GLOBAL CLIMATE BULLETIN

n°234 – December 2018

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I. DESCRIPTION OF THE CLIMATE SYSTEM (October 2018)

I.1.Oceanic analysis

Over the Pacific Ocean :

- Along the equator, significant SST warming, together with the eastward propagation of a Kelvin wave in subsurface. SSTs in the Niño 3.4 box have exceeded the "El Niño" threshold, to reach 0.7°
- In the Northern Hemisphere, globally warmer than normal over the tropics, cooler in the mid-latitudes, warmer to the North, especially near the Bering Strait. No significant PDO signal (see https://www.ncdc.noaa.gov/teleconnections/pdo/)

Over the Maritime Continent :

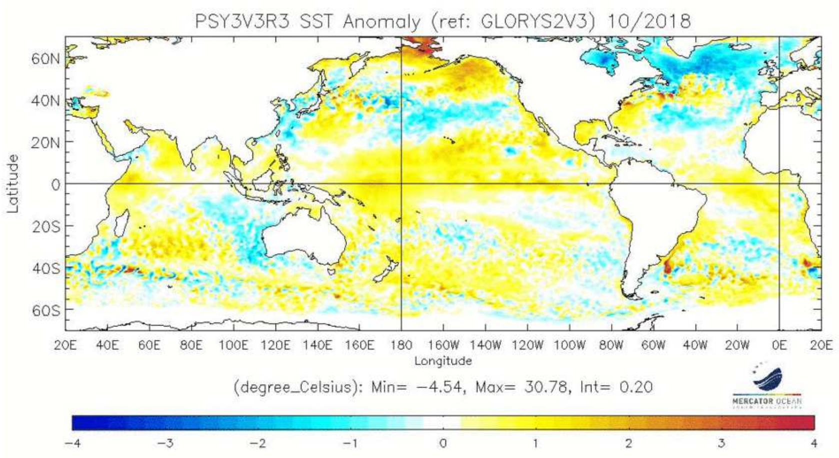
- neutral conditions.

Over the Indian Ocean :

- in the Northern hemisphere, cooling to the West, leading to a neutral DMI (still positive anyway)
- In the Southern hemisphere, cold anomalies to the East and warm anomalies to the West.

Over the Atlantic:

- In the North Atlantic, persistence of the horseshoe structure with a strong cold anomaly from Canada to South Greenland, Iceland and the British Isles, extending southward to western Portugal, Canary islands, and eastern tropical Atlantic. In-between, a warm area is spreading from the Caribbean to the Azores.
- Northern tropics : neutral (cf TNA)
- Warmer than normal along the Equator, especially over the gulf of Guinea.



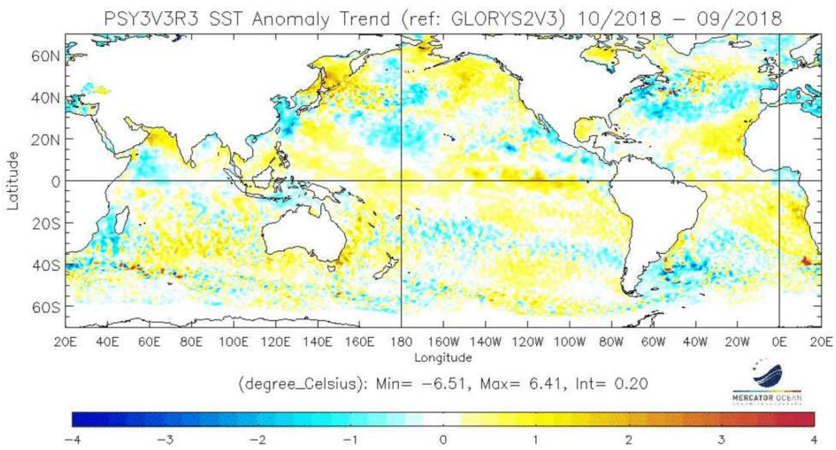


fig.I.1.1: top : SST Anomalies (℃) . Bottom : SST tendency (current – previous month), (reference Glorys 1992-2013).

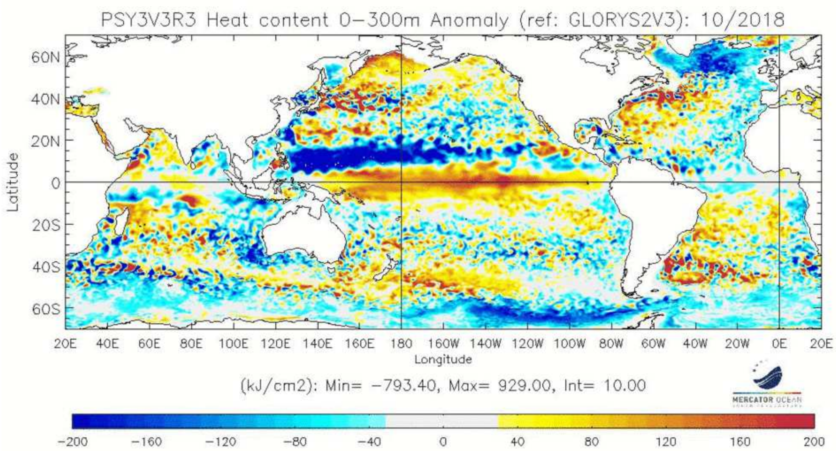


fig.I.1.2: map of Heat Content Anomalies (first 300m, kJ/cm2, reference Glorys 1992-2013)

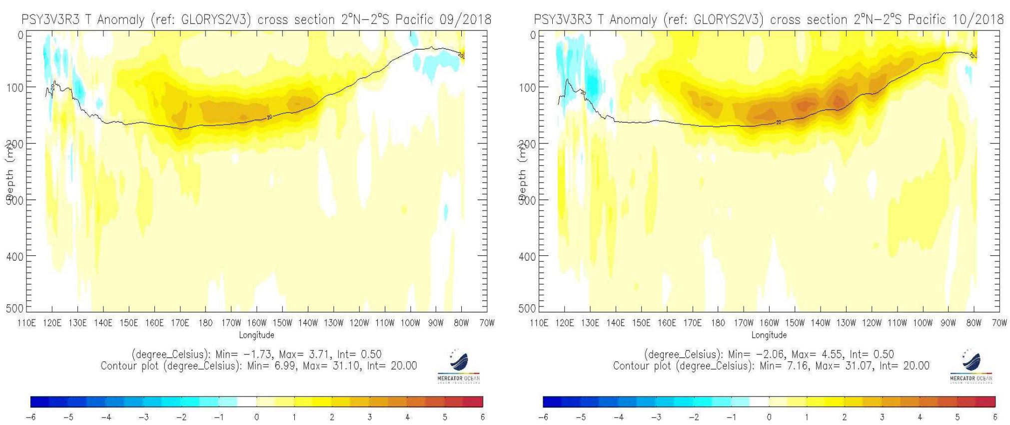


fig.I.1.4: Oceanic temperature anomaly in the first 500 meters in the Equatorial Pacific (previous and current month)

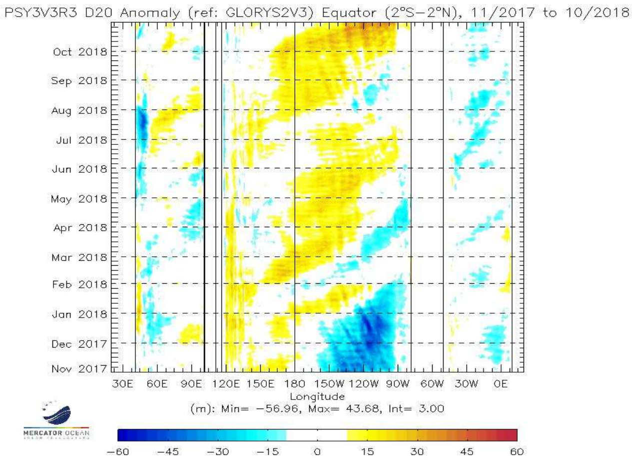


fig.I.1.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20℃ isotherm) along the equator for all oceanic basins over a 6 month period

Sea surface temperature near Europe :

European Arctic Sea: No significant change compared to September. Still mainly warmer than normal, particularly north of Svalbard and on the White Sea. Sea ice extension very low (see fig. I.2.11), just increase at the northeast coast of Greenland. But still colder than normal west of Norway, anomalies have increased since September due to several outbreaks of cold Arctic air.

North Sea: Close to normal near the continent, colder than normal further north. Cold Arctic air advanced further south several times than in September.

Baltic Sea: colder than normal in the west near Sweden, other parts normal to above normal. Cooling was stronger than in the seasonal cycle, but still far from freezing.

Cold blob south of Greenland/Iceland: no significant change in intensity and extension

Subtropical East Atlantic: Cooling at Biscay, now mostly near-normal SST, at the coasts of western France and northern Spain even colder than normal. Colder than normal also near the west coast of Iberia, also in the subsurface.

Mediterranean: Positive anomalies of previous months have disappeared or became at least much weaker. Mostly near-normal SST now, partly even colder, especially in the Aegean and Ionian Sea. Still quite warm only in easternmost parts around Cyprus.

Black Sea: more or less around normal, colder in the west, warmer in the east.

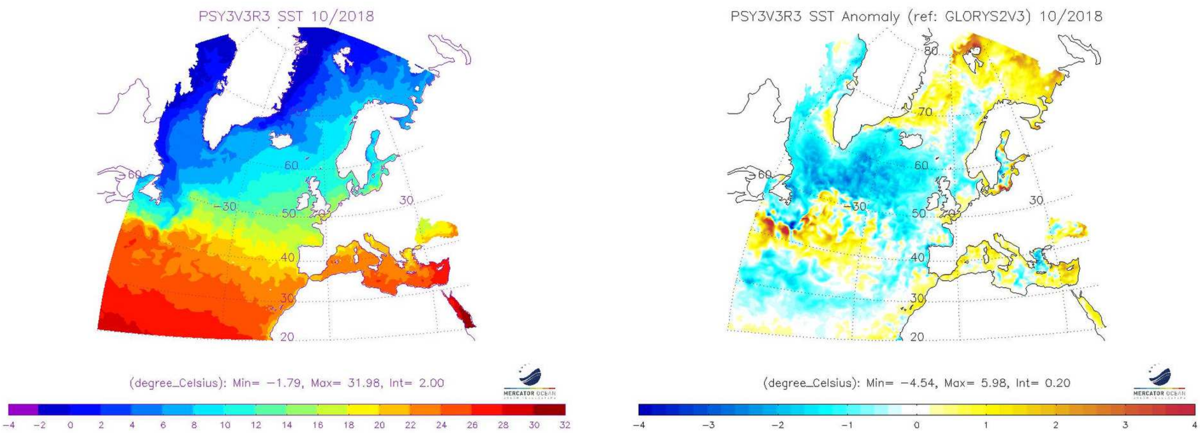


fig.I.1.6 : Mean sea surface temperature in the RA VI Region (Europe) and anomaly (reference Glorys 1992-2013).

I.2. ATMOSPHERE

I.2.a General Circulation

Velocity Potential Anomaly field in the high troposphere (fig. 1.2.1. a – insight into Hadley-Walker circulation anomalies) :

- Patterns quite similar to those of September. Main anomlies : upward over the Atlantic, downward over hte Maritime Continent and Western Pacific.
- active MJO over the Atlantic up to western Indian Ocean (phase 1 and 2). It explains the main upward anomaly centred over the Gulf of Guinea, and the main downward anomaly over the Maritime Continent
- Over the Indian Ocean, VP200 anomaly dipole, consistent with a positive DMI
- Over the rest of Pacific Ocean, weak anomalies. No typical "El Niño" response

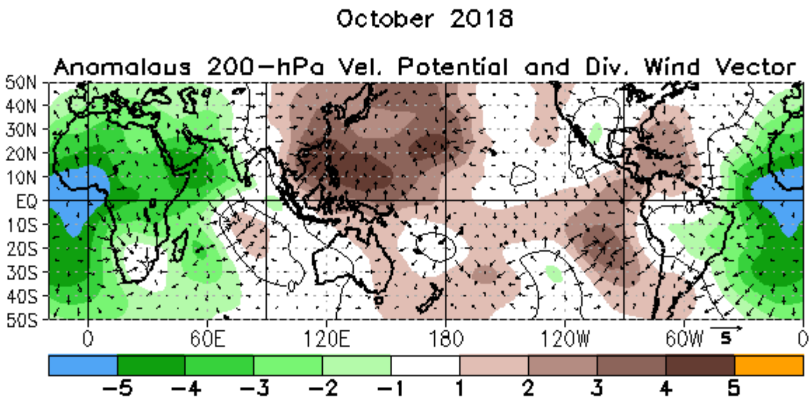


fig.I.2.1.**a**: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly). http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

SOI :

- positive SOI in October (it was negative in the recent months, see NOAA Standardized SOI: https://www.ncdc.noaa.gov/teleconnections/enso/indicators/soi/). According to the BOM calculation, the index has reached the value of +3 (-10 in September). (http://www.bom.gov.au/climate/current/soihtm1.shtml).

MJO (fig. I.2.1.b)

- active MJO during the 1st half of the month

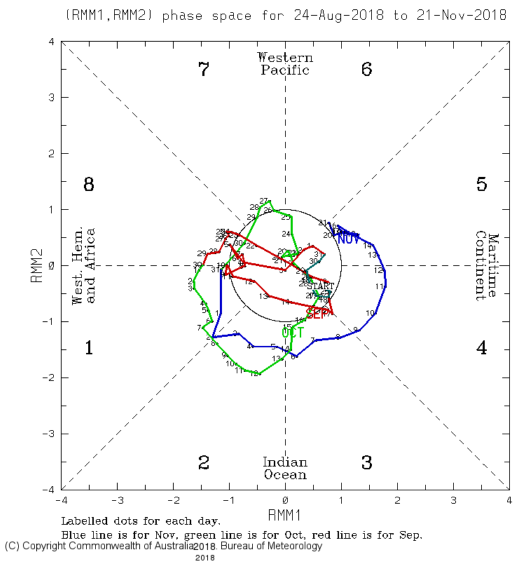


fig.I.2.1.b: indices MJO http://www.bom.gov.au/climate/mjo/

Stream Function anomalies in the high troposphere (fig. 1.2.2 – insight into teleconnection patterns tropically forced):

- related to the large downward anomaly centred near the Maritime Continent, there is a cyclonic anomaly dipole on both sides of the equator over Eastern Indian Ocean. It was already in place last month. It extends up to Middle East and the Eastern Mediterranean.
- no other significant anomalies in the inter-tropical band.

