GLOBAL CLIMATE BULLETIN
n°200 – February 2016

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I. DESCRIPTION OF THE CLIMATE SYSTEM (DECEMBER 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): El Nino event is still strong. Strong warm anomaly along the equator from the International Date Line to the South American coasts. The SST anomaly hasn't changed muche in December (see fig. I.1.1 bottom). In December, the Nino3.4 index value monthly is quite stable at +2.9 °C.

- Sub-surface : weakening but still strong East-West dipole anomaly pattern. The warm anomaly is clearly less extented in December than previously (fig. I.1.4.)

El Niño monitoring: Niño 3.4 index stable at +2.9 °C in December (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 Indian Ocean :

Generalized warm anomaly, but a cooling trend West of Australia. The DMI index is now negative (around -0.4°C at the end of December, see http://stateoftheocean.osmc.noaa.gov/sur/ind/dmi.php) because of a strengthening of the warm anomaly in the eastern part of the Ocean (SETIO index).

In the Atlantic:

Slightly positive or close to neutral on the equator and up to 30S.

In the north intertropical aera and along the US coasts, persistant warm anomaly.

In the North Atlantic, still the strong cold anomaly from Labrador to Europe.

The Mediterraen Sea is still warmer than normal.

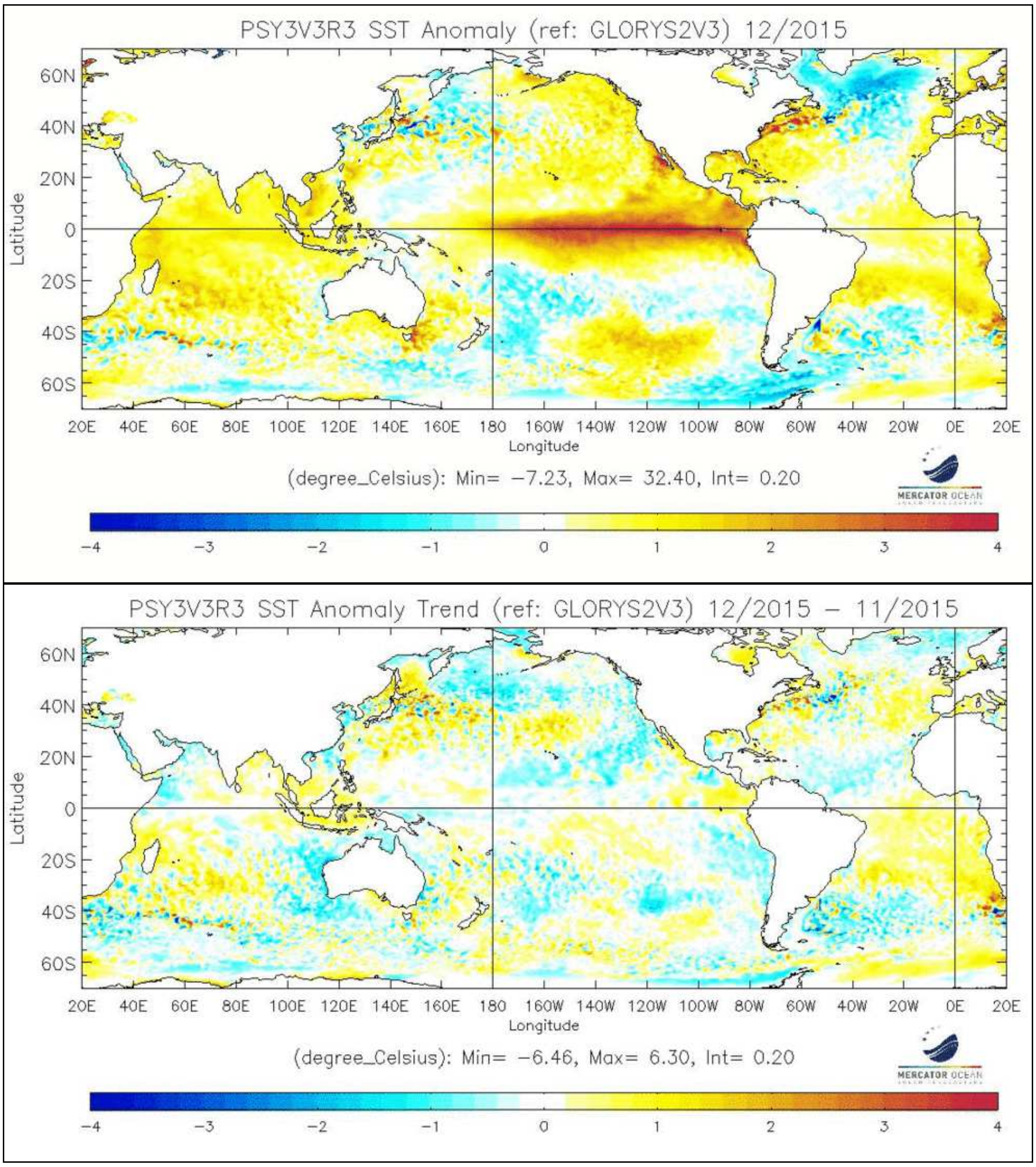

fig.I.1.1: top : SSTs Anomalies (°C) . Bottom : SST tendency (current – previous month), (reference Glorys 1992-2009). http://bcg.mercator-ocean.fr/

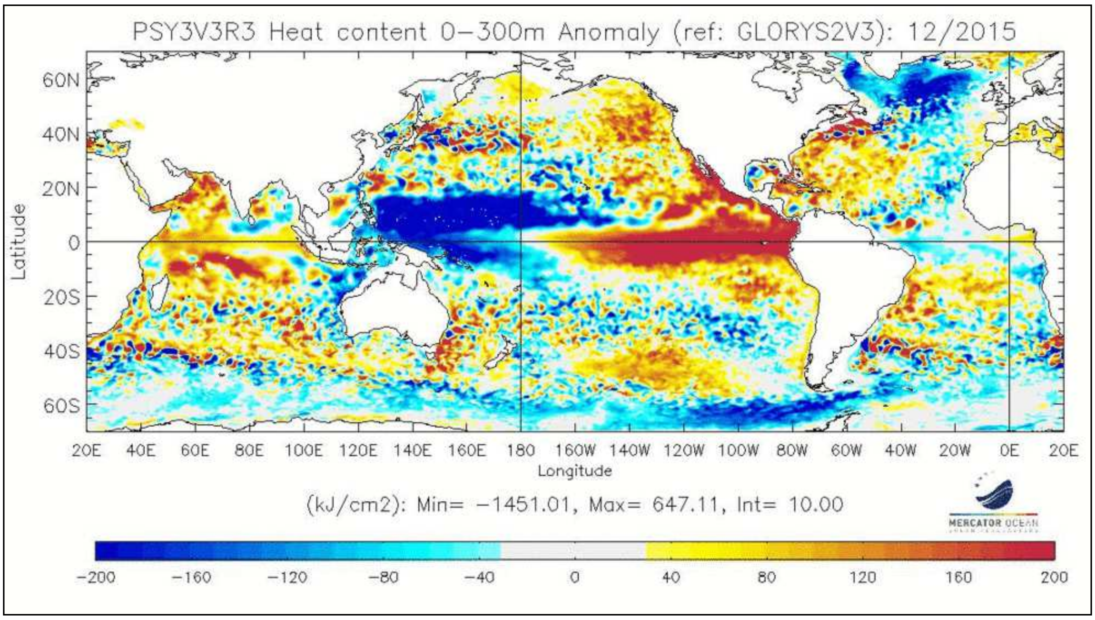

fig.I.1.2: map of Heat Content Anomalies (first 300m, kJ/cm2, reference Glorys 1992-2009)

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

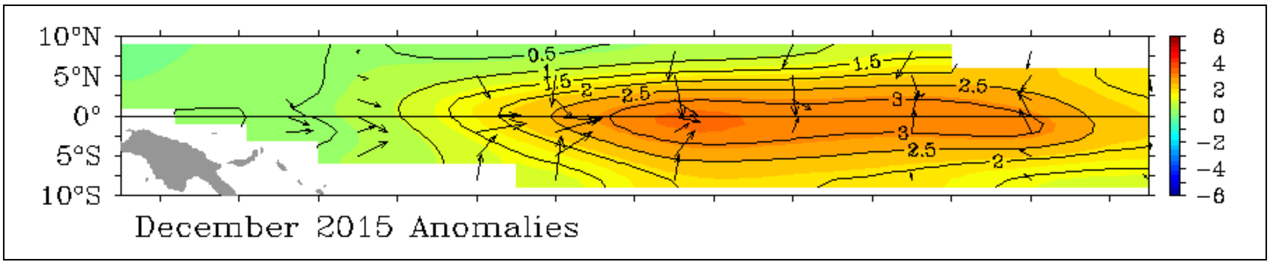

fig.I.1.3: SST Anomalies and Wind anomalies over the Equatorial Pacific from TAO/TRITON.

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

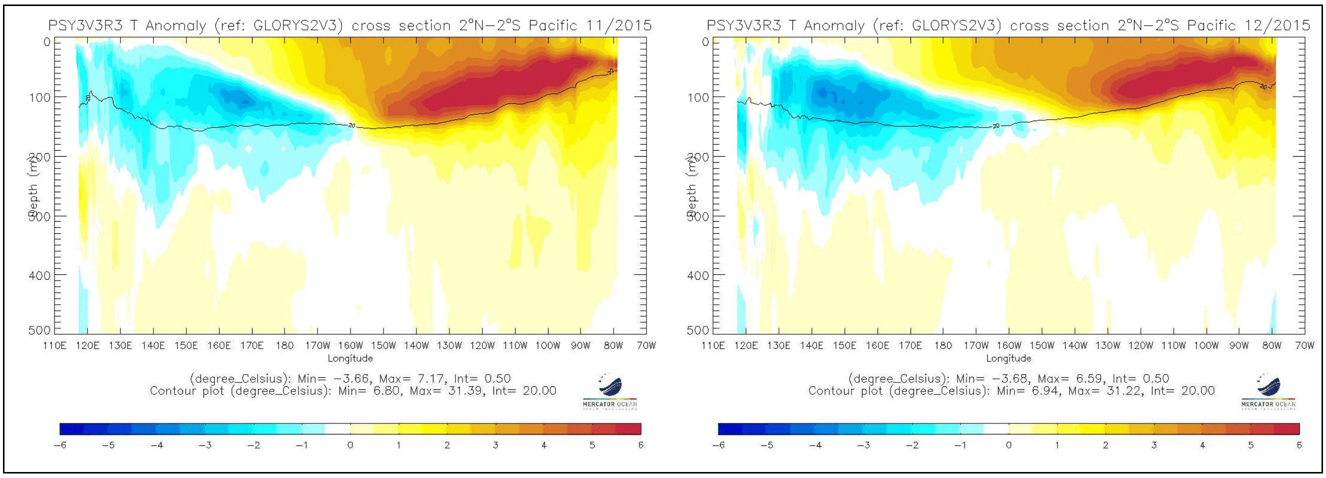

fig.I.1.4: Oceanic temperature anomaly in the first 500 meters in the Equatorial Pacific (previous and current month), http://bcg.mercator-ocean.fr

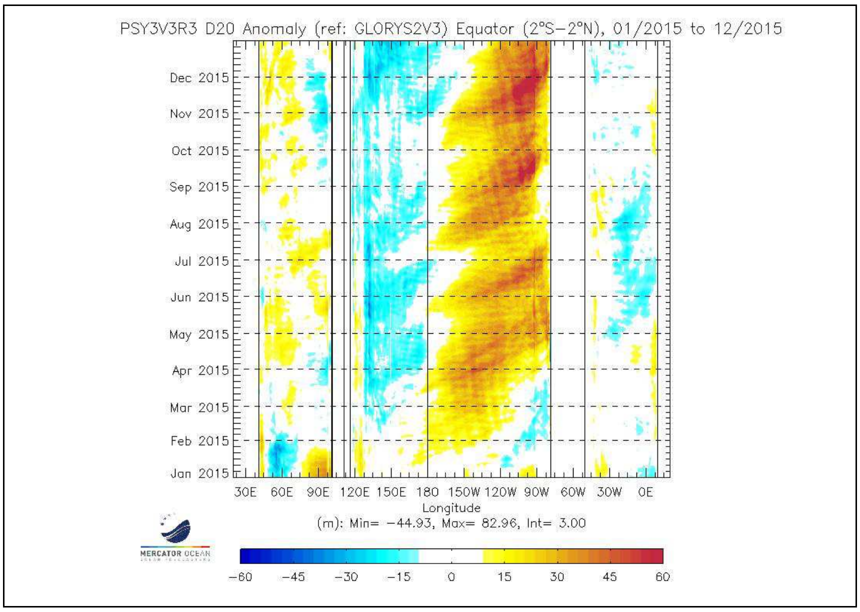

fig.I.1.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 6 month period http://bcg.mercator-ocean.fr/

I.1.b Near Europe

All sea surfaces near Europe mainly warmer than normal except the still persisting cold anomaly over the North Atlantic south of Iceland. To be noted particularly high positive anomalies of the Baltic Sea, especially in the north, preventing freezing, and also in the Arctic Sea. The Mediterranean had an increase of anomalies in the west, and a decrease in the east, but is still around 1 K warmer than normal.

