GLOBAL CLIMATE BULLETIN

n°232 – October 2018

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I. DESCRIPTION OF THE CLIMATE SYSTEM (August 2018)

I.1.Oceanic analysis

Over the Pacific Ocean :

- Along the equator, the pause of surface warming observed in July continues in August on almost all the equator railway. The trend is even sharply downward in the box Niño 3. The extreme east of the rail has warmed with an anomaly close to 0℃. Niño index 3.4: about + 0.2 °C.
  In subsurface, a strong Kelvin wave has formed on the center of the basin and will spread eastward, helping to warm the eastern Pacific in the coming months.
- In the northern hemisphere, persistance of warm anomaly in the Eastern tropical area. At mi-latitudes a fairly complex anomaly structure not projecting into PDO pattern, index slightly negative (-0.33) (see https://www.ncdc.noaa.gov/teleconnections/pdo/)
- In the southern hemisphere, still cold anomalies in Eastern Tropic and weak warm anomalies in the South-West.

Over the Maritime Continent :

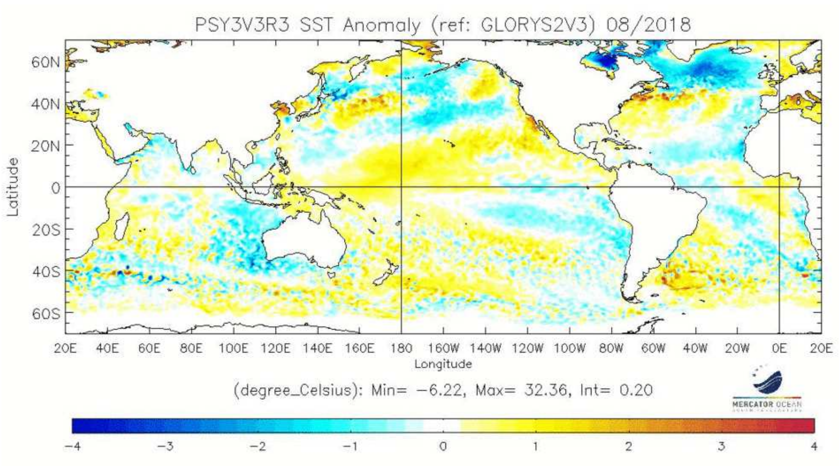
- Warming trend with neutral to positive anomalies.

Over the Indian Ocean :

- in the Northern hemisphere, neutral to slightly cold conditions.
- In the southern hemisphere, cold anomalies on the East and weak warm anomalies on the West.
- DMI slightly positive (source : MERCATOR-Ocean)

Over the Atlantic:

- In the North Atlantic, persistence of a marked horseshoe structure with a very strong cold anomaly from Canada to Island and Labrador surrounded by two warm anomaly. In the vicinity of Europe the ocean remains warmer than normal despite a strong cooling compared to July. In the tropics, attenuation of cold anomalies. TNA index is slightly below zero.
- along the equator, weak warm conditions in the Gulf of Guinea, weak cold conditions in the Western side. TASI is still negative (around -0.6 ℃)
- in the southern basin, no clear structures.



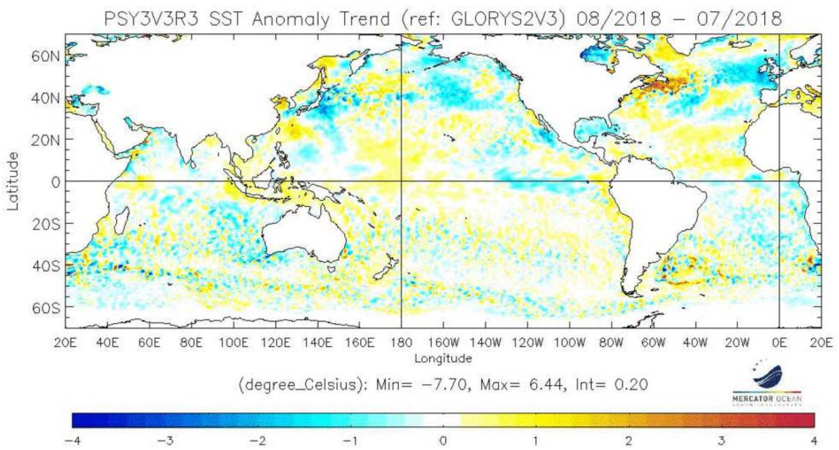


fig.I.1.1: top : SST Anomalies (℃) . Bottom : SST tendency (current – previous month), (reference Glorys 1992-2013).

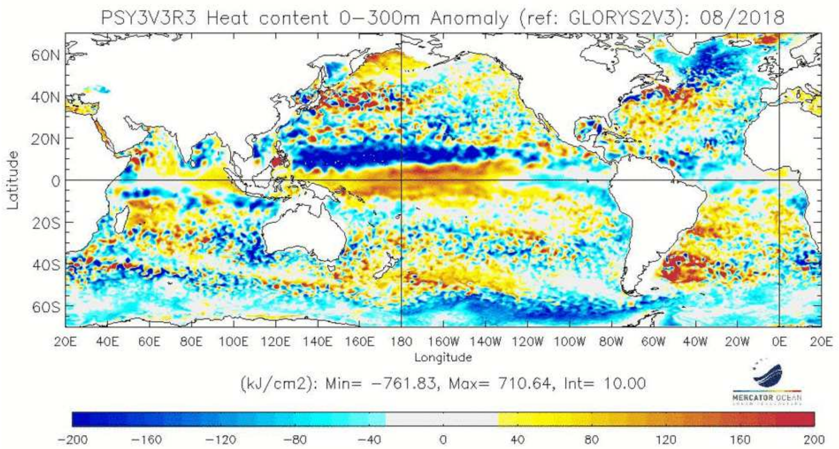


fig.I.1.2: map of Heat Content Anomalies (first 300m, kJ/cm2, reference Glorys 1992-2013)

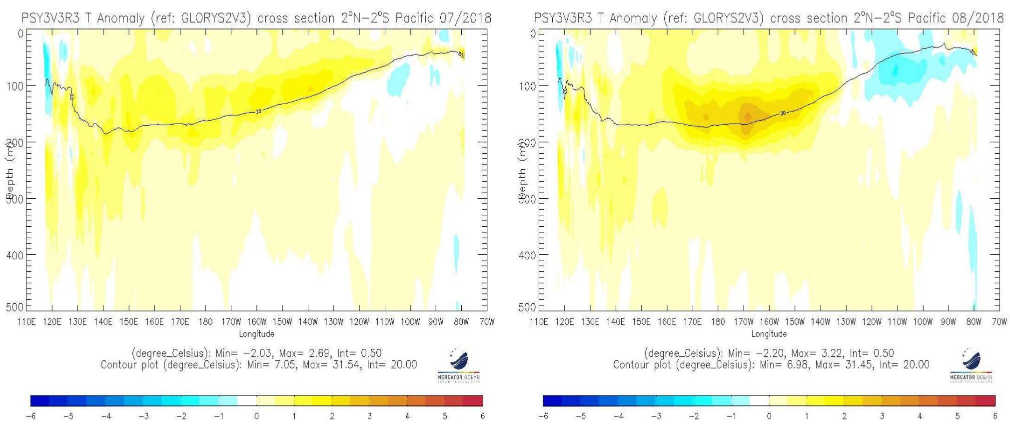


fig.I.1.4: Oceanic temperature anomaly in the first 500 meters in the Equatorial Pacific (previous and current month)

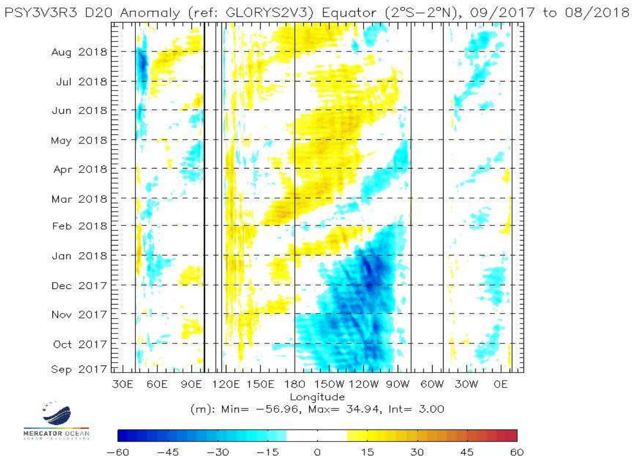


fig.I.1.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20℃ isotherm) along the equator for all oceanic basins over a 6 month period

Sea surface temperature near Europe :

European Arctic Sea: The cold anomaly close to northern Scandinavia from July has disappeared now, the whole European Arctic Sea is warmer than normal, as before particularly north of Svalbard and on the White Sea. Frozen areas have retreated far to the north.

North Sea: still warmer than normal, but less than before.

Baltic Sea: not much change of mean temperature, anomalies still positive, slightly weaker than in July.

Cold blob south of Greenland/Iceland: cold blob has extended to the east, just close to the west coast of Ireland. Elsewhere not much change of intensity, even in the subsurface.

Subtropical East Atlantic: as before colder than normal near Portugal and Gibraltar, but warmer than normal near the Biscay. While the cold anomaly has not changed much, the warm Biscay anomaly became weaker. The subsurface remained cooler than normal, no significant change.

Mediterranean: still warmer than normal. High anomalies particularly in western and central parts of the basin in the Ligurian and Adriatic Sea. In the easternmost part around Cyprus, anomalies became weaker and were close to normal. Nevertheless SST was above 26℃ over much o f the whole basin. The subsurface remained warmer than normal, too.

Black Sea: mainly warmer than normal, only in the northeast partly cooler.

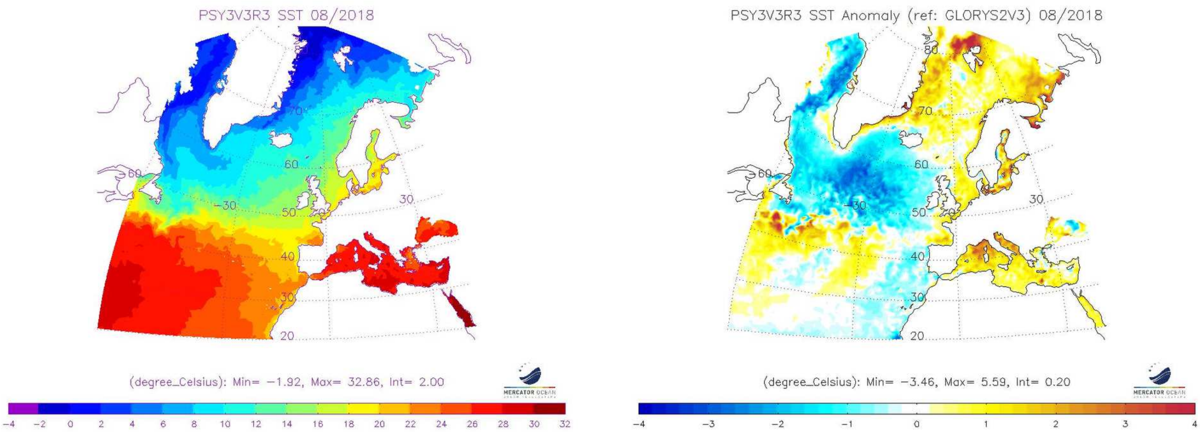


fig.I.1.6 : Mean sea surface temperature in the RA VI Region (Europe) and anomaly (reference Glorys 1992-2013).

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) :

- upward motion anomaly on Western Pacific and downward motion anomalies over Indian Ocean and over the Caribbean. This structure is linked to El Niño modulated by the MJO over the western Pacific.

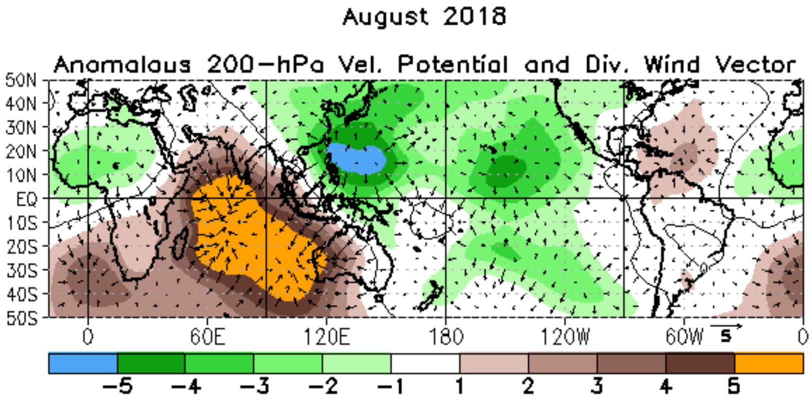


fig.I.2.1.a: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly). http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

SOI :

- SOI remains neutral at -0.3 (NOAA Standardized SOI: https://www.ncdc.noaa.gov/teleconnections/enso/indicators/soi/).
  MJO (fig. I.2.1.b)

- Active MJO during the first half of August over the Western Pacific. (green curve).

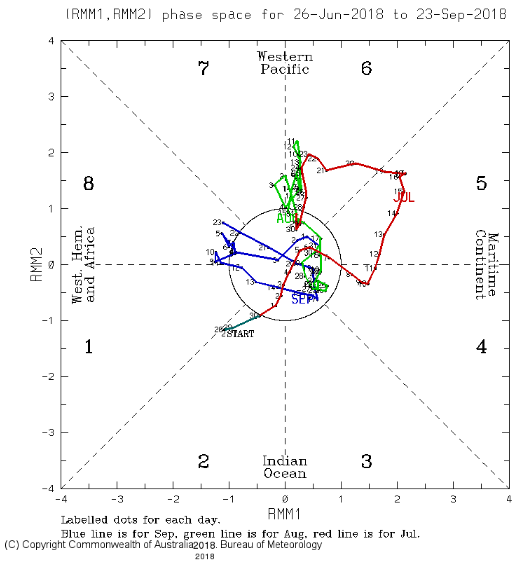


fig.I.2.1.b: indices MJO http://www.bom.gov.au/climate/mjo/

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

- no significant anomalies in the inter-tropical band.

