

Météo-France Seasonal Forecast Bulletin

APRIL - MAY - JUNE 2019

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General synthesis : AMJ 2019

- All the models converge towards a common schema hence a **fairly good predictability**.
- **weak El Nino** will continue during the next 3 months. It is **atypical** because warm anomalies spread over almost the entire equatorial band and because it is expected to strengthen during the summer period, which is not common.
- The **PNA** mode is predicted by a majority of models.
- The **Atlantic Ocean tropical circulation** seems to be influenced (see downward motion anomaly over South America). The low geopotential area in the northern basin is stabilized by the PNA.
- The circulation over **North Atlantic and Europe** for the next quarter should be a mix of NAO+ and blocking mode. The EA+ mode is marked in some models.
- Consequently, we privilege a dominant **warm signal over Europe, and for precipitation drier than normal conditions on a large North and west part of the continent**.

Oceanic analysis of February 2019 : SST anomalies

Current situation : neutral to weak El Niño

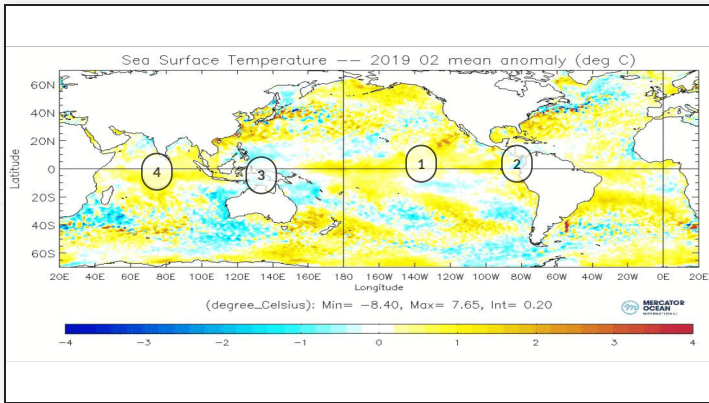
FEBRUARY NINO3.4 INDEX : +0.6°C (Mercator Ocean PSYV4R2 analysis)

LASTEST WEEKLY NINO3.4 ANOMALY : +0.8°C

LASTEST WEEKLY IOD : -0.1°C

(BOM value of March 17th : <http://www.bom.gov.au/climate/enso/indices.shtml>)

Decreasing phase of the PDO, which returns to 0 in sliding annual average (JMA : <http://ds.data.jma.go.jp/tcc/tcc/products/elnino/decadal/pdo.html>)

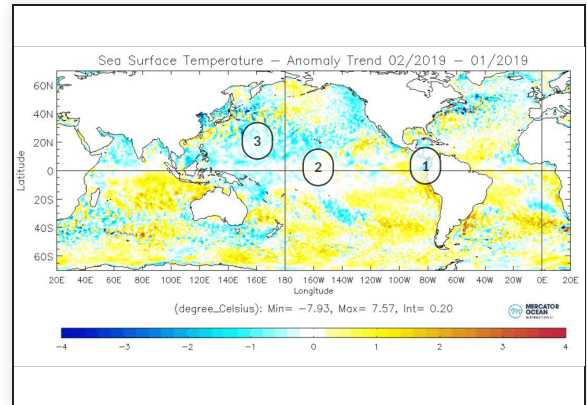


1- warm anomaly related to the current El Niño. the anomaly is uniform over much of the equator.

2- Cold anomaly due to the strong cooling of February

3- Cold anomaly on eastern Maritime Continent

4- warm on a large part of Indian Ocean. Little east-west contrast (IOD near 0)



1- strong cooling near the American coasts

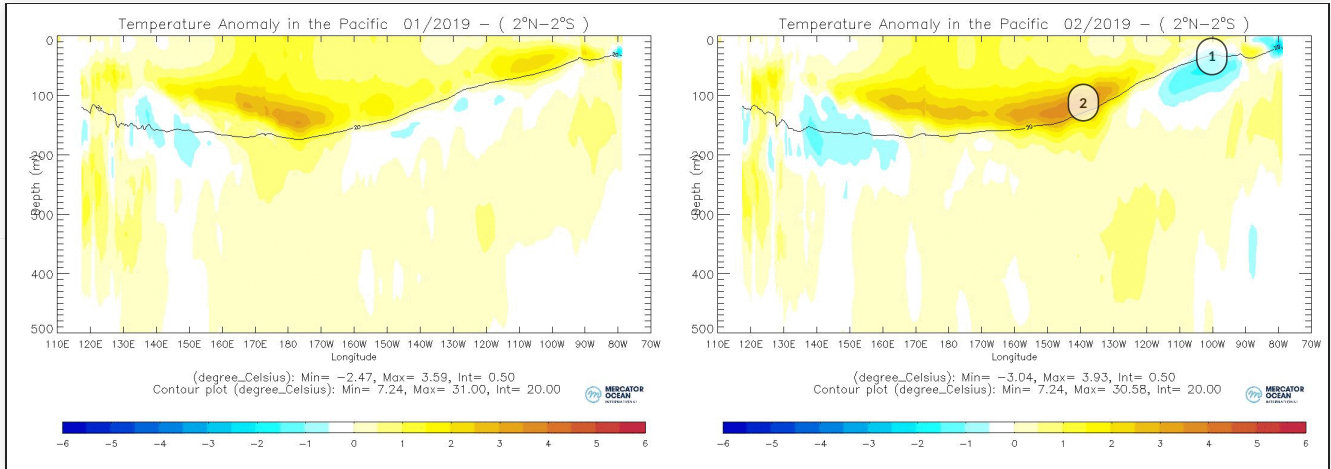
3- global cooling of the North and west Pacific

2- Little evolution along the equator

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

Oceanic analysis of February 2019 : vertical section

strengthening subsurface dynamics in February.

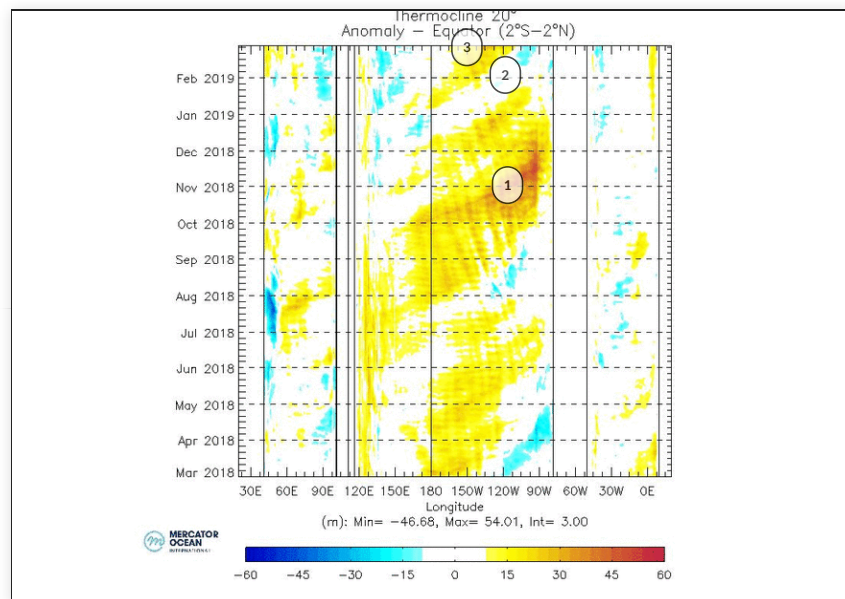


2- Marked Kelvin wave expected to generate net warming in the near future

1- small cold wave associated with marked cooling along the coasts of Colombia and Ecuador

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

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



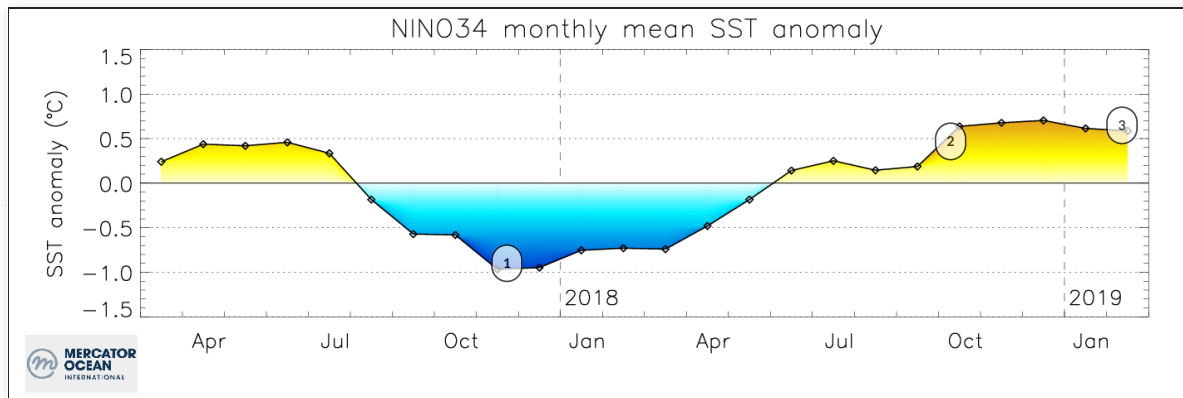
1- Kelvin wave of October which caused the strong growth of the anomaly in the NINO3.4 box

