Météo-France Seasonal Forecast Bulletin

JUNE - JULY - AUGUST 2019

General synthesis : JJA 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, larger than last month). 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 **Blocking pattern and relative low geopotentials over Central Atlantic** are favoured by most of them. This scenario seems consistent with the drivers identified (El Nino and SST patterns).

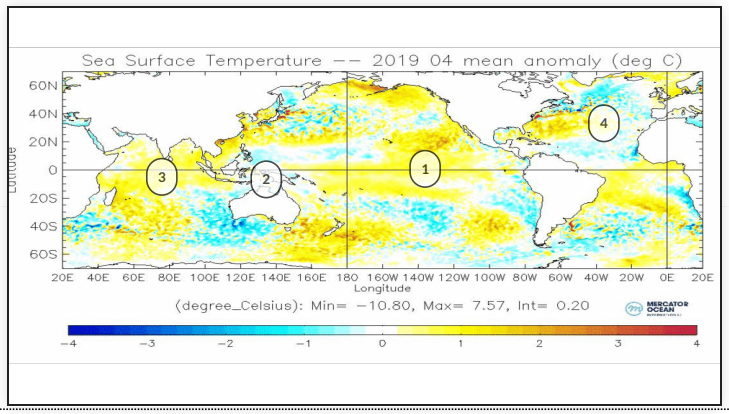
- Consequently, the JJA period should be **warmer than normal** for most of the European continent. Less clear signal over the Southern part of the Medit. Basin (contradictory forcings), and probably more perturbated than normal in the very Eastern part (lower tercile privileged). Regarding precipitation it should be **drier than normal** over **North-Central Europe** and **wetter than normal** over **Middle East.**

Oceanic analysis of April 2019 : SST anomalies

Current situation : weak El Niño conditions

APRIL NINO3.4 INDEX : +0.7 °C (Mercator Ocean PSYV4R2 analysis)
APRIL IOD INDEX : ~0 °C (Mercator Ocean PSYV4R2 analysis)
LASTEST WEEKLY NINO3.4 TREND : slight decrease
LASTEST WEEKLY IOD TREND : slight upward 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)

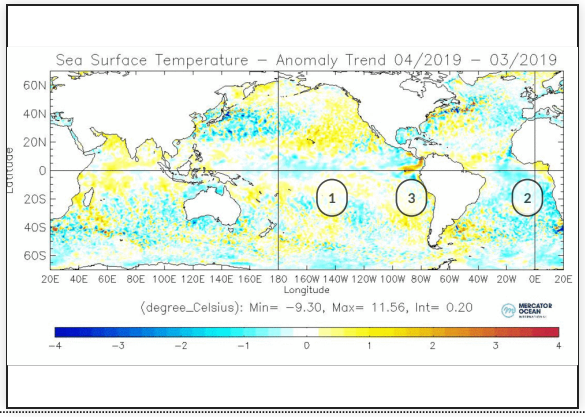


1- warm anomaly related to the current El Niño. the anomaly is uniform over much of the equator.

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

3- large warm anomaly, neutral IOD

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



1- Slight cooling along the Equator

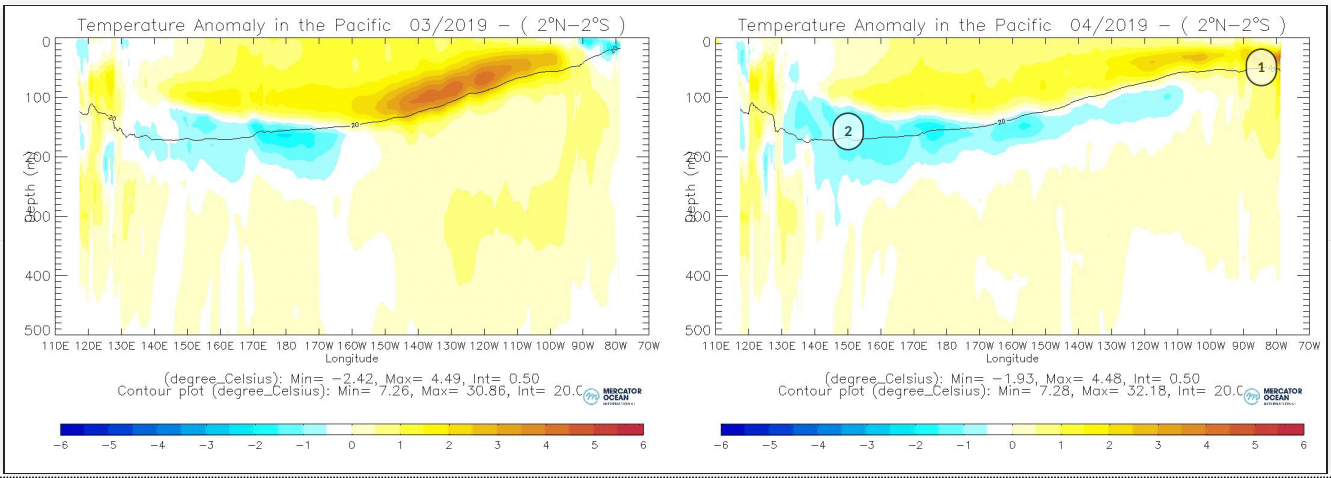
2- Cooling in the equatorial Atlantic, except in the Gulf of Guinea

3- Local warming, in link with the Kelvin wave (see vertical cross-section)

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

Oceanic analysis of April 2019 : vertical section

No new warm Kelvin Wave in sight. Cooling in the western part of the section : to be monitored

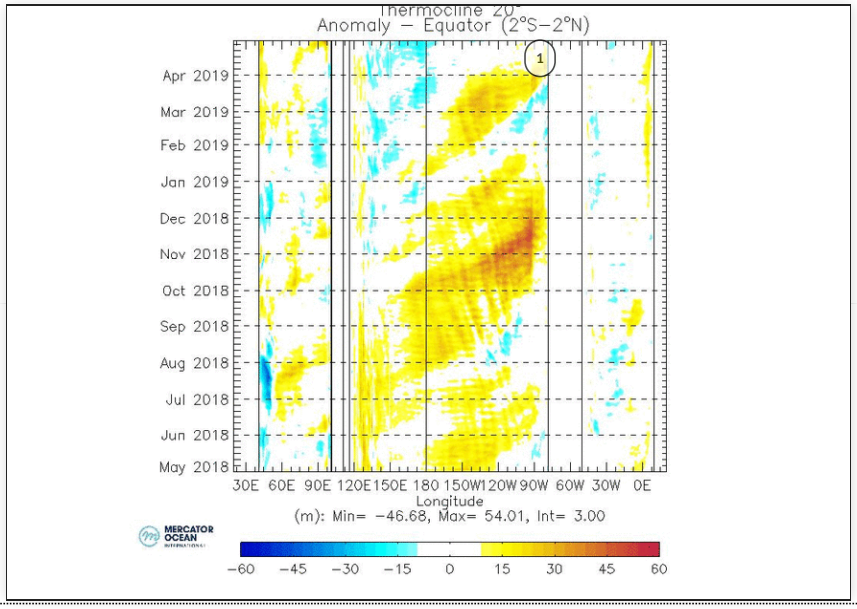


1- Kelvin Wave emerging at the surface, close to the Peruvian coasts.

2- possible setting up of a cold reservoir

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

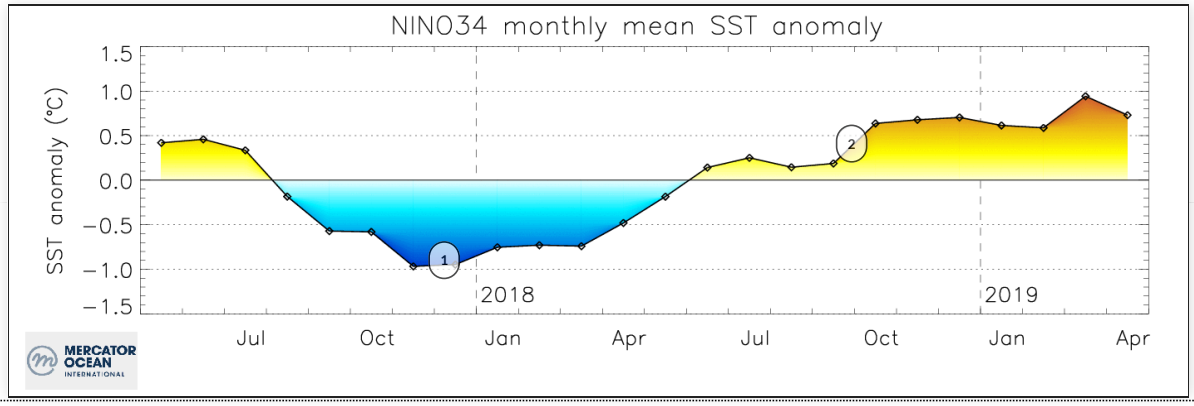
Oceanic analysis of April 2019 : Hovmüller diagram of the 20°C isotherm