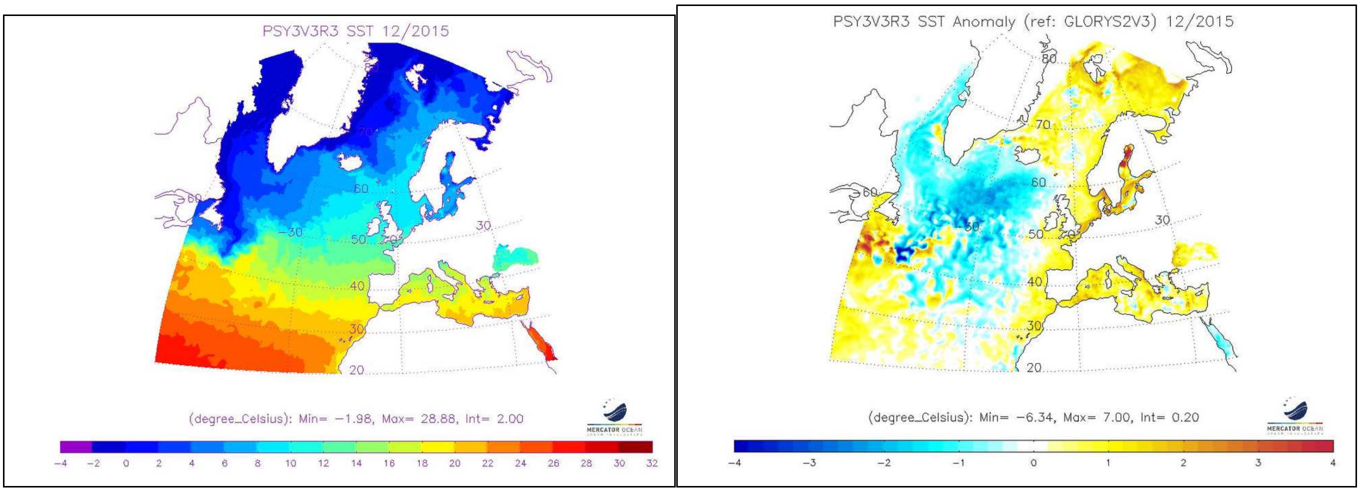

fig.I.1.6 : Mean sea surface temperature in the RA VI Region (Europe) and anomaly (reference Glorys 1992-2009). http://bcg.mercator-ocean.fr/

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) :

Strong Ocean-Atmosphere coupling.

There is still a large positive upward motion anomaly pattern in the Central part of the tropical Pacific Ocean, with an extension up to South of USA. West and East from this anomaly, there are 2 downward anomaly poles : 1 on the Maritime continent (weak), 1 over Northern Brazil (strong). These patterns are quite classical during El Nino events.

Note the MJO has probably reinforced the negative anomaly in Western Pacific.

Still a negative SOI index (-0.6).

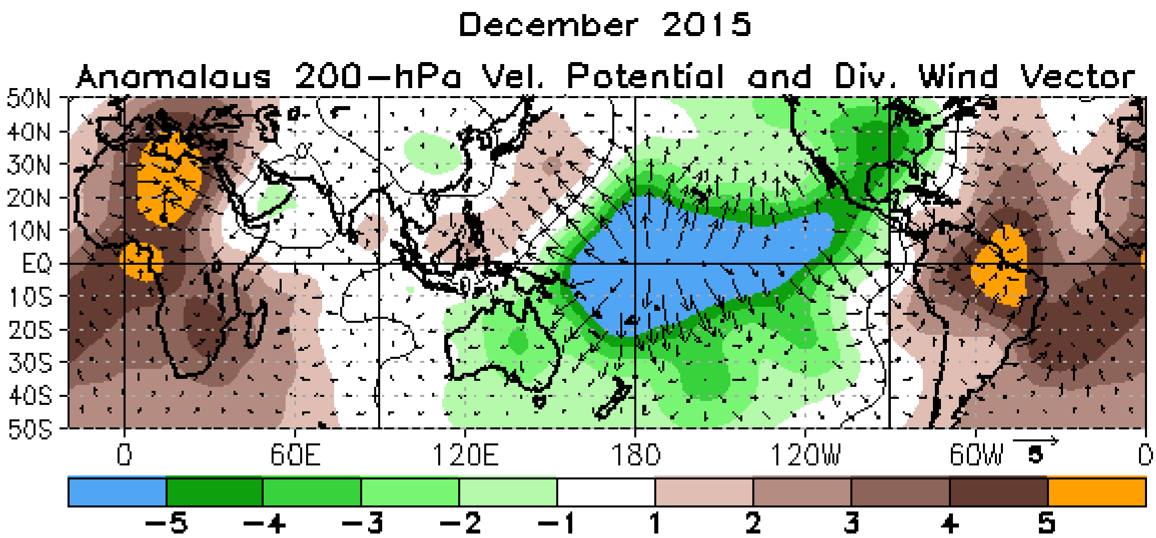

fig.I.2.1: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

MJO (fig. I.2.b):

MJO was very active during the second half of the month (in green) , with significant impact on the velocity potential field (western Pacific).

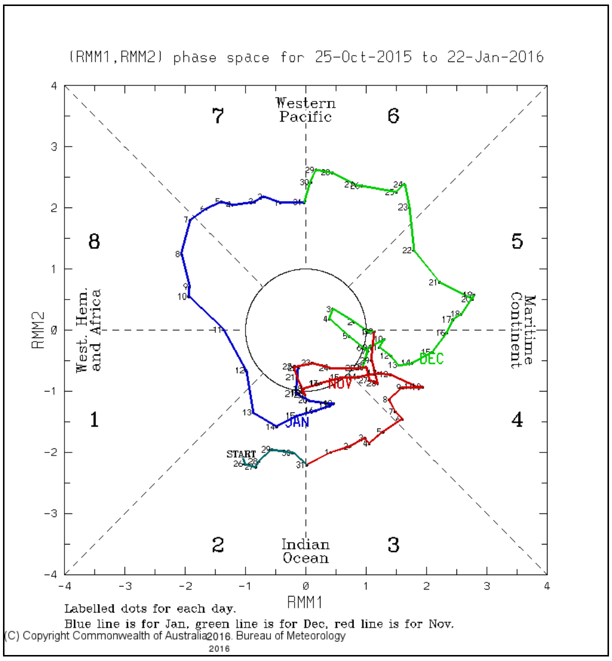

fig.I.2.b: indices MJO http://cawcr.gov.au/staff/mwheeler/maproom/RMM/phase.Last90days.gif

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, especially in Central Pacific and in Western Atlantic (noticeable stability compared to November). Teleconnexions up to mid-latitudes could be seen in NE Pacific (close to PNA pattern, but shifted westerly) and maybe in NW Atlantic (combination between PNA and a teleconnexion beginning over the Caribbean region.

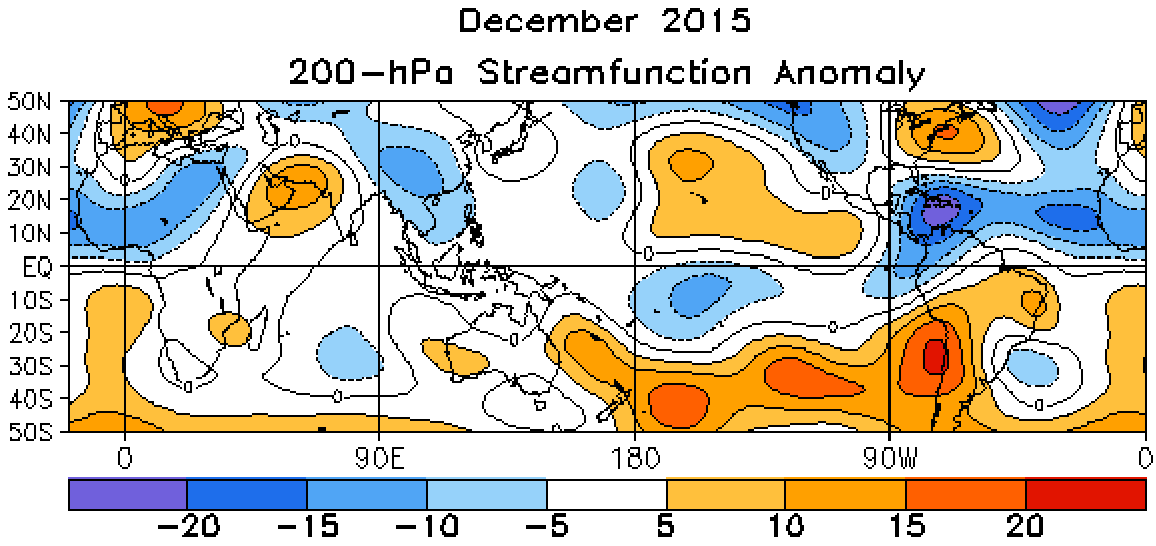

fig.I.2.2: Stream Function Anomalies at 200 hPa.

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, conjunction between a strong EA pattern and NAO pattern.

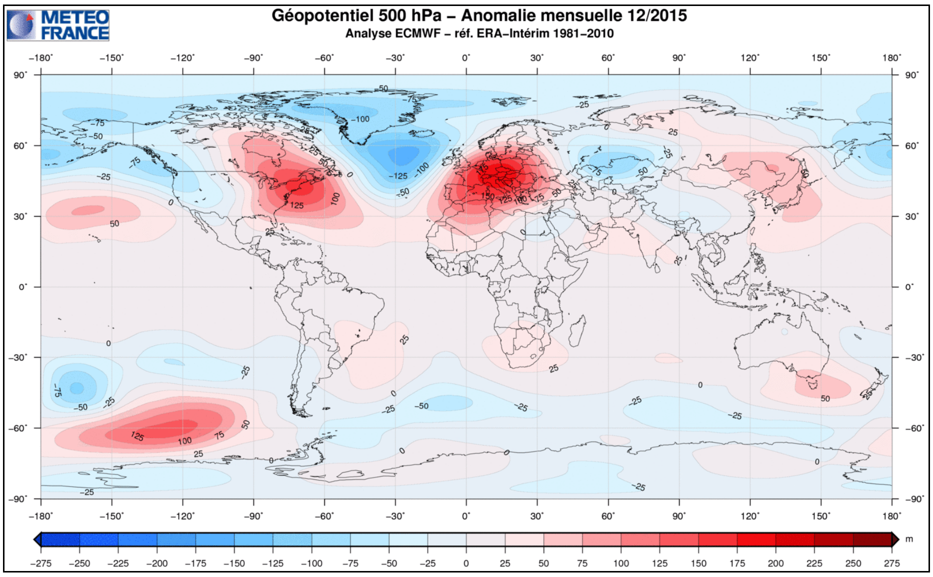

fig.I.2.3: Anomalies of Geopotential height at 500hPa (Meteo-France)

MONTH	NAO	EA	WP	EP-NP	PNA	TNH	EATL/WRUS	SCAND	POLEUR
DEC 15	**2.0**	**3.1**	**0.6**	**---**	**0.5**	**0.0**	**1.3**	**0.1**	**0.6**
NOV 15	1.7	1.6	0.8	-0.9	-0.2	---	0.6	-0.4	-0.7
OCT 15	1.0	0.2	-0.8	0.3	2.1	---	0.6	0.6	-0.5
SEP 15	-0.5	0.2	-1.4	-1.4	-0.8	---	-1.7	1.1	-0.1
AUG 15	-1.1	1.1	-1.5	-0.3	0.1	---	-0.4	0.9	0.1
JUL 15	-3.1	0.2	0.8	0.2	0.3	---	2.0	-1.1	0.4
JUN 15	0.2	1.1	-0.0	1.7	-0.1	---	-0.8	-1.5	-0.2
MAY 15	0.2	0.7	2.1	0.5	-0.1	---	-1.5	-2.1	0.5

Evolution of the main atmospheric indices for the Northern Hemisphere for the last 6 months :
http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/table3.shtml

Sea level pressure and circulation types over Europe

Outstandingly high pressure over southern and central Europe and a deeper-than-normal Icelandic much extending to the south over the North Atlantic and also to northern Europe and the Arctic Sea. Most dominant contributions come from NAO+ and EA+ patterns, which became both much stronger from October to December. NAO+ reflects the deeper-than-normal Icelandic low, while EA+ can explain the shift of the Icelandic low to the south and the extension of high pressure over Europe. There is also a contribution from EATL/WRUS+, explaining the dipole high over Europe vs. low over Russia.

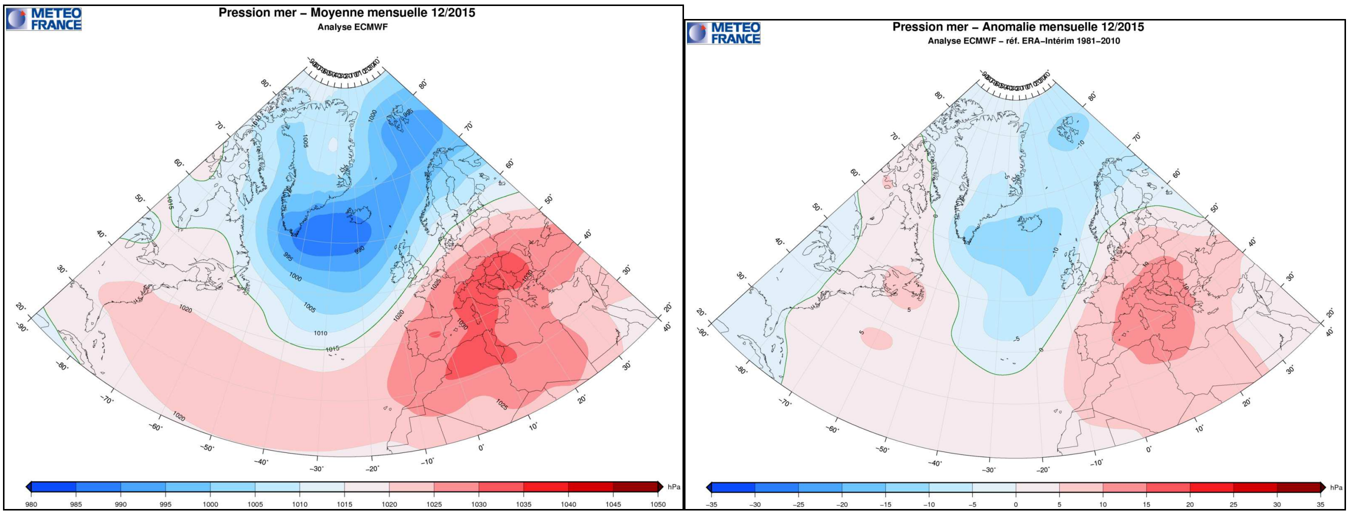

fig.I.2.4: Mean sea level pressure in the RA VI Region (Europe) (top) and 1981-2010 anomalies (bottom).

Circulation indices: NAO and AO

NAO was in a positive phase throughout the month. 25 out of 31 days had a NAO+ weather type, which are exceptionally many. This phase had a peak at the beginning of December, a weakening in the middle of the month, and another regeneration in the last decade of the month.

Similarily, two intense positive phases can be identified for the AO at the beginning and particularly at the end of the month, implying relatively little air mass exchange between the Arctic and the middle latitudes.