2- small temporary cold wave

3- new hot wave quite marked

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

Oceanic analysis of February 2019 : History of Nino3.4



2- strong increase in October

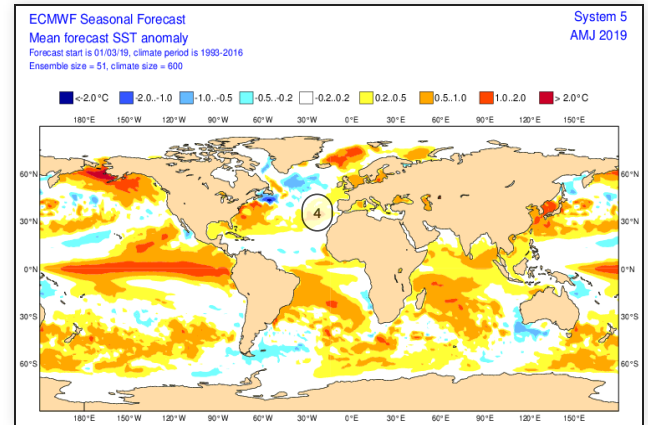
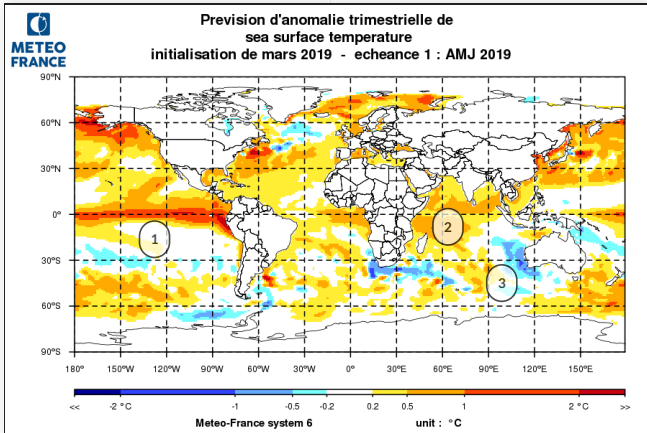
1- La Nina phenomenon of winter 2017-2018

3- Current level around + 0.6°C

Evolution of SST in the NINO3.4 box

Oceanic forecast : SST anomaly

The current weak El Niño episode will continue during the next 3 months.



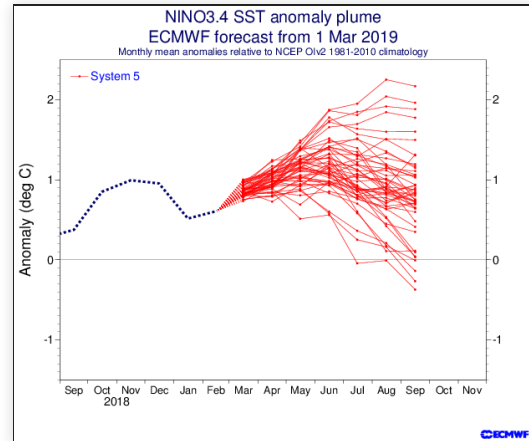
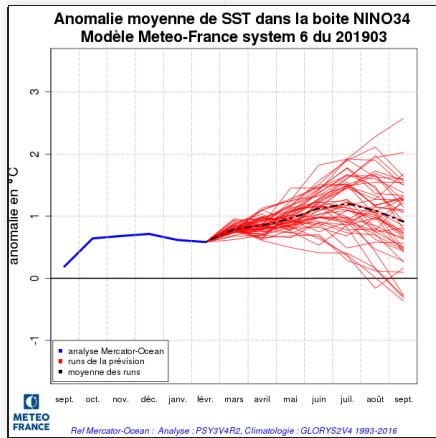
- 1- Good agreement between MF6 and SEAS5 that slightly strengthen the hot anomaly related to El Niño
- 2- warm throughout the Indian Ocean except in the Southeastern part. In these conditions the DMI will remain neutral
- 3- maintaining west-east contrast. the cold zone should be gradually reduced

- 4- Little change in the North Atlantic, always rather hot except in the area of "cold blob" which is maintained

Oceanic forecast : NINO3.4 Plume diagrams

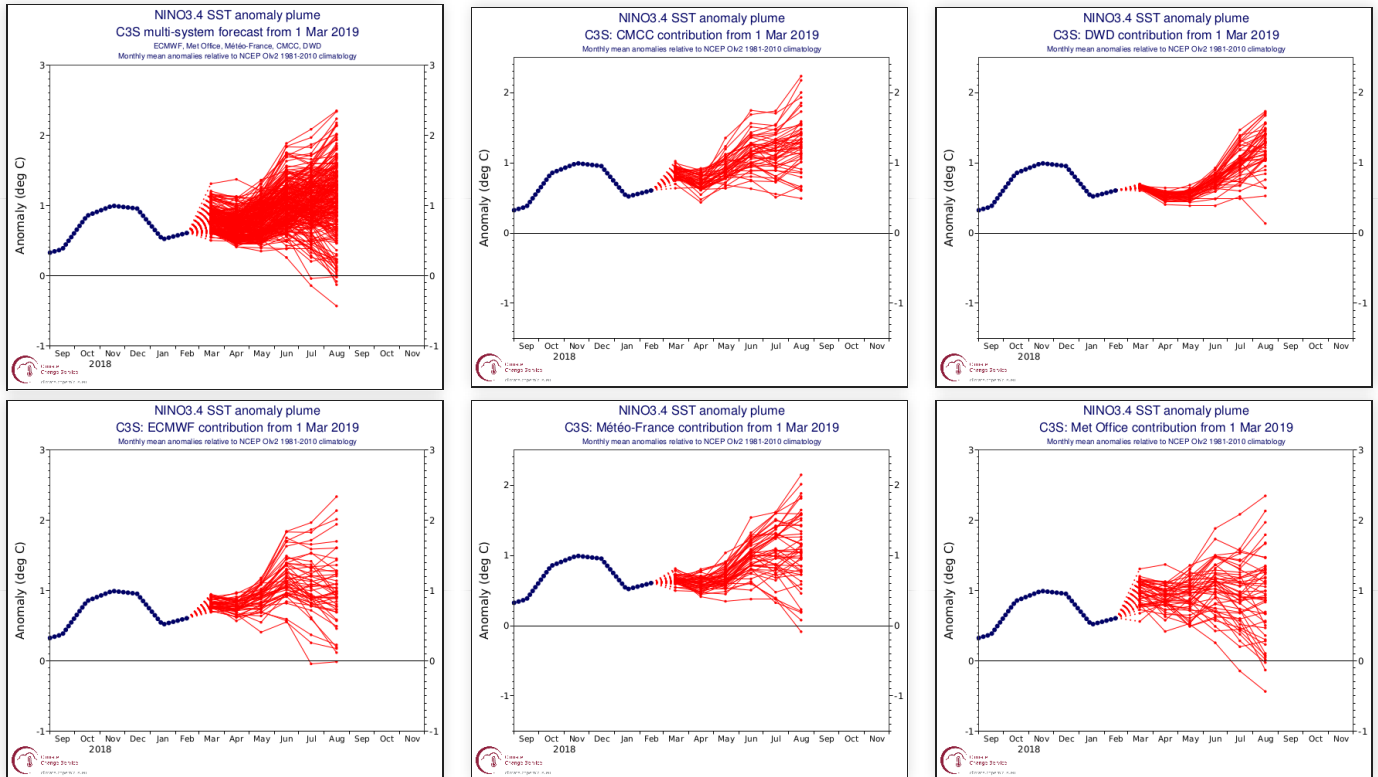
Forecasted Phase : week El Niño

After a break at the beginning of the year, tend to a slight warming for the coming months. The intensity of the phenomenon could reach $+1^{\circ}\text{C}$ at the end of the quarter.



