GLOBAL CLIMATE BULLETIN
n°204 – June 2016

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I. DESCRIPTION OF THE CLIMATE SYSTEM (APRIL 2016)

I.1.OCEANIC ANALYSIS

I.1.a Global analysis

In the Pacific ocean :
El Niño conditions still present but rapidly weakening (Figures I.1.1) especially in the Niño 3.4 region: SST anomalies decreasing to around 1.5°C in April, compared to 2.0°C in March.
The subsurface cooling is strengthening and spreading rapidly eastward, positive anomalies are confined to a very shallow layer less than 50 meters thick. (figures I.1.4). The subsurface negative anomalies have reached the South American coastline (figure 1.1.5).
Over the north Pacific, positive PDO pattern strengthening.

Maritime continent :
Globally warm anomaly, despite a cooling North of Australia.

In the Indian Ocean :
Warm anomalies across the whole basin.
The DMI is still close to zero.

In the Atlantic:
In the equatorial waveguide, still close to neutral condition, except in Guinea Gulf (warmer than normal). In the Northern hemisphere, persistent warm anomaly from Gulf of Mexico to the Sargasso Sea. And still a strong negative anomaly (cold horseshoe pattern) from Newfoundland to the British coast and extending off West Africa coast. In April, we note a warming trend South and South-West of Canary Islands.

In the Mediterraen :
Back to warm anomalies over the whole basin.

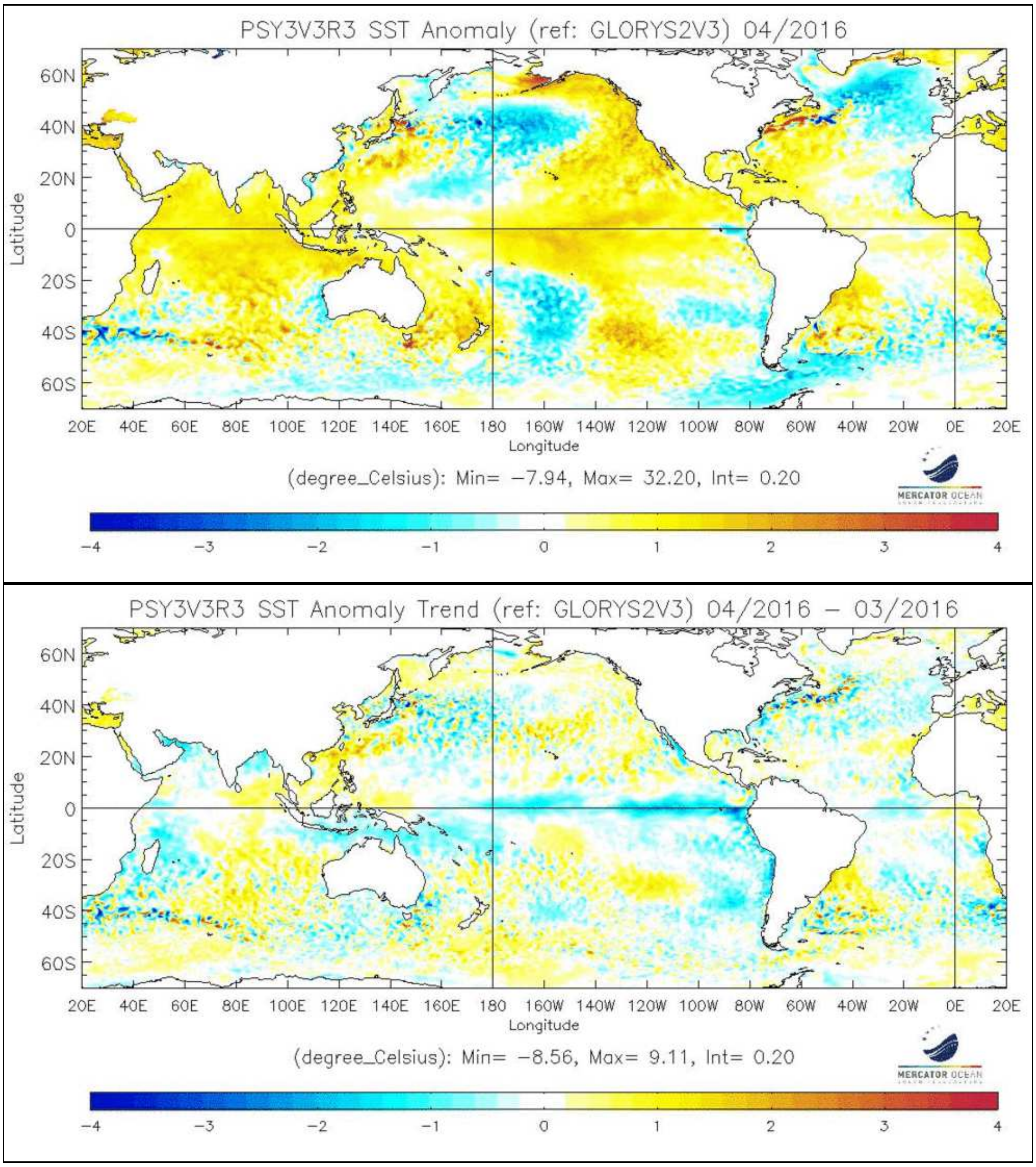

fig.I.1.1: top : SSTs Anomalies (°C) . Bottom : SST tendency (current – previous month), (reference Glorys 1992-2009). http://bcg.mercator-ocean.fr/

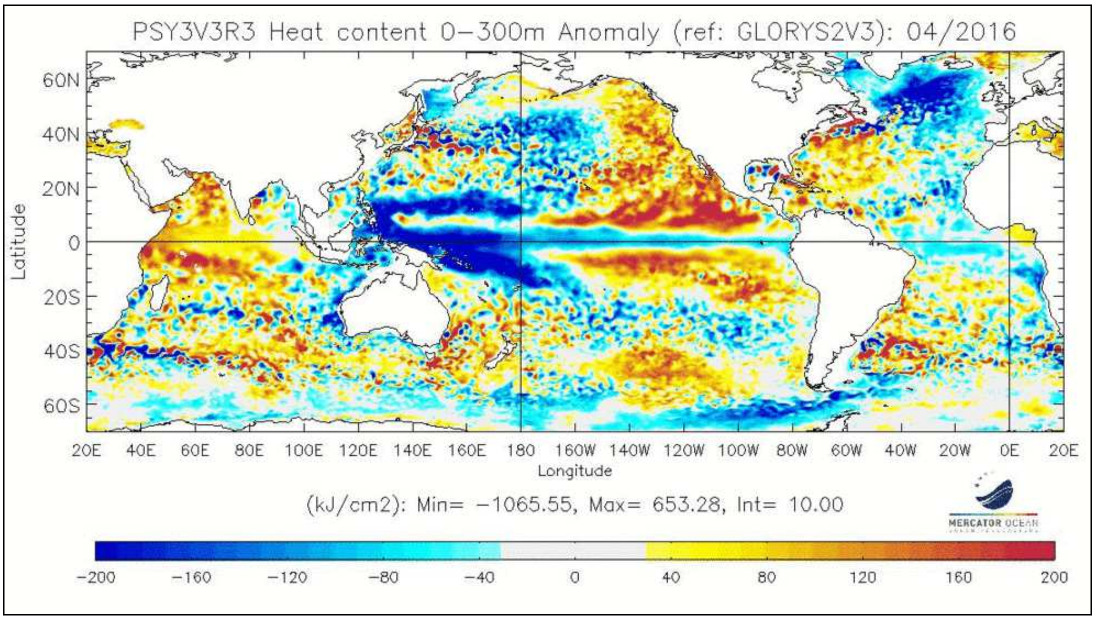

fig.I.1.2: map of Heat Content Anomalies (first 300m, kJ/cm2, reference Glorys 1992-2009)

