GLOBAL CLIMATE BULLETIN
n°199 – Janvier 2016

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I. DESCRIPTION OF THE CLIMATE SYSTEM (NOVEMBER 2015)

I.1.OCEANIC ANALYSIS

I.1.a Global analysis

In the Pacific ocean :

All along the equatorial waveguide :

- Surface (fig.I.1.1, I.1.2 and I.1.3): The strong El Nino event is now well installed. Strong warm anomaly along the equator from the International Date Line to the South American coasts. The SST anomaly has reinforced in November in the central part of the basin, because of a new Kelvin wave (see fig. I.1.4). In November, the Nino3.4 index value monthly mean reaches +3°C (gain of +0.5°C since October), and the Nino1+2 index +2.1 ° C (loss of -0.4°C since October).

- Sub-surface : remaining strong East-West dipole anomaly pattern. Kevin wave clearly visible in fig. I.1.4.

El Niño monitoring: Niño 3.4 index reaches 3 °C in November (monthly mean), corresponding to a strong El Niño event.

Elsewhere:

In the northern hemisphere: still a clear

positive structure of the PDO, but weaker than in the previous months.

In the southern hemisphere: still a cold anomaly pattern from the Salomon Islands to Chile, but weaker than in October.

In the Indian Ocean :

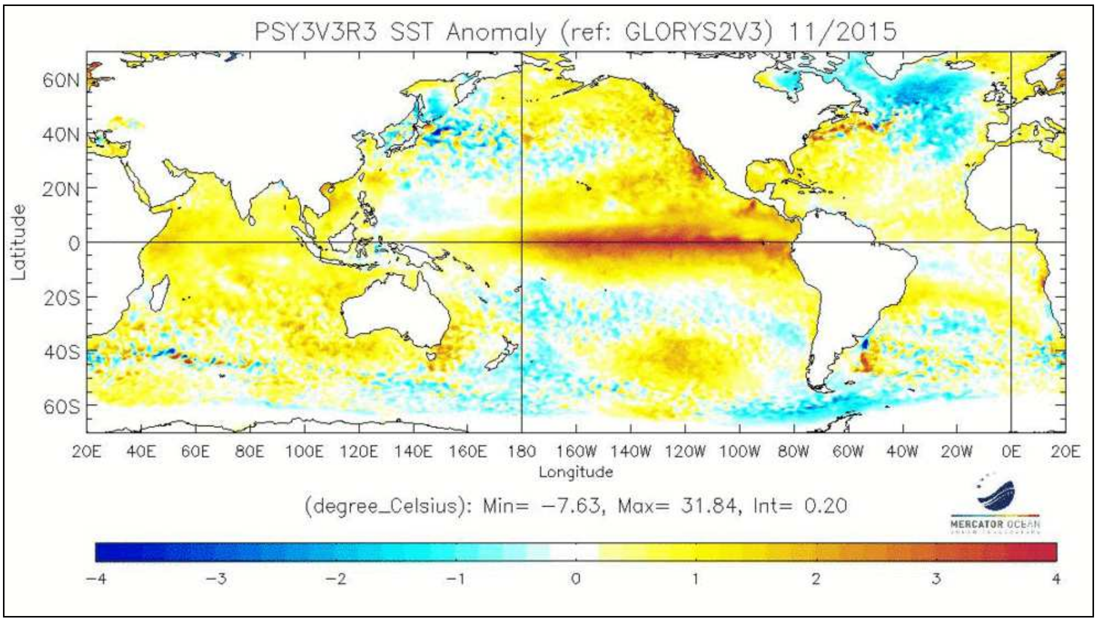
Generalized warm anomaly, stronger along the African coast. The DMI index is still positive but weaker than in October (around +0.6°C (http://stateoftheocean.osmc.noaa.gov/sur/ind/dmi.php)

because of a weakening of the warm anomaly in the western part of the Ocean.

In the Atlantic:

Slightly positive or close to neutral on the equator and up to 30S.
In the north intertropical area and along the US coasts, persistent warm anomaly.
In the North Atlantic, still the strong cold anomaly from Labrador to Europe.

The Mediterranean Sea is still warmer than normal.



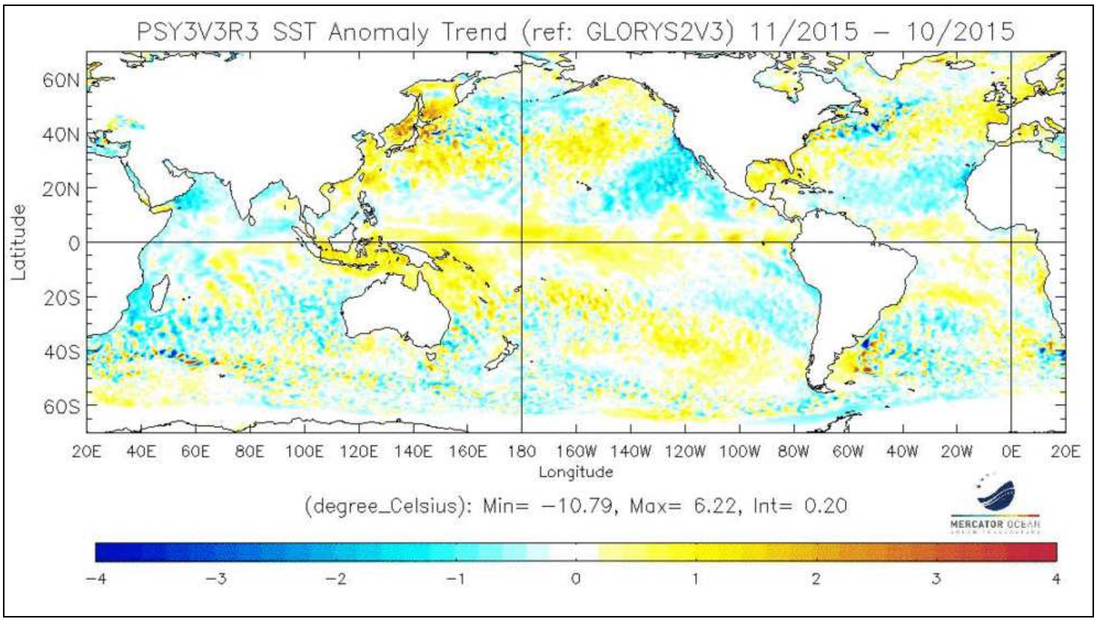


fig.I.1.1: top : SSTs Anomalies (°C) . Bottom : SST tendency (current – previous month), (reference Glorys 1992-2009). http://bcg.mercator-ocean.fr/

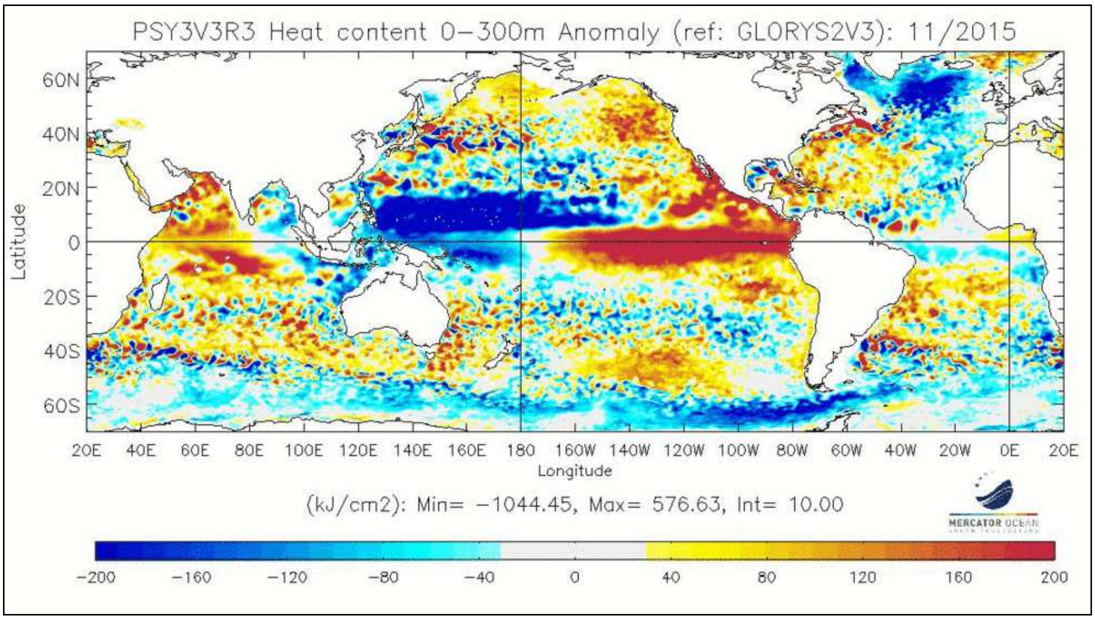


fig.I.1.2: map of Heat Content Anomalies (first 300m, kJ/cm2, reference Glorys 1992-2009)

http://bcg.mercator-ocean.fr/

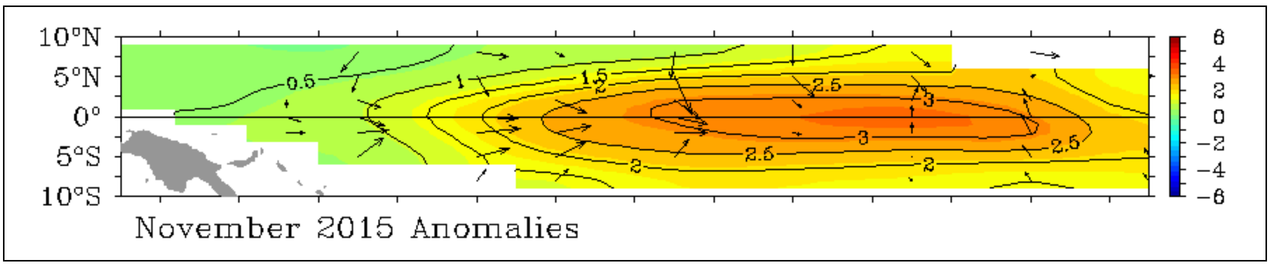


fig.I.1.3: SST Anomalies and Wind anomalies over the Equatorial Pacific from TAO/TRITON.

http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/monthly-summary.html

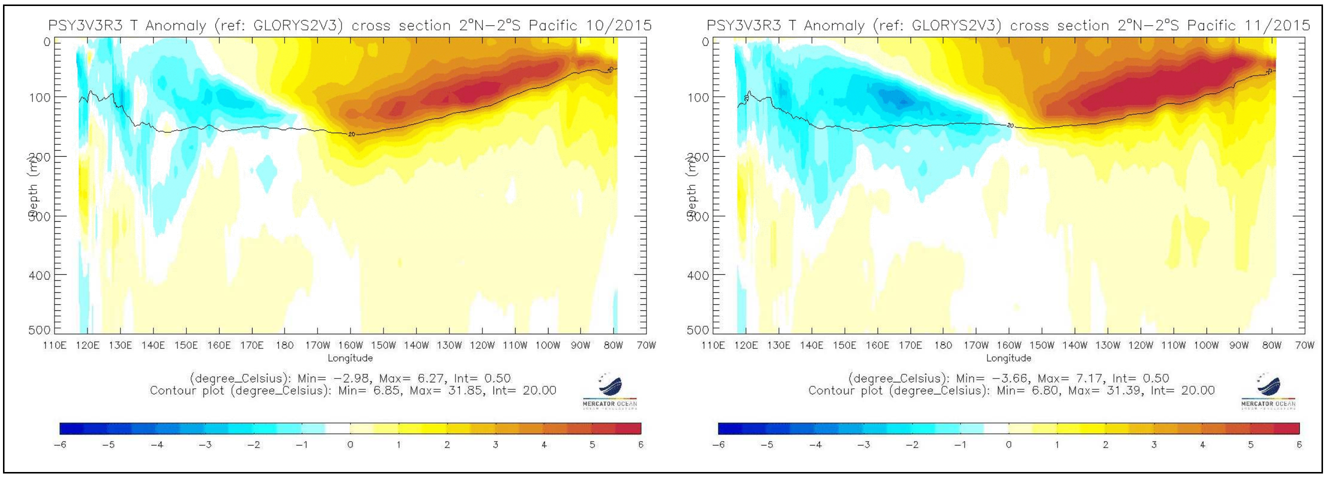


fig.I.1.4: Oceanic temperature anomaly in the first 500 meters in the Equatorial Pacific (previous and current month), http://bcg.mercator-ocean.fr

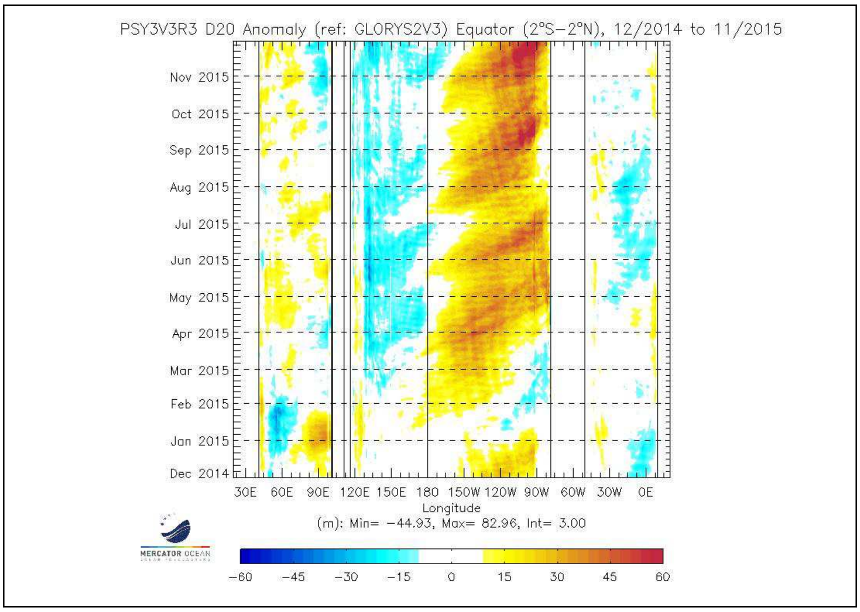


fig.I.1.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 6 month period http://bcg.mercator-ocean.fr/

I.1.b Near Europe

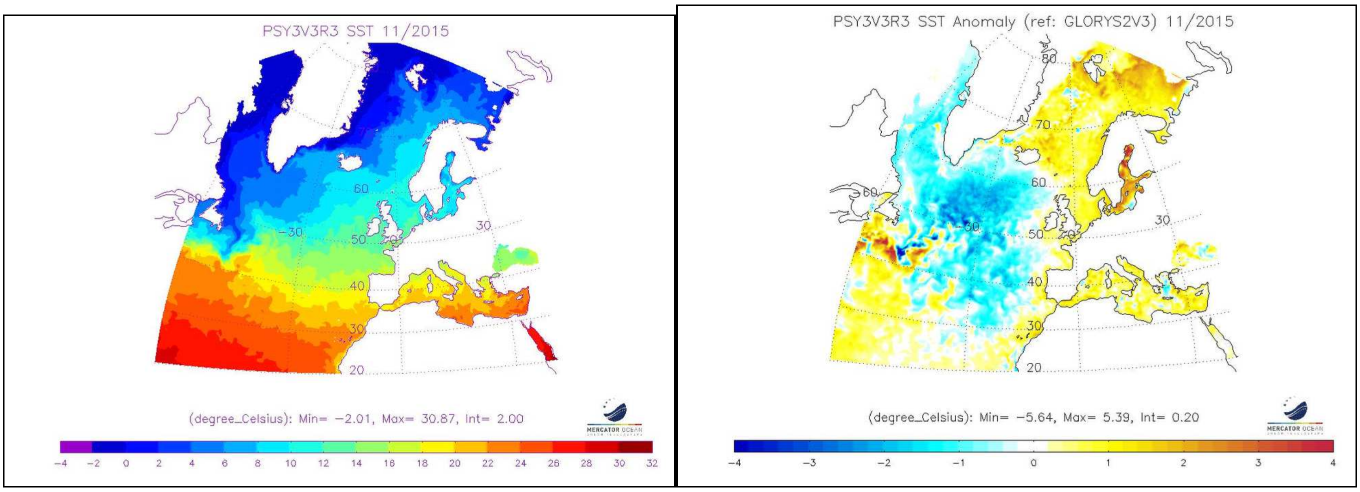


fig.I.1.6 : Mean sea surface temperature in the RA VI Region (Europe) and anomaly (reference Glorys 1992-2009). http://bcg.mercator-ocean.fr/

I.2.ATMOSPHÈRE

I.2.a General Circulation

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

the anomaly field is strongly different from last months, mainly in terms of intensity more than in terms of pattern.