1- Kelvin Wave

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

Oceanic analysis of April 2019 : History of Nino3.4



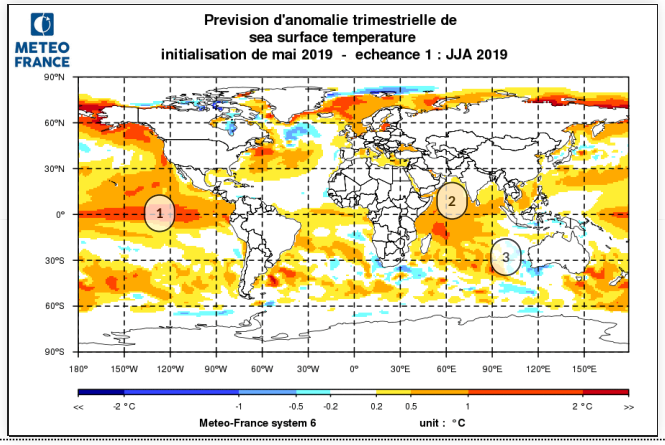
1- La Nina event of winter 2017-2018

2- strong increase in October

Evolution of SST in the NINO3.4 box

Oceanic forecast : SST anomaly

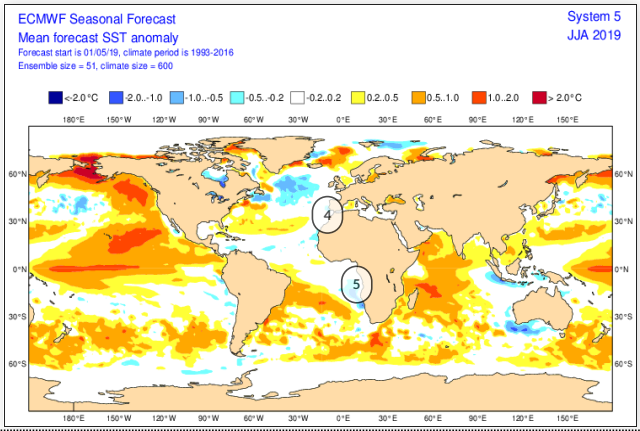
Weak El Niño event to continue during the next 3 months. Good agreement between models for most oceanic areas. The main differences concern the Atlantic Ocean.



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

2- warm throughout the Indian Ocean (closer to neutral in the eastern part) ; IOD index close to neutral or slightly positive

3- maintaining west-east contrast.



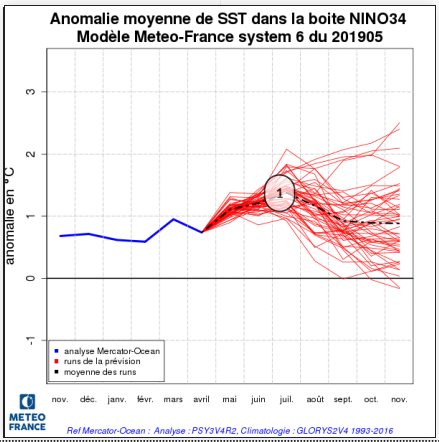
4- Still a cold/warm/cold pattern, some differences between models concerning the strength of the anomalies

5- No agreement between models in the Gulf of Guinea.

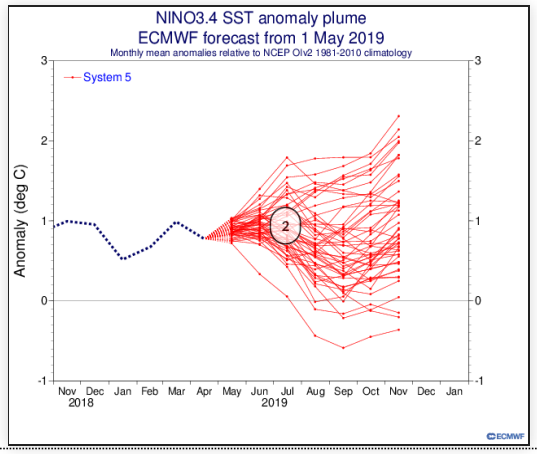
Oceanic forecast : NINO3.4 Plume diagrams

Forecasted Phase : weak El Niño

Despite a good agreement on the mean SST anomaly over the equatorial Pacific, plumes of MF-S6 and SEAS5 are rather different (trend and spread)



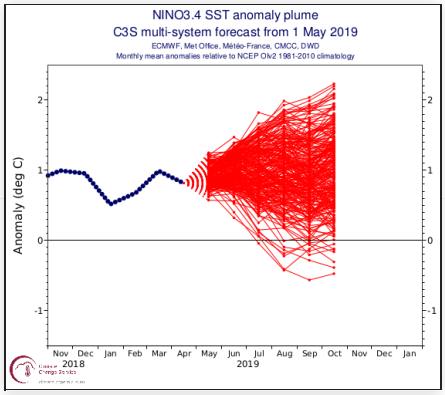
1- Positive trend, little spread

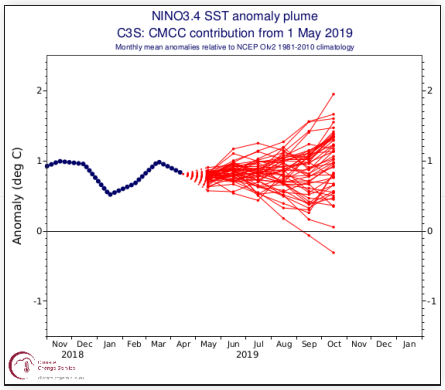


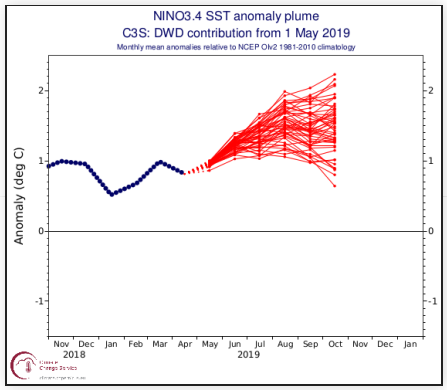
2- No trend and large spread

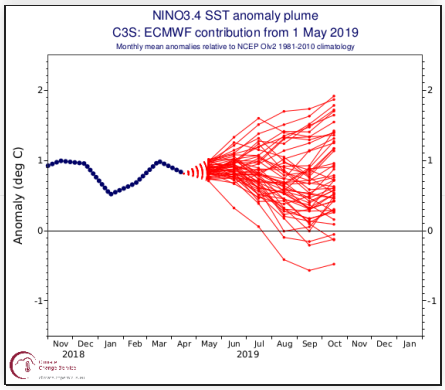
Oceanic forecast : C3S Nino3.4 re-scaled plume diagrams

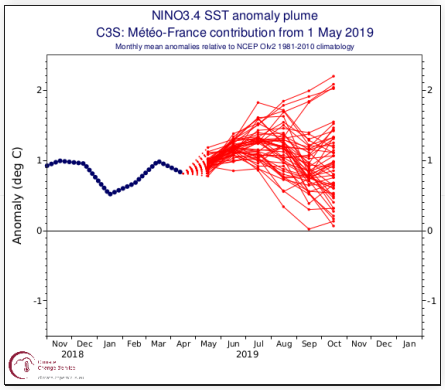
A variety of forecasts, leading to a very large spread in the Multi-Model's plume. The most probable evolution is confirmed (weak El Nino) but with a limited confidence on its intensity.

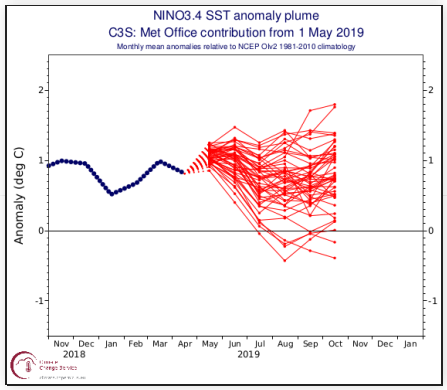










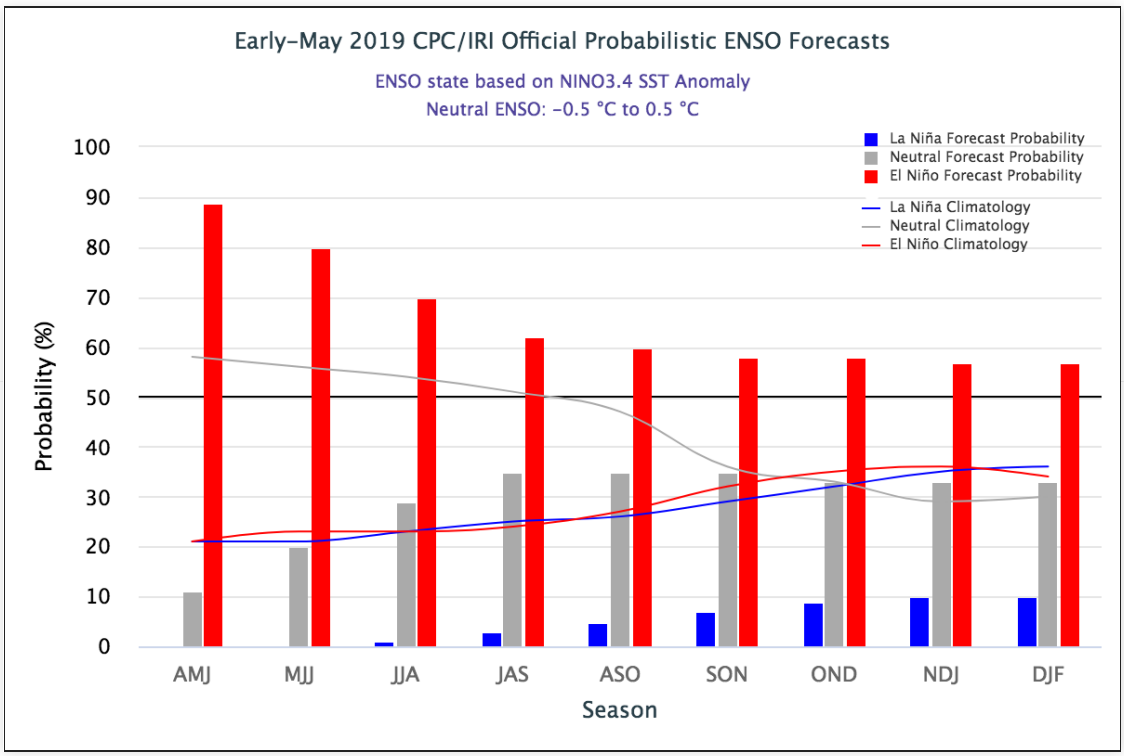


C3S plume diagrams re-scaled from the variance of observations for the period 1981-2010. https://climate.copernicus.eu/charts/c3s_seasonal/