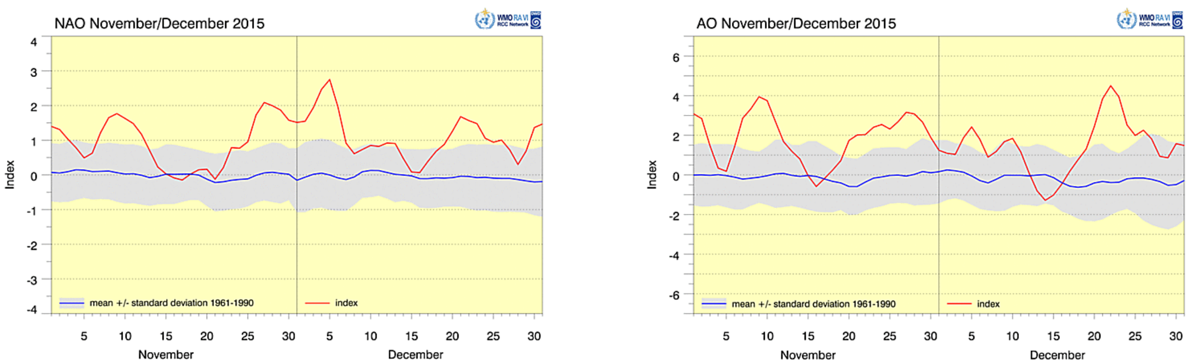

fig.I.2.5: North Atlantic Oscillation (NAO, left) and Arctic Oscillation (AO, right) indices with 1961-1990 mean standard deviation (shading). http://www.dwd.de/rcc-cm , data from NOAA CPC: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml

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, the Caribbean, northern South America.

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

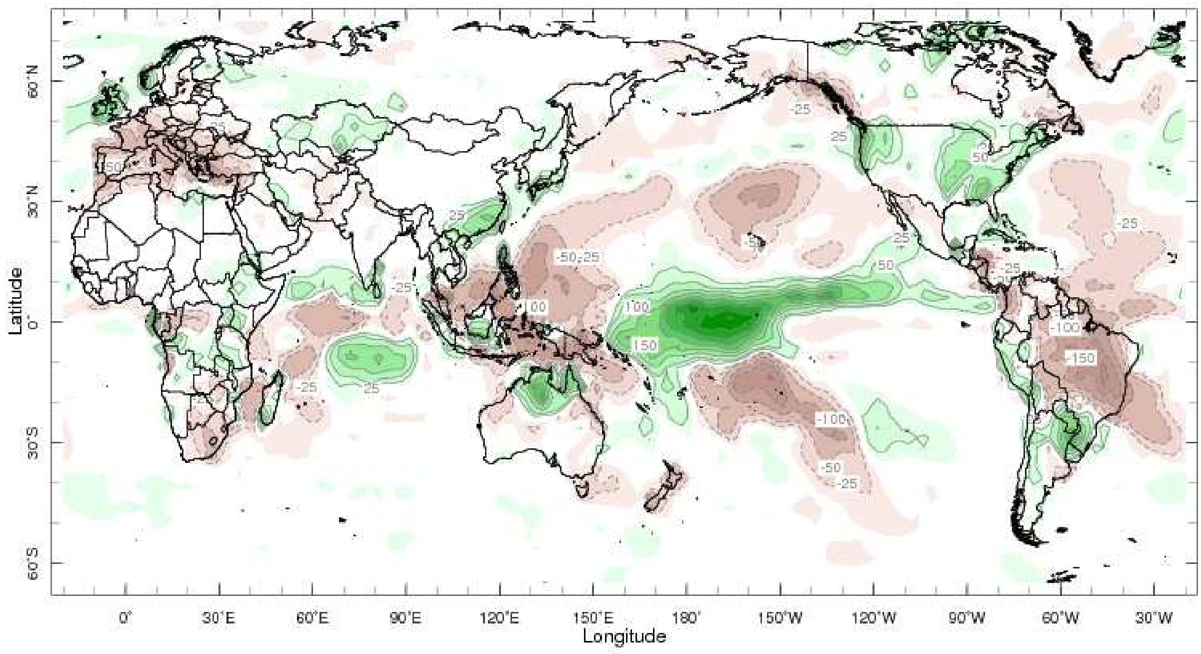

fig.I.2.4: Rainfall Anomalies (mm) (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.

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

Precipitation anomalies in Europe:

It was very dry especially in the southern half of Europe, mainly below the 10th percentile which reflects the huge high pressure influence over that area. Especially Italy, the Balkan Peninsula and Turkey/Syria were extremely dry. In contrast, it was wetter than normal in northern Europe, particularly in the northwest (Ireland, UK, Norway), which saw several episodes of heavy precipitation that month. UK had its wettest December on record, many places in UK and Ireland had twice to four times the normal of monthly totals. The precipitation was caused particularly by some very strong cyclonic developments during intense NAO+ phases.

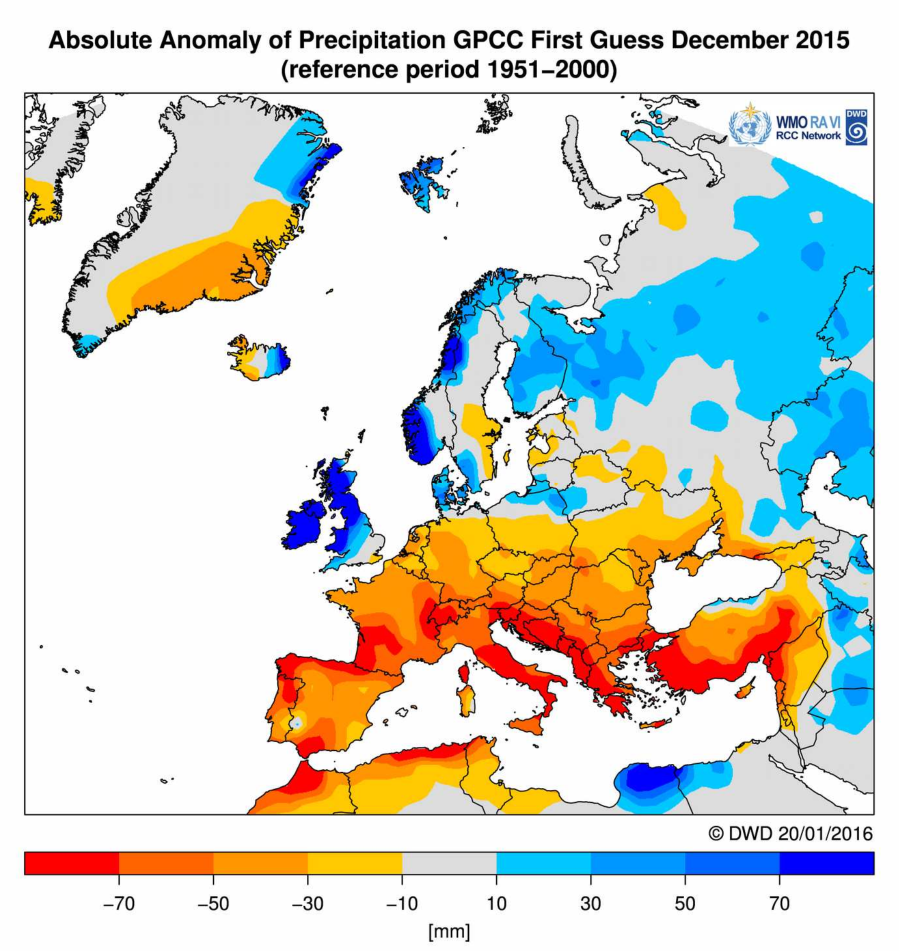

fig.I.2.5: Left: Absolute anomaly (1951-2000 reference) of precipitation in the RA VI Region (Europe), data from GPCC (Global Precipitation Climatology Centre), http://www.dwd.de/rcc-cm. Right: Percentiles of precipitation, 1981-2010 reference. Data from NOAA Climate Prediction Center, http://iridl.ldeo.columbia.edu/maproom/Global/Precipitation/Percentiles.html

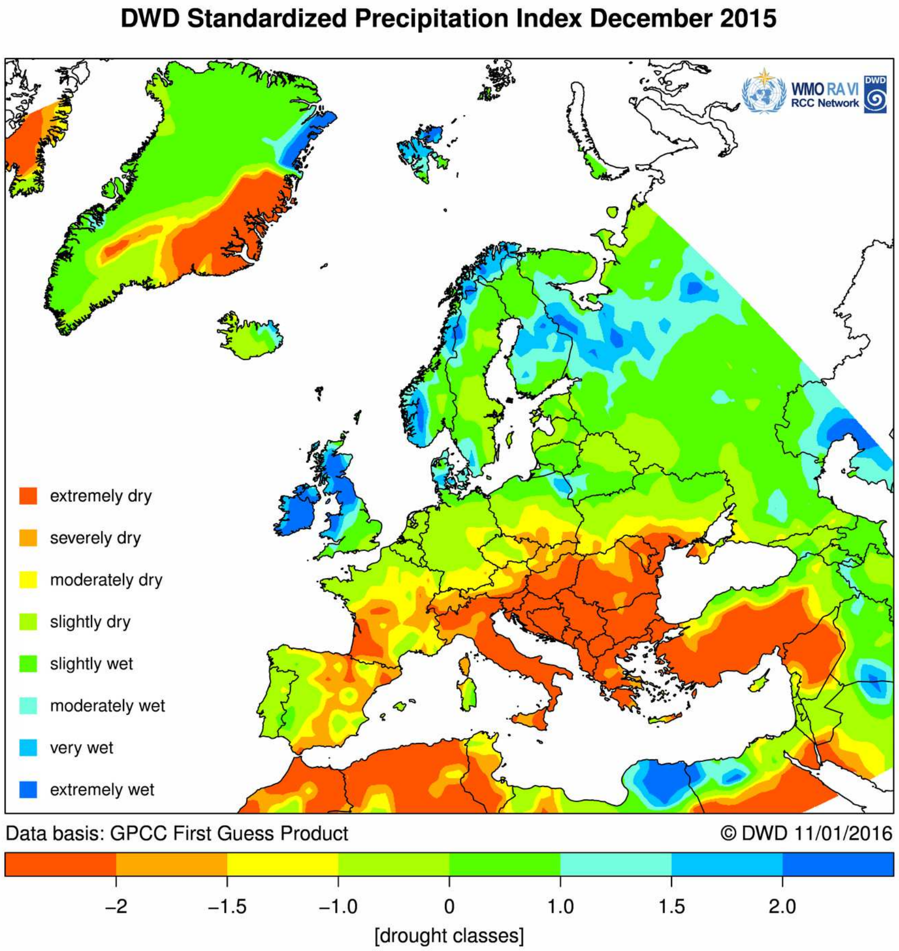

fig. I.2.5a: Standardized Precipitation Index with DWD modification (DWD-SPI), http://www.dwd.de/rcc-cm .

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	SPI DWD Drought Index
Northern Europe	+25.7 mm	+0.481
Southern Europe	-61.1 mm	-1.715

I.2.c Temperature

Consistant with geopotential, warm anomaly over Eurasia and the Mediterranean basin. Warm anomaly in the northern two-thirds of South America. Warm anomaly over a large part of Canada and Eastern USA..

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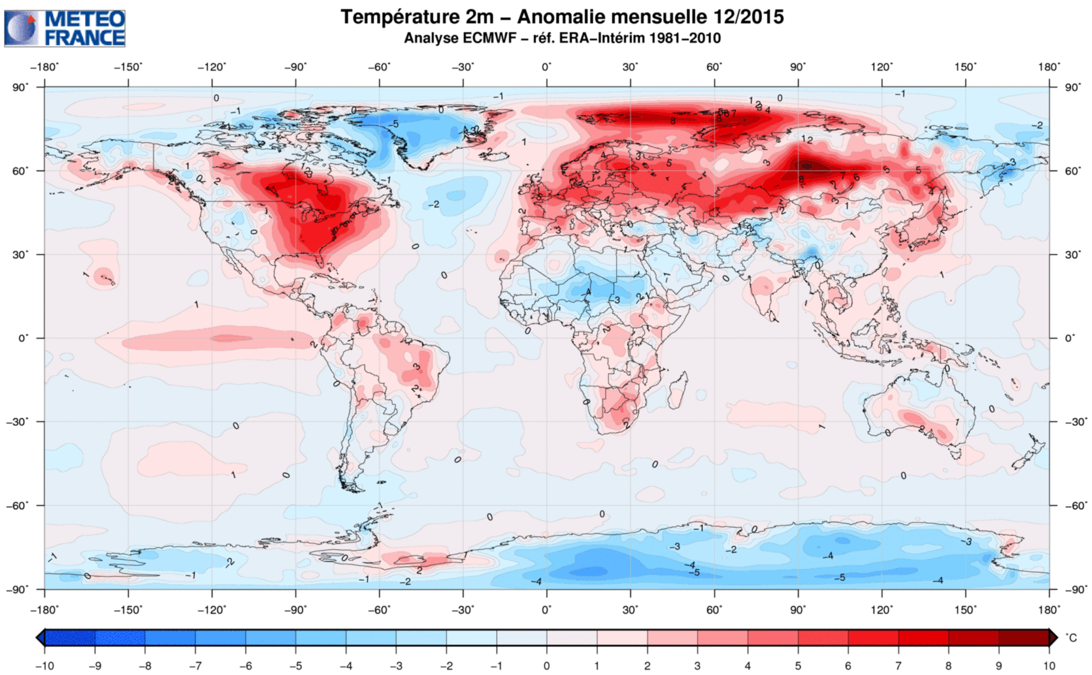


fig.I.2.8: Temperature Anomalies (°C) (Meteo-France)

<u>Temperature anomalies in Europe:</u>

It was very mild almost all over Europe. Particularly high positive anomalies over western, central and northeastern Europe can be explained by advection of very mild air masses in a southwesterly flow. In southern Europe, high temperatures are more caused by high pressure subsidence, but temperature anomalies are lower there. Turkey was colder than normal due to some cold air outbreaks far to the south, but also to some advection of colder continental air from the east. Over the North Atlantic, cold Arctic air moved frequently over Greenland southwards, cooling the sea surface and the air above.