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

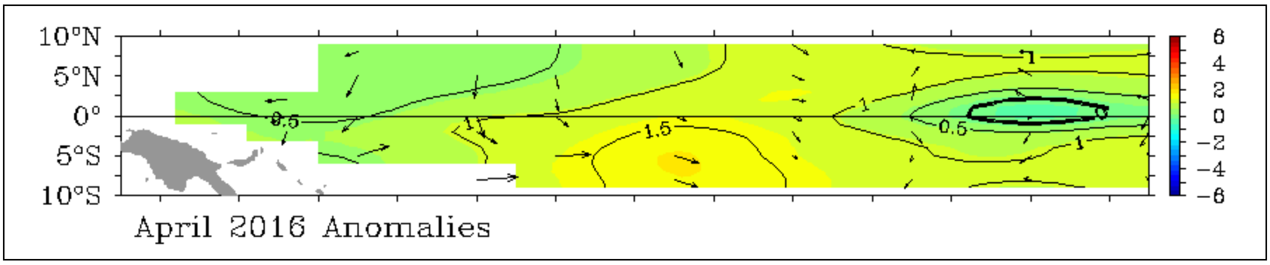

fig.I.1.3: SST Anomalies and Wind anomalies over the Equatorial Pacific from TAO/TRITON.

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

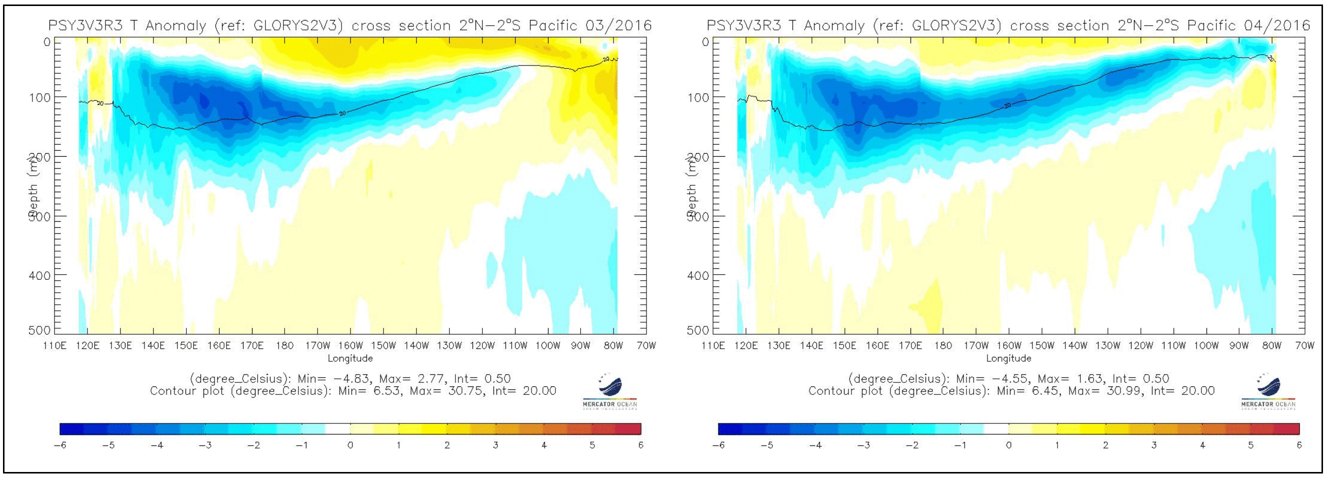

fig.I.1.4: Oceanic temperature anomaly in the first 500 meters in the Equatorial Pacific (previous and current month), http://bcg.mercator-ocean.fr

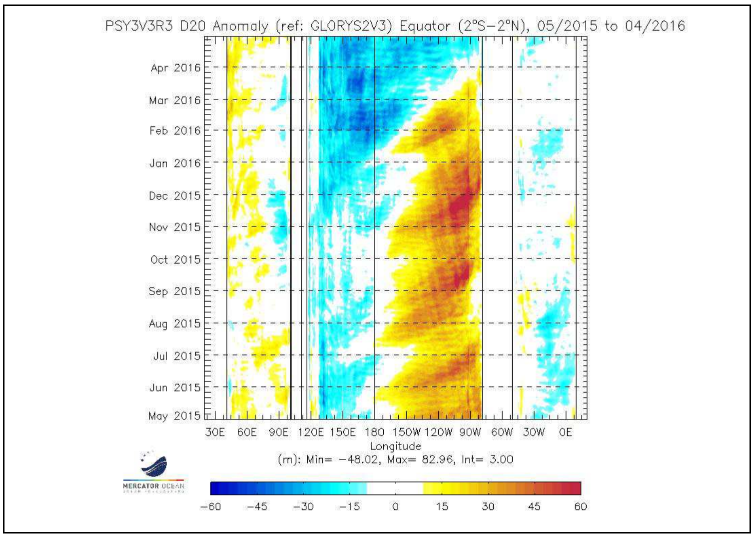

fig.I.1.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 6 month period http://bcg.mercator-ocean.fr/

I.1.b Sea surface temperature Near Europe

Sea surface temperature (SST) near Europe was warmer than normal everywhere except west of Europe where a large cold anomaly on the central North Atlantic is still existing. At the coasts of Western Europe including France, northern Spain and Portugal, anomalies are very close to zero. This corresponds to monthly means of April 2016 ranging from around 9°C near northern France to 16°C near southern Portugal/Spain.

In the Mediterranean Sea, SST anomalies ranged from slightly above zero in the west to around +2°C in the east. Monthly means therefore had a large range from 14°C in the north-western Mediterranean to around 21°C near the Middle East. The Black Sea was 1-3°C warmer than normal (monthly mean around 12°C), the Caspian Sea showed anomalies from +1°C in the south to around +5°C in the north.

