GLOBAL CLIMATE BULLETIN

n°221 – November 2017

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I. DESCRIPTION OF THE CLIMATE SYSTEM (September 2017)

I.1.Oceanic analysis

Widespread cooling over oceanic basins in September.

Over the Pacific ocean :

- Cooling over the tropical Pacific, especially along the equator, east of the date line. Cooling also at the subsurface (fig I.1.1 and I.1.5).
- Niño 3.4 index dropped to -0.5℃ (-0.1℃ in August) a nd the Niño 1.2 index drew near -1℃ (intense cooling in September).
- ENSO phase: still neutral but close to la Niña thresholds.
- Significant cooling at midlatitudes, but with a persisting PDO+ pattern.

Over the Maritime Continent :

- No significant evolution since the month of August : slightly above normal SSTs over the east, close to normal over the western part.

Over the Indian Ocean :

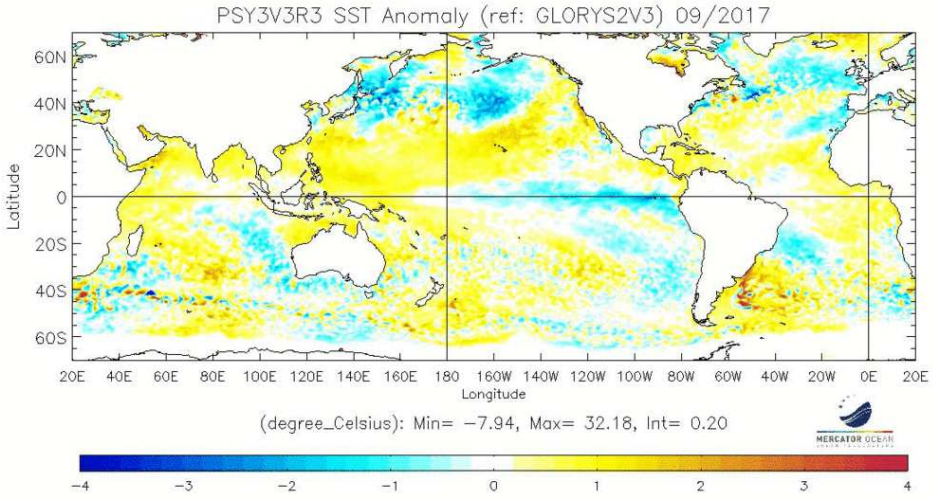
- In the northern hemisphere, the IOD returned to neutral values.
- In the southern hemisphere, persisting (but weakening) SST gradient between a still cold eastern basin (though there was significant warming off the Australian coasts) and a warm western basin.

Over the Atlantic:

- cooling over the northern tropical basin, mainly due to the numerous tropical systems (Irma, José, Katia, Lee, Maria)
- cooling also off the Portuguese coast down to the Canarian Isles.
- despite a slight warming over the mid-latitudes, the meridional gradient persisted in September.

Over the Mediterranean:

- Sharp cooling, mainly to the west, and largely due to a persistent northerly flow.



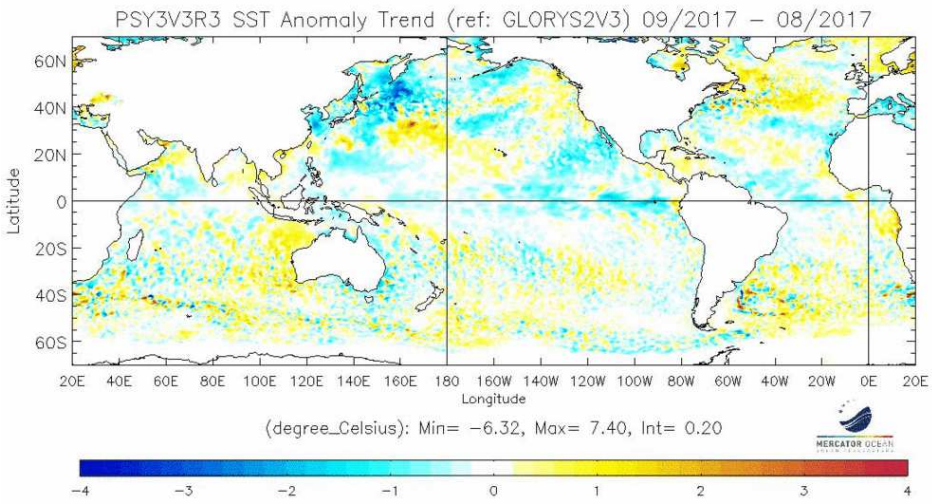


fig.I.1.1: top : SST Anomalies (℃) . Bottom : SST tendency (cu rrent – previous month), (reference Glorys 1992-2013).

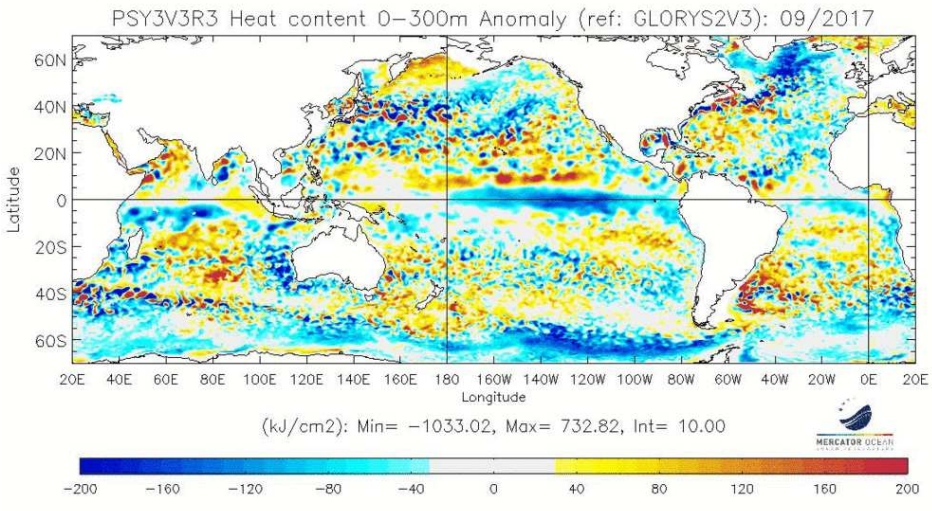


fig.I.1.2: map of Heat Content Anomalies (first 300m, kJ/cm2, reference Glorys 1992-2013)

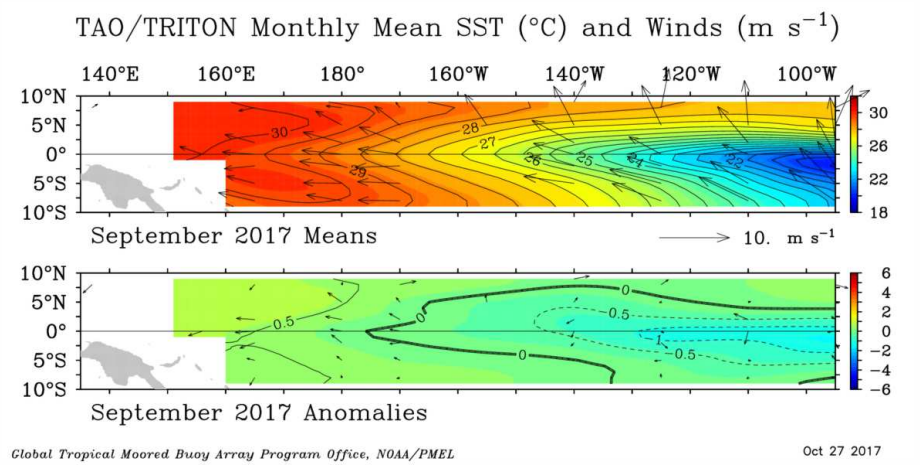


fig.I.1.3: SST Anomalies and Wind anomalies over the Equatorial Pacific from TAO/TRITON.http: //www.pmel.noaa.gov/tao/drupal/assorted_plots/images/sst_wind_mon.png

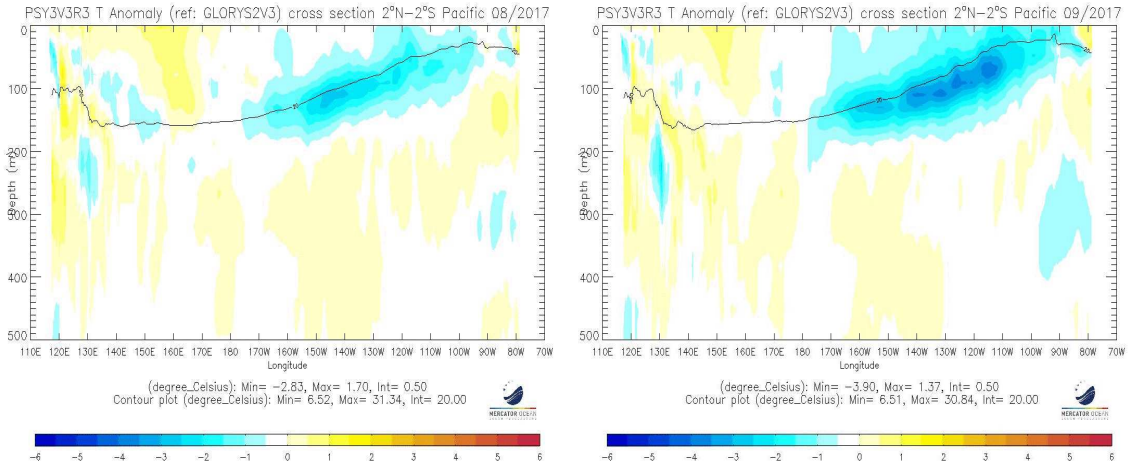


fig.I.1.4: Oceanic temperature anomaly in the first 500 meters in the Equatorial Pacific (previous and current month)

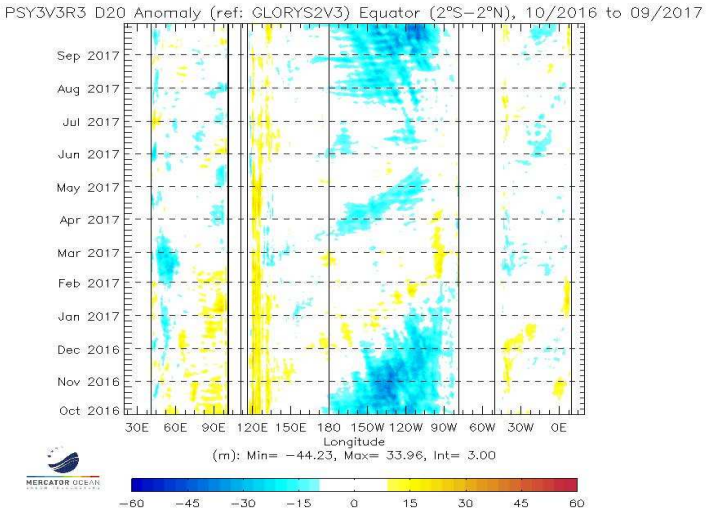


fig.I.1.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20℃ isotherm) along the equator for all oceanic basins over a 6 month period

Sea surface temperature near Europe :

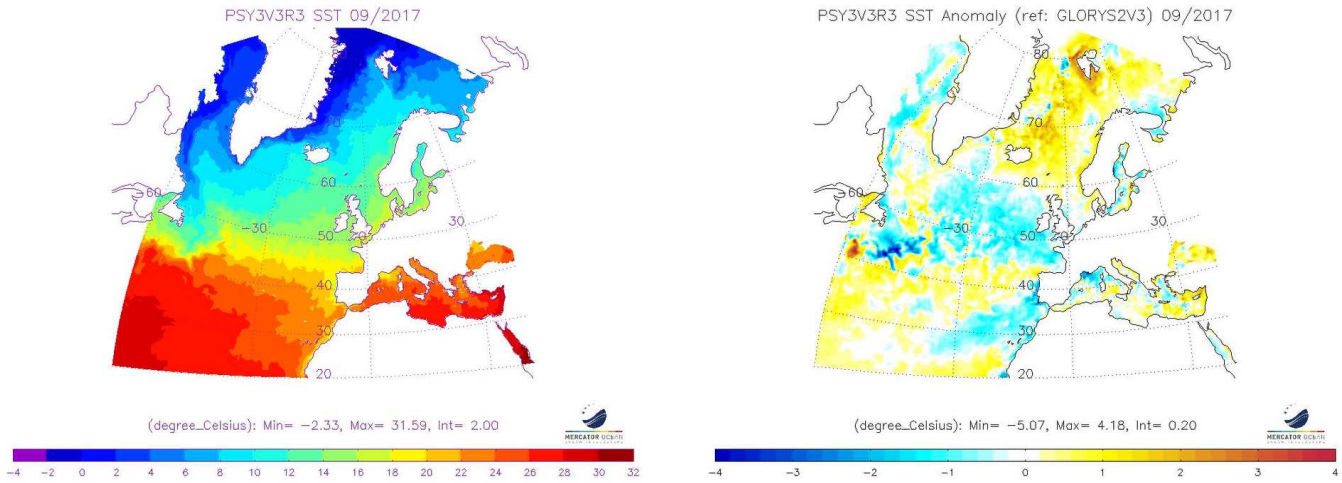


fig.I.1.6 : Mean sea surface temperature in the RA VI Region (Europe) and anomaly (reference Glorys 1992-2013).

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) :

- as in August, downward motion anomalies over the eastern part of tropical Pacific, consistent with the SST anomalies (a hint of some ocean-atmosphere coupling) and upward motion anomalies over the Maritime Continent, especially to the east.
- Elsewhere, little signal but rather favorable for Indian monsoon and rather hostile for west-African monsoon (which is in rather good agreement with rainfall anomalies, see fig I.2.6).

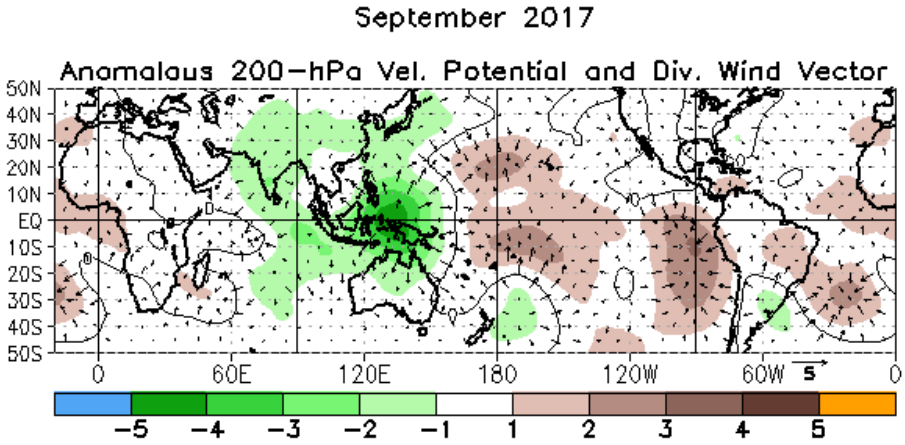


fig.I.2.1.a: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

SOI :

- the SOI remained positive in September at +0.6. See NOAA Standardized SOI: https://www.ncdc.noaa.gov /teleconnections/enso/indicators/soi/ . This is consistent with colder than normal SSTs over the eastern tropical Pacific. For information, the Australian Bureau Of Meteorology uses a non-standardized SOI index which stood at +6.9 for September 2017, the la Niña threshold standing at +7.0 according to the Bureau.