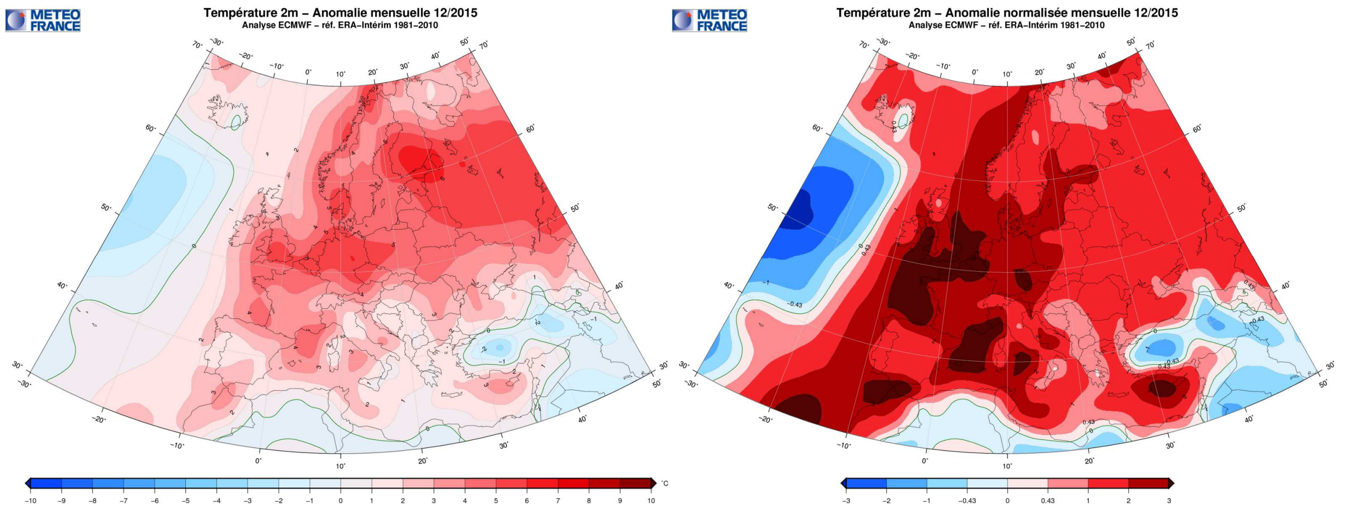


fig.I.2.9: Left graph: Absolute anomaly of temperature in the RA VI Region (Europe). Right graph: Standardized temperature anomalies

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	+4.1°C
Southern Europe	+2.0°C

I.2.d Sea ice

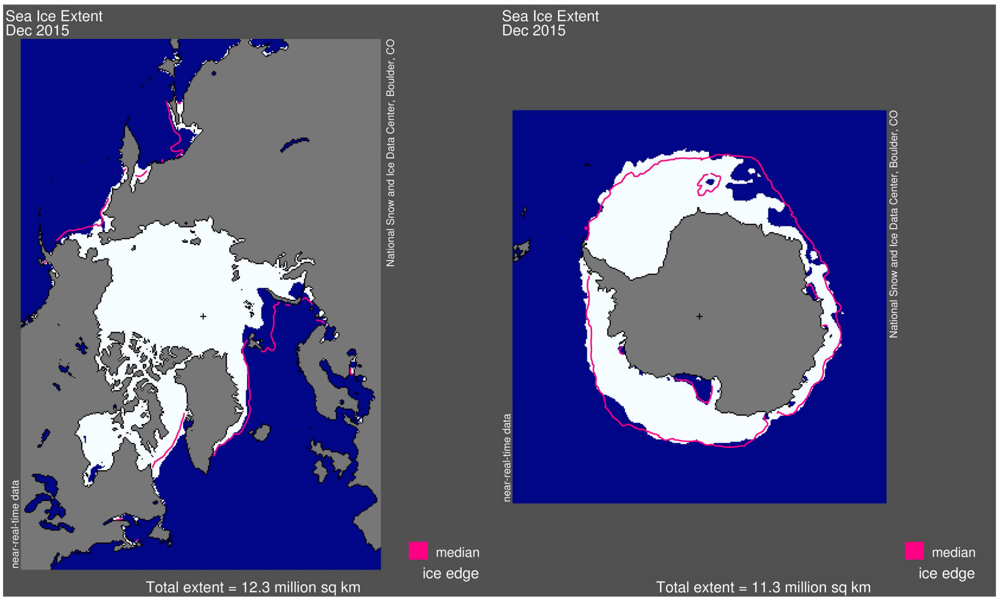


fig.I.2.15: Sea-Ice extension in Arctic (left), and in Antarctic (right). The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

In Arctic (fig. 1.2.15 and 1.2.16 - left): persistent significant deficit (~ -2 std). **In Antarctic (fig. 1.2.15 and 1.2.16 - right)**: near normal values.

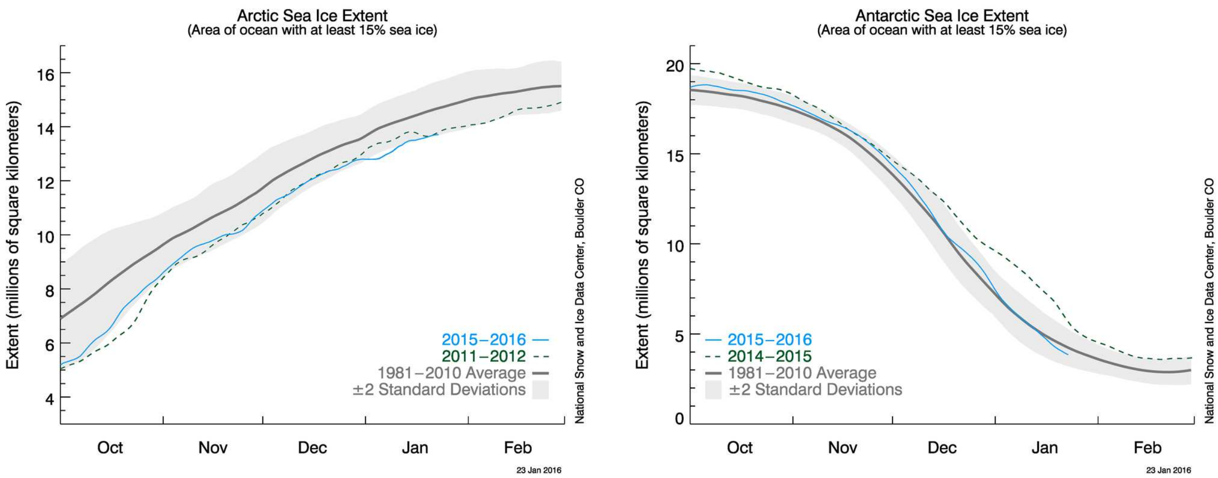


fig. I.2.16 : Sea-Ice extension evolution from NSIDC.

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 still 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, and generally consistent in extra-tropical regions.

II.1.a Sea surface temperature (SST)

Good stability in the El Nino context.

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 New Zealand to Polynesia.

Indian Ocean: Remaining of the generalized warm anomaly.

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.

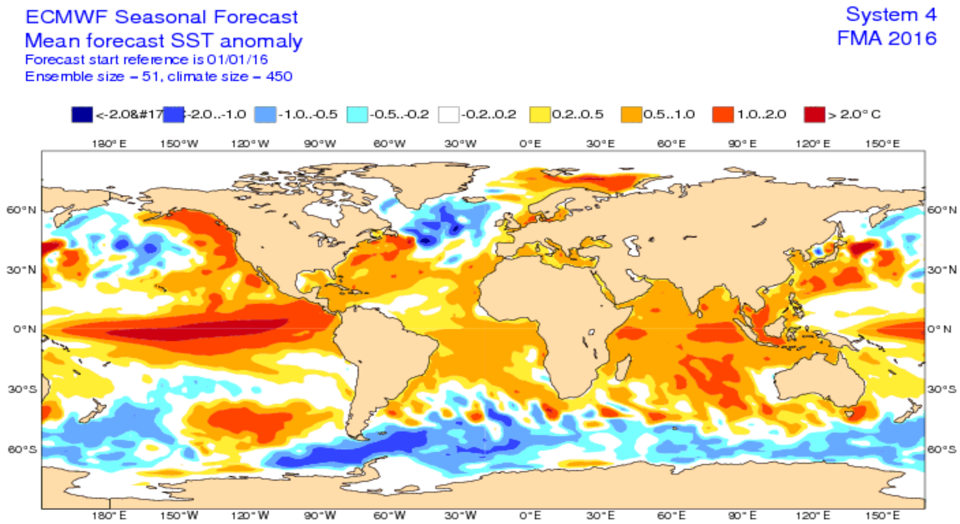


fig.II.1.1: SST anomaly forecast from ECMWF

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

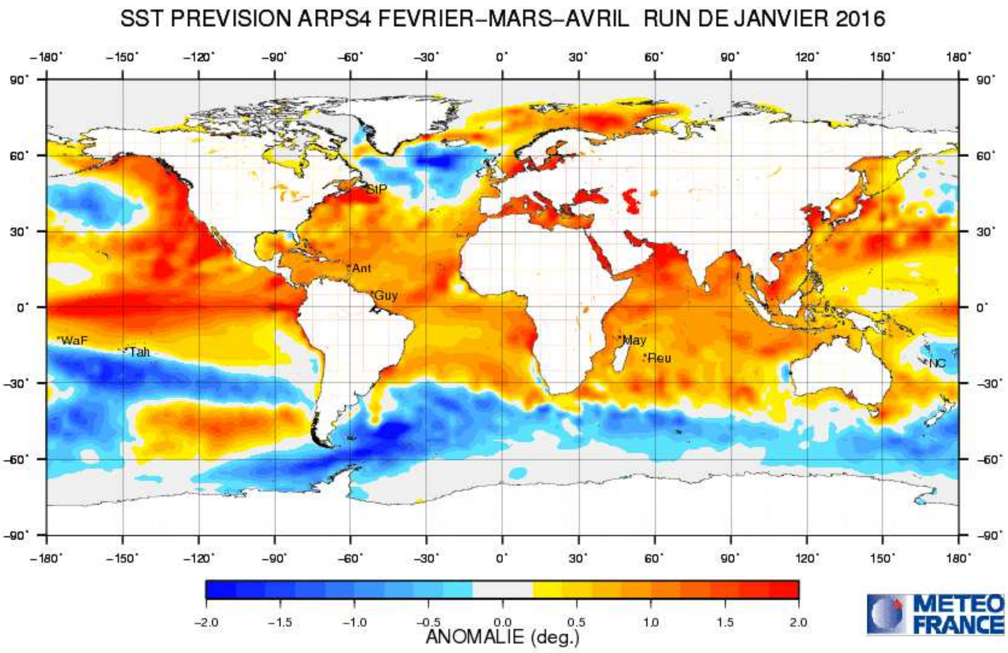


fig.II.1.2: SST Anomaly forecast from Meteo-France (recalibrated with respect of observation).

http://elaboration.seasonal.meteo.fr

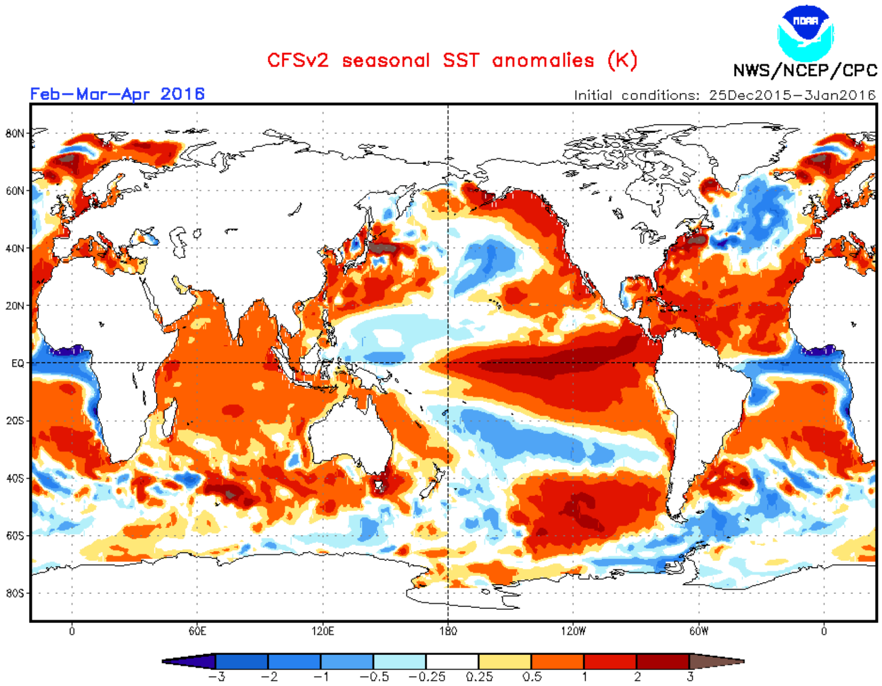


fig.II.1.3: SST anomaly forecast from NCEP.

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

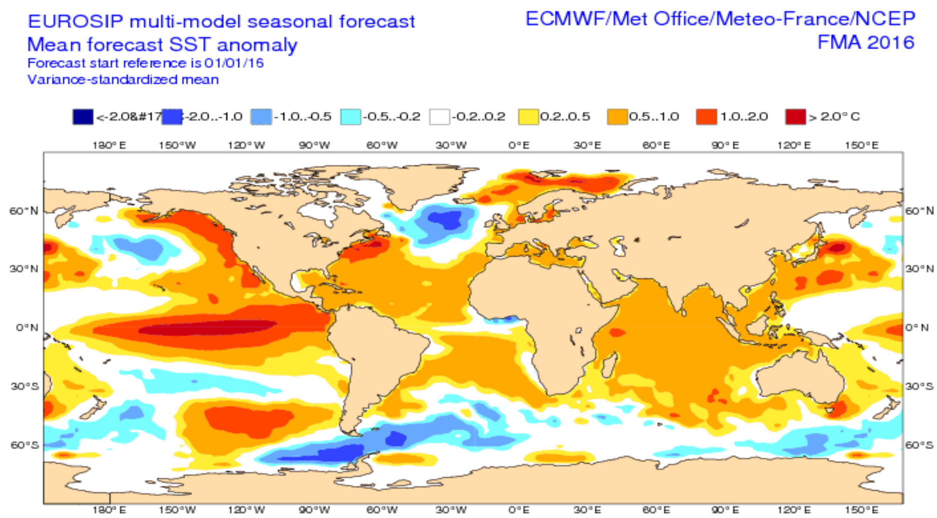


fig.II.1.4: SST Forecasted anomaly from Euro-SIP

II.1.b ENSO forecast

Forecast Phase: fast decreasing of El Niño

Very good consistency between models.