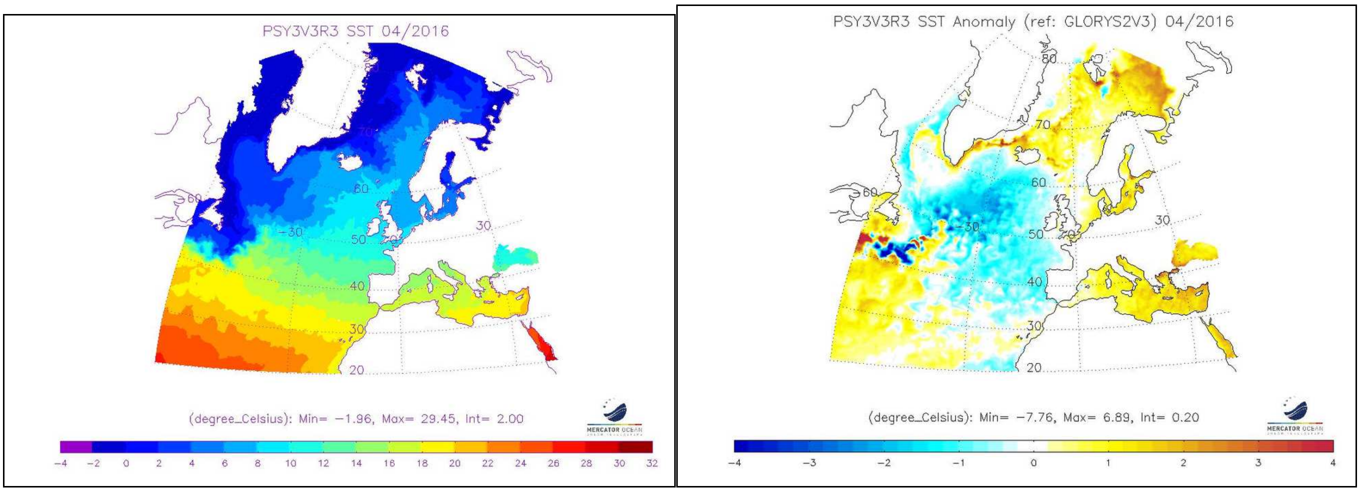

fig.I.1.6 : Mean sea surface temperature in the RA VI Region (Europe) and anomaly (reference Glorys 1992-2009). http://bcg.mercator-ocean.fr/

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) :

Typical El Niño patterns still present but rather weak: upward motion anomaly now confined near the equator and around the dateline. Over the Maritime Continent, there is still a large area of anomalous subsidence with an extension to the North. Globally over the Pacific and Indian Ocean tropics, one can note patterns very similar to last month.

Standardized SOI at -1.2 in April, could be interpreted as a remnant effect of El Nino. (https://www.ncdc.noaa.gov/teleconnections/enso/indicators/soi/)

Over the Atlantic Ocean, persistence of a downward motion anomaly in South tropics. At the contrary, inversion of the dipole of anomalies in North tropics: i.e. negative in the Western part, positive over the African coast.

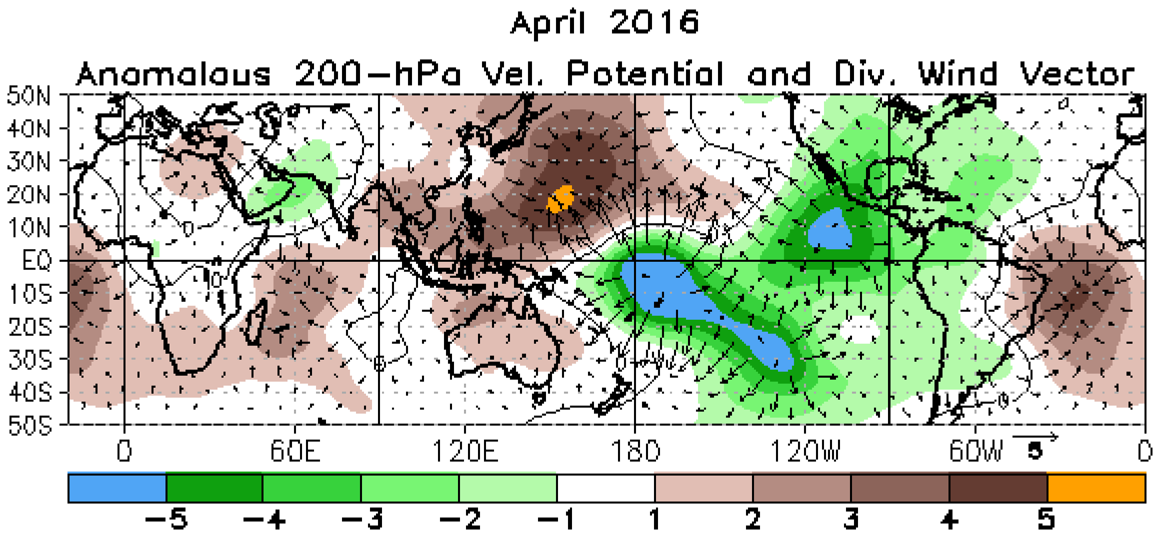

fig.I.2.1: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).

http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

MJO (fig. I.2.b):

MJO was weak in April.

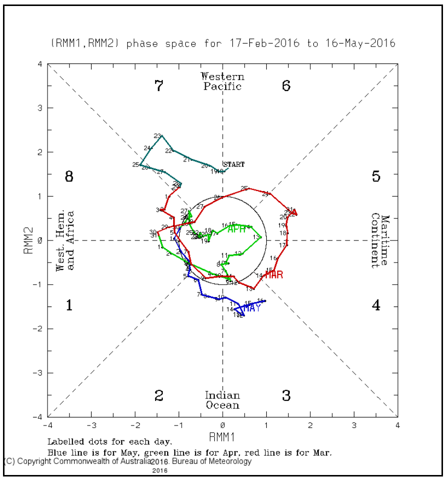

fig.I.2.b: indices MJO http://cawcr.gov.au/staff/mwheeler/maproom/RMM/phase.Last90days.gif

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

Compared to March and even February, good continuity of patterns over Pacific and Indian basins, up to mid-latitudes. This is probably linked to the persistence of velocity potential anomalies previously discussed. The Pacific part (negative pole) of the famous PNA pattern is still visible.
Over the Atlantic, there is not such continuity, and it's difficult to detect any tropical influence up to mid-latitudes.

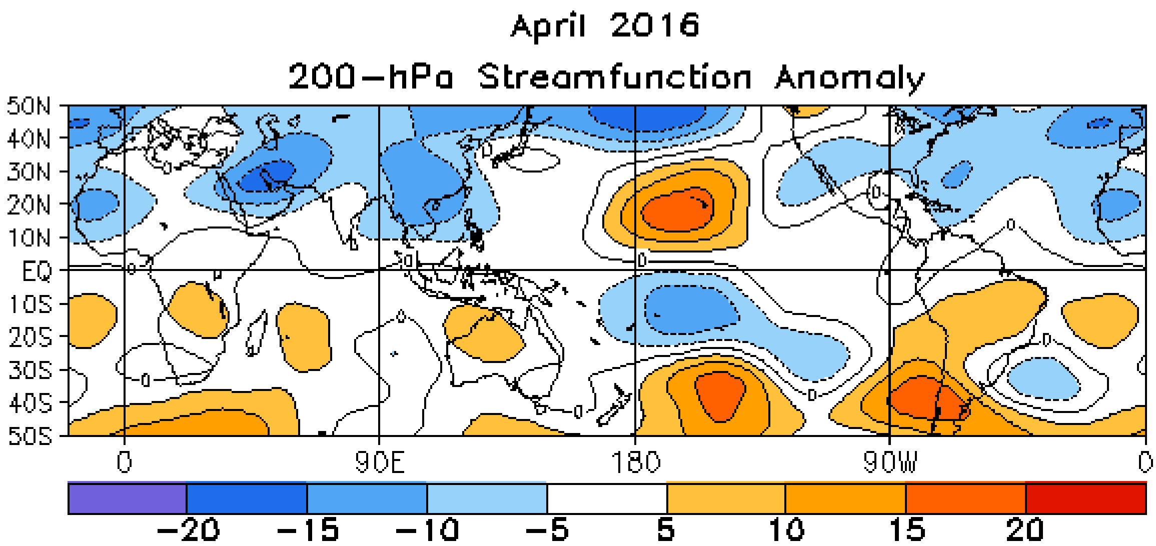

fig.I.2.2: Stream Function Anomalies at 200 hPa.

