

Forecast of climatic parameters : Tropical Storm Frequency

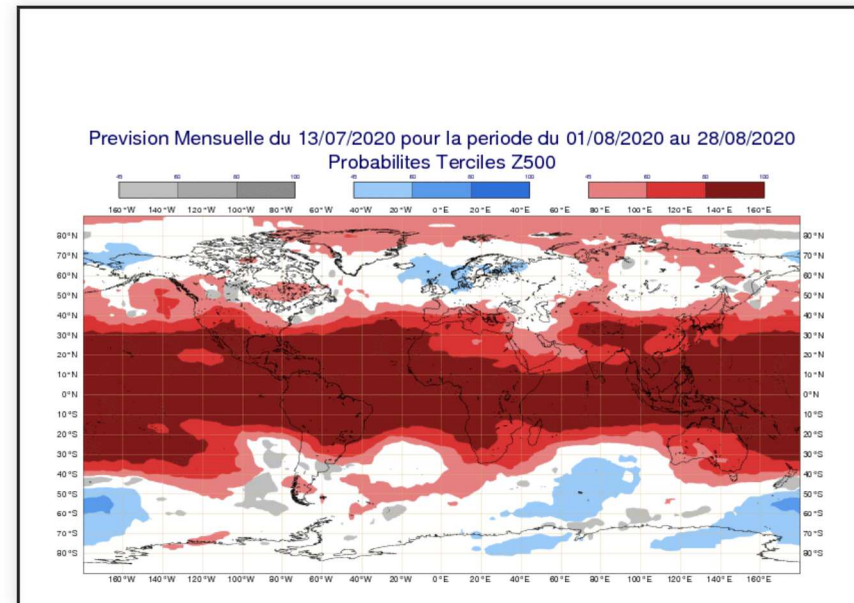
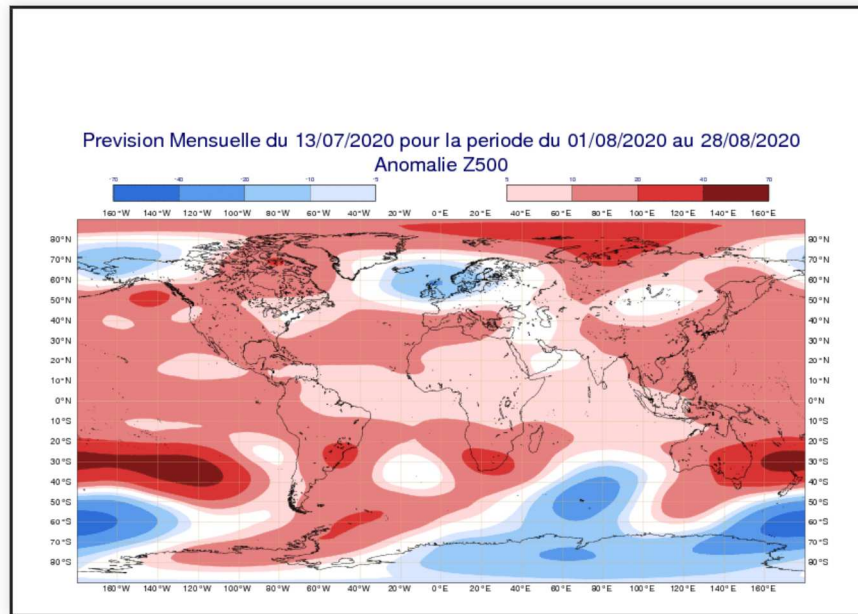
In the Atlantic cyclone season activity may be close than normal according ECMWF or less intense than normal according MF7. ECMWF forecast a higher than normal activity in eastern Pacific which seems contradictory with ocean temperatures on the equatorial pacific.