There is still a positive upward motion anomaly pattern in the Central and Eastern part of the tropical Pacific Ocean, but much weaker and splitted in 2 cells. Note that this pattern is quite classical in winter during El Nino events. West and East from this anomaly, there are 2 downward anomaly poles : 1 on the Maritime continent, 1 over Northern Brazil.

On the contrary, the situation has rather changed in the Indian Ocean. In November, there is a strong upward anomaly motion in the center of the basin, that is very likely due to MJO activity during the 1st part of the month (see fig I.2.b).

Still a negative SOI index in November, but weak (-0.5) for a strong El Nino event : once again, MJO activity has probably temporary disorganized the typical ocean-atmosphere coupling related with El Nino.

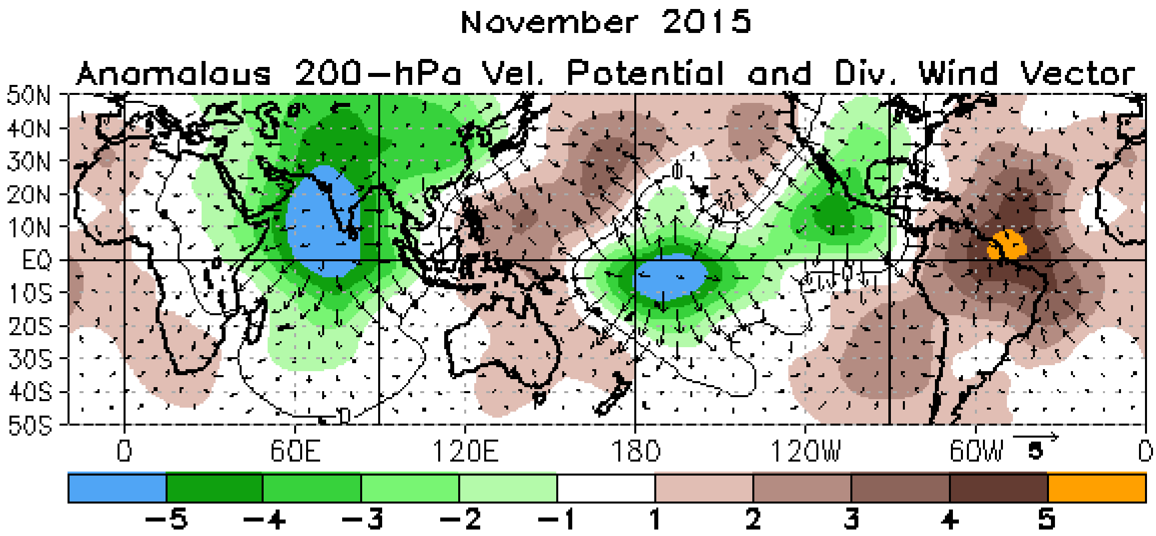


fig.I.2.1: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

MJO (fig. I.2.b):

MJO was very active during the first half of November , with significant impact on the velocity potential fields, and despite the strong El Nino context.

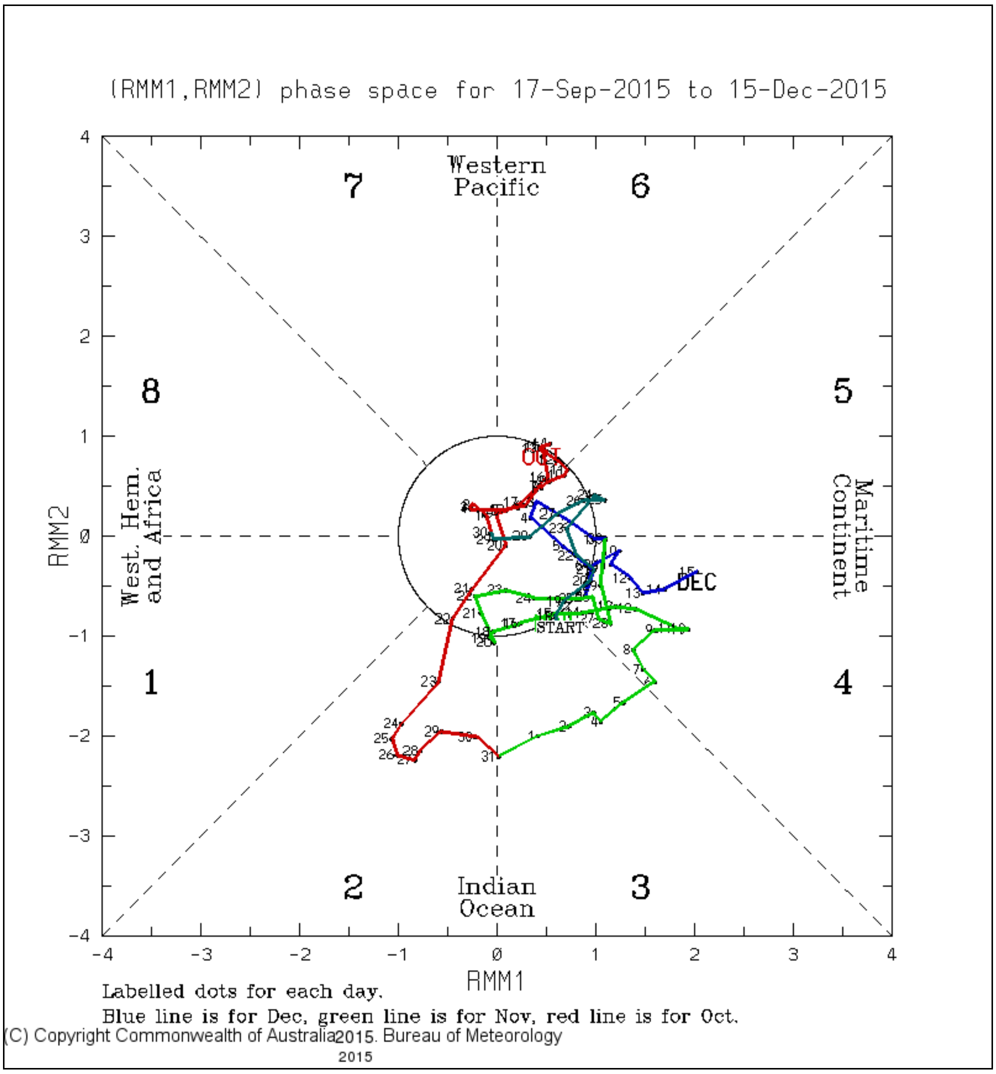


fig.I.2.b: indices MJO http://cawcr.gov.au/staff/mwheeler/maproom/RMM/phase.Last90days.gif

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

Noticeable response to the main equatorial velocity potential anomalies in the tropics.

In the Northern and Southern tropical Pacific, the anticyclonic anomalies are consistent with the Gill theorical model. However, they don't lead to a clear teleconnection pattern in the higher latitudes : for example, the typical PNA pattern has totally collapsed in November.

Over western Indian Ocean, the anticyclonic anomaly, North and South of the equator, could be reasonably linked to the large upward motion anomaly in the middle of the basin.

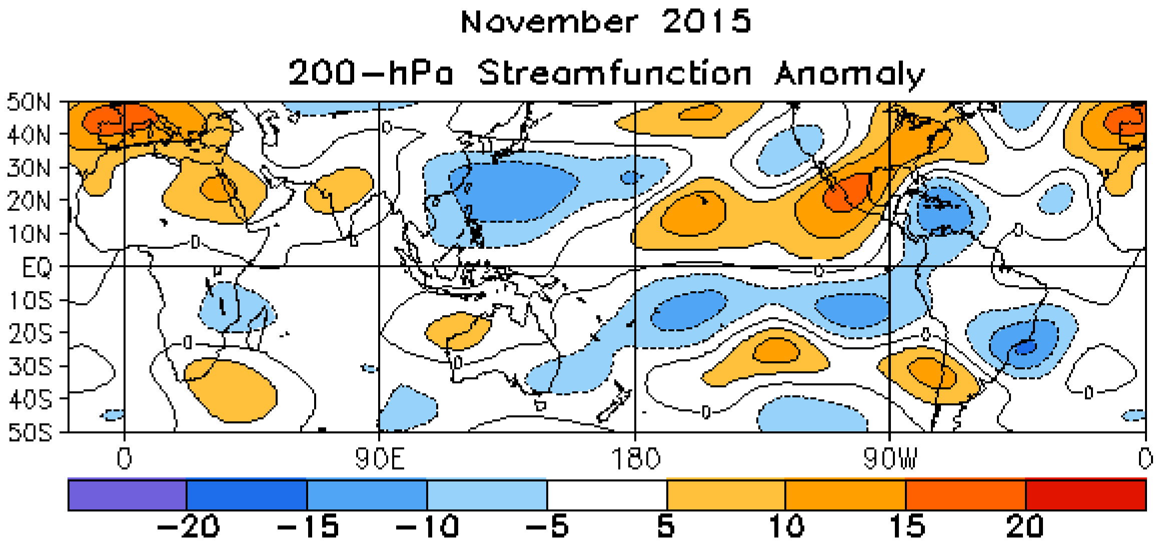


fig.I.2.2: Stream Function Anomalies at 200 hPa.

http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

Geopotential height at 500 hPa (fig. 8 – insight into mid-latitude general circulation) :

Over Northern Atlantic and Europe, positive NAO pattern clearly visible. As we don't identify any clear teleconnexion from the tropics , it is difficult to interpret this situation as a consequence of El Nino.

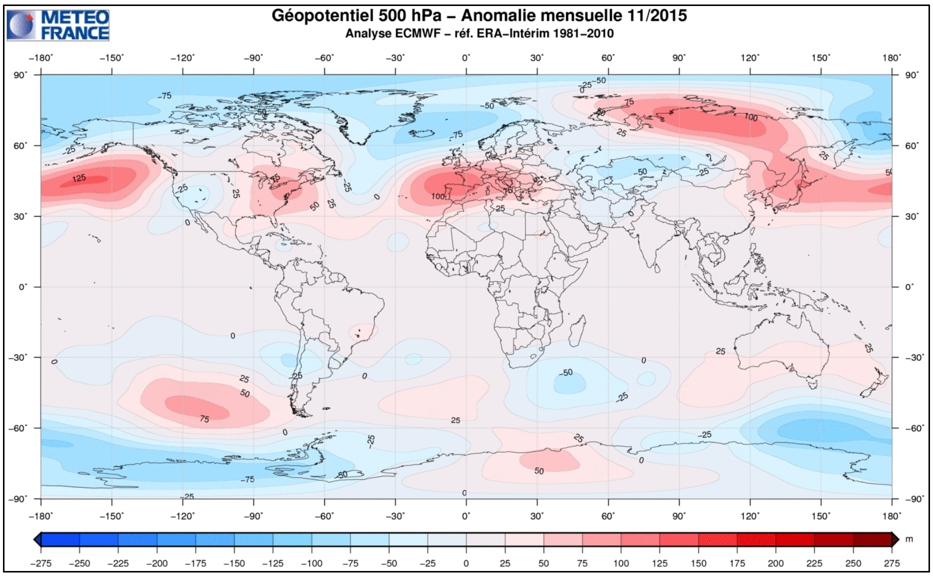


fig.I.2.3: Anomalies of Geopotential height at 500hPa (Meteo-France)

Sea level pressure and circulation types over Europe

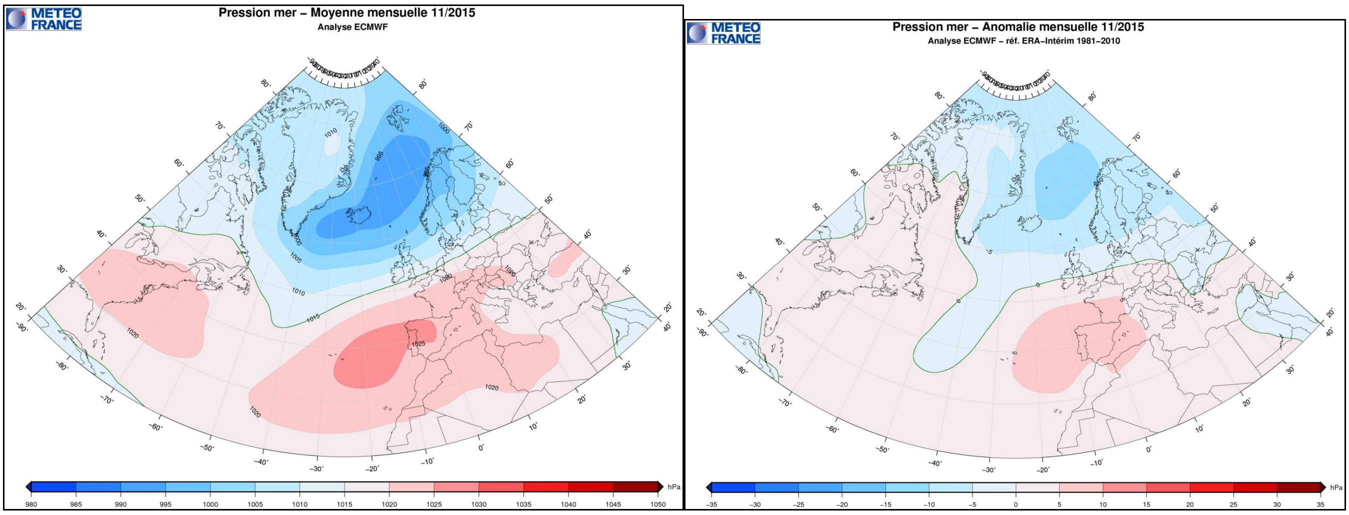


fig.I.2.4: Mean sea level pressure in the RA VI Region (Europe) (top) and 1981-2010 anomalies (bottom).