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

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

Around the north Pacific, the Pacific part of a positive PNA pattern is still clearly visible, with a strong negative anomaly over the Aleutians, and even the positive anomaly over Western Canada.

Around the northern Atlantic and Eurasia, strong anomalies in April. Contrary to the Pacific, we do not detect a tropical forcing to explain (even partly) these anomaly poles. Close to Europe, the main dipole from East Atlantic (-), to Mediterranean Sea (+) is well describe by EA teleconnection indices (EA ~1), with the negative core anomaly over the North Atlantic shifted quite far to the south.

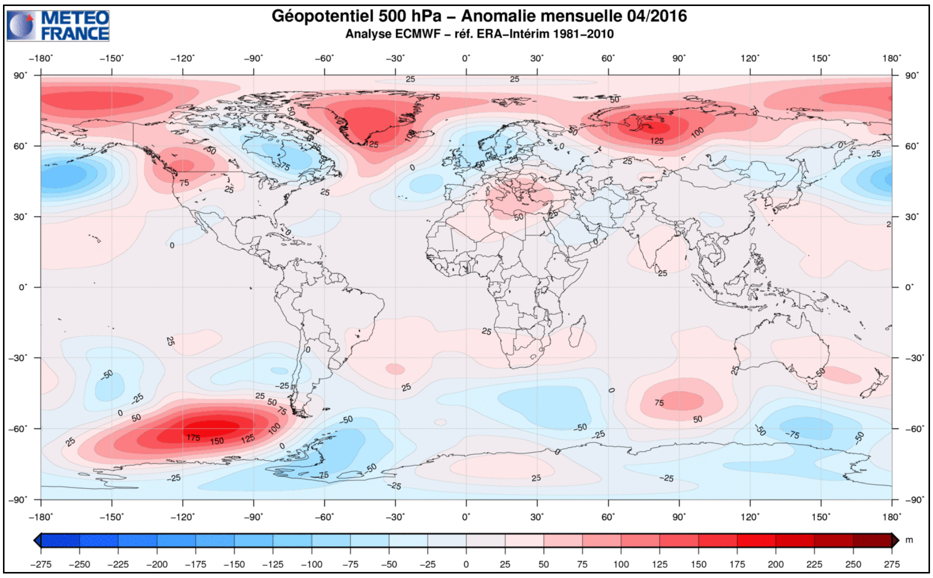

fig.I.2.3: Anomalies of Geopotential height at 500hPa (Meteo-France)

MONTH	NAO	EA	WP	EP-NP	PNA	TNH	EATL/WRUS	SCAND	POLEUR
APR 16	**0.3**	**1.0**	**-0.3**	**1.5**	**1.5**	**0.6**	**-0.5**	**-0.1**	**-1.6**
MAR 16	0.4	0.7	-0.2	0.2	0.4	---	0.3	-0.2	-0.2
FEB 16	1.4	1.9	1.6	0.2	1.7	0.2	-2.4	-0.5	-2.3
JAN 16	-0.4	1.0	1.0	-0.4	1.9	-0.3	-0.5	-0.7	-2.6
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

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 :

The Azores High was weaker than normal in April; it influenced still North Africa, while Western Europe, Iberia and the western Mediterranean were dominated by low pressure situations, especially in the first week of the month. Only temporarily low pressure extended also further south to northern Africa. Around the middle of the month, cyclonic influence also increased in southern parts of Central Europe, and further east (Romania, Ukraine). In the last week of April, a cold Arctic air outbreak (connected with a notable negative Arctic Oscillation phase) reached Europe.
South-eastern Europe and most of North Africa profited from high pressure influence most of the month.

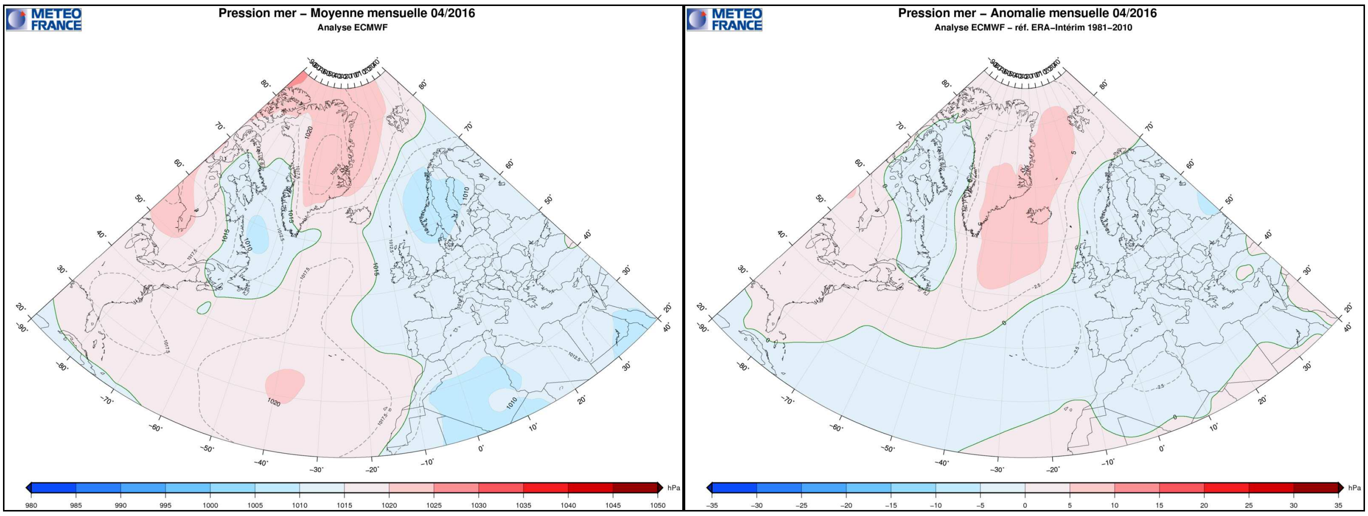

fig.I.2.4: Mean sea level pressure in the RA VI Region (Europe) (top) and 1981-2010 anomalies (bottom).

Circulation indices: NAO and AO
NAO was weak on monthly average (+0.3), but with high variability within the month pointing to very changeable weather conditions.
AO index was mostly negative in April except the beginning of the month, so the exchange of air masses between polar and middle latitudes was more intense than normal. This can also be seen by the large minima and maxima of geopotential anomalies in northern latitudes throughout the northern hemisphere. Intensity was highest at the end of the month, when cold air spread over much of Europe.

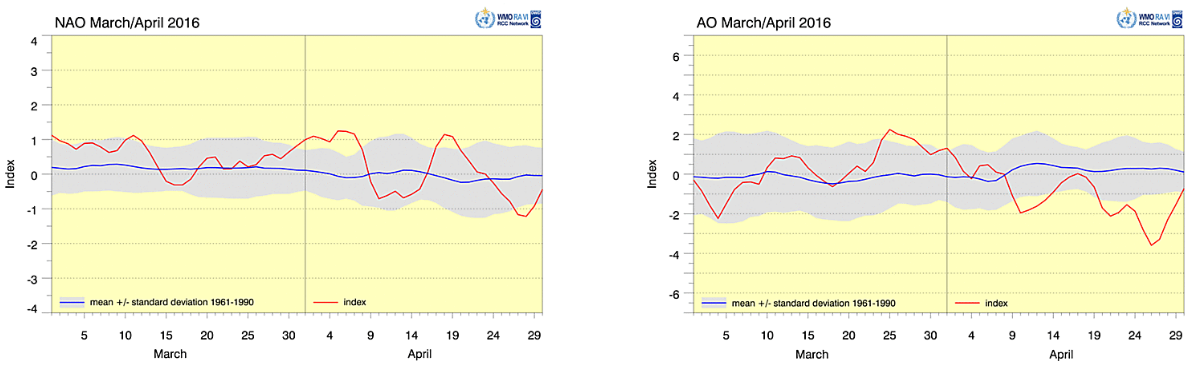

fig.I.2.5: North Atlantic Oscillation (NAO, left) and Arctic Oscillation (AO, right) indices with 1961-1990 mean standard deviation (shading). http://www.dwd.de/rcc-cm , data from NOAA CPC: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml

I.2.b Precipitation

El Niño effects were still visible in April, over the tropical Pacific Ocean and the Maritime continent (up to Asia and Australia) and over South America (contrast Brazil / Caribbean region, and Argentina).