1 - close to normal

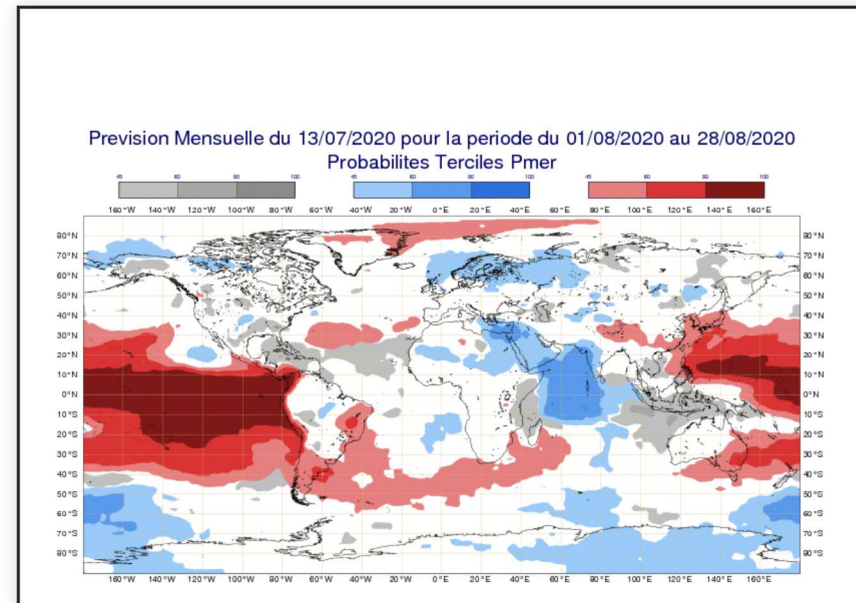
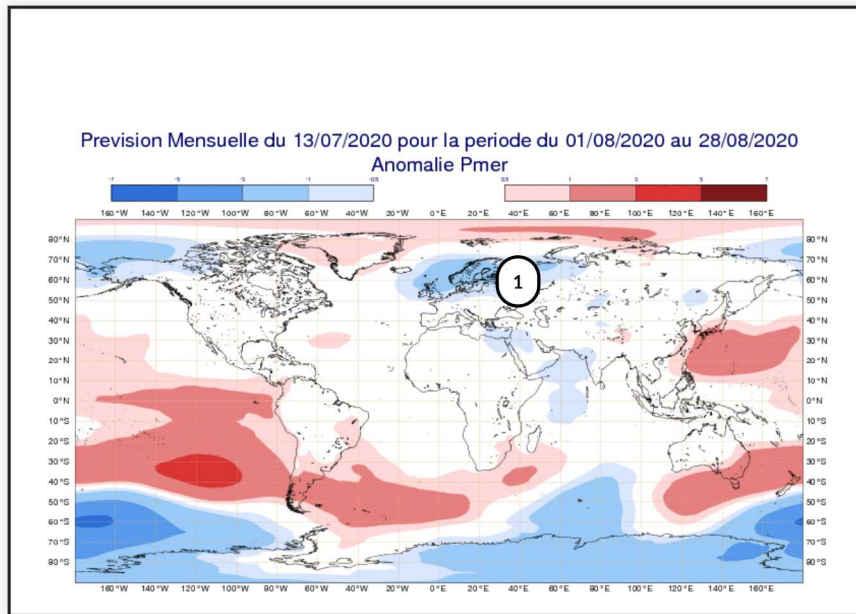
Monthly forecast of 20200713 : Z500