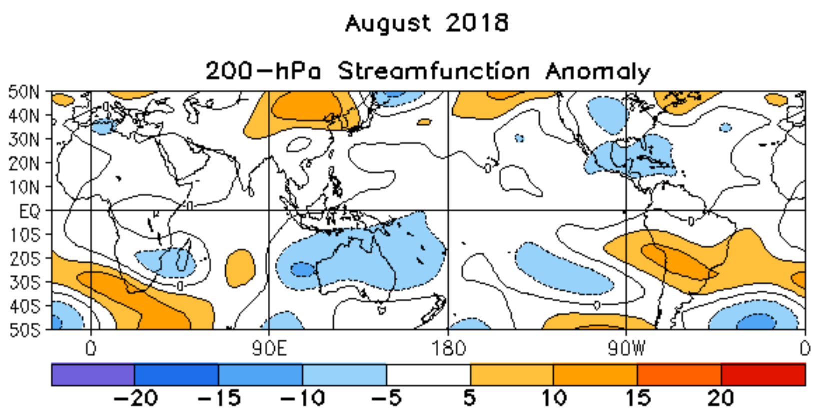


fig.I.2.2: Stream Function Anomalies at 200 hPa.
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

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

- Positive anomaly of Newfoundland to a large part of Europe.
- Negative anomaly in northern Canada to Iceland**.**

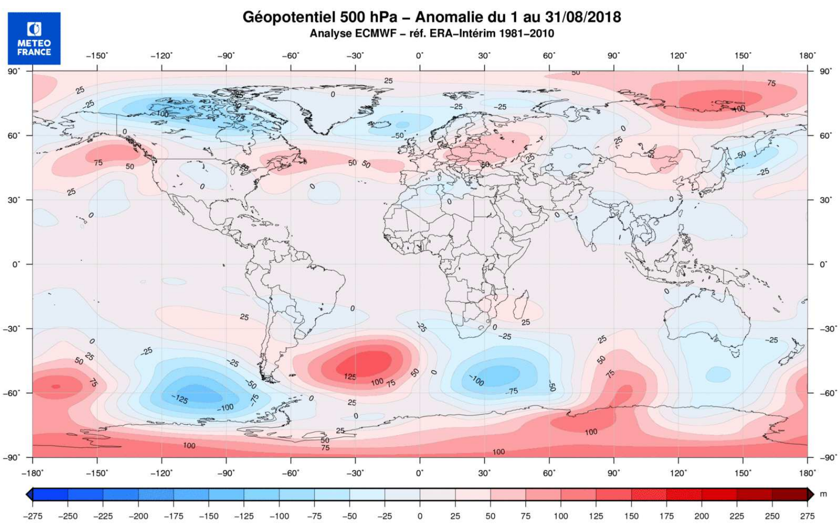


fig.I.2.3: Anomalies of Geopotential height at 500hPa (Meteo-France)

MONTH	NAO	EA	WP	EP-NP	PNA	TNH	EATL/WRUS	SCAND	POLEUR
AUG 18	2.4	1.8	-1.4	-0.8	1.2	---	-0.5	-1.1	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
MAY18	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
FEB 18	1.3	-1.4	0.4	0.2	-1.7	2.2	-1.4	0.4	-2.2
JAN 18	1.2	0.6	0.4	0.7	-0.1	-0.3	-1.6	0.4	-1.5
DEC 17	0.7	-0.5	0.3	---	0.6	1.0	-1.6	-0.5	-2.0
NOV 17	-0.1	0.1	0.7	0.4	-2.0	---	-1.2	-0.1	-2.2
OCT 17	0.7	0.6	0.7	-0.6	-0.3	---	0.0	0.3	-1.2

Evolution of the main atmospheric indices for the Northern Hemisphere for the last 11 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

Continuation of a strong zonal flow over the eastern North Atlantic with positive phases of NAO and EA. In contrast to July, blocking over Europe has disappeared on average and the zonal flow extended to Europe with cyclonic conditions over Scandinavia and anticyclonic conditions over the middle latitudes. For that reason SCAND pattern switched to a negative phase and EATL/WRUS became weaker. In southern Europe it was mainly cyclonic over Italy and the eastern Mediterranean. Intense cyclonic development was fostered by warm sea surface.

Météo France weather type classification shows a mix of different weather types that month (Atlantic ridge, Atlantic trough, Blocking) with one third of days each, so the circulation patterns were not uniform during the month. Scandinavian blocking was especially active at the beginning of August (in continuation of July), but later in the month a more zonal regime established, modulated by occasional ridges and troughs passing over the North Atlantic and Europe, but without long-persisting structures. The Hess-Brezowsky classification shows anticyclonic patterns for Central Europe in majority (17 days, high pressure bridge over Central Europe or west anticyclonic), but also 11 days with cyclonic types (west or southwest cyclonic or Low over Central Europe) and 3 days with trough over Western Europe.

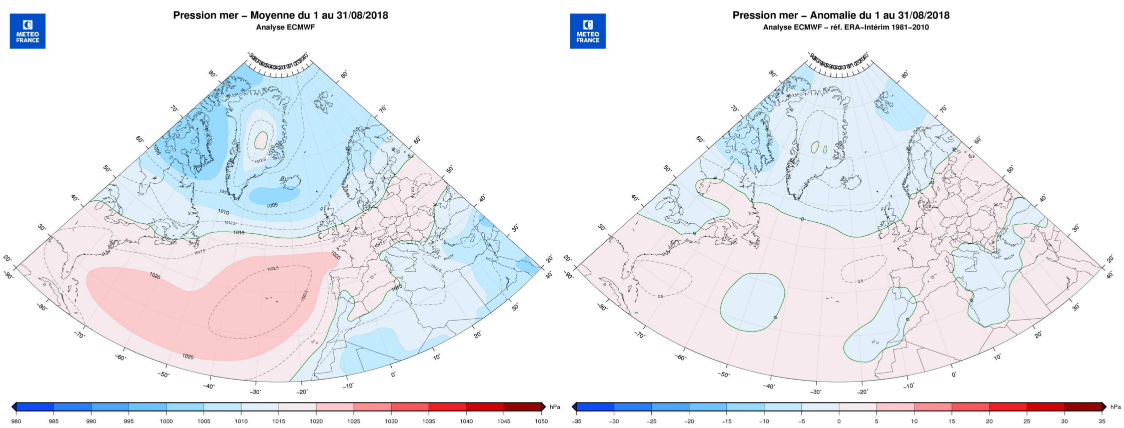


fig.I.2.4: Mean sea level pressure in the RA VI Region (Europe) (top) and 1981-2010 anomalies (bottom).

Circulation indices: NAO and AO

NAO was in a positive phase during the whole month, though with large fluctuations revealing the fast-changing patterns during the month, but with zonal dominance.

AO, too, was in a positive phase almost the whole month, except at the beginning. This is reflected by the long belt of cyclonic geopotential anomalies over subpolar regions (Canada – Iceland – Northern European continent, fig. I.2.3) and the positive high pressure anomalies in the subtropics and middle latitudes, which means that there was an enhanced zonal component over much of the northern hemisphere. (Note that the southern hemisphere has just a reverse structure, an enhanced late winter meridional pattern.)

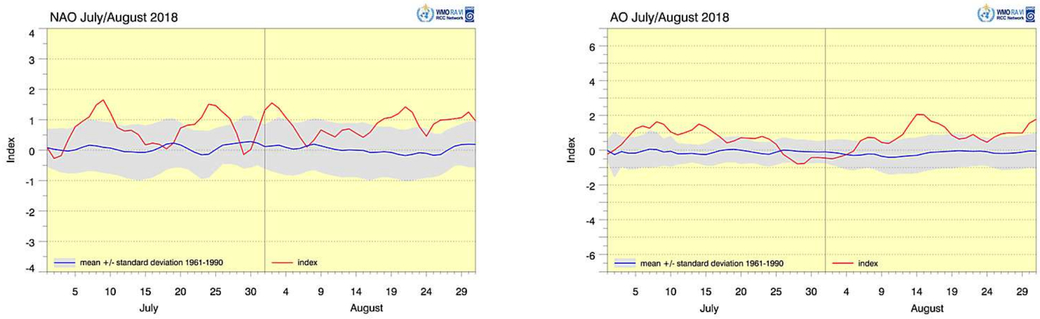


fig.I.2.5: North Atlantic Oscillation (NAO, left) and Arctic Oscillation (AO, right) indices with 1961-1990 mean standard deviation (shading). http://www.dwd.de/rcc-cm , data from NOAA CPC: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml

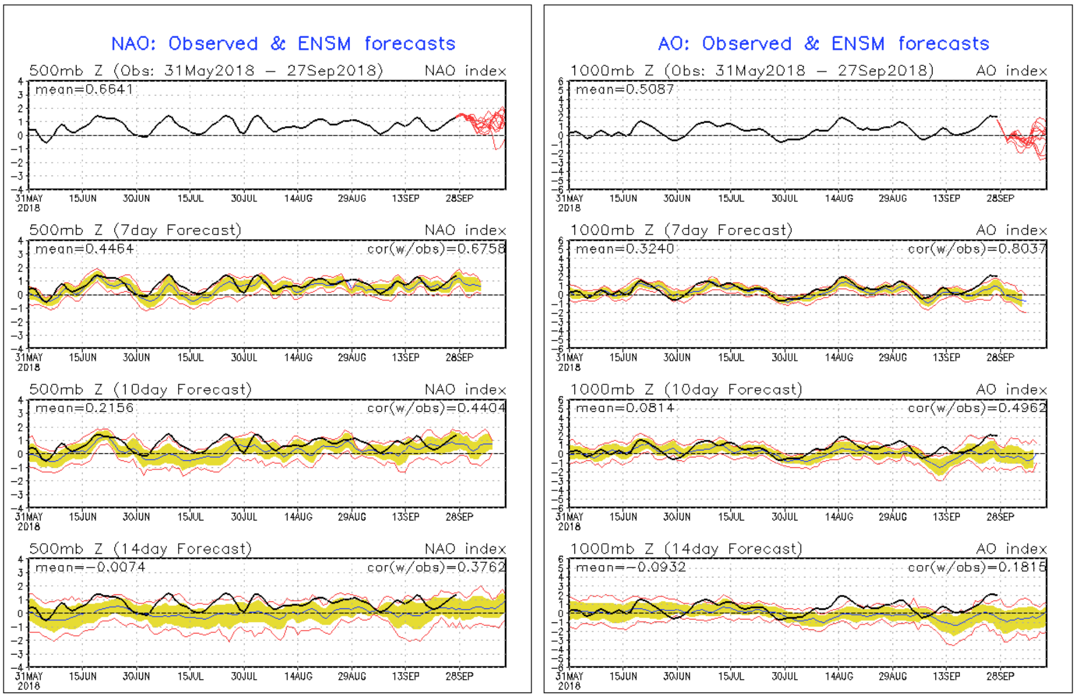


fig. I.2.5a: North Atlantic Oscillation (NAO, left) and Arctic Oscillation (AO, right) indices for the last 4 months and forecasts for the following weeks. Source: NOAA CPC, http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml

I.2.b Precipitation

- In connection with the MJO and upward motion anomaly, more rainy than normal over western Pacific.
- dry over Central America, the Caribbean area, Indian Ocean and Maritime Continent
- Over Europe, dry in most countries.

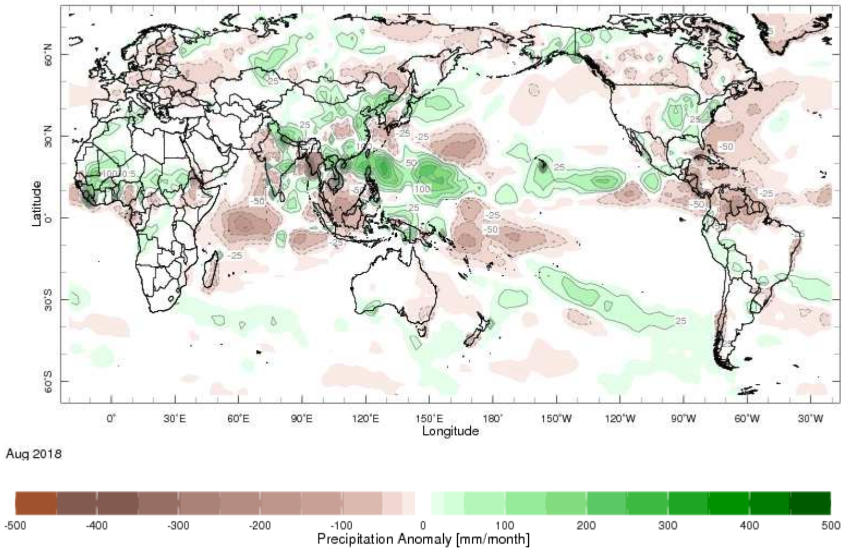


fig.I.2.6: Rainfall Anomalies (mm) (departure to the 1979-2000 normal).
Green corresponds to above normal rainfall while brown indicates below normal rainfall.
http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/Anomaly.html

Precipitation anomalies in Europe:

Dry conditions continued over Western and Central Europe, also in parts of Northern Europe, and emerged also over Eastern Europe. Locally severe or extreme drought conditions occurred particularly in parts of Iberia, France, Germany, western Poland, but also in Eastern Europe west and north of the Black Sea. On the other hand, other parts of northern Europe, especially the western Norwegian coast were rainy that month and also some of the Mediterranean region. This reflects mainly the mean geopotential and SLP distribution (fig. I.2.3 and I.2.4), especially the prevailing high pressure conditions over the middle latitudes and the zonal flow over Scandinavia.

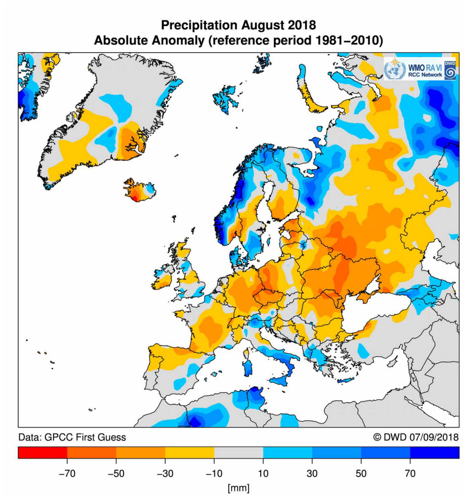


fig.I.2.7.a : Absolute anomaly (1951-2000 reference) of precipitation in the RA VI Region (Europe), data from GPCC (Global Precipitation Climatology Centre), http://www.dwd.de/rcc-cm.