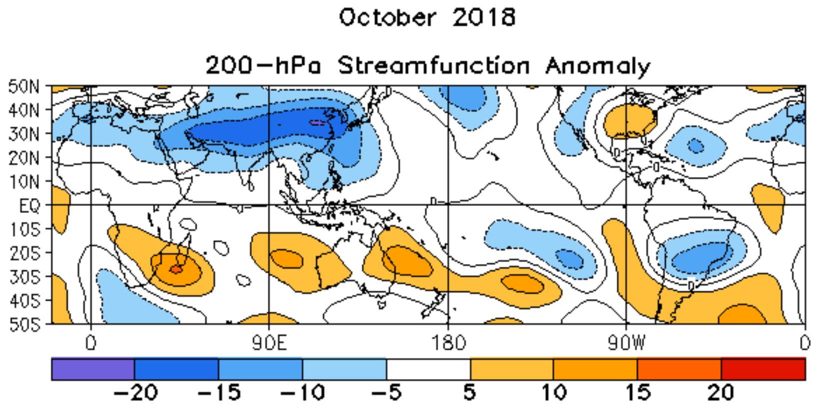


fig.I.2.2: Stream Function Anomalies at 200 hPa.
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

Geopotential height at 500 hPa (fig.1.2.3 – insight into mid-latitude general circulation) :

- positive NAO pattern over the Atlantic, but shifted Northward compared to typical NAO
- Negative anomalies over Western Mediterranean Sea

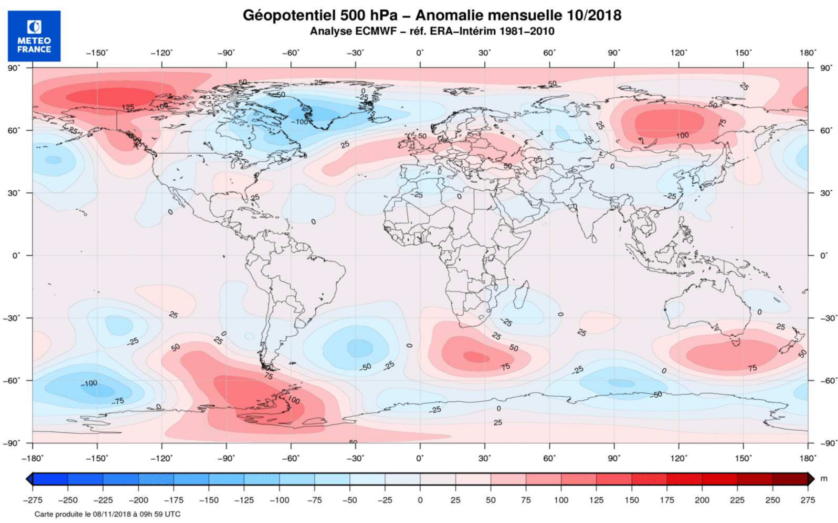


fig.I.2.3: Anomalies of Geopotential height at 500hPa (Meteo-France)

MONTH	NAO	EA	WP	EP-NP	PNA	TNH	EATL/WRUS	SCAND	POLEUR
OCT 18	1.5	-0.4	-1.1	1.2	0.4	---	0.4	-1.1	-1.3
SEP 18	1.8	0.1	-1.8	-0.8	1.2	---	-1.8	-0.7	0.5
AUG 18	2.4	1.8	-1.4	-0.8	1.2	---	-0.5	-1.1	0.0
JUL 18	1.4	2.4	-0.8	-0.2	-0.8	---	-2.2	2.3	-0.1
JUN 18	1.4	-0.5	-0.4	0.1	0.7	---	-0.2	-0.8	-0.9
MAY 18	2.0	-0.1	-0.2	-1.0	-1.1	---	-1.4	1.7	-0.3
APR 18	1.2	1.1	-0.7	-0.2	-1.1	---	0.5	0.3	-1.3
MAR 18	-1.4	-0.6	0.8	0.3	-1.2	---	4.0	-0.8	0.1

Evolution of the main atmospheric indices for the Northern Hemisphere for the last 12 months. (see http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/table3.shtml for the most recent 13 months).

Sea level pressure and circulation types over Europe

Azores High extended to the north, Icelandic Low slightly more intense than normal and extending over the European Arctic Sea. This caused a strong zonal flow over the North Atlantic, but shifted far to the north affecting mainly northern parts of Europe. Long duration of NAO+ phase, but weakening since August. The other main persisting pattern over Europe is a SCAND- phase due to an ongoing cyclonic anomaly over Scandinavia.

The northward shift of the frontal zone and the Azores High is related to extension of high pressure influence over the middle latitudes of Europe including south-eastern Europe like it was in September and much in preceding months.

Southern Europe was mostly cyclonic, especially the western Mediterranean, but also the Middle East, consistent with VP200 upward anomaly, which extended from the tropics further north to the Mediterranean (see fig. I.2.1.a)

Note also a POLEUR- pattern, which has emerged in October and implies a weak polar vortex (but it became stronger later).

According to MF weather types classification three different types prevailed in October (winter types): Atlantic Ridge (12 days, implying the northward shift of the Azores High to the north), Blocking (11 days, with high pressure over Central Europe, sometimes extending to Scandinavia), and NAO+ (8 days).

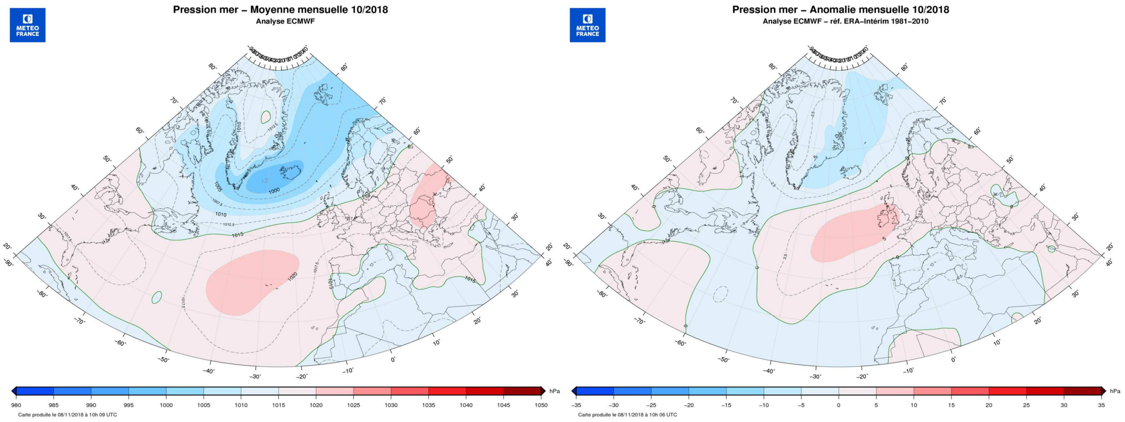


fig.I.2.4: Mean sea level pressure in the RA VI Region (Europe) (top) and 1981-2010 anomalies (bottom).

Circulation indices: NAO and AO

NAO was mainly in a positive phase in the first two thirds of October, but with high oscillations. In the last third of the month, NAO switched to a negative phase. AO mainly shows the same kind of variability, implying that there was a hemispheric circulation change in the last third of month. Circulation became more meridional towards the end of the month, and cold air advanced far to the south of Europe particularly in the last days of October especially over the western parts inducing several cut-off lows over the western Mediterranean region.

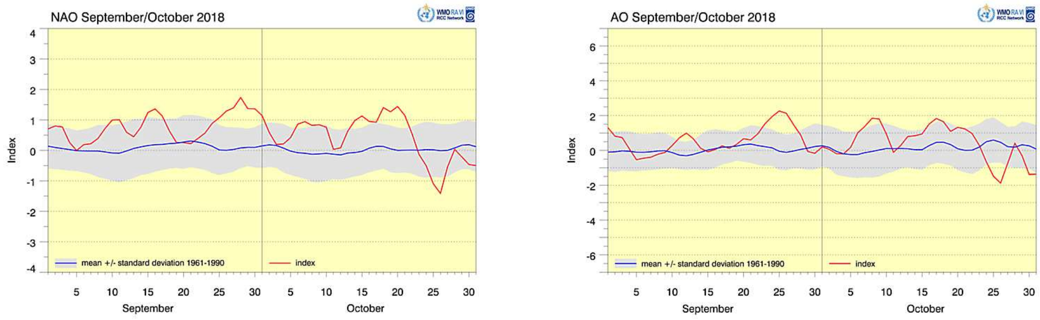


fig.I.2.5: North Atlantic Oscillation (NAO, left) and Arctic Oscillation (AO, right) indices with 1961-1990 mean standard deviation (shading). http://www.dwd.de/rcc-cm , data from NOAA CPC: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml

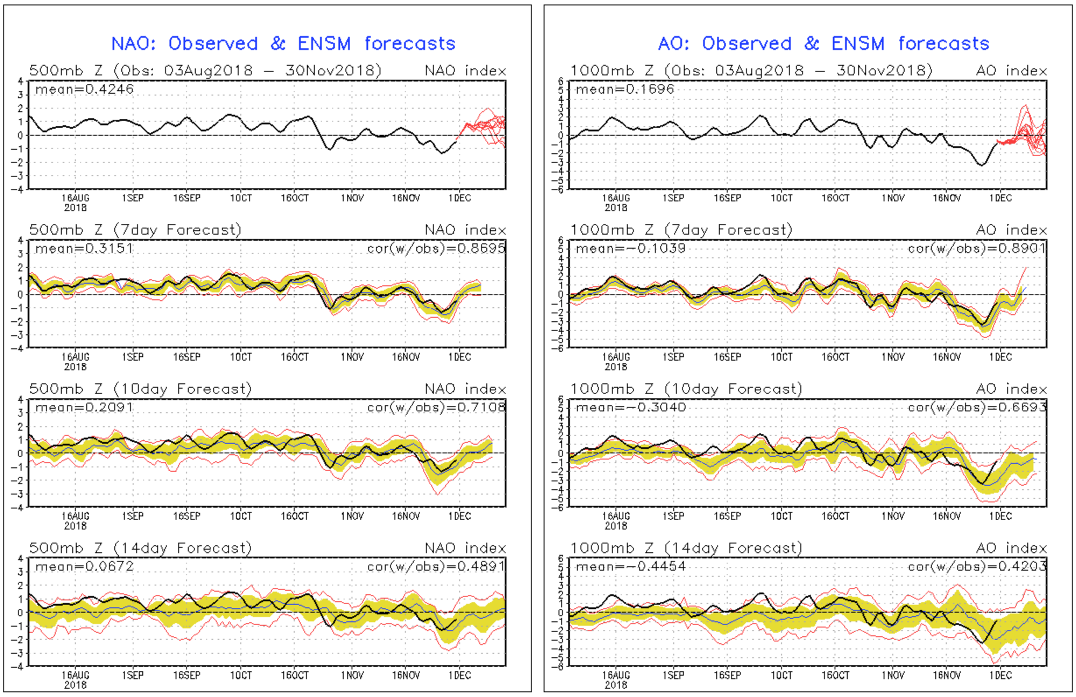


fig. I.2.5a: North Atlantic Oscillation (NAO, left) and Arctic Oscillation (AO, right) indices for the last 4 months and forecasts for the following weeks. Source: NOAA CPC, http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml

I.2.b Precipitation

- Mostly dry over the Maritime Continent and Western Pacific in agreement with subsidence anomalies. Also dry over the Carribbean and the North-East of South America.
- Wet for eastern Pacific (along the equator) up to Mexico and Texas.
- Over Europe, mostly dry from the British Isles to Norway and wet over the Mediterranean Basin

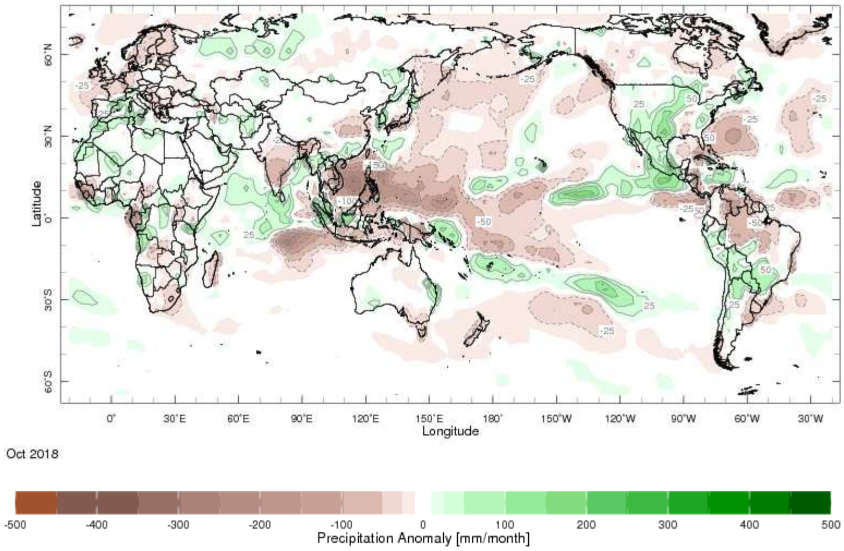


fig.I.2.6: Rainfall Anomalies (mm) (departure to the 1979-2000 normal).
Green corresponds to above normal rainfall while brown indicates below normal rainfall.
http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/Anomaly.html

Precipitation anomalies in Europe:

Precipitation distribution was much in contrast in October. A large dry zone extended from Western Europe over Central Europe to Scandinavia (especially on those days with Scandinavian blocking), but also to southeastern Europe. Anomalies were quite strong; totals were below the 10th percentile in many places. Especially in large parts of Central Europe, a long drought period continued with serious impact to water supply and water traffic on rivers, but also in agriculture, e.g. seeding of winter cereals in hard and dry soils. GPCC drought index classified a severe, locally extreme drought in parts of Central and Southeastern Europe.

It was wet with frequent extreme precipitation and flooding over the Western Mediterranean region, with totals above the 90th percentile due to frequent cut-off lows (see above). Another centre of cyclonic activity caused locally heavy precipitation over Turkey and the Middle East, also with flood events. Furthermore some parts of northern Europe had well-above precipitation. The northward shift of zonal circulation affected particularly Scotland and western Norway with frequent and high precipitation. Large parts of Northern Russia were affected by frequent troughs moving over that area.

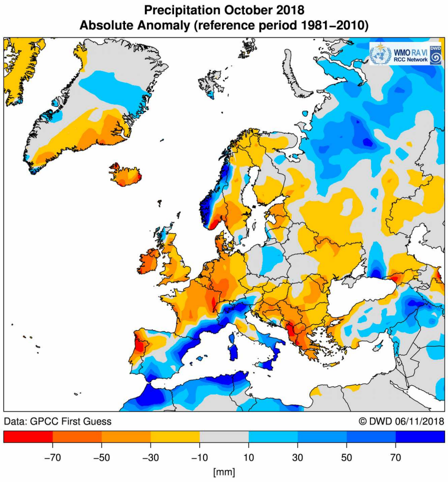


fig.I.2.7.a : Absolute anomaly (1951-2000 reference) of precipitation in the RA VI Region (Europe), data from GPCC (Global Precipitation Climatology Centre), http://www.dwd.de/rcc-cm.