Dry anomaly pattern over West Africa (around the Guinea Gulf).

Over Europe, high spatial variability: rather wet conditions to the West, dry to the South-East.

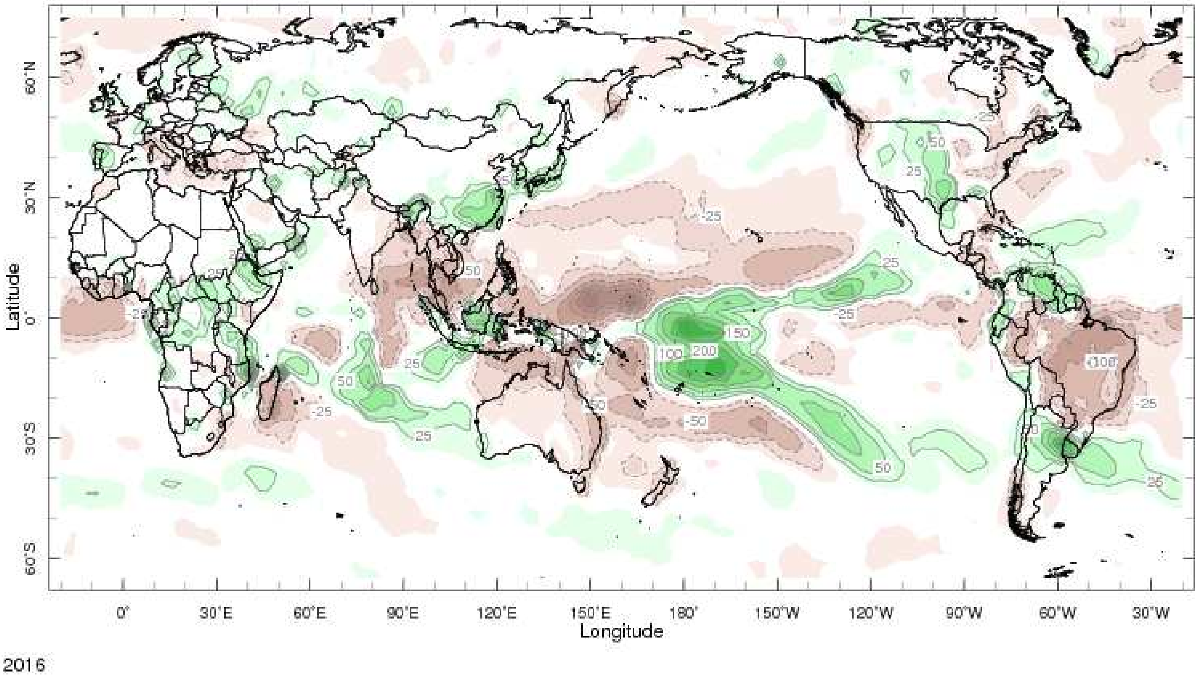

fig.I.2.4: Rainfall Anomalies (mm) (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.

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

Precipitation anomalies in Europe:

Precipitation anomalies show a very large spatial variability. They exceeded 150% particularly in Iberia and the western Alps, partly exceeding the 90th percentile, but they were also well above normal in places near to the Black Sea and locally also near to the eastern Mediterranean. On the other hand, much of the Mediterranean area saw a very dry month with less than half of the normal precipitation.

The precipitation distribution shows again the general tendency reflected by the geopotential (more cyclonic in the west and north and some disturbances in Eastern Europe and mainly anticyclonic in southeastern parts, though with some locally heavy precipitation).

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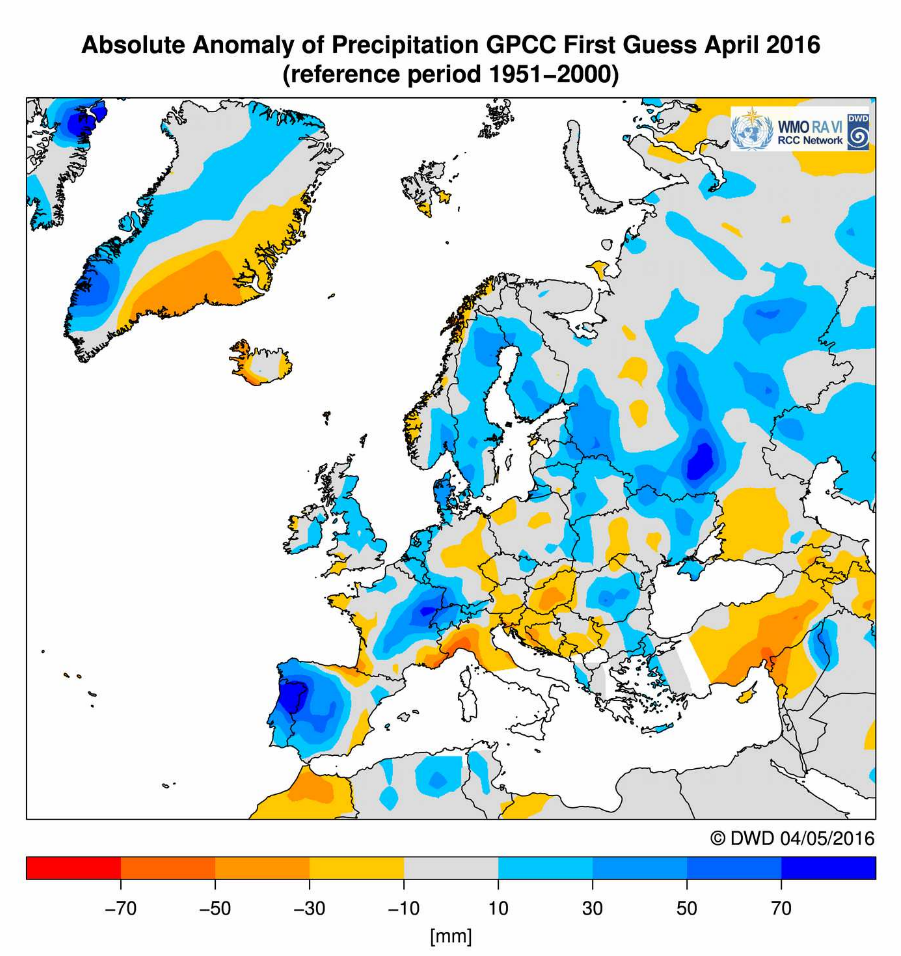


fig.I.2.5: Left: Absolute anomaly (1951-2000 reference) of precipitation in the RA VI Region (Europe), data from GPCC (Global Precipitation Climatology Centre), http://www.dwd.de/rcc-cm. Right: Percentiles of precipitation, 1981-2010 reference. Data from NOAA Climate Prediction Center, http://iridl.ldeo.columbia.edu/maproom/Global/Precipitation/Percentiles.html