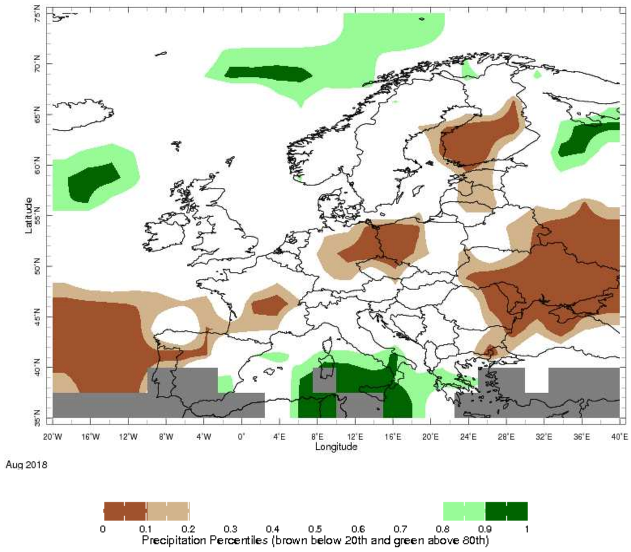


fig.I.2.7.b : Percentiles of precipitation, 1981-2010 reference. Data from NOAA Climate Prediction Center, http://iridl.ldeo.columbia.edu/maproom/Global/Precipitation/Percentiles.html

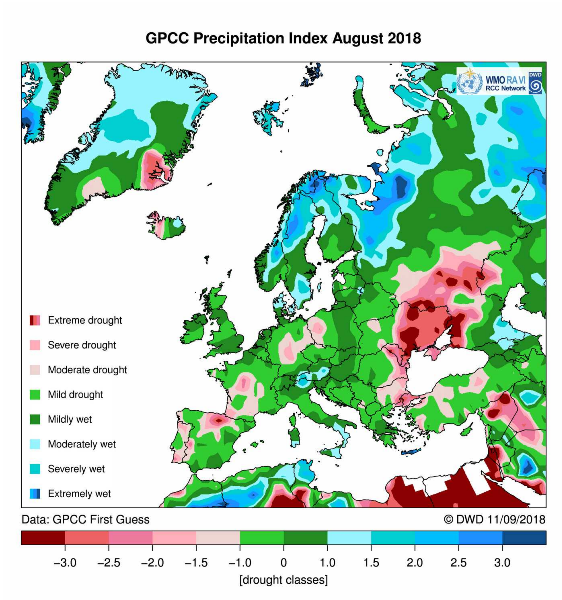


fig. I.2.8: GPCC Precipitation Index, http://www.dwd.de/rcc-cm .

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	- 6.1 mm	+ 0.247
Southern Europe	- 5.0 mm	- 0.324

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 was well over normal on a large part of the continent. Some exceptions : British Islands and Norway around normal.
- strong positive anomaly over extreme North Siberia
- colder than normal over Central Siberia and from Canada's Great North to Greenland.

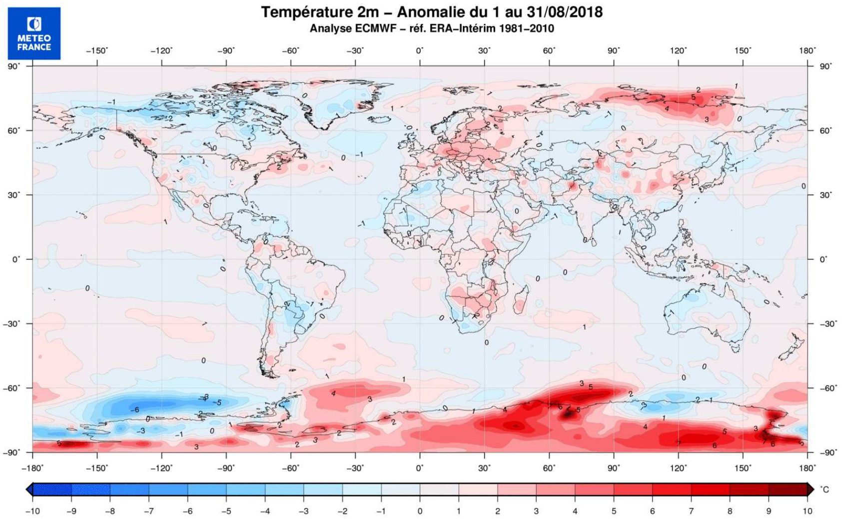


fig.I.2.9: Temperature Anomalies (℃) (Meteo-France)

Temperature anomalies in Europe:

Warmer than normal over almost entire Europe except the northwest (Ireland, Scotland, western Scandinavia) and places in the south. It was the warmest August on record averaged over Europe according to Copernicus (since 1979) and NOAA (since 1910). Highest anomalies over eastern Central Europe. The warming is due to anticyclonic subsidence (especially over Central Europe), solar radiation anomalies (especially in Eastern Europe), but also due to advection from the south (during meridional episodes) reaching far north into Finland / northwestern Russia.

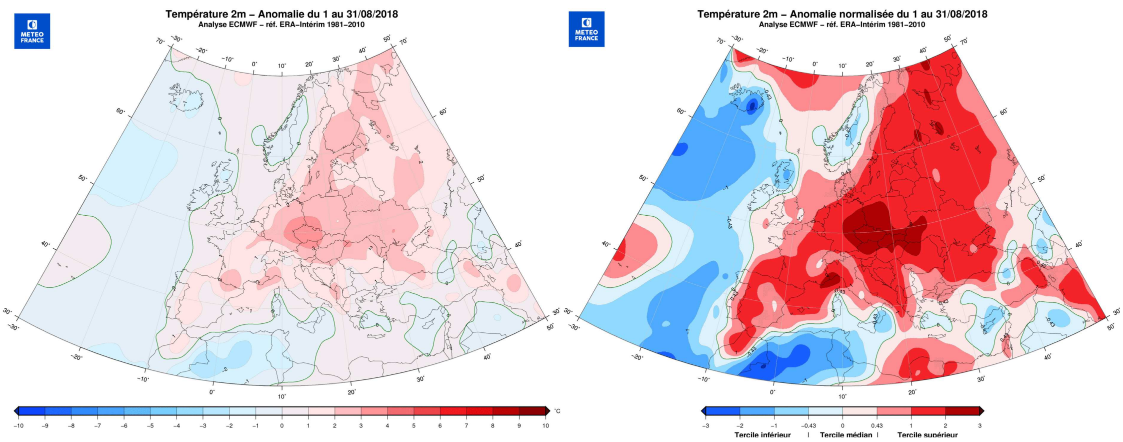


fig.I.2.10: Left graph: Absolute anomaly of temperature in the RA VI Region (Europe). Right graph: Standardized temperature anomalies

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	+ 1.8 ℃
Southern Europe	+ 2.1 ℃

I.2.d Sea ice

- In the Arctic : deficit remains important even if has diminished in August.
- In Antarctica : slightly in deficit in August.

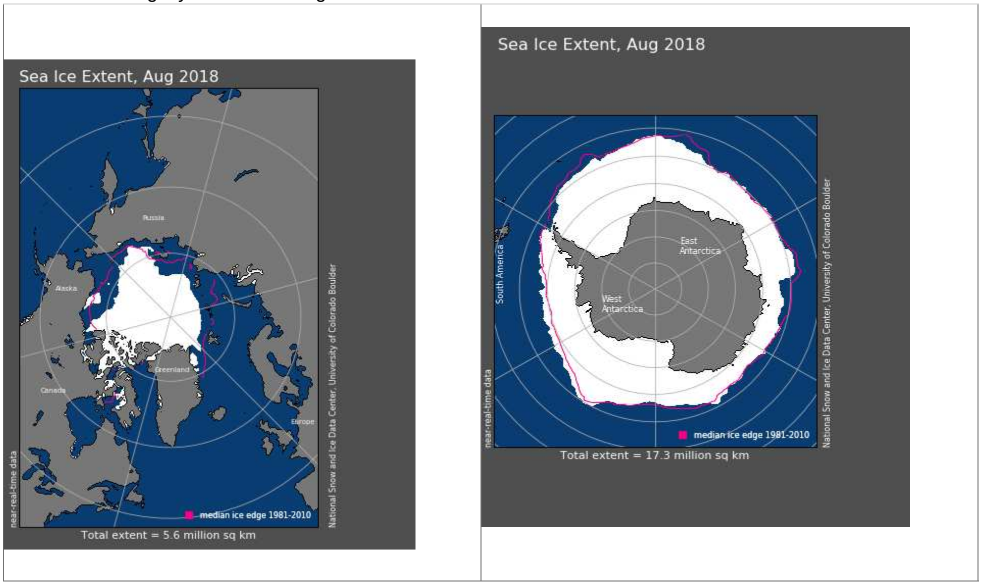


fig.I.2.11: Sea-Ice extension in Arctic (left), and in Antarctic (right). The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

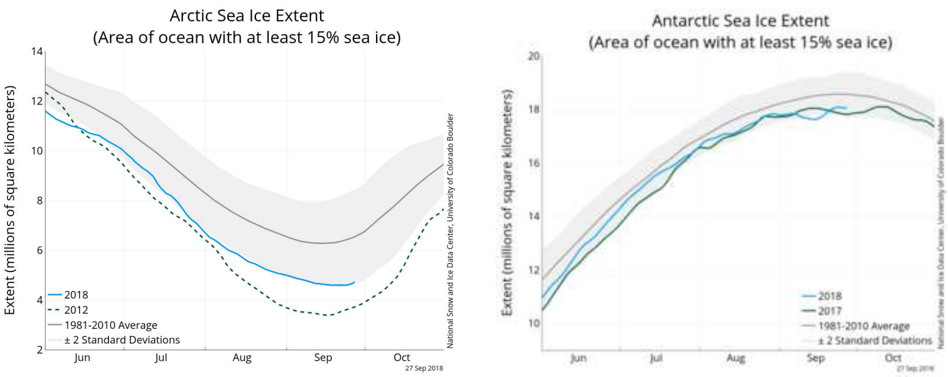
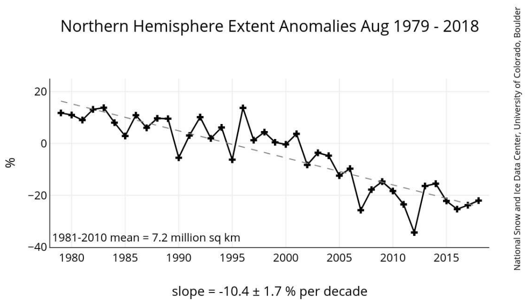


fig. I.2.12 : Sea-Ice extension evolution from NSIDC. https://nsidc.org/data/seaice_index/images/daily_images /N_stddev_timeseries.png



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

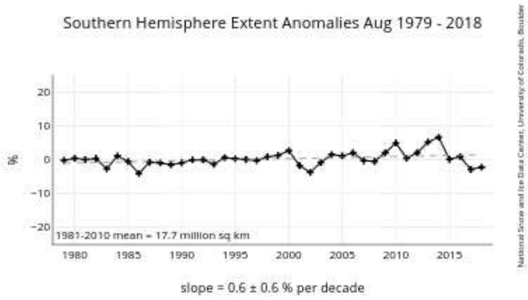


fig 1.2.13 : Monthly Sea Ice Extent Anomaly Graph in Antarctic for the month of analysis (http://nsidc.org/data/seaice_index/)

II. SEASONAL FORECAST FROM DYNAMICAL MODELS

In Central Pacific, the current SST warming along the Equator is expected to continue during the fall and then capped from December. A weak to moderate El Niño event should occur during autumn.

NB : In this bulletin, the new MF-S6 model is used for illustrations. But please note that the EUROSIP system, shown in this bulletin, still uses the 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 good agreement for the SST of OND forecast.

- Pacific Ocean: Warm anomaly expected along the Equator, with a maximum between +1 and +2℃ in the cen ter of the basin. The warm anomaly continues in the Eastern Tropic and the conditions are neutral on the western part. In the North, the PDO type structure is not well organized. It should be noted that MF6 doesn't warm the extreme east of the equatorial rail, unlike the other models (see boxes Nino1-2 http://seasonal.meteo.fr/fr/content/MF6-previ-plumes)
- Indian Ocean: A slight East-West contrast is maintained, leading to a weakly positive DMI index for the quarter. (see BOM summary here : http://www.bom.gov.au/climate/model-summary/#tabs=Indian-Ocean).
- Atlantic Ocean:
  - northern Atlantic : maintaining the tripolar structure -cold-hot-cold - described in the analysis. Near the European Coast return to neutrality. In the Tropics negative temperature anomalies form the western coast of Africa to the Caribbean are rather unfavourable to cyclonic activity.
  - equatorial Atlantic : Weak warm anomaly in the southern tropical zone. No signal over the Gulf of Guinea
  - South Atlantic : Warm anomalies rather marked in the western part
- Mediterranean Sea : in continuity with previous forecasts, warmer than normal especially to the East.

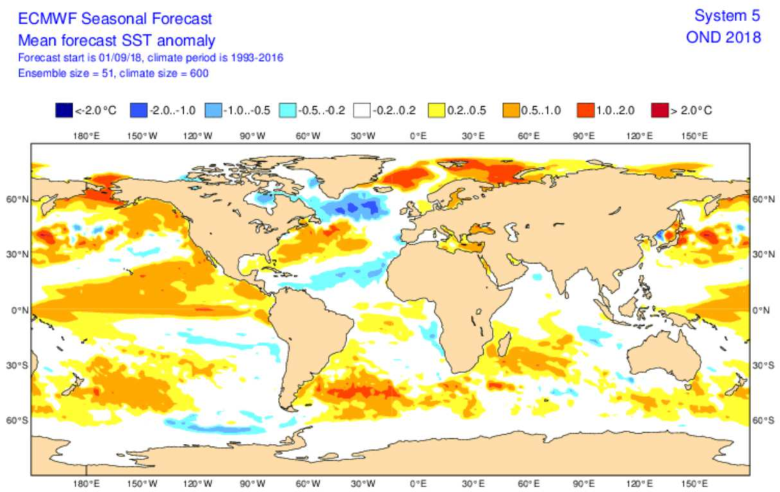


fig.II.1.1: SST anomaly forecast from ECMWF
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

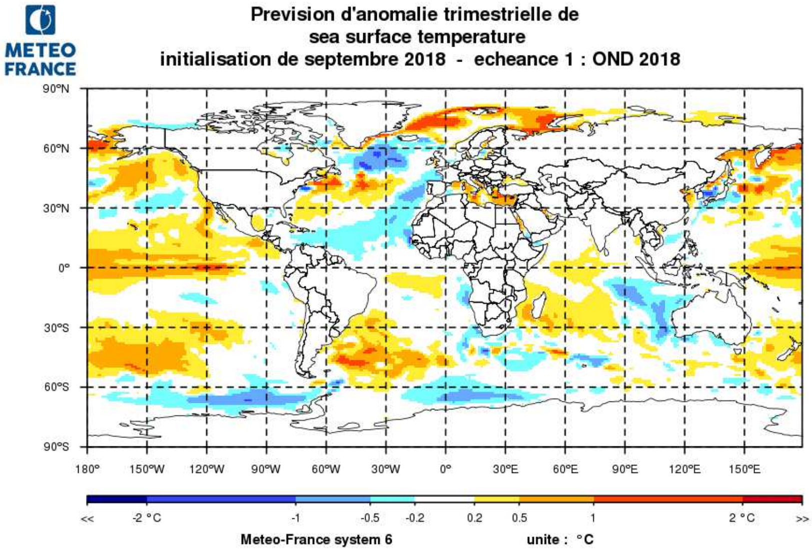


fig.II.1.2: SST Anomaly forecast from Meteo-France (recalibrated with respect of observation).
http://seasonal.meteo.fr

