

Météo-France Seasonal Forecast Bulletin

JULY - AUGUST - SEPTEMBER 2019

1. General synthesis
 1. JAS 2019
2. Oceanic analysis of May 2019
 1. SST anomalies
 2. vertical section
 3. Hovmüller diagram of the 20°C isotherm
 4. History of Nino3.4
3. Oceanic forecast
 1. SST anomaly
 2. NINO3.4 Plume diagrams
 3. Synthesis from IRI
4. Drivers
 1. Atlantic SST
5. Drivers
 1. Summary
6. Atmospheric circulation forecasts
 1. velocity potentiel and stream function at 200hPa
 2. 500 hPa Geopotential anomalies
 3. Z500 anomalies in C3S models
 4. Z500 anomalies multi-systems
7. Modes of variability
 1. forecast
8. Weather regimes
 1. summer MSLP
 2. Impacts
9. Forecast of climatic parameters
 1. Temperature
 2. T2M probabilities in C3S models
 3. Température synthèse de l'IRI
 4. Precipitation
 5. precipitation probabilities - zoom over Europe
 6. IRI precipitation synthesis
 7. Tropical Storm Frequency
10. Monthly forecast of 20190620
 1. SST
 2. Z500
 3. temperature
 4. precipitation
 5. summer SLP weather regimes
11. Synthesis map for Europe
 1. Temperature
 2. Precipitation

General synthesis : JAS 2019

- **Rather good consistency between models in the tropics** for the coming 3 months. There are much more uncertainty over North Atlantic and Europe.
- **weak El Nino** would continue (but large spread in Nino3.4 forecast). Significant consequences on Walker circulations (see VP 200 hPa, good consistency between models). Anyway, no extra-tropical connections visible, the signal seems to be trapped in low latitudes.
- Differences between models for **North Atlantic and Europe circulation** but a **relative low geopotentials in western Europe** are favoured by most of them.
- Consequently, the JAS period should be **warmer than normal over eastern Europe**. Elsewhere on the continent there is no clear signal. Regarding precipitation **no scenario is favoured**.

Oceanic analysis of May 2019 : SST anomalies

Current situation : weak El Niño conditions

MAY NINO3.4 INDEX : +0.7 °C (Mercator Ocean PSYV4R2 analysis)

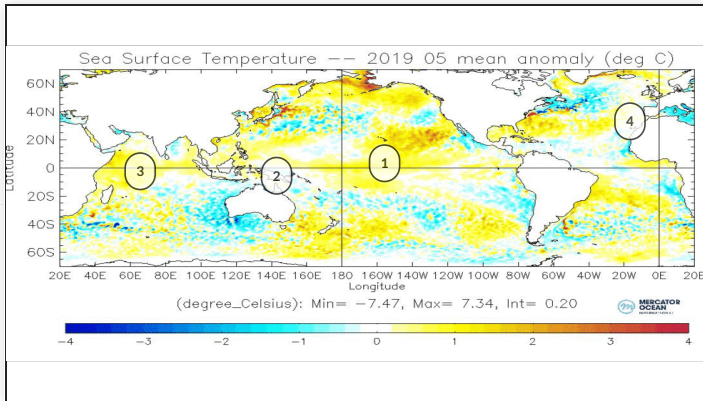
MAY IOD INDEX : +0.6 °C (Mercator Ocean PSYV4R2 analysis)

LASTEST WEEKLY NINO3.4 TREND : no trend

LASTEST WEEKLY IOD TREND : slight decrease trend

(BOM value : <http://www.bom.gov.au/climate/enso/indices.shtml>)

PDO : close to 0 ; also close to 0 over 12-month running average (JMA : <http://ds.data.jma.go.jp/tcc/tcc/products/elnino/decadal/pdo.html>)

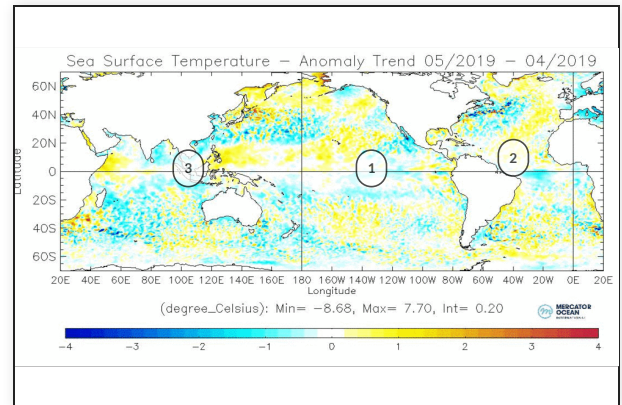


2- Persistence of a weak cold anomaly on eastern Maritime Continent

4- NAO+ like pattern (cold/warm/cold)

1- warm anomaly related to the current El Niño. the anomaly is uniform over much of the equator.

3- large warm anomaly, IOD became positive in May



3- Increase in the west/east contrast which led to a positive IOD index

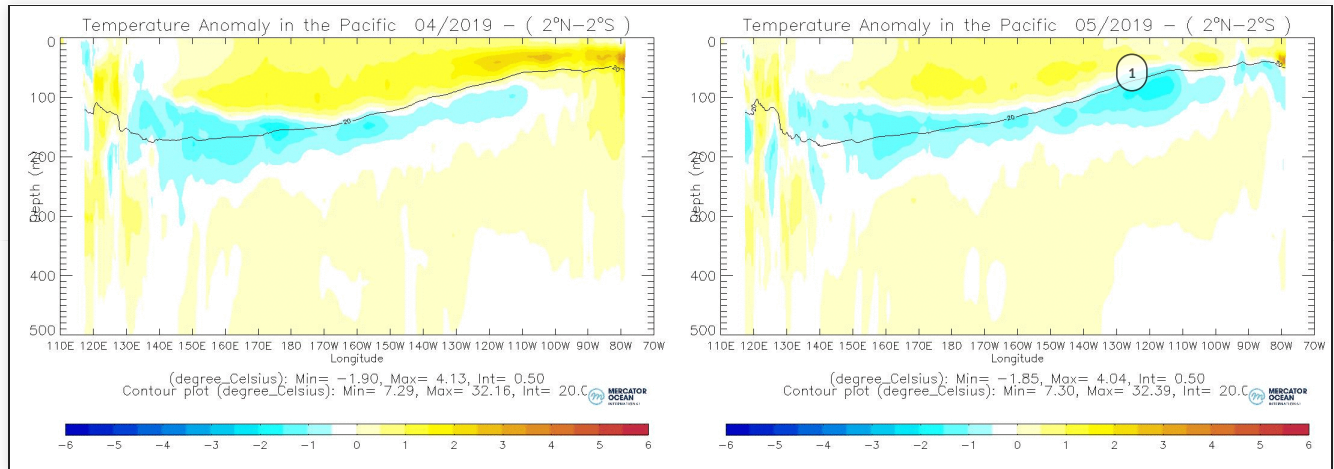
1- Slight cooling along the Equator

2- Cooling in the equatorial Atlantic, and light warming in northern tropical Atlantic

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

Oceanic analysis of May 2019 : vertical section

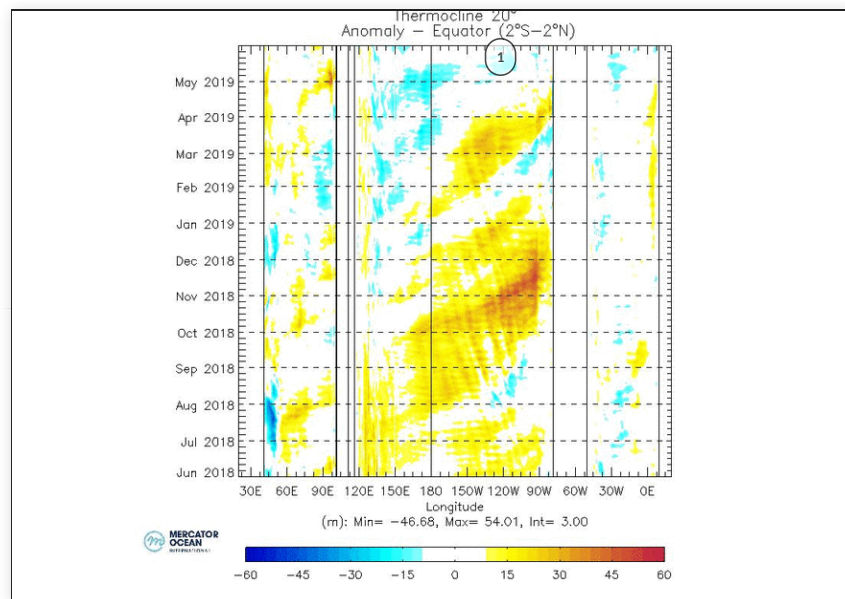
No new warm Kelvin Wave in sight. Cooling in the central part of the section



1- Propagation of cold water.