Oceanic forecast : Synthesis from IRI

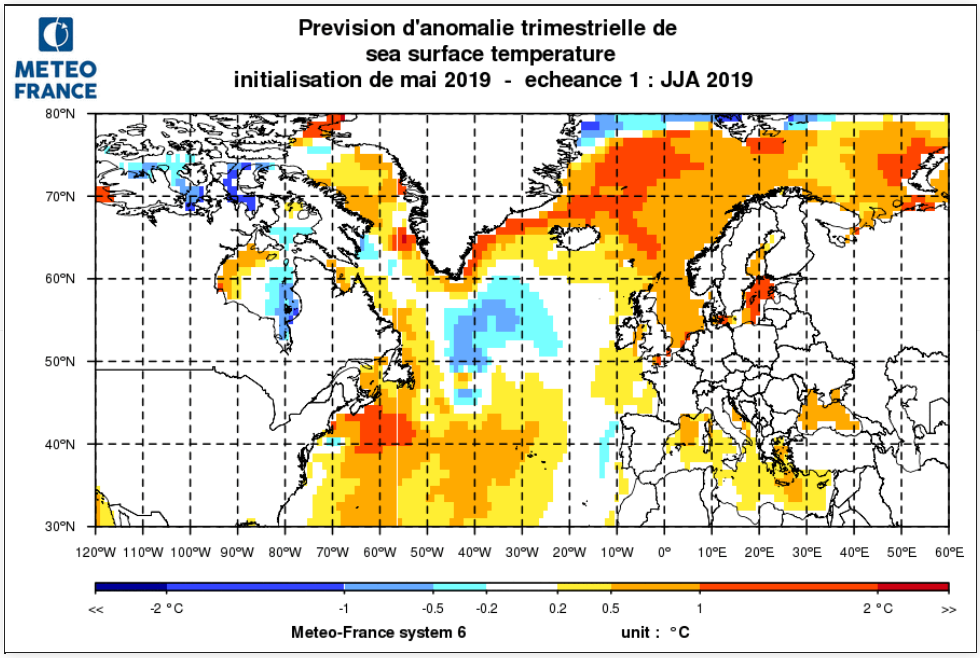
High probability (70%) of El Nino for JJA.

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

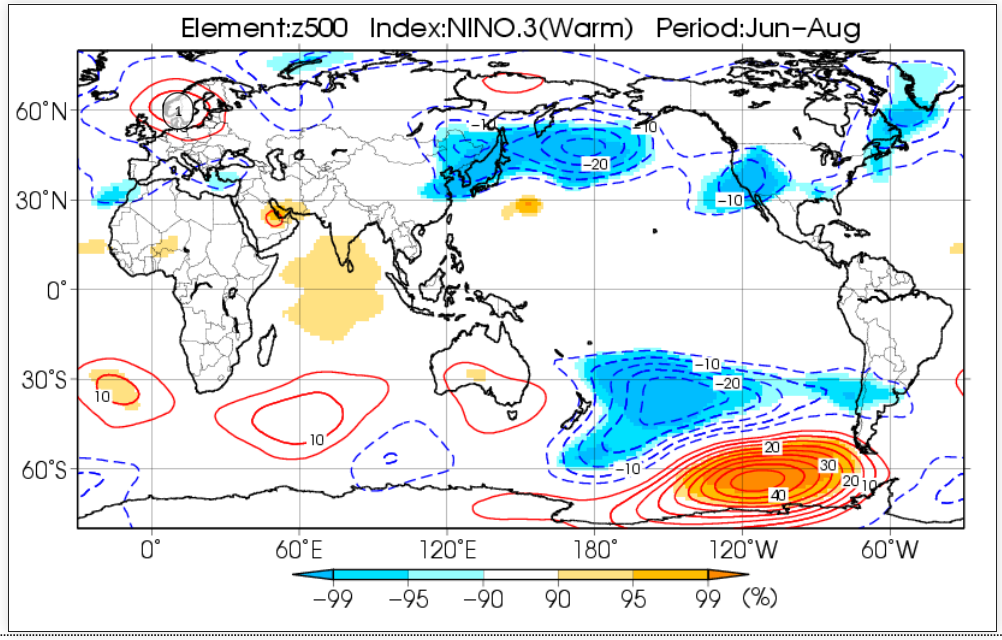


This SST pattern tends to favour blocking regimes (Guemas et al., 2010)

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/

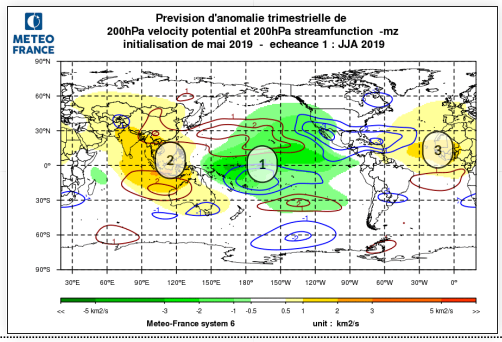


1- Positive anomaly corresponding to Scandinavian Blocking

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

VP 200 hPa : good agreement between models; large area of upward anomalies over the Tropical Pacific, and large subsiding anomalies over the Maritime Continent and South Asia. Over the Atlantic, globally positive anomalies (max. over W. Africa). Patterns are consistent with El Niño.

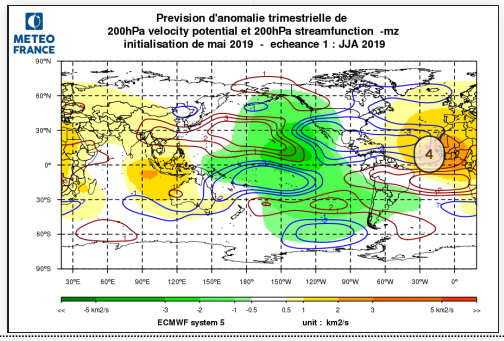
Streamfunction : signal trapped in the tropics, strong over the Pacific, weaker but still significant westward up to Asia and eastward all accross the Atlantic.



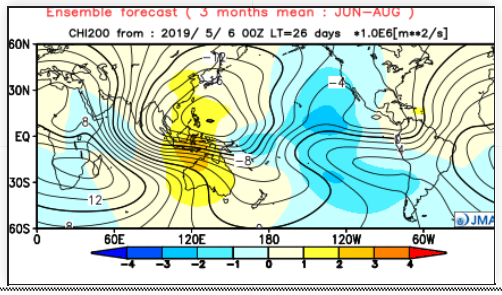
1- Strong upward motion anomaly, and strong response in streamfunction north and south of the equator

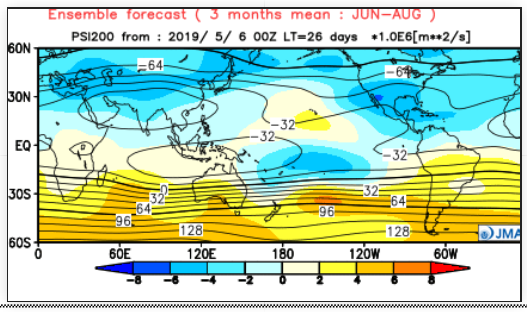
2- Subsidence over Martime Continent, up to south Asia

3- Downward anomaly (good agreement between models)



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



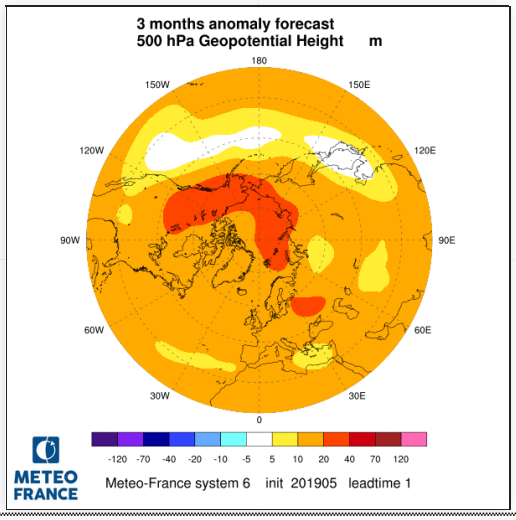


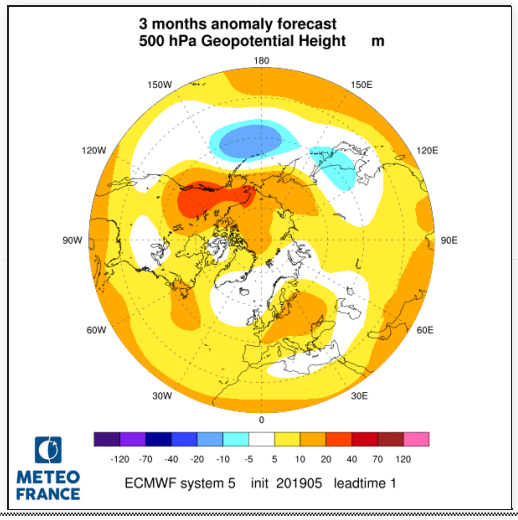
Top, MF6 and SEAS5: color range of velocity potential anomalies (green: ascending, orange: subsidence) and isolines of stream function anomalies (red: anticyclonic in the northern hemisphere, blue: cyclonic in the northern hemisphere). Bottom, JMA model, left potential velocity and anomalies, right stream function and anomalies.