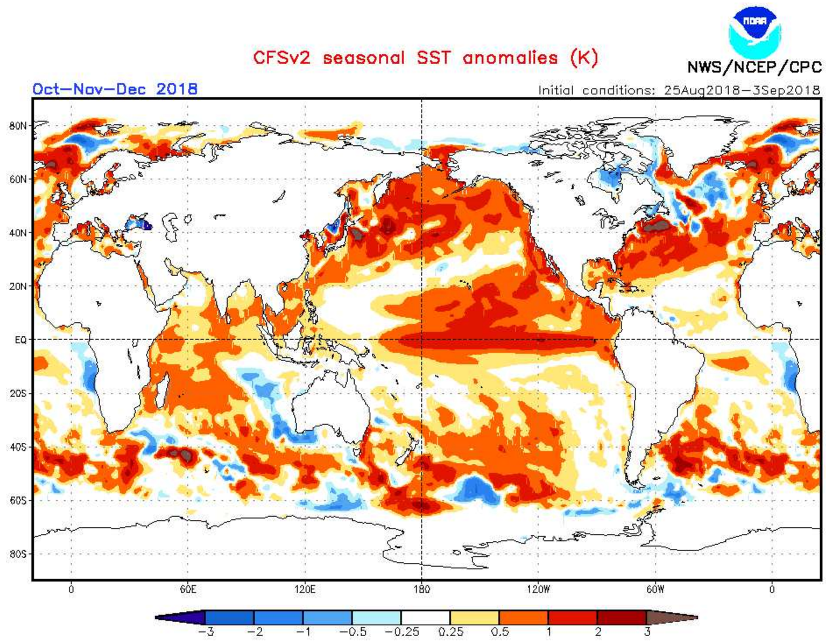


fig.II.1.3: SST Anomaly forecast from NCEP.
http://www.cpc.ncep.noaa.gov/products/people/wwang/cfsv2fcst/imagesInd1/glbSSTSeaInd1.gif

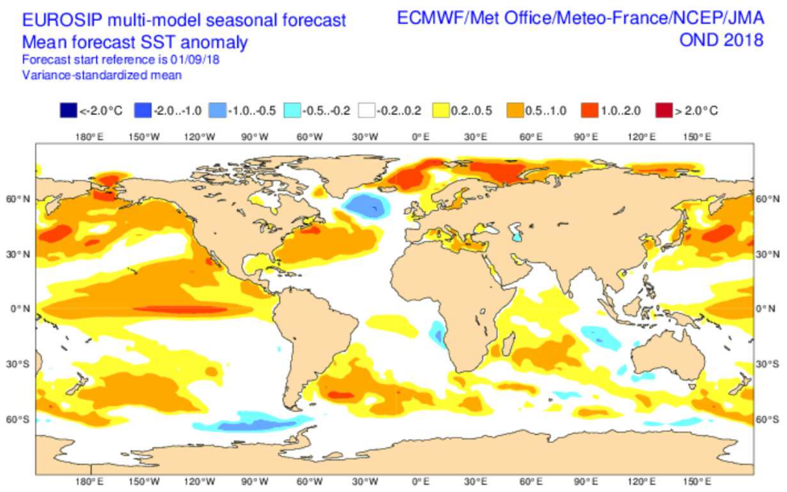
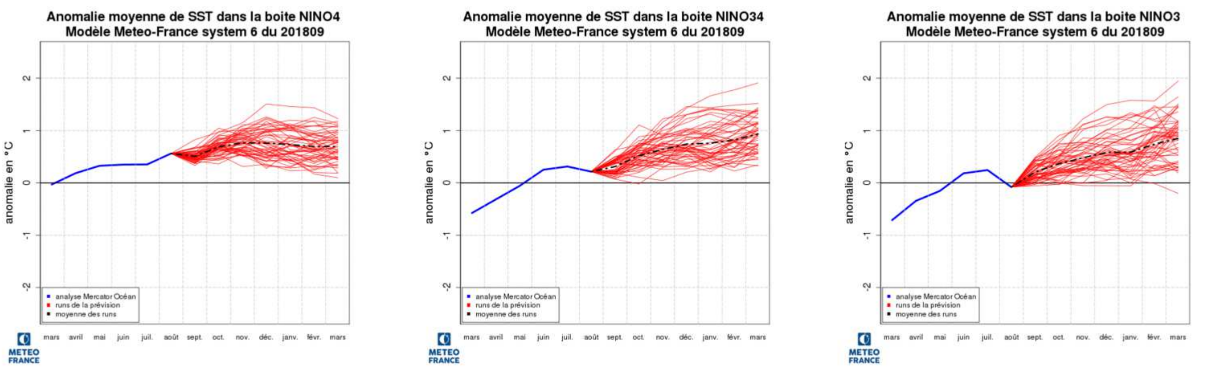
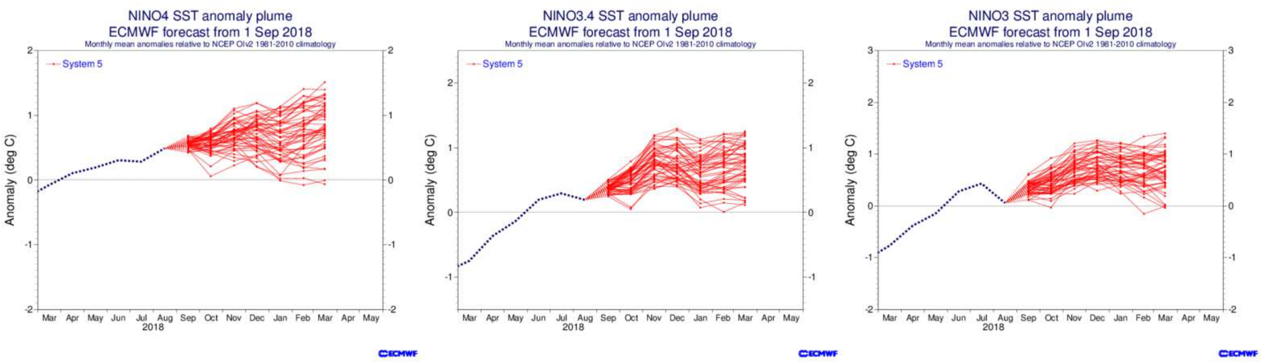


fig.II.1.4: SST Forecasted anomaly from Euro-SIP

II.1.b ENSO forecast :

Forecast Phase**: positive phase during OND**. The warming would continue to a maximum of around +0.8°C at the end of the year. The event probability is around 70% in the IRI synthesis. The strongest anomalies should be located in the center of basin. In a first time SST near South American Coast should stay around normal then increase at the end of the year.





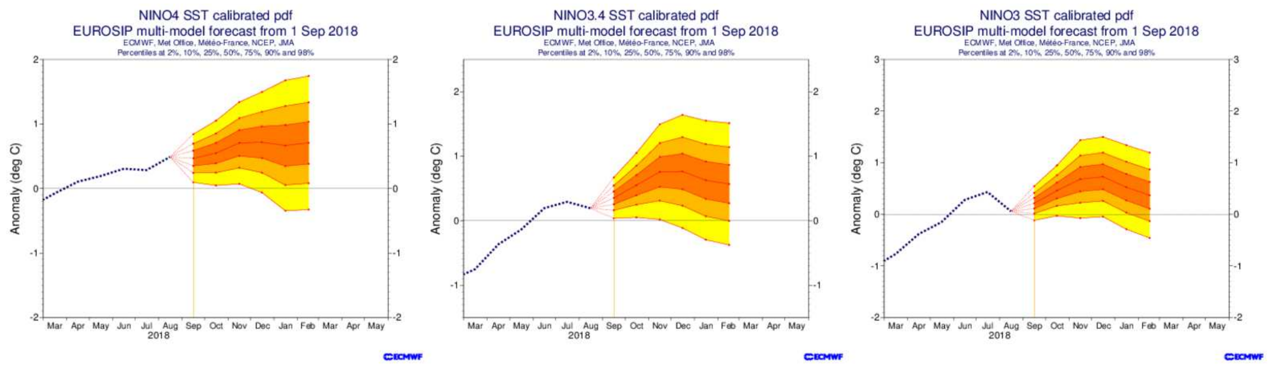


fig.II.1.5: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members -
and EUROSIP (bottom) – recalibrated distributions -
(http://seasonal.meteo.fr , http://www.ecmwf.int/)

I.1.c Atlantic ocean forecasts

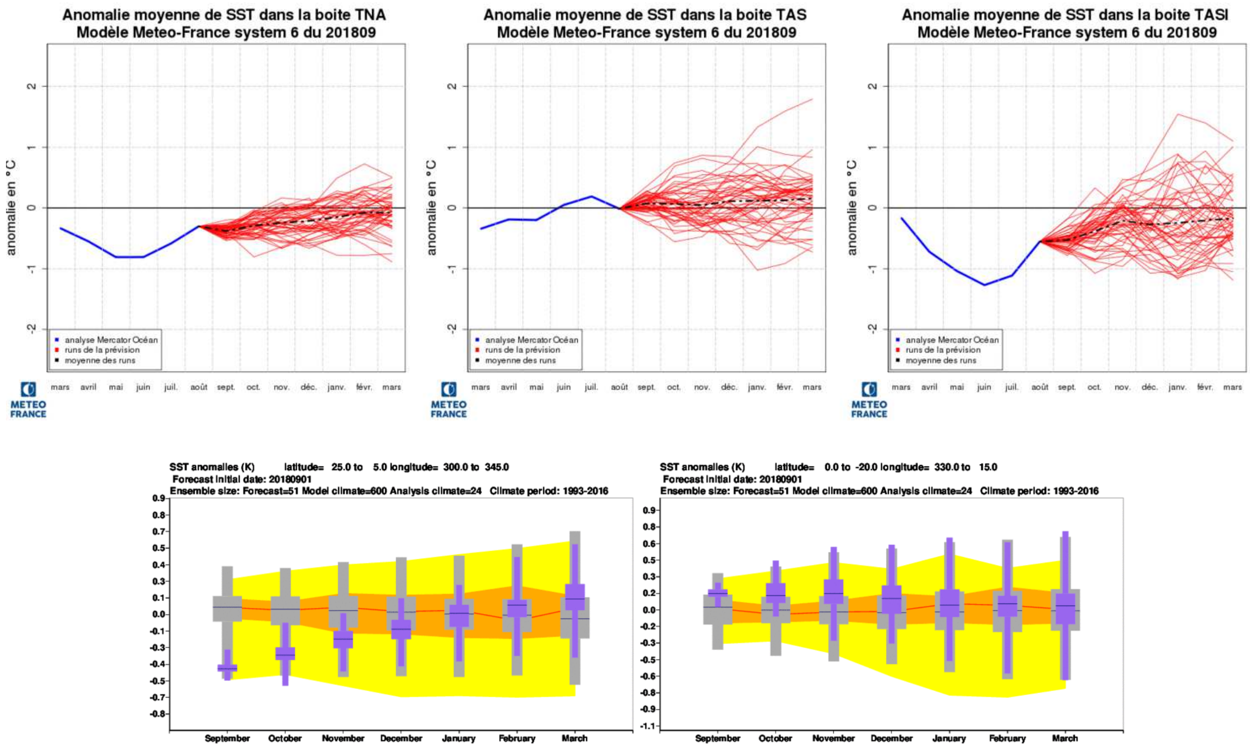


fig.II.1.6: SSTs anomaly forecasts in the Atlantic Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

I.1.d Indian ocean forecasts

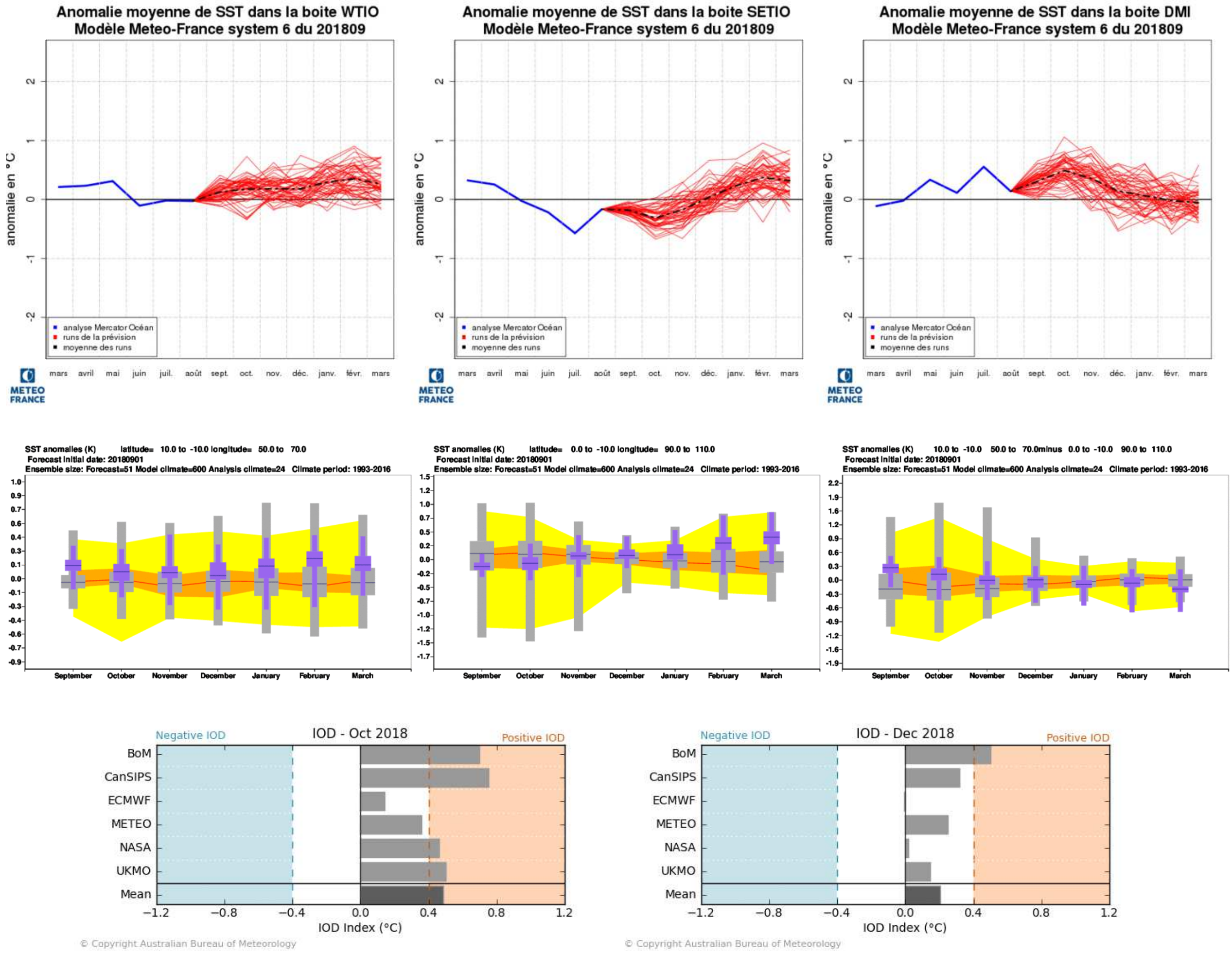


fig.II.1.7: SST anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

II.2. GENERAL CIRCULATION FORECAST

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

The atmospheric reaction predicted by the models is classic, fairly clear but moderate.