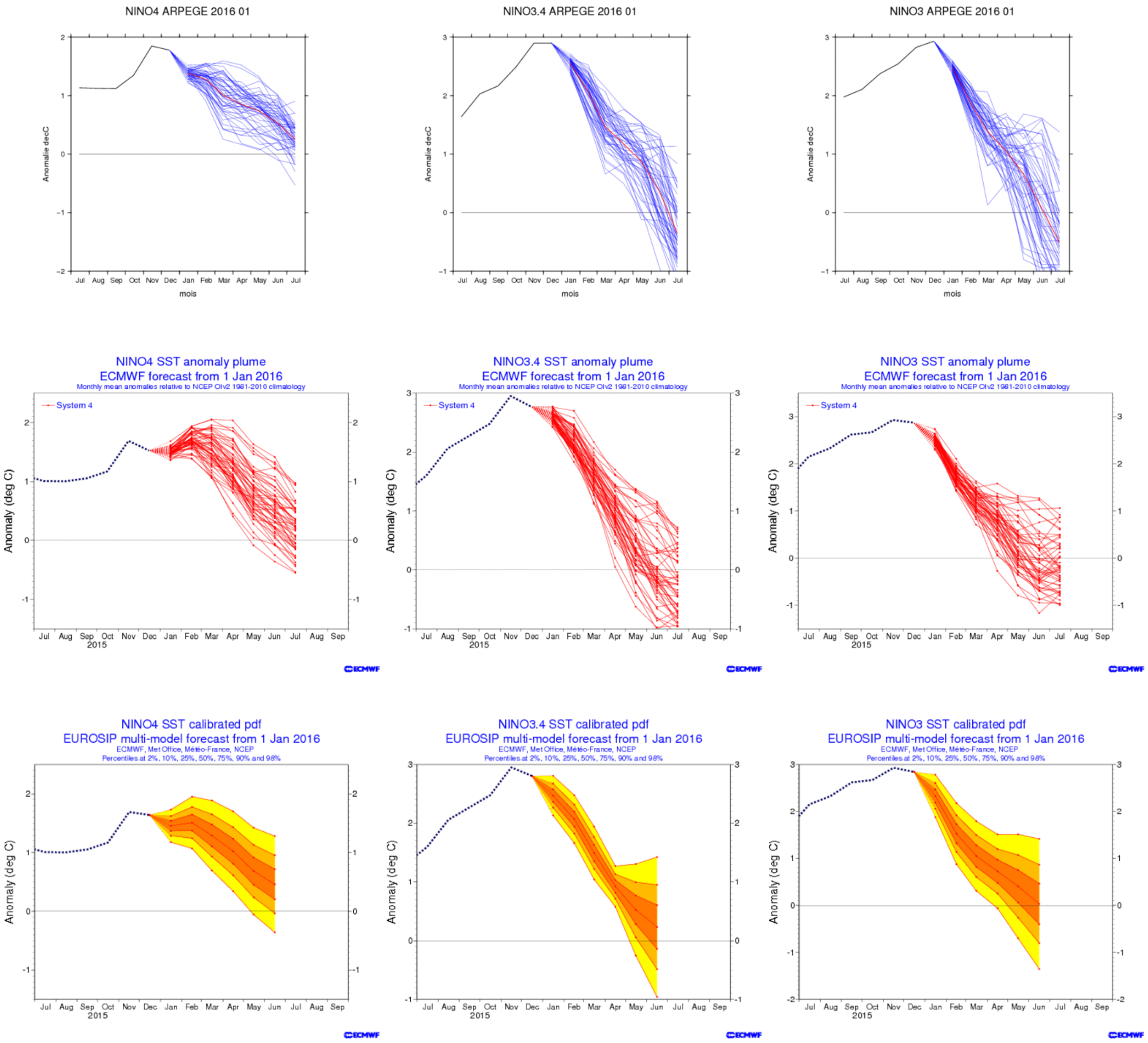


fig.II.1.5: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members - and EuroSIP (bottom) – recalibrated distributions - (http://elaboration.seasonal.meteo.fr , http://www.ecmwf.int/)

II.1.c Atlantic ocean forecasts

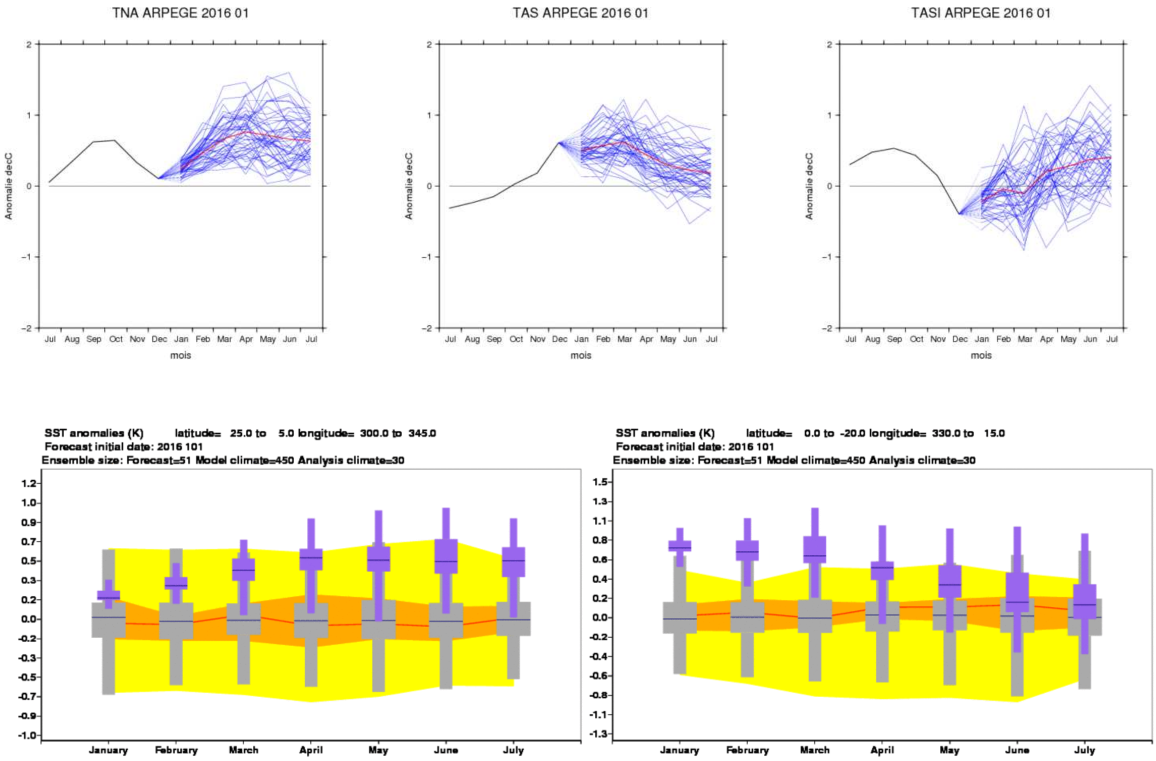
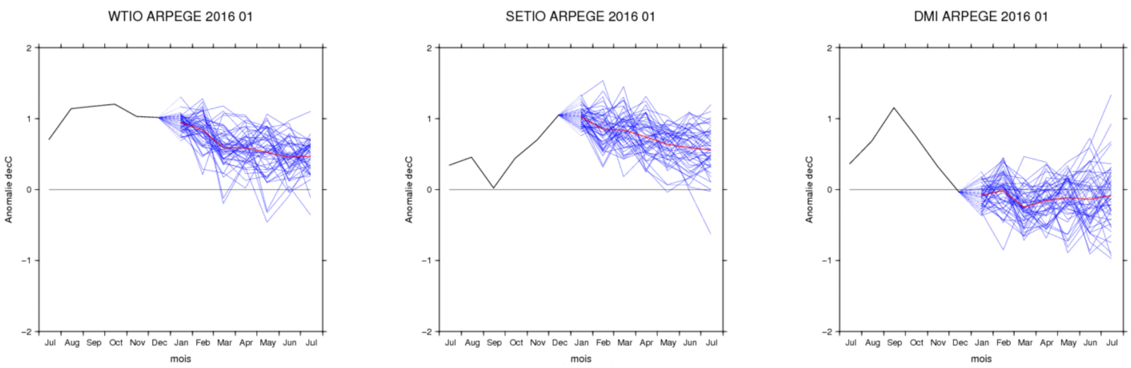


fig.II.1.6: SSTs anomaly forecasts in the Atlantic Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

II.1.d Indian ocean forecasts



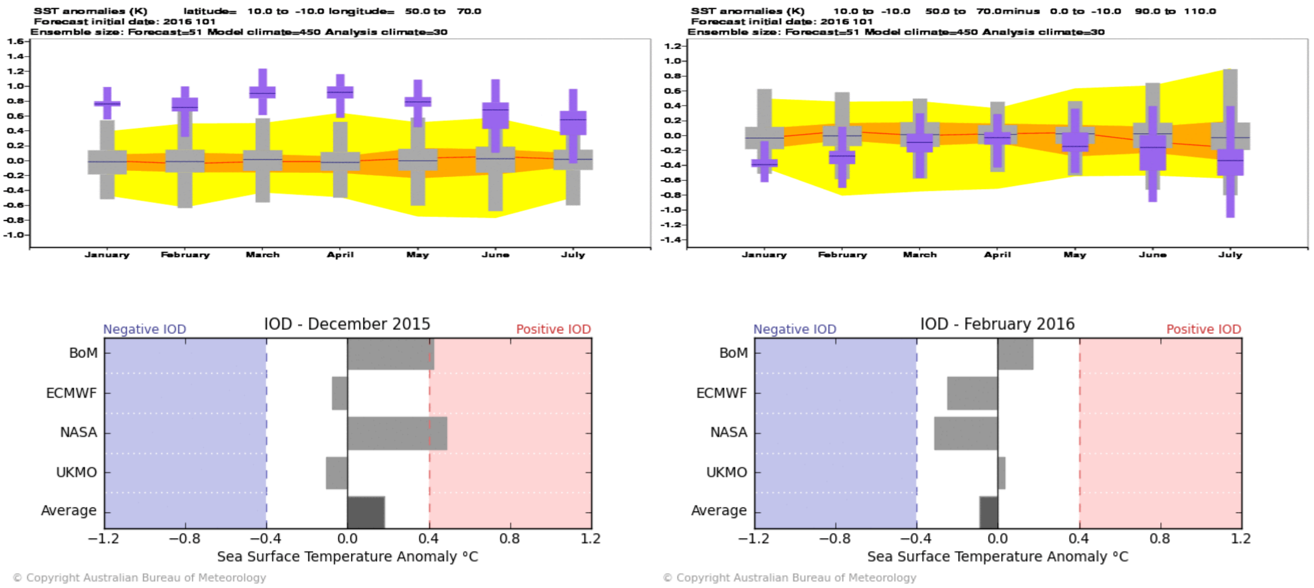


fig.II.1.7: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

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.

Some differences in the Indian Ocean, concerning weak anomalies.

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, but some differences in higher latitudes, especially close to Europe.

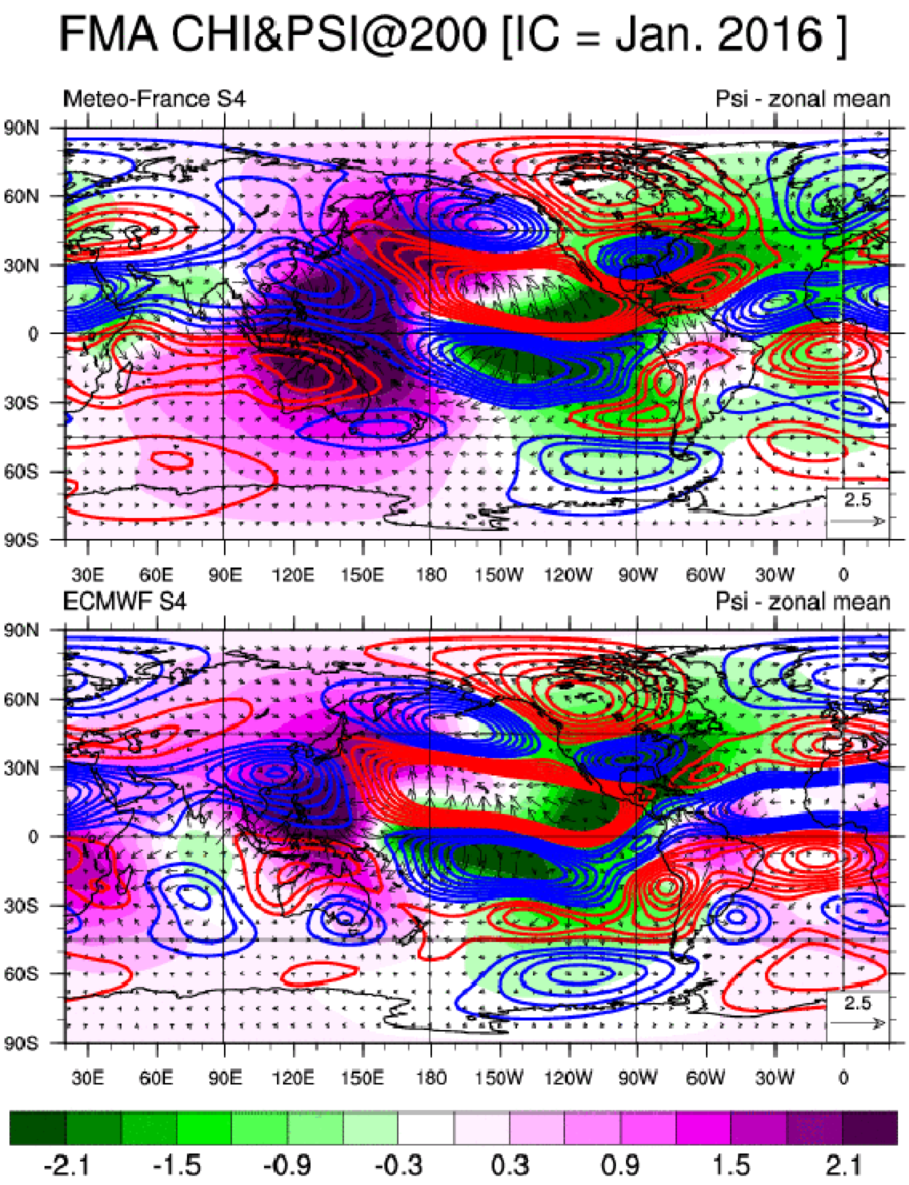


fig.II.2.1: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), associated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa by Météo-France (top) and ECMWF (bottom).