Atmospheric circulation forecasts : 500 hPa Geopotential anomalies

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

Over North Atlantic and Europe, non-contrast Z500 anomaly chart in MF-S6. SEAS5 mean circulation looks like a combination NAO+ / Scandinavan Blocking.



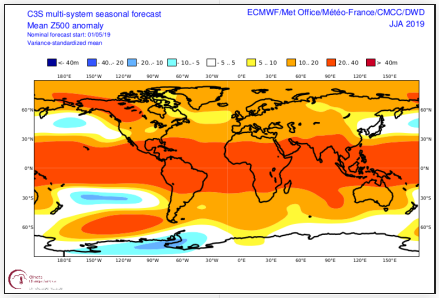


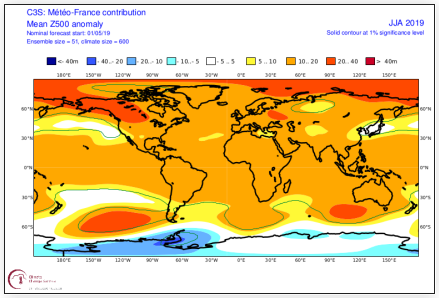
Atmospheric circulation forecasts : Z500 anomalies in C3S models

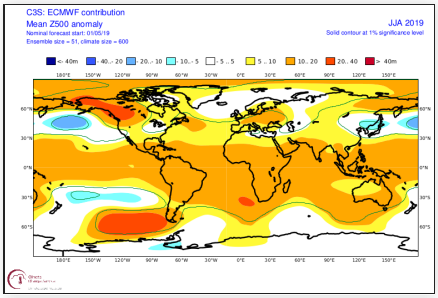
In DWD, CMCC and in the Multi-model, the prevailing signal over North Atlantic and Europe is a contrast Ocean (-) / Continent (+), corresponding to a mix of Blocking / Atlantic Low.

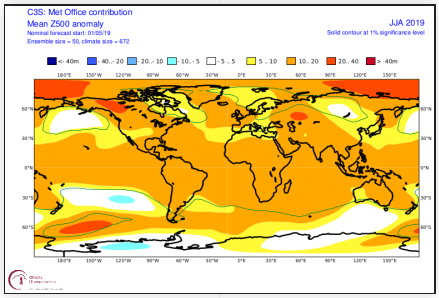
MF-S6, SEAS5 and Met Office don't consolidate this scenario.

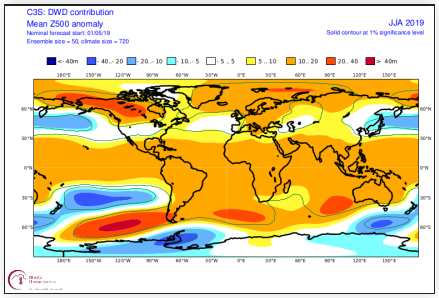
Multi-model's chart is quite "flat" (little contrast)

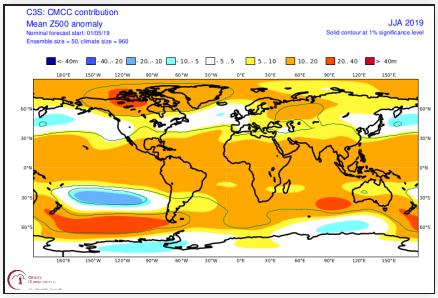






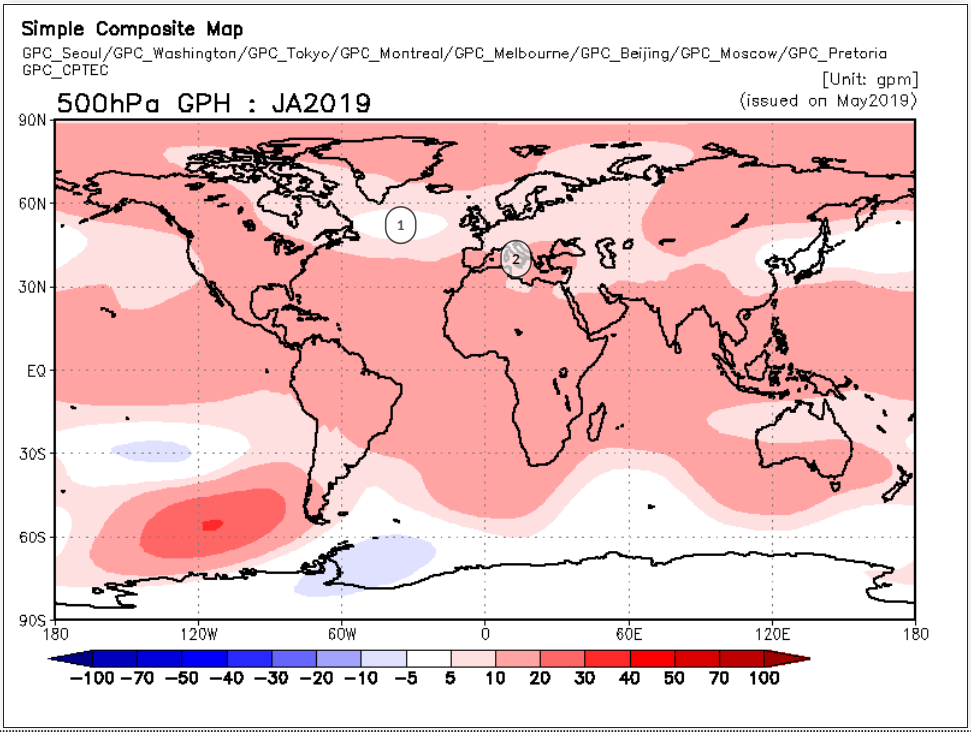






Atmospheric circulation forecasts : Z500 anomalies multi-systems

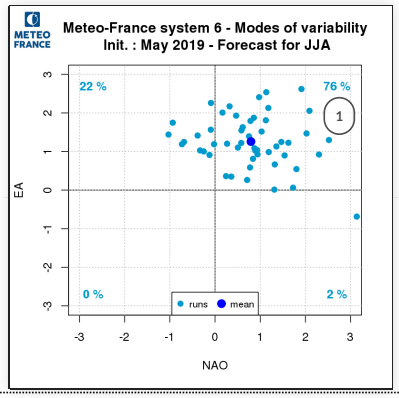
For North Atlantic and Europe : compared to C3S, the WMO multi-model reinforces the relative low anomaly in the middle of Noth Atlantic. This corresponds to a positive East-Atlantic mode of varaibility. And the West/East contrast between Ocean and continent is weakned.



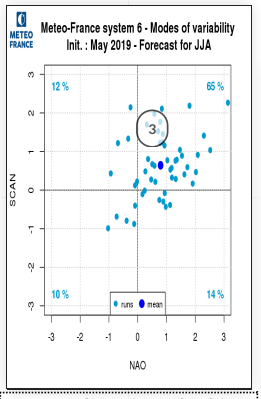
1- Relative low anomaly

2- Positive anomaly over the Mediterranean Basin

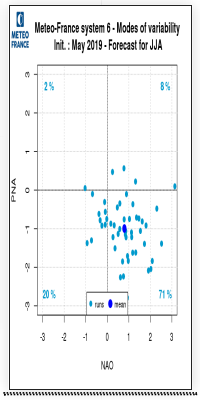
Modes of variability : forecast

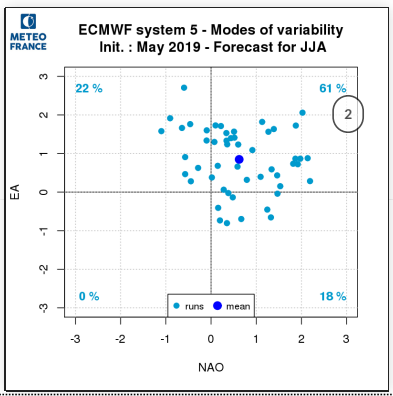


1- Despite a very smoothed Z500 chart, MF-S6 strongly favour positive NAO and EA. This is maybe due to the strenghtening of the MSLP over North Tropics (see MSLP anaomly field)