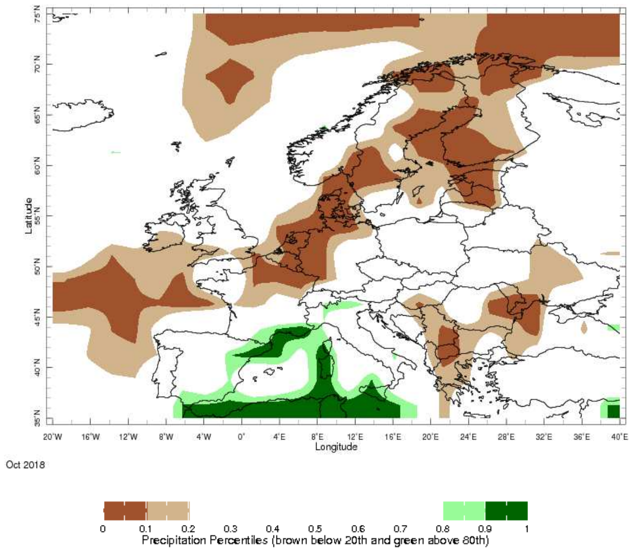


fig.I.2.7.b : Percentiles of precipitation, 1981-2010 reference. Data from NOAA Climate Prediction Center, http://iridl.ldeo.columbia.edu/maproom/Global/Precipitation/Percentiles.html

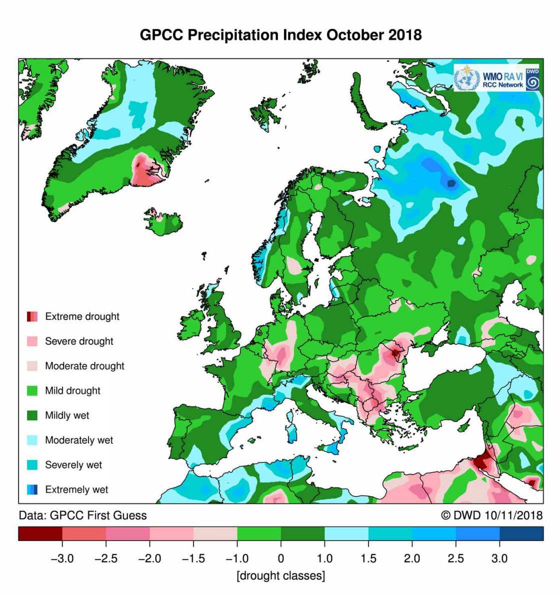


fig. I.2.8: GPCC Precipitation Index, http://www.dwd.de/rcc-cm .

Monthly mean precipitation anomalies in European subregions. Subregions refer to ECMWF land boxes defined in Annex III.3. Anomalies are based on gridded data from GPCC First Guess Product, ftp://ftp-anon.dwd.de/pub/data/gpcc/PDF/GPCC_intro_products_2008.pdf, 1951-2000 reference.

Subregion	Absolute anomaly	GPCC Drought Index
Northern Europe	- 8.3 mm	+ 0.087
Southern Europe	+ 8.0 mm	+ 0.099

Please note: new drought index since January 2016. The GPCC drought index, which also considers evaporation in addition to precipitation replaces the former SPI-DWD.

I.2.c Temperature

- over Europe, temperature once again above normal for most countries with the exception of the British Isles and Scandinavian countries (normal conditions)
- strong positive anomaly over Alaska and from Central America to Florida. Negative anomalies over the rest of the North American continent.
- strong warm anomalies over the Arctic.

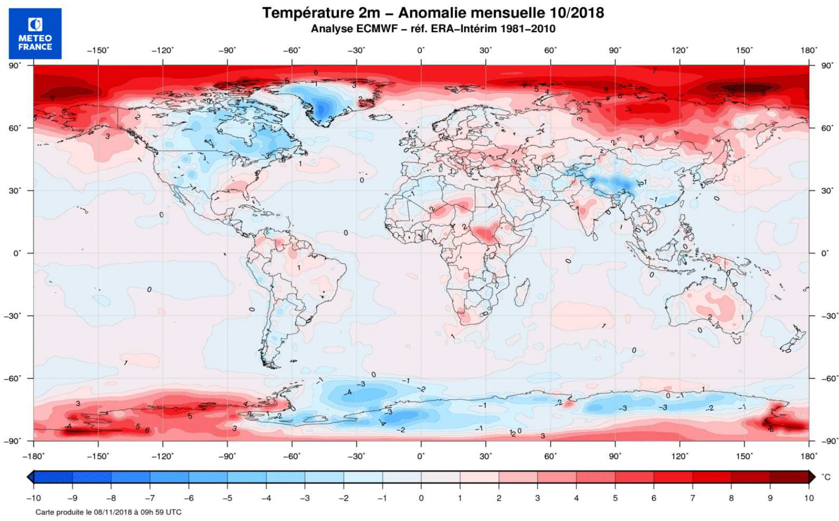


fig.I.2.9: Temperature Anomalies (℃) (Meteo-France)

Temperature anomalies in Europe:

Much of Europe was warmer than normal with highest anomalies over the southeast, up to +3℃ anomaly. T he southeast was especially affected by advection of subtropical warm air in addition to high pressure influence. In the rest of Europe, anomalies were mostly smaller (0 to +2℃) but mostly positive mainly due to high pressure influence with subsidence. Some areas in Northern and Western Europe where slightly colder than normal due to rain events and occasional Arctic outbreaks.

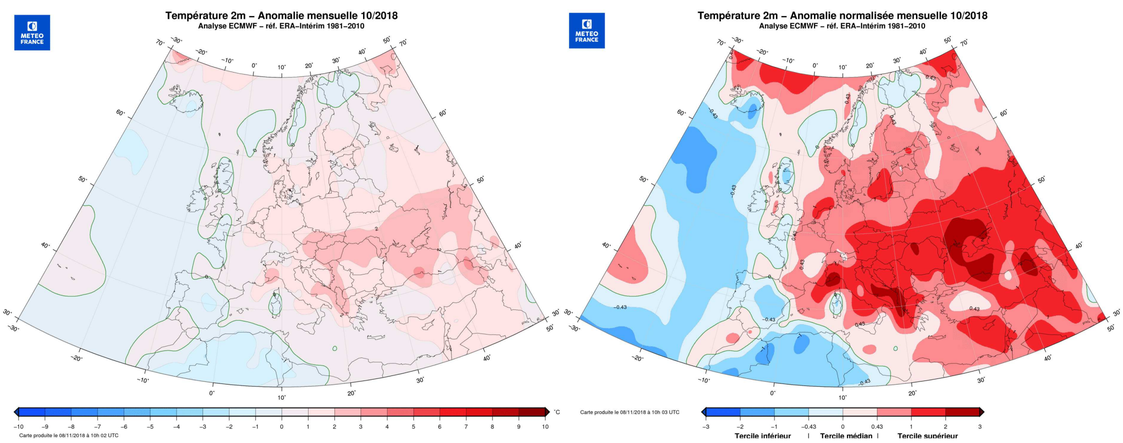


fig.I.2.10: Left graph: Absolute anomaly of temperature in the RA VI Region (Europe). Right graph: Standardized temperature anomalies

Monthly mean temperature anomalies in European subregions: Subregions refer to ECMWF land boxes defined in Annex III.3. Anomalies are based on gridded CLIMAT data from DWD, http://www.dwd.de/rcc-cm, 1961-1990 reference.

Subregion	Anomaly
Northern Europe	+ 0.7 ℃
Southern Europe	+ 1.2 ℃

I.2.d Sea ice

- In the Arctic : very strong deficit, close to the lowest extension since 1979
- In Antarctica : Strong deficit

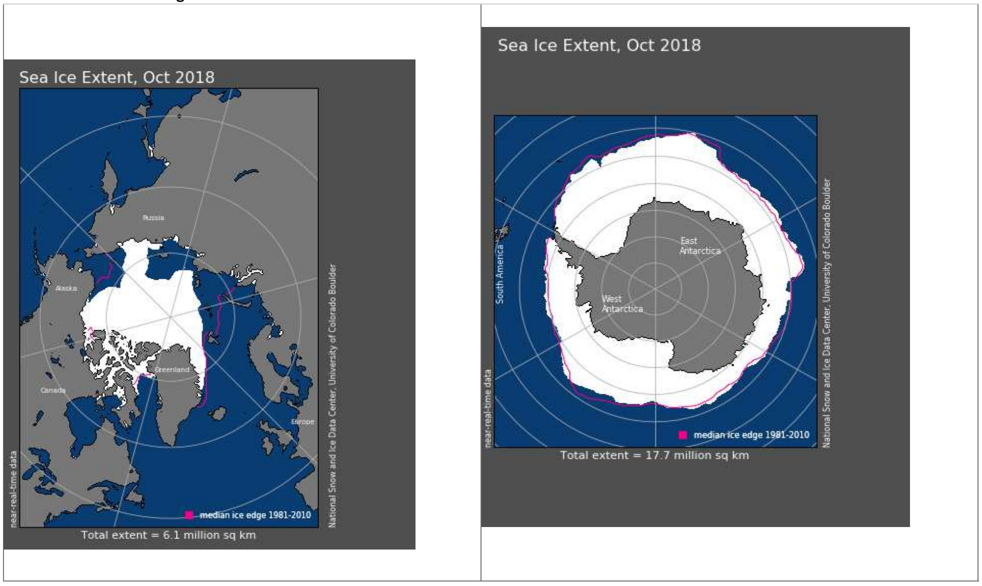


fig.I.2.11: Sea-Ice extension in Arctic (left), and in Antarctic (right). The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

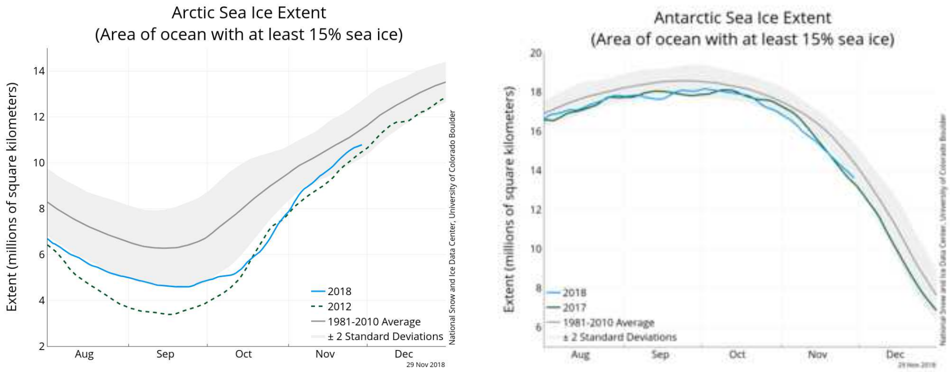
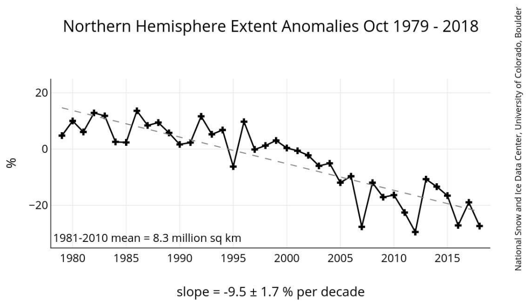


fig. I.2.12 : Sea-Ice extension evolution from NSIDC. https://nsidc.org/data/seaice_index/images/daily_images /N_stddev_timeseries.png



Monthly Sea Ice Extent Anomaly Graph in Arctic for the month of analysis.
http://nsidc.org/data/seaice_index/images/n_plot_hires.png

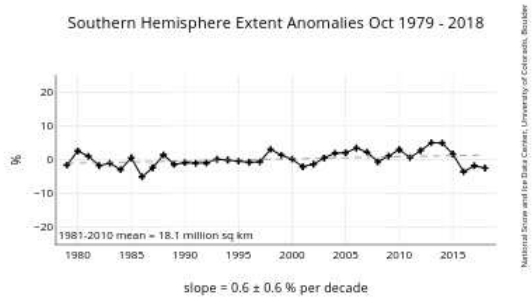


fig 1.2.13 : Monthly Sea Ice Extent Anomaly Graph in Antarctic for the month of analysis (http://nsidc.org/data/seaice_index/)

II. SEASONAL FORECAST FROM DYNAMICAL MODELS

Onset of a weak-to-moderate El Niño event in November lasting until early boreal spring.

NB : MF-S6 is the operational model of Meteo-France. But please note that the EUROSIP system, shown in this bulletin, is still using MF-S5 outputs - viewable on http://seasonal.meteo.fr/fr/content/ARP5 -.

II.1. OCEANIC FORECASTS

II.1.a Sea surface temperature (SST, figure II.1.1 to II.1.4)

Models are in rather good agreement for the next three months. However the duration and the intensity of the El Niño event differ from one model to another.

- Pacific Ocean: Warm anomaly forecast along the Equator, east of the dateline, with a maximum between +1 and +2℃ in the Niño 3.4 box. In the Northern Hemisphere, warm anomaly forecast in the tropics with a positive PDO. In the southern hemisphere only weak anomalies are forecast but they are consistent with a Niño configuration.
- Indian Ocean: neutral DMI. Note than during an El Niño event though, the DMI is usually positive.
- Atlantic Ocean:
  - northern Atlantic : no significant changes with a tripole-like configuration (cool, warm, cool).
- Mediterranean Sea : persisting warm anomalies

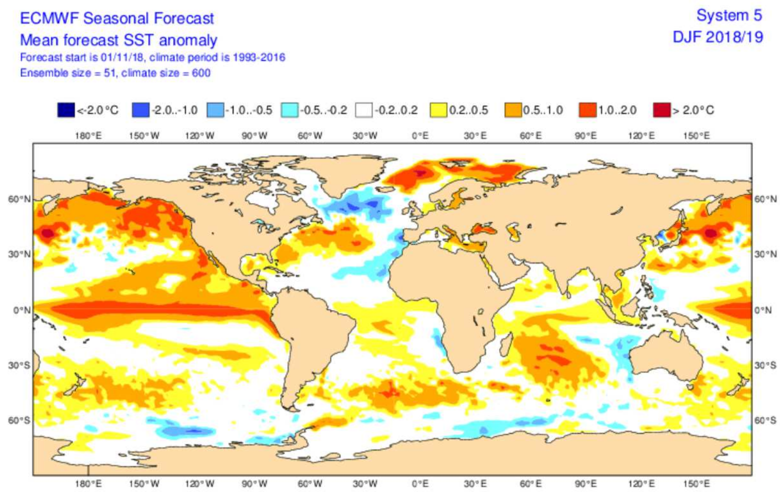


fig.II.1.1: SST anomaly forecast from ECMWF
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

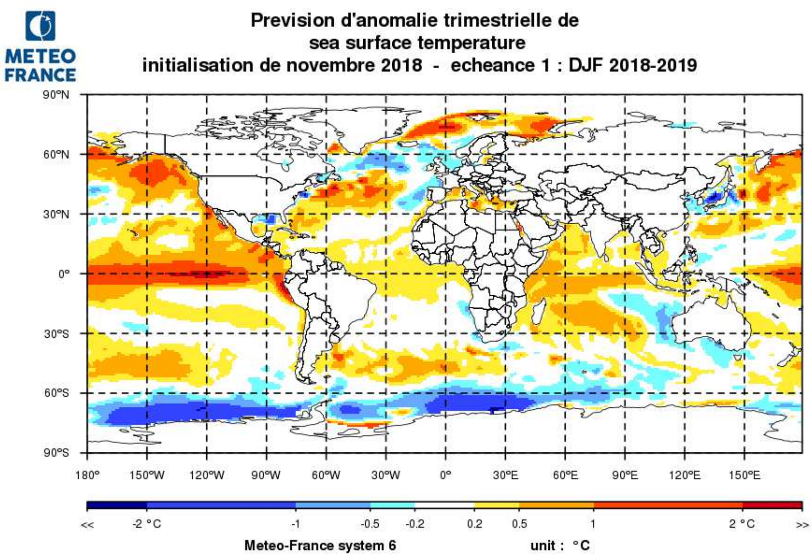


fig.II.1.2: SST Anomaly forecast from Meteo-France (recalibrated with respect of observation).
http://seasonal.meteo.fr