<u>Circulation indices: NAO and AO</u>

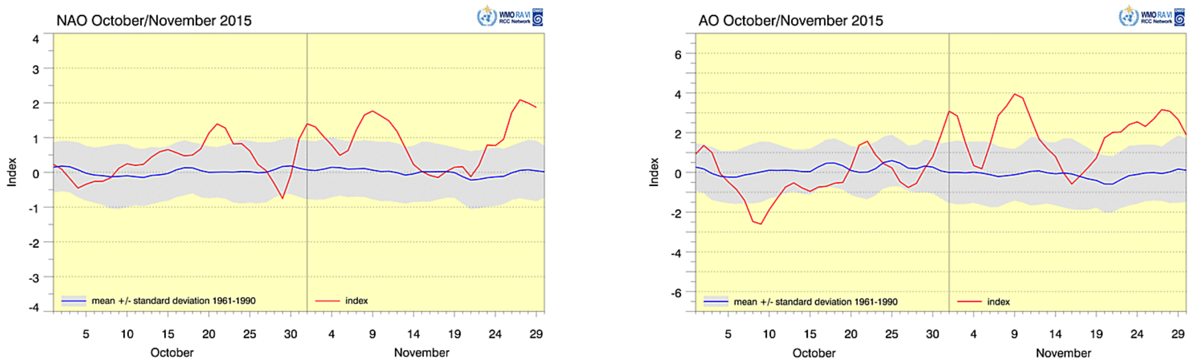


fig.I.2.5: North Atlantic Oscillation (NAO, left) and Arctic Oscillation (AO, right) indices with 1961-1990 mean standard deviation (shading). http://www.dwd.de/rcc-cm , data from NOAA CPC: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml

I.2.b Precipitation

The strongest anomalies are those conventionally expected in the Niño current phase, with a surplus of precipitation over the central and eastern equatorial Pacific and marked deficit on the Maritime Continent, and Central America, the Caribbean, northern South America.

Over Europe, North-South gradient clearly linked to the geopotentiel pattern (NAO+).

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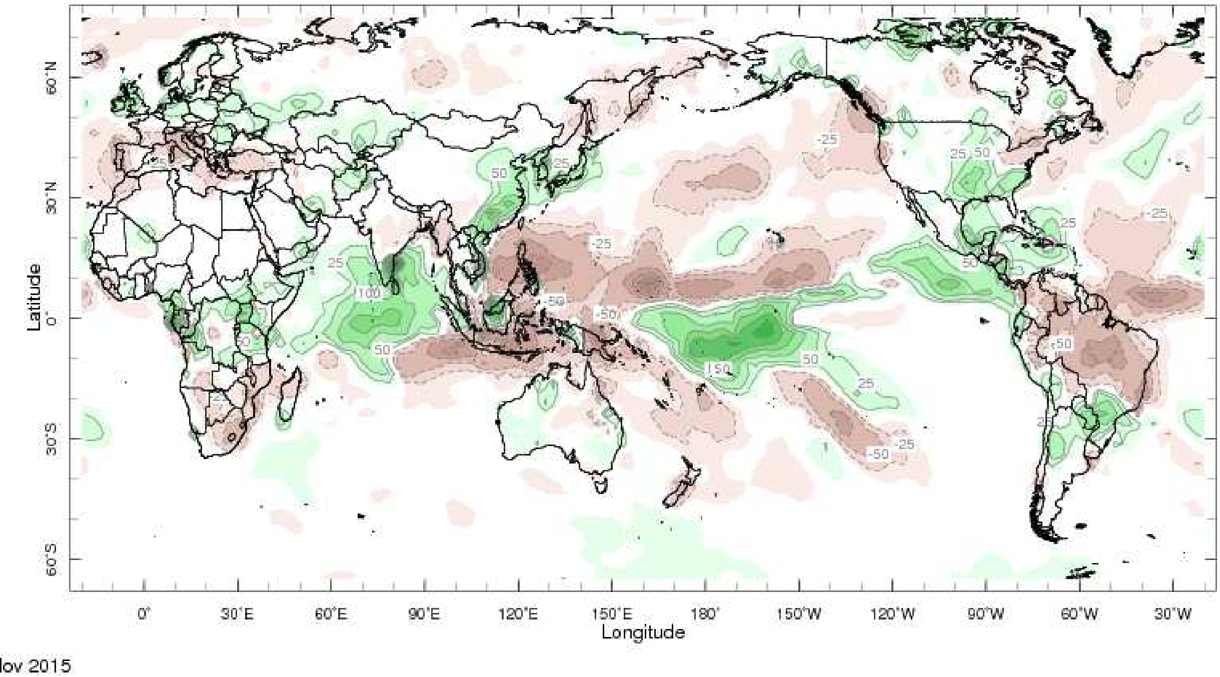

fig.I.2.4: Rainfall Anomalies (mm) (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.

http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/Anomaly.html

Precipitation anomalies in Europe:

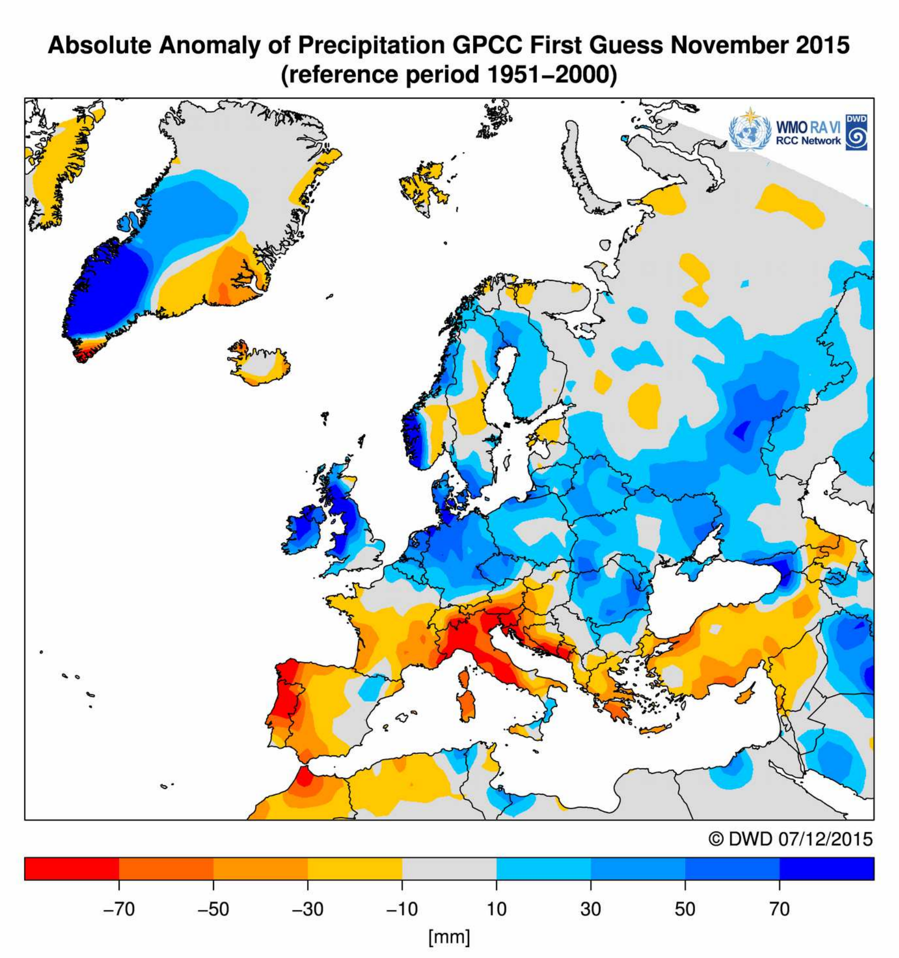

fig.I.2.5: Left: Absolute anomaly (1951-2000 reference) of precipitation in the RA VI Region (Europe), data from GPCC (Global Precipitation Climatology Centre), http://www.dwd.de/rcc-cm. Right: Percentiles of precipitation, 1981-2010 reference. Data from NOAA Climate Prediction Center, http://iridl.ldeo.columbia.edu/maproom/Global/Precipitation/Percentiles.html

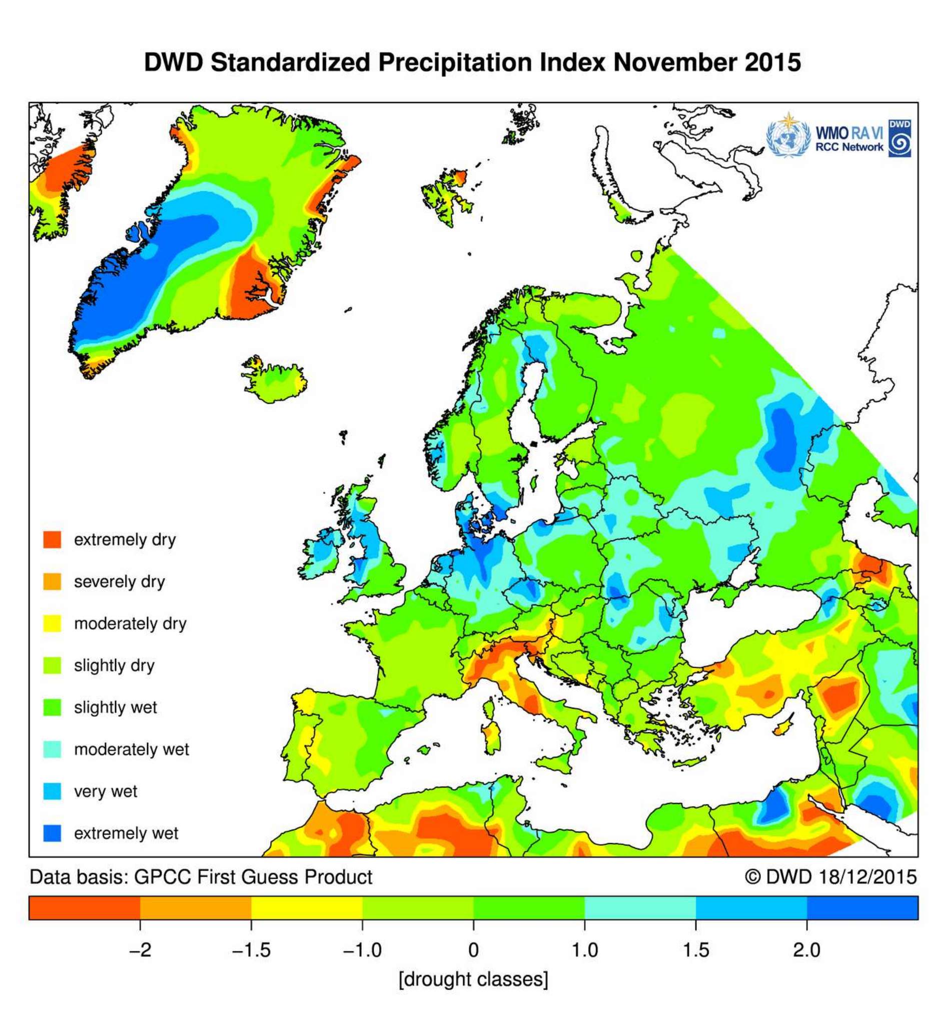

fig. I.2.5a: Standardized Precipitation Index with DWD modification (DWD-SPI), http://www.dwd.de/rcc-cm .

I.2.c Temperature

Consistant with geopotential, warm anomaly over Europe and the Mediterranean basin.

Warm anomaly in the northern two-thirds of South America. Warm anomaly over a large part of Canada, and strong contrast between West and East of USA.

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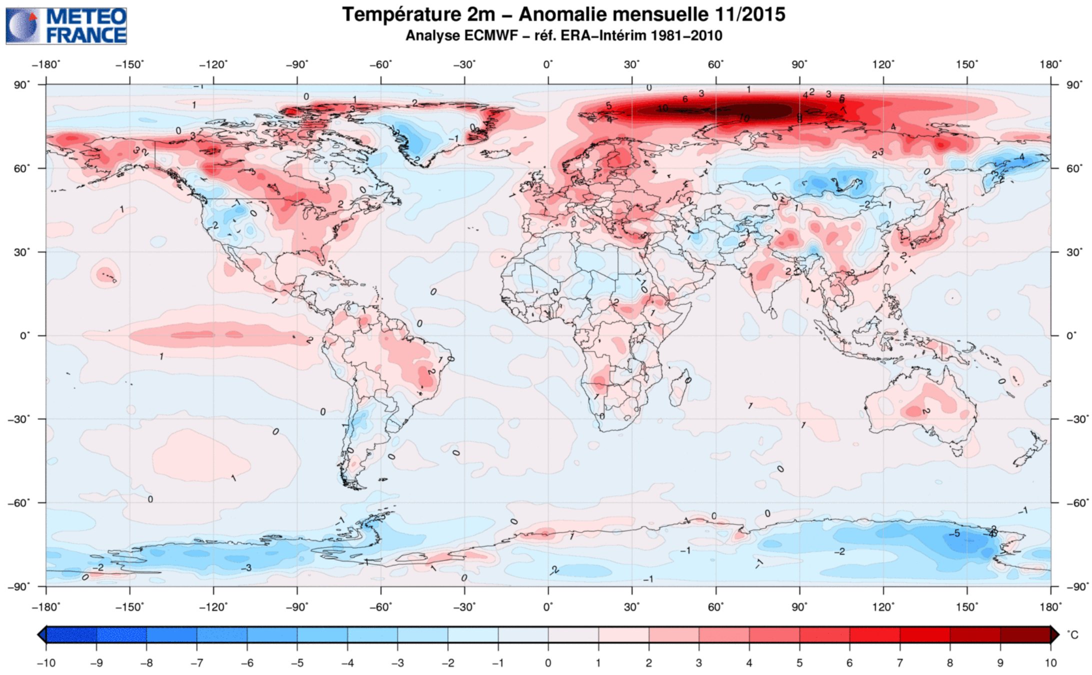


fig.I.2.8: Temperature Anomalies (°C) (Meteo-France)

Temperature anomalies in Europe:

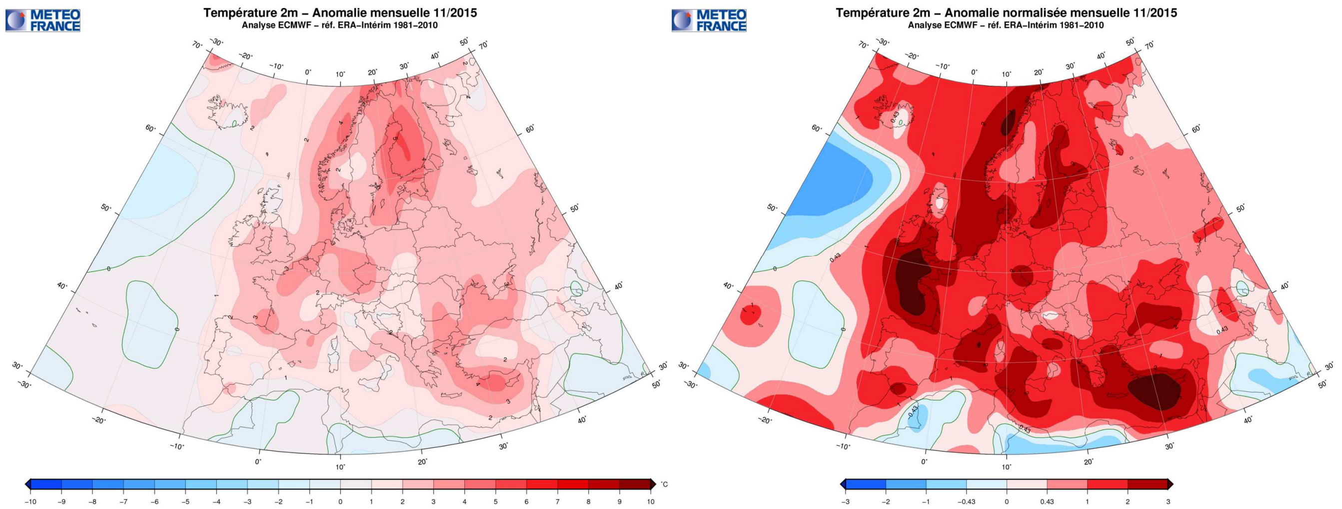


fig.I.2.9: Left graph: Absolute anomaly of temperature in the RA VI Region (Europe). Right graph: Standardized temperature anomalies

I.2.d Sea ice

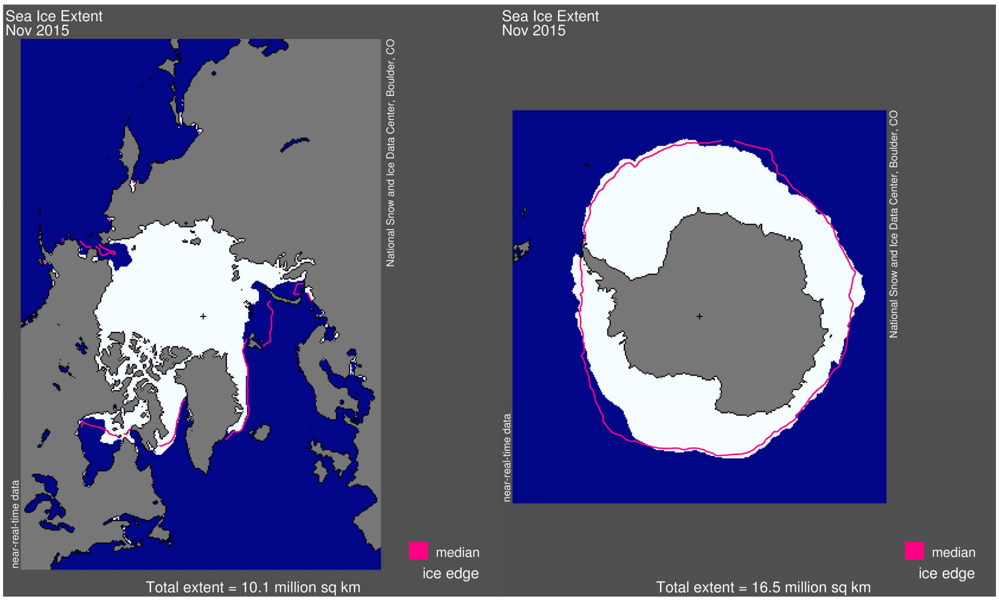
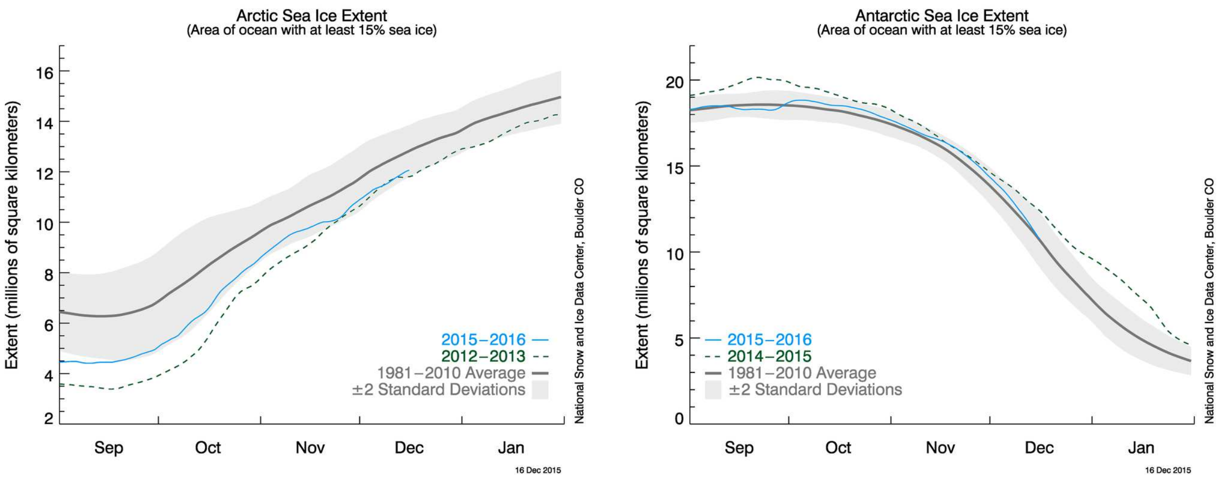


fig.I.2.15: Sea-Ice extension in Arctic (left), and in Antarctic (right). The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

In Arctic (fig. 1.2.6 and 1.2.7 - left) : persistent significant deficit (~ -2 std).

In Antarctic (fig. 1.2.6 and 1.2.7 - right) : near normal



values.

fig. I.2.16 : Sea-Ice extension evolution from NSIDC.

http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png

II. SEASONAL FORECAST FROM DYNAMICAL MODELS

II.1. OCEANIC FORECASTS

The global climate system is strongly influenced by the current El Nino event. In that condition, the predictability is significantly strengthened in the tropical area, but seems also much better than usual in some regions mid-latitudes. All seasonal forecast models are very close in the tropics, particularly EUROSIP models. The anomaly patterns are very consistent both for the ocean and for the atmosphere in the tropical areas.

II.1.a Sea surface temperature (SST)

Pacific Ocean: remaining of the warm anomaly in central and eastern Equatorial Waveguide. The large area of warm anomaly will also persist along the western coast of North America to the Bering Strait, due to the positive PDO phase.

Persistance of the cold anomaly in the Southern Hemisphere, from the Solomon Islands to New Zealand south on one hand, and with an extension towards the east until about 90W on the other hand. Intertestingly, all models forecast a significant warming around the maritime continent.

Indian Ocean: Remaining of the generalized warm anomaly, particularly strong in the south of the Tropic of Capricorn. Many models forecast an evolution toward a neutral or negative DMI (currently positive).

Atlantic Ocean : As in previous months, the tropical Atlantic is the only area where models diverge significantly with a very clear difference between ECMWF and ARP on one hand (warm anomalies), and NCEP on the other hand (significant cold anomaly) . The EUROSIP average is neutral but unreliable in this area. The models agree on the persistence of the strong cold anomaly on the North Atlantic and of warm anomaly from Caribbean and American coasts to Africa.

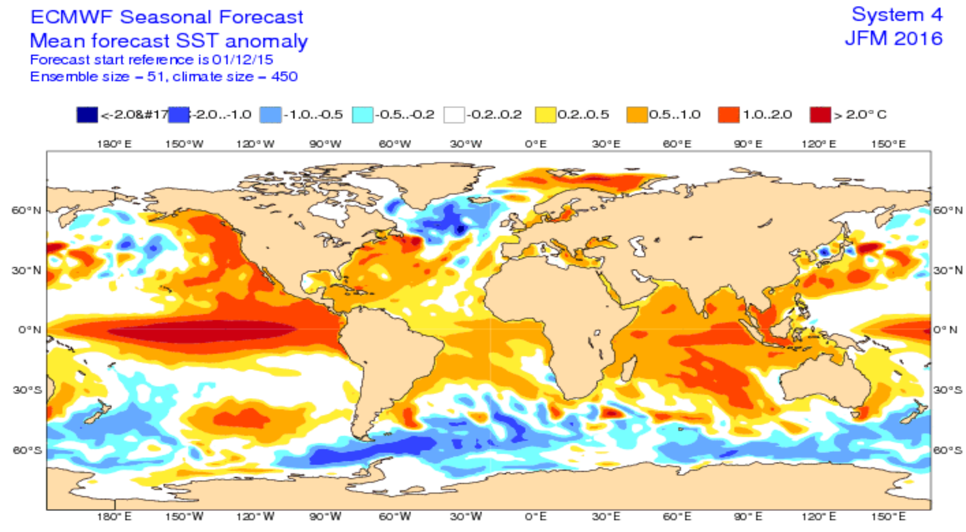


fig.II.1.1: SST anomaly forecast from ECMWF

http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

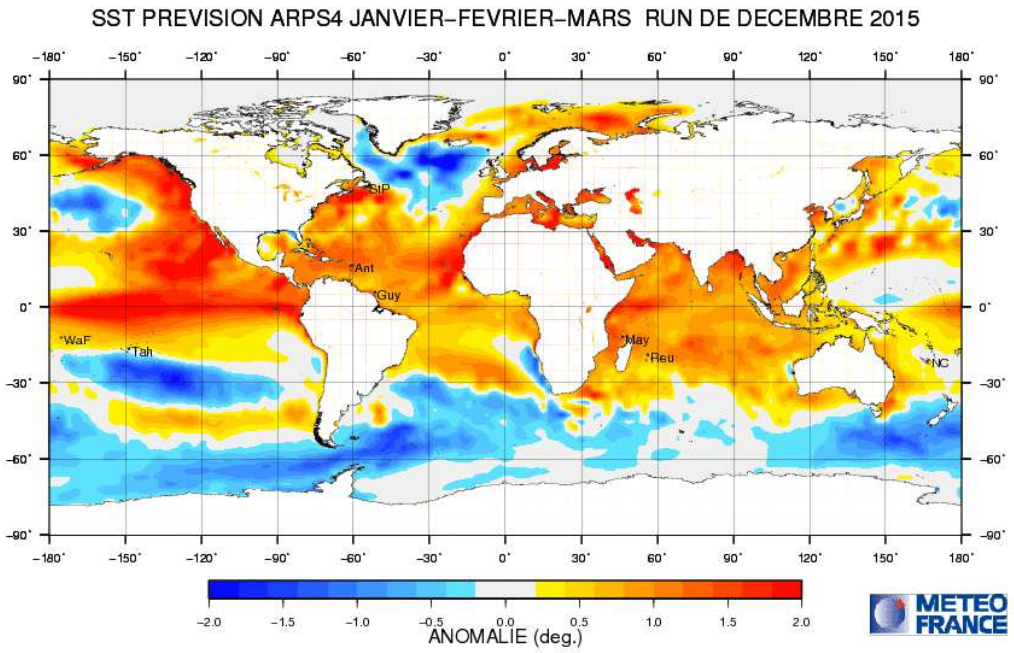


fig.II.1.2: SST Anomaly forecast from Meteo-France (recalibrated with respect of observation).

http://elaboration.seasonal.meteo.fr

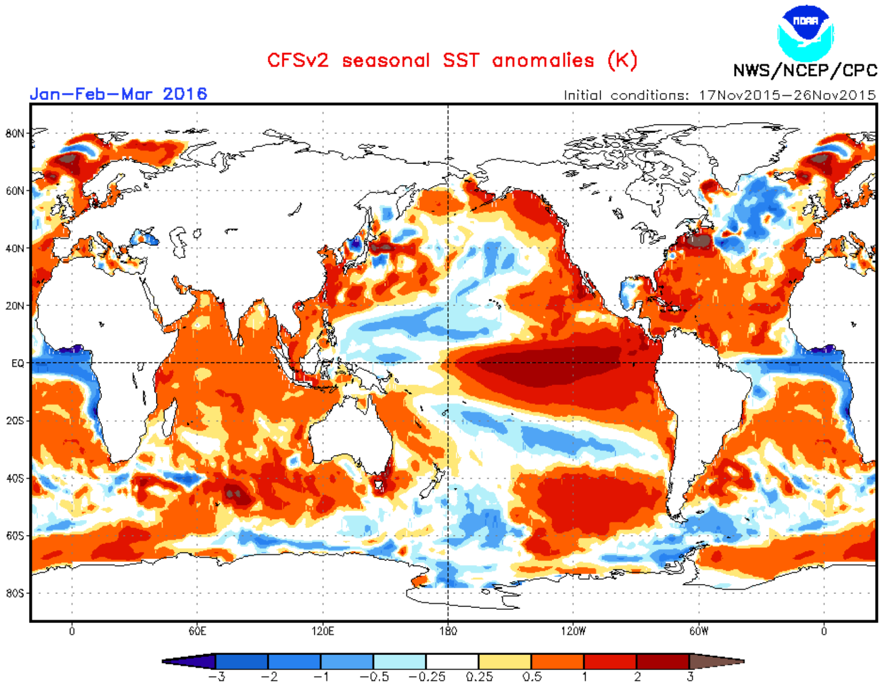


fig.II.1.3: SST anomaly forecast from NCEP.

http://www.cpc.ncep.noaa.gov/products/people/wwang/cfsv2fcst/imagesInd1/glbSSTSeaInd1.gif

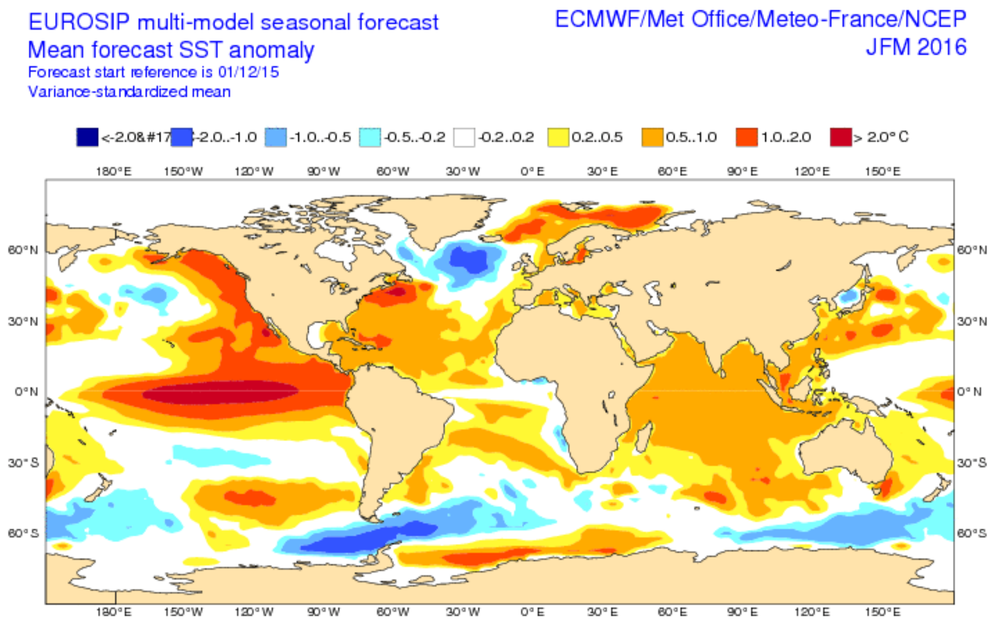


fig.II.1.4: SST Forecasted anomaly from Euro-SIP

II.1.b ENSO forecast

Forecast Phase: very strong El Niño event

Very good consistency between models in the strength of El Nino. The SST anomaly in Niño3.4 box should follow a classic path and start a rapid decreasing in January. The average maximum value on a quarter (according to the ONI) should be similar to the event record for 1997/1998. http://www.cpc.noaa.gov/products/analysis_monitoring/ensostuff/ensoyears.shtml .