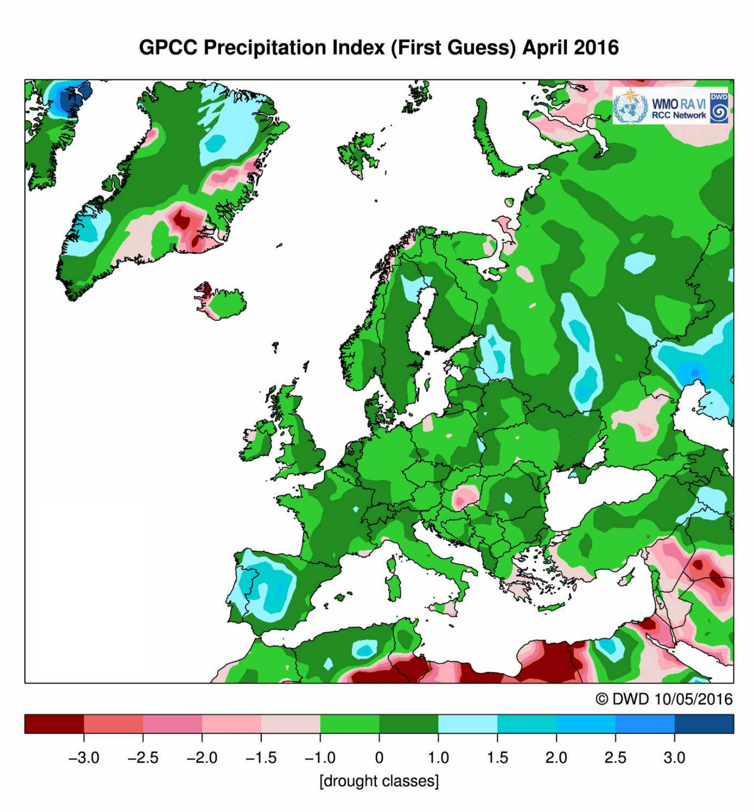


fig. I.2.5a: GPCP Precipitation Index http://www.dwd.de/rcc-cm .

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	GPCP Drought Index
Northern Europe	+ 8.6 mm	+ 0.027
Southern Europe	-3.4 mm	-0.017

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

Widespread positive anomalies, particularly over the Arctic.
Few exceptions over the continents in the northern hemisphere: Eastern Canada, Western Europe, Middle East, SE Russia. One can note that over Alaska and Canada, the anomaly dipole is the classical consequence of the positive PNA circulation.

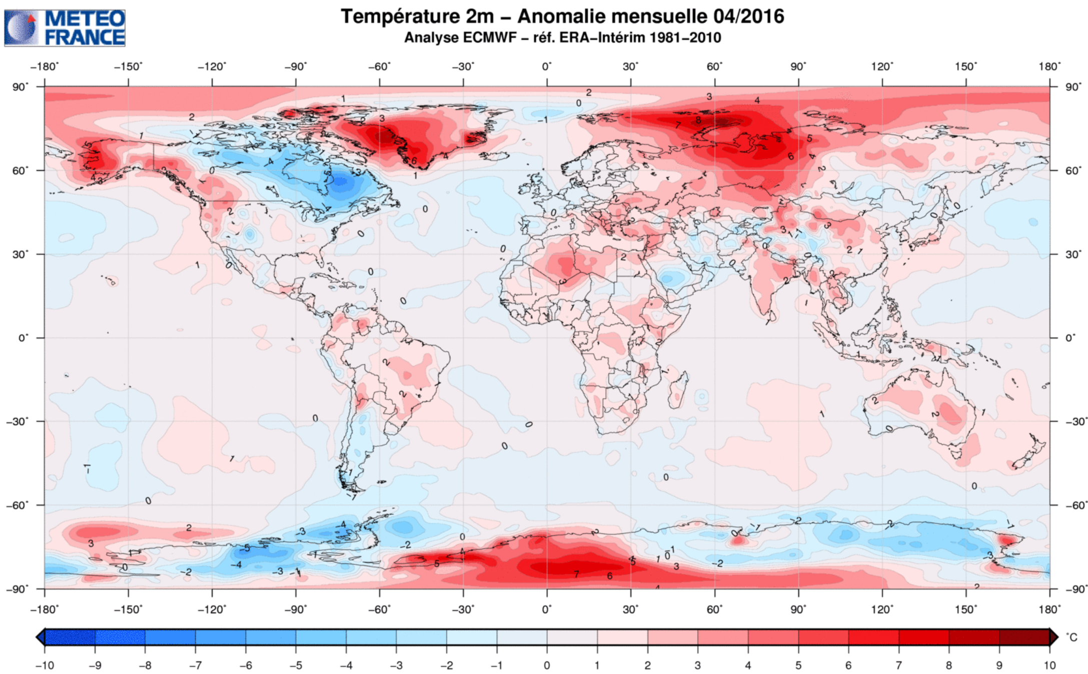


fig.I.2.8: Temperature Anomalies (°C) (Meteo-France)

<u>Temperature anomalies in Europe:</u>
Monthly mean temperature in April 2016 ranged from less than 5°C in the Alps to above 20°C in Middle East. Anomalies were slightly below zero in most ofwestern and parts of central Europe; there were positive particularly in eastern parts of the RA VI Region. This reflects the geopotential anomaly distribution with most intense cyclonic influence in western parts and most intense anticyclonic influence in eastern parts, especially around the south-eastern Balkans.

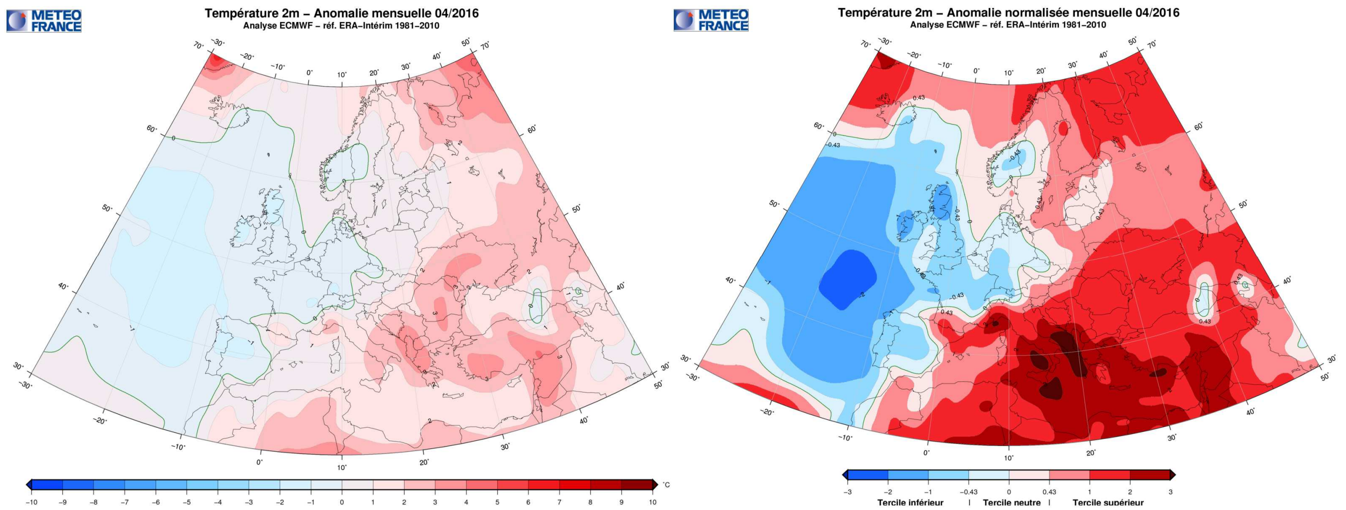


fig.I.2.9: Left graph: Absolute anomaly of temperature in the RA VI Region (Europe). Right graph: Standardized temperature anomalies