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

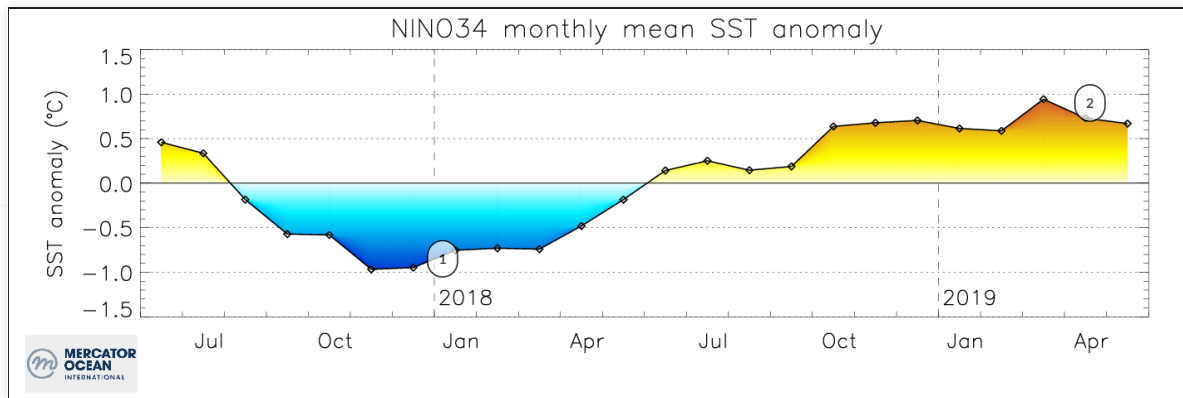
Oceanic analysis of May 2019 : Hovmöller diagram of the 20°C isotherm



1- almost no evolution of thercline last month

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

Oceanic analysis of May 2019 : History of Nino3.4



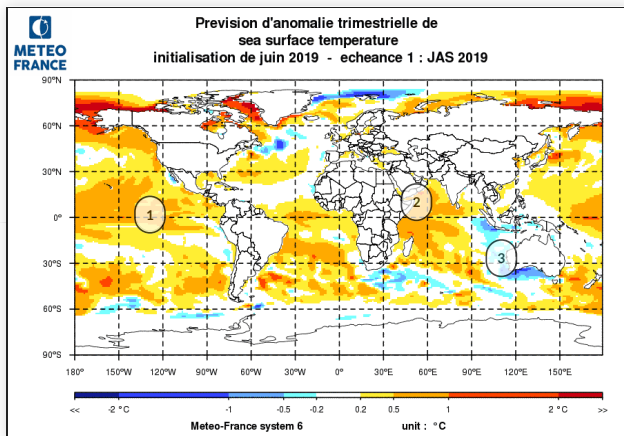
1- La Nina event of winter 2017-2018

2- slight decrease of positive anomalies in recent months

Evolution of SST in the NINO3.4 box

Oceanic forecast : SST anomaly

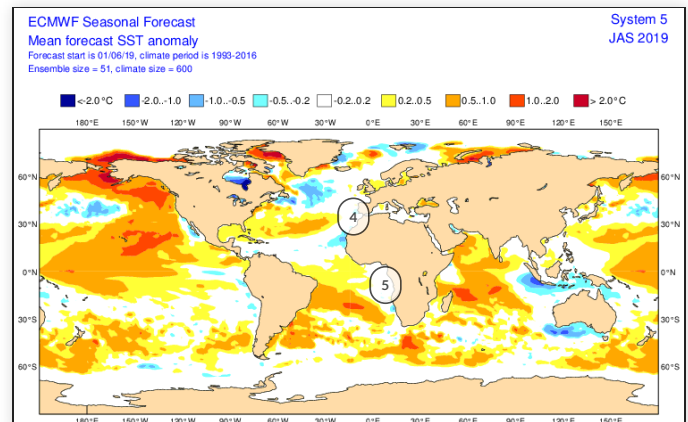
Weak El Niño event to continue during the next 3 months. Good agreement between models for most oceanic areas. The main differences concern the Atlantic Ocean.



1- Good agreement between MF6 and SEAS5 , maintaining a weak El Niño for the next three months.

3- maintaining west-east contrast.

2- warm throughout the Indian Ocean (negative in the eastern part)
; IOD index remains positive



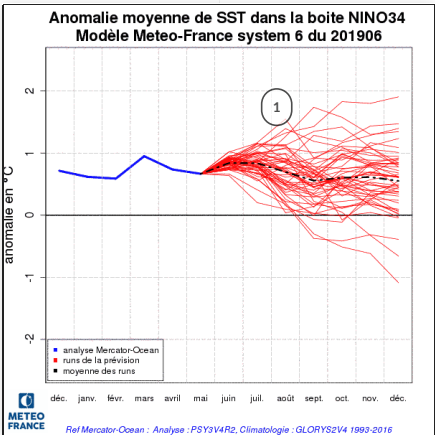
4- Still a cold/warm/cold pattern, some differences between models concerning the strength of the anomalies

5- warm anomaly less marked in the Gulf of Guinea with ECMWF

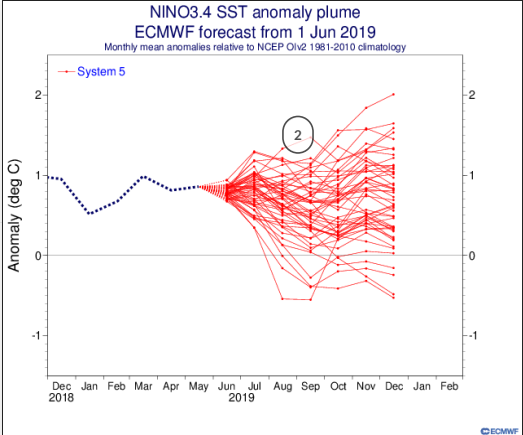
Oceanic forecast : NINO3.4 Plume diagrams

Forecasted Phase : weak El Niño

The anomaly decreases slightly on average over the next few months. The dispersion becomes quite strong