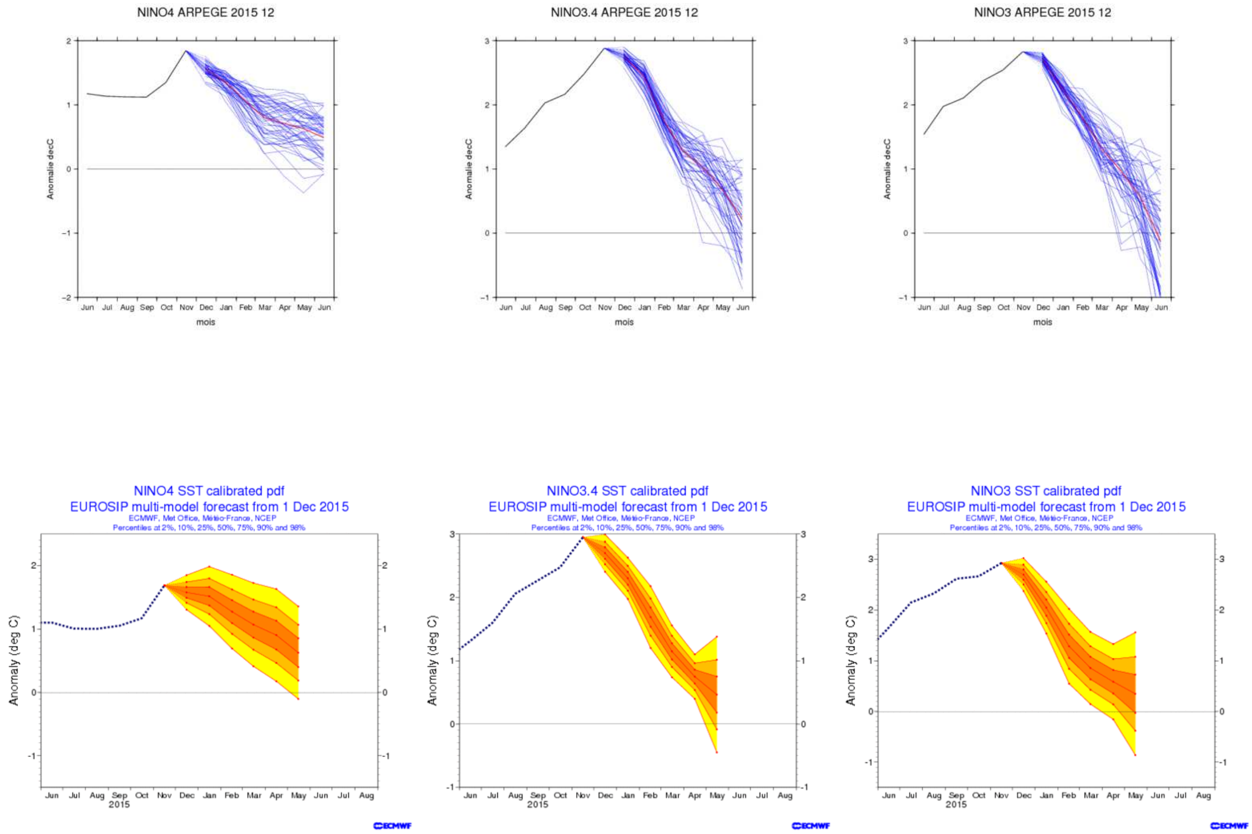


fig.II.1.5: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members - and EuroSIP (bottom) – recalibrated distributions - (http://elaboration.seasonal.meteo.fr , http://www.ecmwf.int/)

II.1.c Atlantic ocean forecasts

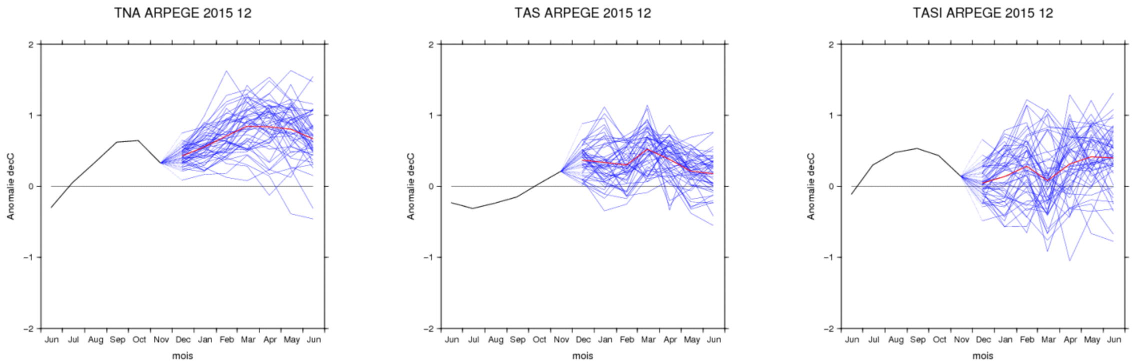
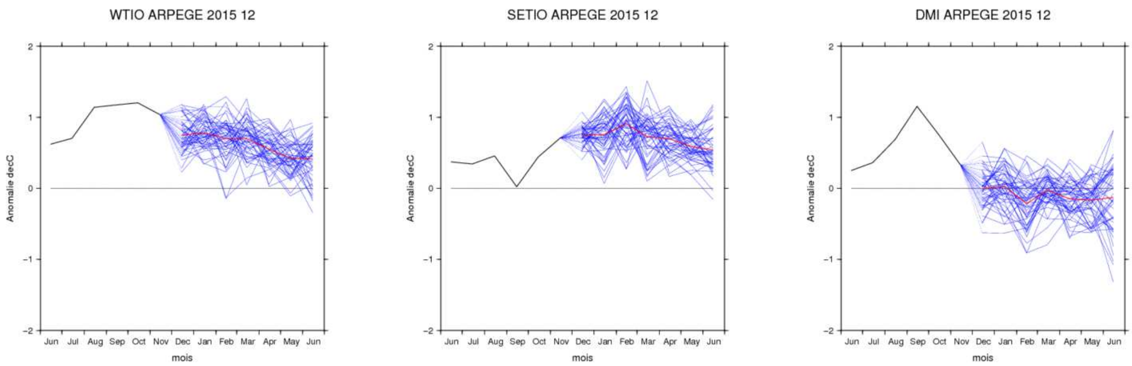


fig.II.1.6: SSTs anomaly forecasts in the Atlantic Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

II.1.d Indian ocean forecasts



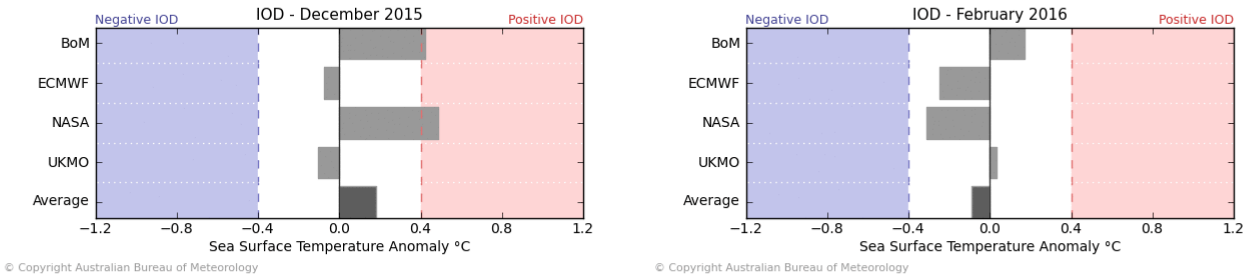


fig.II.1.7: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

II.2. GENERAL CIRCULATION FORECAST

II.2.a Global forecast

Velocity potential anomaly field (cf. fig. II.2.1 – insight into Hadley-Walker circulation anomalies):

Strong and consistent signal, with a major dipole linked to El Nino, with a very strong downward anomaly area on Maritime Continent and a vaste upward motion area on central and eastern Pacific Ocean. Note that this upward motion anomaly is divided in 2 maxima, the 1st one centered around 150°W and the second one in the Northern hemisphere, extending from Pacific to Central America : this is typical what the pattern exhibits by composite of El Nino events in DJF.

Some differences in the Indian Ocean, concerning weak anomalies compared to Pacific ones.

Stream Function anomaly field (cf. fig. II.2.1 – insight into teleconnection patterns tropically forced):

The models are very close in the intertropical belt, with strong anomalies. We see again a quadripole in the tropical Pacific Ocean and Eastern Indian Ocean, clearly linked to major velocity potentail anomalies over the Maritime Continent and the central Pacific Ocean. The 3 models are forecasting a clear teleconnection from Pacific to Canada (PNA pattern). Over Atlantic Ocean, models are consistent in the tropics, they show significant differences in higher latitudes, especially close to Europe.

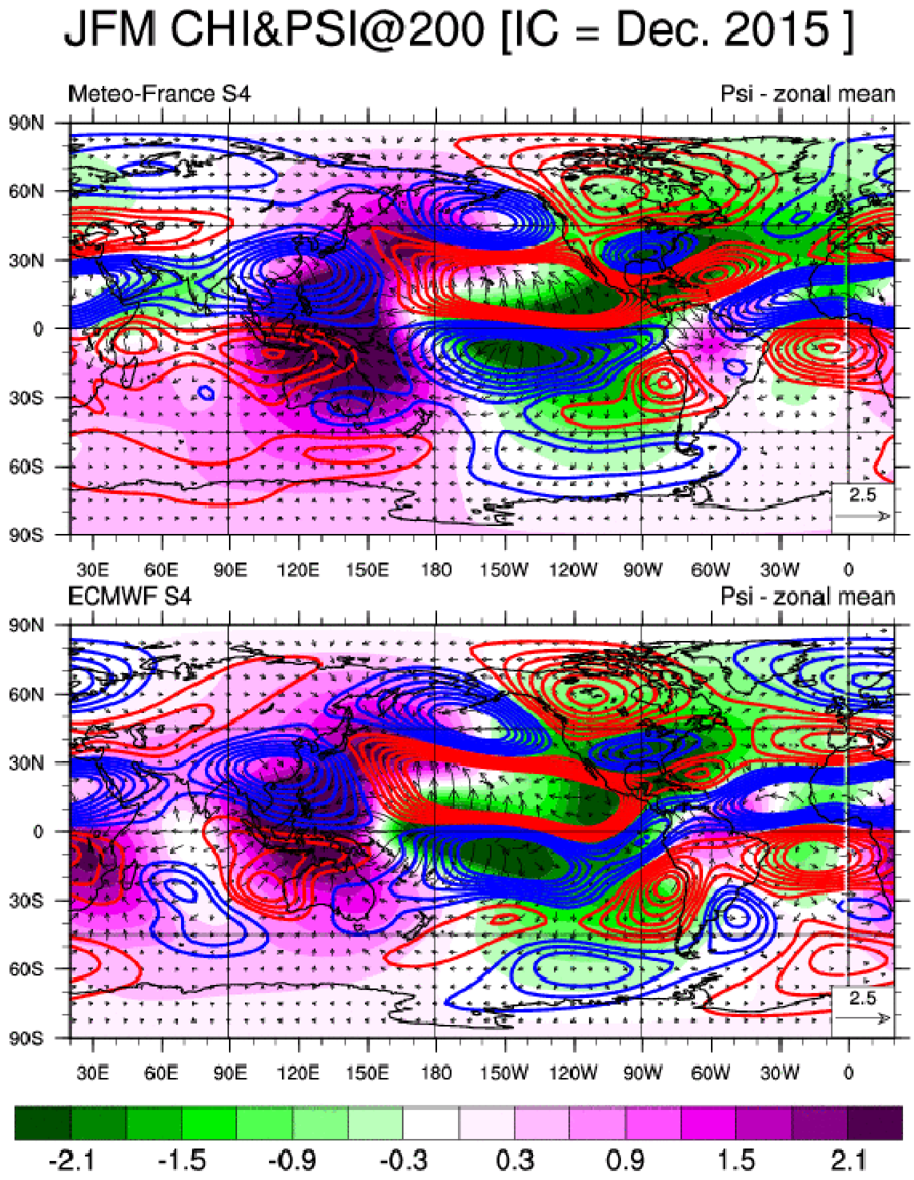


fig.II.2.1: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), associated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa by Météo-France (top) and ECMWF (bottom).

II.2.b North hemisphere forecast and Europe

Geopotential height anomalies (fig. II.2.2 – insight into mid-latitude general circulation anomalies):

Very strong anomalies in MF and ECMWF, consequence of lower dispersion than usual between members of each model. And we can find most geopotential anomaly kernels on both models. The differences in intensity and position are quite important close to Europe, especially the negative anomaly close to the British Isles. As a consequence, like last month, anomalous regime occurrences are opposite between MF and ECMWF concerning NAO+ and NAO- regimes.

Looking at other GPC forecasts, we can't find a more probable mode in Northern Atlantic. The dominant idea is a circulation stronger than usual, corresponding to a positive NAO (as ECMWF or UKMO) or a more South-Western anomaly circulation (like MF or NCEP).