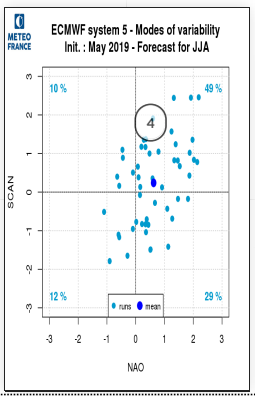


3- Scandinavian Blocking is favoured

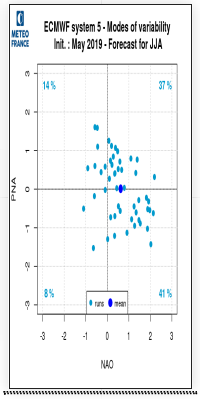




2- Same signal in SEAS5 than in MF-S6

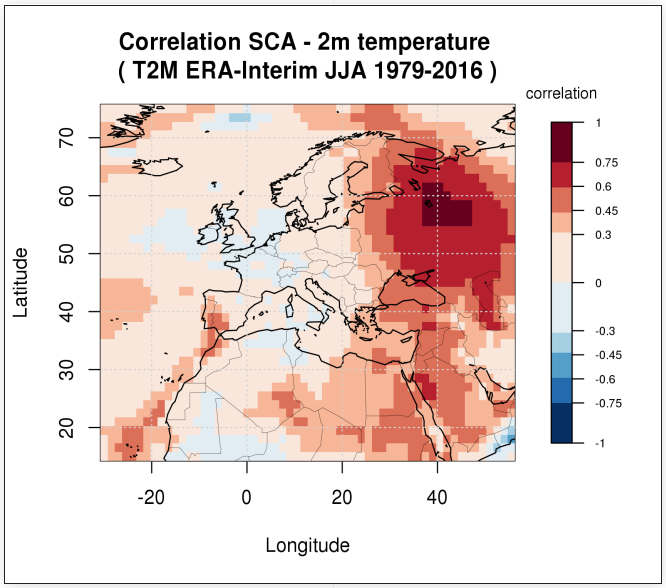


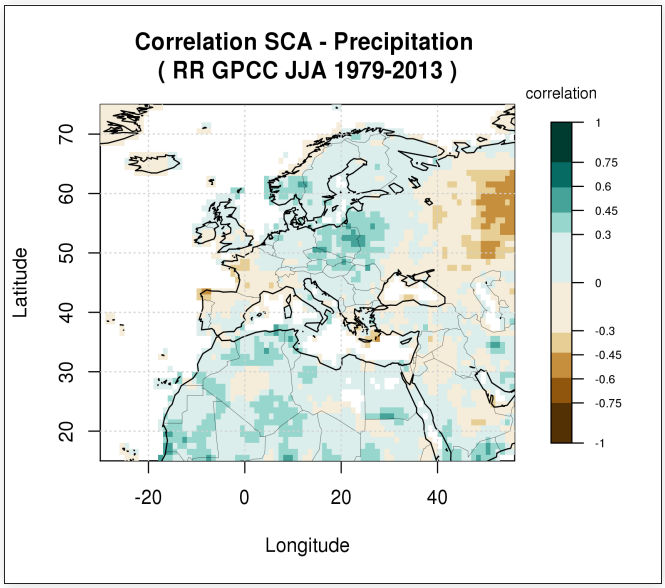
4- SCAN + : 59%



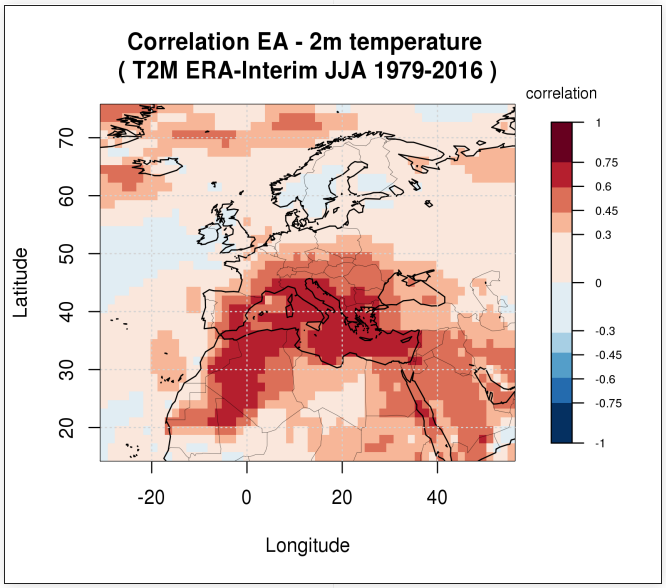
see the modes of variability patterns

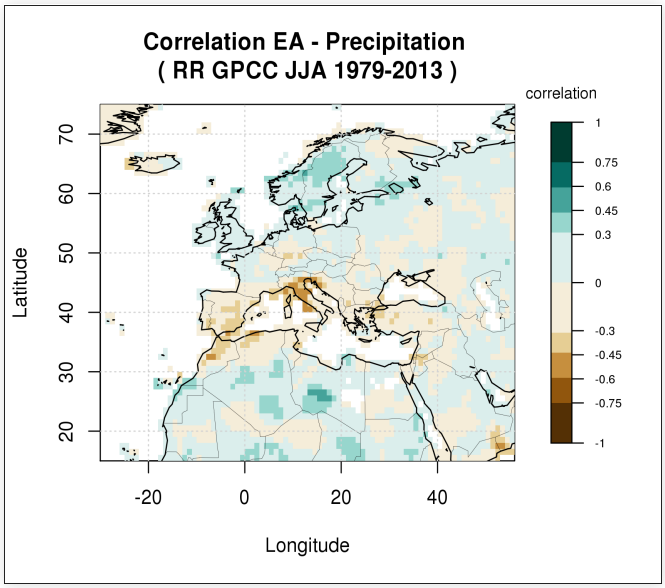
Modes of variability : SCA impacts





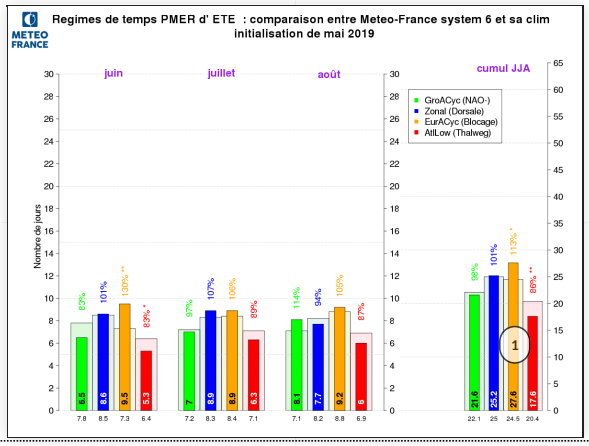
Modes of variability : East Atlantic impacts



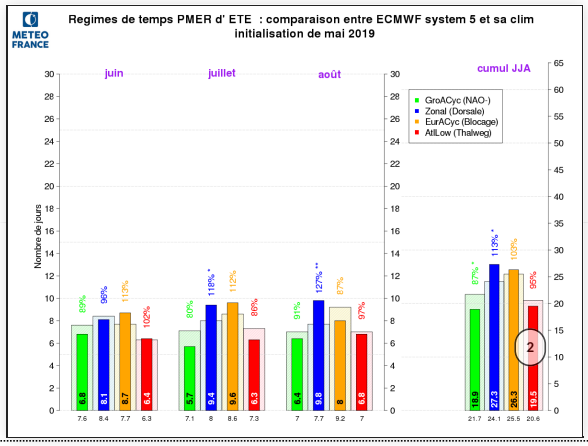


Weather regimes : summer MSLP

"Blocking" favoured by both MF-S6 and SEAS5.