II.2.b North hemisphere forecast and Europe

Geopotential height anomalies (fig. II.2.2 – insight into mid-latitude general circulation anomalies): One 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 months, anomalous regime occurrences are opposite between MF and ECMWF concerning NAO+ and NAO- regimes.

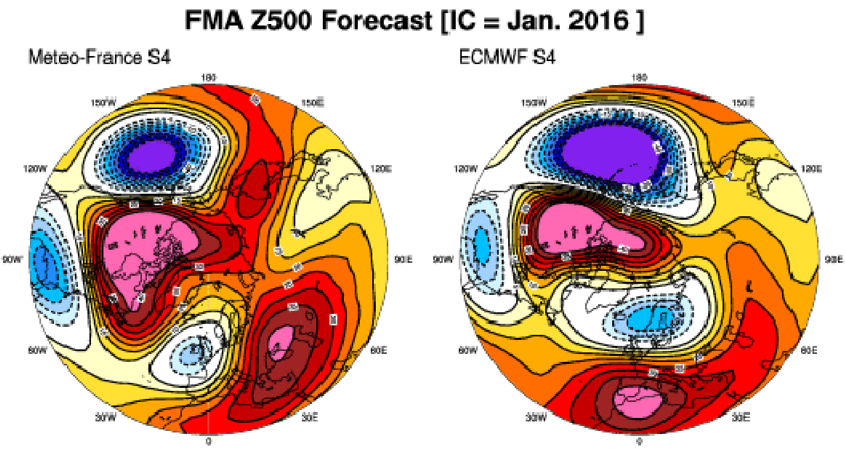


fig.II.2.2: Anomalies of Geopotential Height at 500 hPa from Météo-France (left) and ECMWF (right).

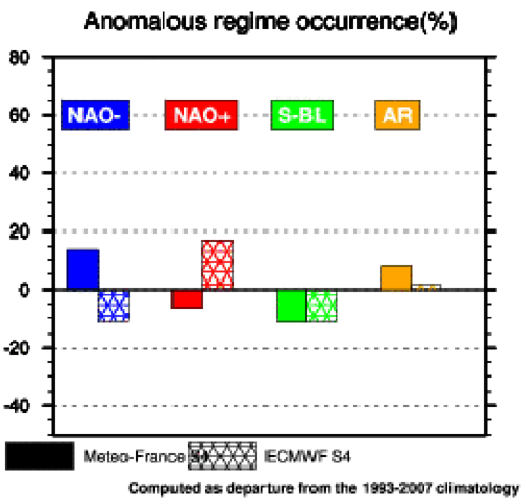


fig.II.2.3: North Atlantic Regime occurrence anomalies from Météo-France and ECMWF : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.

II.3. IMPACT: TEMPERATURE FORECASTS

Besides global warming, the ENSO+ and PDO+ context and Indian Ocean SST anomalies are favourable 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

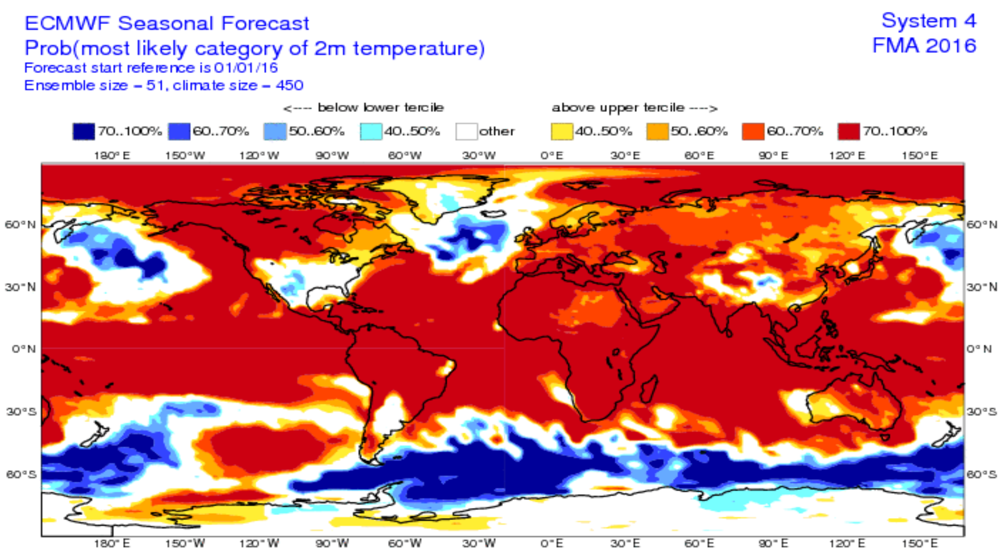


fig.II.3.1: Most likely category probability of T2m from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/

II.3.b Météo-France

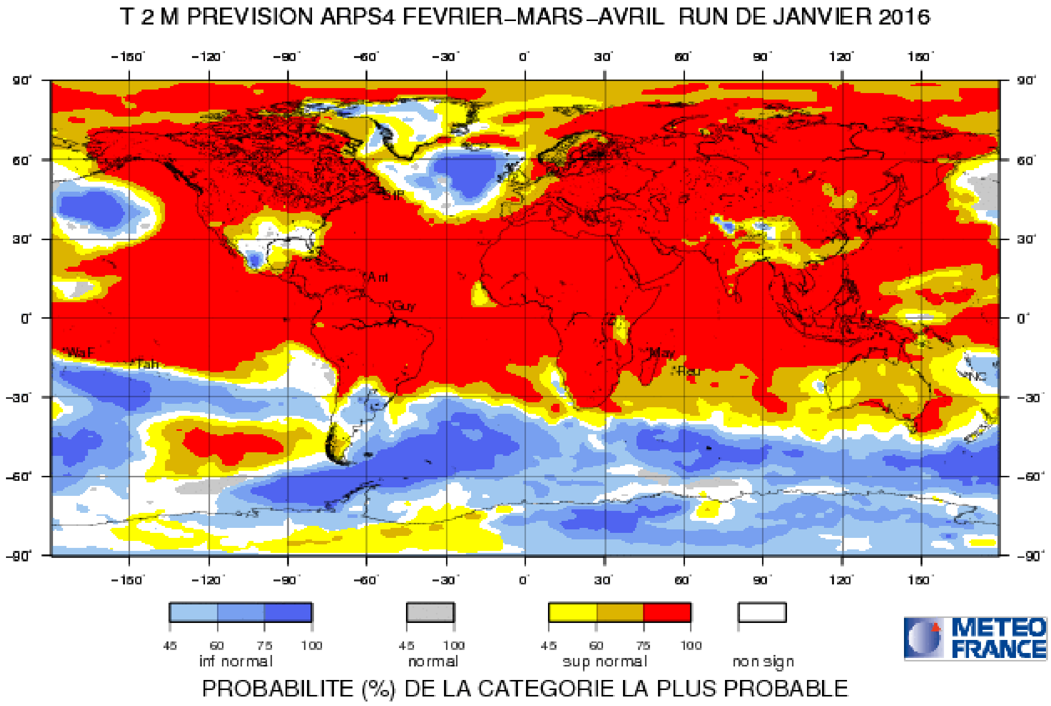


fig.II.3.2: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.3.c Japan Meteorological Agency (JMA)

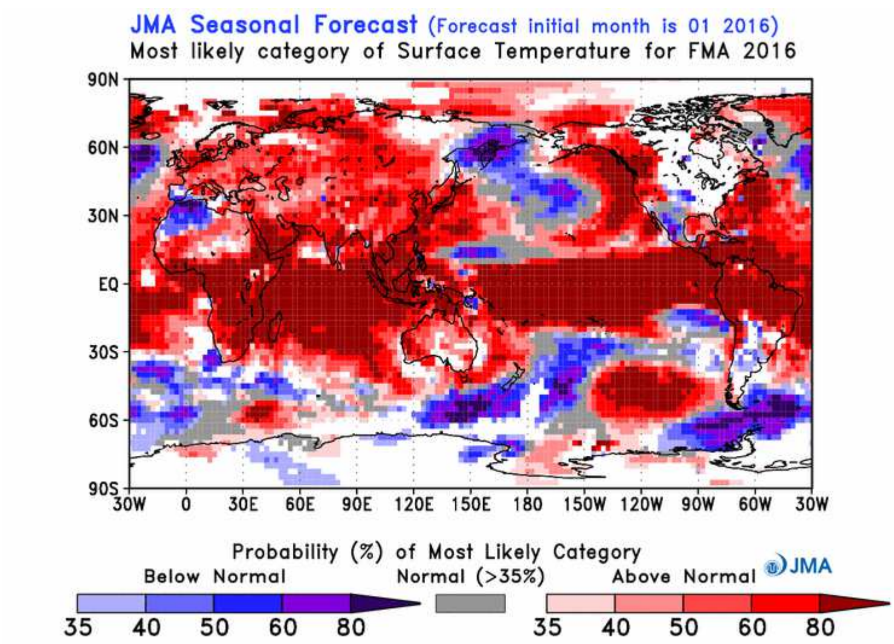


fig.II.3.3: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.php

II.3.d EUROSIP

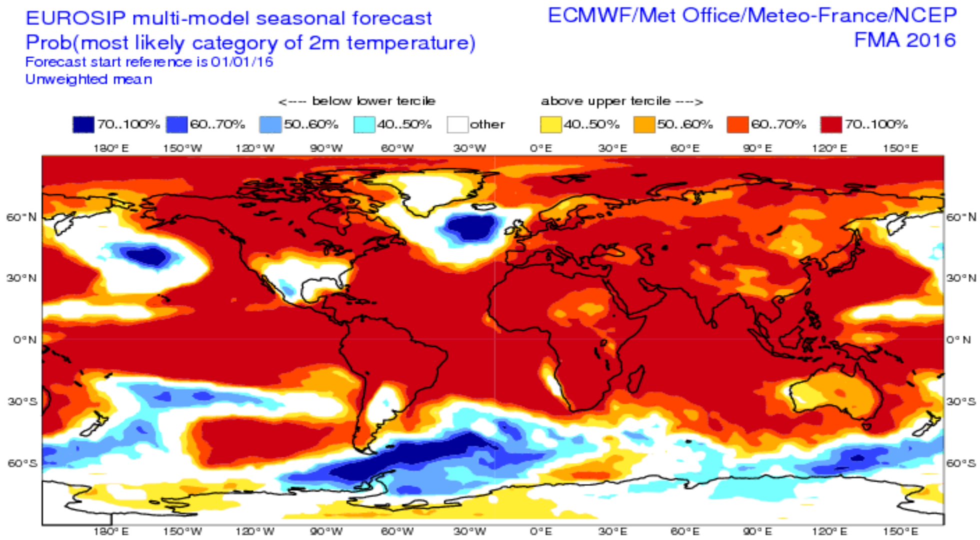


fig.II.3.4: Multi-Model Probabilistic forecasts for T2m from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/

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 Eastward to the coasts of Peru and Ecuador, and northward to Mexico and South of USA; and extending Westward over Indonesia. 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.

Conversely, dry anomaly is expected on the Caribbean and northern South America, as well as southern Africa and Madagascar, and from NE Australia to South 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.

II.4.a ECMWF

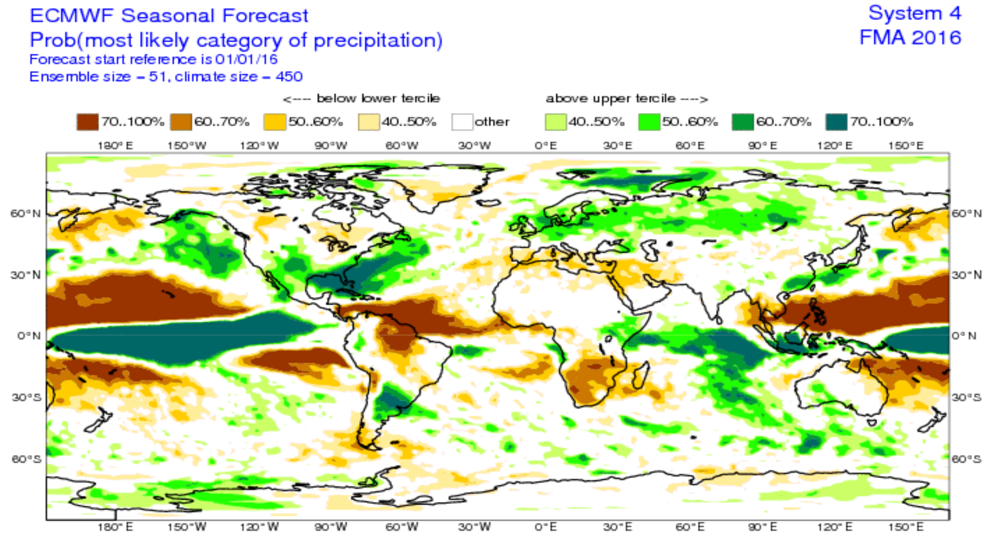


fig.II.4.1: Most likely category probability of rainfall from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/

II.4.b Météo-France

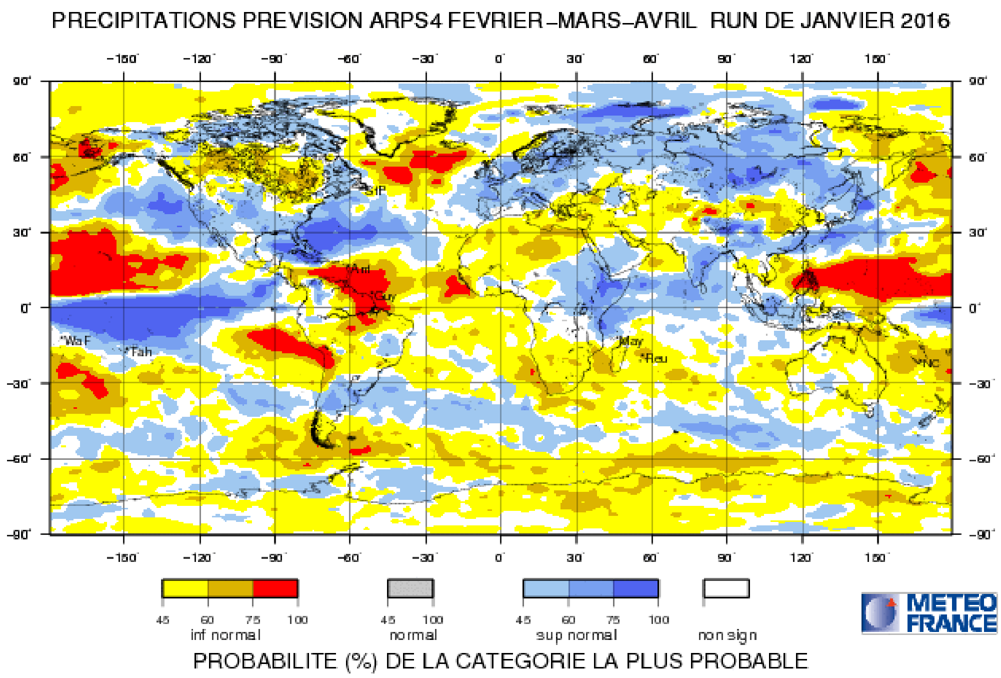


fig.II.4.2: Most likely category of Rainfall. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Japan Meteorological Agency (JMA)