MJO (fig. I.2.1.b)

- No significant MJO activity in September (as in August), contrasting with a strong activity starting in early October.

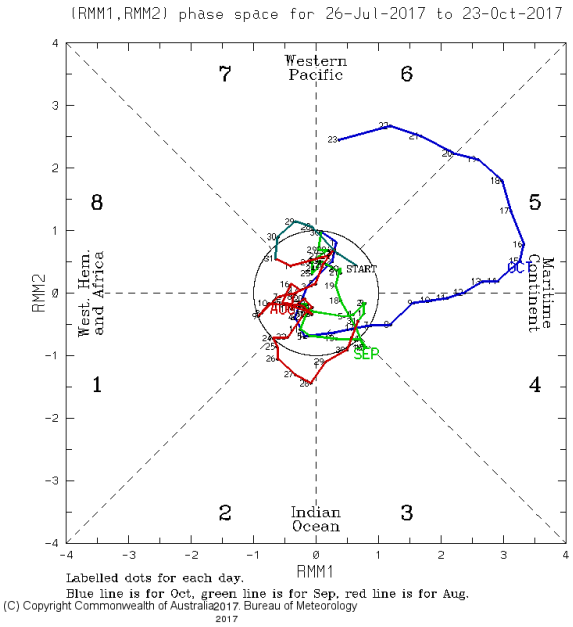


fig.I.2.1.b: indices MJO http://www.bom.gov.au/climate/mjo/

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

- There are no traces of tropical forcing towards midlatitudes. Stream function anomalies are related to extra-tropical activity.

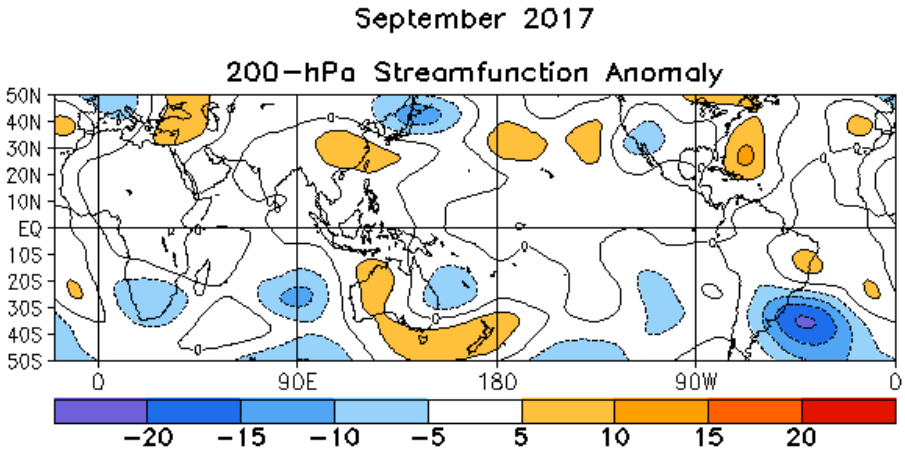


fig.I.2.2: Stream Function Anomalies at 200 hPa.
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

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

- Negative anomalies extending from southern Greenland towards western Europe, combined with positive anomalies from Quebec to the Iberic Peninsula, resulted in a enhanced westerly to north-westerly flow over western Europe.
- A strong positive anomalie appeared over northeastern Scandinavia, but this pattern did not influence western European weather that much (the Med basin remained under Atlantic Ridge-like conditions).
- In the southern hemisphere, mostly positive anomalies for the mid-latitudes, and negative anomalies over the Antarctic (strong polar vortex).

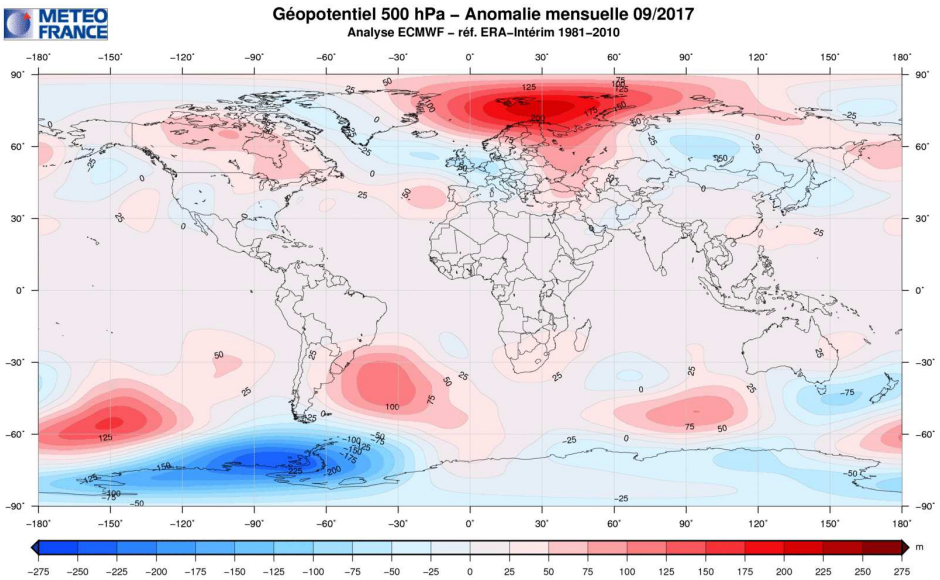
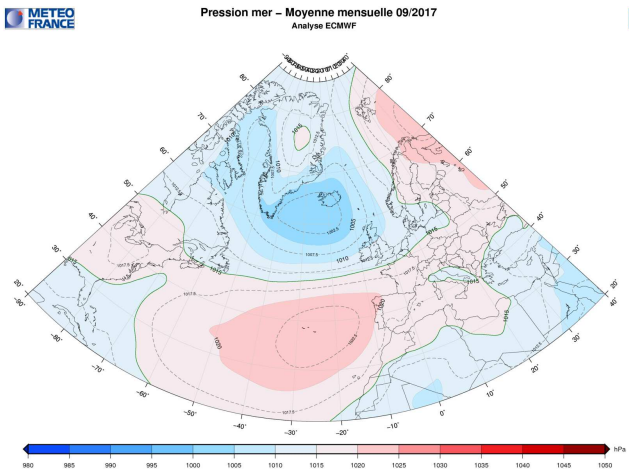


fig.I.2.3: Anomalies of Geopotential height at 500hPa (Meteo-France)

MONTH	NAO	EA	WP	EP-NP	PNA	TNH	EATL/WRUS	SCAND	POLEUR
AUG 17	-1.5	2.0	1.4	-1.6	0.2	---	-2.9	-1.6	1.8
JUL 17	1.3	1.8	0.5	0.0	1.3	---	-0.6	0.0	-0.1
JUN 17	0.4	2.0	-0.8	0.5	1.2	---	0.3	-1.4	-0.1
MAY 17	-1.7	0.5	0.7	-0.7	-0.2	---	1.5	0.9	0.5
APR 17	1.7	-0.6	-0.4	1.0	0.1	---	0.7	-1.5	-1.4
MAR 17	0.4	1.0	-2.1	-1.0	-0.0	---	-1.0	-1.0	0.7

Evolution of the main atmospheric indices for the Northern Hemisphere for the last 6 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



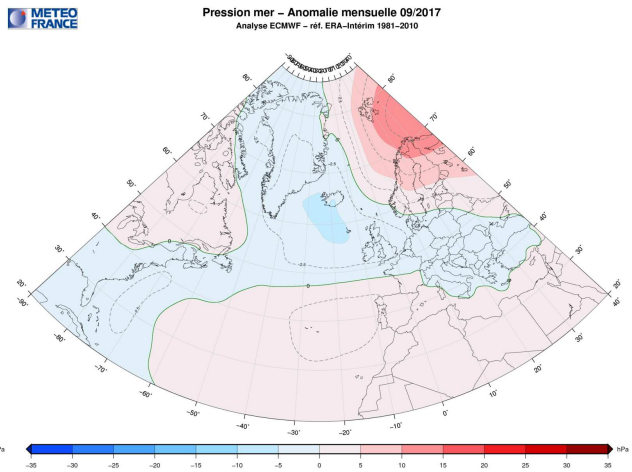


fig.I.2.4: Mean sea level pressure in the RA VI Region (Europe) (top) and 1981-2010 anomalies (bottom).

Circulation indices: NAO and AO

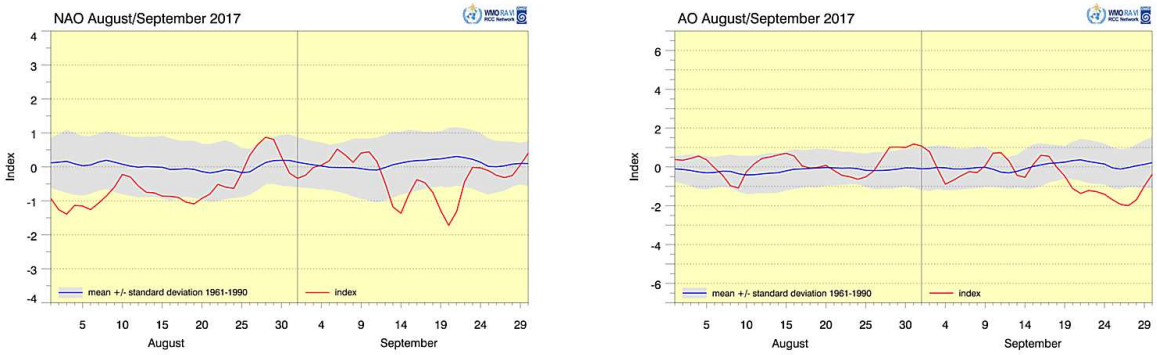


fig.I.2.5: North Atlantic Oscillation (NAO, left) and Arctic Oscillation (AO, right) indices with 1961-1990 mean standard deviation (shading). http://www.dwd.de/rcc-cm , data from NOAA CPC: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml

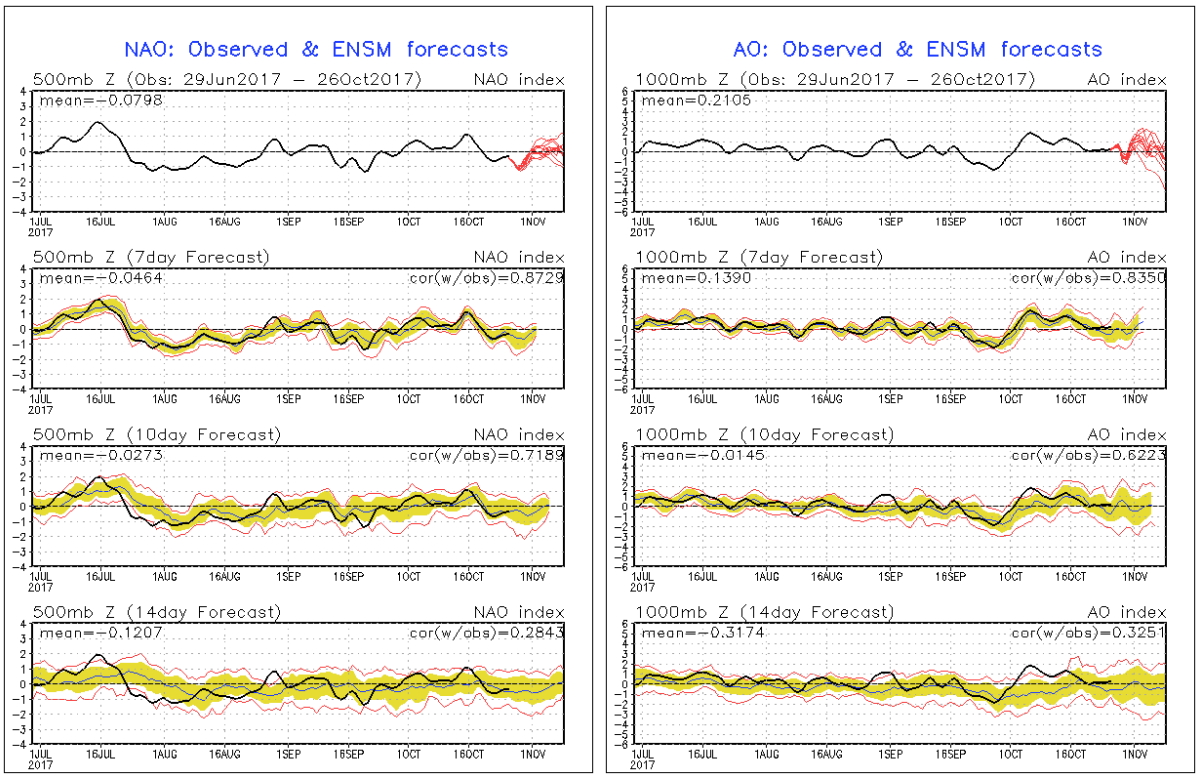


fig. I.2.5a: North Atlantic Oscillation (NAO, left) and Arctic Oscillation (AO, right) indices for the last 4 months and forecasts for the following weeks. Source: NOAA CPC, http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml

I.2.b Precipitation

- In agreement with velocity potential anomalies, rainfall was above normal for the Maritime Continent (particularly over the east), and below normal over the Equatorial Pacific.
- Drier than normal over West-Africa (but the monsoon had been active in August) and for Amazonia where rainfall deficits have been persisting since April.
- Wetter than normal for the eastern Carribean, Florida, and Mexico following the numerous tropical systems.
- Over Europe, wet conditions from the British Isles towards the Balkans, very dry from Iberic Peninsula to southeastern France (northwesterly flow). Also dry over Scandinavia (strong anticyclonic anomaly)

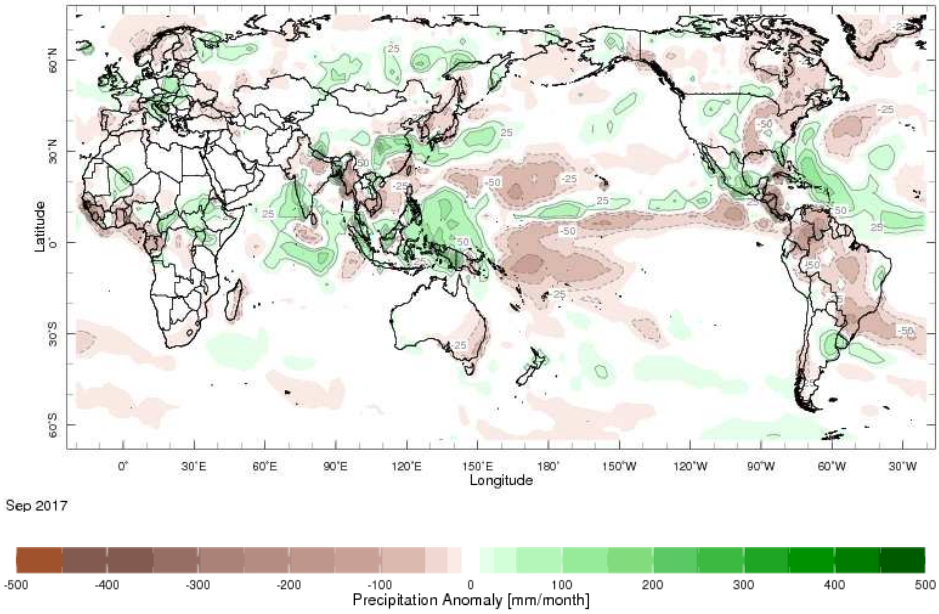


fig.I.2.6: Rainfall Anomalies (mm) (departure to the 1979-2000 normal).
Green corresponds to above normal rainfall while brown indicates below normal rainfall.
http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/Anomaly.html

Precipitation anomalies in Europe:

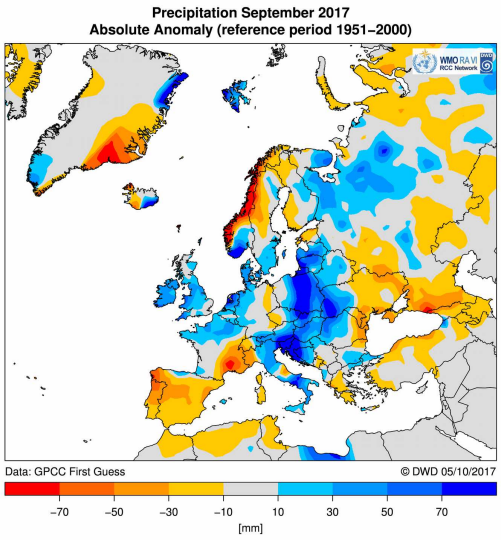


fig.I.2.7.a : Absolute anomaly (1951-2000 reference) of precipitation in the RA VI Region (Europe), data from GPCC (Global Precipitation Climatology Centre), http://www.dwd.de/rcc-cm.