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



Monthly forecast of 20200713 : MSLP

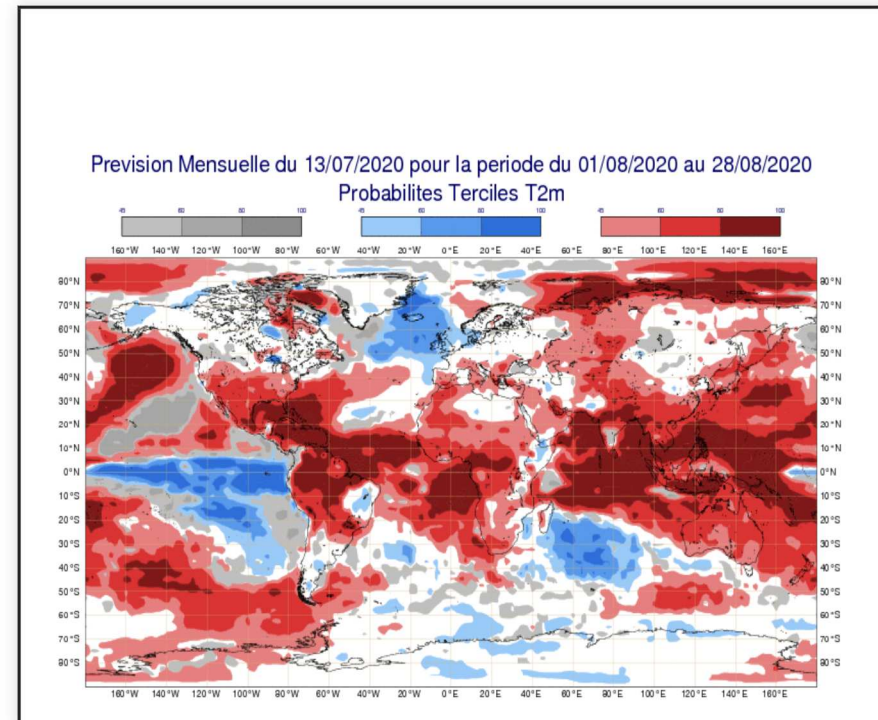
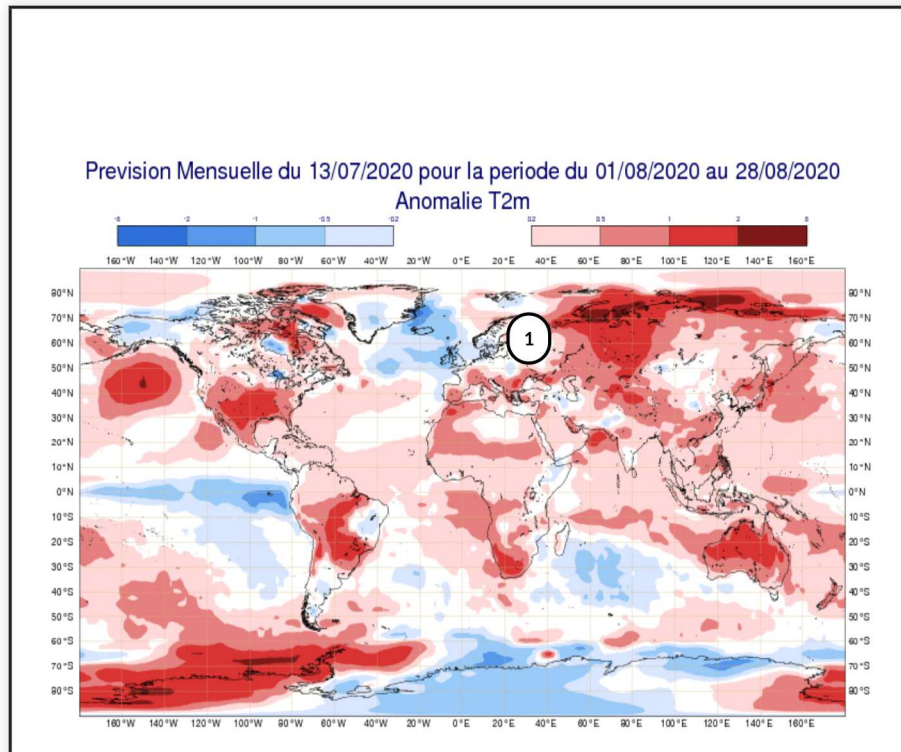
High perssure on the near Atlantic, low pressure in Northeastern Europe and a significant gradient on the North Sea