1- Slight decrease, moderate spread

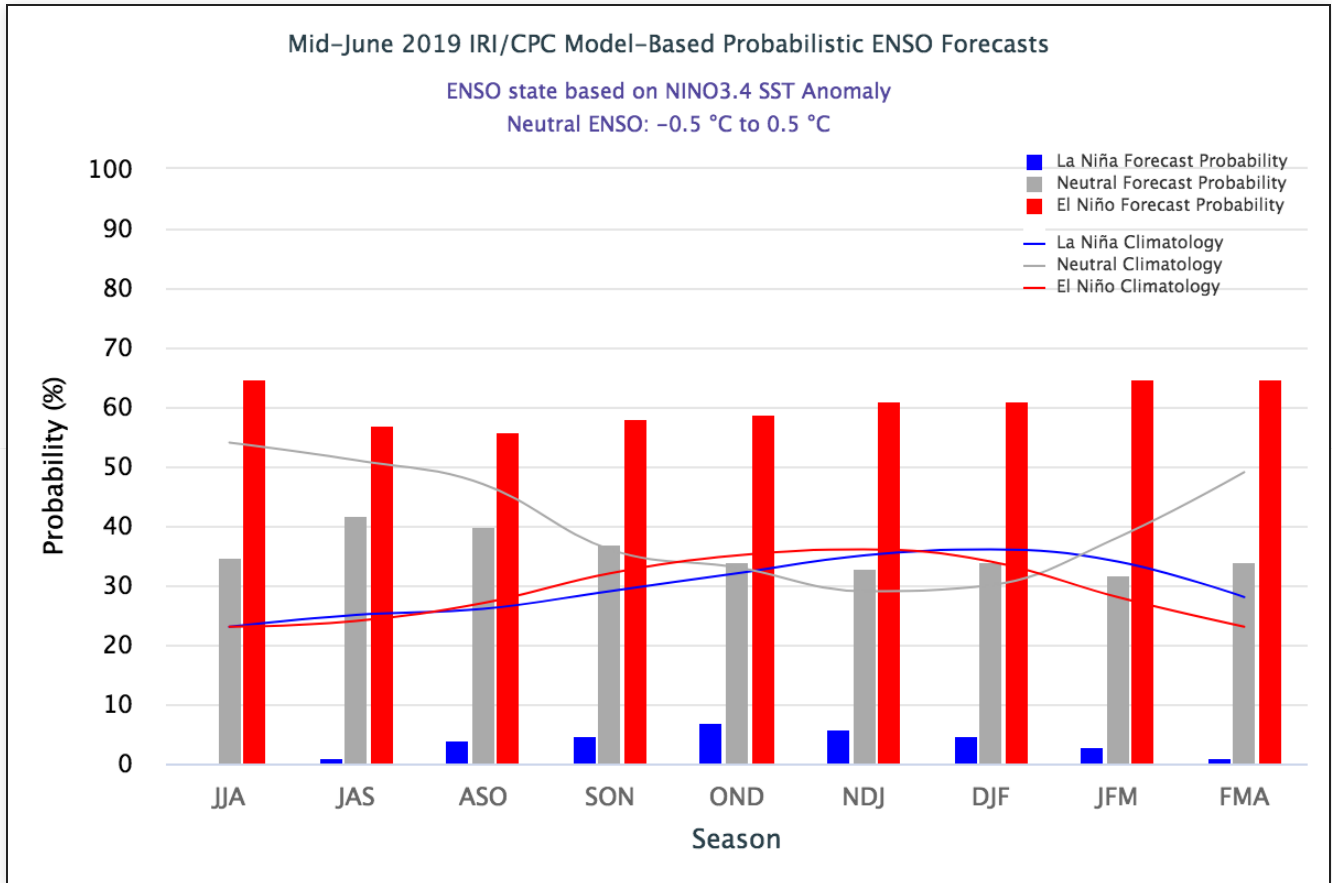


2- No trend and large spread

Oceanic forecast : Synthesis from IRI

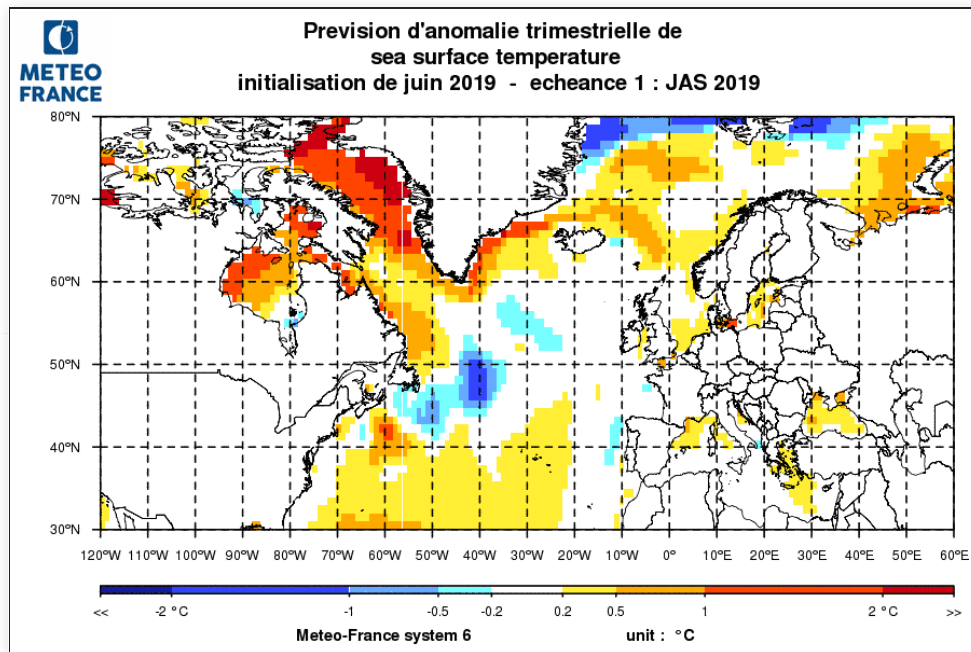
High probability (about 58%) of El Niño for JAS.

In this synthesis, still a rather high probability for the event to persist until next winter : to be taken carefully (see previous slide).



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

Drivers : Atlantic SST

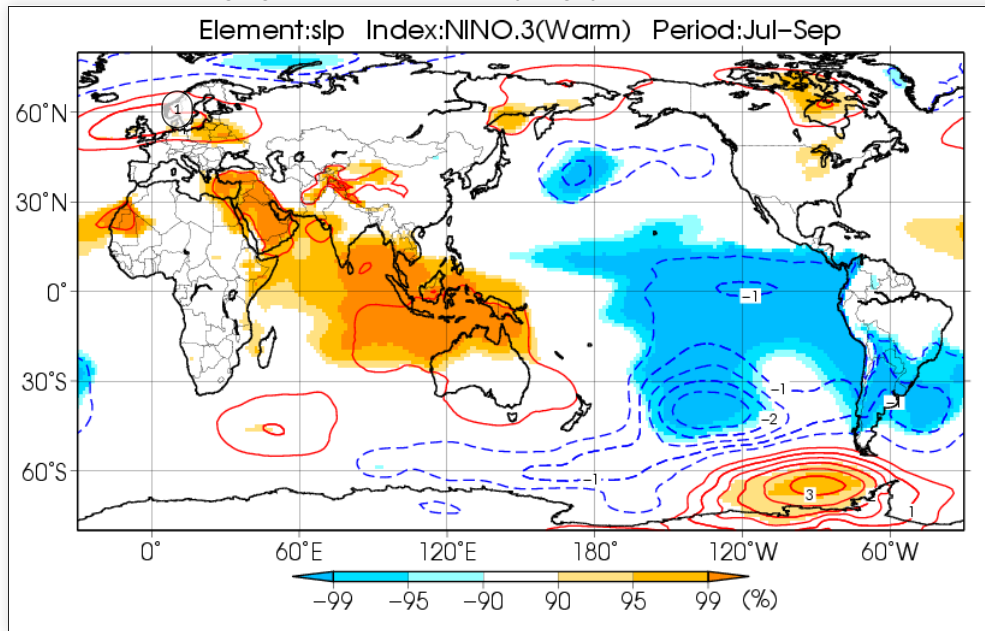


This SST pattern tends to favour blocking regimes (Guemas et al., 2010)

Drivers : Summary

SST pattern over the North Atlantic : tend to favour blocking regimes.

Weak El Niño : weak correlation blocking regimes. See http://ds.data.jma.go.jp/tcc/tcc/products/clisys/enso_statistics/

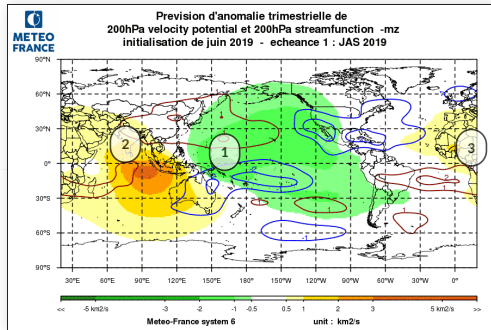


1- Positive anomaly corresponding to Scandinavian Blocking

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

Velocity Potential : good agreement between models; large area of upward anomalies over the Tropical Pacific, and large subsiding anomalies over large part of the Maritime Continent and Indian Ocean. Over the Atlantic, globally positive anomalies (max. over W. Africa). Patterns are consistent with El Niño.

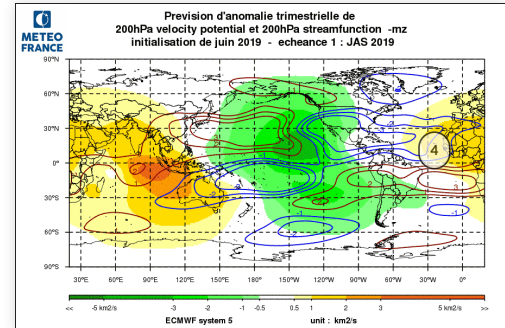
Streamfunction : signal trapped in the tropics, strong over the Pacific, weaker but still significant westward up to Asia and eastward all across the Atlantic.



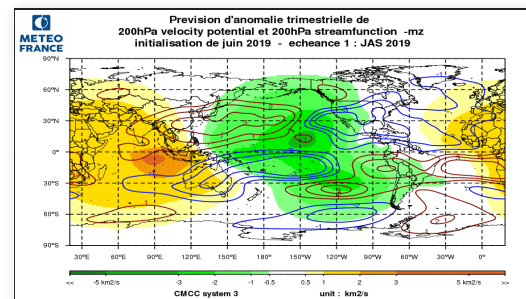
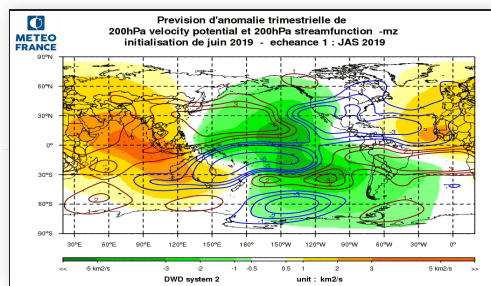
3- Downward anomaly (good agreement between models)

1- Upward motion anomaly on almost all the Pacific, and response in streamfunction north and south of the equator near the strongest core

2- Subsidence over large part of Indian Ocean and west of maritime continent



4- In streamfunction, cyclonic anomaly. It is stronger in SEAS5 (this map), DWD and CMCC than in MF-S6.

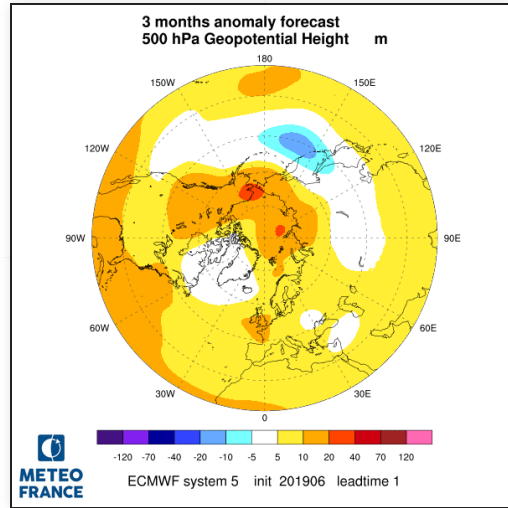
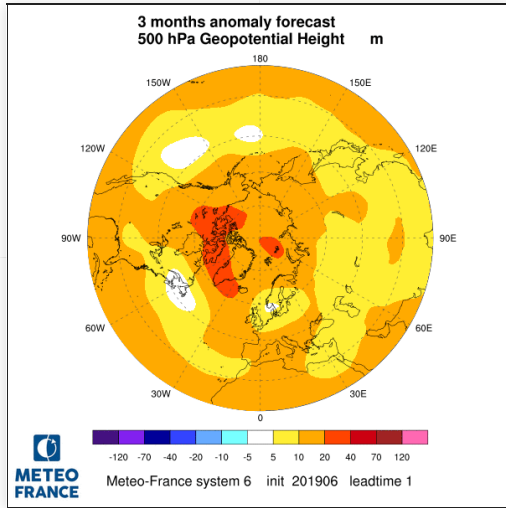


MF6, SEAS5, DWD and CMCC 200hPa velocity potential anomalies (color range, green: ascending, orange: subsidence) and stream function anomalies (isolines, red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere).

Atmospheric circulation forecasts : 500 hPa Geopotential anomalies

Around North Pacific, rather good agreement between MF-S6 and SEAS5.