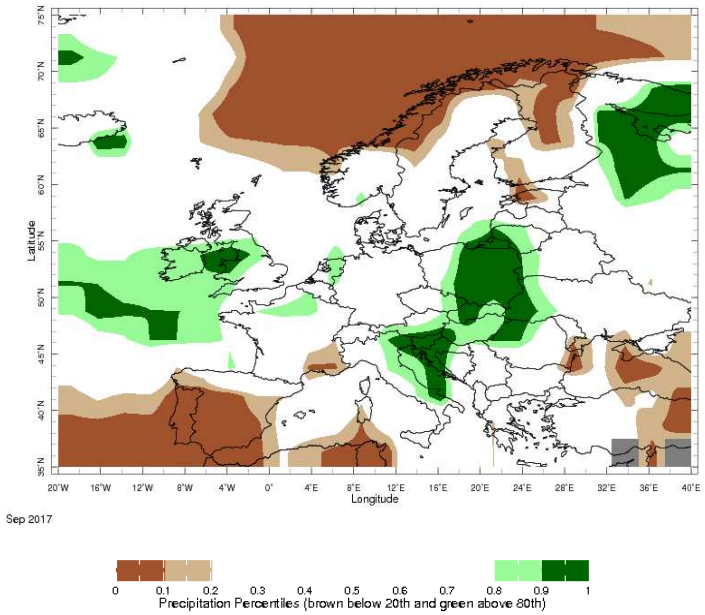


fig.I.2.7.b : Percentiles of precipitation, 1981-2010 reference. Data from NOAA Climate Prediction Center, http://iridl.ldeo.columbia.edu/maproom/Global/Precipitation/Percentiles.html

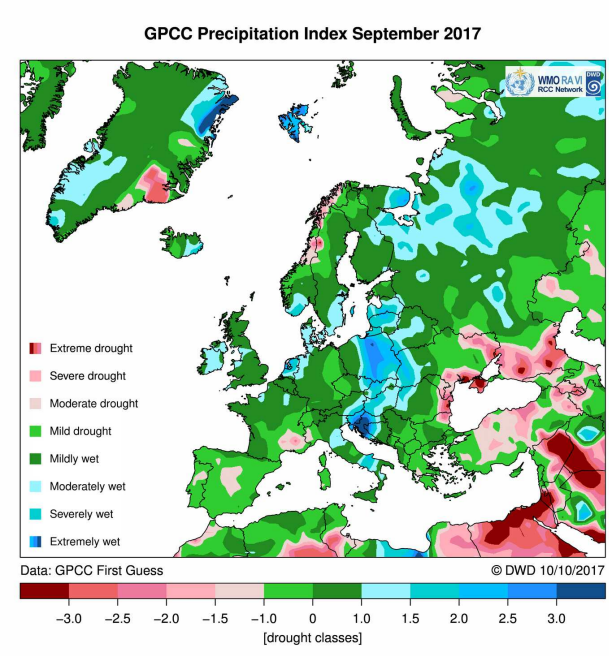


fig. I.2.8: GPCC Precipitation Index, http://www.dwd.de/rcc-cm .

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		
Southern Europe		

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

- According to the Copernicus analysis September 2017 was the 2nd warmest on record worldwide (global anomaly of +0.48℃ compared to +0.56℃ in September 2016).
- Cooler than normal over much of Siberia and western US
- Much warmer than normal for Canada and the Middle East (record warmth for Turquey and Iraq)

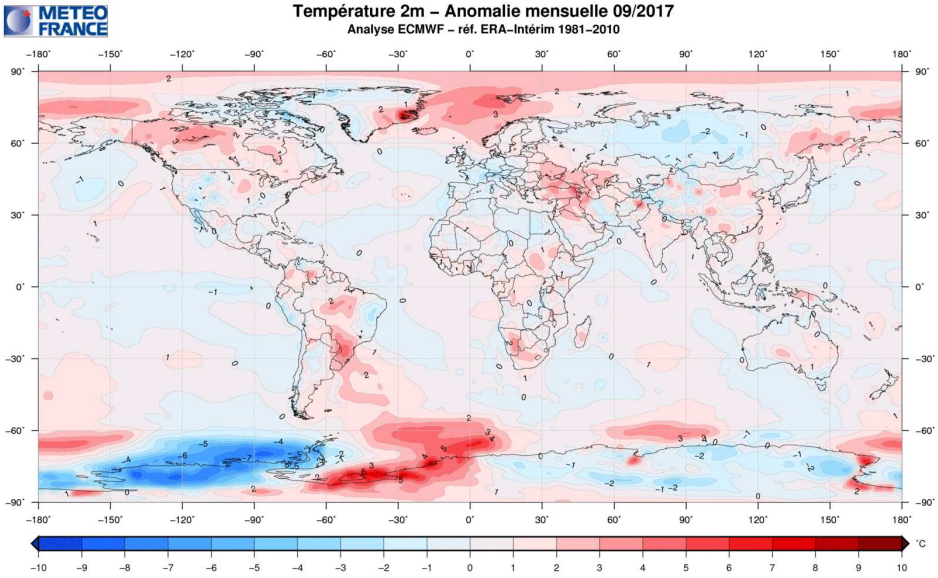


fig.I.2.9: Temperature Anomalies (℃) (Meteo-France)

Temperature anomalies in Europe:

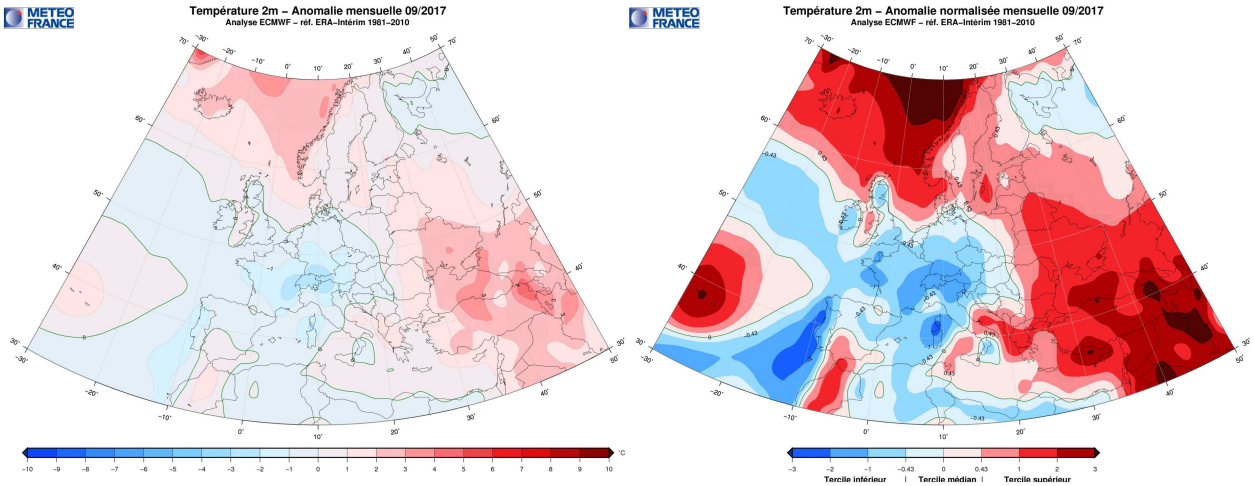


fig.I.2.10: Left graph: Absolute anomaly of temperature in the RA VI Region (Europe). Right graph: Standardized temperature anomalies

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	
Southern Europe	

I.2.d Sea ice

- In the Arctic, the ice extent remained well below 1981-2010 normal (7th lowest mean extent since 1979). The annual minium was reached on September 13th, ranking as 8th lowest.
- Fort the Antarctic, the deficit remained also very high : the annual maxima could be 2nd lowest since 1979 (to be confirmed next month since a 2nd maximum, slighlty higher than the first one, has been reached in early October).

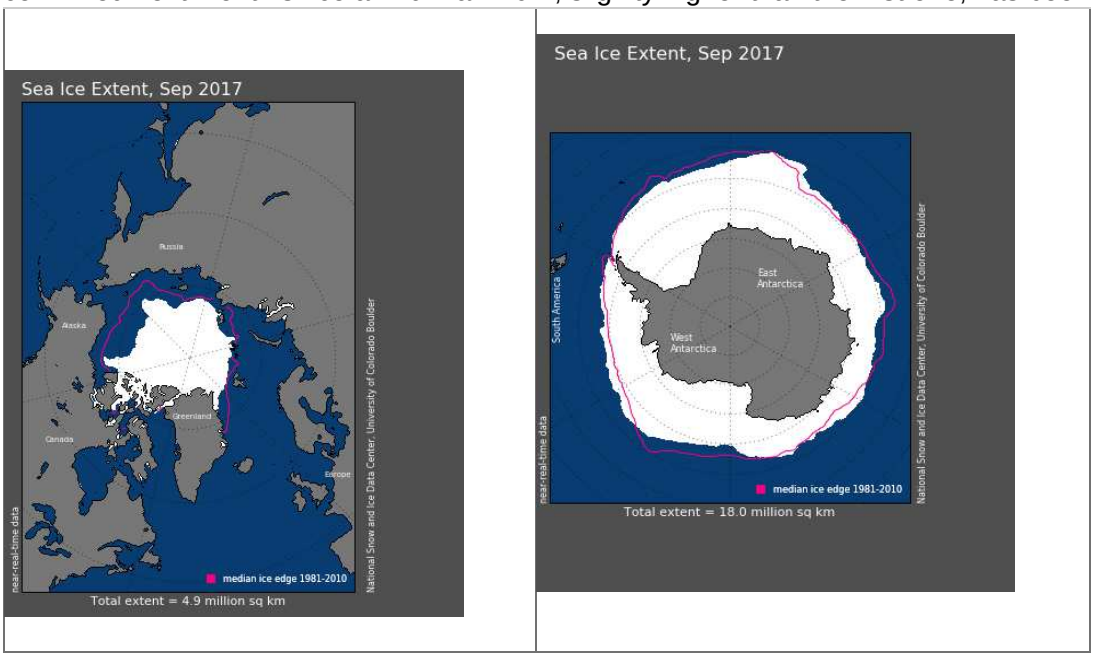


fig.I.2.11: Sea-Ice extension in Arctic (left), and in Antarctic (right). The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

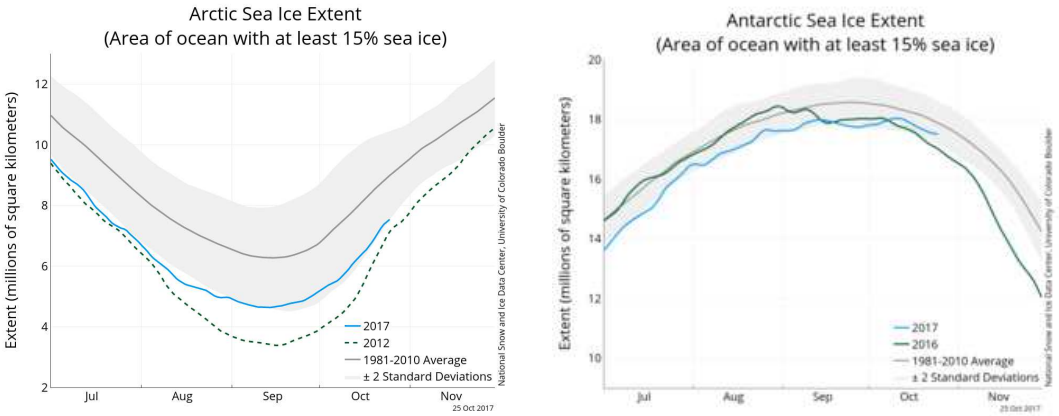
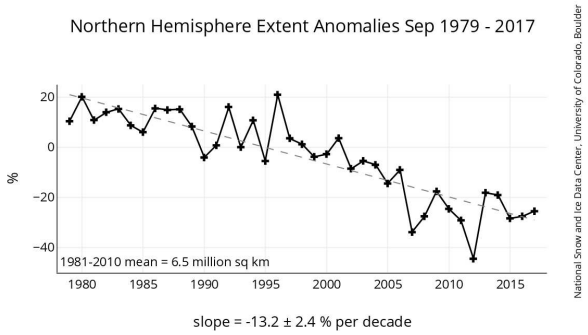


fig. I.2.12 : Sea-Ice extension evolution from NSIDC. https://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png



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

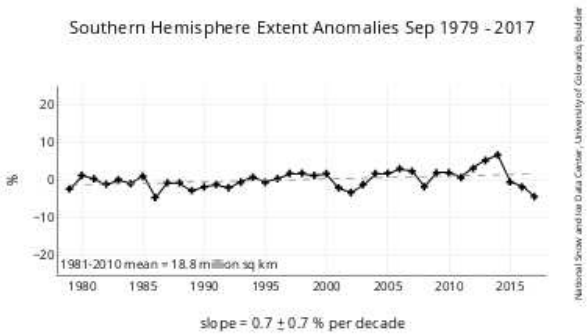


fig 1.2.13 : Monthly Sea Ice Extent Anomaly Graph in Antarctic for the month of analysis (http://nsidc.org/data/seaice_index/)

II. SEASONAL FORECAST FROM DYNAMICAL MODELS

II.1. OCEANIC FORECASTS

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

EUROSIP models still in good agreement this month

- Pacific Ocean: further cooling is expected along the Equatorial rail, especially in November, up to the date line, and even further west. La Niña conditions should therefore settle for the next three months. Over the northern mid-latitudes, a weak PDO+ signal should persist.
- Indian Ocean: warm/cool contrast persisting (though somehow reduced) between the western and the eastern basin in the southern hemisphere. In the northern hemisphere, a little warmer to the west, close to neutral to the east, with a DMI index slightly positive but not significantly (see figure II.1.7).
- Atlantic Ocean:
  - In the northern basin, the models suggest a cold - warm - cold (or neutral) tripole from south of Greenland to the Tropical Atlantic, which is somehow typical of a NAO+ like atmospheric circulation.
- Mediterranean Sea : positive anomalies for the whole basin, especially to the west.