1- Blocking favoured

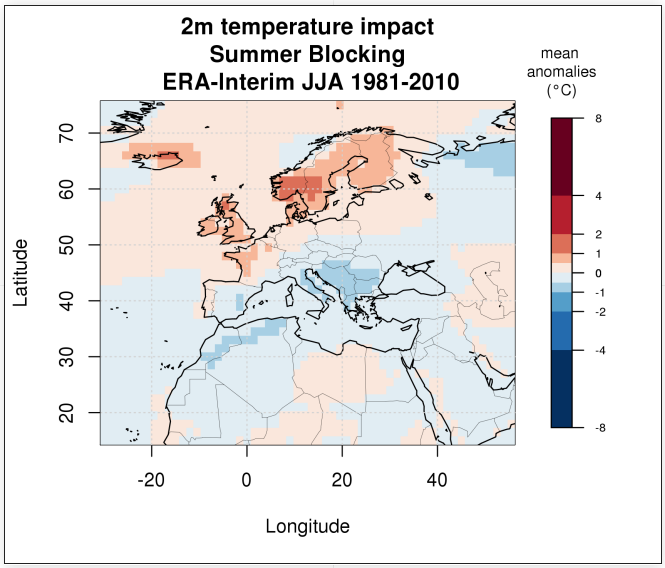


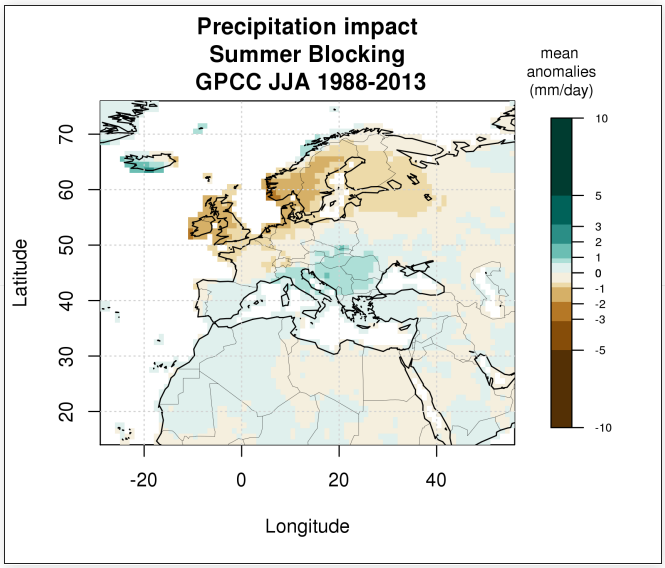
2- Blocking significantly favoured

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

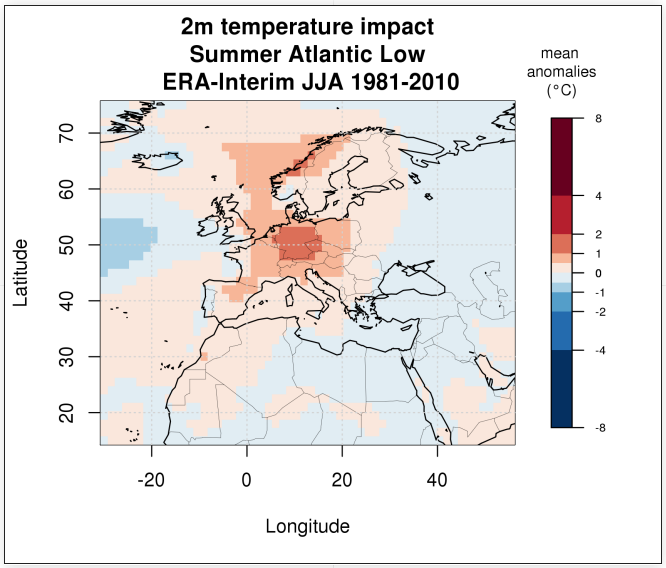
Weather regimes : Impacts

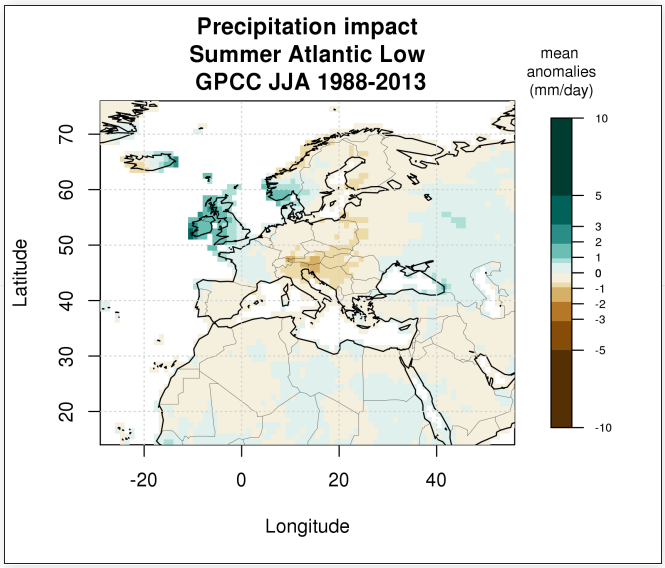




Impact of Summer Blocking weather regime on temperature and precipitation. (ref ERA-interim 1981-2010 for temperature and GPCC 1988-2013 for precipitation)

Weather regimes : Impacts



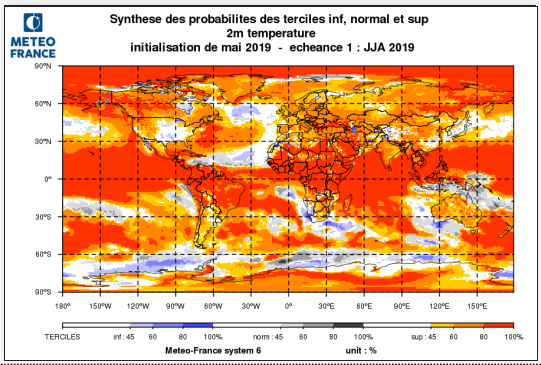


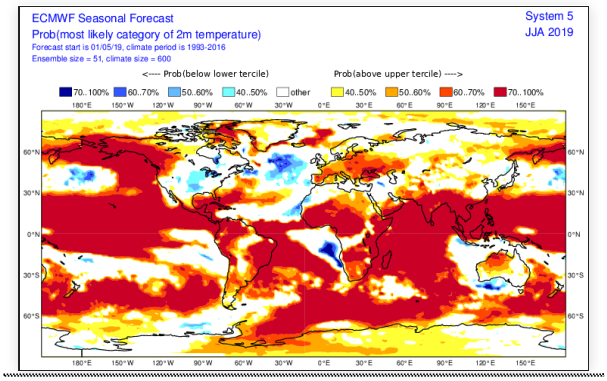
Impact of Atlantic Low weather regime on temperature and precipitation. (ref ERA-interim 1981-2010 for temperature and GPCC 1988-2013 for precipitation)

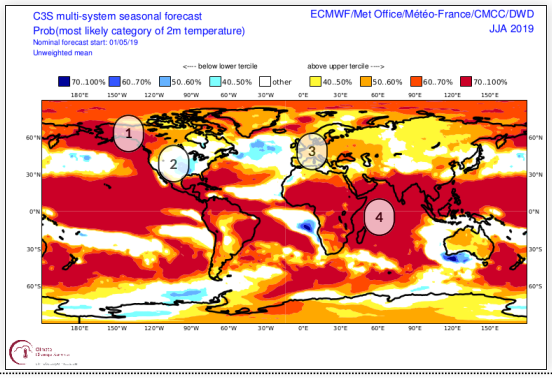
Forecast of climatic parameters : Temperature

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

Over the European continent, the upper tercile is the most probable (see multi-model). And over North Africa, the most frequent scenario is a West (- or neutral) / East (+) gradient.





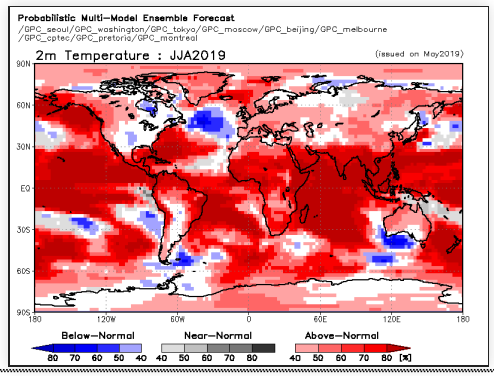


1- Continuing warm conditions over Alaska and western Canada (positive PNA)

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

3- Weak warm signal for western Europe

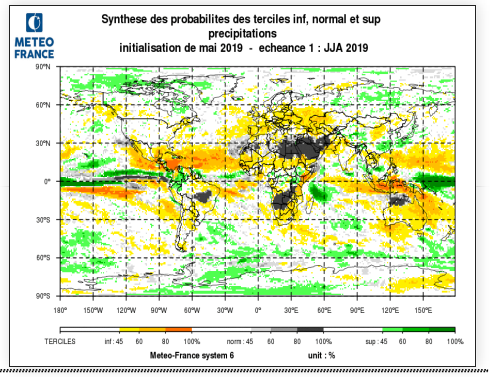
4- Widespread warm signal over Tropical regions

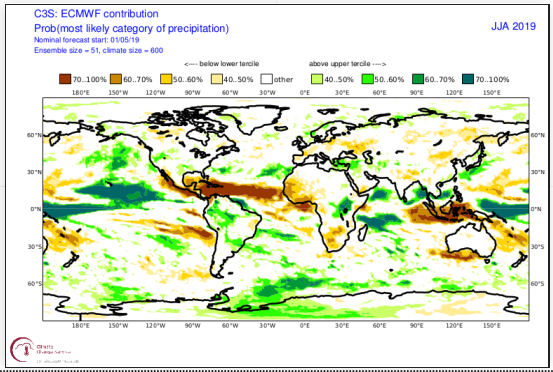


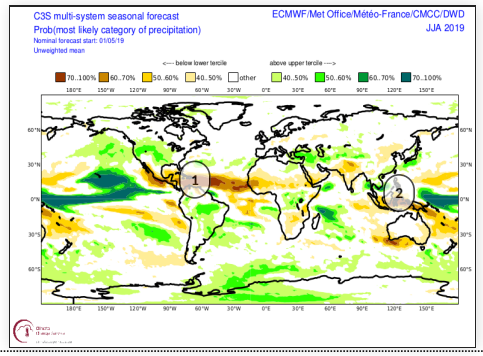
2m temperature probability map from MF6 (top left), SEAS5 (top right), C3S multi-models (bottom left) and others multi-models (bottom right)

Forecast of climatic parameters : Precipitation

Models in good agreement over the Tropics, consistent with an El Nino configuration. Drier than normal conditions very likely over the Caribean.
Over Europe, disagreement between models (not a surprise, considering the diversity of circulation scenarios). A majority of models forecast a high probability of wet conditions over the Eastern part of the Mediterranean basin.