- Velocity potential : two waves structure. Downward motion anomaly from Eastern Indian Ocean to South-eastern Asia and Australia. It is stronger in MF6. Upward motion anomaly over Pacific Ocean. Relative upward motion anomaly over Africa and relative downward motion anomaly over Caribbean, stronger in ECMWF5.
- Stream function : consistent with starting El Nino, anomalies structures are close for both models. The intensity of the kernels is fairly weak, only ECMWF5 has little stronger kernels over Pacific Ocean, Central America, Africa and India. No significant teleconnection with mi-latitudes.

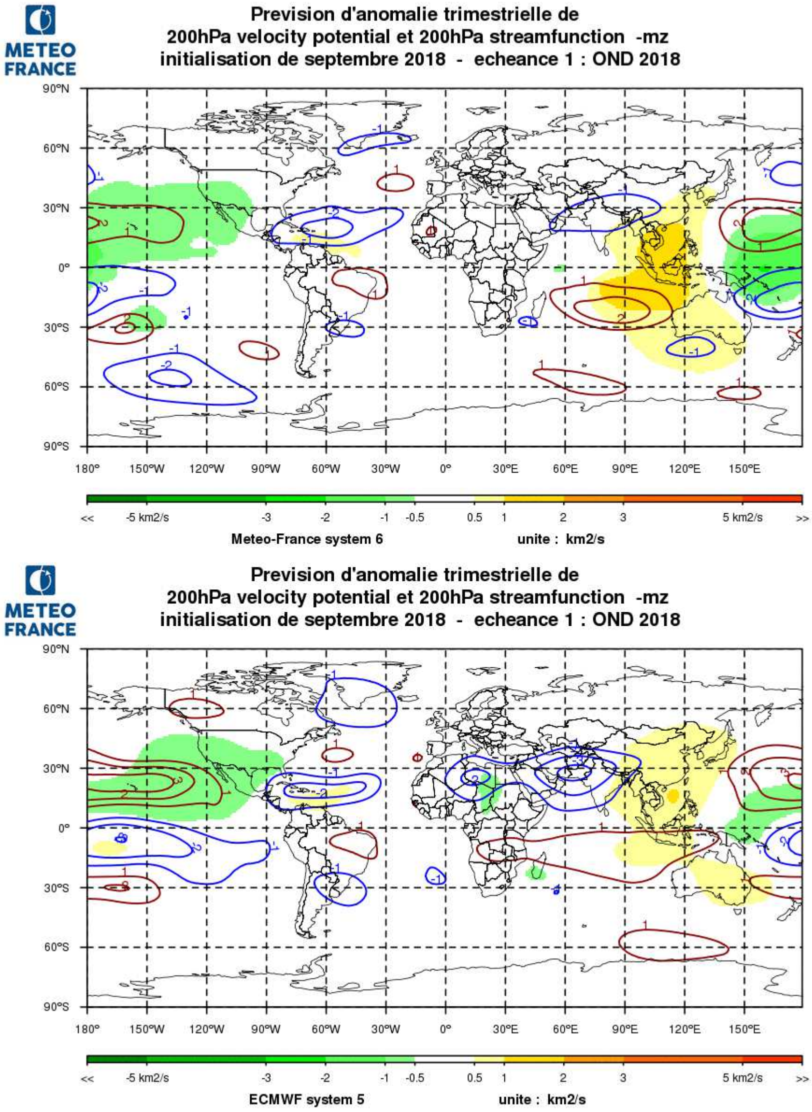


fig.II.2.a: Velocity Potential anomaly field χ (shaded area – green negative anomaly and yellow positive anomaly), associated with Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa by Météo-France (top) and ECMWF (bottom).
http://seasonal.meteo.fr

II.2.b Geopotential height anomalies

Overall agreed to propose a fairly strong positive geopotential anomaly from Scandinavia to nothern Russia and to Canada.

In contrast, the models suggest a weak relative anomaly over the north-east Atlantic and a small positive anomaly south of North Atlantic.

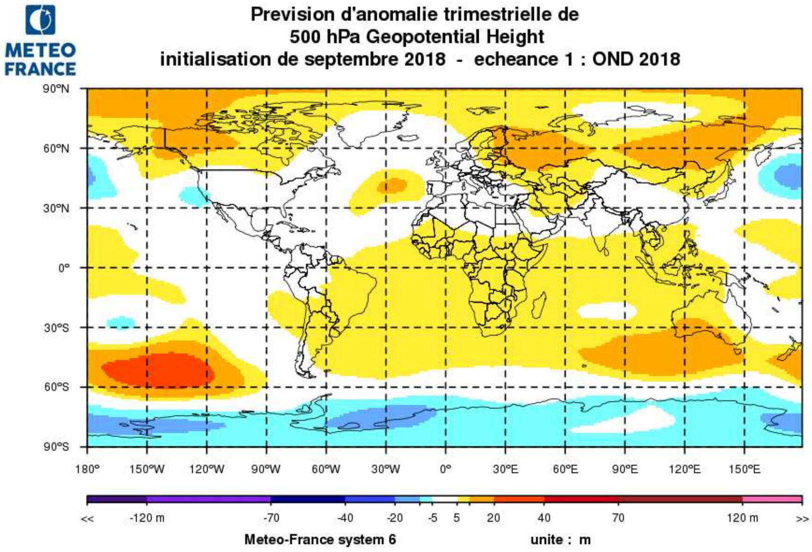


fig.II.2.b.1: Anomalies of Geopotential Height at 500 hPa from Météo-France.
http://seasonal.meteo.fr

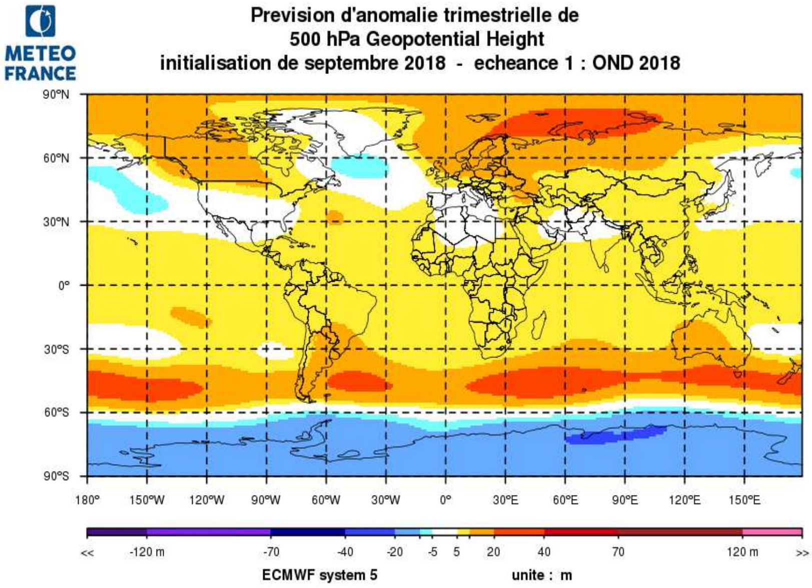


fig.II.2.b.2: Anomalies of Geopotential Height at 500 hPa from ECMWF.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast

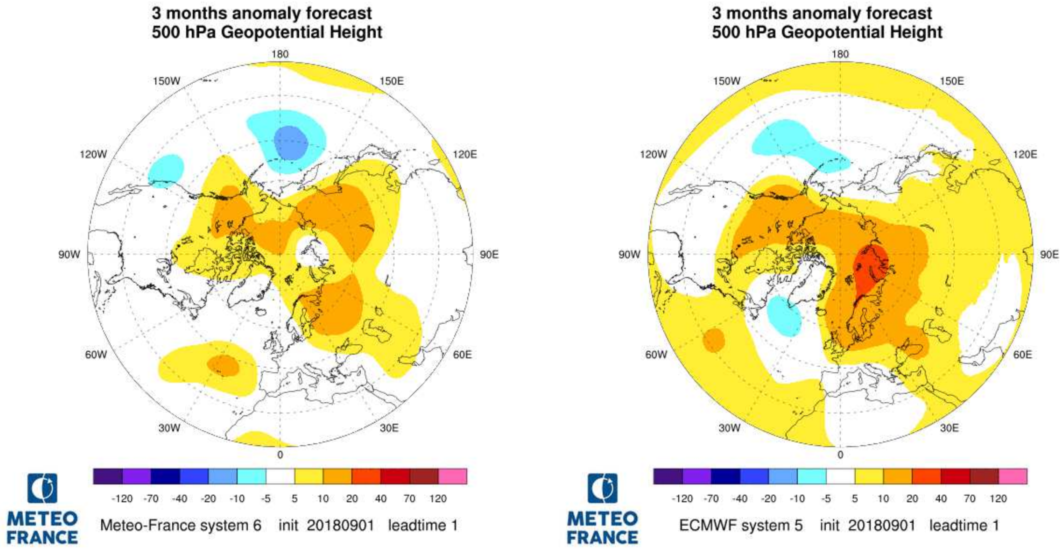


fig.II.2.b.3: Anomalies of Geopotential Height at 500 hPa from Météo-France. http://seasonal.meteo.fr

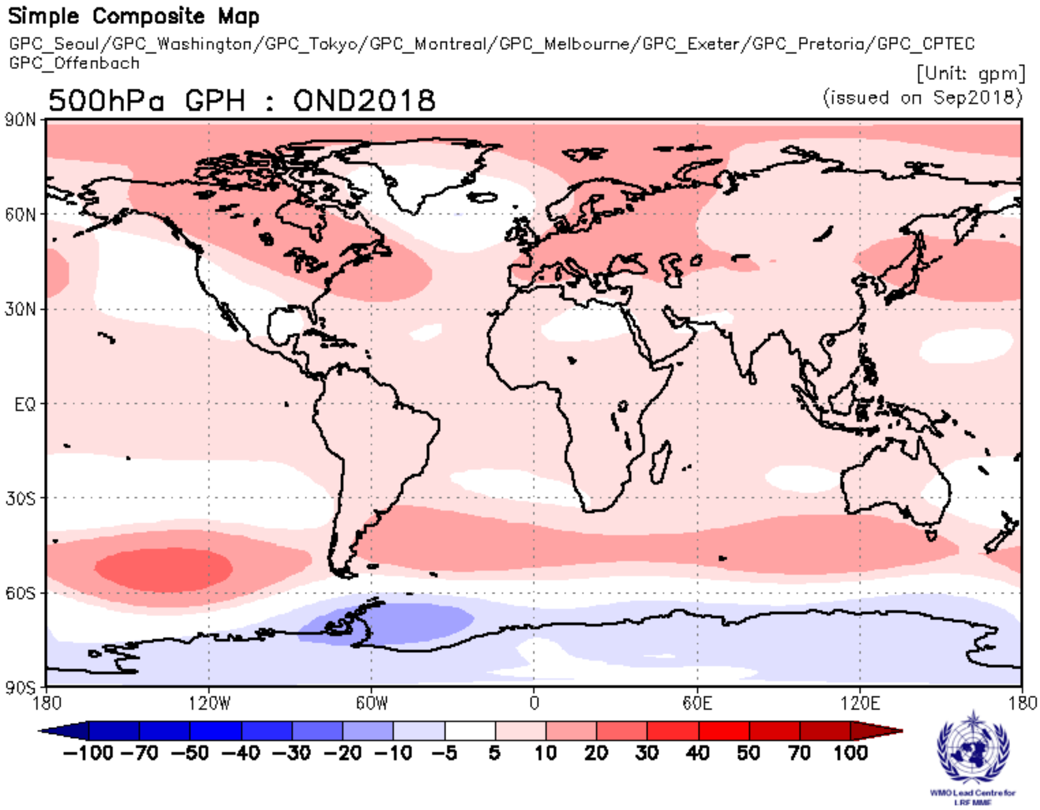


fig.II.2.b.4 : multi-model forecast of geopotential anomaly at 500 hPa

II.2.c. modes of variability

The blocking mode (SCAN) clearly dominates with both systems.

NAO has a positive sign instead. This is well consistent with gepotential anomaly forecasts.