1 - low pressure anomaly

Monthly forecast of 20200713 : temperature

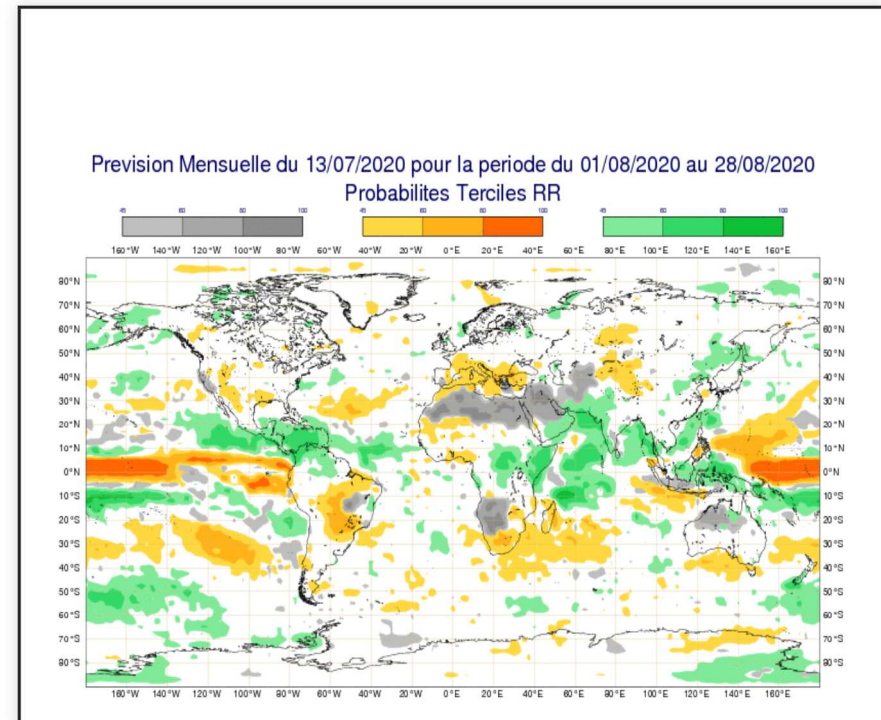
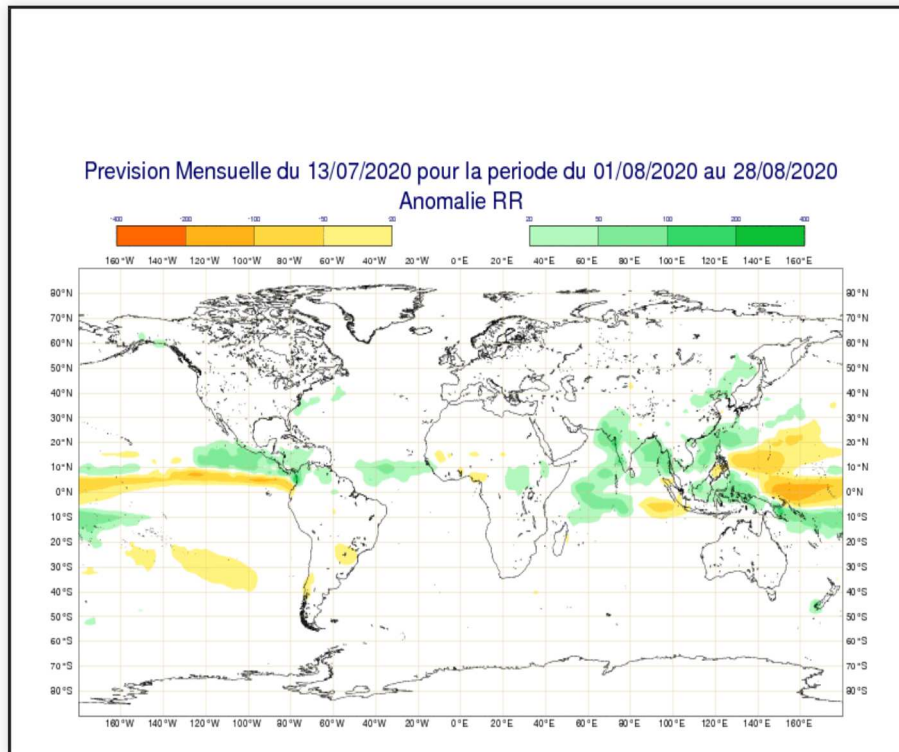
The pattern of the first month in Europe looks like the seasonal forecasts.