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	+0.9°C
Southern Europe	+1.7°C

I.2.d Sea ice

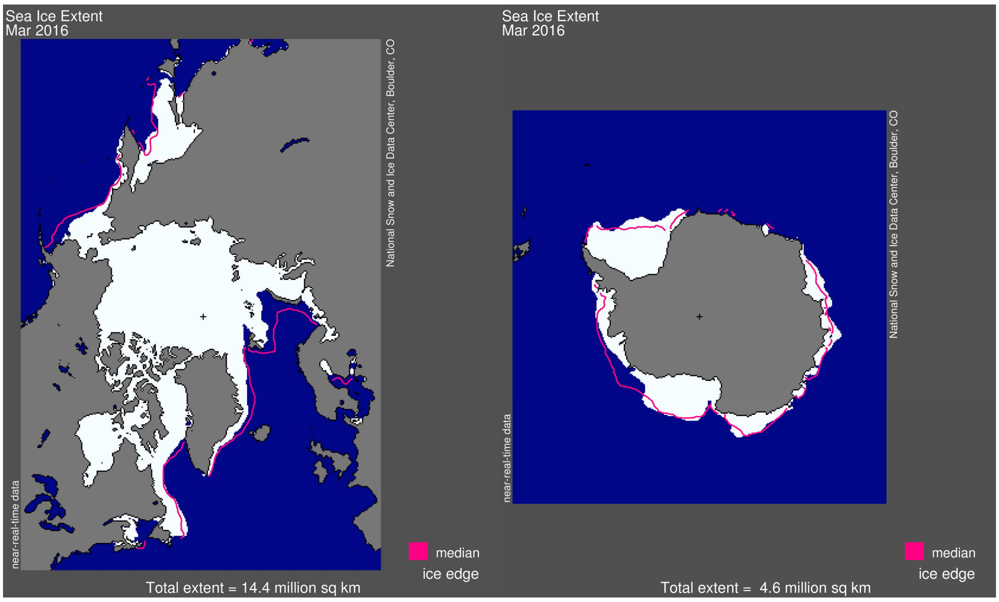


fig.I.2.15: Sea-Ice extension in Arctic (left), and in Antarctic (right). The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

In the Arctic (fig. 1.2.6 and 1.2.7 - left) : Persistent very large deficit (< -2 std).
In the Antarctic (fig. 1.2.6 and 1.2.7 - right) : near-normal

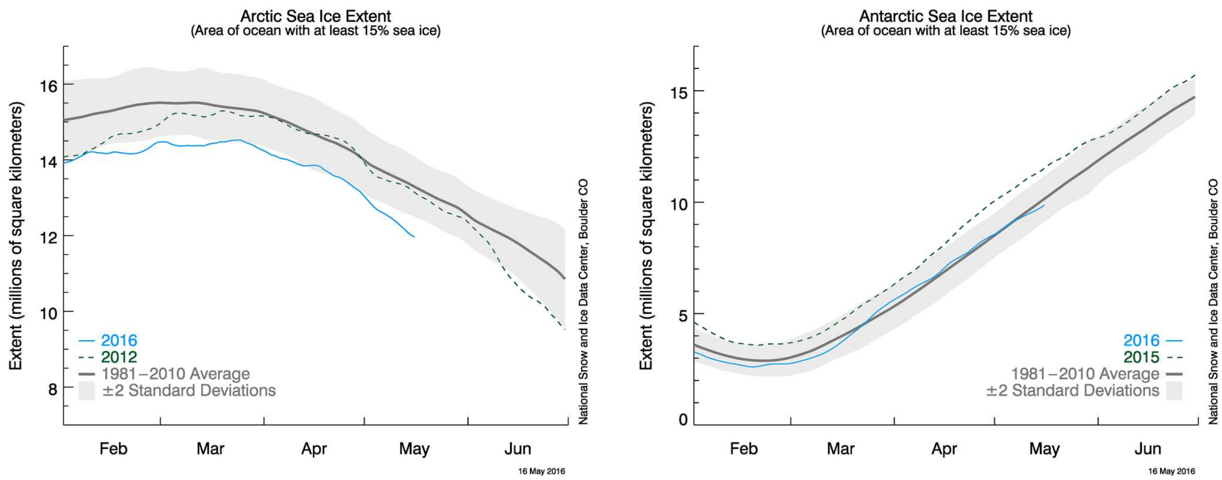


fig. I.2.16 : Sea-Ice extension evolution from NSIDC.
http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png

II. SEASONAL FORECAST FROM DYNAMICAL MODELS

El Niño is now in a rapidly decaying phase. The coupling with atmospheric response would significantly decrease in the coming weeks and months. Seasonal models are suggesting an evolution towards oceanic la Niña conditions which could occur as soon as the month of July (potentially June, considering Nino3.4 index).
The atmospheric response is consistent with La Nina over the Indian and Pacific basin, the dispersion is higher over the Atlantic basin and a fortiori over Europe.

II.1.OCEANIC FORECASTS

II.1.a Sea surface temperature (SST)

Pacific Ocean: Along the equator, models are in good agreement and suggest that a negative SST anomaly should rapidly spread westward up to the dateline. Positive SST anomalies should maintain on both sides (North and South). Over the Niño 3.4 box, la Niña threshold could be reached very soon (see median value of the Eurosip Niño 3.4 plume, figure II.1.5), perhaps in June. Over north Pacific, positive PDO is still present. Over south Pacific, warm anomalies should prevail, but an area of colder waters should persist along the ZCPS.

Indian Ocean: Warmer than normal over a large part of the basin. A negative anomaly is forecasted along the African coast. So IOD should become negative.

Atlantic Ocean: in the tropics, the cold bias of CFS (NCEP model) has disappeared. Anyway, there are still some noticeable differences between models. In the Guinea Gulf, ECMWF is colder than the other models, the "no signal" of EUROSIP hides a high variability in the forecasts. Concerning Northern Atlantic, CFS is less cold than the others, and close to Europe and Africa, its anomalies are even positive (negative with the other models).