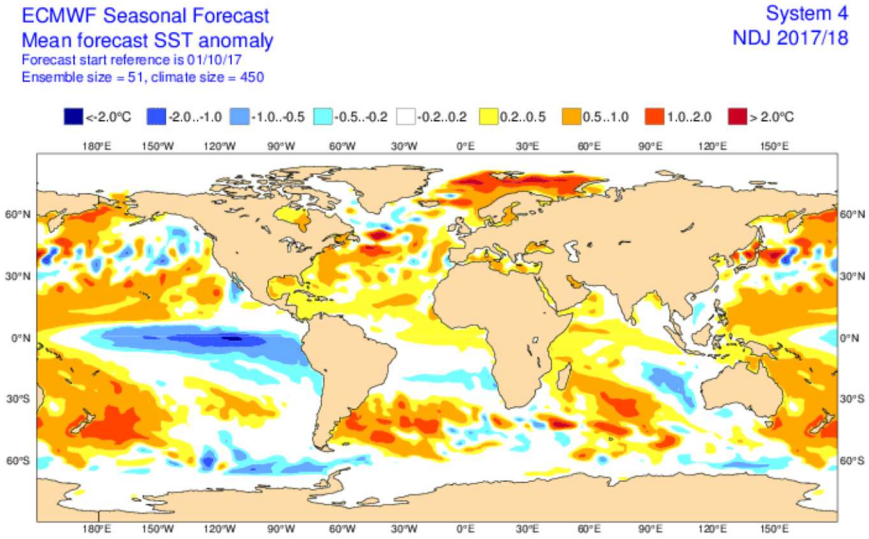


fig.II.1.1: SST anomaly forecast from ECMWF
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

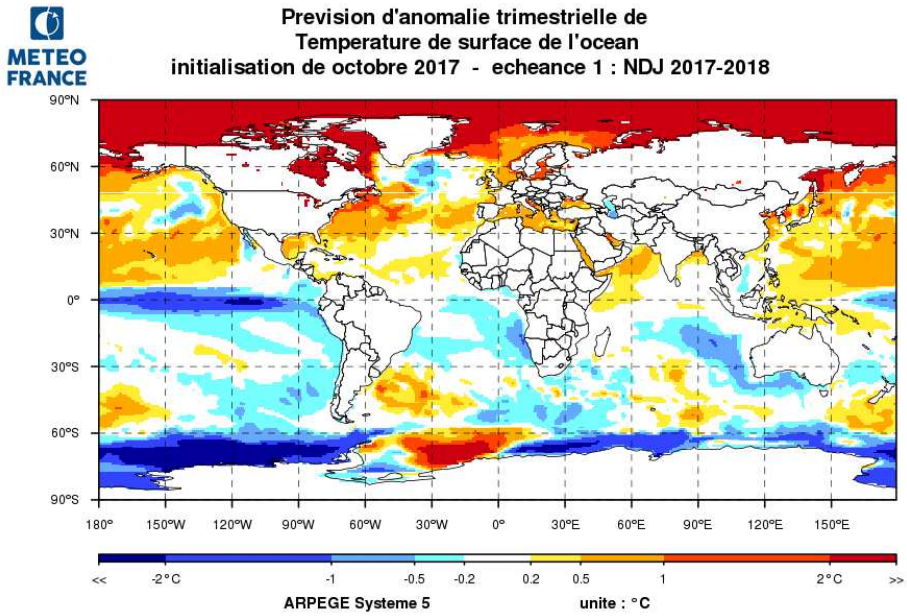


fig.II.1.2: SST Anomaly forecast from Meteo-France (recalibrated with respect of observation). http://seasonal.meteo.fr

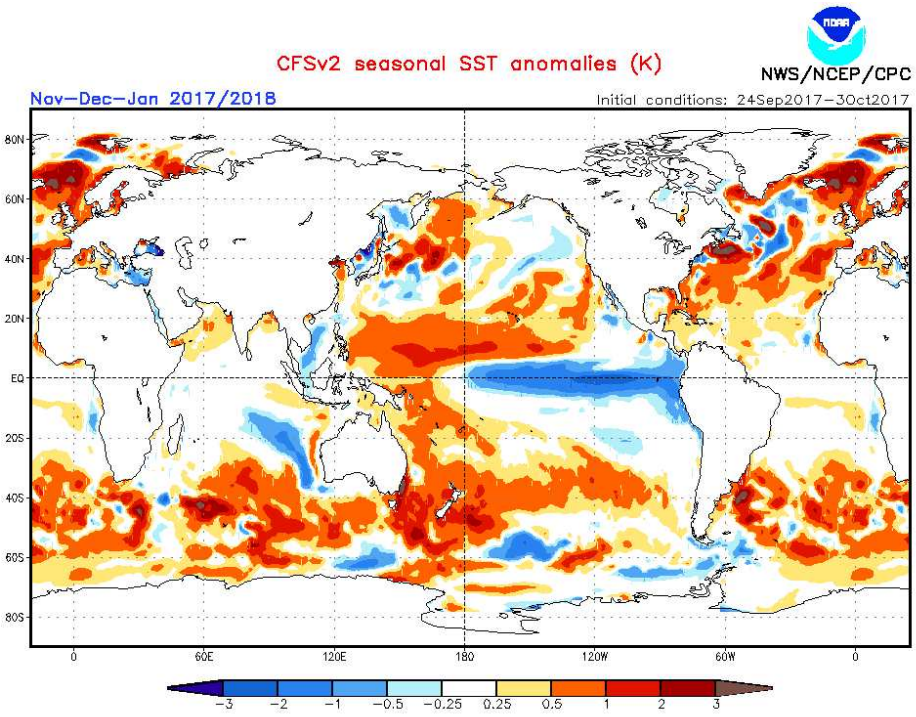


fig.II.1.3: SST Anomaly forecast from NCEP. http://www.cpc.ncep.noaa.gov/products/people/wwang/cfsv2fcst/imagesInd1/glbSSTSeaInd1.gif

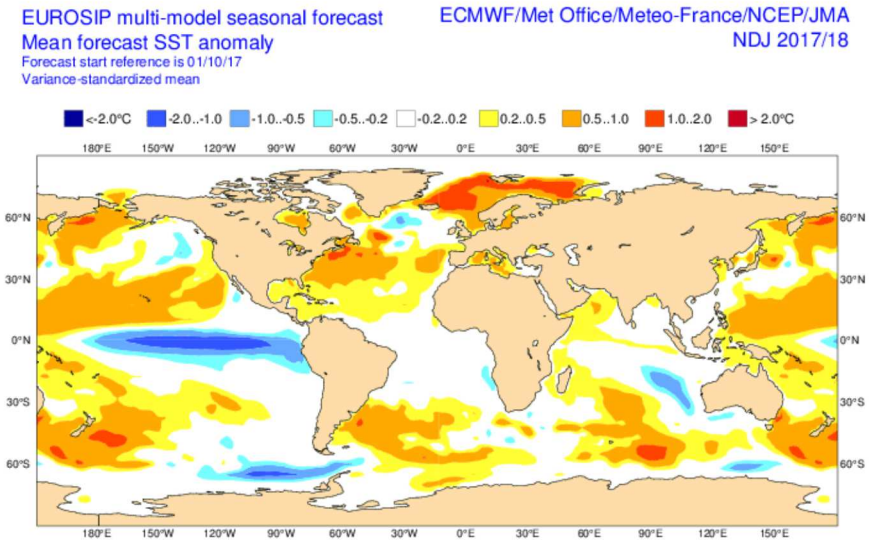
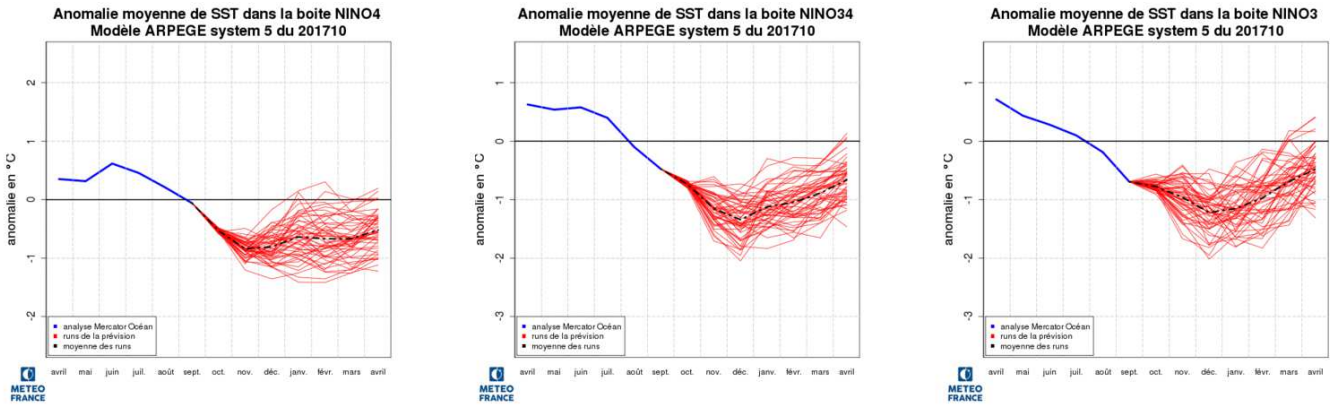


fig.II.1.4: SST Forecasted anomaly from Euro-SIP

II.1.b ENSO forecast :

***Forecast Phase*: weak La Niña likely for the next three-month period.**

Although the definition of a La Niña event regarding SST anomalies and SOI can vary from one institute to the other (NOAA, BOM, IRI), all models suggest Niña-like oceanic conditions for the November - January period. SST anomalies in the Niño 3.4 box should drop to -1.0℃ in November (-0.7℃ already reached as of 18th october) an d should remain at this level for the whole period (see figure II.1.5). Though it would be starting later in the year than usual, a weak to moderate La Niña event seems very likely for the 3 coming months, which should be easing in early boreal spring (march 2018). WMO has recently issued a probability of 50-55 % of La Niña conditions for the remainder of 2017 (against 45/50 % chances of staying neutral).



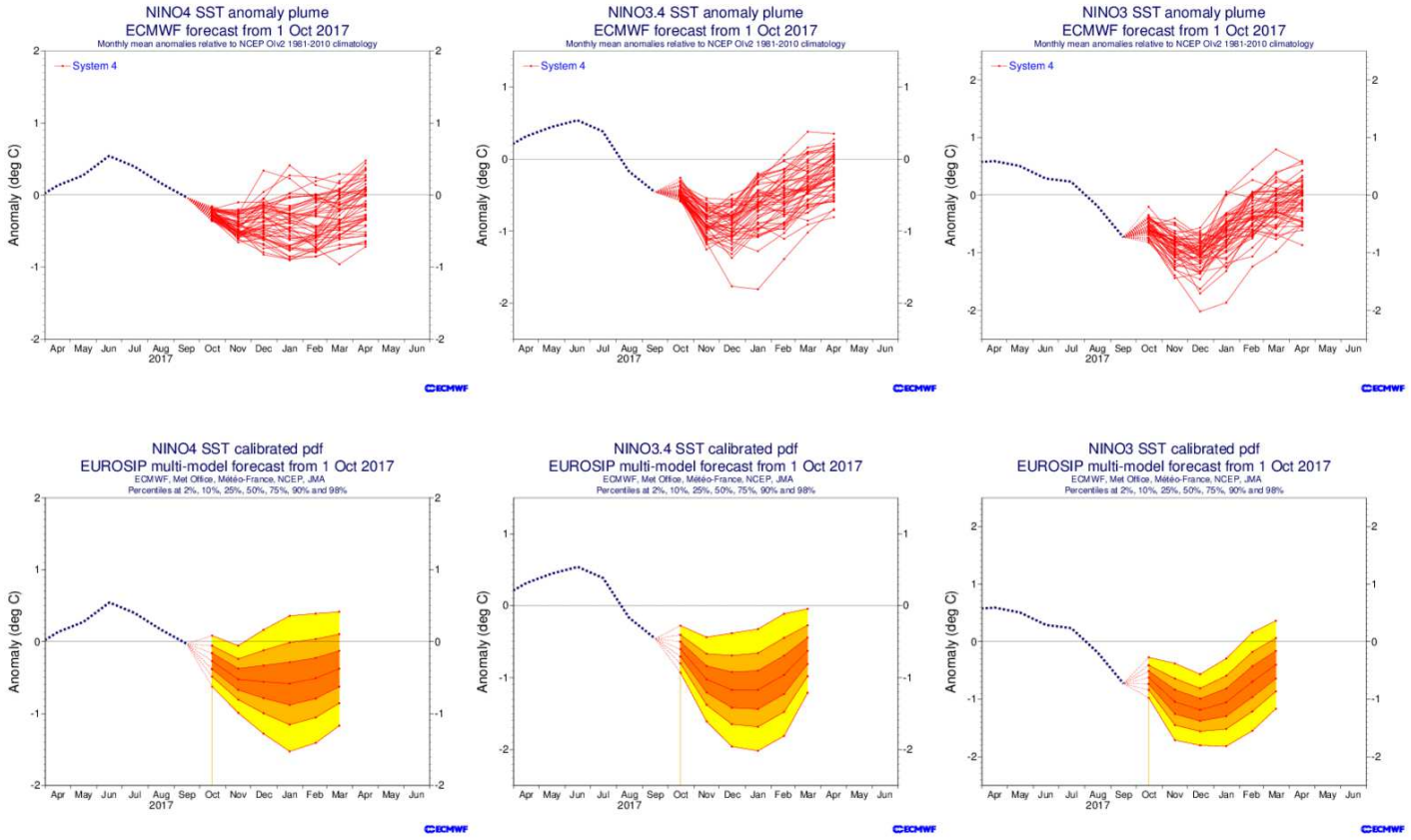


fig.II.1.5: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members -
and EUROSIP (bottom) – recalibrated distributions -
(http://seasonal.meteo.fr , http://www.ecmwf.int/)