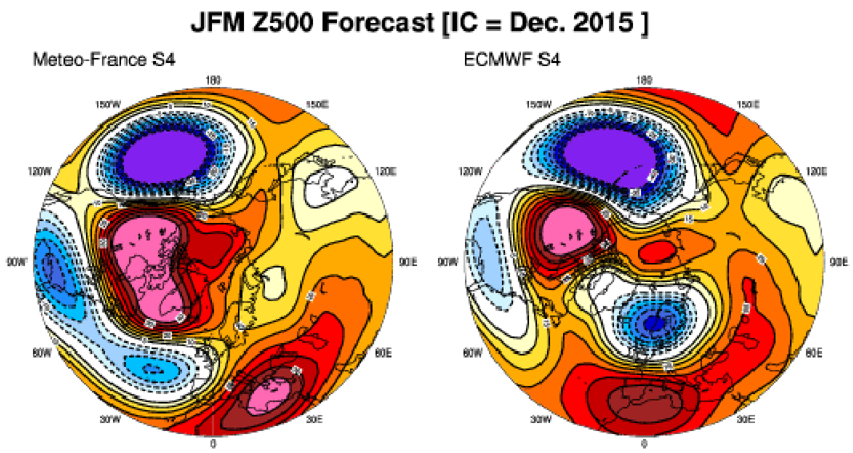


fig.II.2.2: Anomalies of Geopotential Height at 500 hPa from Météo-France (left) and ECMWF (right).

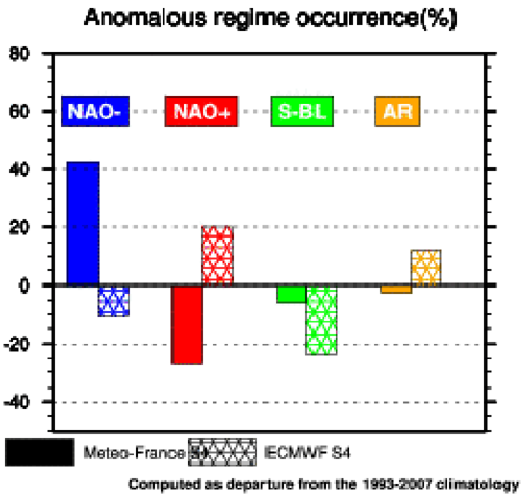


fig.II.2.3: North Atlantic Regime occurrence anomalies from Météo-France and ECMWF : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.

II.3. IMPACT: TEMPERATURE FORECASTS

Besides global warming, the ENSO+ and PDO+ context and Indian Ocean SST anomalies are favorable to enhanced probability of global warm anomaly. The few exceptions are on sea areas where surface temperatures are provided below normal, and on land : Mexico, southern United States, Argentina and very south of Brazil.

On Europe, a "warmer than normal" signal is most likely, except the British Isles. This is consistent with general circulation.

II.3.a ECMWF

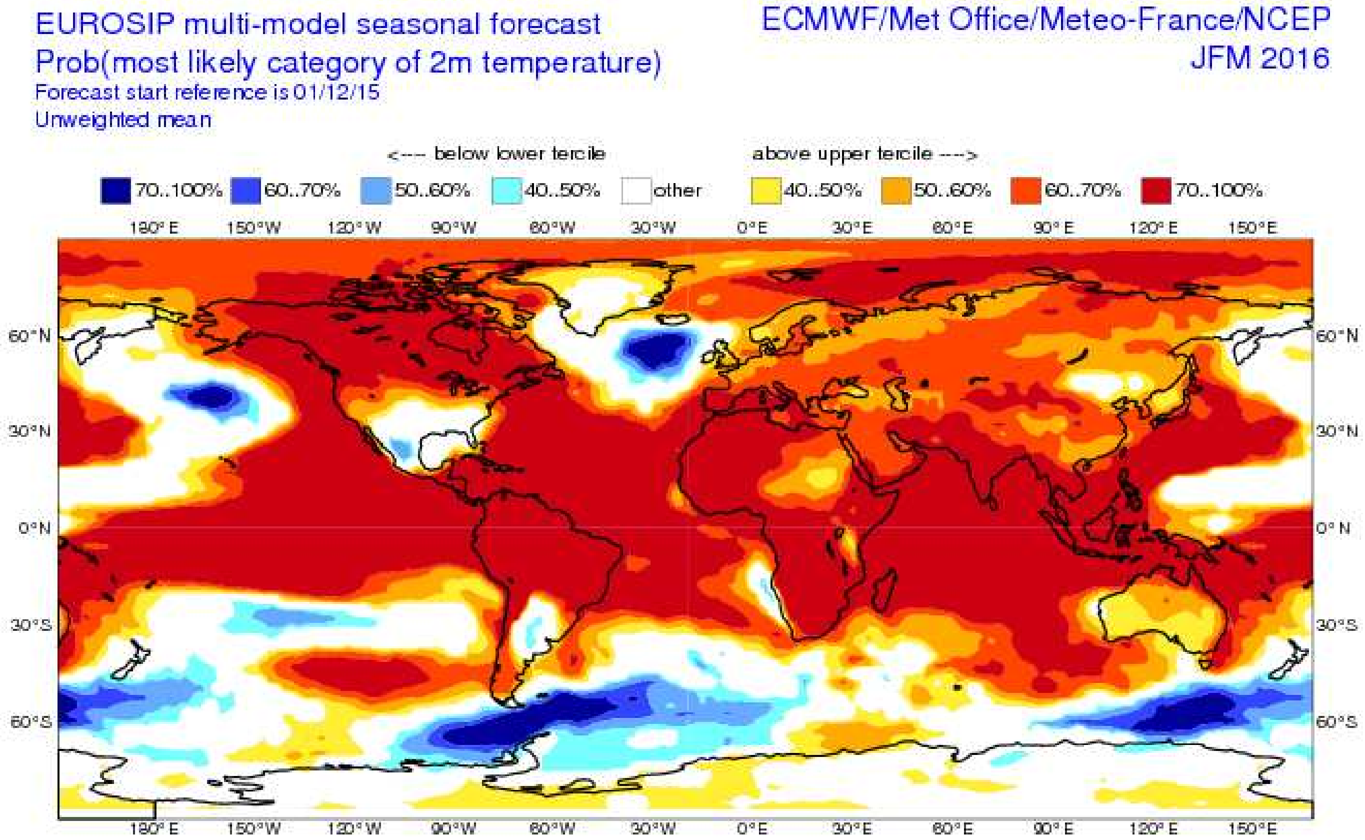


fig.II.3.1: Most likely category probability of T2m from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/

II.3.b Météo-France

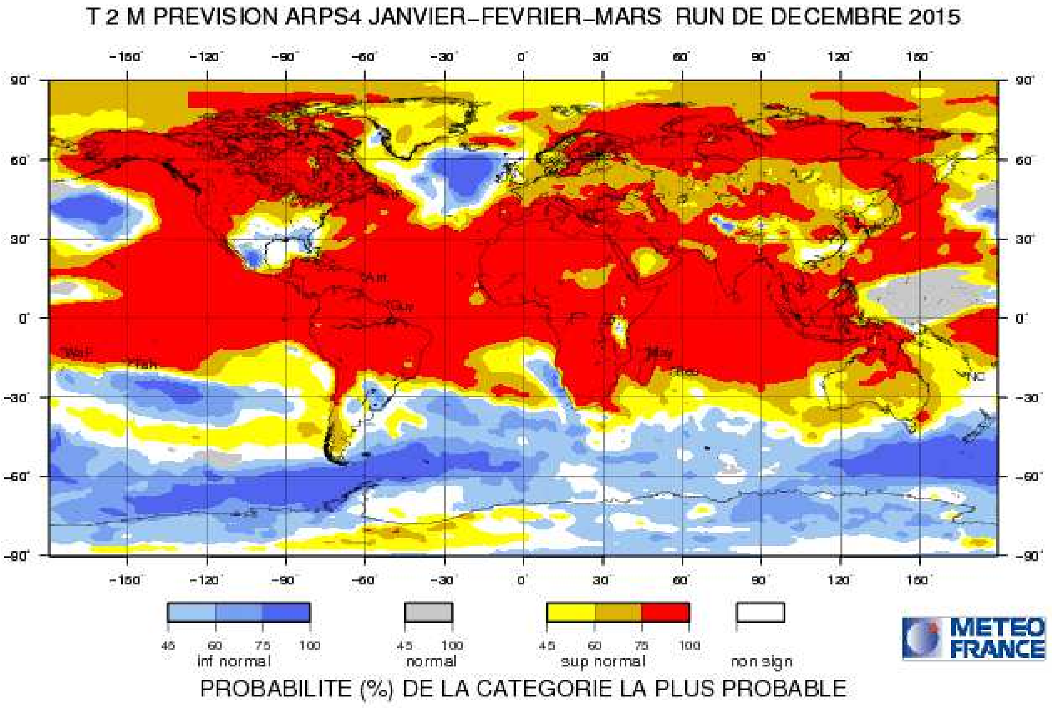


fig.II.3.2: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.3.c Japan Meteorological Agency (JMA)

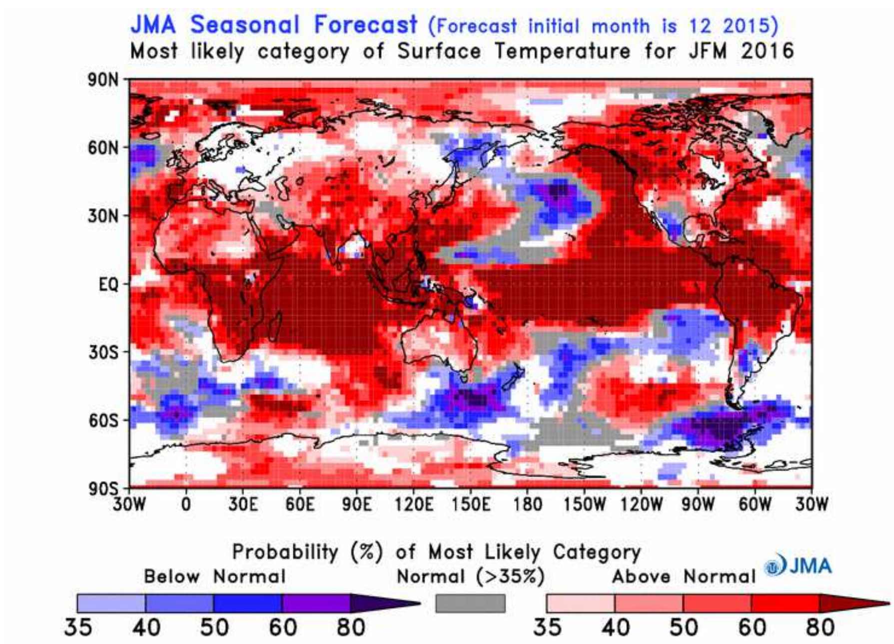


fig.II.3.3: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.php

II.3.d EUROSIP

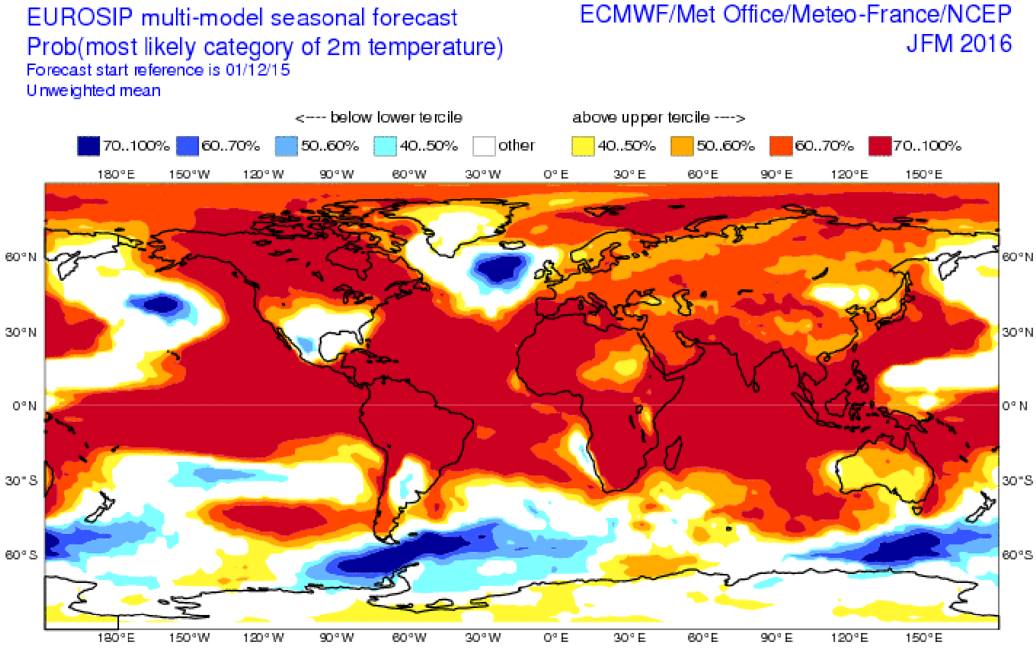


fig.II.3.4: Multi-Model Probabilistic forecasts for T2m from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).

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

II.4. IMPACT : PRECIPITATION FORECAST

There is a large contribution of the El Nino event to the forecasted anomalies distribution. Enhanced probability of excess precipitation in central and eastern equatorial Pacific extending to the coasts of Peru and Ecuador, and northward to Mexico and South of USA. The same in southern Brazil, Uruguay, and northern Argentina. Also on the Horn of Africa, the Great Lakes region and much of the Indian Ocean. Also enhanced probability of excess precipitation in Central Asia and China, and even very strong over eastern China, the Koreas and Japan.

Conversely, dry anomaly is expected on the Caribbean and northern South America, as well as southern Africa. Contrasted situation over the Maritime Continent up to Polynesia.

For Europe, a north-south gradient in the forecast seems to appear with an enhanced probability of dry anomaly on North Africa and the Mediterranean Sea and an enhanced probability of wet anomaly in the northwest of Europe. The boundary between these two areas is blurred and varies from one model to another. However the most probable signal is a wet signal over contiental Europe.