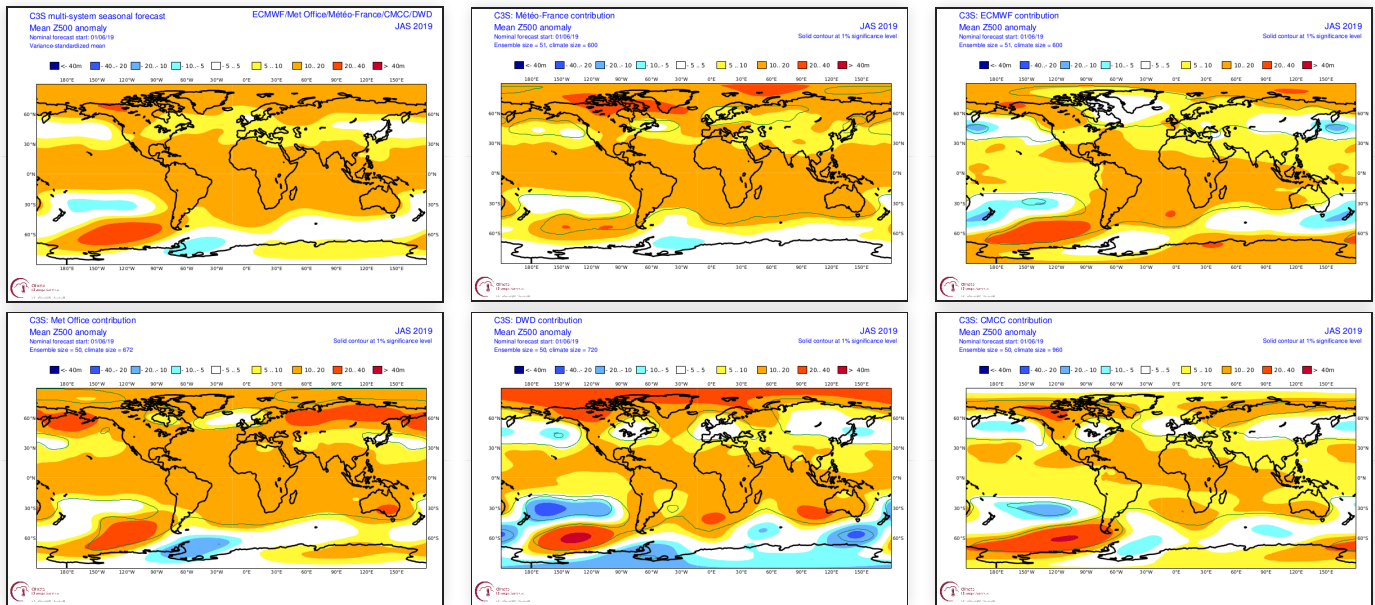
Over North Atlantic opposite signal between models : MF6 forecasts positive anomaly around Greenland and negative far south like NAO - Z500 regime or Greenland Anticyclone MSLP regime



Atmospheric circulation forecasts : Z500 anomalies in C3S models

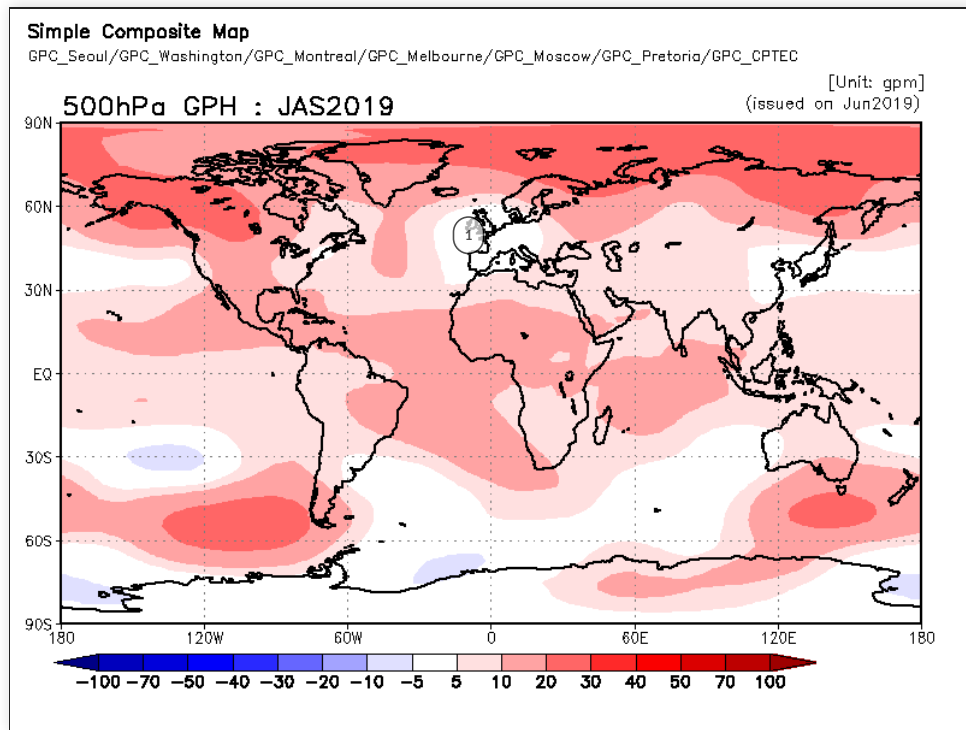
ECMWF is different from the multi-model on the North Atlantic forecasting a positive anomaly over Greenland.

The prevailing signal is rather negative anomaly from Quebec to western Europe, corresponding to NAO- Z500 regimes or Greenland anticyclone summer SPL régimes



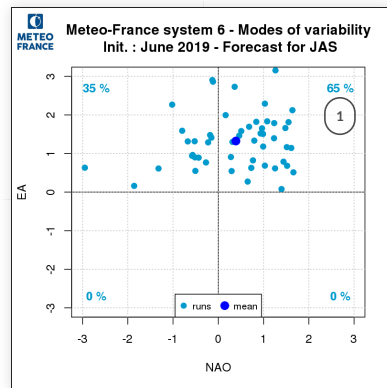
Atmospheric circulation forecasts : Z500 anomalies multi-systems

For North Atlantic and Europe : compared to C3S, the WMO multi-model reinforces the relative low anomaly in western Europe.

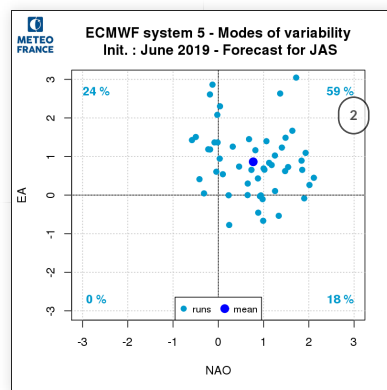
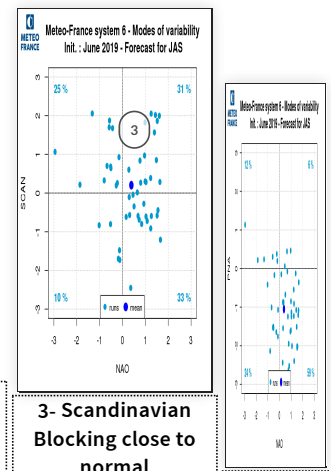


1- Relative low anomaly

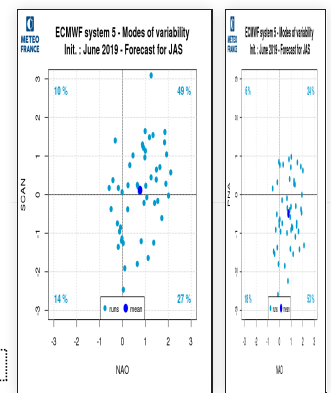
Modes of variability : forecast



1- Despite Z500 anomaly structure, MF-S6 favours positive NAO. This is maybe due to the strengthening of the geopotential over North Tropics (see Z500 anomaly field) link to the climate warning in summer. EA is clearly favored and it's also a sign of climate warning (as we can see on the Hindcast of MF6 : <http://seasonal-int.meteo.fr/content/MF6-scores-modes-diag>)



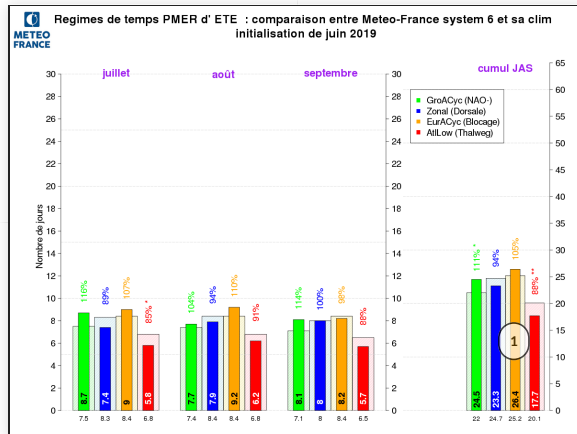
2- Same signal in SEAS5 than in MF-S6 with NAO reinforced



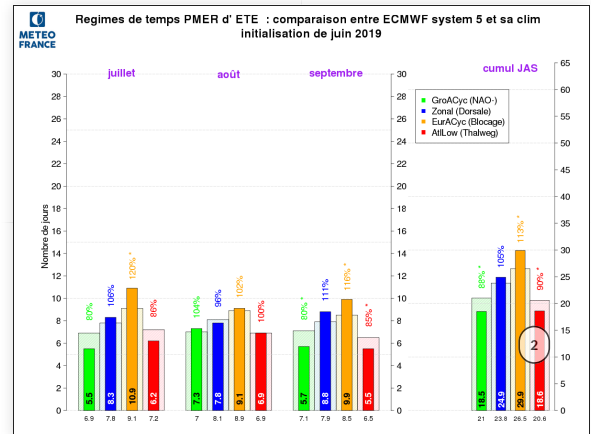
see the modes of variability patterns

Weather regimes : summer MSLP

MF6 close to the multi-model is preferred. Greenland Anticyclone is favored and Atlantic Low is less common than climatology.