I.1.c Atlantic ocean forecasts

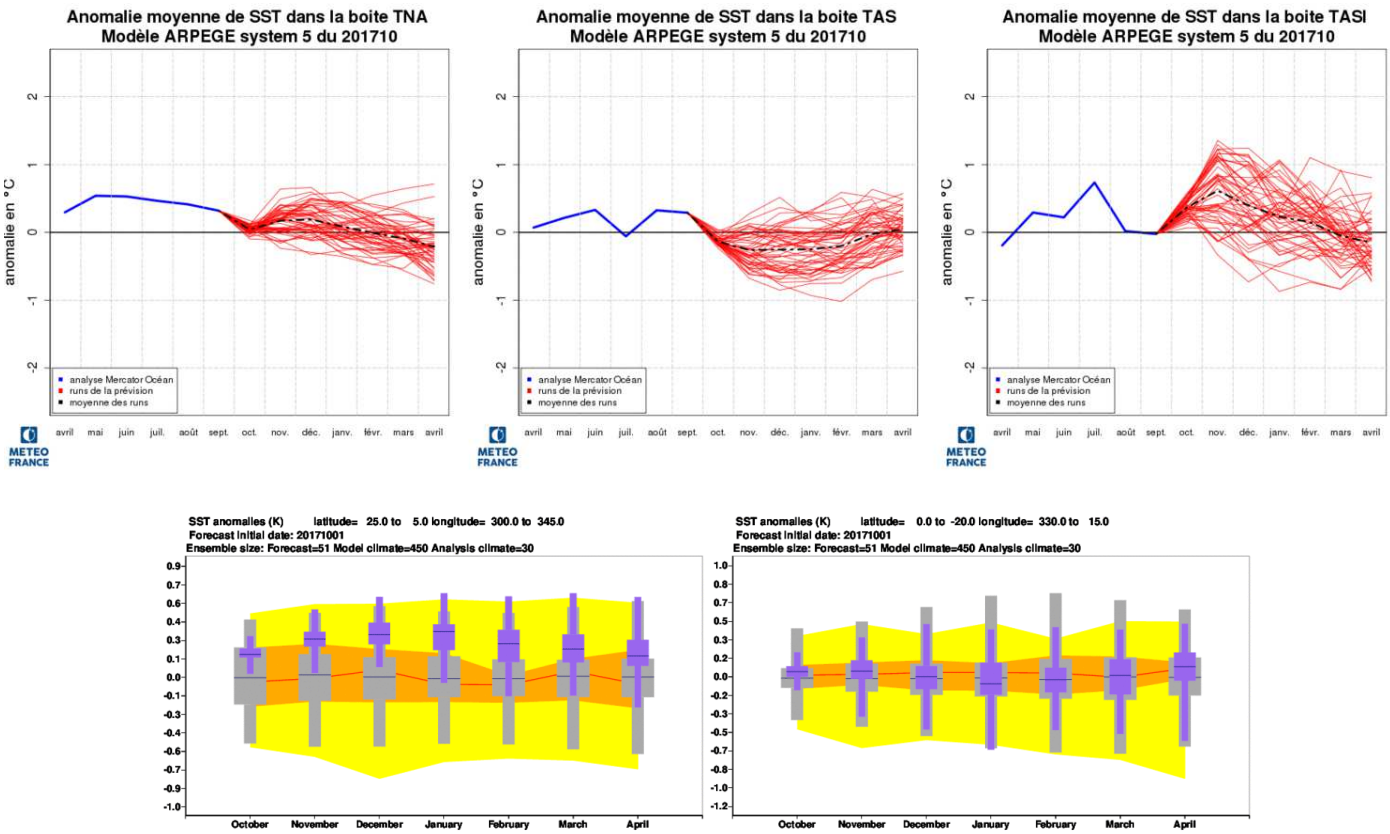


fig.II.1.6: SSTs anomaly forecasts in the Atlantic Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

I.1.d Indian ocean forecasts

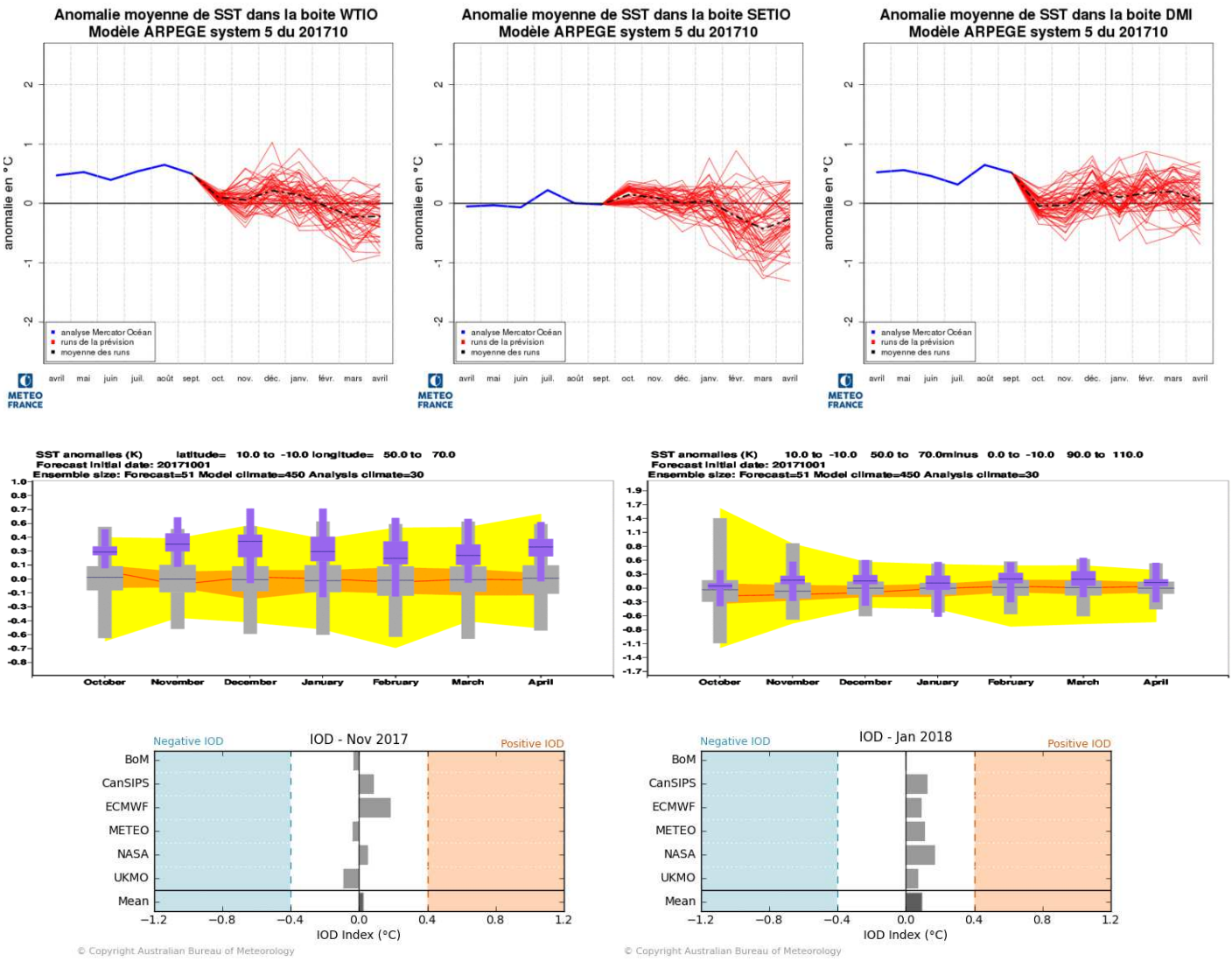


fig.II.1.7: SST anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

II.2. GENERAL CIRCULATION FORECAST

caution : MF System output have to be considered cautiously : a biais and a drift (between lead-times 0 and 6) in surface temperatures and 500 hPa heights make it difficult tio analyze these charts.

II.2.a Velocity potential anomaly field and Stream Function anomaly field

- Velocity potential :
  MF and ECMWF in good agreement, showing a La Niña-like atmospheric response : negative anomaly covering the Maritime Continent spreading to south-east Asia and Japan, and a positive anomaly over the tropical Pacific, up to Baja California. Elsewhere, the signal is much weaker and the agreement not that good, especially for eastern Africa and Madagascar. ECMWF and JMA do however agree with an upward motion anomaly, which is more consistent with the forecast SSTs (figure II.1.4).

- Stream Function : Ninã-like response over the tropical Pacific, exending towards the north Atlantic.

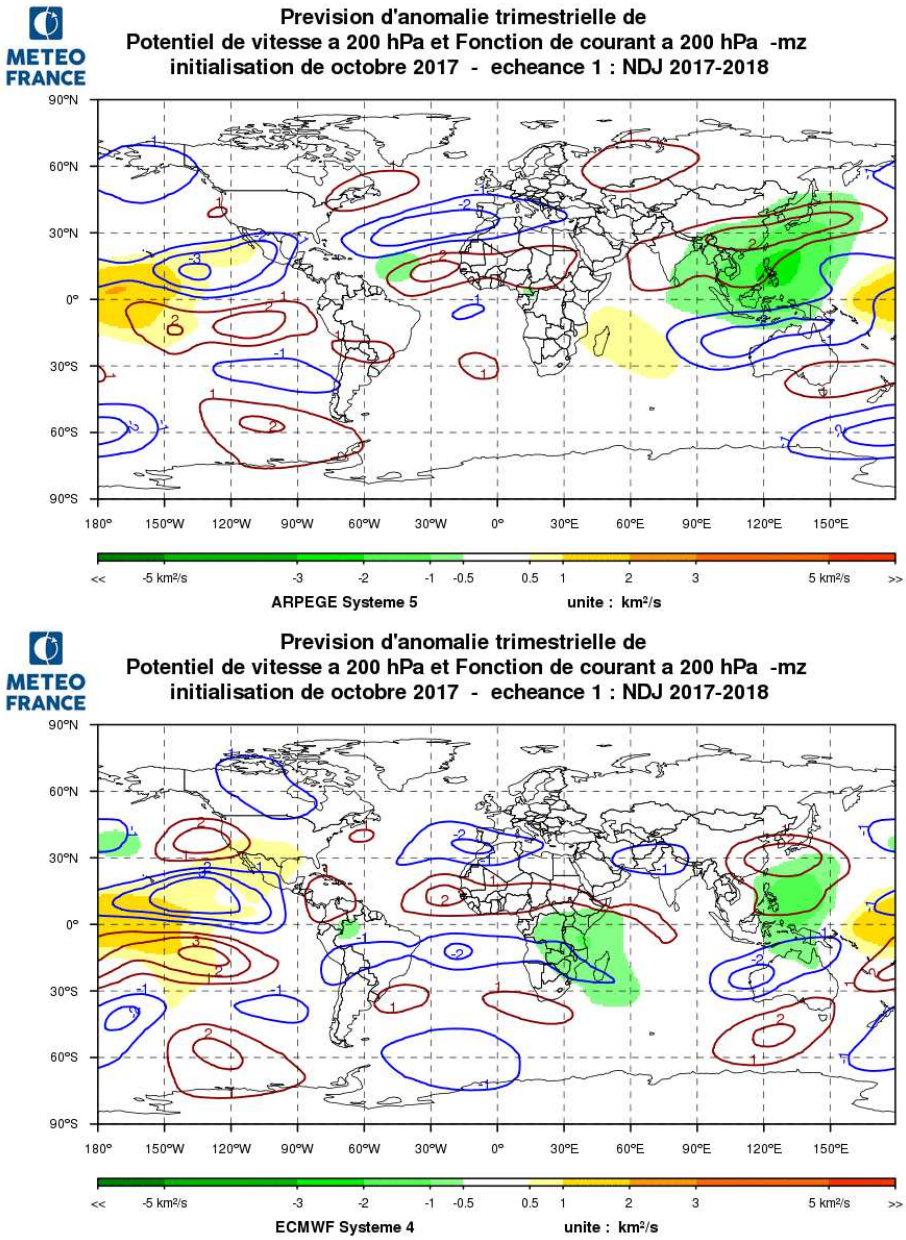


fig.II.2.1: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), associated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa by Météo-France (top) and ECMWF (bottom). http://seasonal.meteo.fr

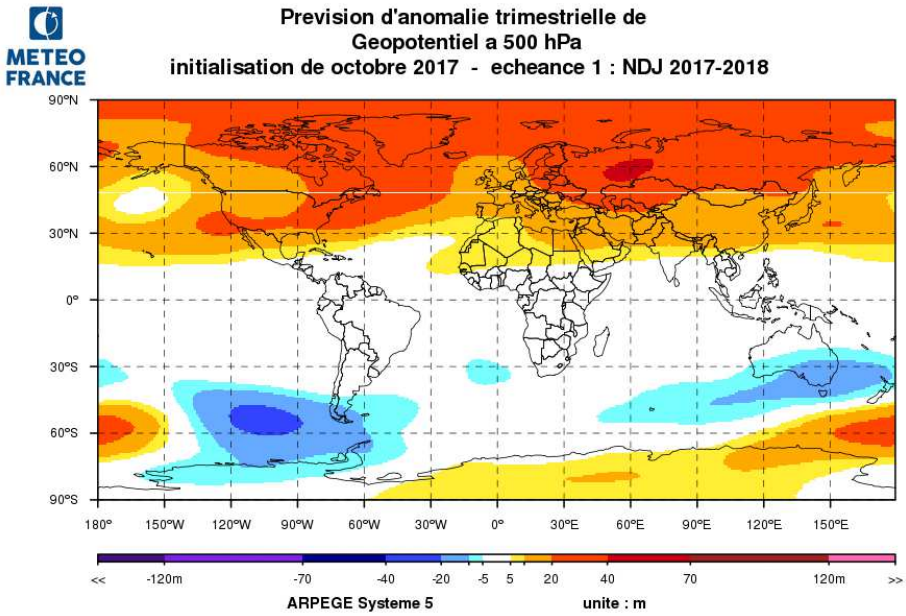
II.2.b Geopotential height anomalies

Rather good agreement of ECMWF and MF S5 over north America, with a negative PNA pattern suggested, which is consistent with a La Niña event.

Over Europe, the agreement is not so good, and the ECMWF and MF S5 suggestions (fig II.2.2) differ greatly from most of the GPC models, which suggest a positive NAO pattern (see for example the mean EUROSIP anomaly on fig II.2.3). MF System 6 (not operational yet) is much more similar to most of the GPC models.

Besides that, la Niña events combined with a positive PDO is known to favor positive NAO circulations over western Europe.

We will therefore follow this latter scenario for the rest of this bulletin.