II.4.a ECMWF

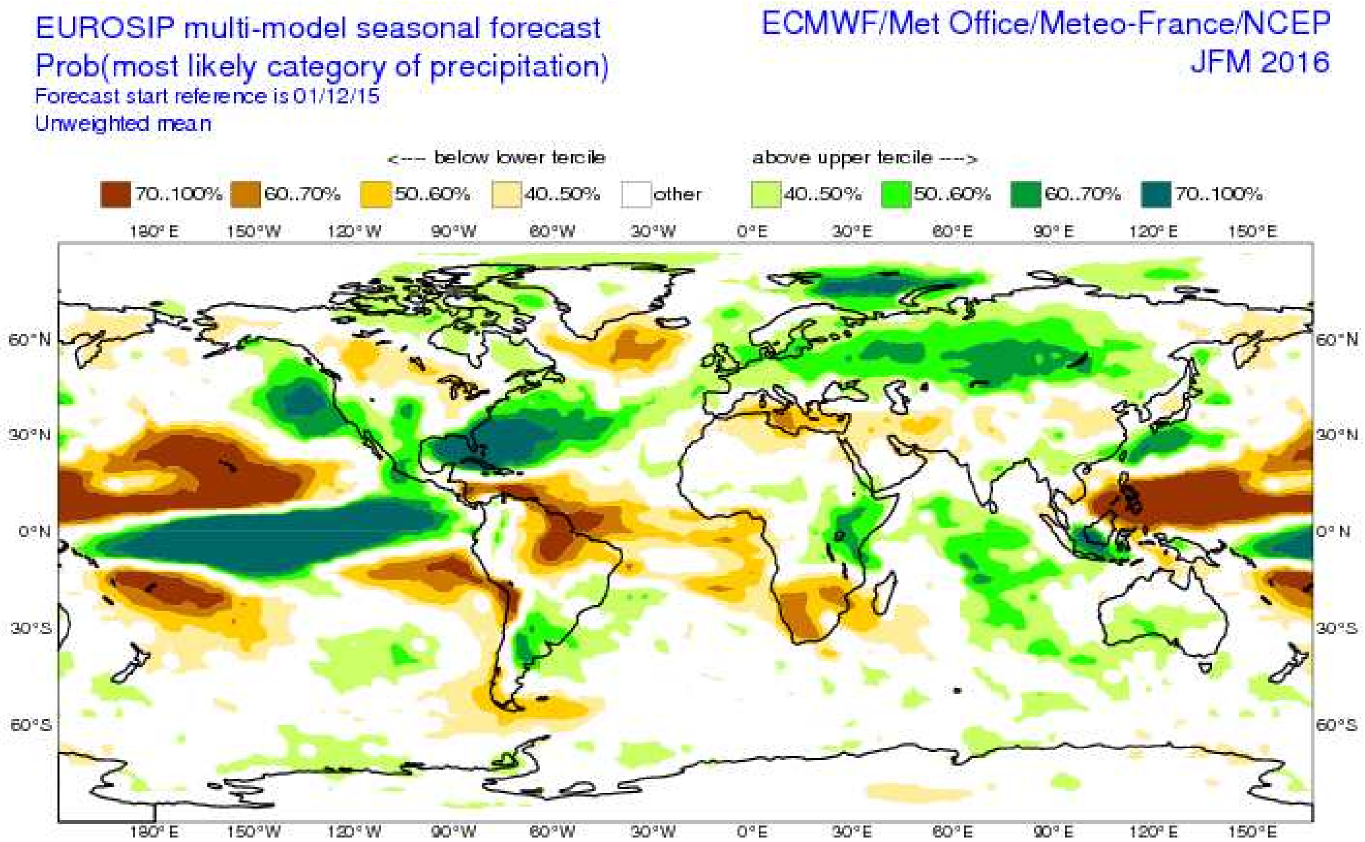


fig.II.4.1: Most likely category probability of rainfall from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/

II.4.b Météo-France

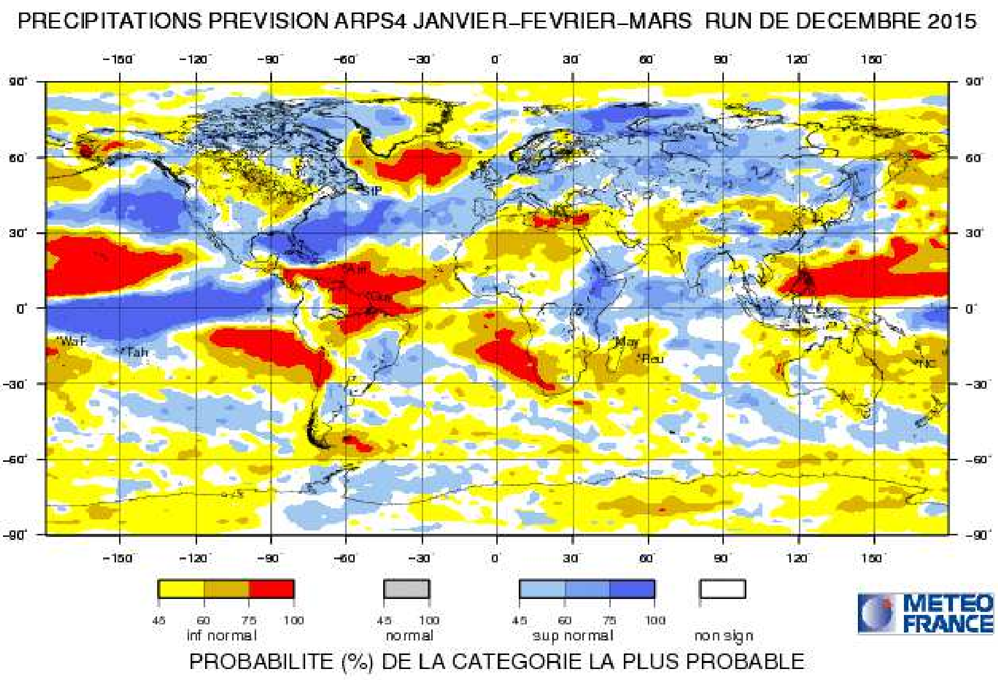


fig.II.4.2: Most likely category of Rainfall. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Japan Meteorological Agency (JMA)

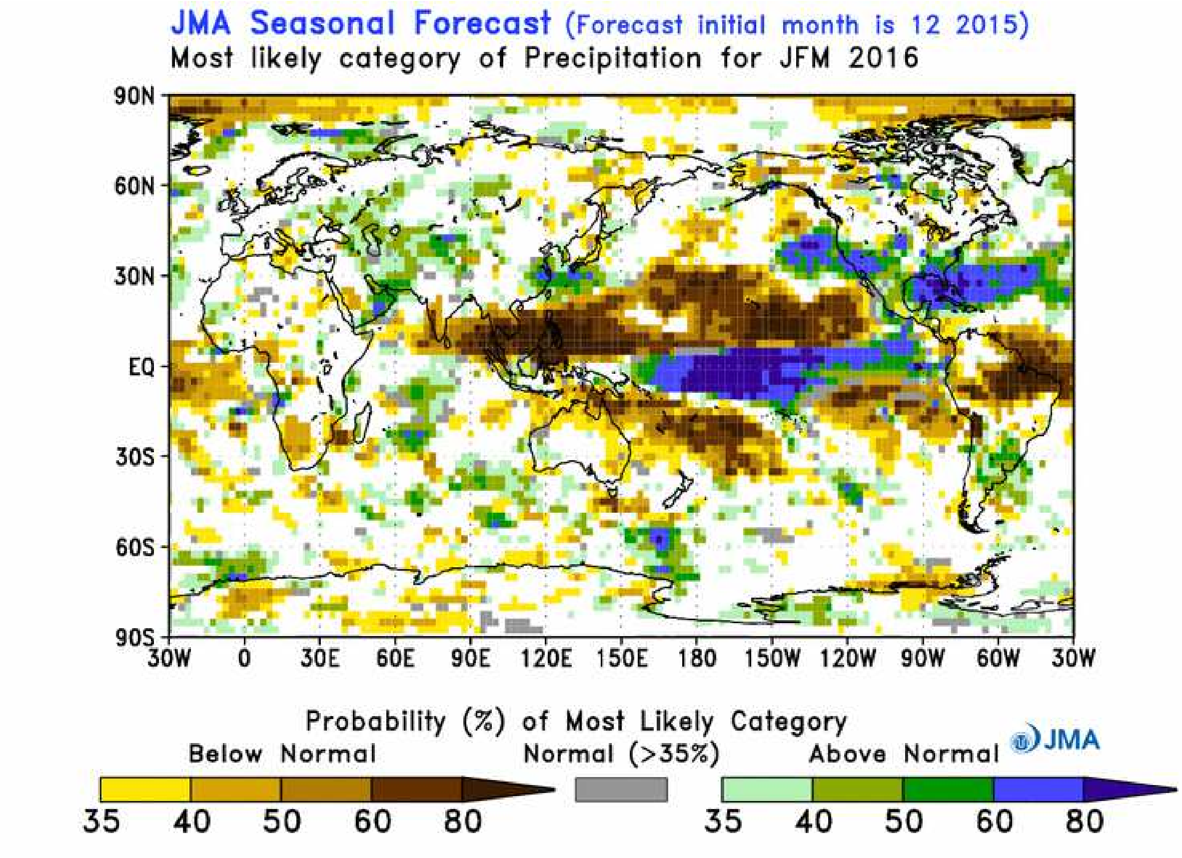


fig.II.4.5: Most likely category of Rainfall from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.php

II.4.d EUROSIP

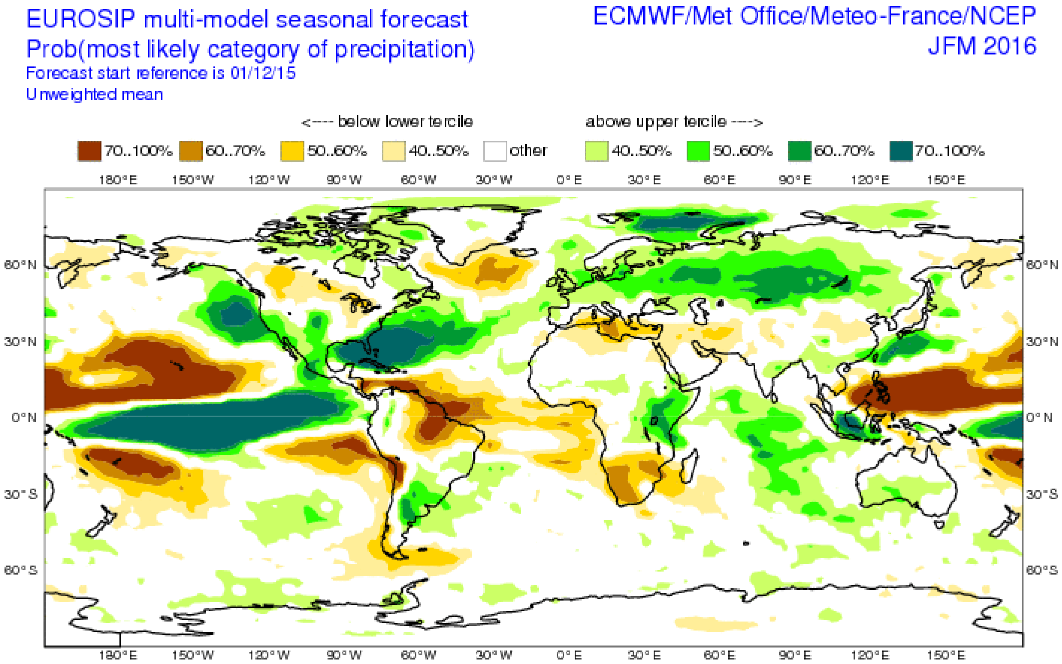


fig.II.4.7: Multi-Model Probabilistic forecasts for precipitation from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal).

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

II.5. REGIONAL TEMPERATURES and PRECIPITATIONS

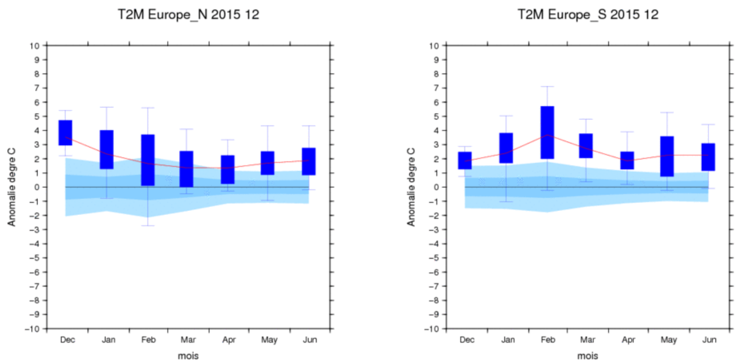


fig.II.5.1 : Climagrams for Temperature in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

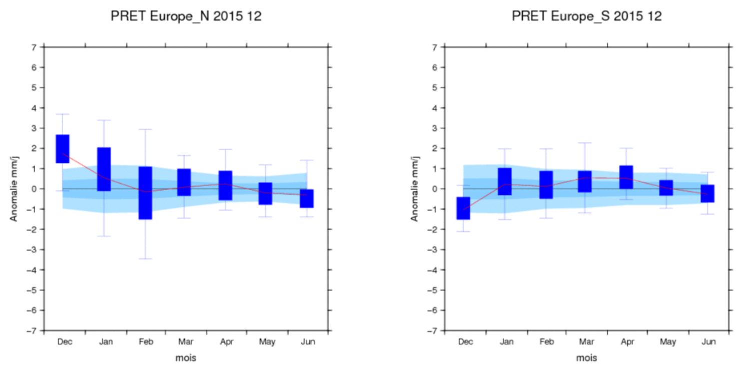


fig.II.5.2 : Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

II.6. MODEL'S CONSISTENCY

Not available

fig.II.6.1 : GPCs Consistency maps from LC-MME http://www.wmolc.org/

For SST :

For Z500 :

For T2m :

For Precipitation :

II.7. "EXTREME" SCENARIOS

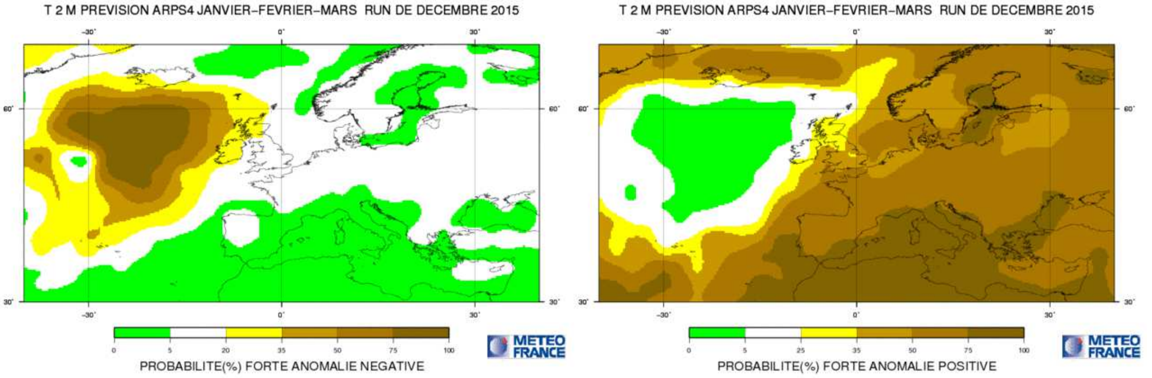


fig.II.7.1 : Top : Meteo-France T2m probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution). Bottom : ECMWF T2m probability of « extreme » below normal conditions (left - lowest ~20% of the distribution) and "extreme" above normal conditions (right – highest ~20% of the distribution).