1- Greenland Anticyclone favoured / Atlow less frequent than climatology

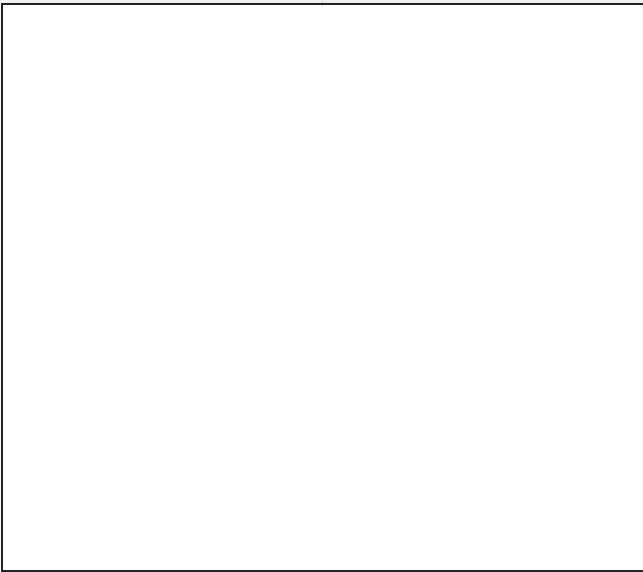


2- Favored regime (Blocking) is different from MF6

Frequency of SLP weather regimes, compared to model's own climatology, for the next three months and aggregation over the entire quarter, for MF6 (left) and SEAS5 (right).

See the summer weather regime patterns

Weather regimes : Impacts

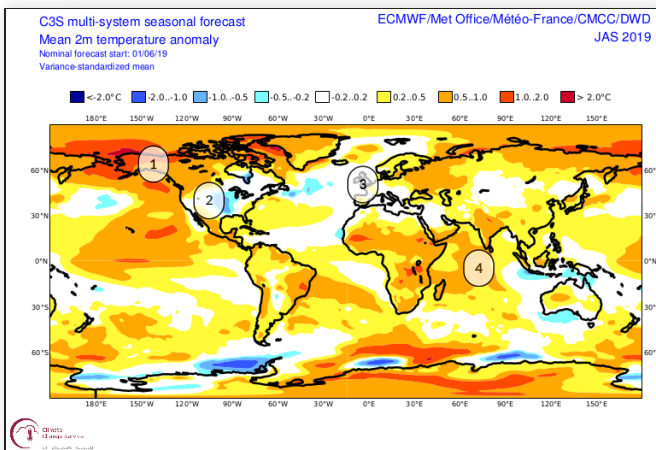
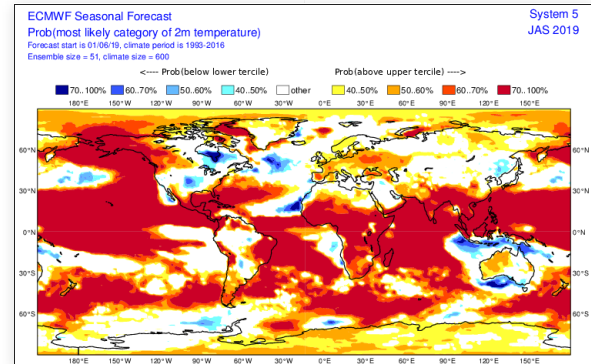
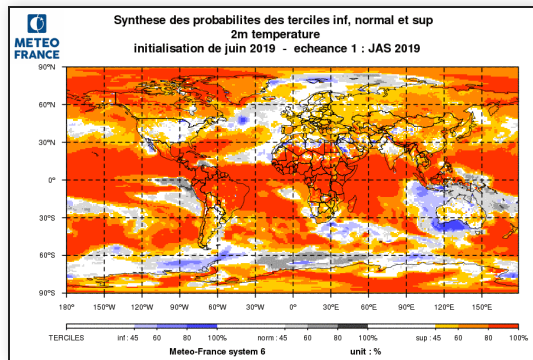


Impact of Summer Greenland Anticyclone weather regime on temperature and precipitation. (ref ERA-interim 1981-2010 and GPCC 1988-2013)

Forecast of climatic parameters : Temperature

Dominant warm signal over continents. Exceptions : East and South part of North America, West of Europe.

Over the European continent, the upper tercile is the most probable in the eastern part while no scenario emerges to the west (see multi-model).

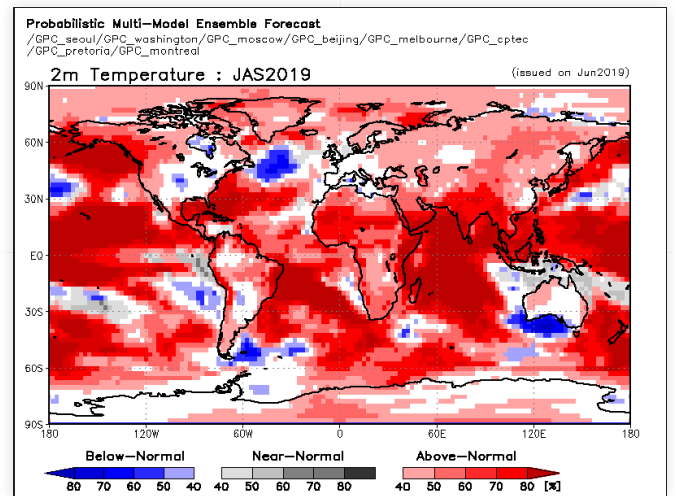


1- Continuing warm conditions over Alaska and western Canada (positive PNA)

2- Cooler than normal over central and western US (positive PNA)

4- Widespread warm signal over Tropical regions

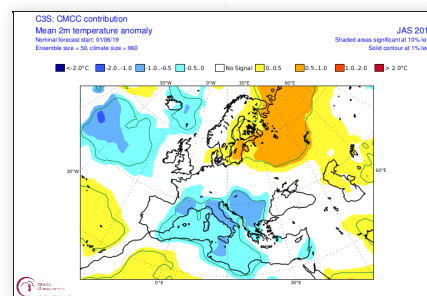
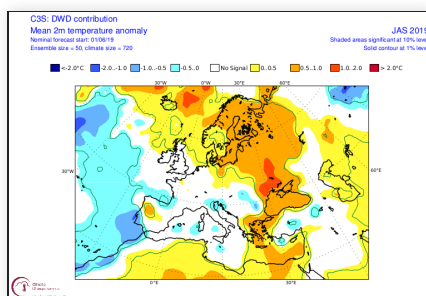
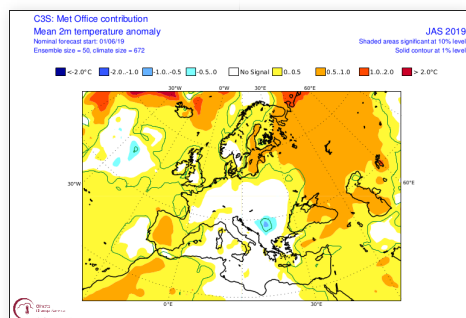
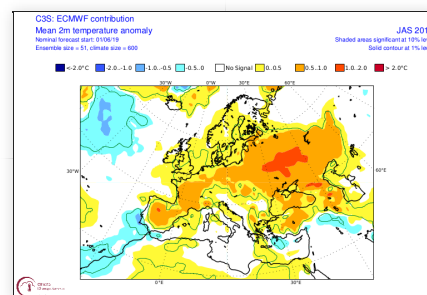
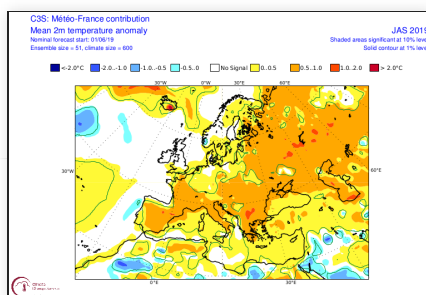
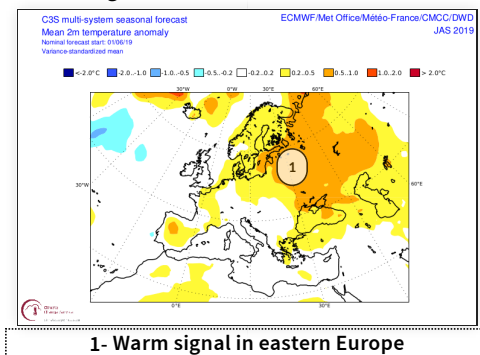
3- No signal for western Europe



2m temperature probability map from MF6 (top left), SEAS5 (top right), C3S multi-models (bottom left) and others multi-models (bottom right)