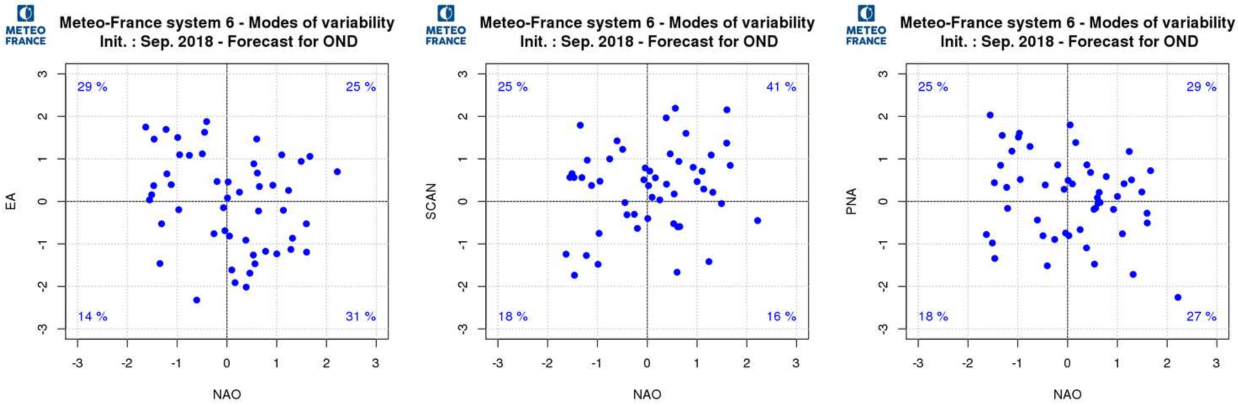


fig.II.2.c.1 : modes of variability forecasts over the Northern hemisphere with Meteo-France MF-S6

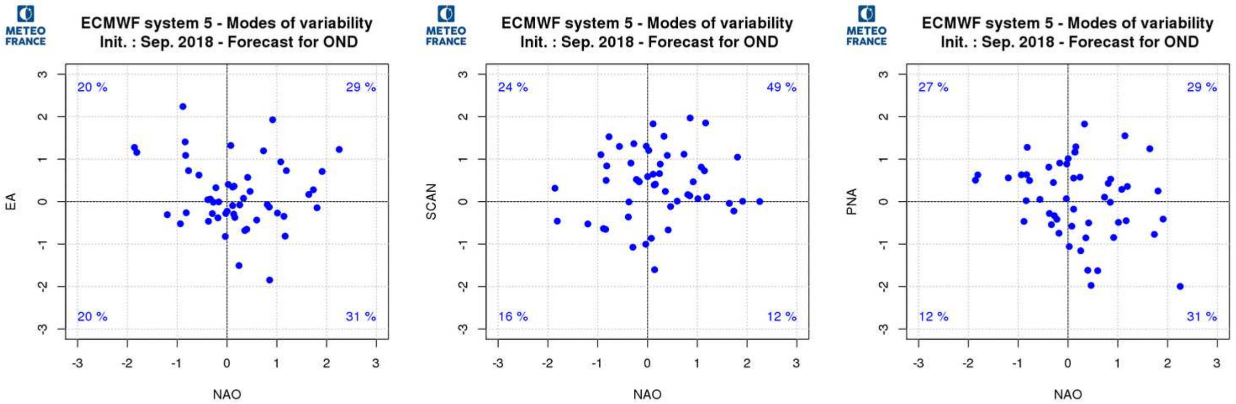


fig.II.2.c.2 : modes of variability forecasts over the Northern hemisphere with ECMWF-S5

II.2.d. weather regimes

No privileged schemes with MF6.

CEP5 accentuates the winter blocking regime, in agreement with the dominant mode (SCAN).

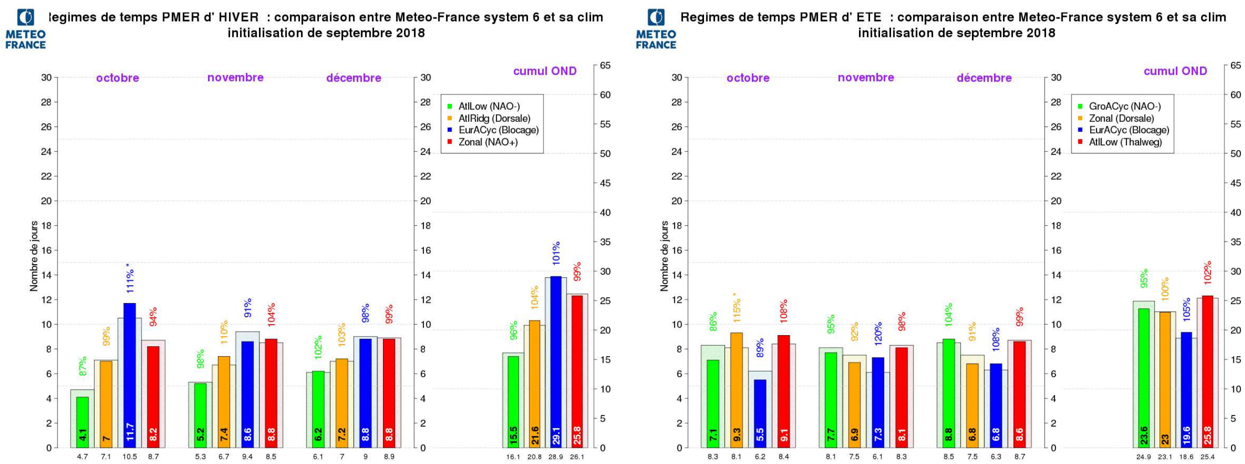


fig.II.2.d.1: North Atlantic Regime occurrence anomalies from Meteo-France MF-S6 : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.
Left : winter regimes; Right : summer regimes

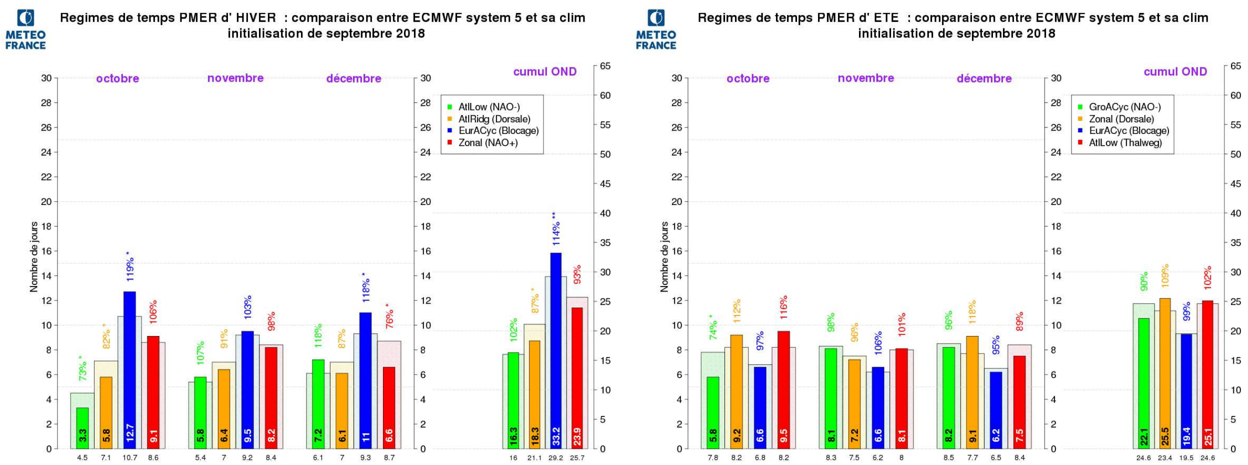


fig.II.2.d.2 : North Atlantic Summer Regime occurrence anomalies from ECMWF-S5 : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes
Left : winter regimes; Right : summer regimes

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

Signal rather hot on Europe a little more marked in the east and quite weak on France

The dominant SCAN mode in the forecast does not plead for hot on France.

II.3.a Météo-France

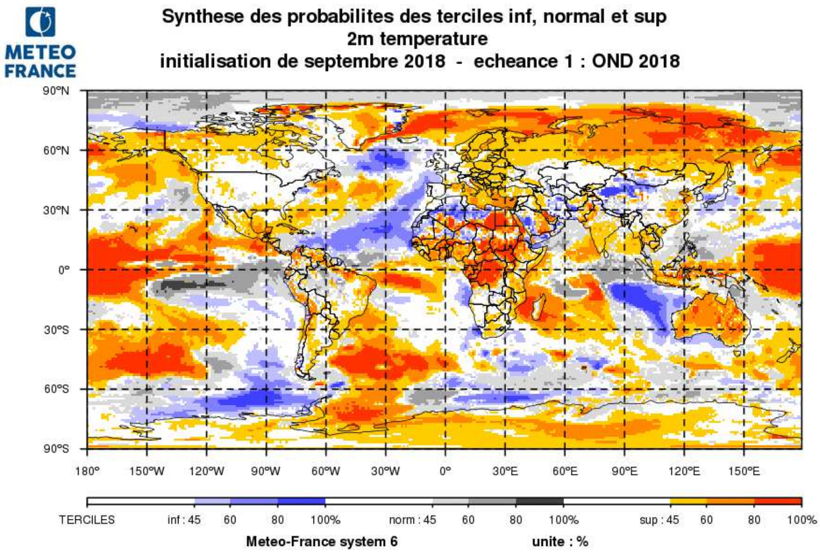


fig.II.3.1: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://seasonal.meteo.fr/

II.3.b ECMWF

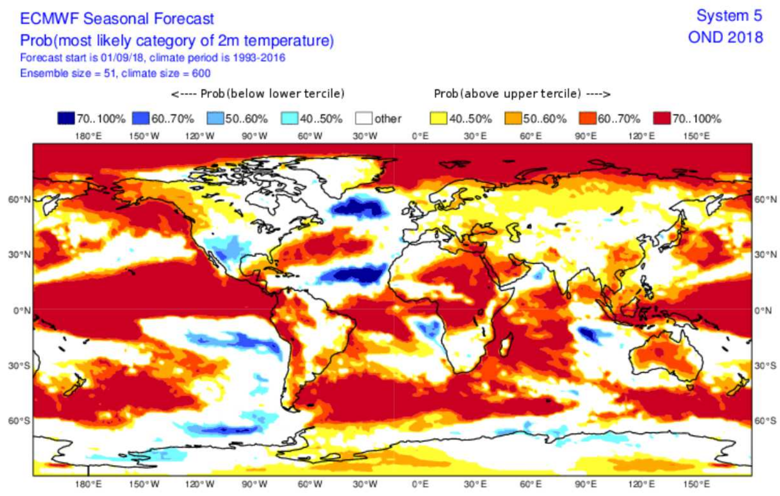


fig.II.3.2: Most likely category probability of T2m from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seaso...

II.3.c Japan Meteorological Agency (JMA)

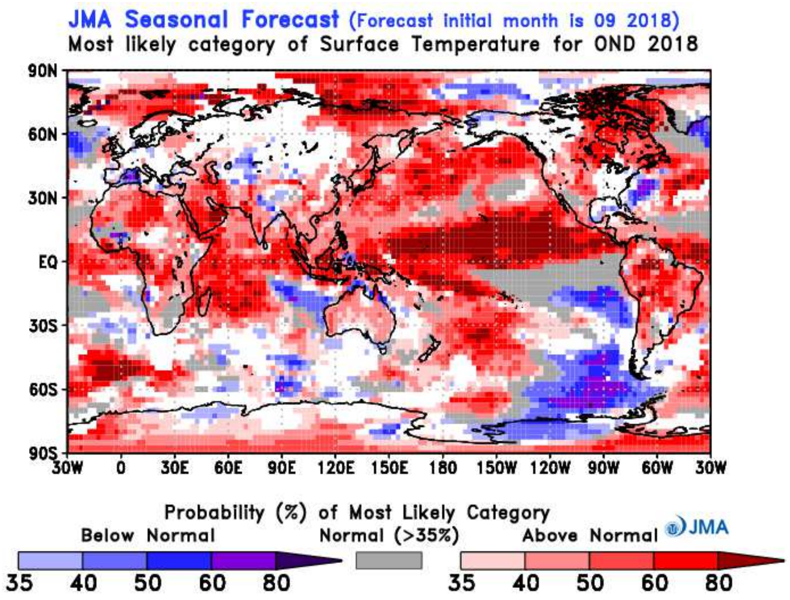


fig.II.3.3: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/3-mon/fcst/fcst_gl.php

II.3.d EUROSIP

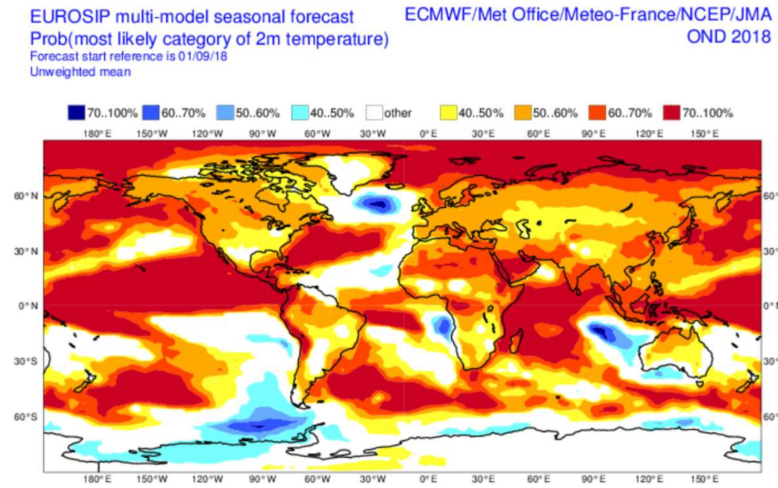


fig.II.3.4: Multi-Model Probabilistic forecasts for T2m from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmv2/param_euro/seasonal_charts_2tm/

II.3.e GPCC's composite

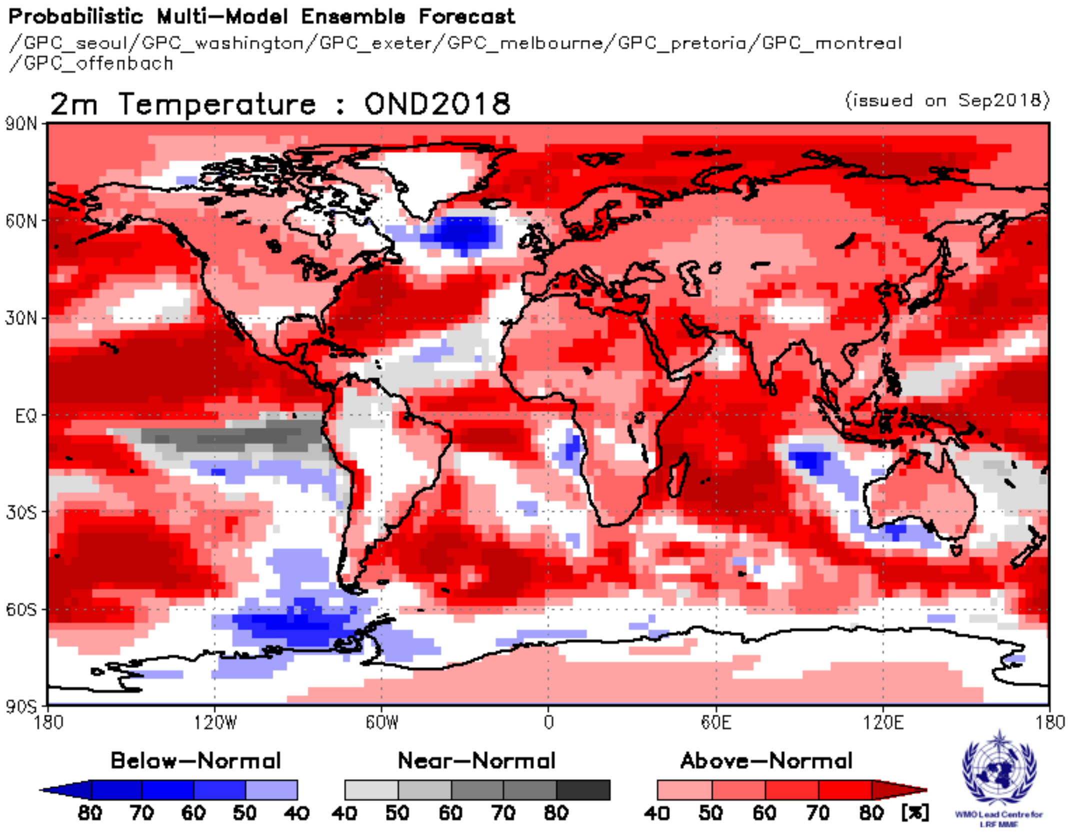


fig.II.3.1.c : Multi-model forecast of temperature anomalies at 2m

II.4. IMPACT : PRECIPITATION FORECAST

- Very few signal at mid-latitudes.Wet signal on the southern United States in connection with El Niño.
- inter-tropical regions : we begin to see in models a typical pattern of precipitation related to an El Nino phenomenon. Wet on Pacific and Western Indian Ocean, dry on Maritime Continent and Australia. Consistent with SST anomalies, dry conditions continue on North Tropical Atlantic. Also notes wet conditions over West Africa.