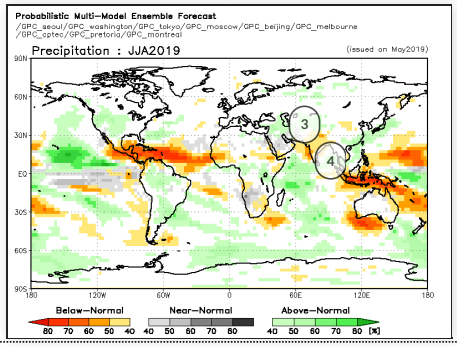






1- Dry over the Caribbean

2- Dry over the Maritime Continent

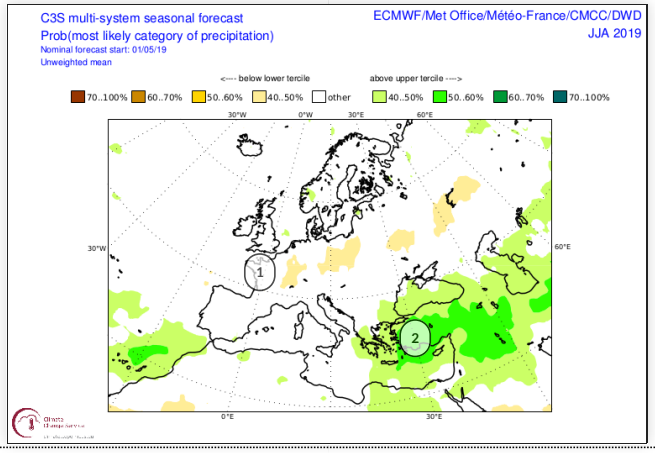


3- Wet over Middle East

4- Dry over India (poor Monsoon ? Forecast Warm Indian Ocean is not favourable for an active monsoon)

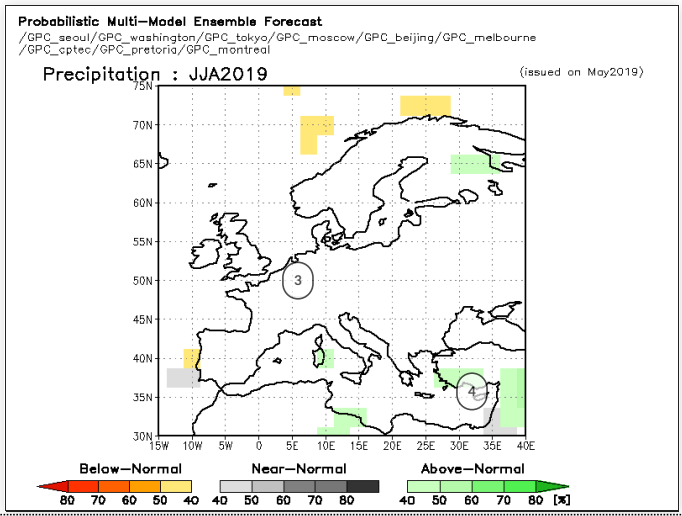
precipitation probability map from MF6 (top left), SEAS5 (top right), C3S multi-models (bottom left) and others multi-models (bottom right)

Forecast of climatic parameters : precipitation probabilities - zoom over Europe



1- Some traces of "dry signal" over Europe

2- Wet over eastern Middle East

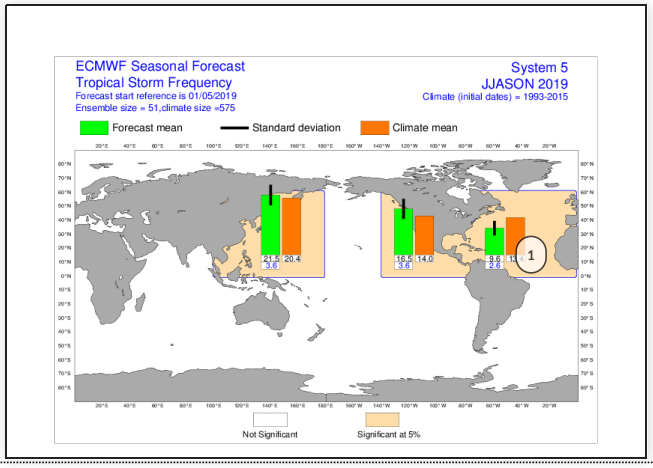


4- Wet signal for Middle East

3- No clear signal for western Europe

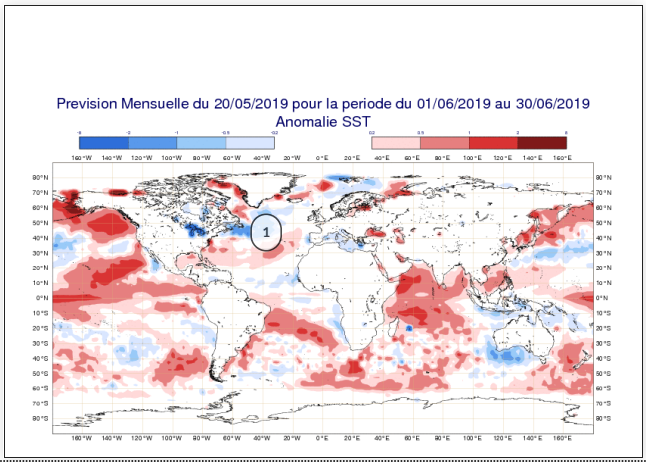
multi-models probability map : C3S on the left; WMO on the right.

Forecast of climatic parameters : Tropical Storm Frequency

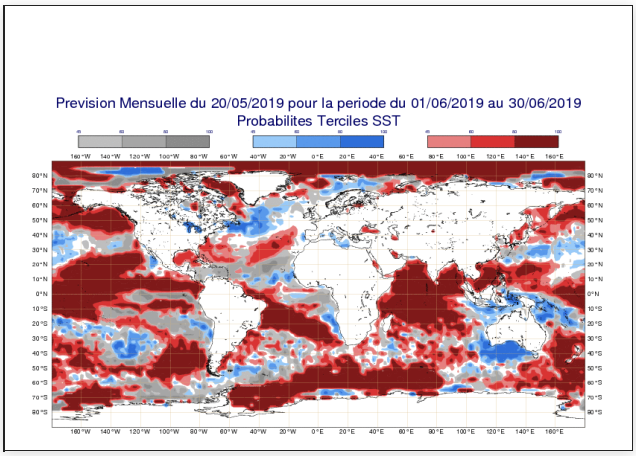


1- hurricane activity expected below normal in the Altantic (consistent with El Niño and colder than normal SSTs).