Forecast of climatic parameters : T2M probabilities in C3S models

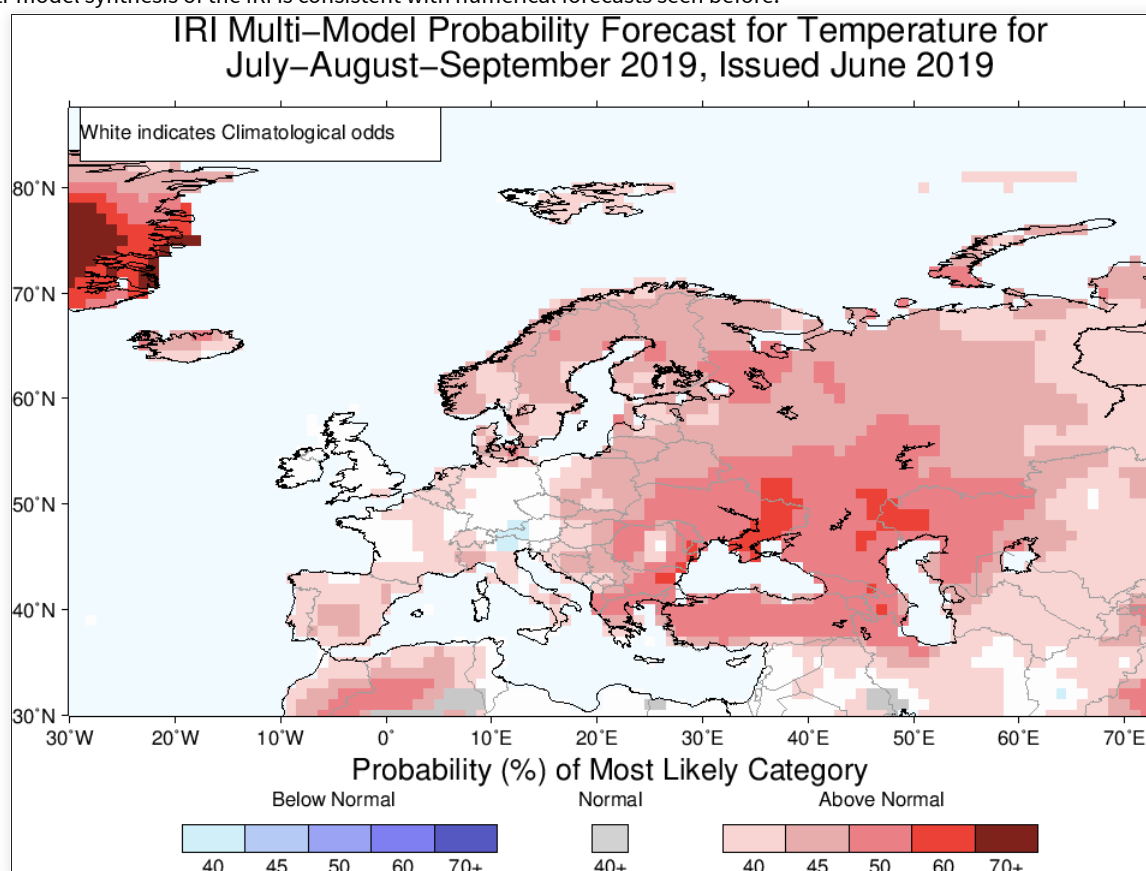
Warm signal is more accentuated with MF6 and ECMWFs5 in agreement with their atmospheric circulation anomaly



C3S multi-models probability map (top left) and MF6, ECMWF5, UKMO, DWD, CMCC models.

Forecast of climatic parameters : Température synthèse de l'IRI

The multi-model synthesis of the IRI is consistent with numerical forecasts seen before.

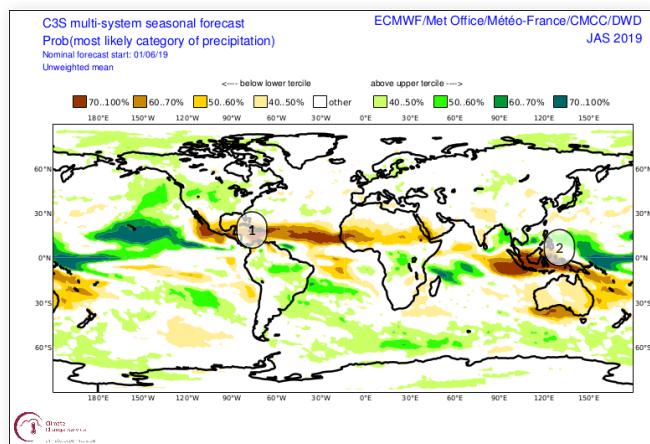
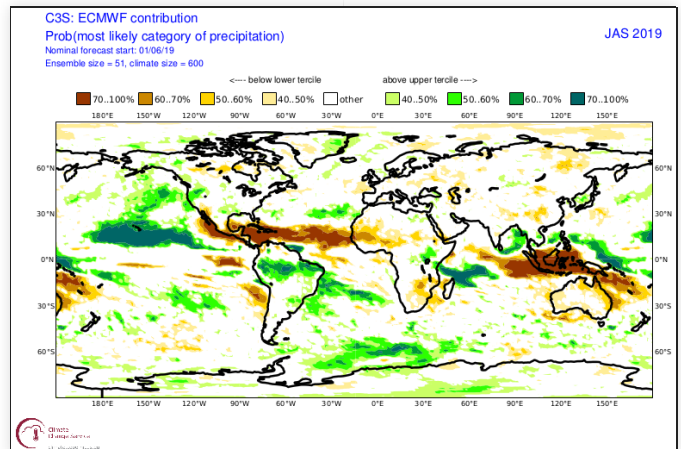
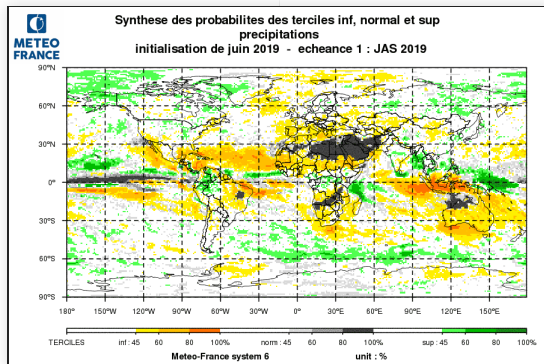


<https://iri.columbia.edu/our-expertise/climate/forecasts/>

Forecast of climatic parameters : Precipitation

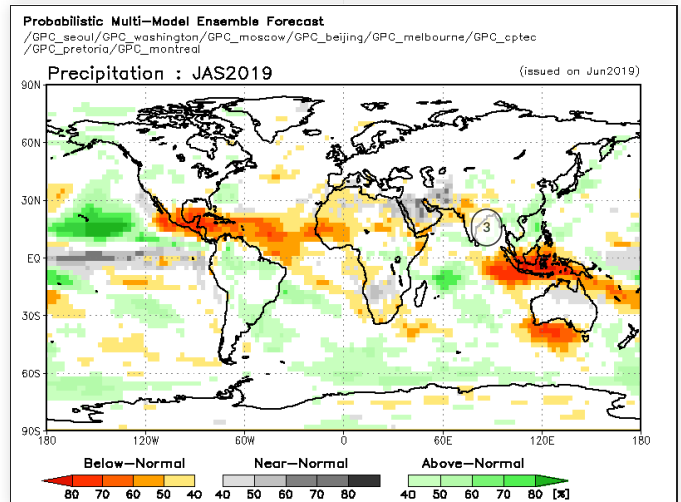
Models in good agreement over the Tropics, consistent with an El Nino configuration. Drier than normal conditions very likely over the Caribbean and Maritime Continent

Over Europe no signal in multi-models. MF6 suggests dry conditions around Mediterranean.



2- Dry over the Maritime Continent

1- Dry over the Caribbean



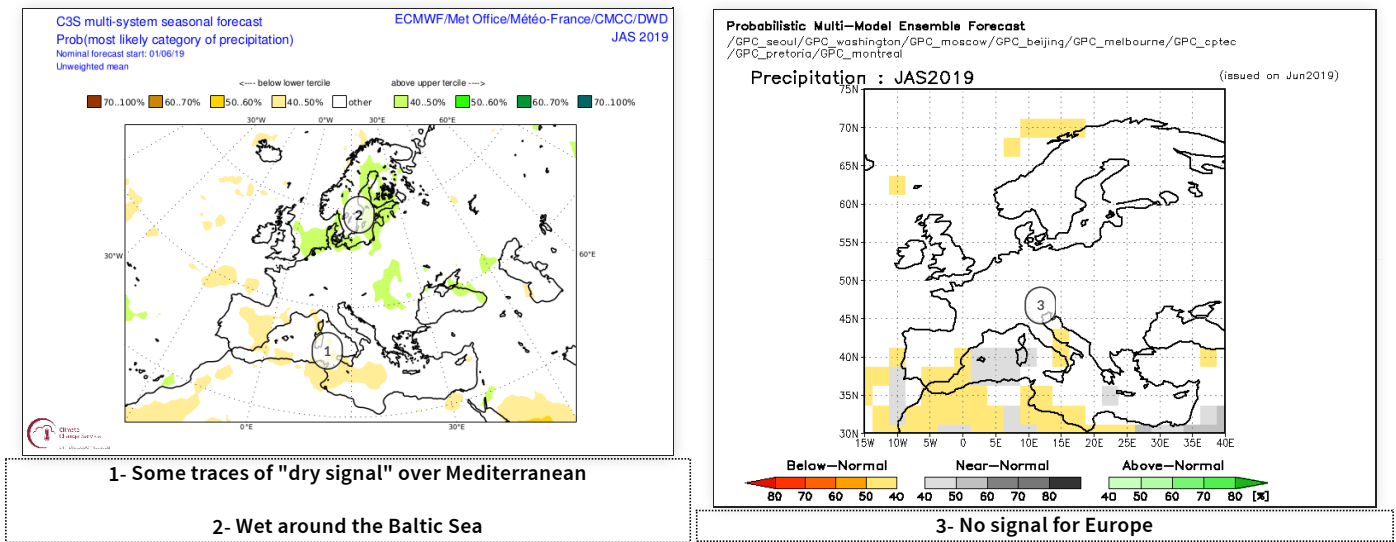
3- Dry over India (poor Monsoon ?)

precipitation probability map from MF6 (top left), SEAS5 (top right), C3S multi-models (bottom left) and others multi-models (bottom right)