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

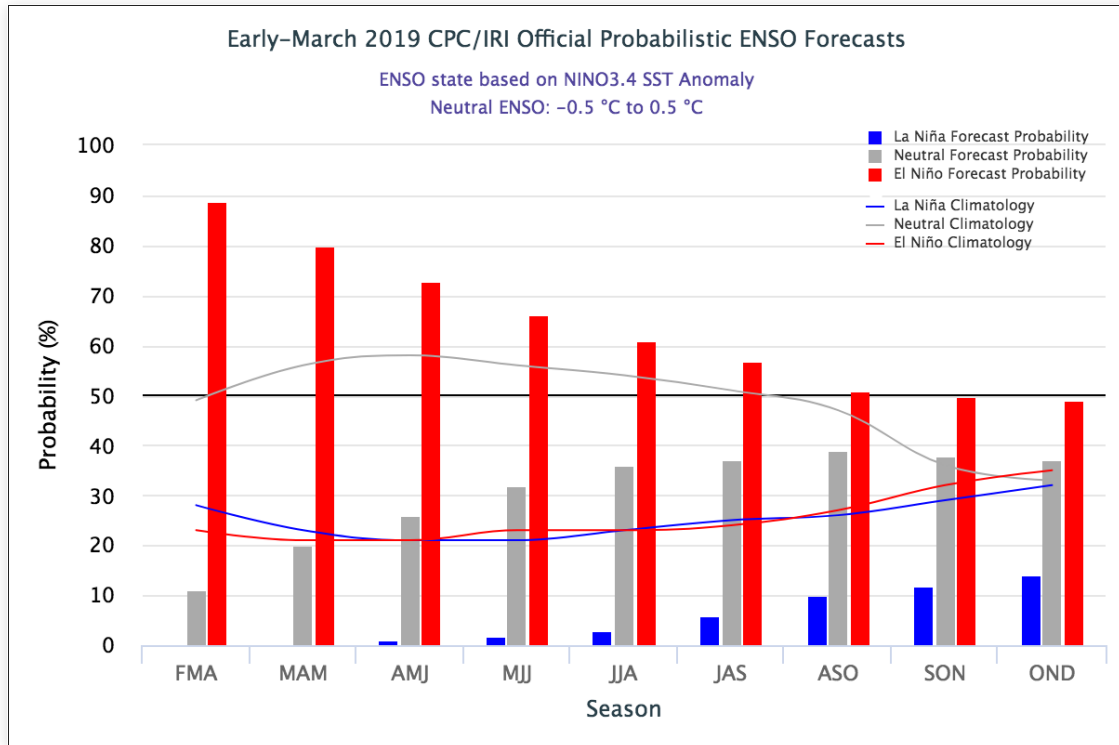
pretty good agreement between models (except UKMO). After a phase of stability, return of an upward trend of the recalibrated anomaly.



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

Oceanic forecast : Synthèse de l'IRI

The probability for El Niño decreases gradually. For the AMJ quarter it remains the majority (over 70%)



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

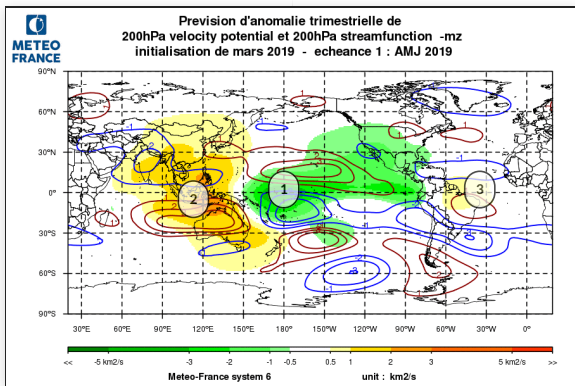
Drivers : Summary

No drivers identified this month.

El Nino is weak and atypical and others drivers aren't robust in inter-season.

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

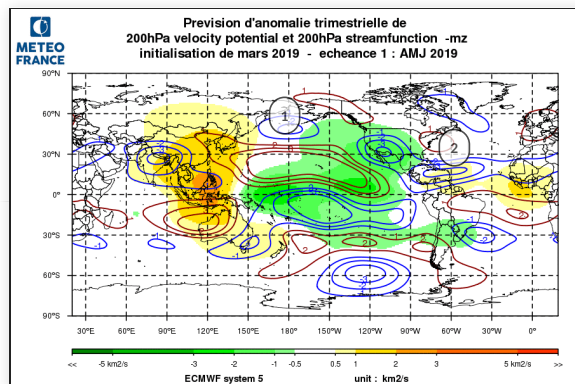
Very good models consistency for velocity potentiel fields. SEAS5 stream fonction anomalies are stronger than MF6. A PNA teleconnection is well marked in SEAS5 while it is practically non-existent in MF6.



1- VP : upward motion anomaly kernel

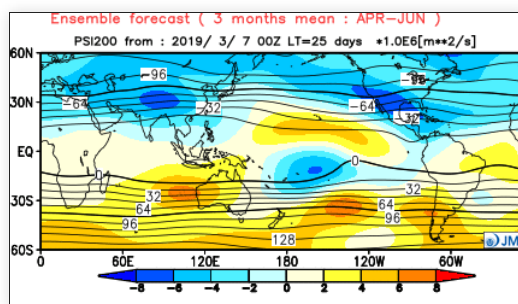
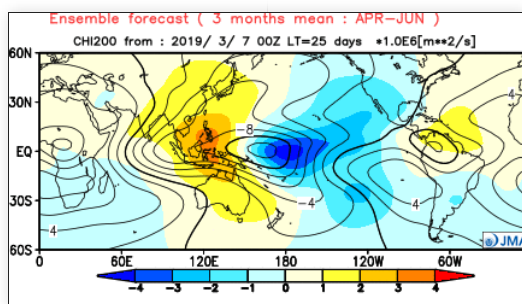
3- VP : small upward motion kernels

2- VP : downward motion anomaly kernel



2- SF : teleconnection over the Western Atlantic basin

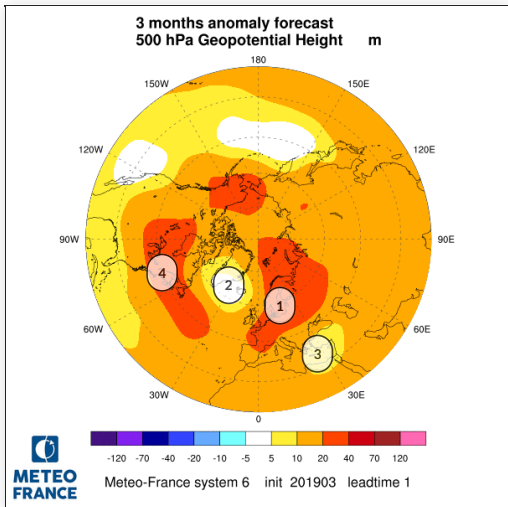
1- SF : positive PNA teleconnection, well marked in SEAS5



Top, MF6 and SEAS5: color range of velocity potentiel 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

MF6 and SEAS5 have a similar anomaly field structure but the values are shifted upwards with MF6 and down with SEAS5

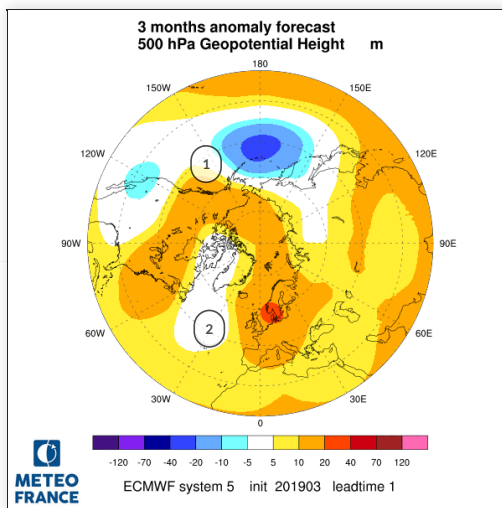


1- high values over North Europe

2- Low values near Greenland and Iceland. (NOA+ structure type)

3- negative anomaly on Eastern Mediterranean sea

4- high values over Northeastern America

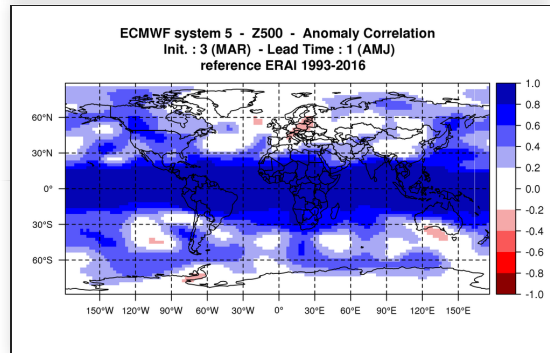
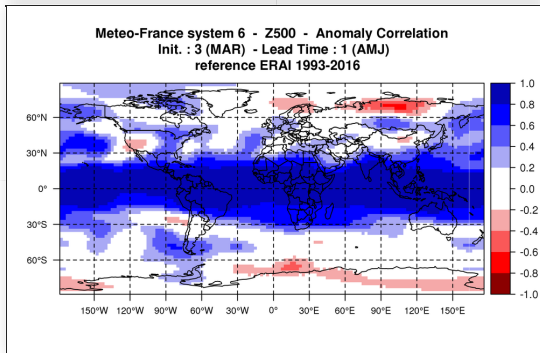
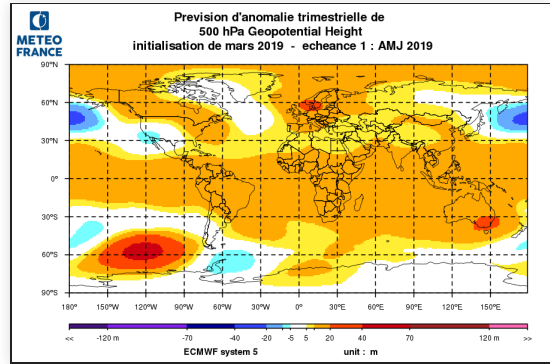
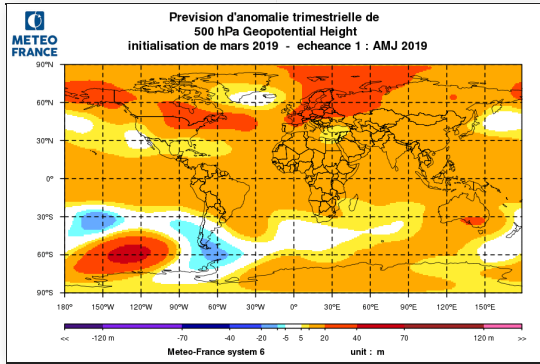