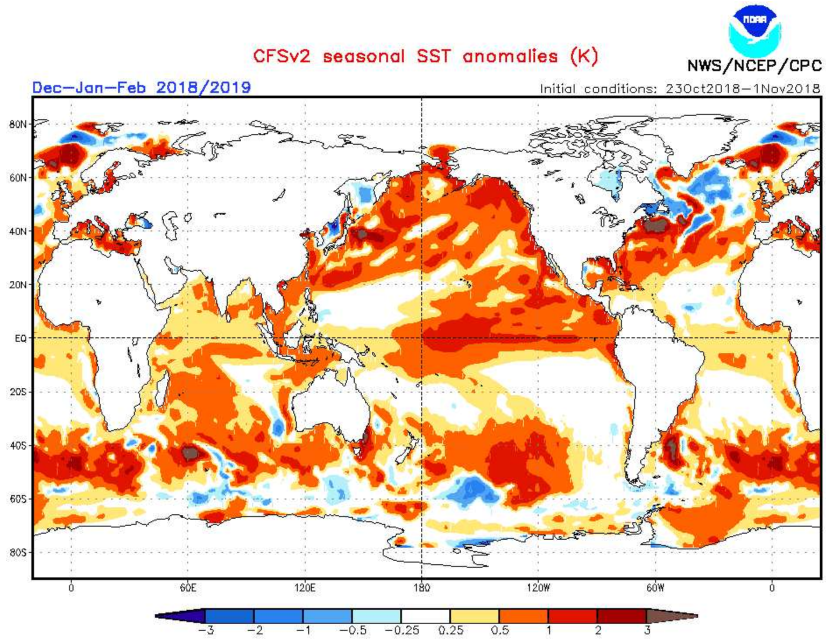


fig.II.1.3: SST Anomaly forecast from NCEP.
http://www.cpc.ncep.noaa.gov/products/people/wwang/cfsv2fcst/imagesInd1/glbSSTSeaInd1.gif

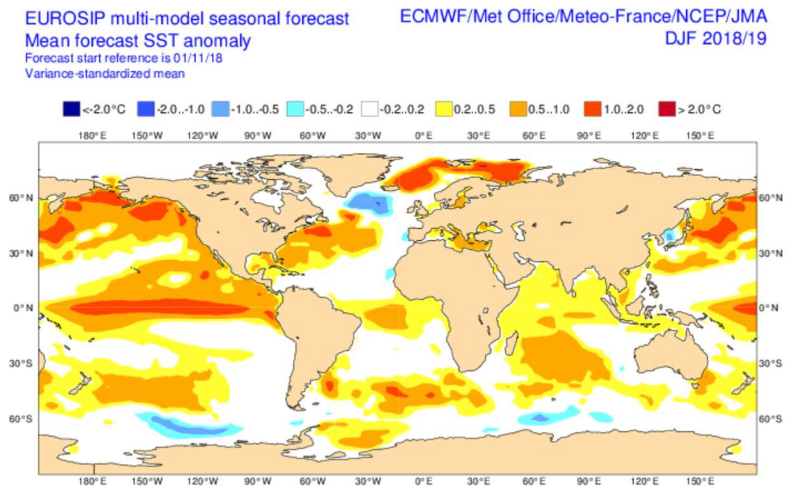


fig.II.1.4: SST Forecasted anomaly from Euro-SIP

II.1.b ENSO forecast :

***Forecast Phase*: weak to moderate El Niño**. Ongoing warming persisting through November and December and forecast to peak around +1.0℃ in the Niño 3.4 box. MF6 forecasts a stronger intensity than the other models (median : +1.5℃). The event pr obability is now around 90% in the IRI synthesis (https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/).

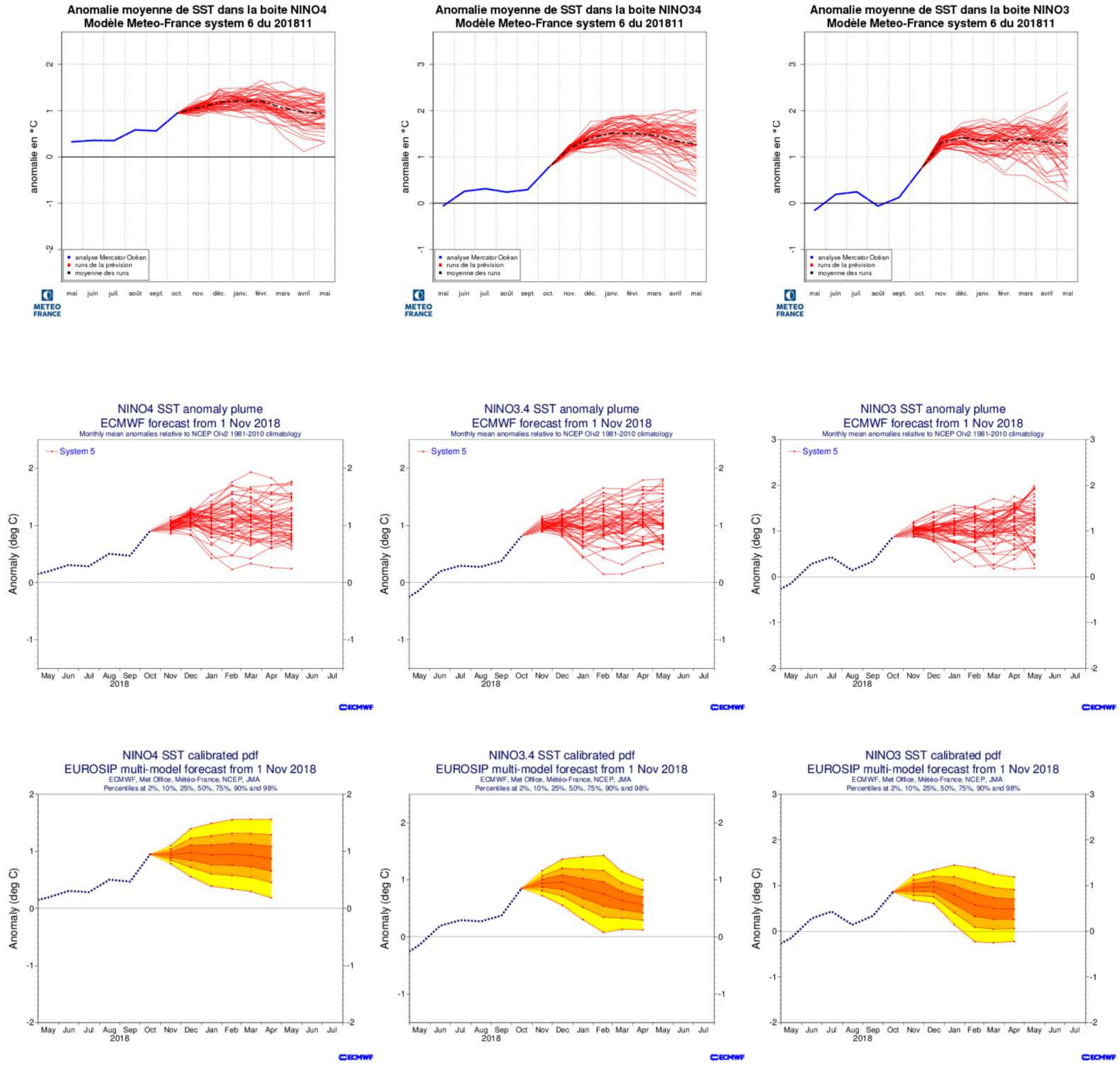
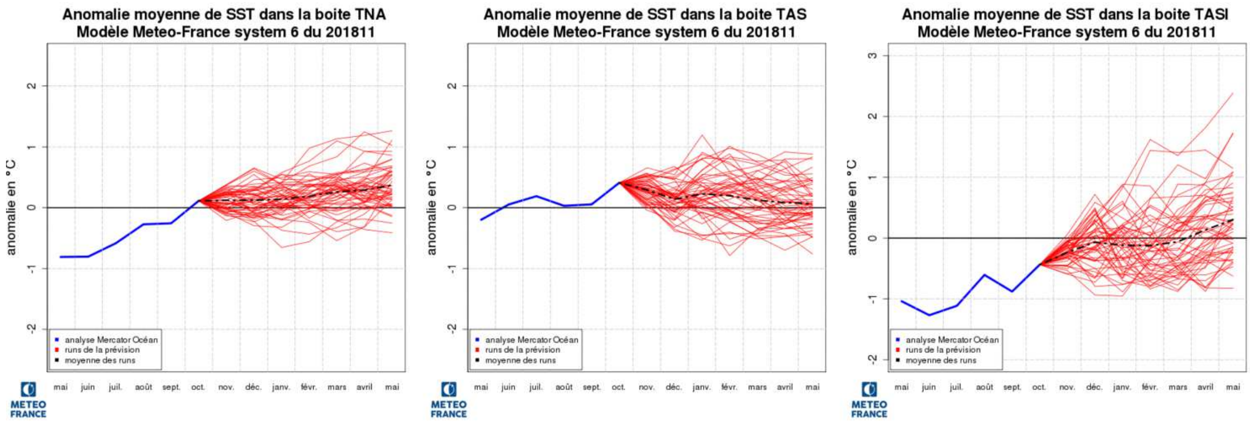


fig.II.1.5: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members -
and EUROSIP (bottom) – recalibrated distributions -
(http://seasonal.meteo.fr , http://www.ecmwf.int/)

I.1.c Atlantic ocean forecasts



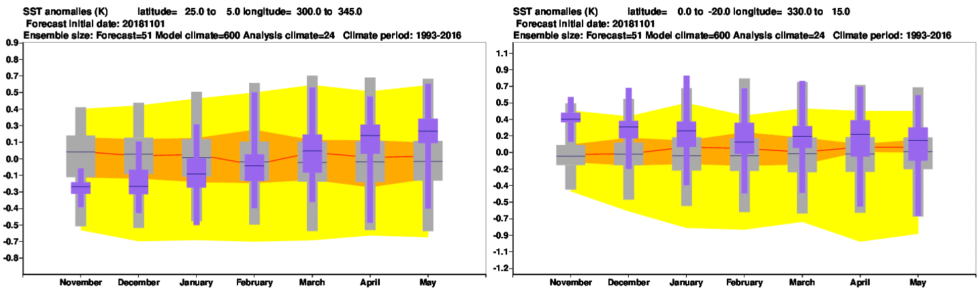


fig.II.1.6: SSTs anomaly forecasts in the Atlantic Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

I.1.d Indian ocean forecasts

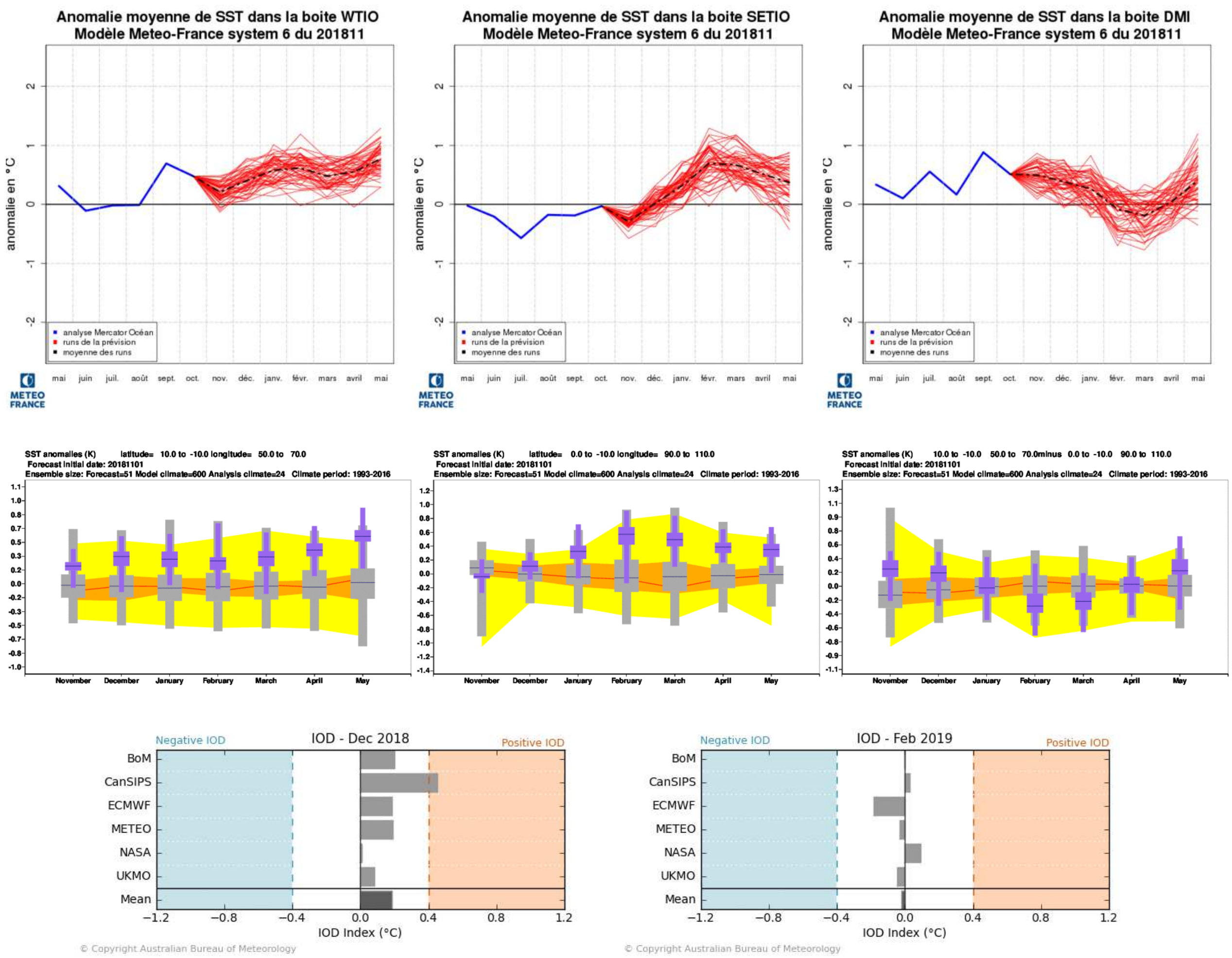


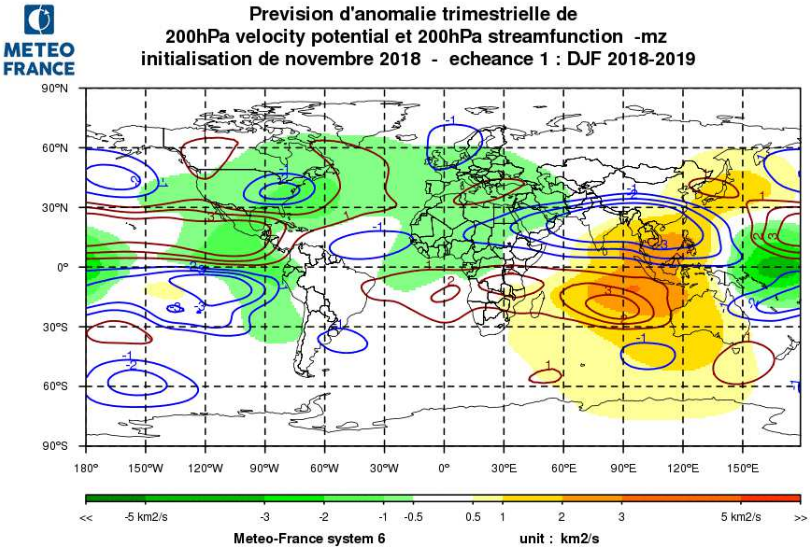
fig.II.1.7: SST anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

II.2. GENERAL CIRCULATION FORECAST

II.2.a Velocity potential anomaly field and Stream Function anomaly field at 200 hPa

Typical atmospheric response to an El Niño event, but without any significant teleconnection with Europe. Good agreement between models (MF-S6, ECMWF and JMA)

- Velocity potential : El-Niño-type response. Upward motion anomalies over Central and Eastern equatorial Pacific. Subsidence anomalies for Eastern Indian Ocean and Maritime Continent.Weak upward anomaly signal over the Equatorial Atlantic (East part).
- Stream function : consistent response to El Niño for both the Pacific and the Indian Ocean. Significant teleconnection is seen over North America with a positive PNA pattern (even stronger with ECMWF). They differ in the location of the cyclonic anomaly over the Eastern coast of North America. Anayway they have a similar signal on both sides of the equator over the Atlantic Ocean, with a dipole a cyclonic anomaly circulation.