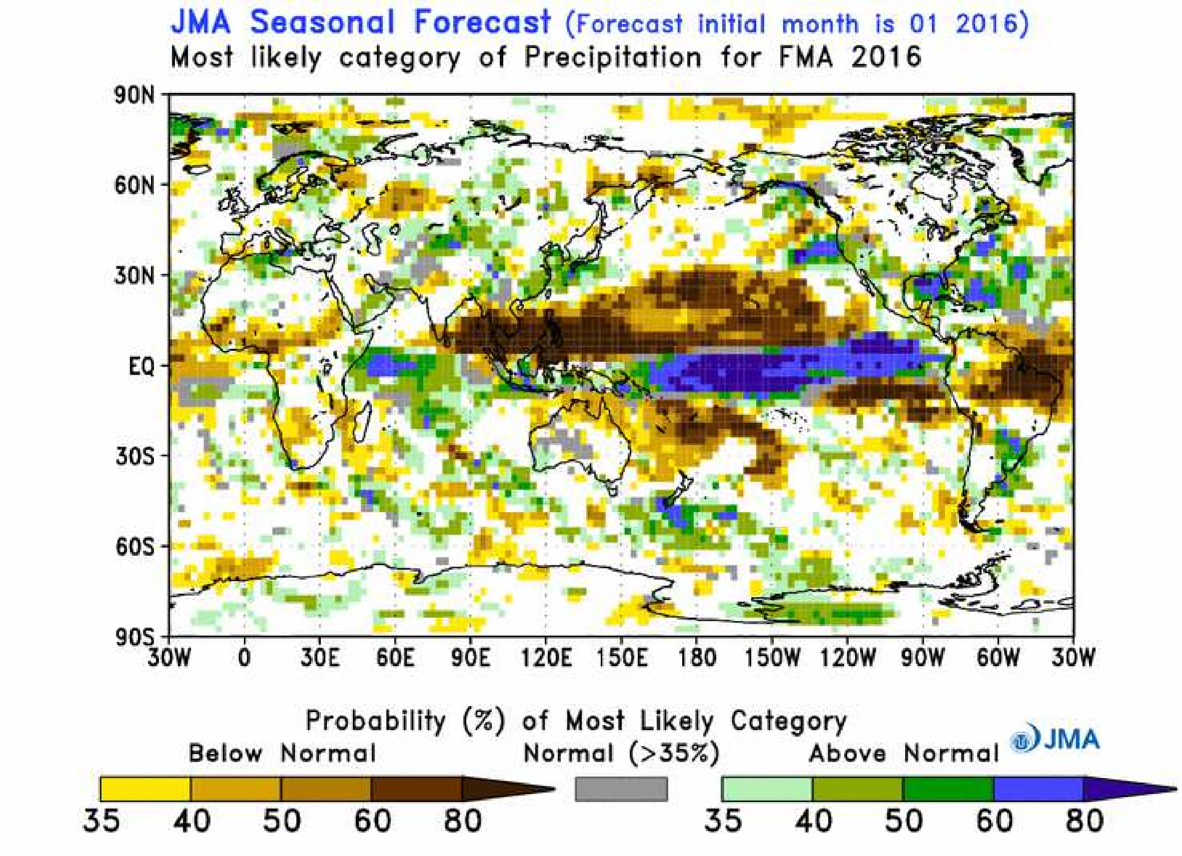


fig.II.4.5: Most likely category of Rainfall from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.php

II.4.d EUROSIP

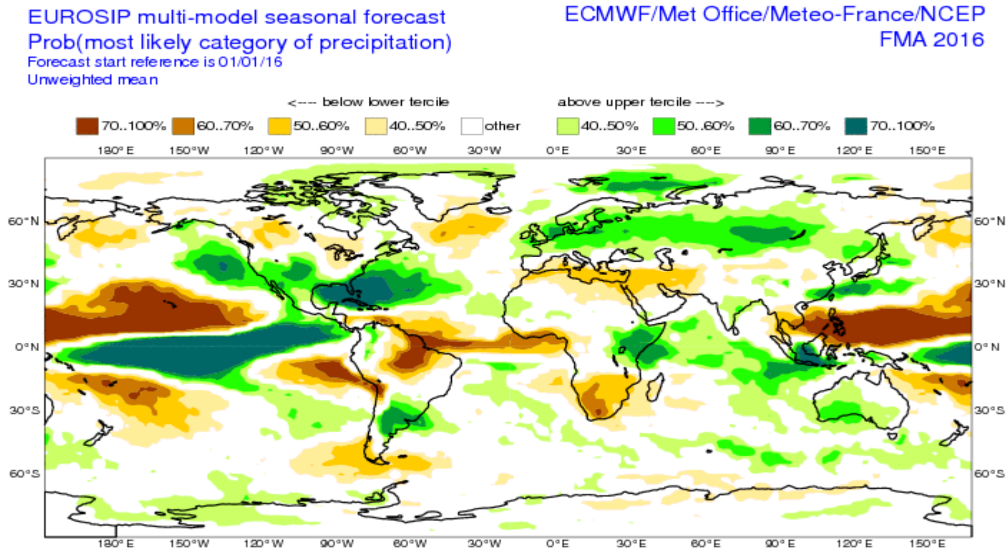


fig.II.4.7: Multi-Model Probabilistic forecasts for precipitation from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal).

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

II.5. REGIONAL TEMPERATURES and PRECIPITATIONS

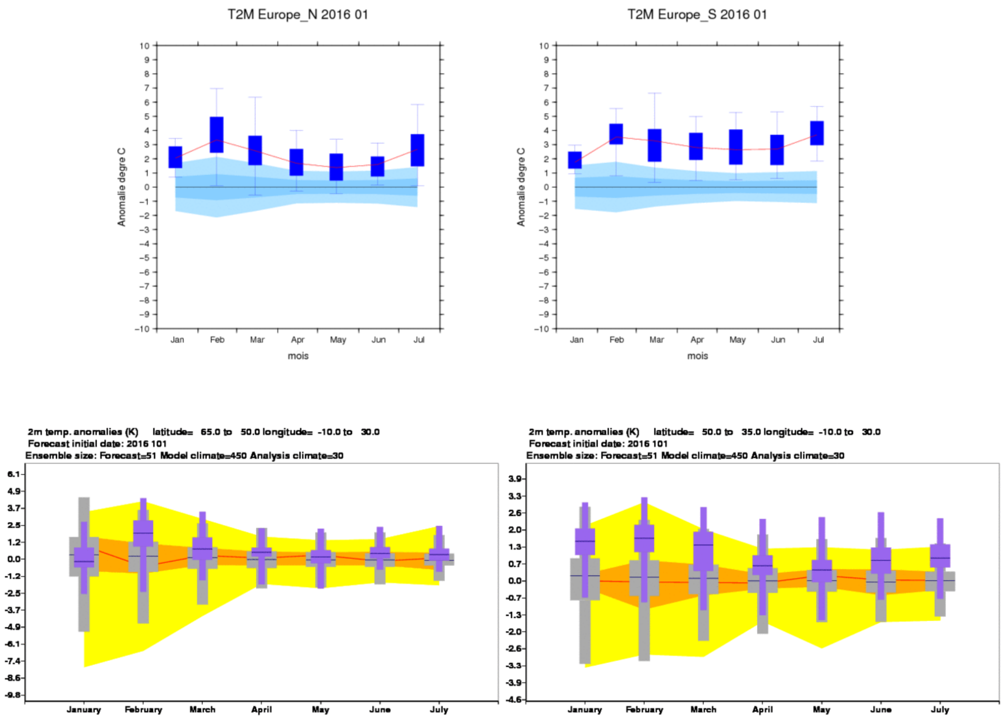


fig.II.5.1 : Climagrams for Temperature in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

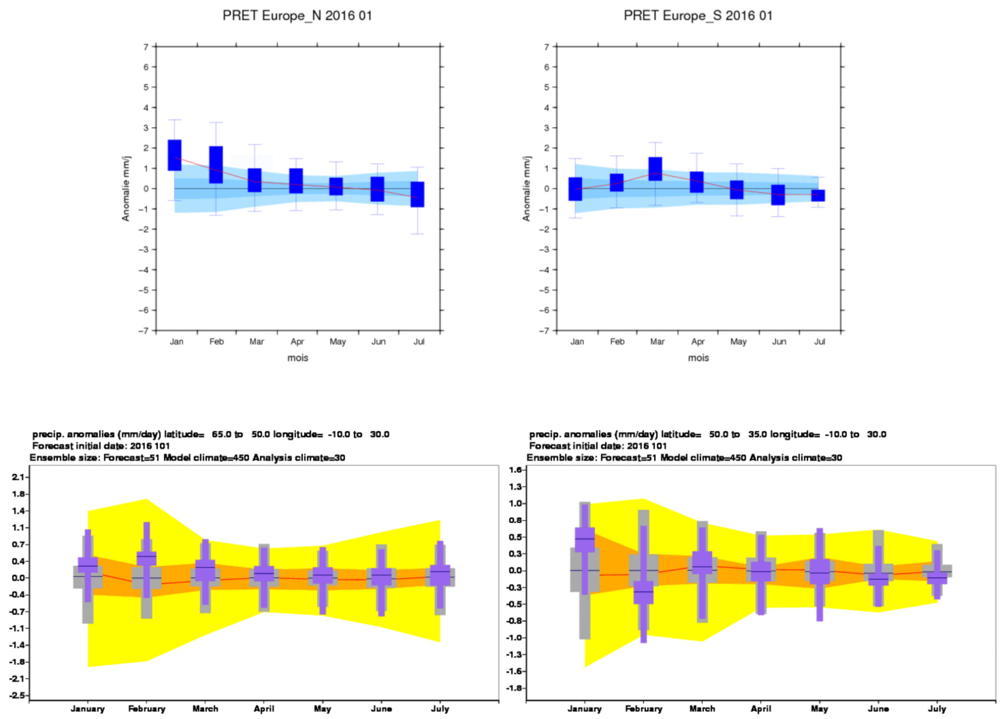


fig.II.5.2 : Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

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

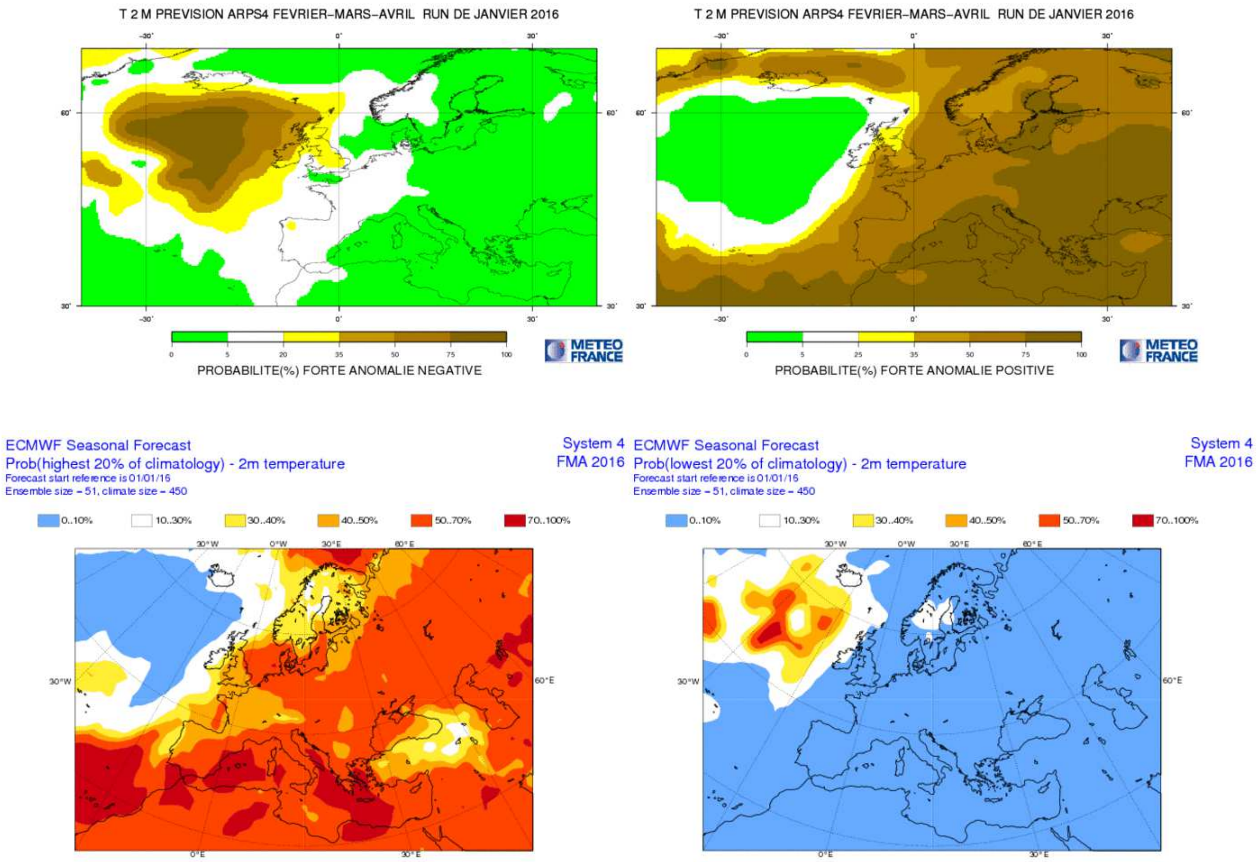


fig.II.7.1 : Top : Meteo-France T2m probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution). Bottom : ECMWF T2m probability of « extreme » below normal conditions (left - lowest ~20% of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