2- Larger cyclonic weakness with SEAS5 over the North Atlantic

1- Positive PNA structure

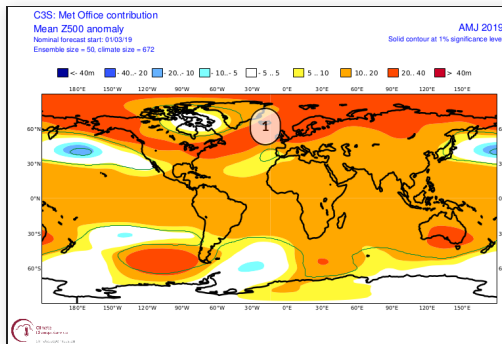
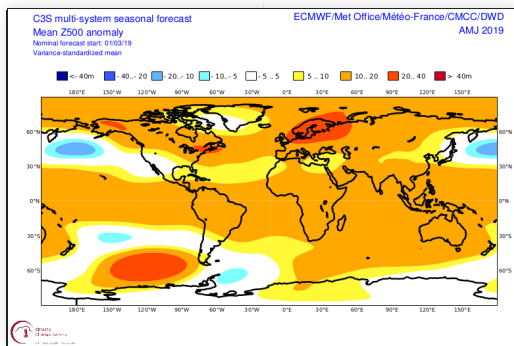
Atmospheric circulation forecasts : Z500 scores

Low predictability in general over the North Atlantic and Europe. MF6 is a bit better on the western edge of Europe.

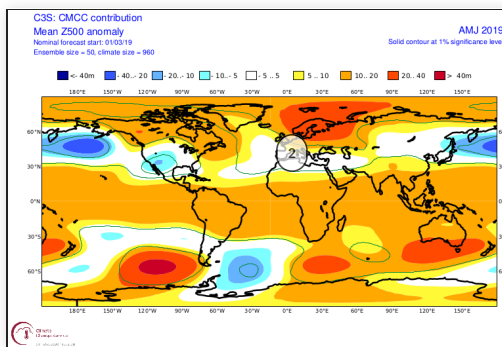
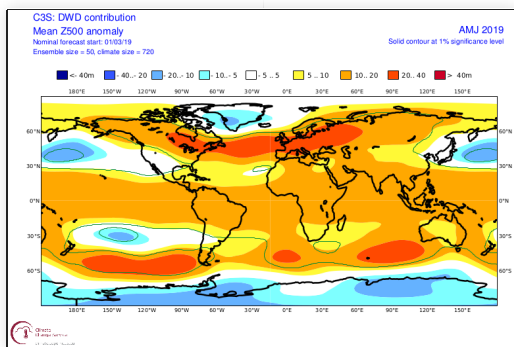


Atmospheric circulation forecasts : Z500 anomalies in C3S models

the C3S multi-model synthesis is consistent with MF6 and SEAS5, despite fairly marked differences in UKMO and CMCC.



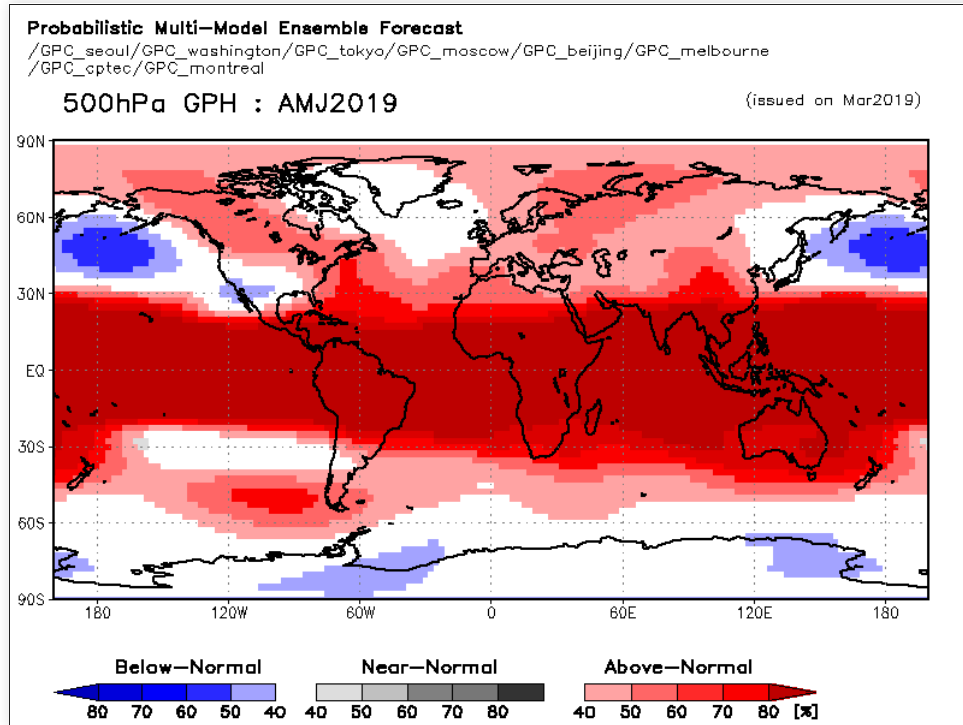
1- higher field on the North Atlantic



2- Lower field on the North Atlantic and Mediterranean sea

Atmospheric circulation forecasts : Z500 anomalies multi-systems

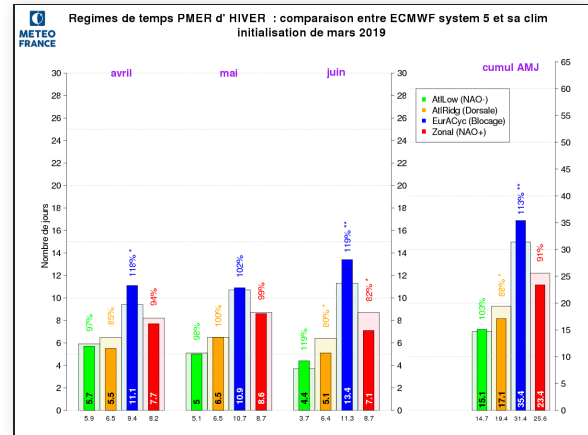
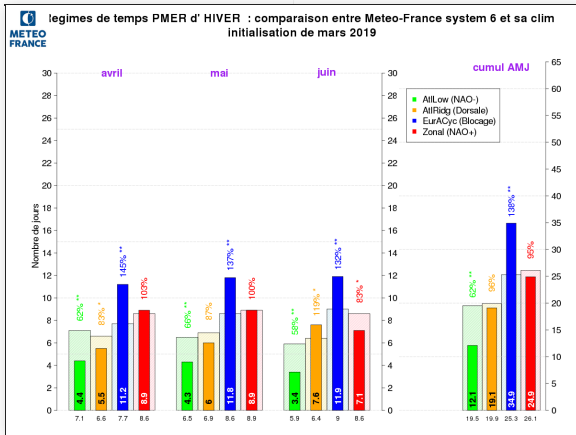
The WMO LRF multi-model adopts the same schema as the C3S models, with a marked PNA on Pacific Ocean and a zone of low values on the North Atlantic and a positive anomaly on Europe, favoring NAO+, EA+ and SCAN+ modes of variability.



Weather regimes : winter Sea Level Pressure classification

Significant excess of blocking frequency in both model.