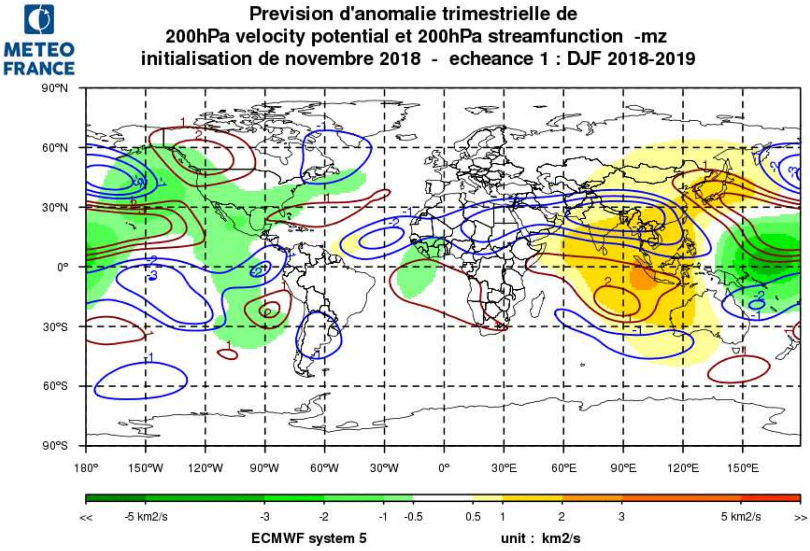


fig.II.2.a: Velocity Potential anomaly field χ (shaded area – green negative anomaly and yellow positive anomaly), associated with Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa by Météo-France (top) and ECMWF (bottom).
http://seasonal.meteo.fr

II.2.b Geopotential height anomalies

Good consensus for a strong positive PNA signal. Significant differences among models regarding Northern Atlantic and Europe.

Downstream from the PNA, the negative anomaly over the Eastern Coast of North America and a positive one close to Greenland. This dipole correspond to a negative NAO circulation. This is the signal shown by most of the GPC models.

But close to Europe, models are quite different. Anyway one can isolate some similarities from GPC composites, and MF-S6 is consistent with the composite, so is retained as privileged scenario.

Another region where the GPC composite supports MF-S6 scenario : the relative minimum extending from Northern Indian Ocean to the Arabic Peninsula and to North Africa.

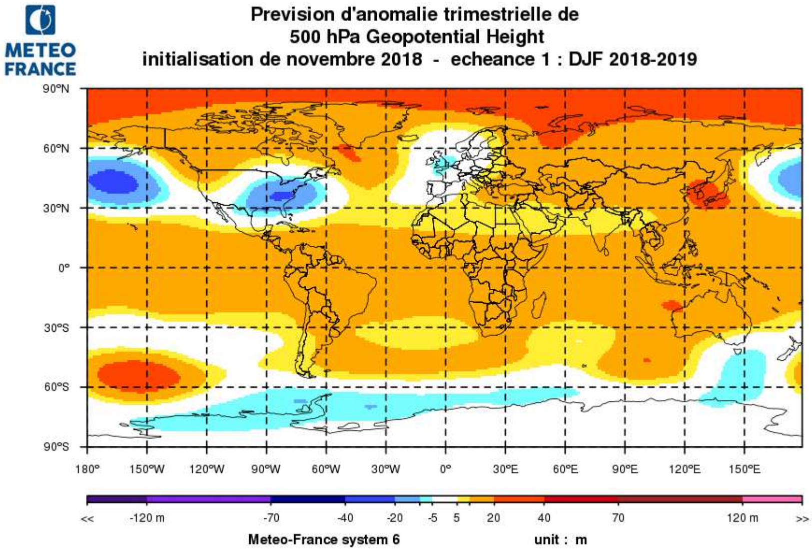


fig.II.2.b.1: Anomalies of Geopotential Height at 500 hPa from Météo-France.
http://seasonal.meteo.fr

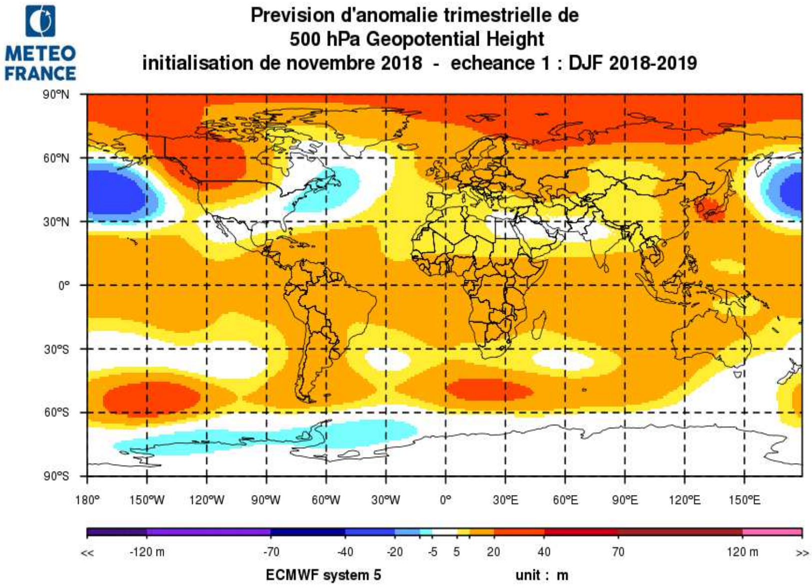


fig.II.2.b.2: Anomalies of Geopotential Height at 500 hPa from ECMWF.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast

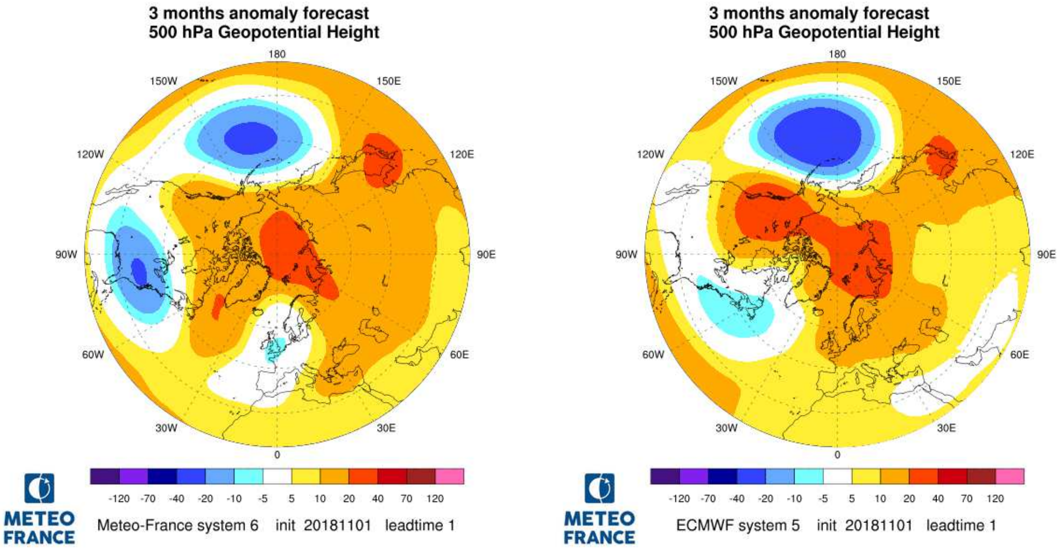


fig.II.2.b.3: Anomalies of Geopotential Height at 500 hPa from Météo-France.
http://seasonal.meteo.fr

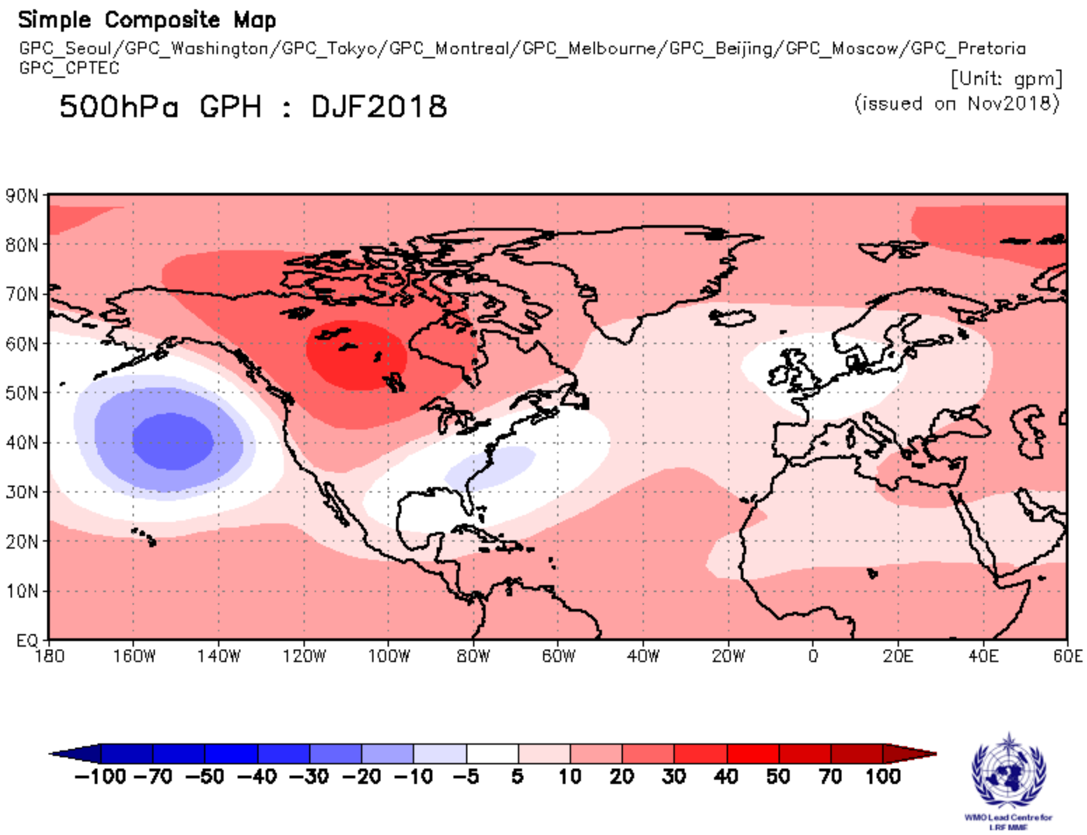


fig II.2.b.4 : Multi-Model anomaly of geopotential height at 500 hPa (https://www.wmolc.org)

II.2.c. modes of variability

Most probable phases : positive PNA and negative NAO (not with ECMWF).

For the secondary modes, positive EA and positive SCAN

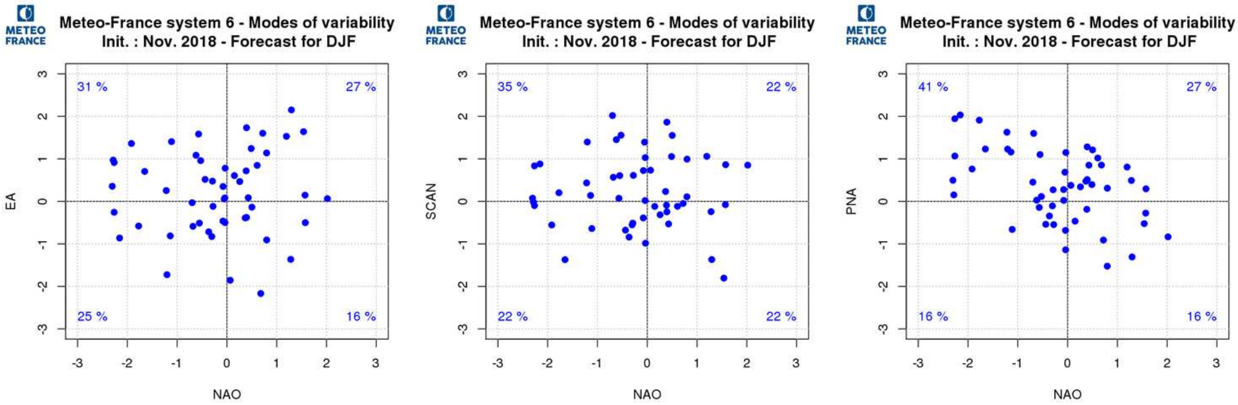


fig.II.2.c.1 : modes of variability forecasts over the Northern hemisphere with Meteo-France MF-S6

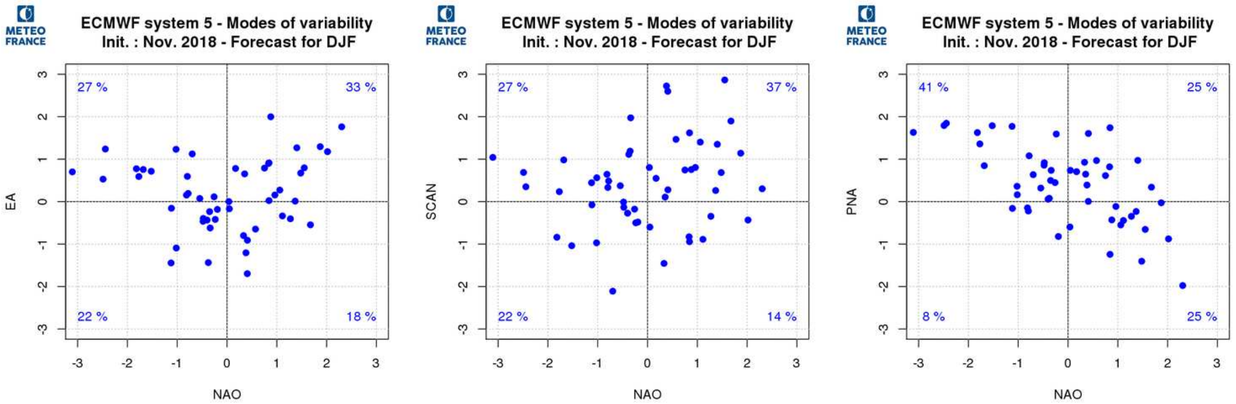


fig.II.2.c.2 : modes of variability forecasts over the Northern hemisphere with ECMWF-S5

II.2.d. weather regimes

No significant signal.