II.4.a Météo-France

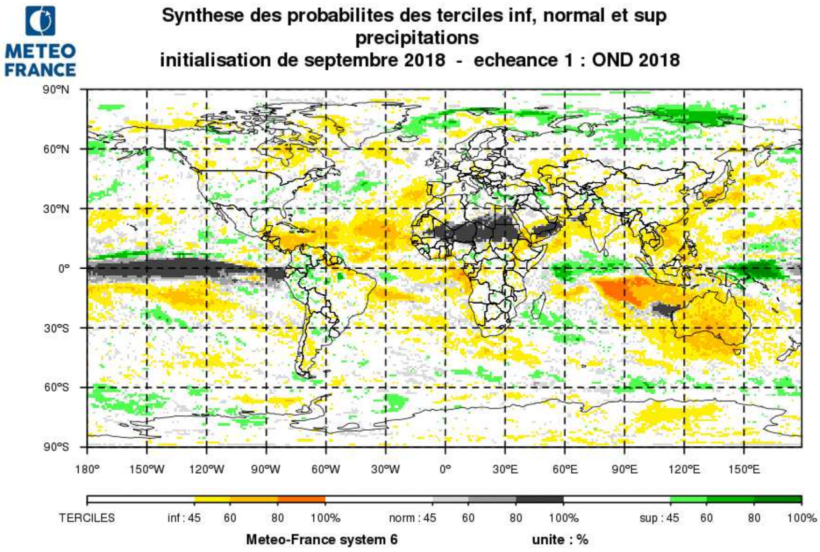


fig.II.4.1: Most likely category of Rainfall. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://seasonal.meteo.fr/

II.4.b ECMWF

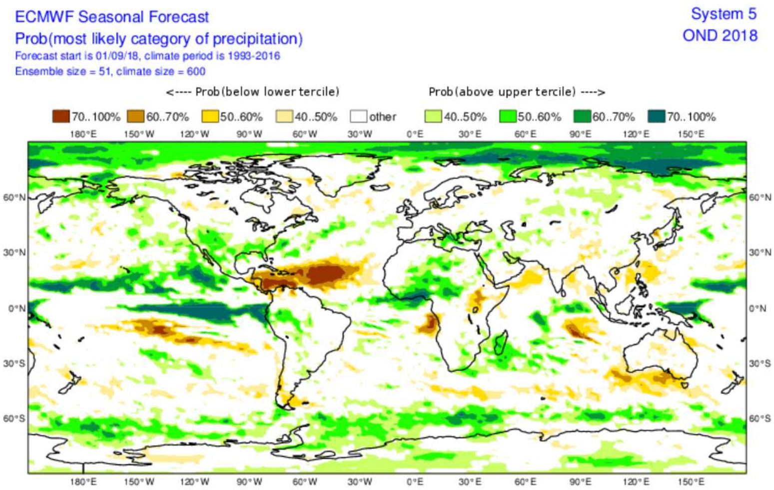


fig.II.4.2: Most likely category probability of rainfall from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

II.4.c Japan Meteorological Agency (JMA)

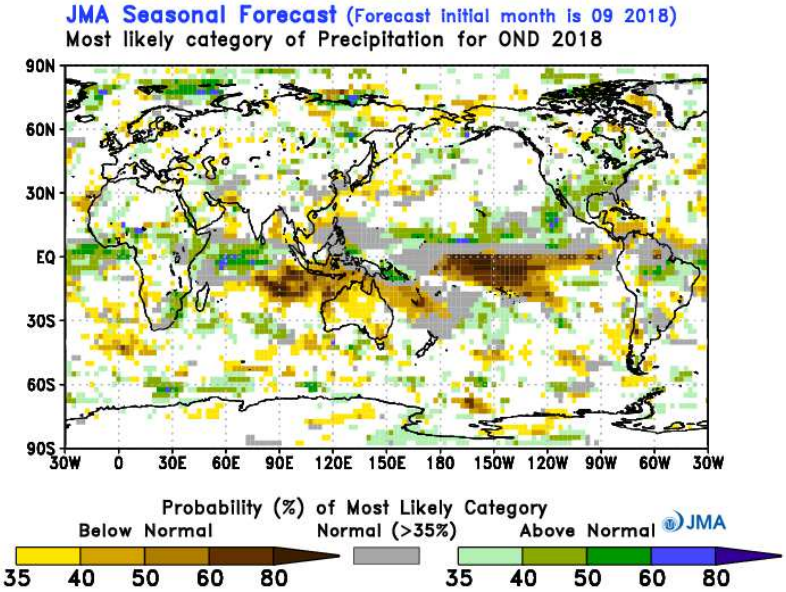


fig.II.4.3: Most likely category of Rainfall from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.

http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/3-mon/fcst/fcst_gl.php

II.4.d EUROSIP

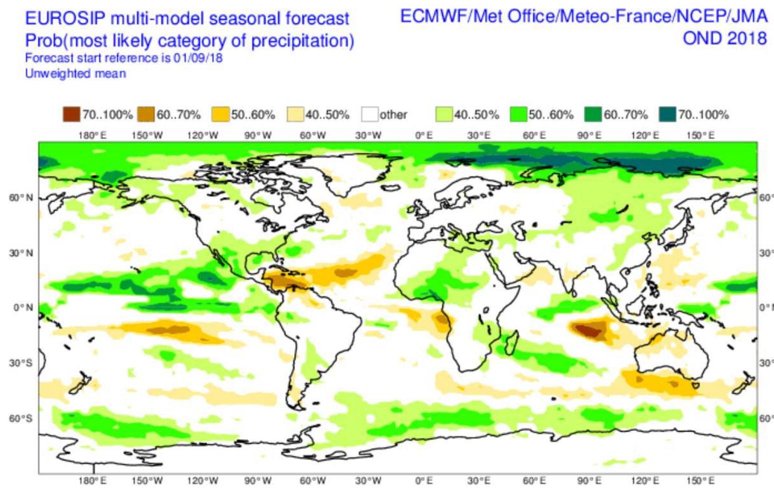


fig.II.4.4: Multi-Model Probabilistic forecasts for precipitation from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal).

http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmv2/param_euro/seasonal_charts_2tm/

II.4.e GPCC's Composite

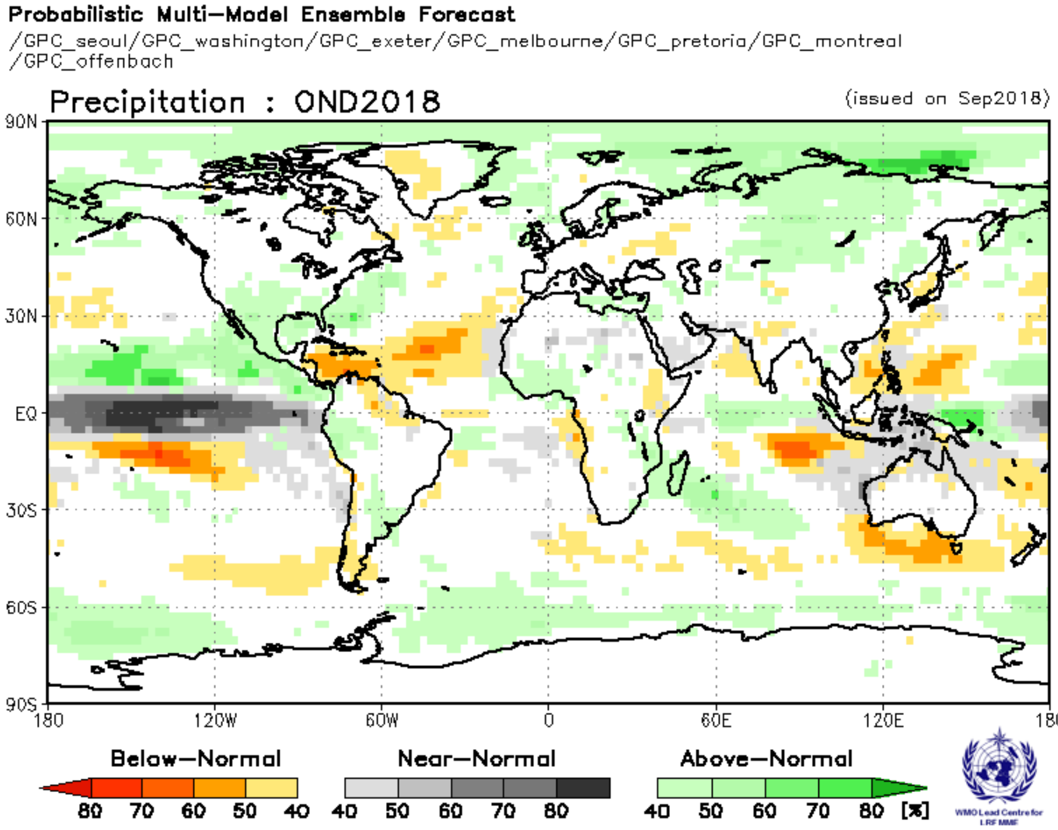


fig.II.3.2.c: Multi-model forecast of precipitation anomalies

II.5. REGIONAL TEMPERATURES and PRECIPITATION

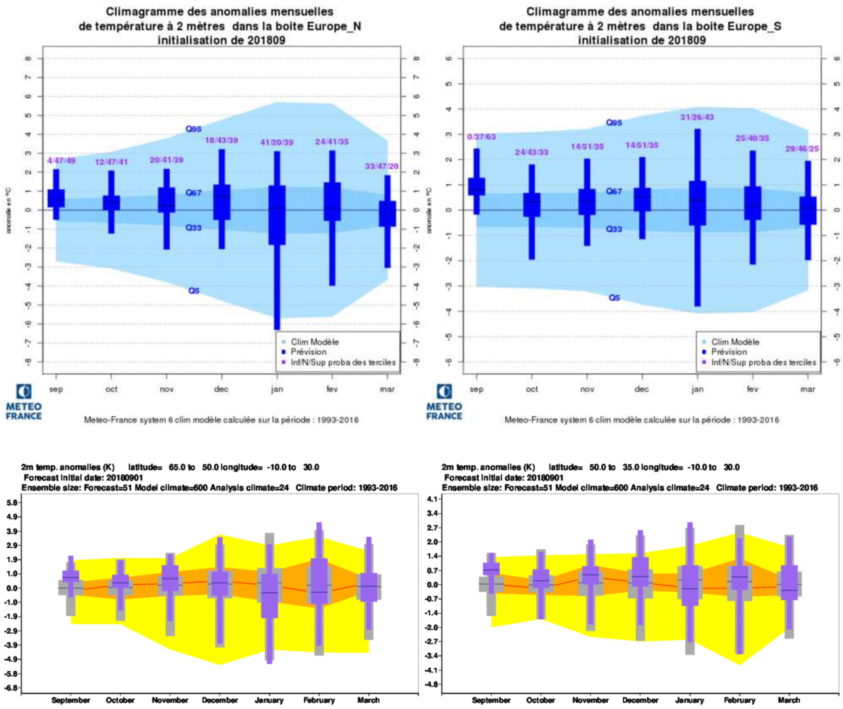


fig.II.5.1 : Climagrams for Temperature in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