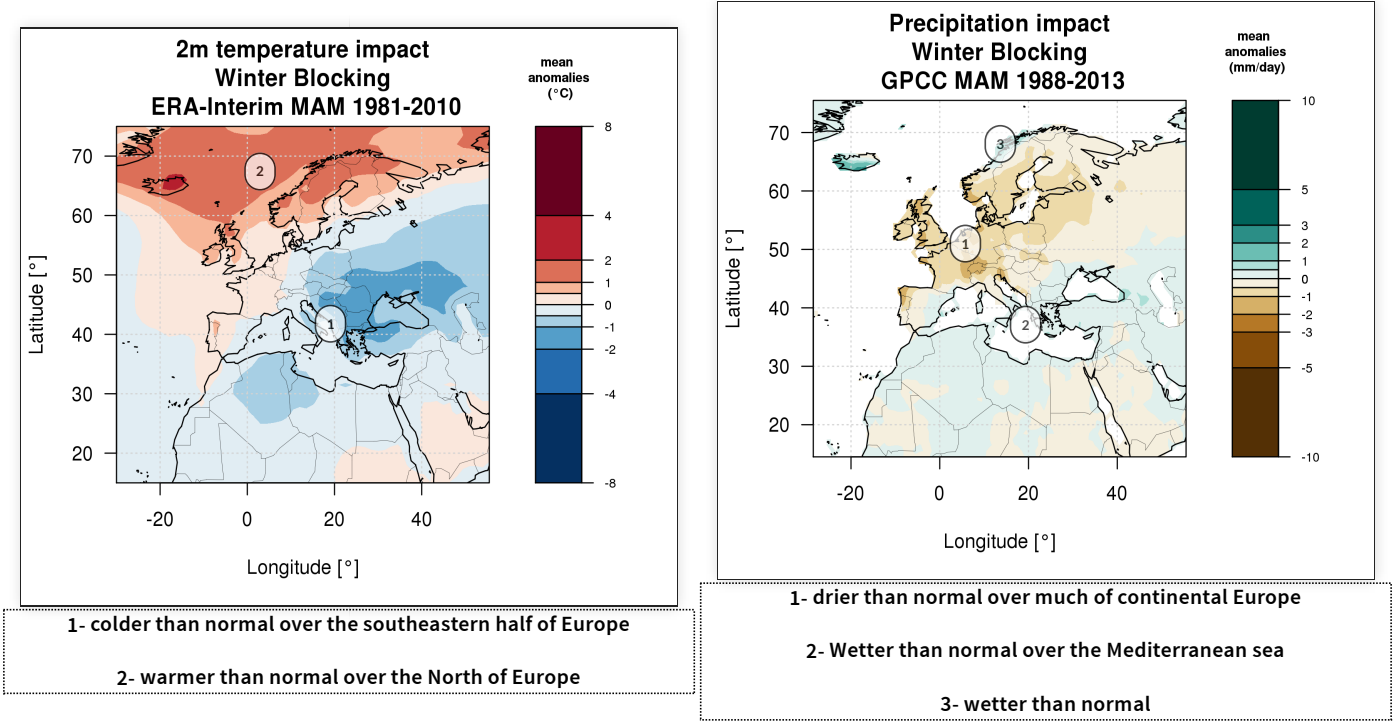
There is also a deficit in NAO- with MF6 but SEAS5 doesn't have such an option.



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).

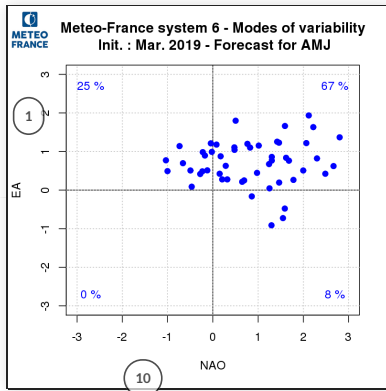
See the winter weather regime patterns

Weather regimes : Impacts



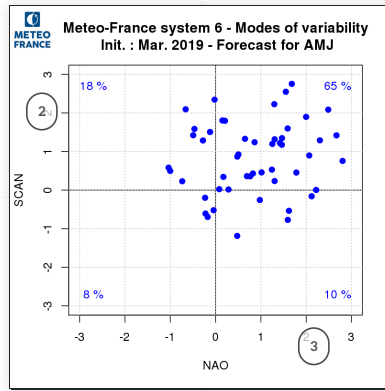
Impact of Winter Blocking weather regimes on temperature and precipitation. (ref ERA-interim 1981-2010)

Modes of variability : forecast



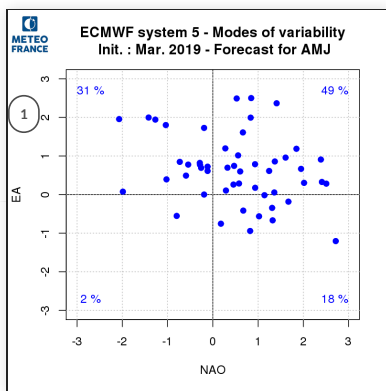
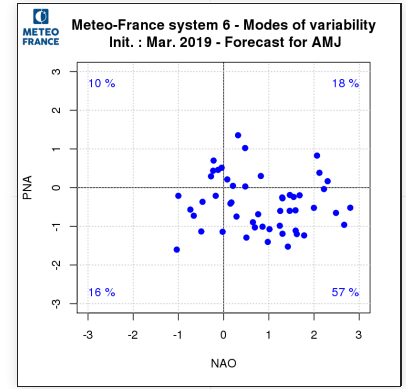
1- EA : 92%

10- both models opt for a strong dominant EA mode

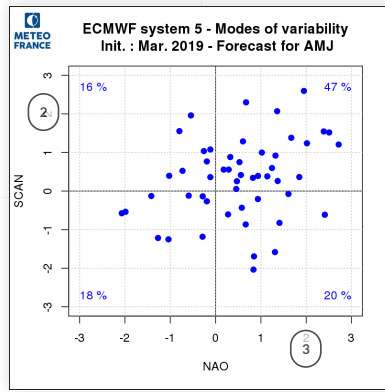


2- SCAN : 83% strongly favored in MF-S6

3- NAO+ : 75%

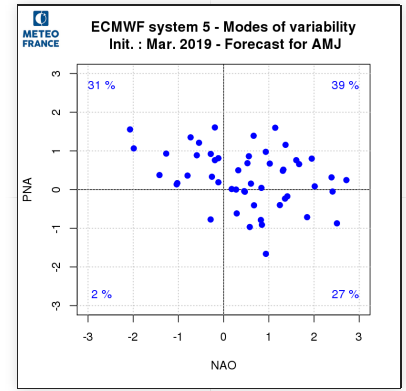


1- EA : 80%



2- SCAN : 63%

3- NAO+ : 67%

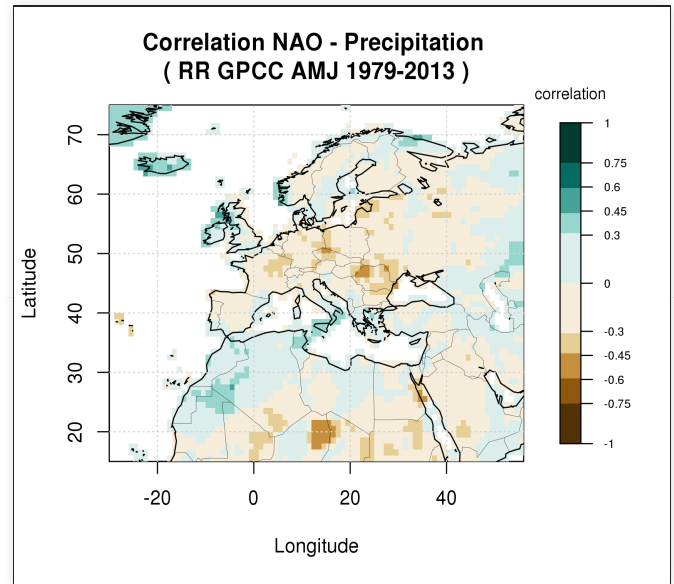
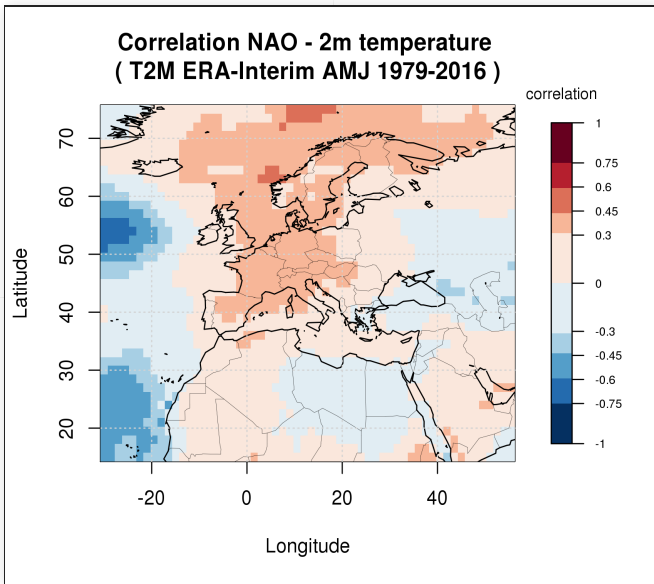