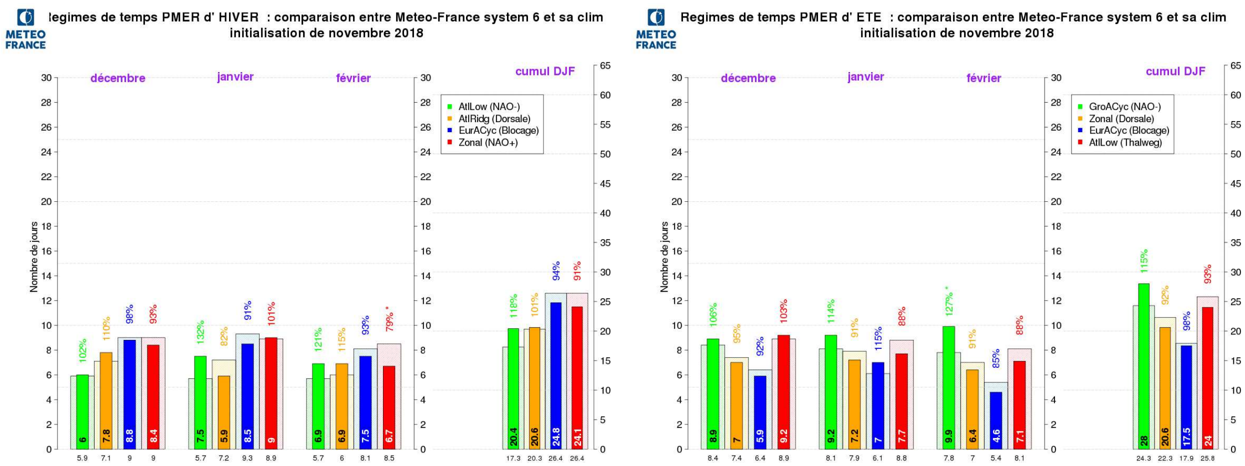


fig.II.2.d.1: North Atlantic Regime occurrence anomalies from Meteo-France MF-S6 : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.
Left : winter regimes; Right : summer regimes

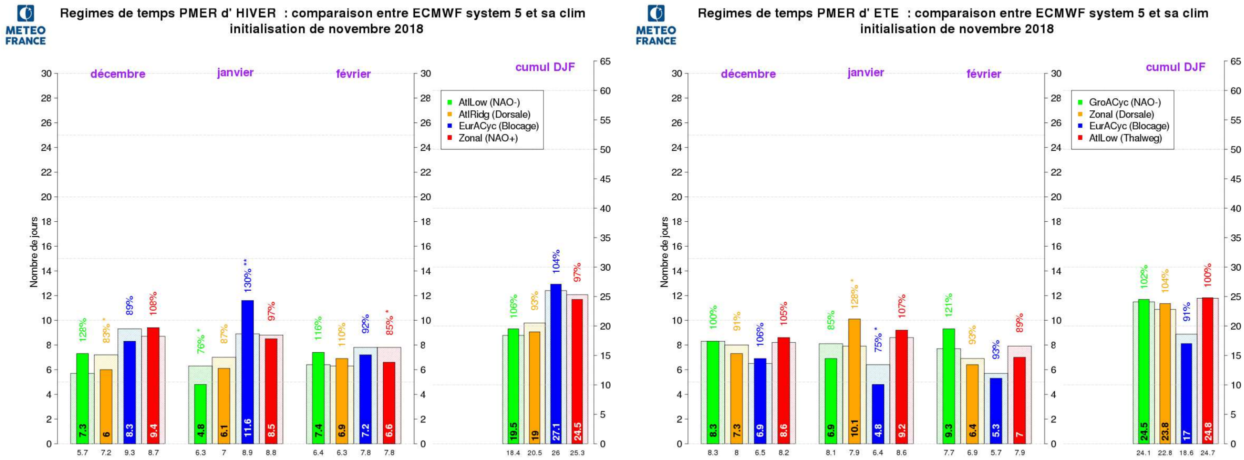


fig.II.2.d.2 : North Atlantic Summer Regime occurrence anomalies from ECMWF-S5 : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes
Left : winter regimes; Right : summer regimes

II.3. IMPACT : TEMPERATURE FORECASTS (figure II.3.1 to II.3.4)

For North America : in agreement with the positive PNA, warm anomalies expected west of the Rockie Mountains, and cold anomalies to the east.

For Europe and North Atlantic : Of note, is the absence of a warm signal for most of Europe for the next three months.Warm anomalies for the Mediterranean for a majority of models.

II.3.a Météo-France

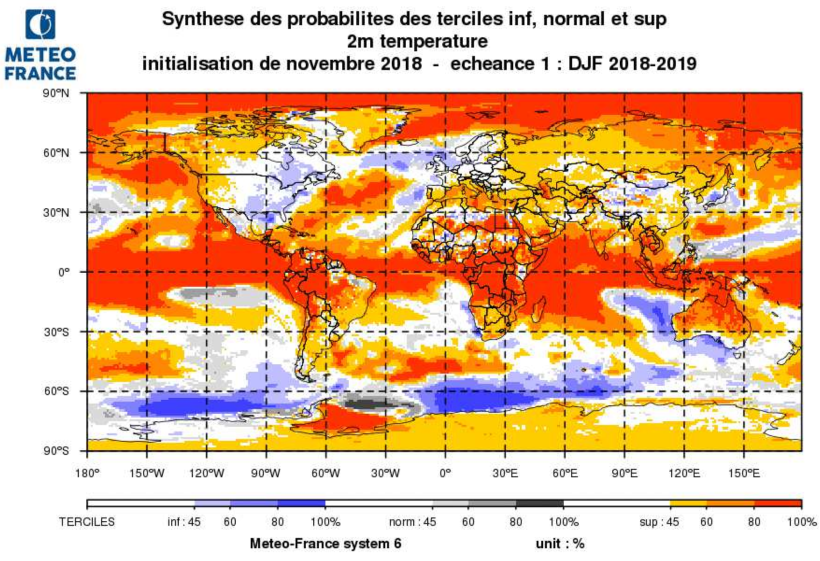


fig.II.3.1: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://seasonal.meteo.fr/

II.3.b ECMWF

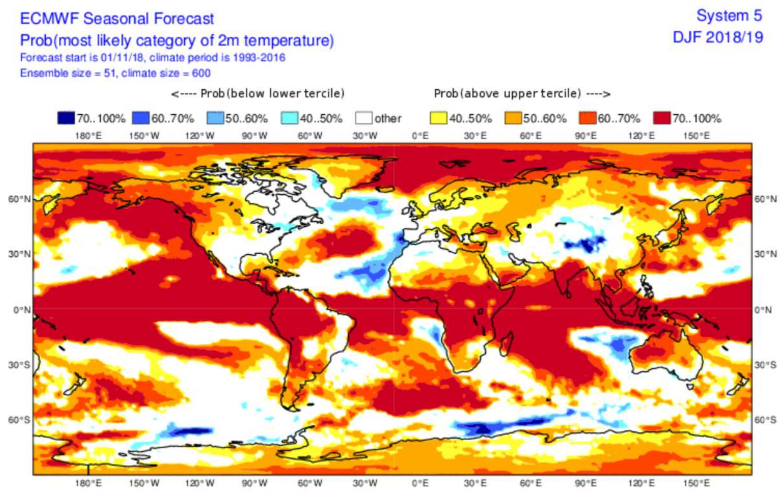


fig.II.3.2: Most likely category probability of T2m from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seaso...

II.3.c Japan Meteorological Agency (JMA)

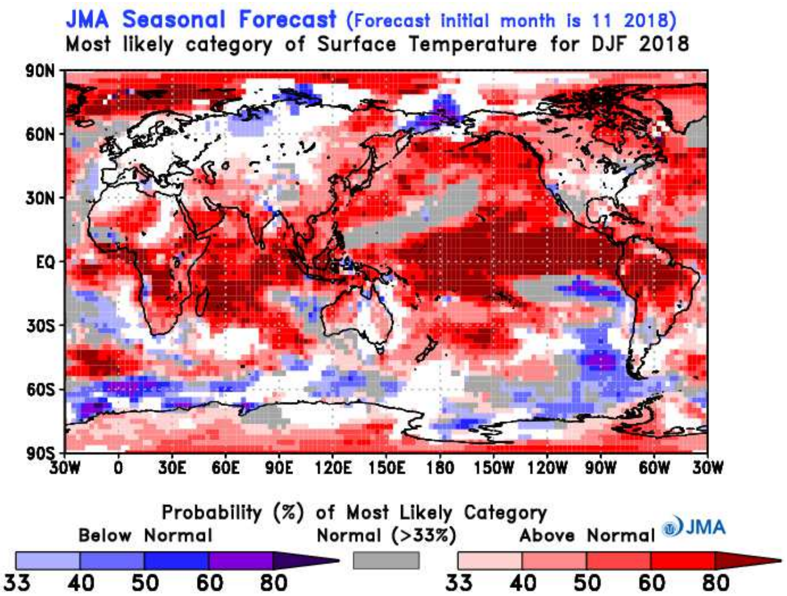


fig.II.3.3: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/3-mon/fcst/fcst_gl.php

II.3.d EUROSIP

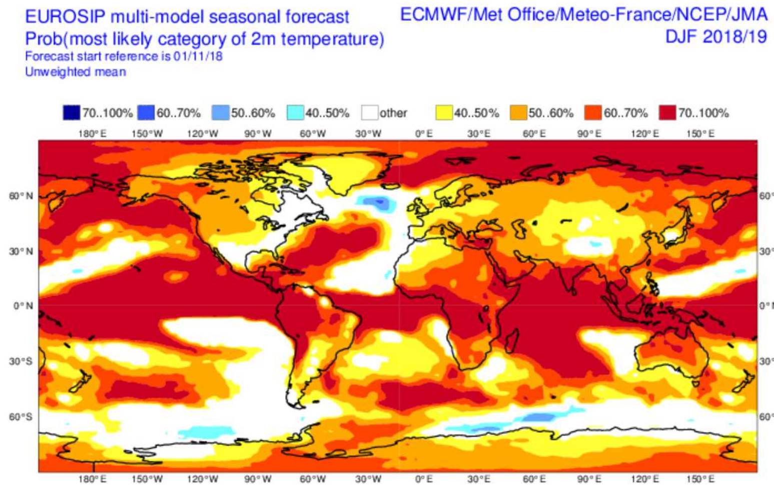


fig.II.3.4: Multi-Model Probabilistic forecasts for T2m from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmv2/param_euro/seasonal_charts_2tm/

II.3.e GPCC's composite

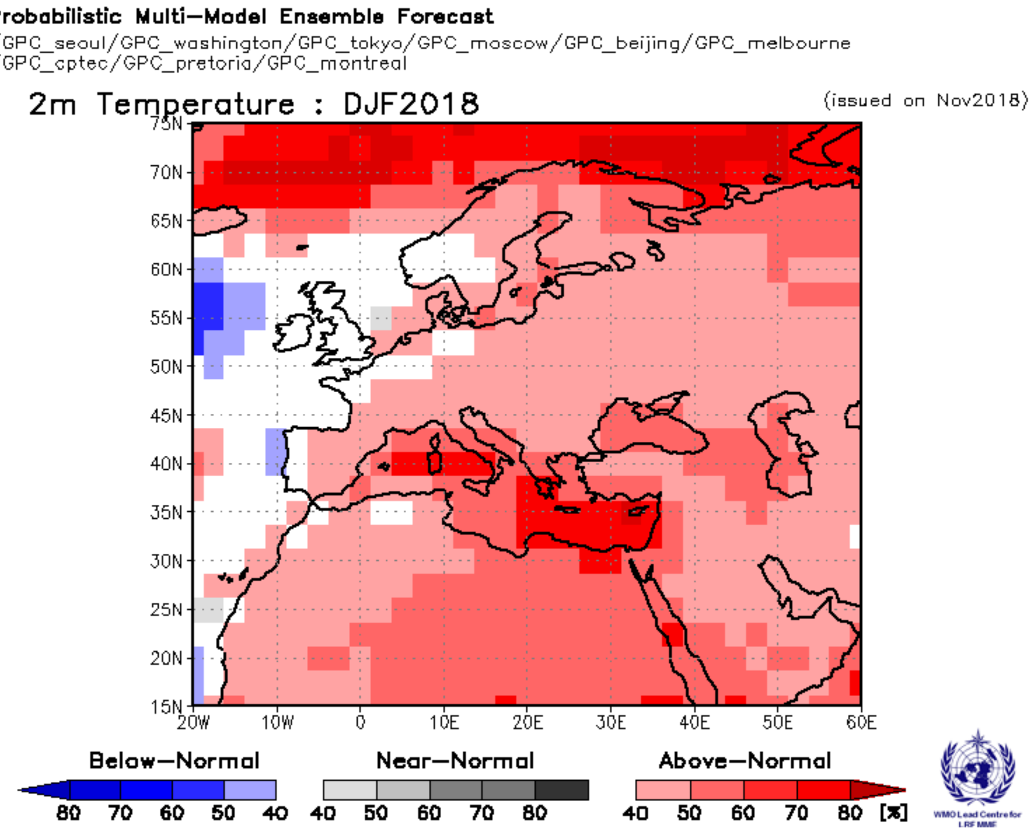


fig.II.3.1.c : Multi-model forecast of temperature anomalies at 2 metres (https://www.wmolc.org)

II.4. IMPACT : PRECIPITATION FORECAST

- Wet signal on the south-eastern United States in connection with positive PNA, and also over south-western California (El Niño consistent).
- For Europe, very low signal.
- inter-tropical regions : good agreement between models and also with an El-Niño type response. Dry over Australia, Maritime Continent and the Carribean. Wet over Mexico and western Peru.