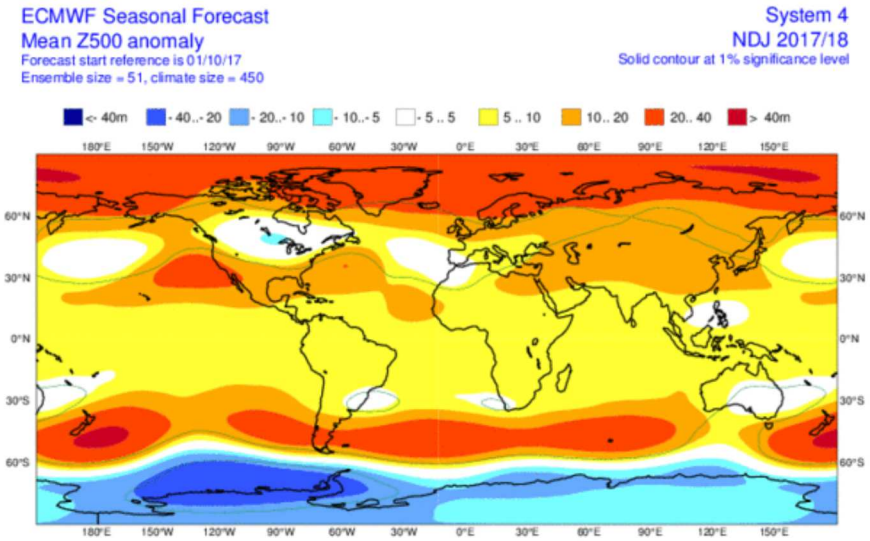


fig.II.2.2: Anomalies of Geopotential Height at 500 hPa from Météo-France and ECMWF.
http://seasonal.meteo.fr http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast

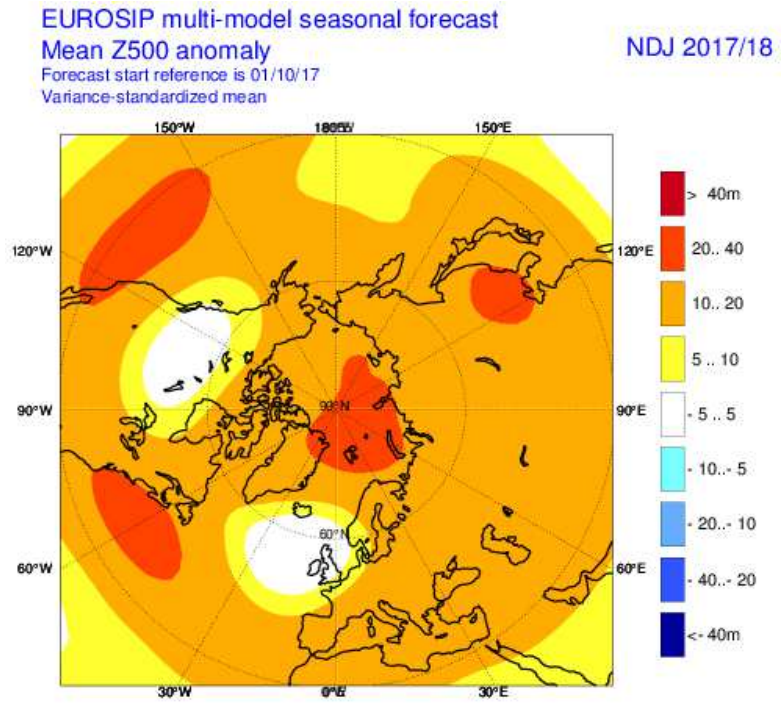


fig II.2.3 : Mean Anomaly of Geopotential Height at 500 hPa from the EUROSIP models

II.2.c. modes of variability

MF S5 model forecasts only.

This model favors positive SCAND, NAO, and EA modes, which are rather difficult to see on the 500 hPa heights anomalies on fig II.2.2.

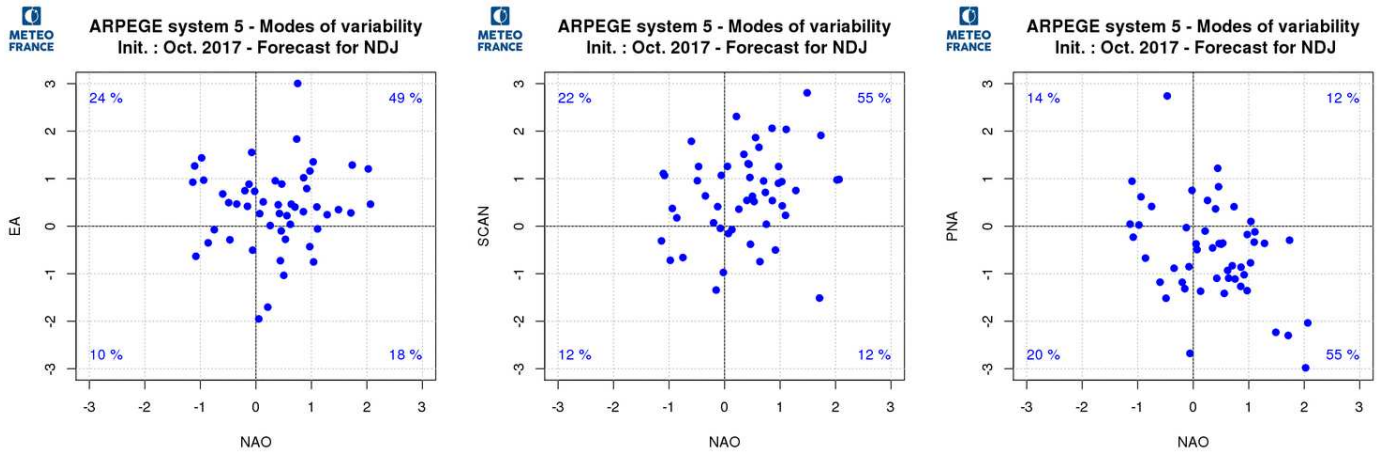


fig.II.2.4 : modes of variability forcasts over the Northern hemisphere with Meteo-France ARPEGE-S5

II.2.d. weather regimes

MF S5 model forecasts only.

Even though this classification is based on MSLP anomalies and not on 500 hPa heights anomalies, it is rather surprising that the positive NAO is less favored than the other regimes whereas it was the prominent forecast mode of variability (see previous paragraph). The Blocking pattern is favored by MF S5 but this is not in agreement with most of the other GPC models.

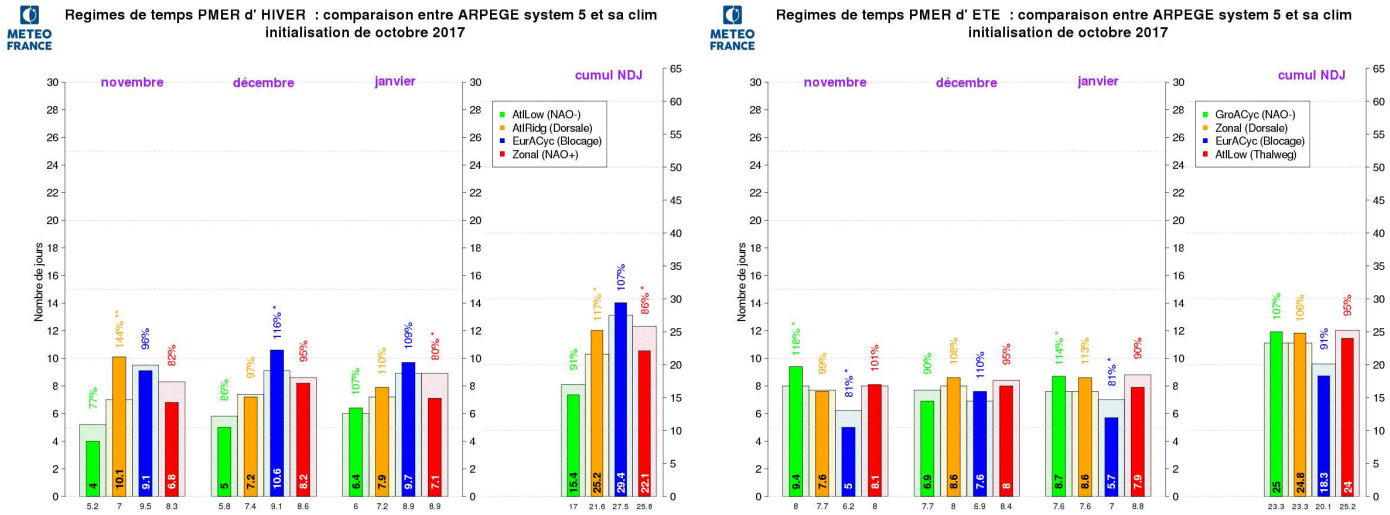


fig.II.2.5: North Atlantic Regime occurrence anomalies from Meteo-France ARPEGE-S5 : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.

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

Warm signal dominates the northern hemisphere (see EUROSIP mean on fig II.3.4), apart from north-western USA and Canada, which is consistent with La Niña and a negative PNA (cold anomalies expected over these regions).

For Europe, there are differences between the model outputs. ECMWF does not forecast any positive anomalies from Scandinavia to Central Europe (negative NAO forecast by this model). But this is not supported by most of the other models (see § II.2.b) for which positive anomalies engulf much of the Continent (see fig II.3.4). This is also more consistent with a Niña/PDO+ configuration.

II.3.a Météo-France

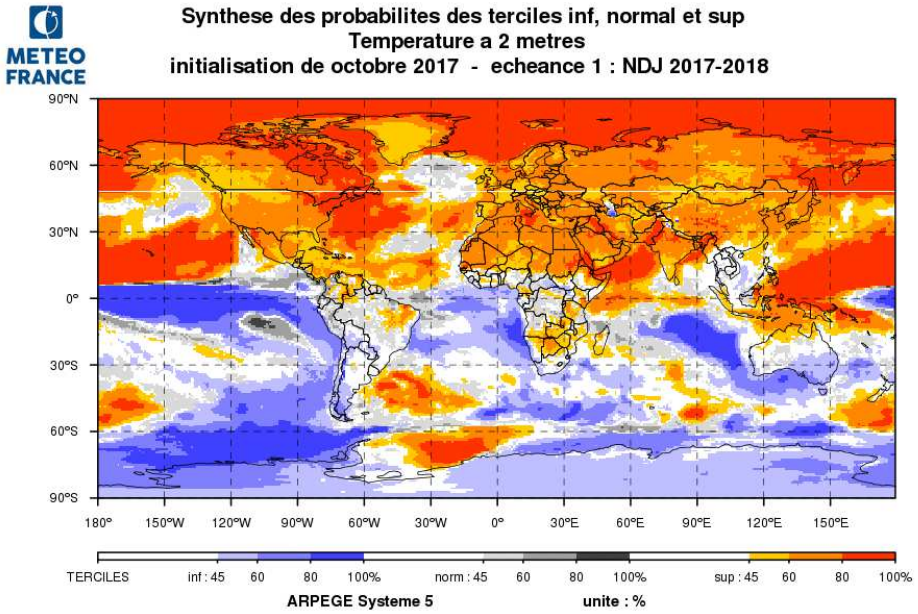


fig.II.3.1: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://seasonal.meteo.fr/

II.3.b ECMWF

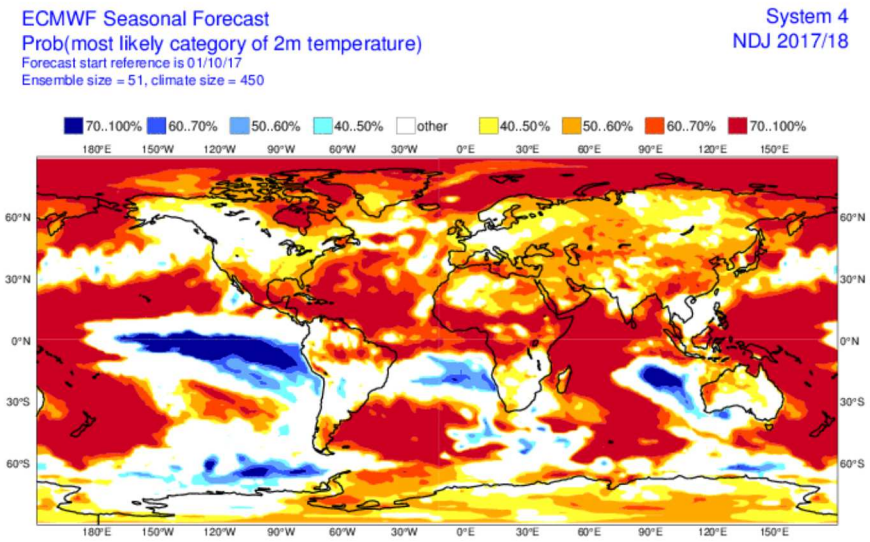


fig.II.3.2: Most likely category probability of T2m from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seaso...

II.3.c Japan Meteorological Agency (JMA)

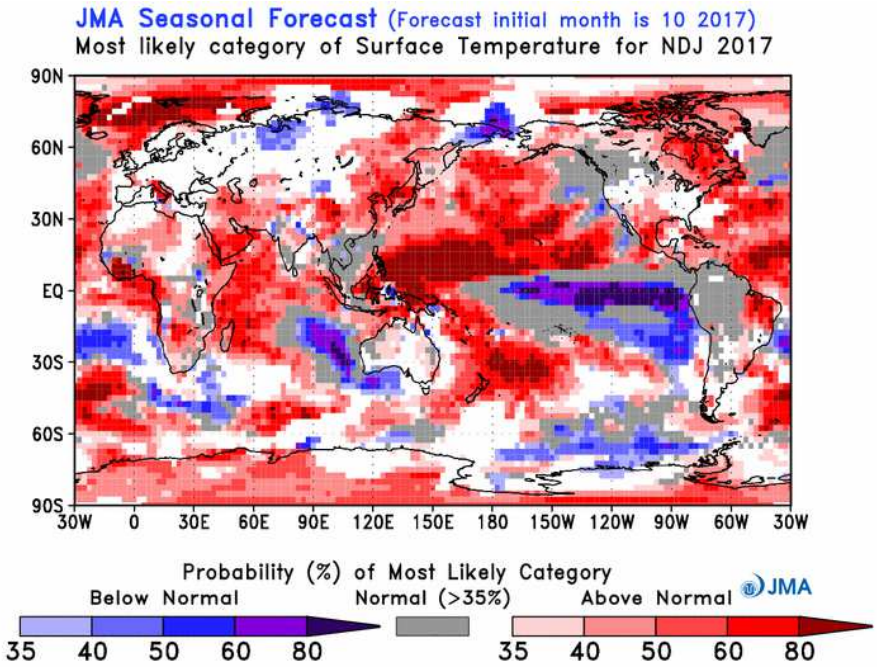


fig.II.3.3: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/3-mon/fcst/fcst_gl.php

II.3.d EUROSIP

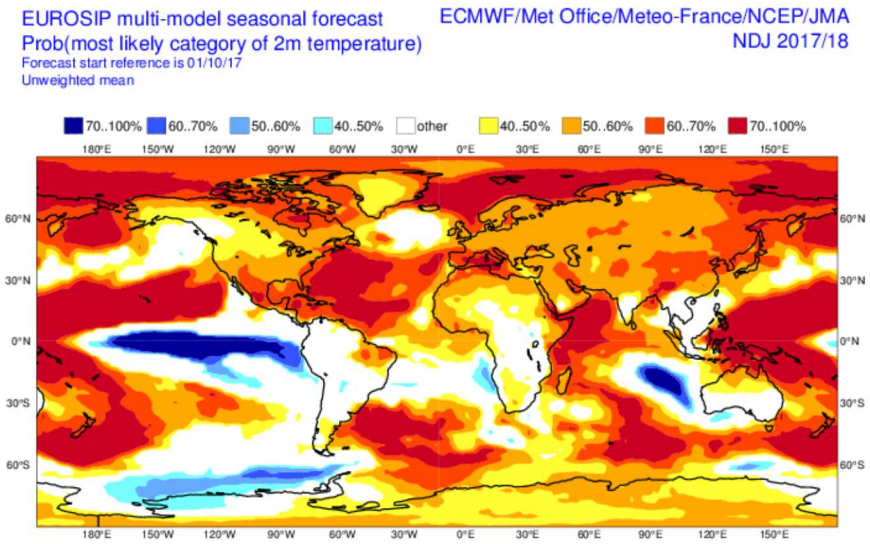


fig.II.3.4: Multi-Model Probabilistic forecasts for T2m from EuroSip (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmv2/param_euro/seasonal_charts_2tm/

II.4. IMPACT : PRECIPITATION FORECAST

- For the Maritime Continent, forecasted rainfall anomalies are not fully consistent with vertical velocities anomalies since the EUROSIP wet signal is confined to the Philippines. Despite the DMI being forecast close to zero, the expected Niña conditions should favor enhanced rainfall over New Guinea / eastern Indonesia and the Philippines.
- Consistent with warm SSTs, positive rainfall anomalies are expected for south-eastern Africa from the Great Lakes to Mozambique, extending towards Madagascar and the Mascarenes (there is an incertainty however concerning the velocity potential anomaly, that could modulate the rainfall pattern)
- Wet conditions also likely with La Niña for south-western tropical Pacific and eastern Australia. The Amazon could return to wetter conditions
- the negative PNA should favor wetter (snowier) than normal conditions for Canada and north-western US, while it should be drier over south-eastern US.
- for Europe, ECMWF and MF S5 dot not support the guidance brought by the majority of GPCs which suggest wet conditions to the north and rather dry conditions to the south (consistent with positive NAO).