see the modes of variability patterns

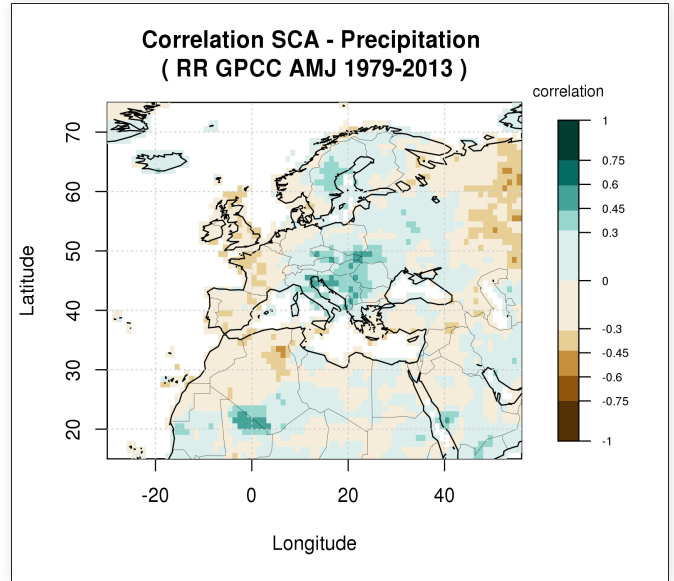
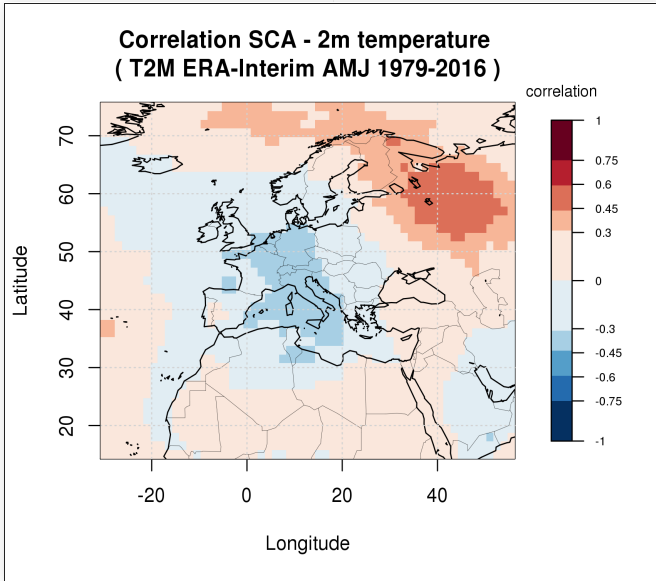
Modes of variability : NAO impacts

The forecast of modes of variability is more robust than the weather regimes forecast.

a mix of NAO+ and SCA+ mode could be favour

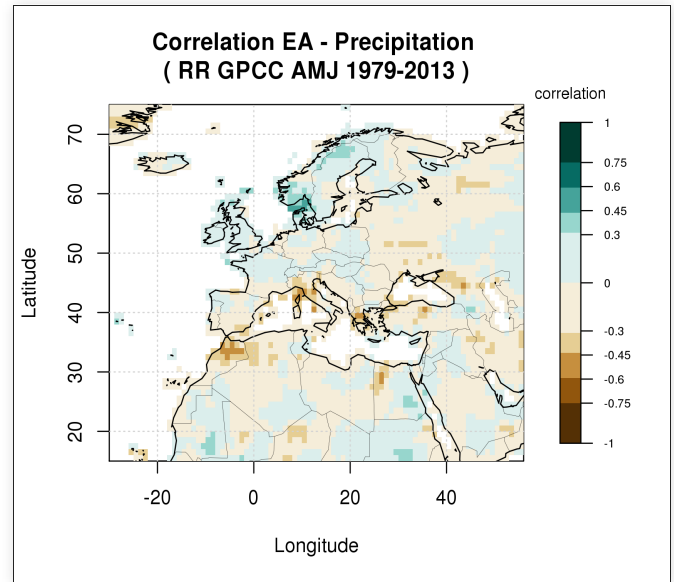
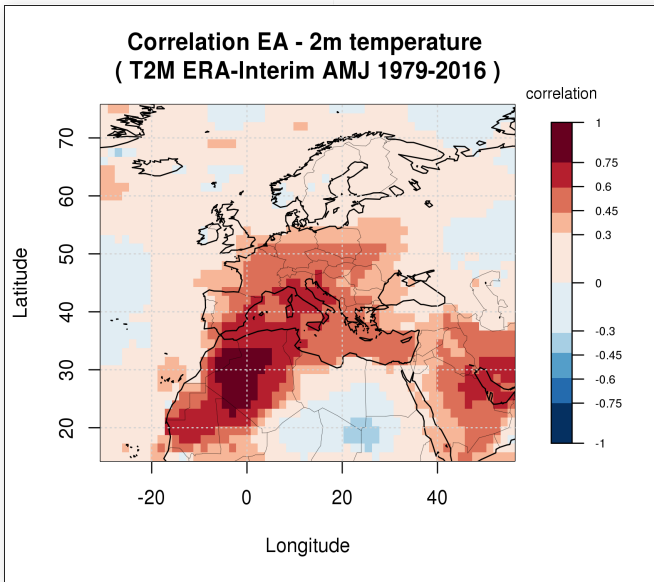


Modes of variability : SCA impacts



Modes of variability : East Atlantic mode of variability impacts

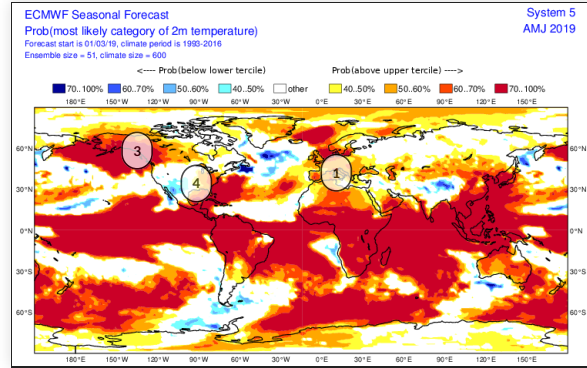
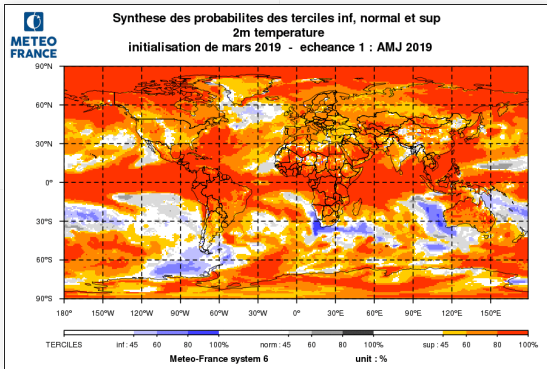
the EA+ mode signal is strong in MF6 and SEAS5 but difficult to link with the forecasted Z500 field



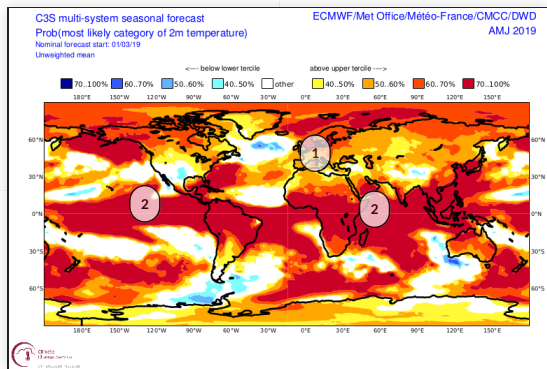
Forecast of climatic parameters : Temperature

Good agreement between C3S and WMO multi-model.

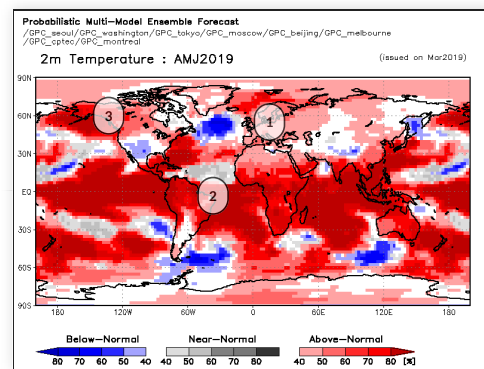
Warm anomalies of temperatures are more common in the northern hemisphere in MF6 than SEAS5.



- 1- Warm anomaly on most of the European continent
- 3- Warm signal expected over Alaska and the western half of Canada.
- 4- Cool signal on the southern United States and Mexico



- 1- Warm anomaly on most of the European continent
- 2- warm signal on most tropical area
- 2- warm signal on most tropical area