Forecast of climatic parameters : precipitation probabilities - zoom over Europe

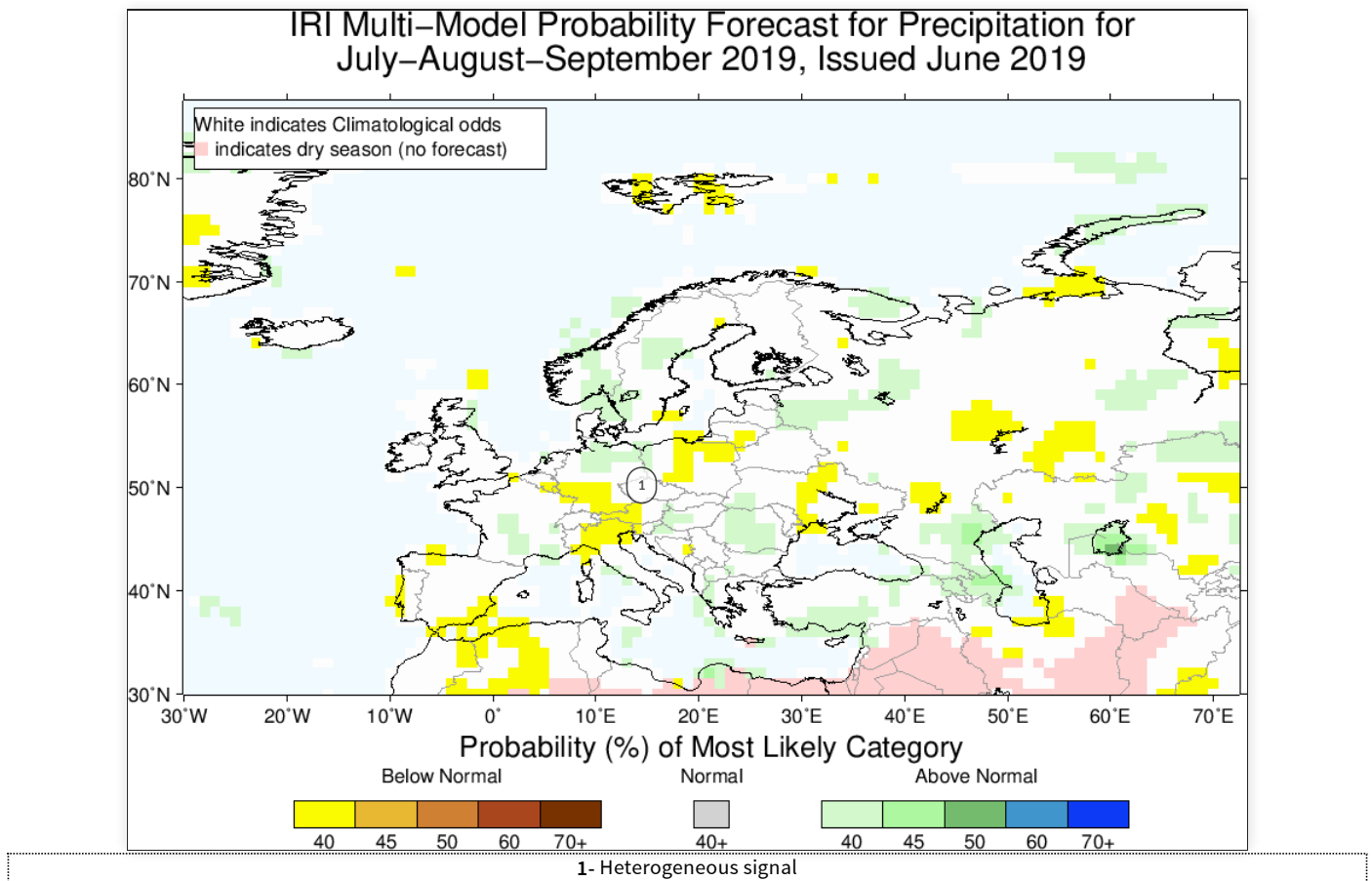
The signal of precipitation is quit different between models (not shown)

C3S multi-models suggests dry conditions around Mediterranean and wet conditions for North Sea to Baltic Sea such as NAO - impact or climate trend in summer.



multi-models probability map : C3S on the left; WMO on the right.

Forecast of climatic parameters : IRI precipitation synthesis



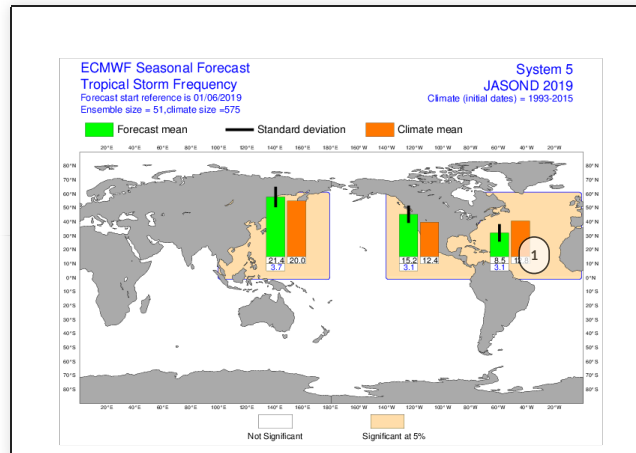
<https://iri.columbia.edu/our-expertise/climate/forecasts/>

Forecast of climatic parameters : Tropical Storm Frequency

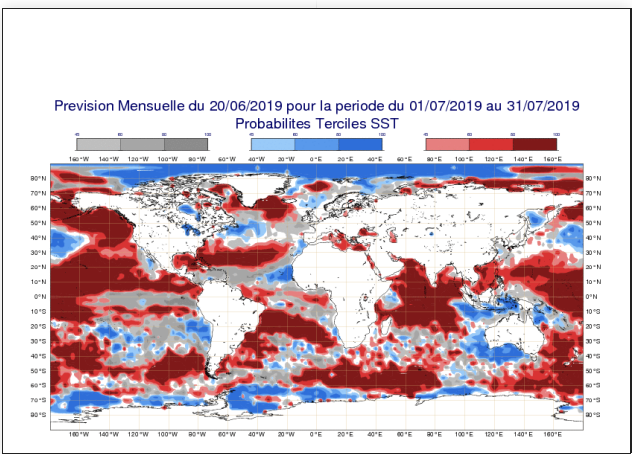
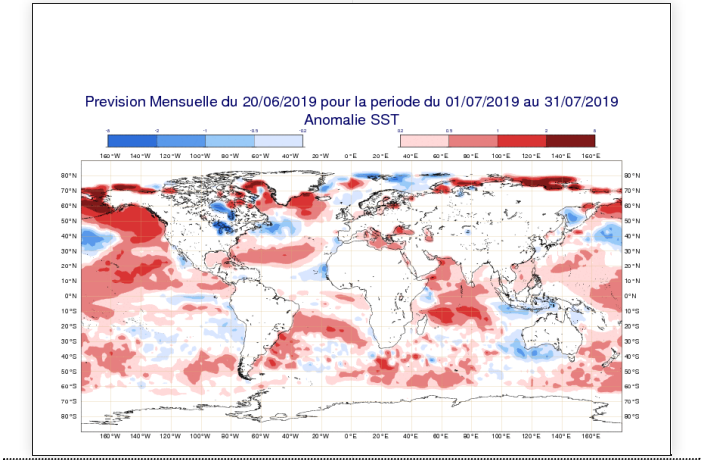
ECMWF forecasts tropical storm frequency below average.

Nevertheless NOAA's CPC is predicting that a near-normal Atlantic hurricane season is most likely this year.(<https://www.nhc.noaa.gov/>).

MF6 forecasts also normal hurricane season on the lesser antilles (<http://www.meteofrance.gp/>)

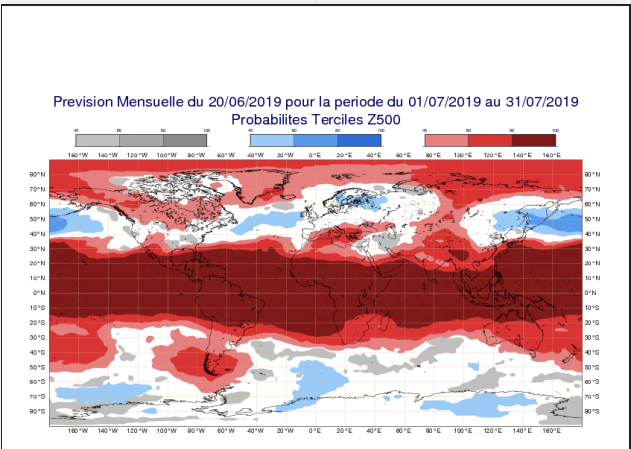
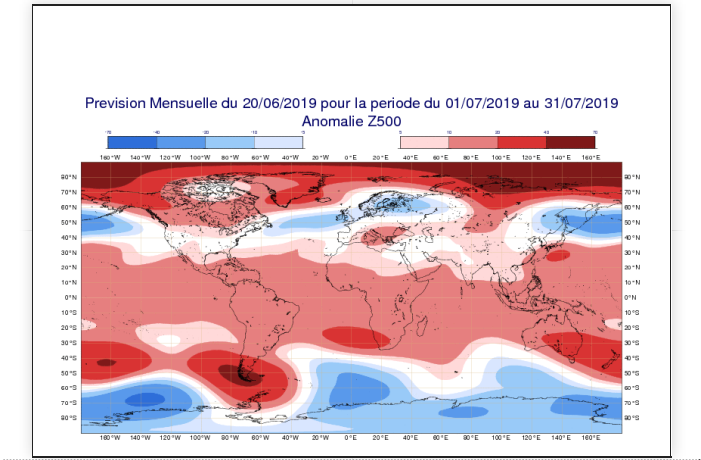