Monthly forecast of 20190520 : SST

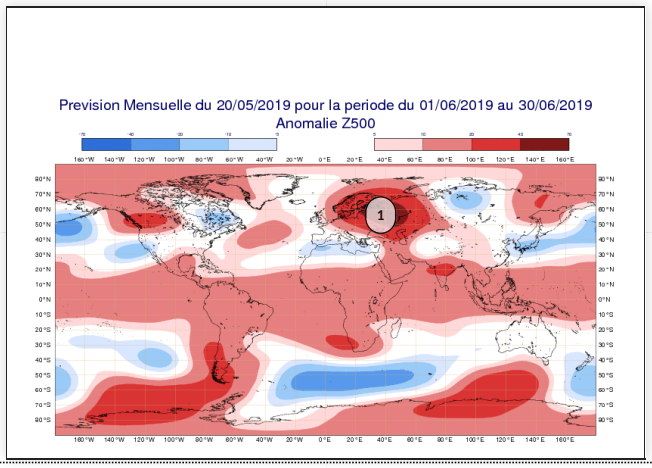


1- COld tongue : warm anomaly, not favourable to monsoon activity

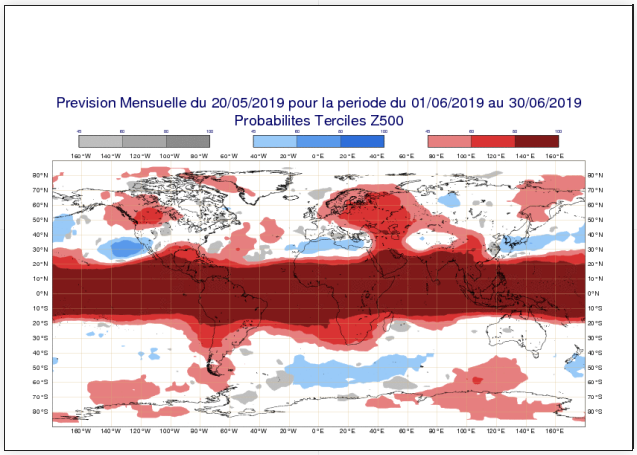


Monthly forecast of 20190520 : Z500

The ECMWF monthly forecast is consistent with the seasonal forecast

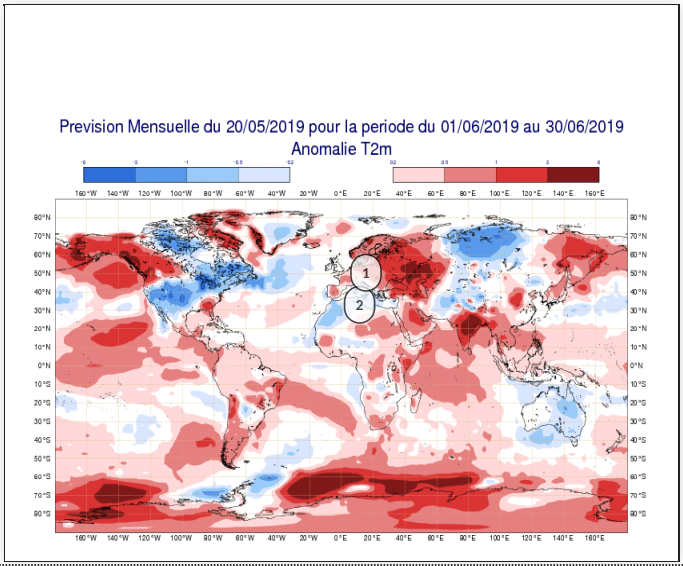


1- Strong Blocking pattern



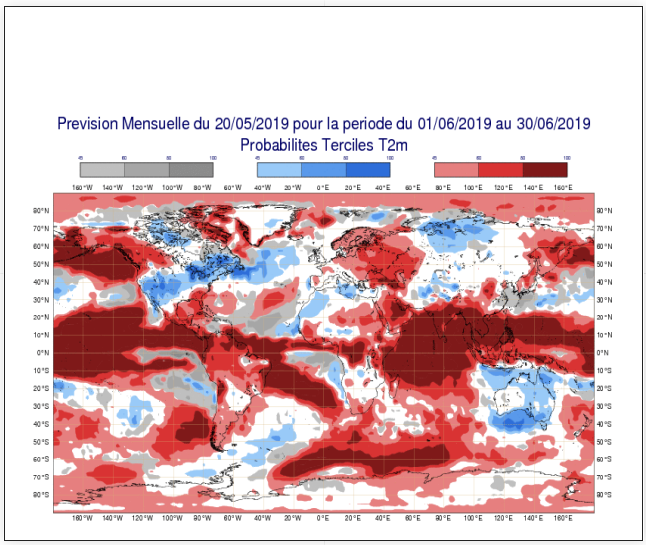
Monthly forecast of 20190520 : temperature

The temperature pattern is consistent with a preeminent blocking mode.

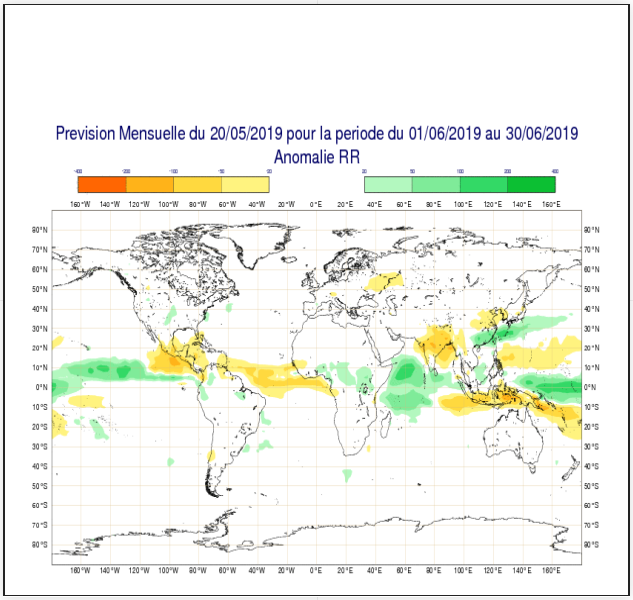


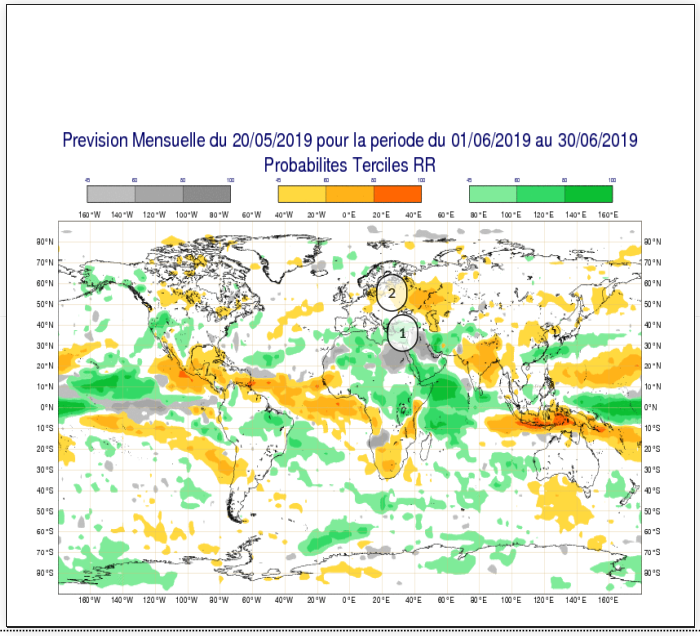
1- Warm anomaly especially over Central and Northern Europe

2- West/East gradient over North Africa



Monthly forecast of 20190520 : precipitation

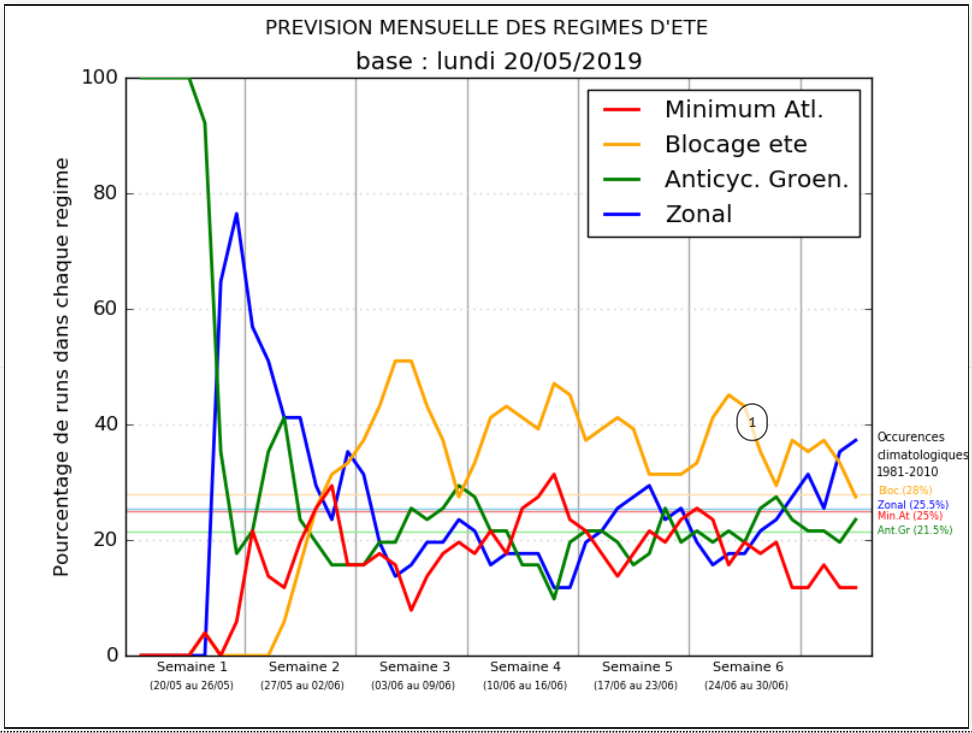




1- wet signal over North Africa, eastern Mediterranean and Middle East

2- Dry signal for Eastern Europe

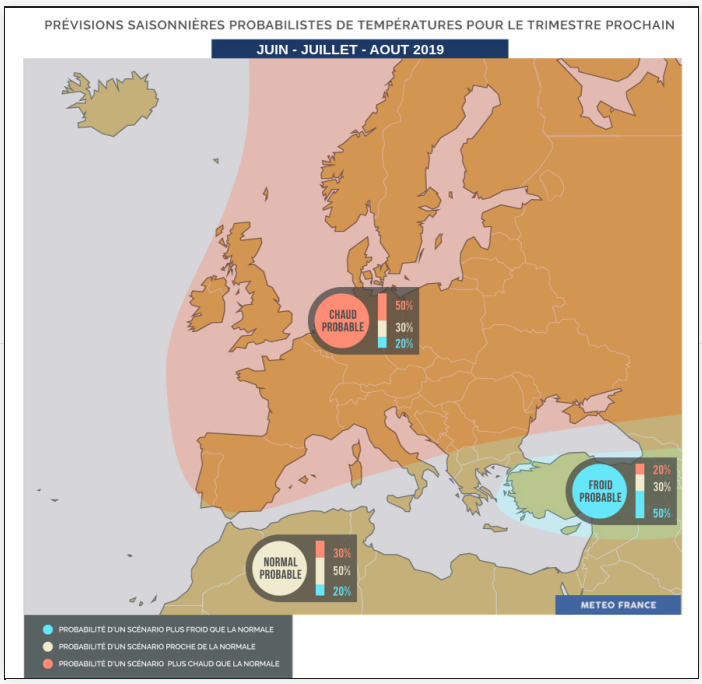
Monthly forecast of 20190520 : summer SLP weather regimes



1- "Blocking" favoured

Synthesis map for Europe : Temperature

Blocking (and to a lesser extent Atlantic Low) regimes should account for warmer than normal conditions for most of Europe (especially Northern and Central Europe). For the Mediterranean, due to the contradictory influences of the 2 regimes, a normal scenario is privileged. And over Middle-East, perturbated conditions should be more frequent than normal, so the colder tercile of temperature is privileged.



Synthesis map for Europe : Precipitation

According to a predominant blocking pattern, parts of Central and Northern Europe should experience drier than normal conditions, while south-eastern regions (Greece, Turkey) could get wetter than normal conditions. Elsewhere no predominant scenario.