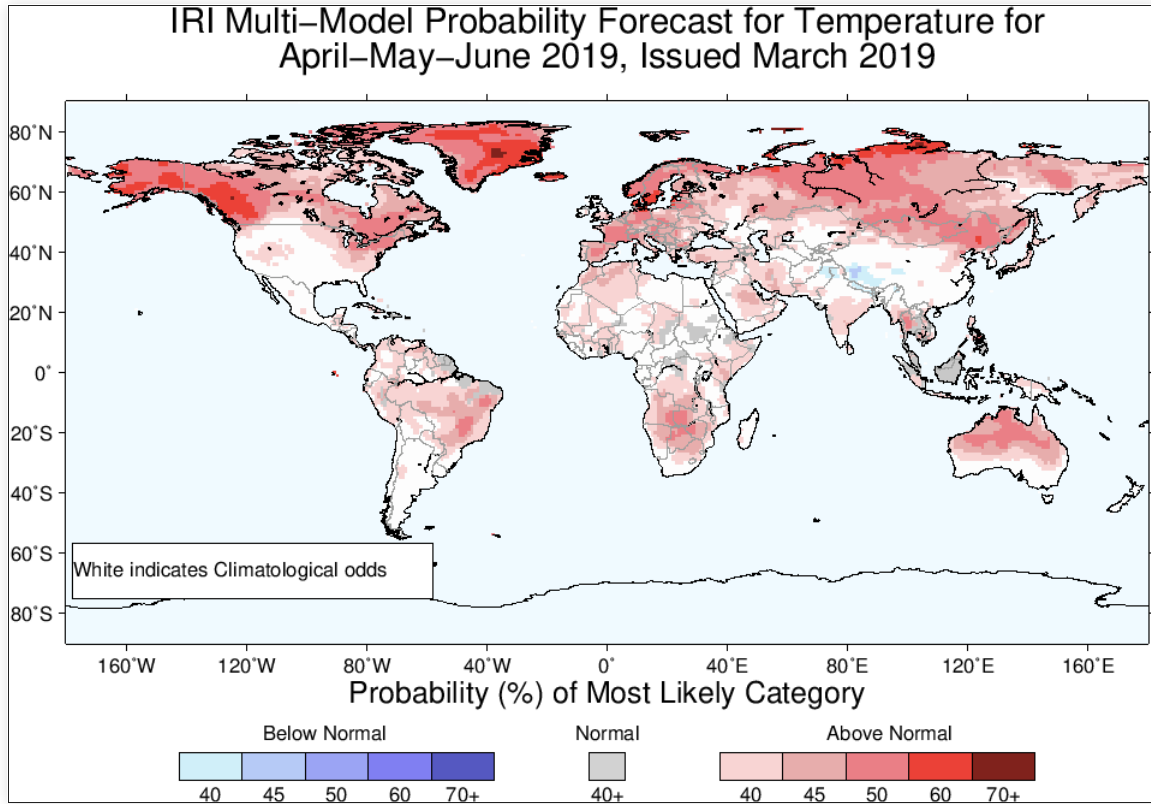


- 1- Warm anomaly on most of the European continent
- 3- Warm signal expected over Alaska and the western half of Canada.
- 2- signal chaud sur la plupart des régions tropicales

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 : Température synthèse de l'IRI

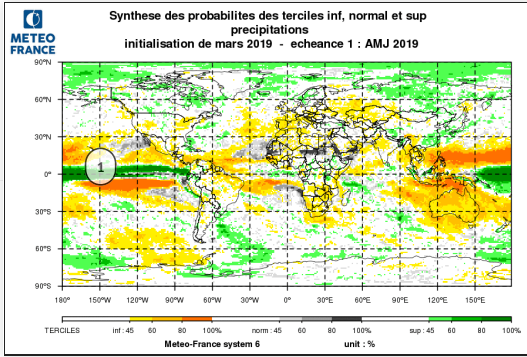
the multi-model synthesis of the IRI is consistent with the previous analysis



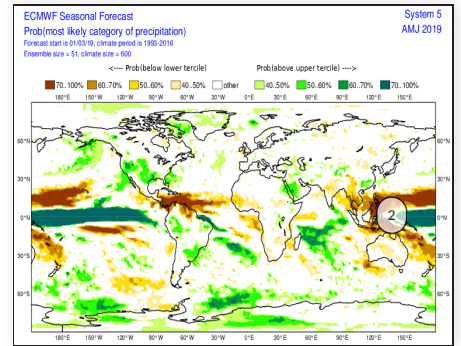
<https://iri.columbia.edu/our-expertise/climate/forecasts/>

Forecast of climatic parameters : Precipitation

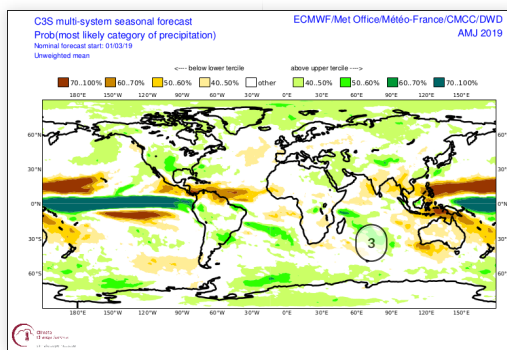
The models are in very good agreement in the tropical zone with a typical structure of anomalies of an El Nino situation. Few signal over Europe.



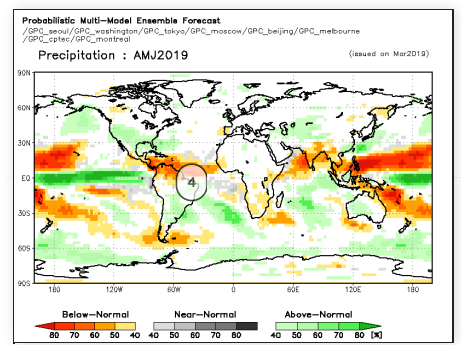
1- trace of the El Nino phenomenon, with an excess of precipitation along the equator, and a deficit on both sides.



2- dry on Eastern Maritime Continent



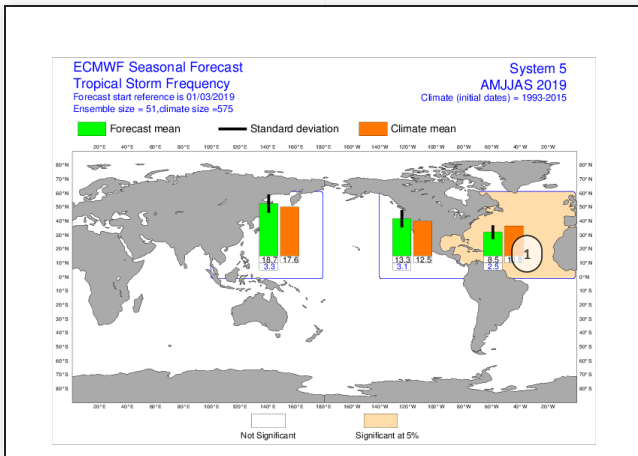
3- Wet area on southern Indian Ocean (The Reunion Island)



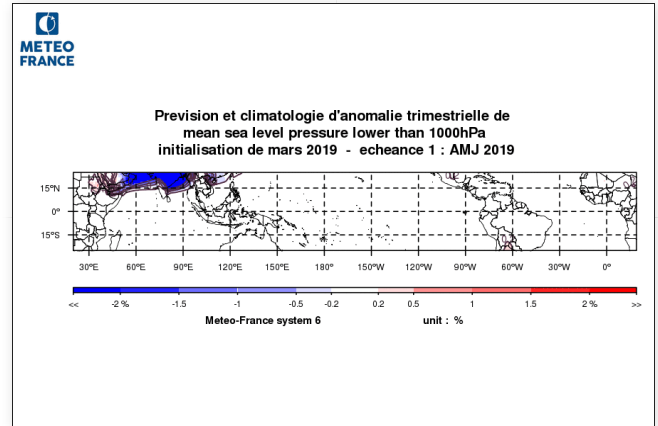
4- still dry in the West Indies

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 : Tropical Storm Frequency

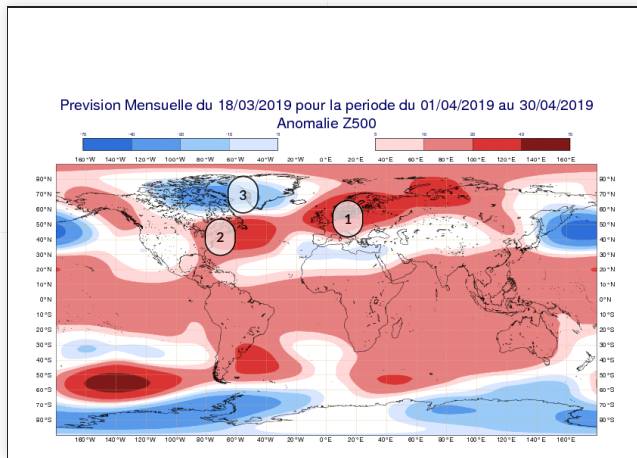


1- expected activity below normal



Monthly forecast of 20190318 : Z500

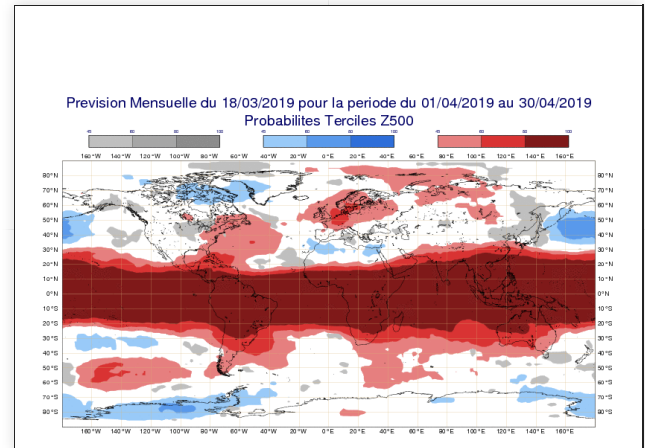
The ECMWF monthly forecast is consistent with the seasonal forecast