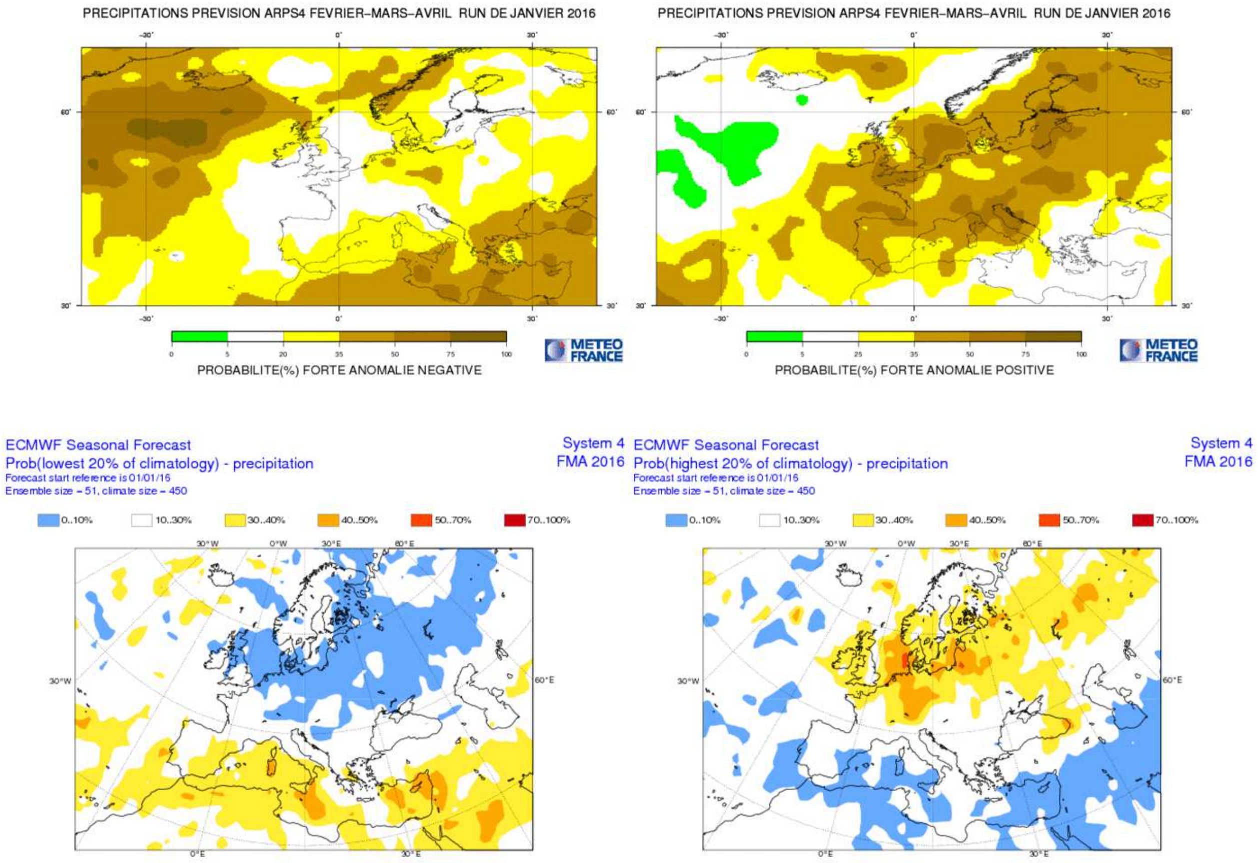


fig.II.7.2 : Top : Meteo-France rainfall probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution).
Bottom : ECMWF rainfall probability of « extreme » below normal conditions (left - lowest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

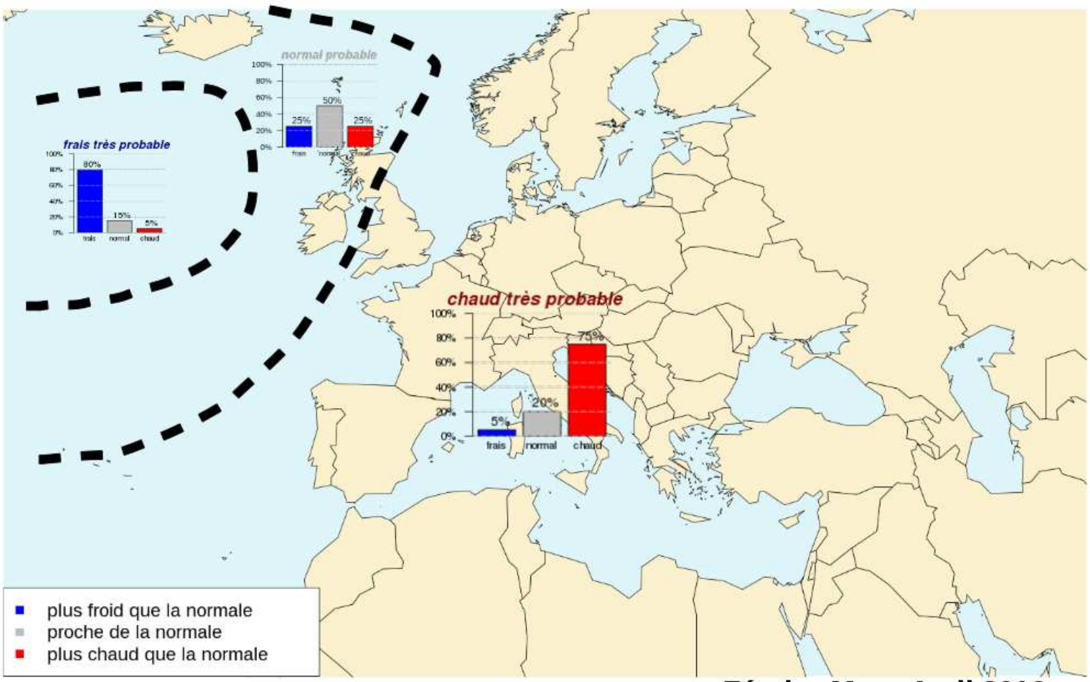
II.8. DISCUSSION AND SUMMARY

II.8.a Forecast over Europe

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

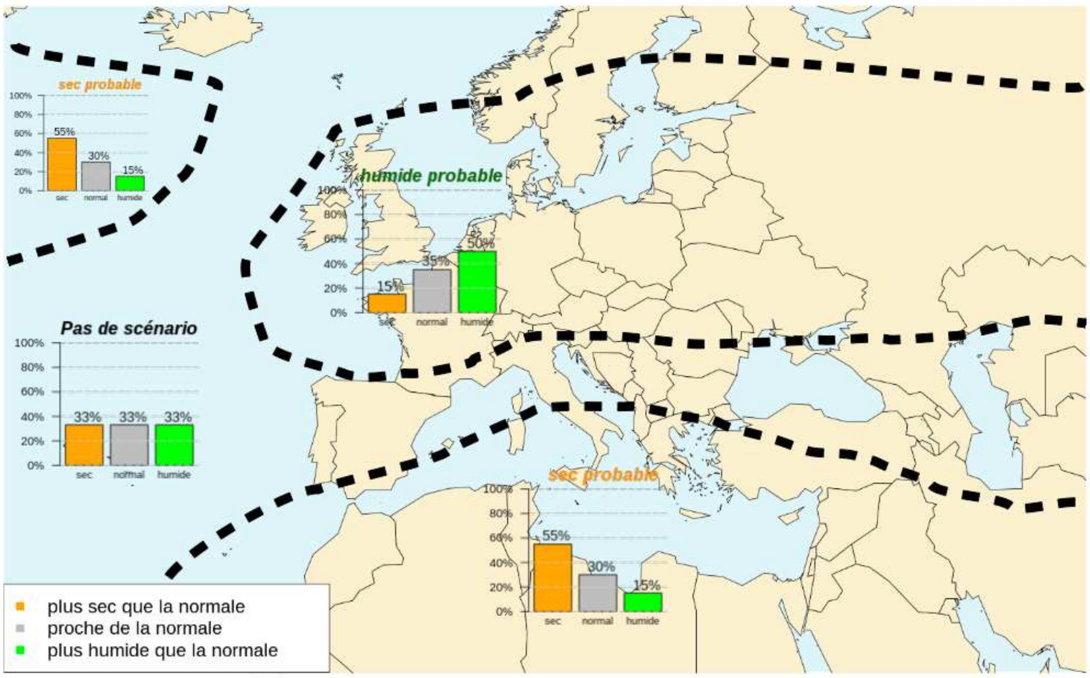
Precipitation: wet signal over Europe, dry signal over the Mediterranean Sea.

Prévisions saisonnières probabilistes de températures pour le trimestre prochain



Février-Mars-Avril 2016

Prévisions saisonnières probabilistes de précipitations pour le trimestre prochain



Février-Mars-Avril 2016

II.8.b Tropical cyclone activity

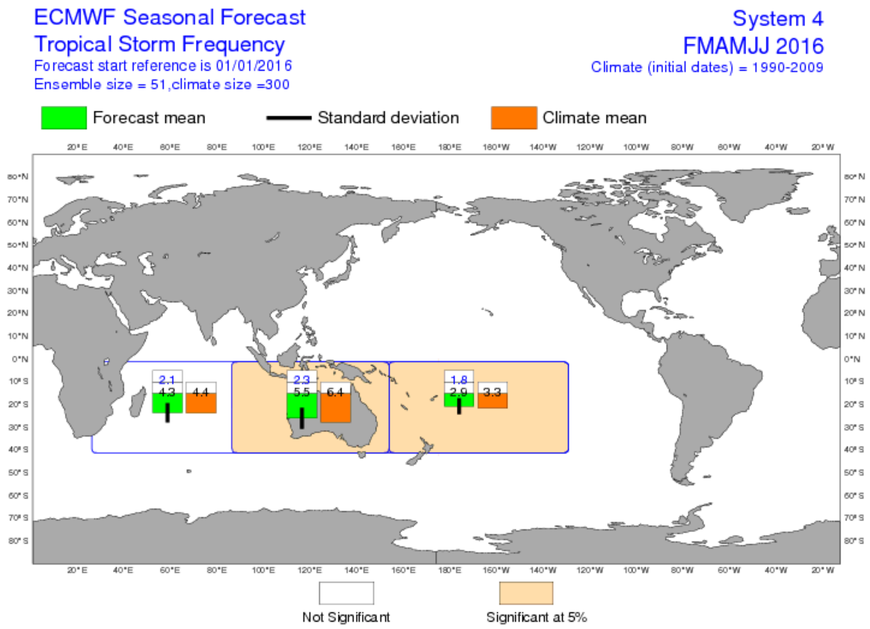


fig.II.8.1: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/

In south Pacific, the hurricane season is expected stonger than normal in the Polynesian area and weaker than normal in the southwestern Pacific (El Nino context).

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.

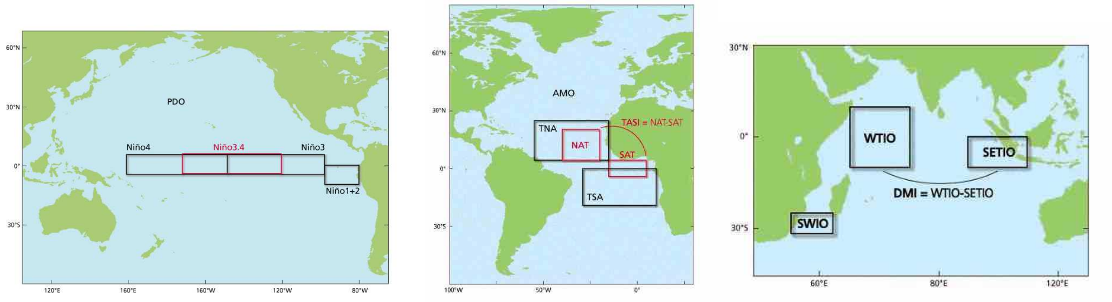
II.10. « NINO », SOI INDICES AND OCEANIC BOXES

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).

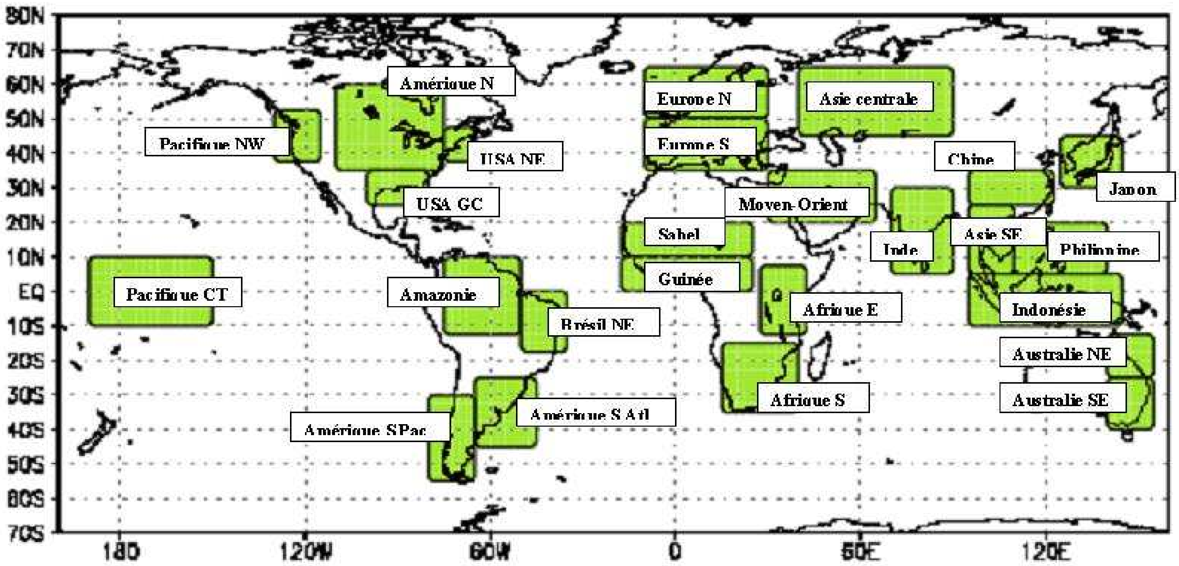
Associated to the oceanic « El Niño / La Niña » events, and taking into account the strong ocean/atmopshere coupling, the atmosphere shows also interanual variability associated to these events. It is monitored using the SOI (Southern Oscillation Index). This indice is calculated using standardized sea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