II.4.a Météo-France

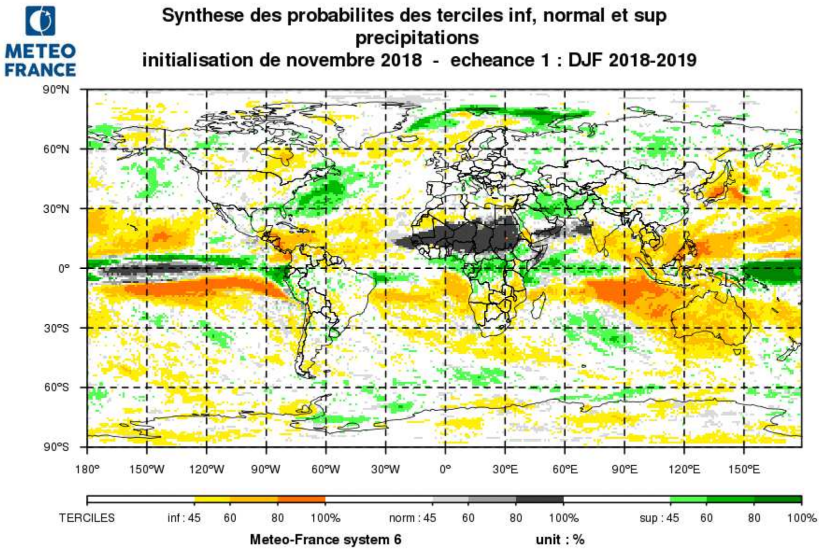


fig.II.4.1: Most likely category of Rainfall. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://seasonal.meteo.fr/

II.4.b ECMWF

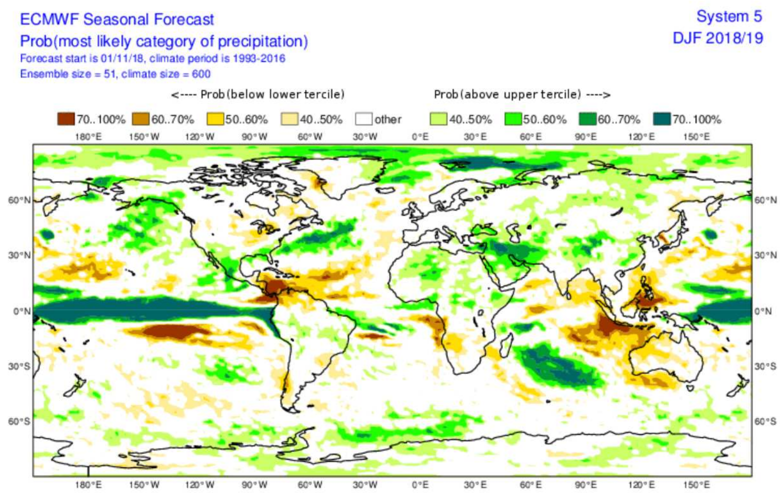


fig.II.4.2: Most likely category probability of rainfall from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

II.4.c Japan Meteorological Agency (JMA)

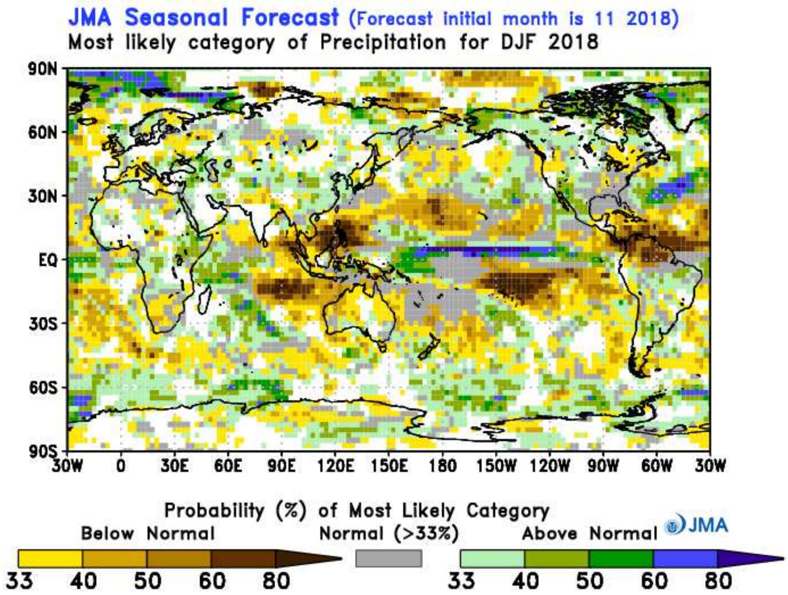


fig.II.4.3: Most likely category of Rainfall from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/3-mon/fcst/fcst_gl.php

II.4.d EUROSIP

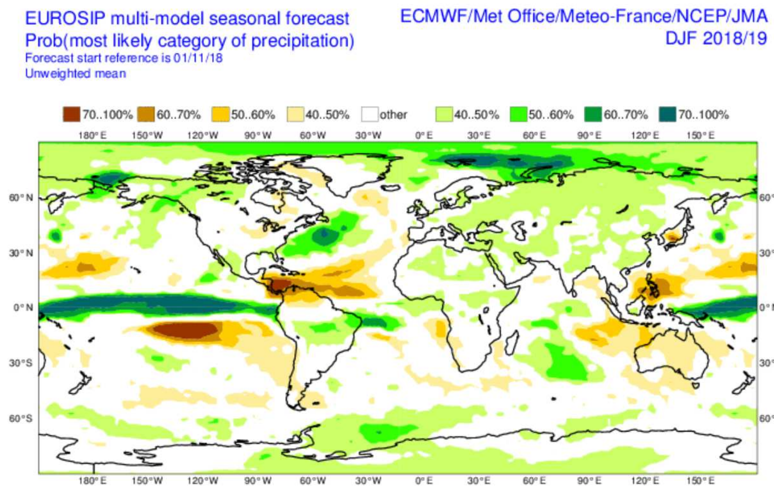


fig.II.4.4: Multi-Model Probabilistic forecasts for precipitation from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmv2/param_euro/seasonal_charts_2tm/

II.4.e GPCC's Composite

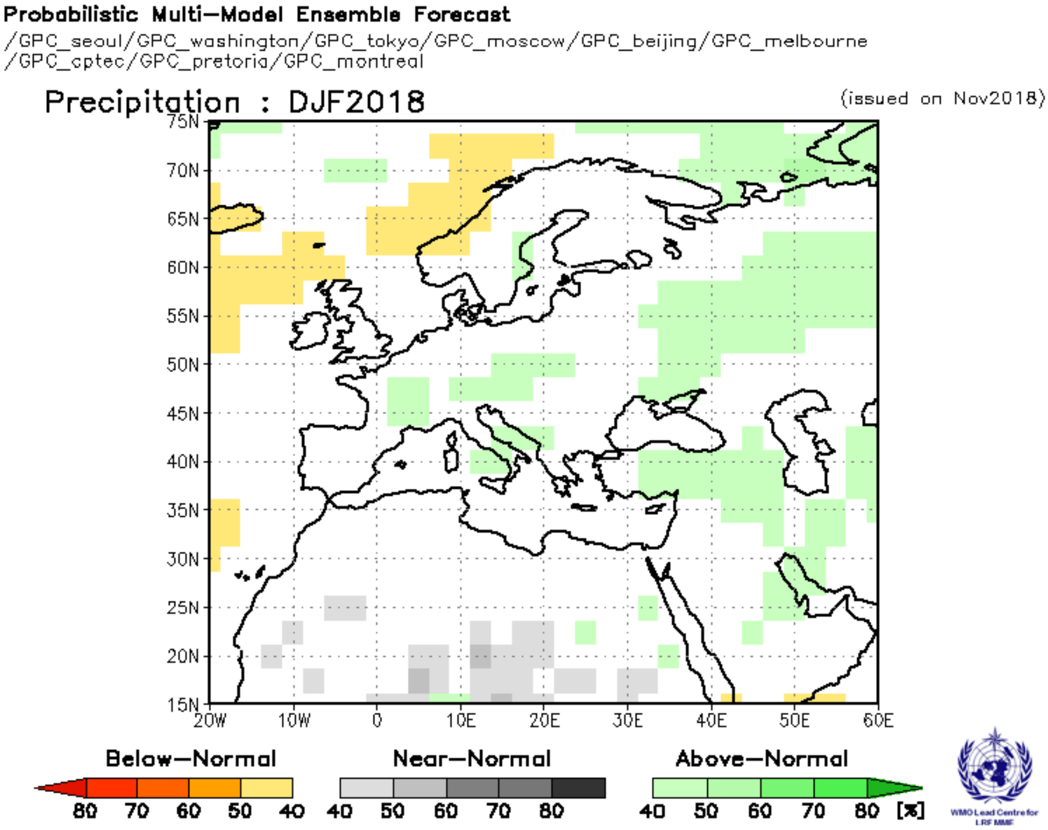


fig.II.3.2.c: Multi-model forecast of precipitation anomalies (https://www.wmolc.org)

II.5. REGIONAL TEMPERATURES and PRECIPITATION

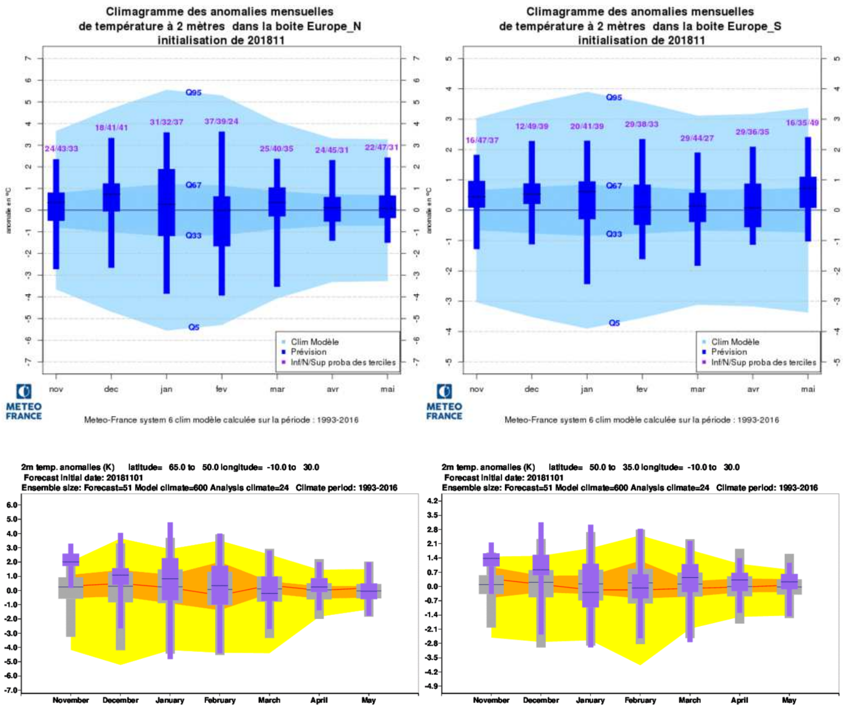


fig.II.5.1 : Climagrams for Temperature in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

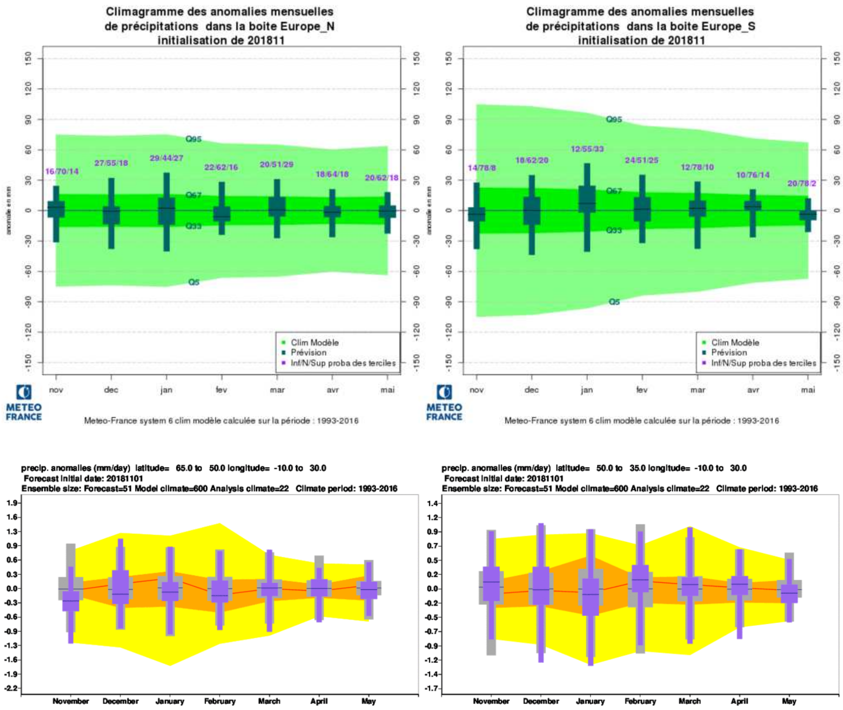


fig.II.5.2 : Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

II.6. "EXTREME" SCENARIOS

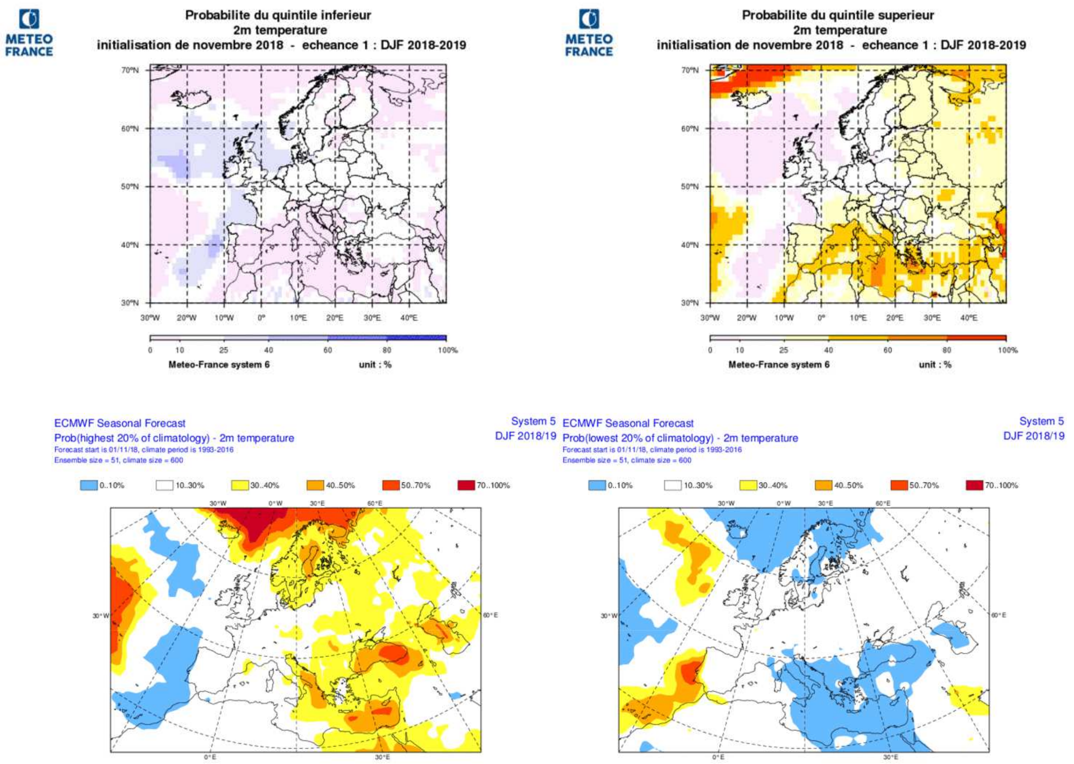


fig.II.6.1 : Top : Meteo-France T2m probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution). Bottom : ECMWF T2m probability of « extreme » below normal conditions (left - highest ~20% of the distribution) and "extreme" above normal conditions (right – lowest ~20% of the distribution).