Monthly forecast of 20190620 : SST



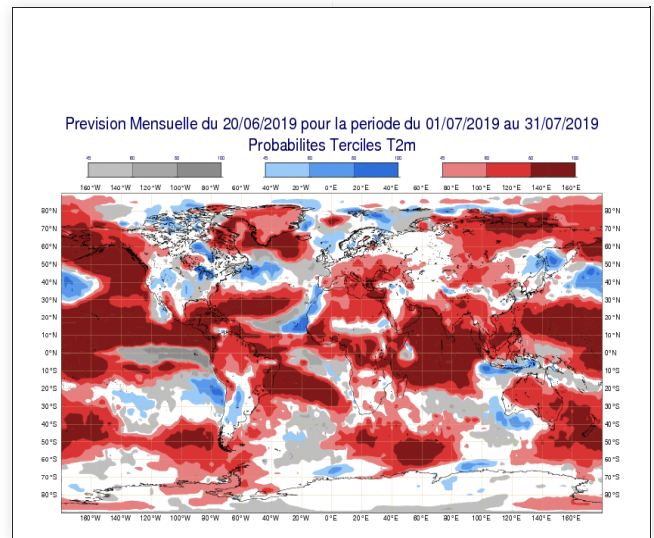
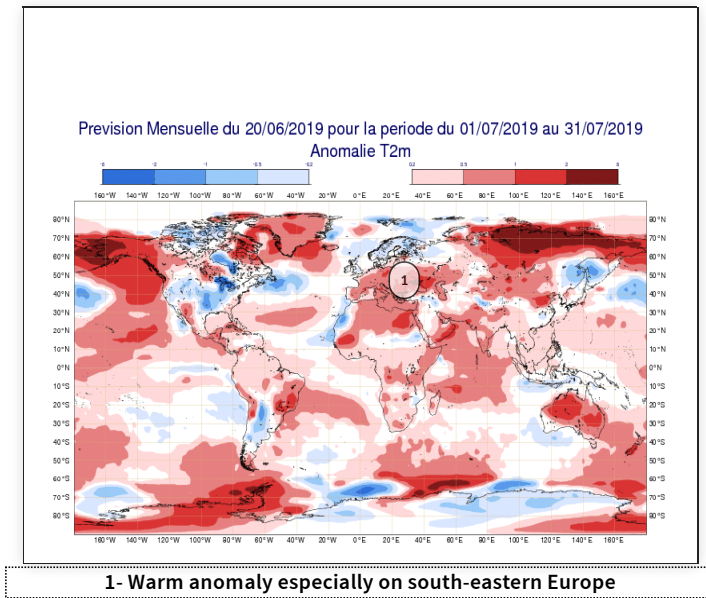
Monthly forecast of 20190620 : Z500

The ECMWF monthly forecast look like NAO- Z500 summer regime.

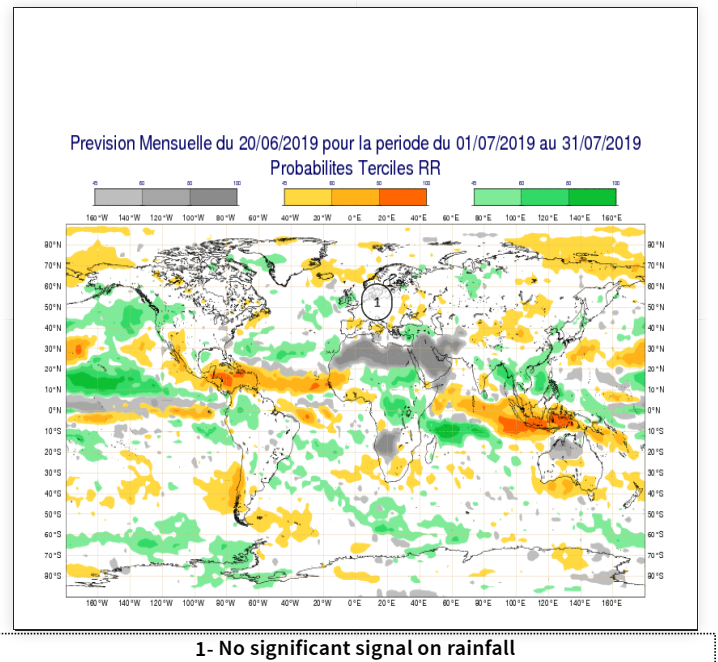
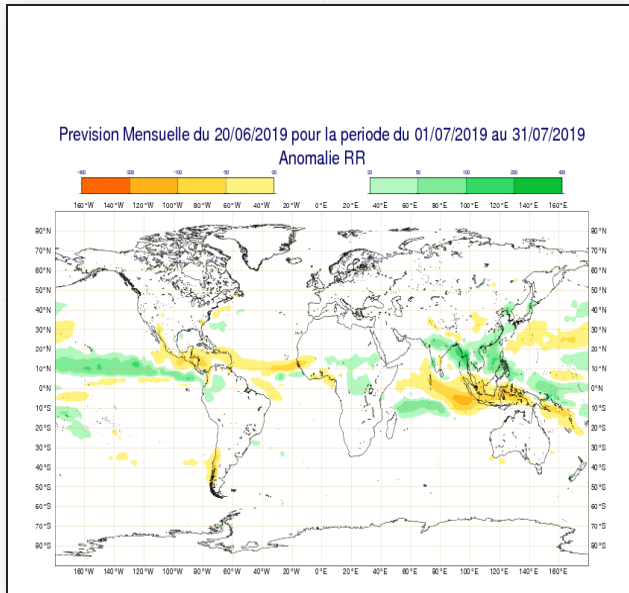


Monthly forecast of 20190620 : temperature

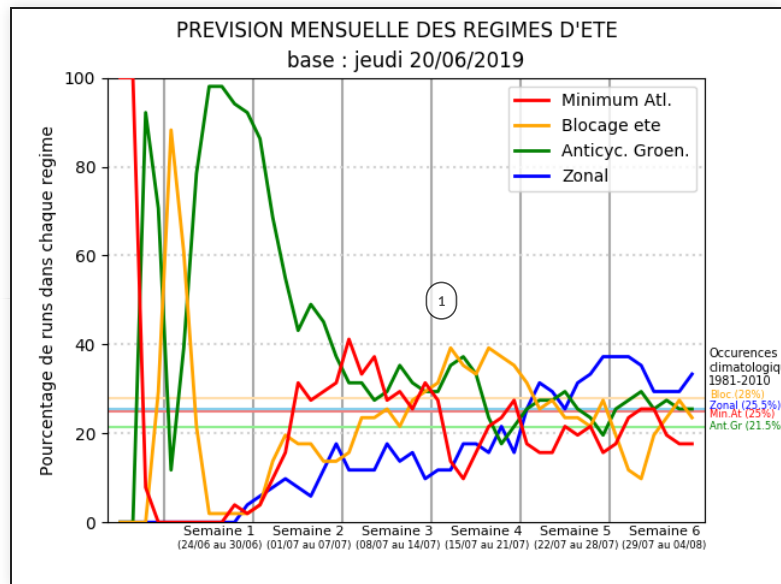
The temperature pattern is consistent with a Greenland anticyclone weather regime : cold anomalies in northern Europe and warm anomalies in the south.



Monthly forecast of 20190620 : precipitation



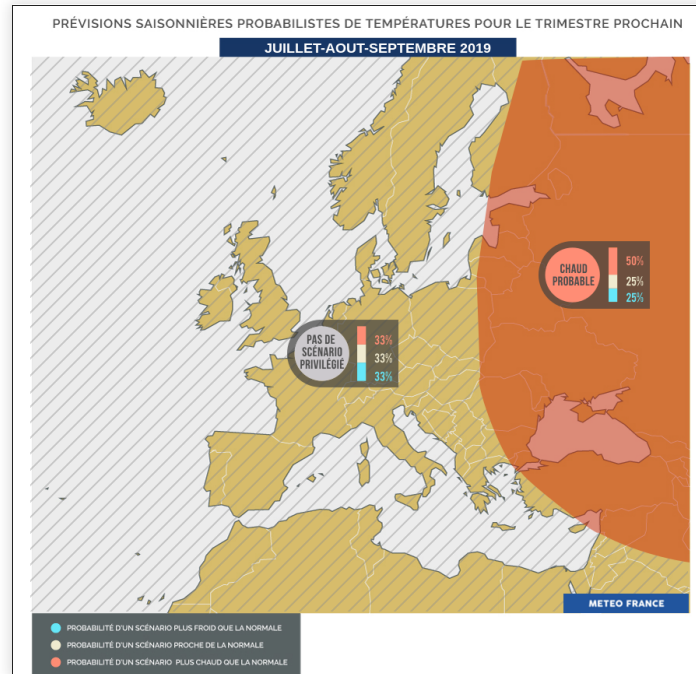
Monthly forecast of 20190620 : summer SLP weather regimes



1- "Greenland Anticyclone" is favoured especially in the first half of July.

Synthesis map for Europe : Temperature

Fairly high dispersion of atmospheric circulation forecast. For the temperature the prevailing signal of multi-ensemble forecasting is a warm anomalie on Eastern Europe



Synthesis map for Europe : Precipitation

The signal of precipitation is quite different between models. Multi-models forecasts have a very weak signal related to climate change.

No predominant scenario.