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

Monthly forecast of 20200713 : precipitation

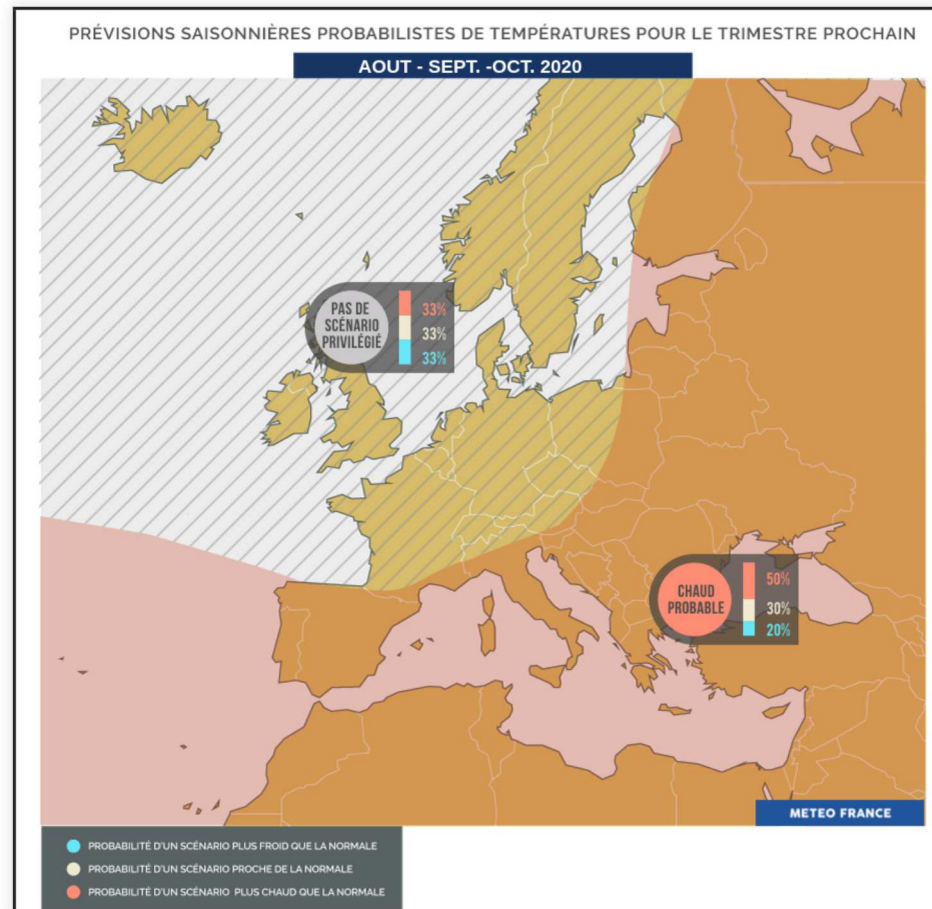
Weak dry signal over near Atlantic, wet little signal on the Baltic Seas.



Synthesis map for Europe : Temperature

The warm area follows the increased probability of warmer than normal emerging from the models around Mediterranean and eastern of Europe. This is consistent with the favoured zonal regime.

Elsewhere the zonal regime tempers the warm climate change signal.



Synthesis map for Europe : Precipitation

The zonal regime, favoured in the forecasts, is associated with drier than normal weather from Atlantic coast to southern Europe and wetter than normal around Scandinavia.

The dry zone follows the consensus of the models and the wetter zone reflects the anomaly observed in the case of zonal regime.