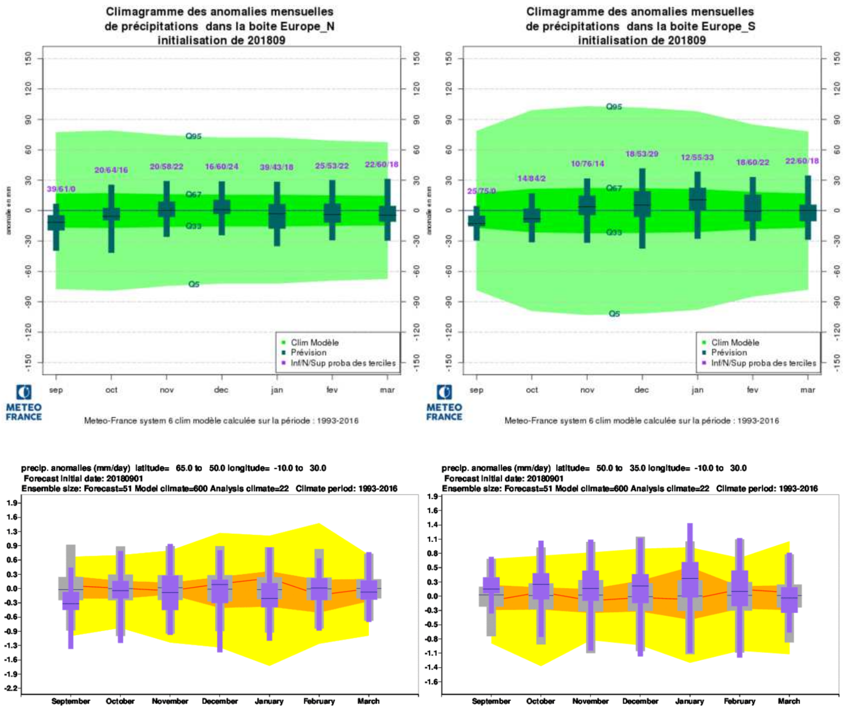


fig.II.5.2 : Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

II.6. "EXTREME" SCENARIOS

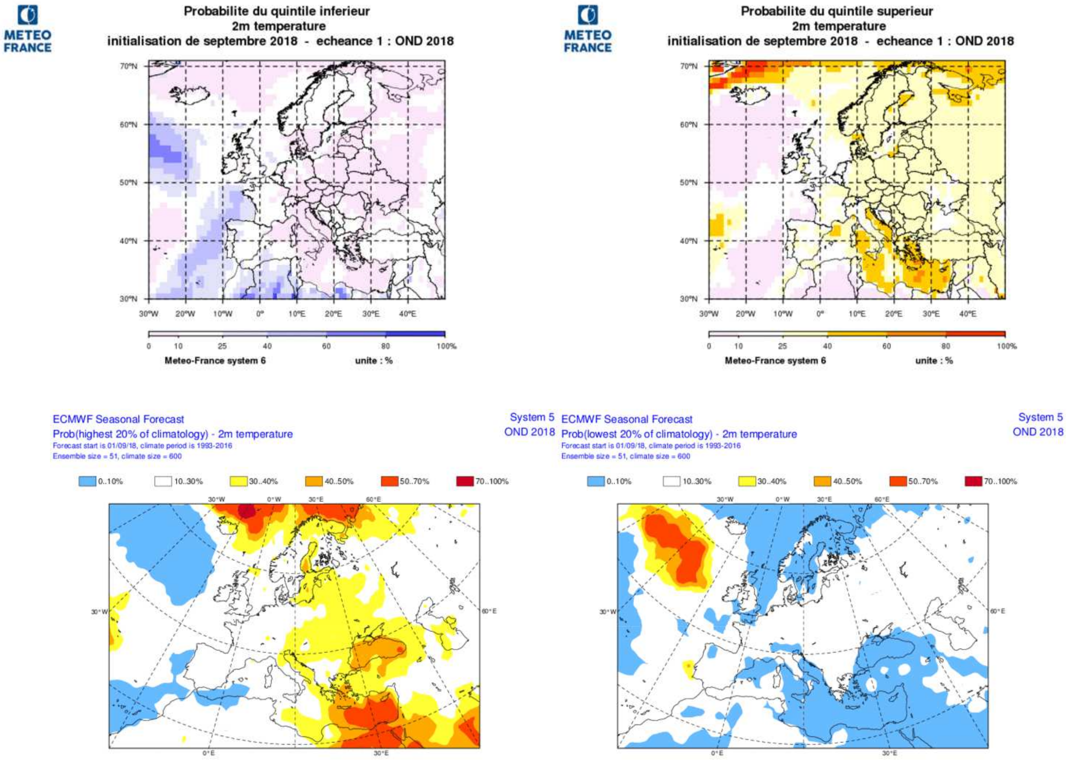


fig.II.6.1 : Top : Meteo-France T2m probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution). Bottom : ECMWF T2m probability of « extreme » below normal conditions (left - highest ~20%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

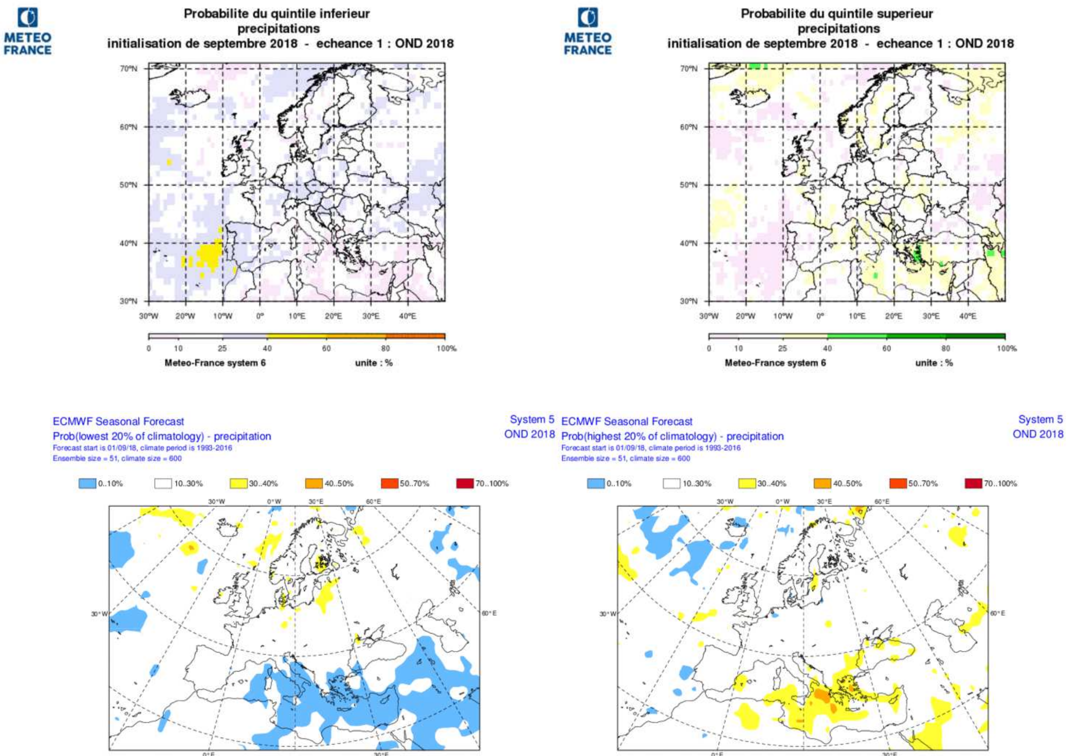


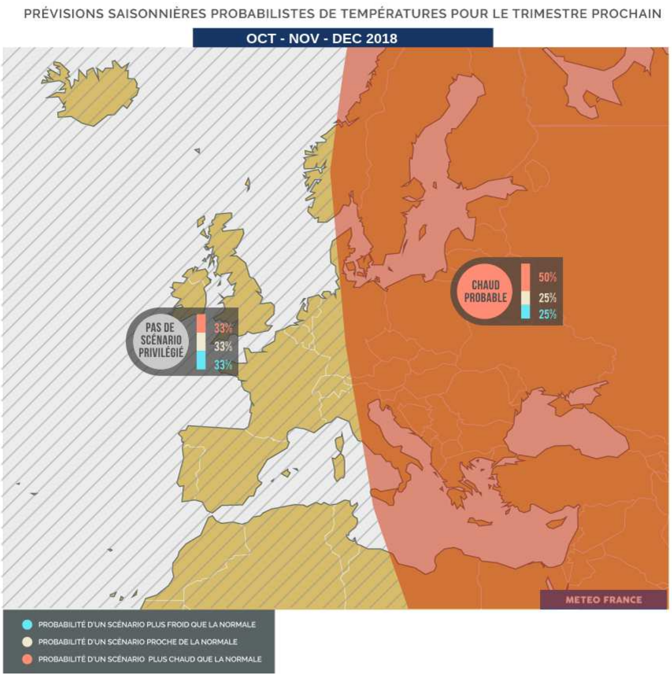
fig.II.6.2 : Top : Meteo-France rainfall probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution).
Bottom : ECMWF rainfall probability of « extreme » below normal conditions (left - lowest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

Models agree.

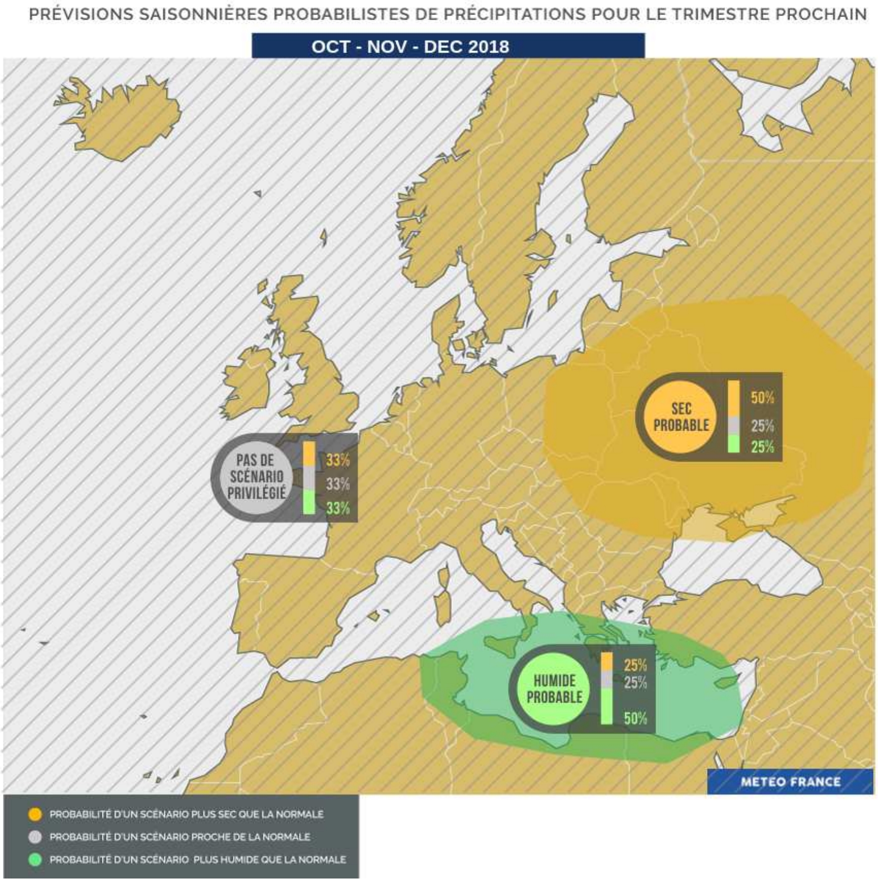
Temperature : models agree on a warmer than normal 3-month period over eastern Europe, in fairly good agreement with the impacts of SCAN mode.



Precipitations : The SCAN mode is associated with wet conditions from the British islands to the Mediterranean and drier to Russia and Eastern Europ

We do not really find this signal in the models except on the eastern Mediterranean (wet conditions related to a warmer sea than normal?).

We remain cautious in limiting the wet signal on this zone



II.7.b Tropical cyclone activity

North Atlantic : no significant difference than normal hurricane season activity are forecast by ECMWF-S5 model.

North Pacific : forecast activity near normal. However the current warming in the center of Pacific Ocean should modify the hurricane frequency and place of birth during the next months.

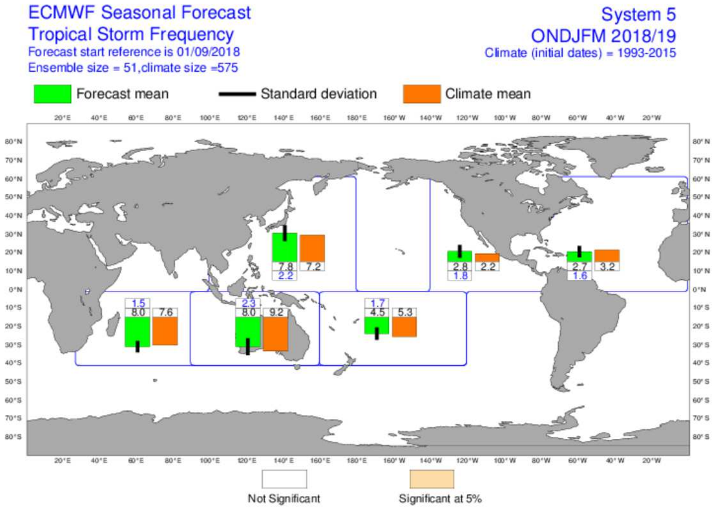


fig.II.7.1 : Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF). www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtr...">http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/euros...">www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtr...">http://www.ecmwf.int/produc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

III.1. **Seasonal Forecasts**

Presently several centers provide seasonal forecasts, especially those designated as Global Producing Centers by WMO (see www.wmo.int/pages/prog/wcp/wcasp/clips/producers_forecasts.html">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 www.bom.gov.au/wmo/lrfvs/">http://www.bom.gov.au/wmo/lrfvs/">www.bom.gov.au/wmo/lrfvs/">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 where the SST warming is developing first at the surface (especially for coastal events).

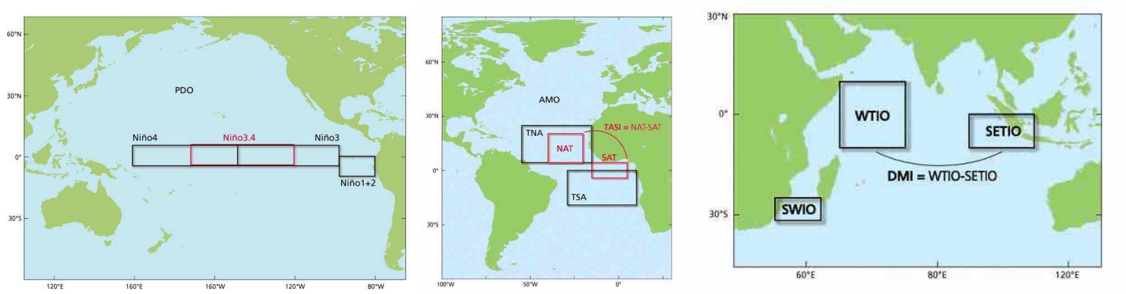
- Niño 3 : 5°S/5°N 90W-150W ; it is the region where the interanual variability of SST is the greatest.

- Niño 4 : 5°S/5°N 160E- 150W ; it is the region where 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).

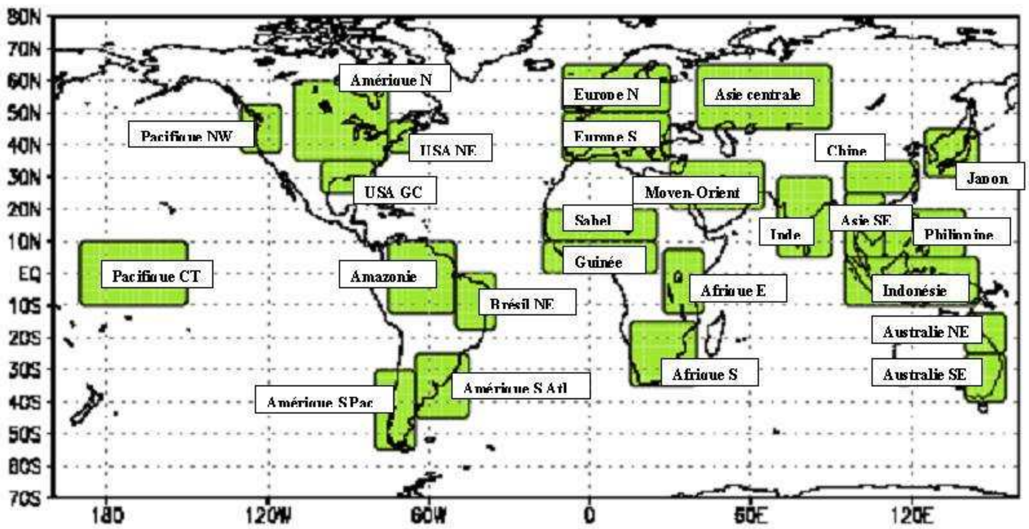
Associated to the oceanic « El Niño / La Niña » events, and taking into account the strong ocean/atmopshere coupling, the atmosphere shows also interanual variability associated to these events. It is monitored using the SOI (Southern Oscillation Index). This indice is calculated using standardized sea 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).