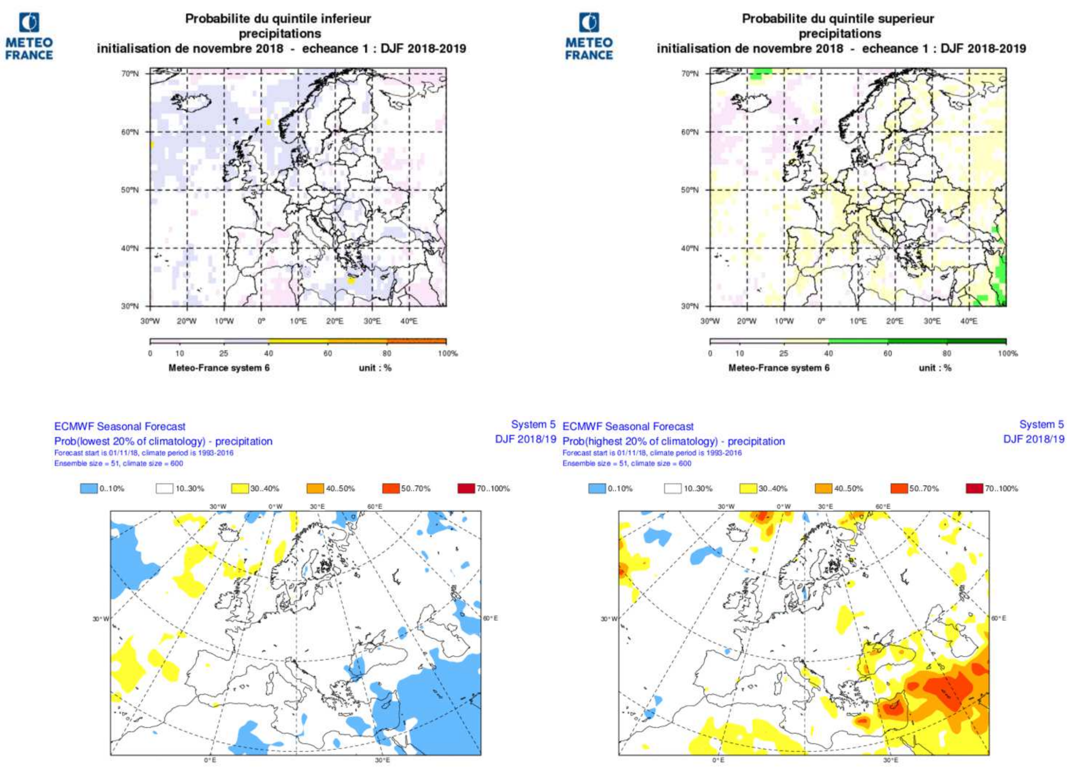


fig.II.6.2 : Top : Meteo-France rainfall probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution).
Bottom : ECMWF rainfall probability of « extreme » below normal conditions (left - lowest ~20% of the distribution) and "extreme" above normal conditions (right – highest ~20% of the distribution).

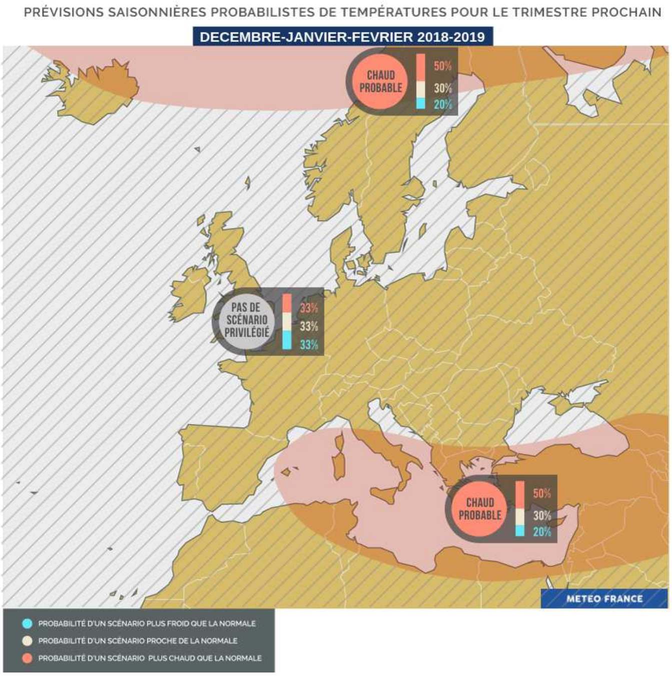
II.7. DISCUSSION AND SUMMARY

II.7.a Forecast over Europe

"Predictors" which could influence the weather in Europe for the next three months. :

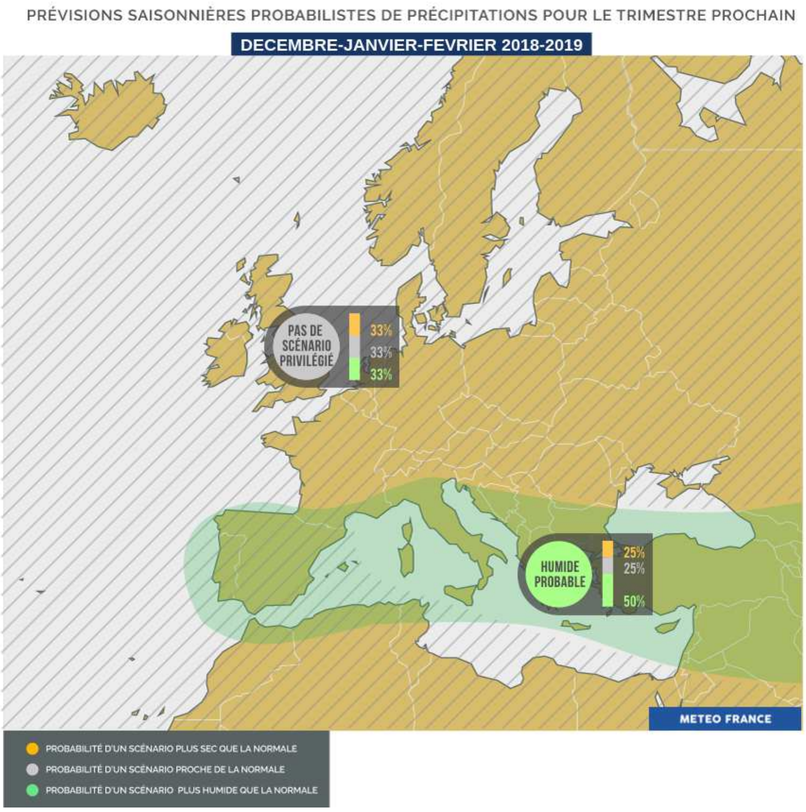
- El Niño (weak to moderate) : favors negative NAO (and also EA+ and SCAND+ see composites on http://ds.data.jma.go.jp/tcc/tcc/products/clisys/enso_statistics/)
- Late summer Atlantic SSTs : the observed tripole pattern has been showned (Cassou, 2004) to favour positive NAO during the following winter
- westerly QBO (but recently sign change) : defavor SSW and NAO- circulations
- Eurasian October snow extent : around normal as of mid-October : no influence
- **Conclusion** : contradictory forcings
  Taking into account the models outputs in terms of large scale circulation, our privileged scenario corresponds to a negative NAO circulation dominating this winter. Secondary, positive EA circulation.

Temperature : The above conclusions would lead to mild conditions for the Mediterranean, and the less probable scenario for Continental Europe is "Warmer than normal"



Precipitations : Wet conditions likely over the Mediterranean, extending toward Portugal, western France and southern England (EA+ mode).

Wetter than normal conditions expected over he Mediterranean (see NAO- impacts).



II.7.b Tropical cyclone activity

Indian Ocean : lower than normal activity forecast around Australia, in agreement with Niño conditions. Close to normal for the western basin.

South-west Pacific : forecast activity below normal. To be qualified on the equatorial areas, where the activity could be inhanced.

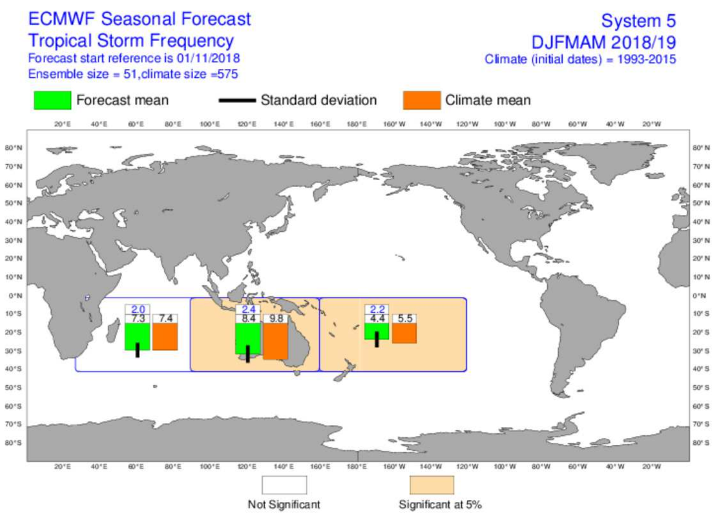


fig.II.7.1 : Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtrop/trop_euro /eurosip_tropical_storm_frequency/

III.1. Seasonal Forecasts

Presently several centers provide seasonal forecasts, especially those designated as Global Producing Centers by WMO (see http://www.wmo.int/pages/prog/wcp/wcasp/clips/producers_forecasts.html).

- BoM, CMA, CPTEC, DWD, ECMWF, JMA, KMA, Météo-France, NCEP and UK Met Office have ocean/atmosphere coupled models. The other centers have atmospheric models which are forced by a SST evolution which is prescribed for the entire period of forecast.
- LC-MME and Euro-SIP provide multi-model forecasts. Euro-Sip is presently composed using 5 models (ECMWF, MF, NCEP, UK Met Office and JMA). LC-MME uses information coming from most of the GPCs ; providing deterministic and probabilistic combinations of several coupled and forced models.

Seasonal forecasts use the ensemble technique to sample uncertainty sources inherent to these forecasts. Several Atmospheric and/or oceanic initial states are used to perform several forecasts with slightly different initial state in order to sample the uncertainty related to imperfect knowledge of the initial state of the climate system. When possible, the model uncertainty is sampled using several models or several version of the same model. The horizontal resolution of the Global models is currently between 100 and 300km. This mean that only Large Scale feature make sense in the interpretation of the issued forecasts. Generally speaking, the temperature forecasts show better skills than rainfall forecasts. Then, it exists a natural weakness of the seasonal predictability in Spring (ref to North Hemisphere).

In order to better interpret the results, it is recommended to look to verification maps and graphs which give some insight into the expected level of skill for a specific parameter, region and period. A set of scores is presented on the web-site of the Lead-Centre for Verification (see http://www.bom.gov.au/wmo/lrfvs/) ; scores are also available at the specific web site of each centers.

This bulletin collects all the information available the 21st of the current month preceding the forecasted 3-month period.

III.2. « NINO », SOI indices and Oceanic boxes

El Niño and La Niña events primarily affect tropical regions and are monitored by following the SST evolution in specific area of the equatorial Pacific.

- Niño 1+2 : 0°/10°S 80W-90W ; it is the region whe re the SST warming is developing first at the surface (especially for coastal events).

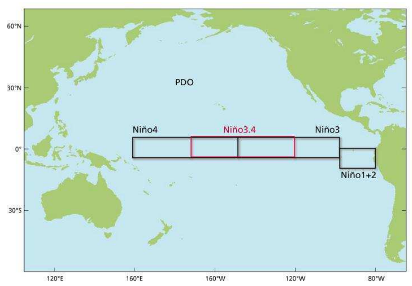
- Niño 3 : 5°S/5°N 90W-150W ; it is the region wher e the interanual variability of SST is the greatest.

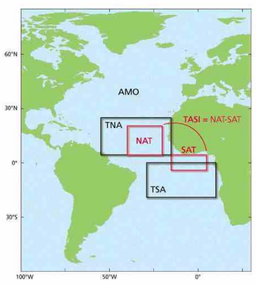
- Niño 4 : 5°S/5°N 160E- 150W ; it is the region wh ere SST evolution have the strongest relationship with evolution of convection over the equatorial Pacific.

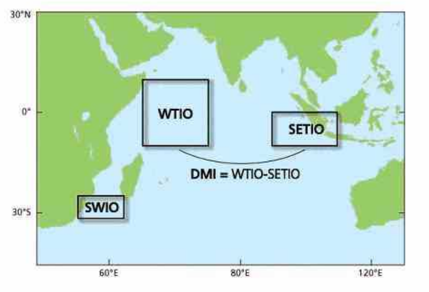
- Niño 3.4 : 5°S/5°N 120W-170W ; it is a compromise between Niño 3 and Niño 4 boxes (SST variability and Rainfall impact).

Associated to the oceanic « El Niño / La Niña » events, and taking into account the strong ocean/atmopshere coupling, the atmosphere shows also interanual variability associated to these events. It is monitored using the SOI (Southern Oscillation Index). This indice is calculated using standardized sea level pressure at Tahiti minus standardized sea level pressure at Darwin (see above figure). It represents the Walker (zonal) circulation and its modifications. Its sign is opposite to the SST anomaly meaning that when the SST is warmer (respectively colder) than normal (Niño respectively Niña event), the zonal circulation is weakened (respectively strengthened).

Oceanic boxes used in this bulletin :

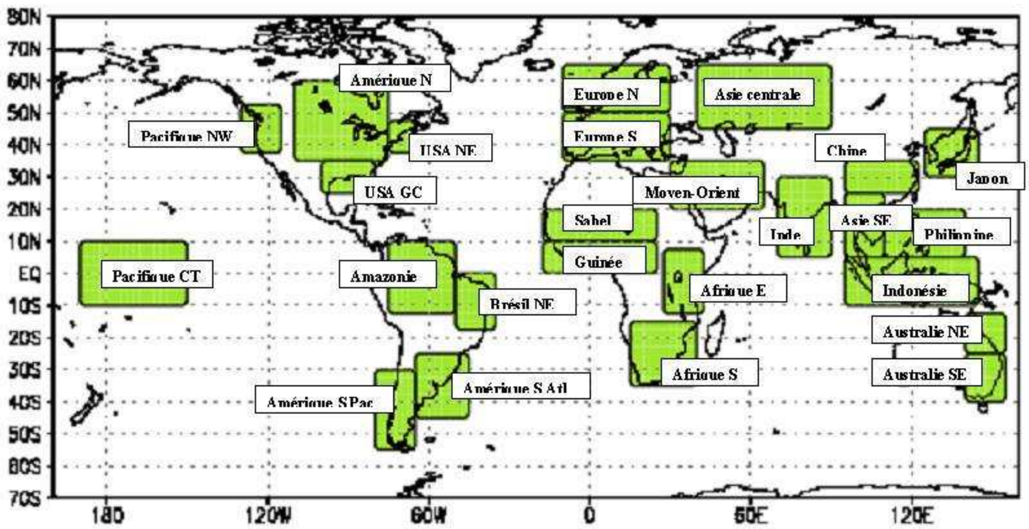






III.3. Land Boxes

Some forecasts correspond to box averaged values for some specific area over continental regions. These boxes are described in the following map and are common to ECMWF and Météo-France.



III.4. Acknowledgement

This bulletin is edited by the RCC-LRF Node of the RCC Network in Toulouse for the RA VI. It is a joint effort of the RCC-Climate Monitoring Node (led by DWD) and the RCC-LRF Node (Co-Led by Météo-France).