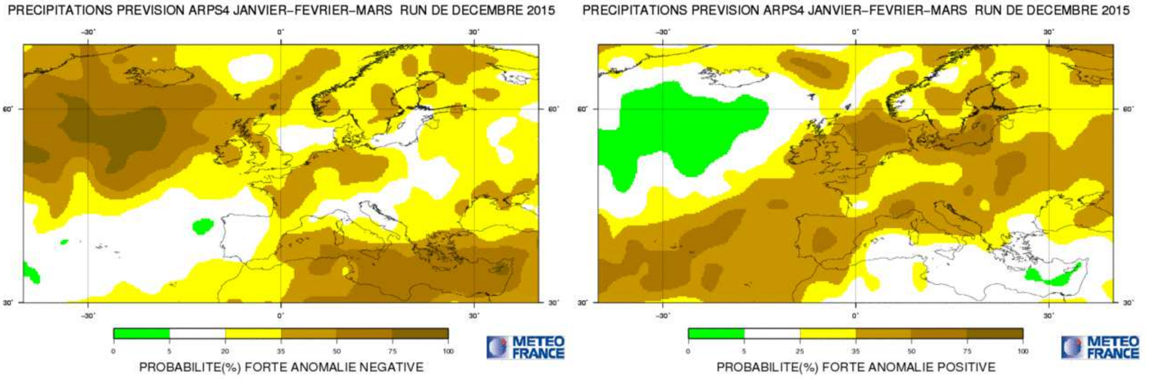


fig.II.7.2 : Top : Meteo-France rainfall probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution).
Bottom : ECMWF rainfall probability of « extreme » below normal conditions (left - lowest ~20% of the distribution) and "extreme" above normal conditions (right – highest ~20% of the distribution).

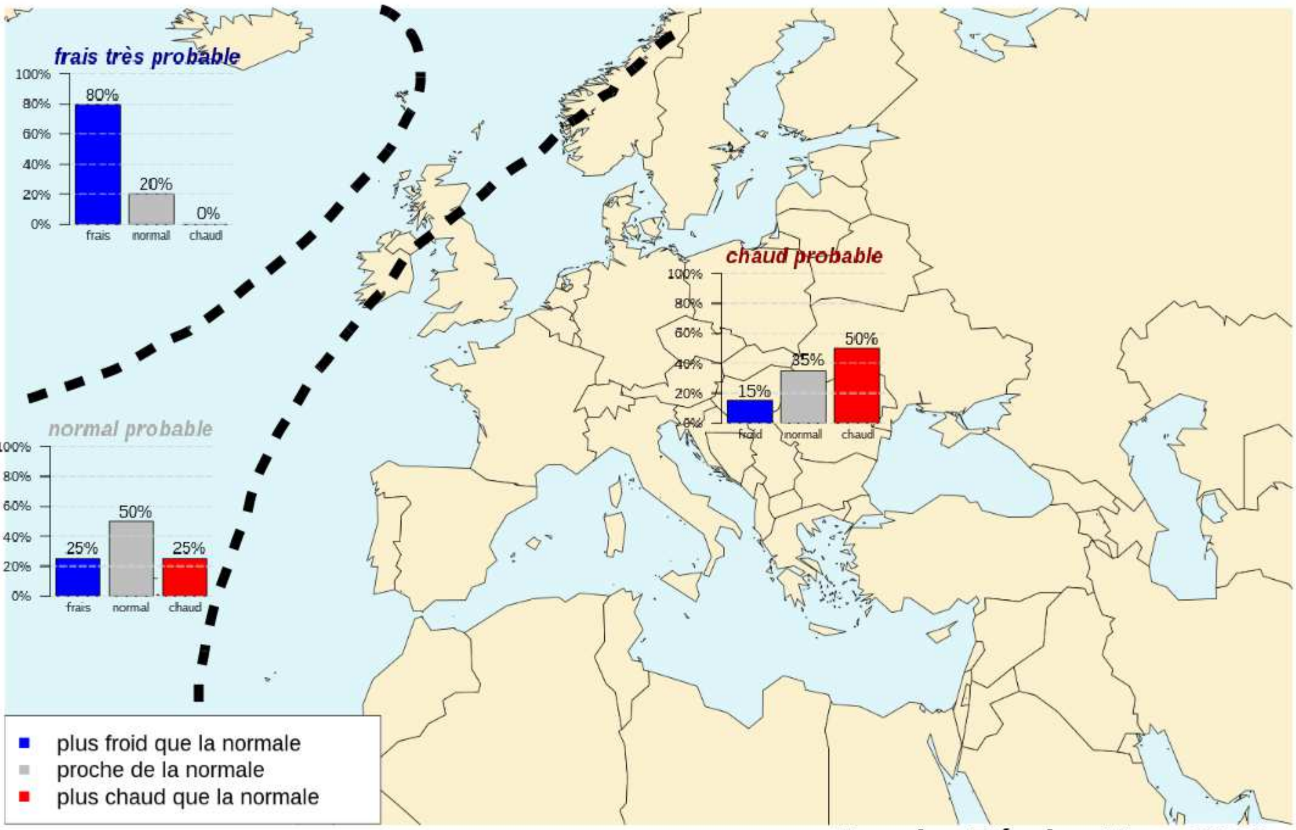
II.8. DISCUSSION AND SUMMARY

II.8.a Forecast over Europe

Temperatures: More warmly than the normal signal on Europe, except British Isles where normal temperatures are likely.

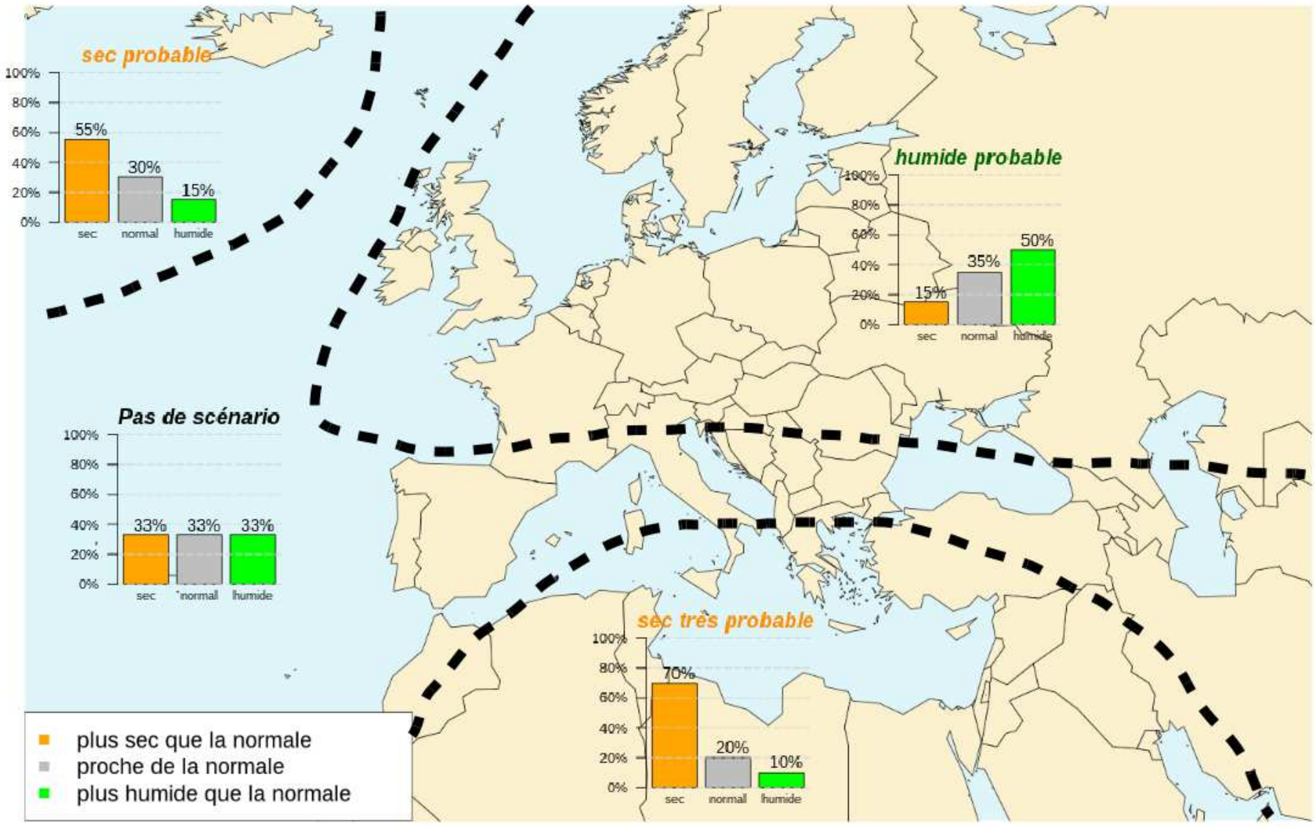
Precipitation: wet signal over Europe, dry signal over the Mediterranean Sea

Prévisions saisonnières probabilistes de températures pour le trimestre prochain



Janvier-Février-Mars 2016

Prévisions saisonnières probabilistes de précipitations pour le trimestre prochain



Janvier-Février-Mars 2016

II.8.b Tropical cyclone activity

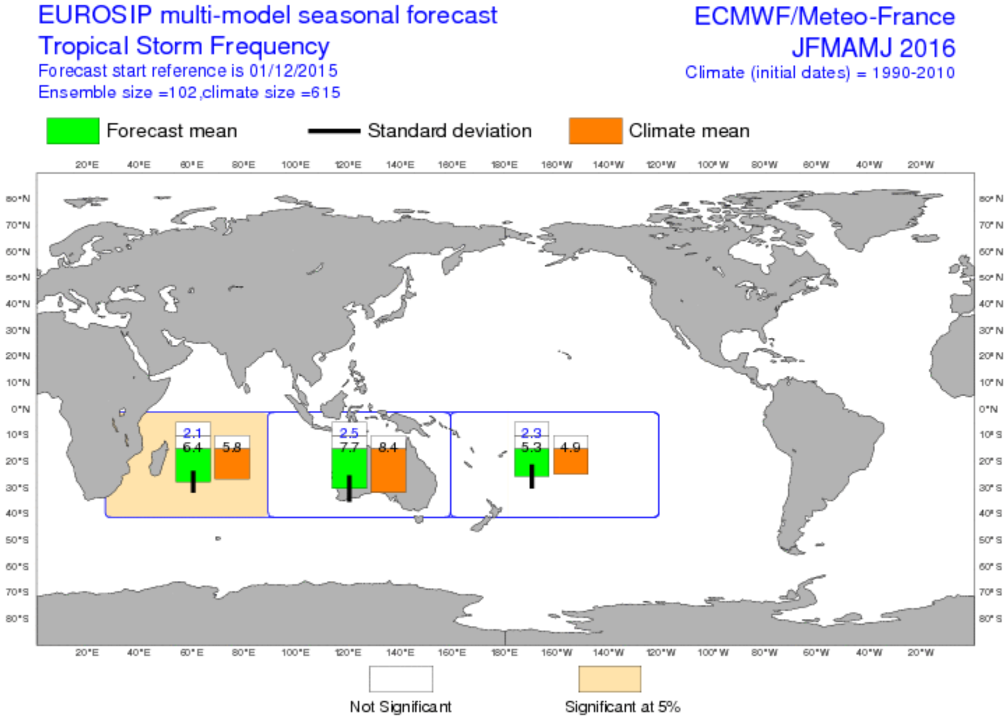


fig.II.8.1: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/

The hurricane season is expected lowerr than normal in the southwestern Indian Ocean (source : Meteo-France La Réunion) and significantly weaker in the southeastern Indian Ocean Indian Ocean (see EUROSIP). In south Pacific, the hurricane season is expected stonger than normal in the Polynesian area and weaker than normal in the southwestern Pacific so the mean over the EUROSIP box is not significant and does not reflect the impact of a strong El Niño.

ANNEX

II.9. 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 4 models (ECMWF, Météo-France, NCEP and UK Met Office). 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.

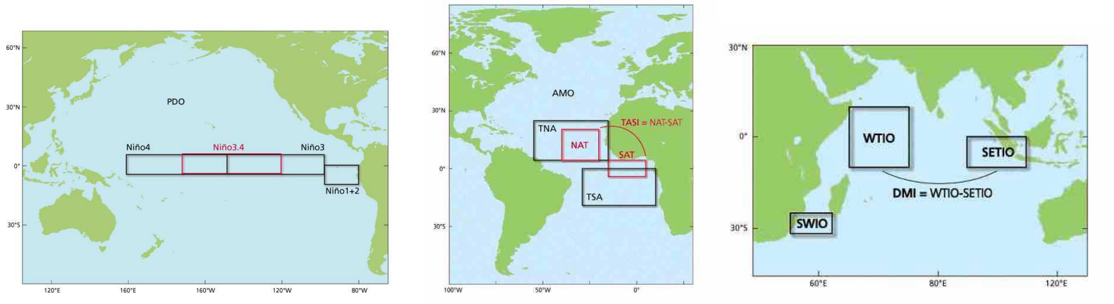
II.10. « NINO », SOI INDICES AND OCEANIC BOXES

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- 150 W ; 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).

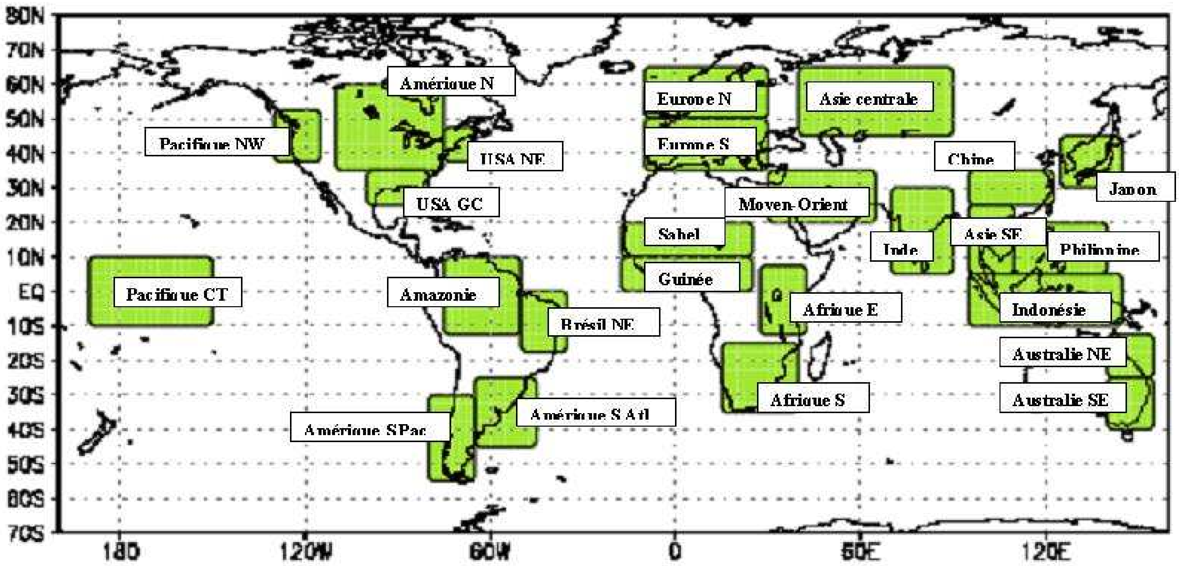
Associated to the oceanic « El Niño / La Niña » events, and taking into account the strong ocean/atmopshere coupling, the atmosphere shows also interanual variability associated to these events. It is monitored using the SOI (Southern Oscillation Index). This indice is calculated using standardized sea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



II.11.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.



II.12. 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).