II.4.a Météo-France

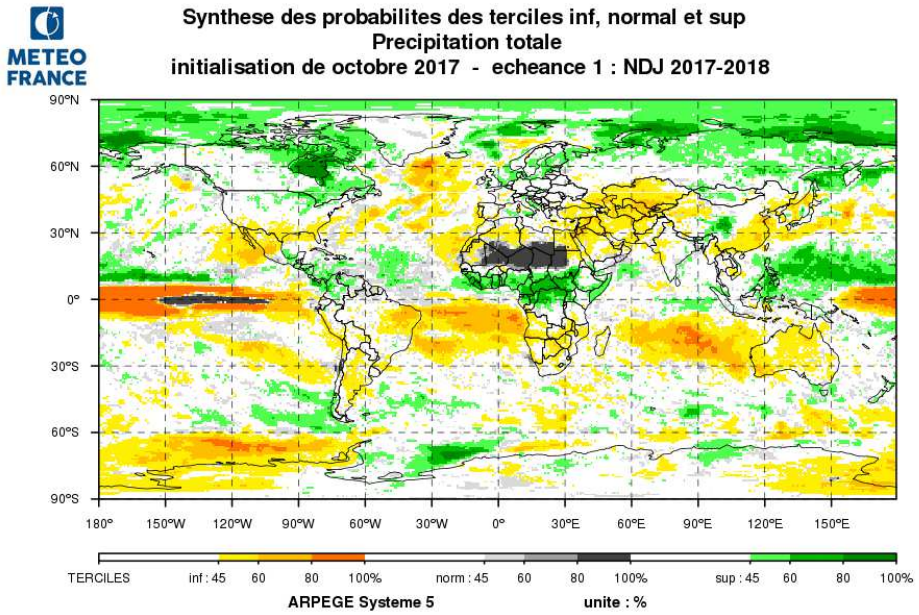


fig.II.4.1: Most likely category of Rainfall. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://seasonal.meteo.fr/

II.4.b ECMWF

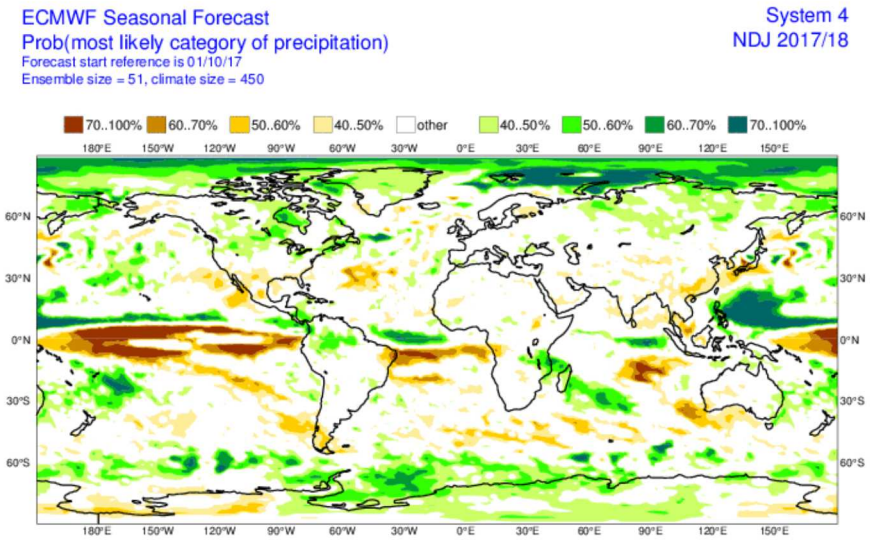


fig.II.4.2: Most likely category probability of rainfall from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

II.4.c Japan Meteorological Agency (JMA)

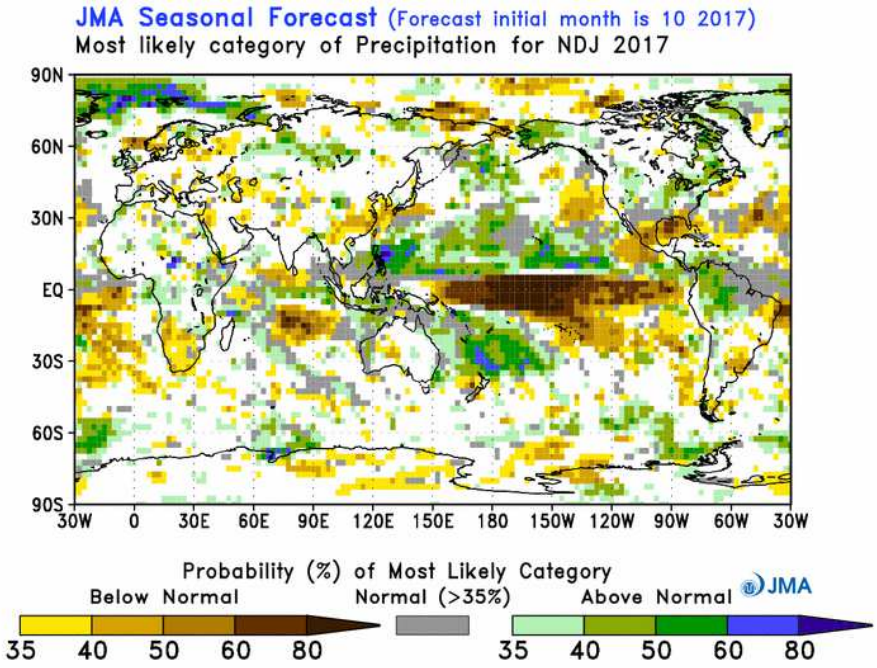


fig.II.4.3: Most likely category of Rainfall from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/3-mon/fcst/fcst_gl.php

II.4.d EUROSIP

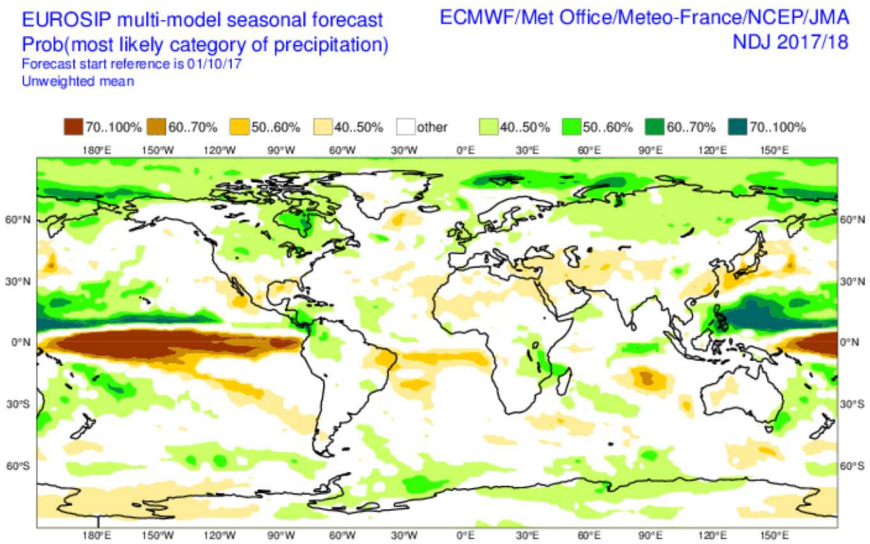


fig.II.4.4: Multi-Model Probabilistic forecasts for precipitation from EuroSip (2 Categories, Below and Above normal – White zones correspond to No signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmv2/param_euro/seasonal_charts_2tm/

II.5. REGIONAL TEMPERATURES and PRECIPITATION

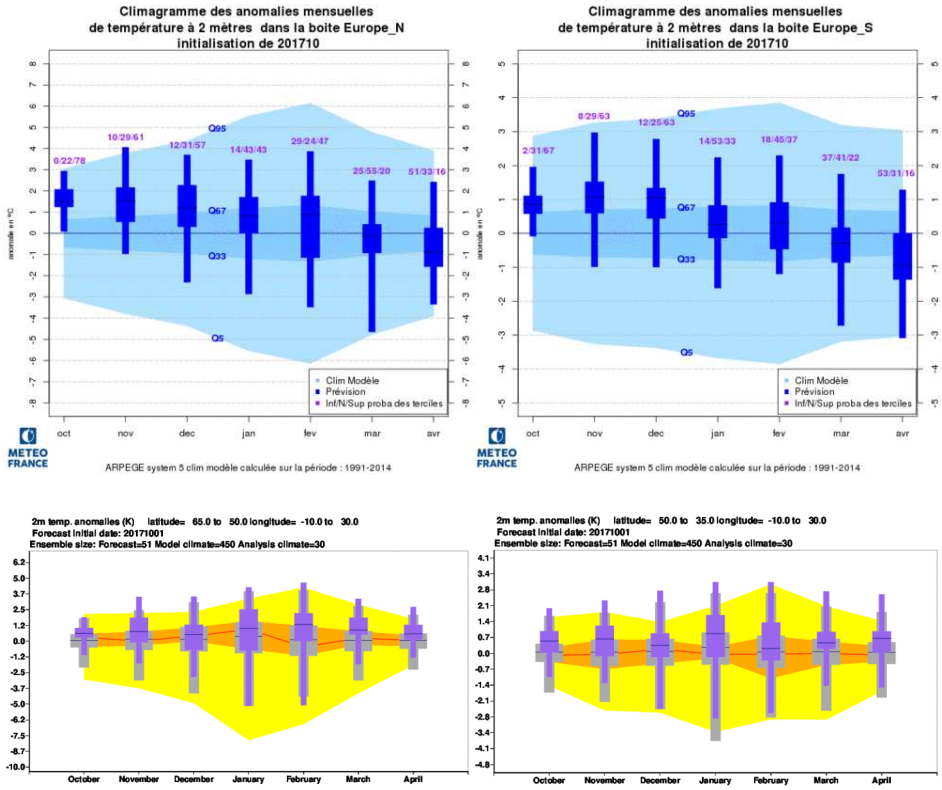


fig.II.5.1 : Climagrams for Temperature in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

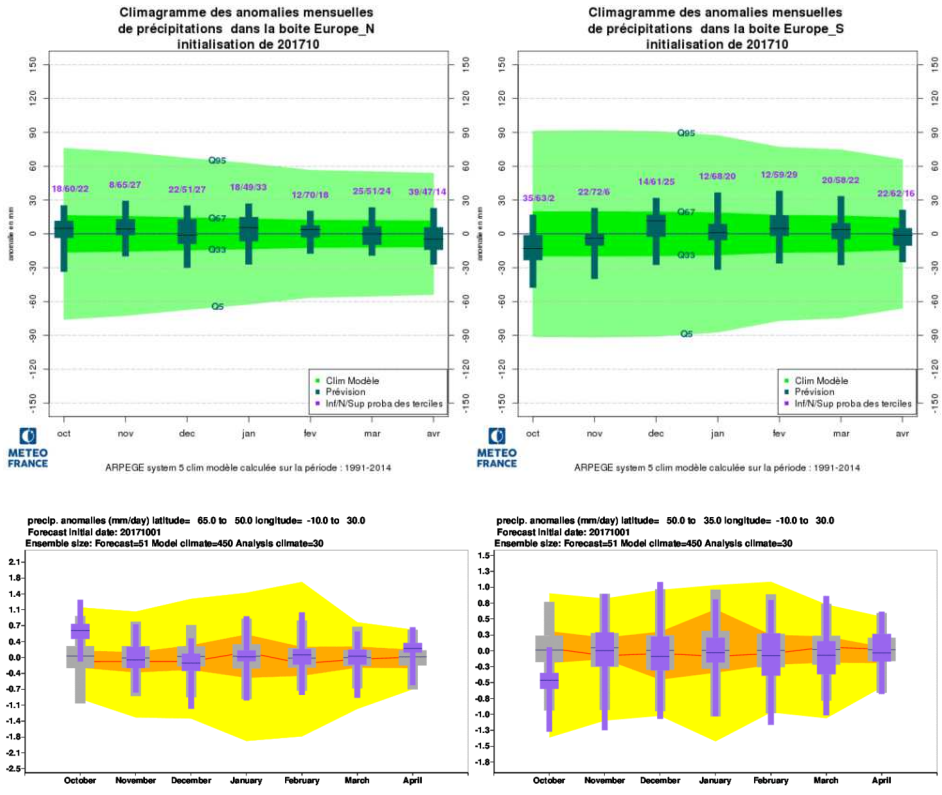


fig.II.5.2 : Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

II.6. "EXTREME" SCENARIOS

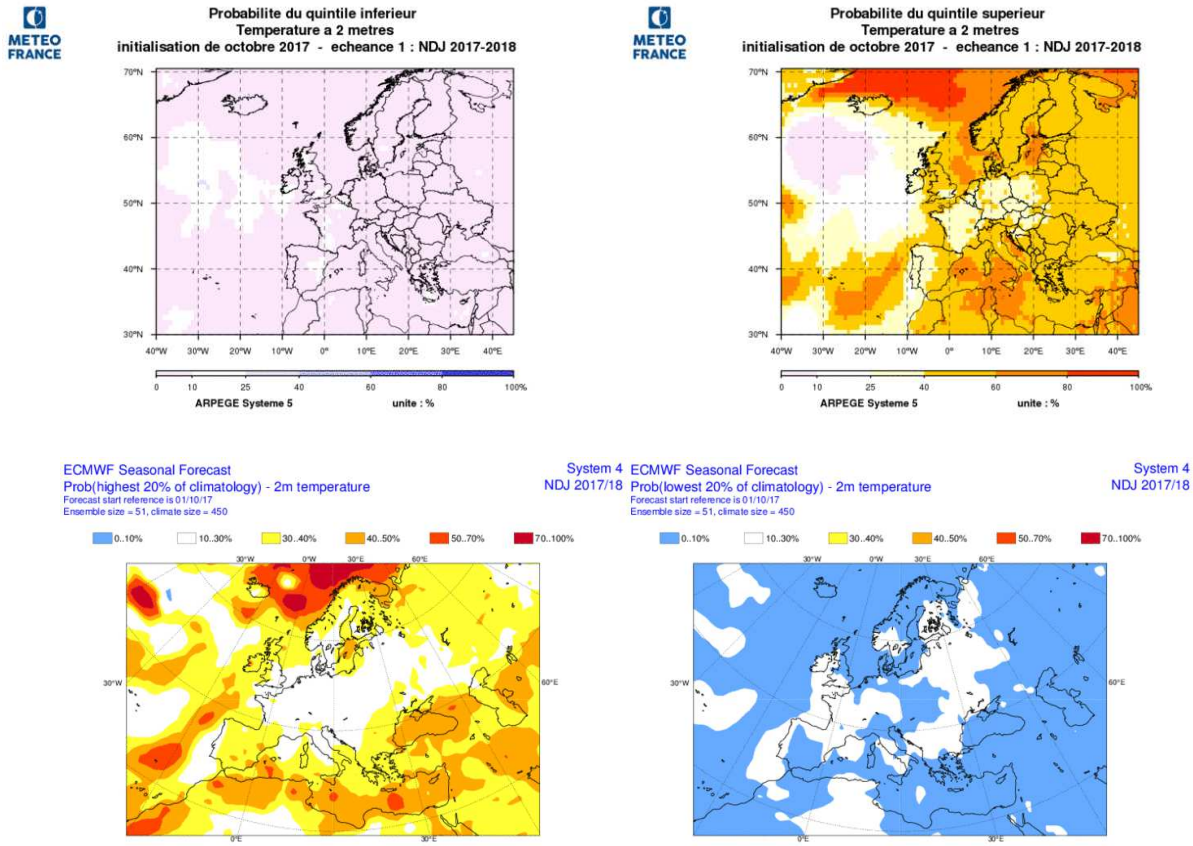


fig.II.6.1 : Top : Meteo-France T2m probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution). Bottom : ECMWF T2m probability of « extreme » below normal conditions (left - highest ~20%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