1- High values. Consistent with blocking situation

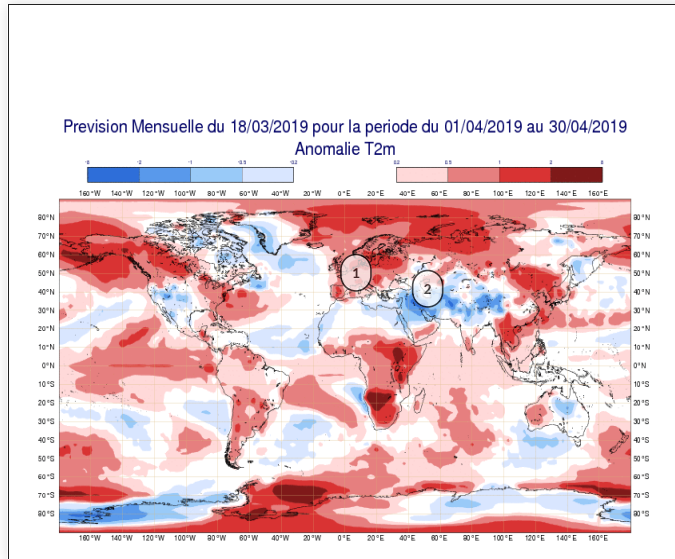
3- Z500 low westh of Greenland

2- high value on Northeastern America



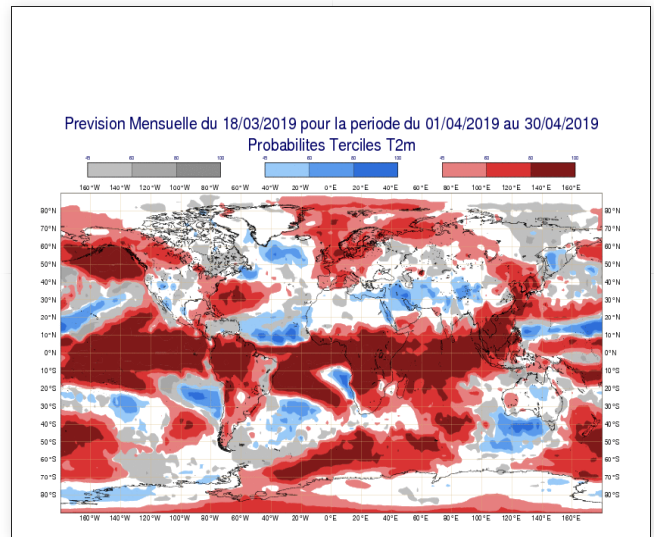
Monthly forecast of 20190318 : temperature

The temperature pattern is consistent with NAO+ mode.

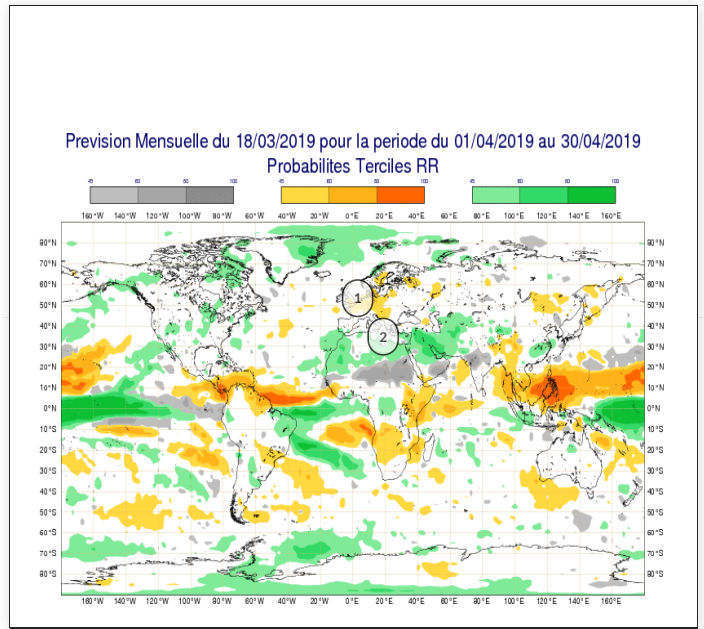
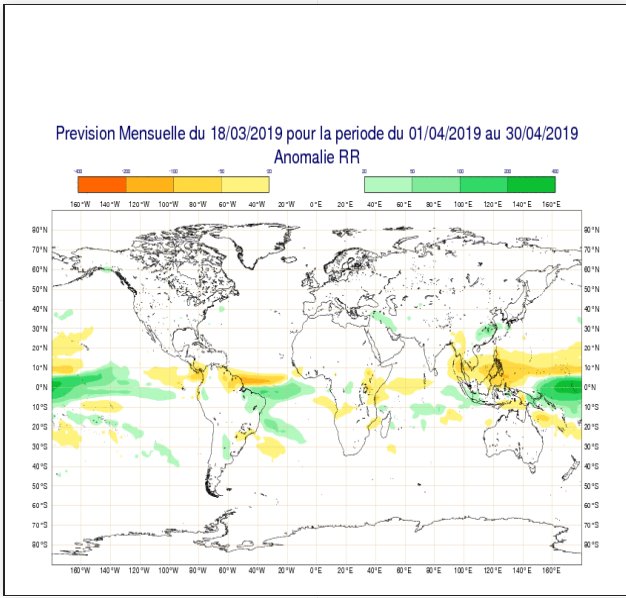


1- Warm anomaly over a large part of Europe

2- Cold anomaly from North Africa to Middle East to Central Asia



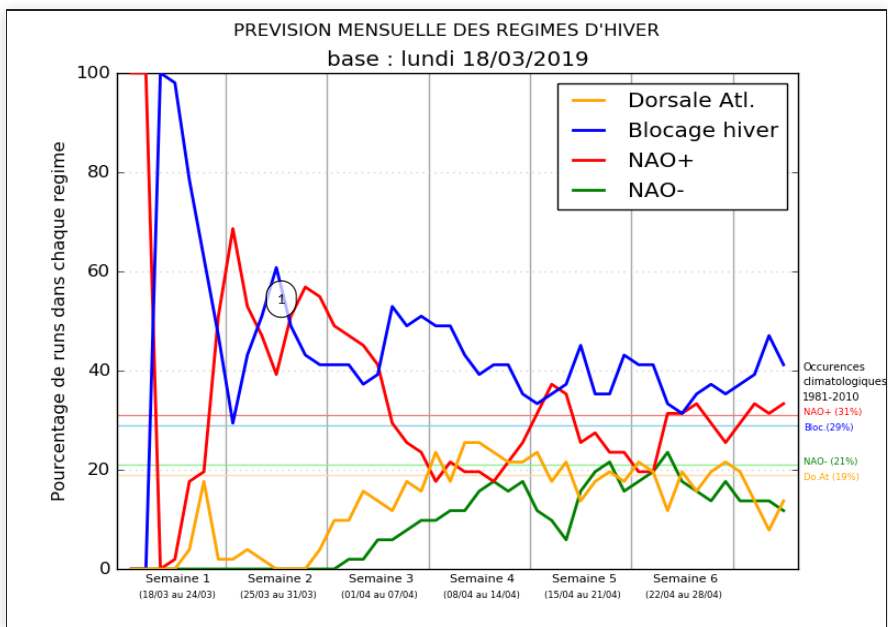
Monthly forecast of 20190318 : precipitation



1- weak dry signal on Europe

2- Weat wet signal on Mediterranean area

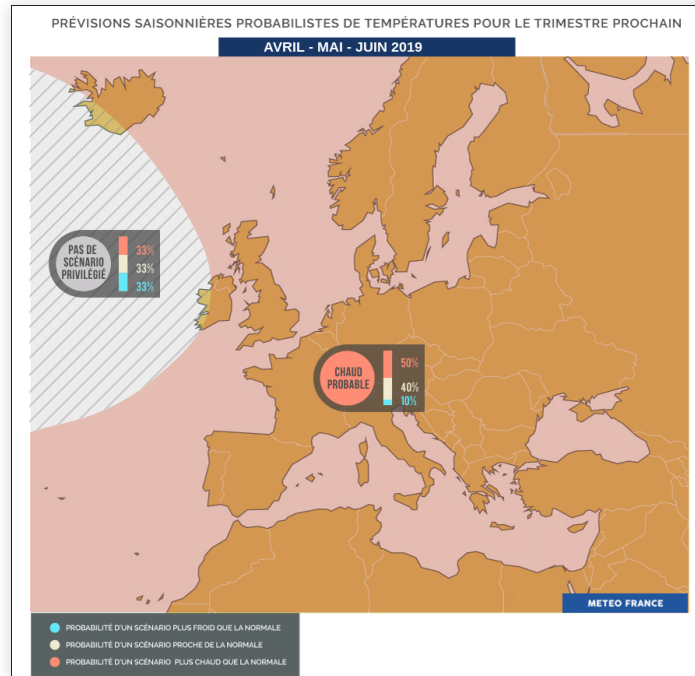
Monthly forecast of 20190318 : winter SLP weather regimes



1- Consistent with seasonal forecast, Blocking and NAO+ will dominate during the whole month

Synthesis map on Europe : Temperature

All analyzed data converge towards a warmer than normal scenario across Europe



Synthesis map on Europe : Precipitation

The high geopotential values expected over Europe, in a situation favoring NAO + and blocking, should lead to a drier scenario than normal over a large part of the continent.