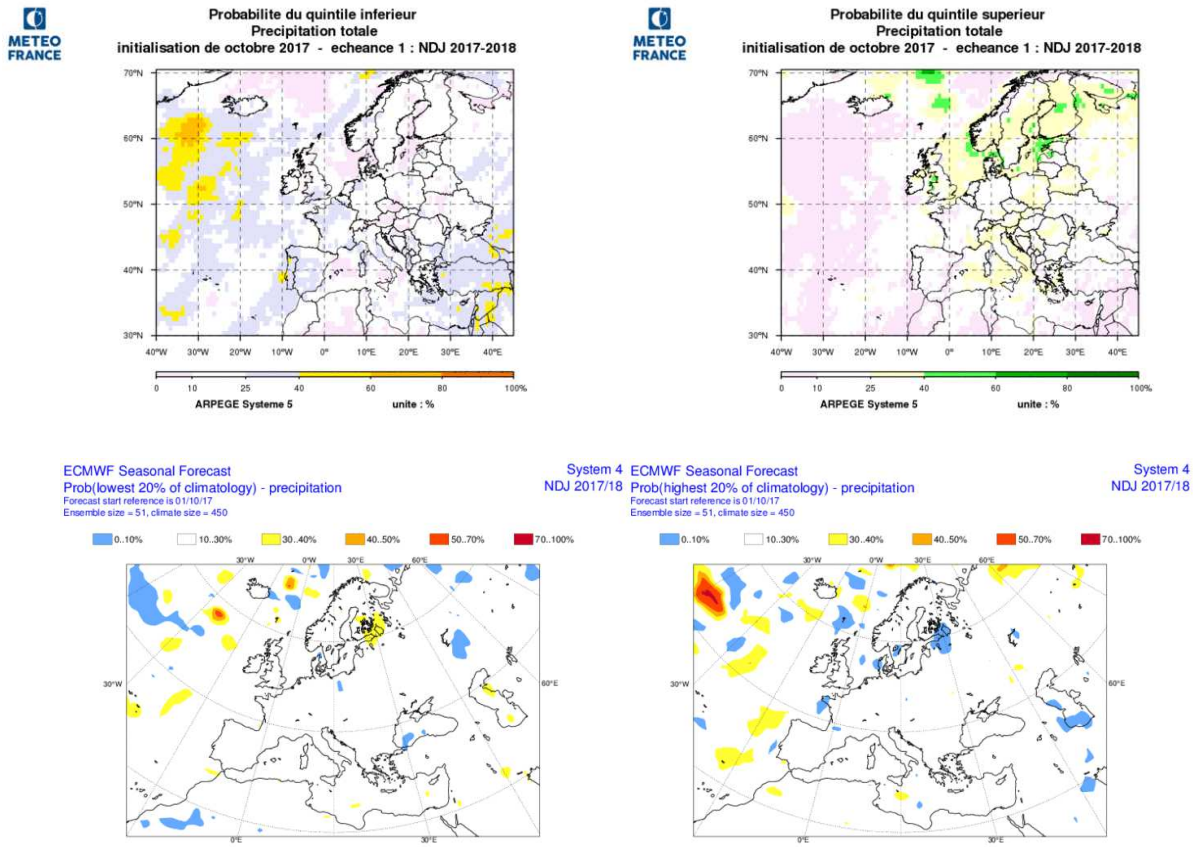


fig.II.6.2 : Top : Meteo-France rainfall probability of « extreme » below normal conditions (left - lowest ~15% of the

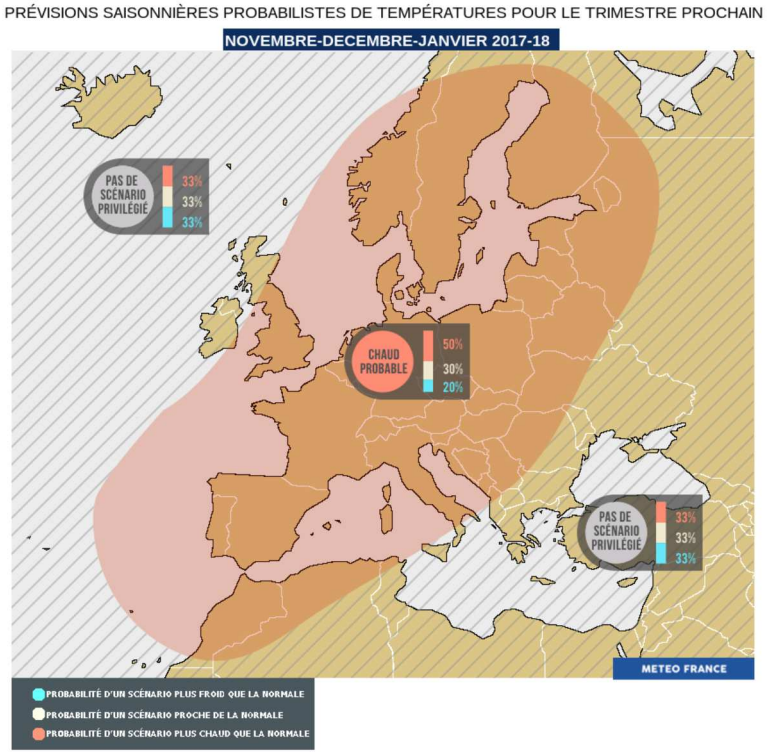
distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution).
Bottom : ECMWF rainfall probability of « extreme » below normal conditions (left - lowest ~20% of the distribution) and "extreme" above normal conditions (right – highest ~20% of the distribution).

II.7. DISCUSSION AND SUMMARY

II.7.a Forecast over Europe

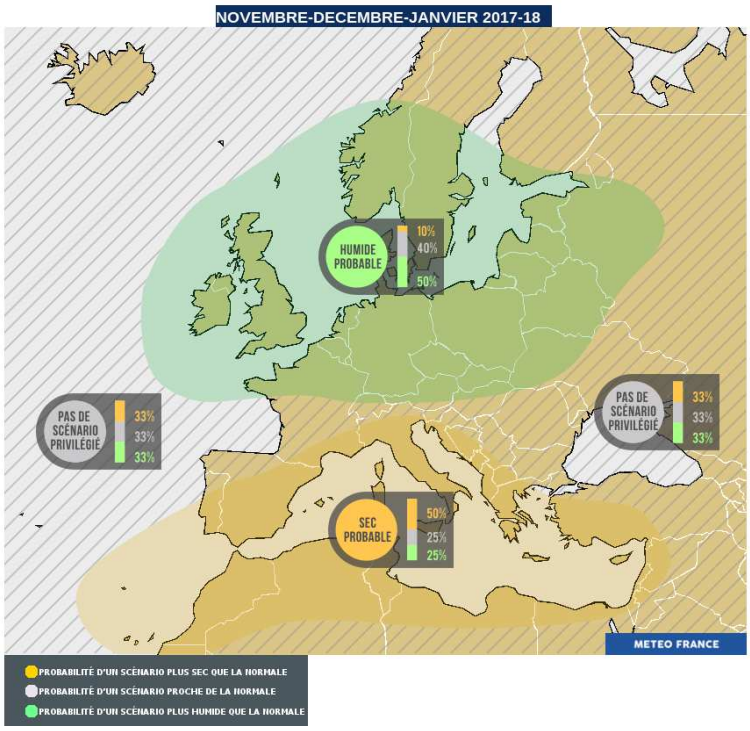
GPC guidance favors a westerly oceanic flow over western Europe. Even if some uncertainty remains, and despite the Niña event is expected to be of weak to moderate intensity, the odds for a positive NAO pattern look higher than normal for the three coming months.

Temperatures : a warm scenario is therefore forecast for most of Europe. For the Middle East, Russia, and countries surrounding the Black Sea the warm signal is less clear. Same thing for the western part of the British isles and Iceland, close to the Atlantic cold blob.



Precipitations: the zonal flow would enhance rainfall over northern Europe while drier than normal conditions should persist over the western Mediterranean basin.

PRÉVISIONS SAISONNIÈRES PROBABILISTES DE PRÉCIPITATIONS POUR LE TRIMESTRE PROCHAIN



II.7.b Tropical cyclone activity

Below-normal activity likely for south-western Pacific (consistent with La Niña). Close to normal for the Indian Ocean.

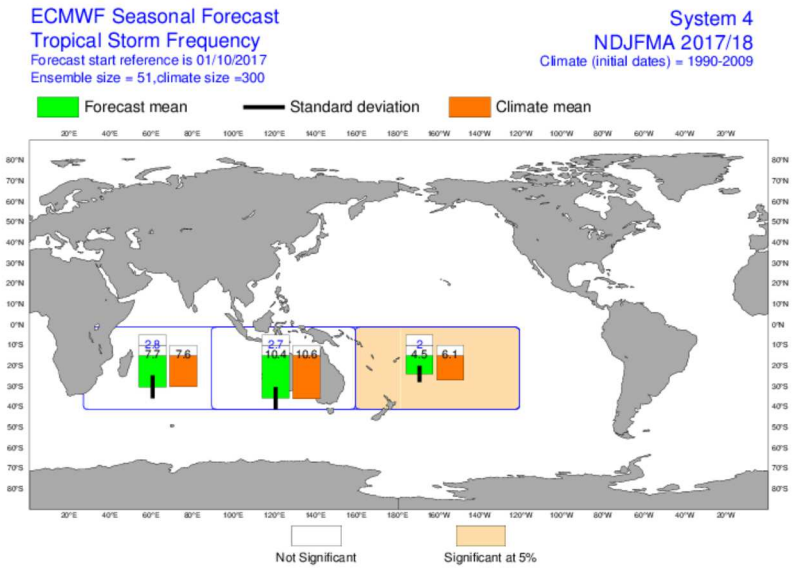


fig.II.7.1 : Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtrop/trop_euro
/eurosip_tropical_storm_frequency/

III.1. Seasonal Forecasts

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

- BoM, CMA, CPTEC, ECMWF, JMA, KMA, Météo-France, NCEP and UK Met Office have ocean/atmosphere coupled models. The other centres 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 interpretate 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 centres.

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 wher e the SST warming is developing first at the surface (especially for coastal events).

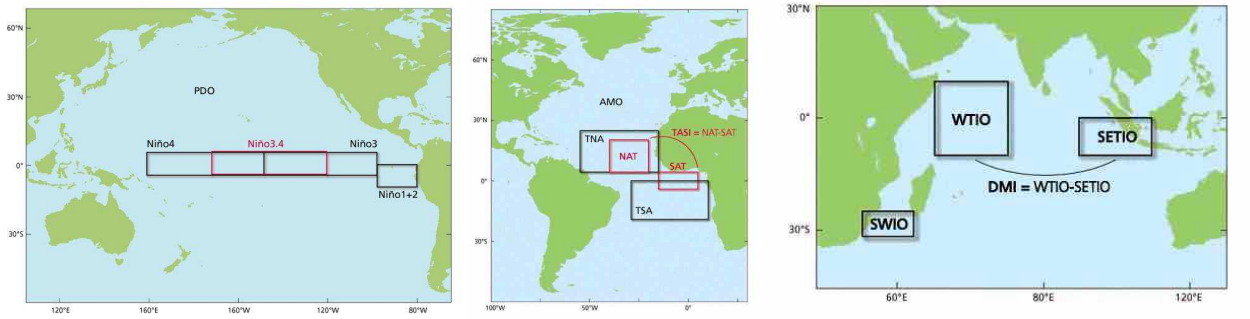
- Niño 3 : 5°S/5°N 90W-150W ; it is the region where the interanual variability of SST is the greatest.

- Niño 4 : 5°S/5°N 160E- 150W ; it is the region whe re 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 be tween Niño 3 and Niño 4 boxes (SST variability and Rainfall impact).

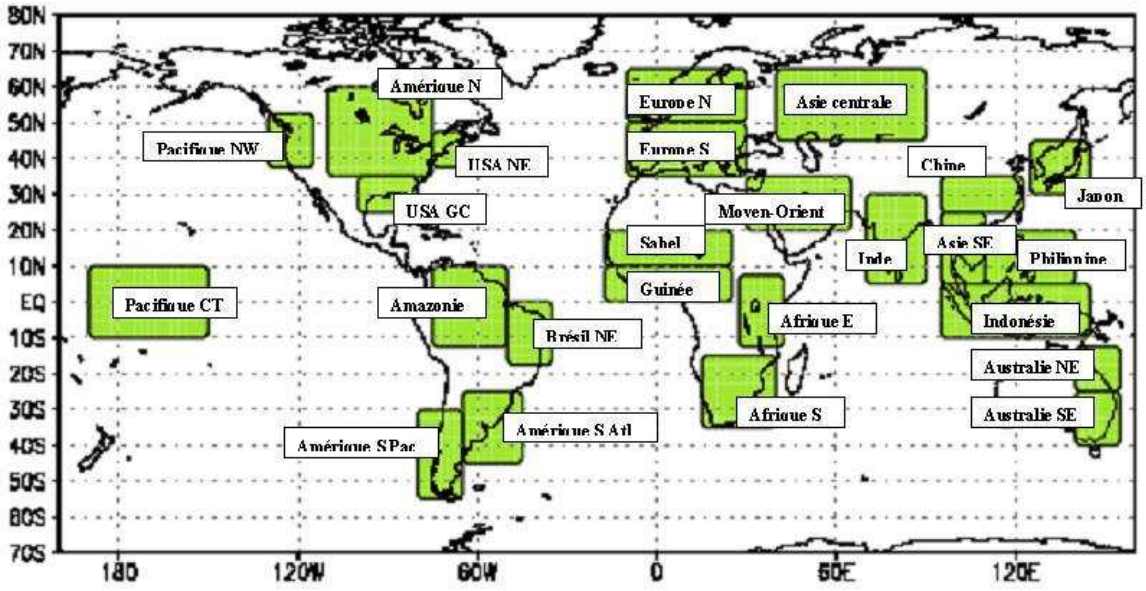
Associated to the oceanic « El Niño / La Niña » events, and taking into account the strong ocean/atmopshere coupling, the atmosphere shows also interanual variability associated to these events. It is monitored using the SOI (Southern Oscillation Index). This indice is calculated using standardized sea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