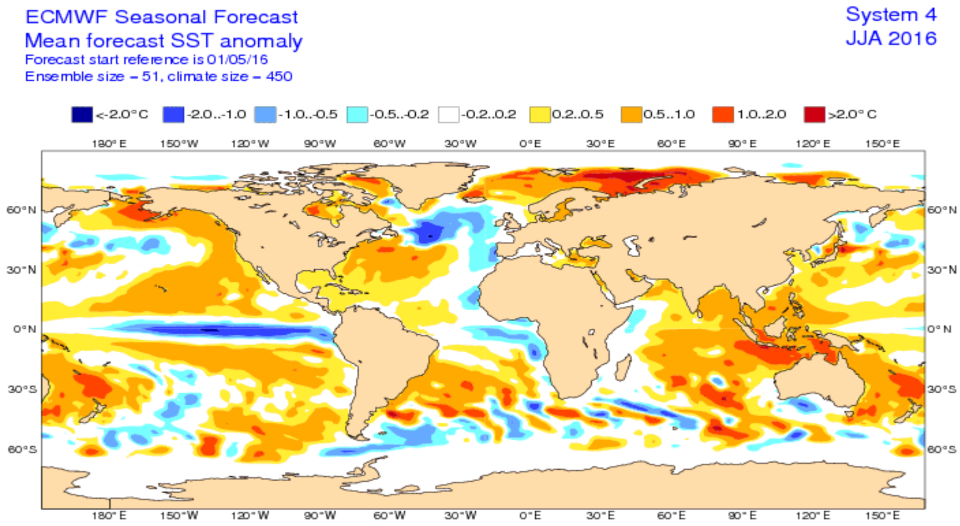


fig.II.1.1: SST anomaly forecast from ECMWF

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

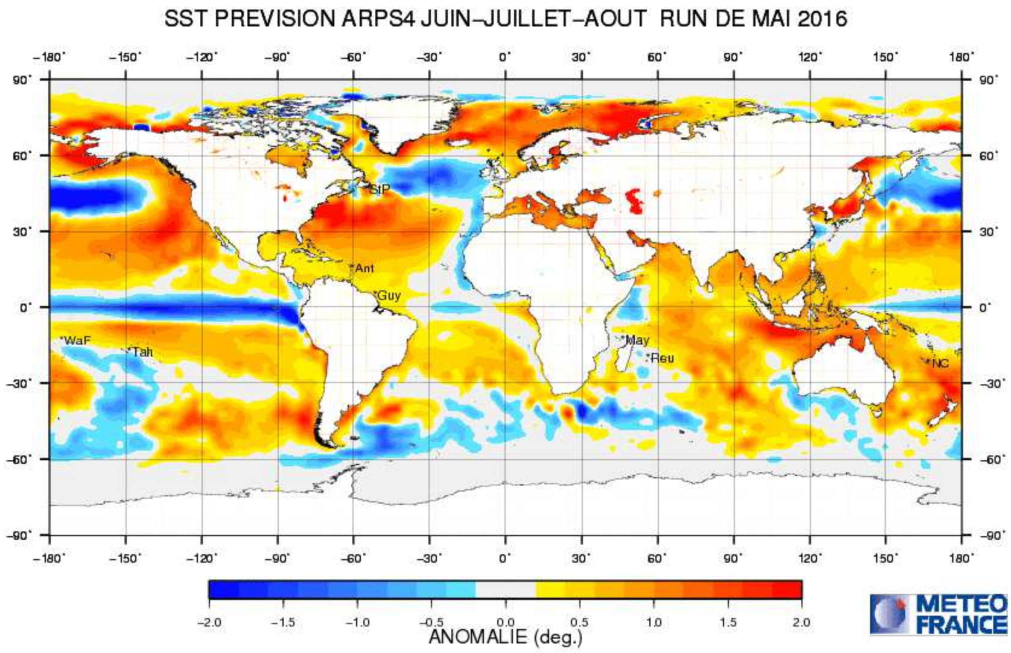


fig.II.1.2: SST Anomaly forecast from Meteo-France (recalibrated with respect of observation).

http://elaboration.seasonal.meteo.fr

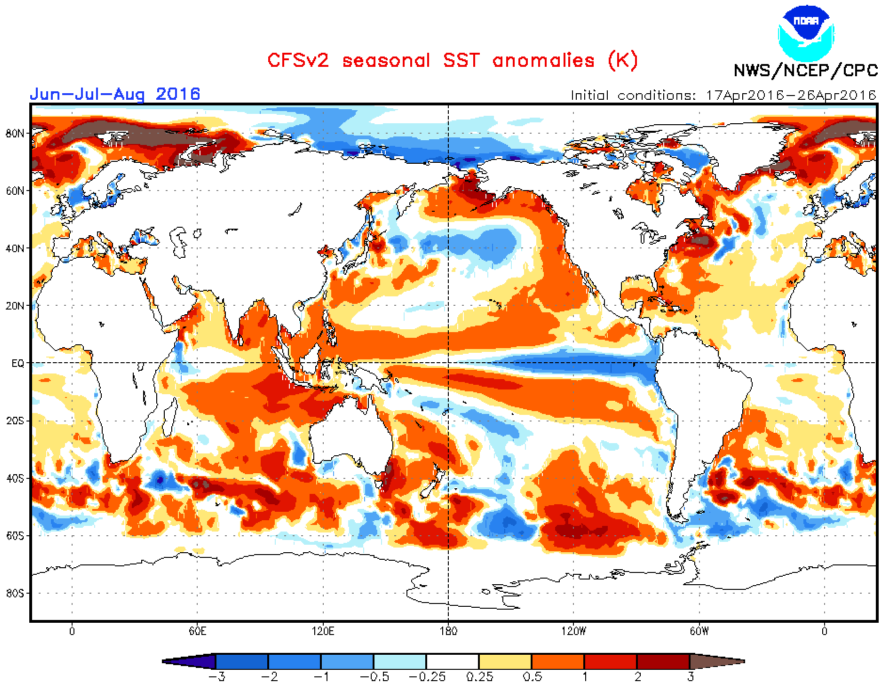


fig.II.1.3: SST anomaly forecast from NCEP.

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

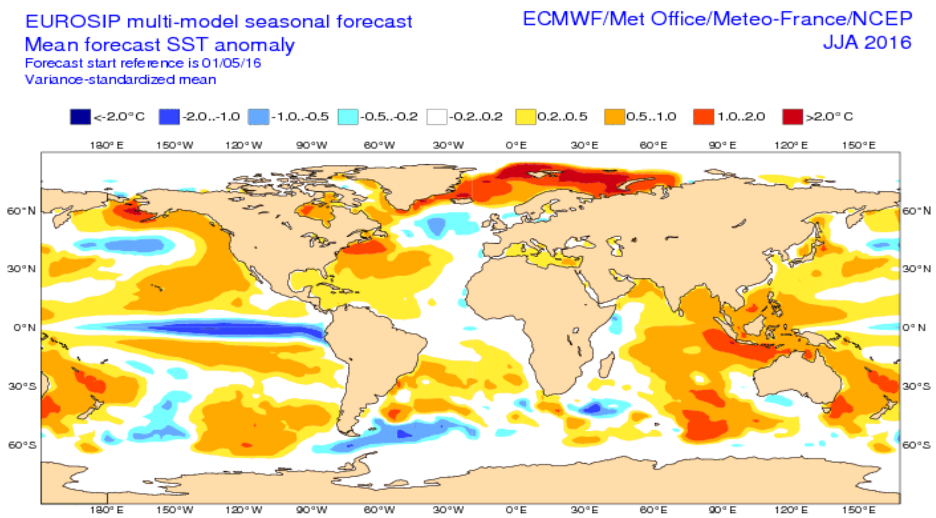


fig.II.1.4: SST Forecasted anomaly from Euro-SIP

II.1.b ENSO forecast

Forecast Phase: high probability of La Niña (around 75% with EUROSIP) from July (possibly June)

Models in good agreement for a rapid decrease of the tropical Pacific SST in the Niño 3.4 region for the next 3 months, with values becoming negative as soon as the month of June and that could reach Niña thresholds in June or July.

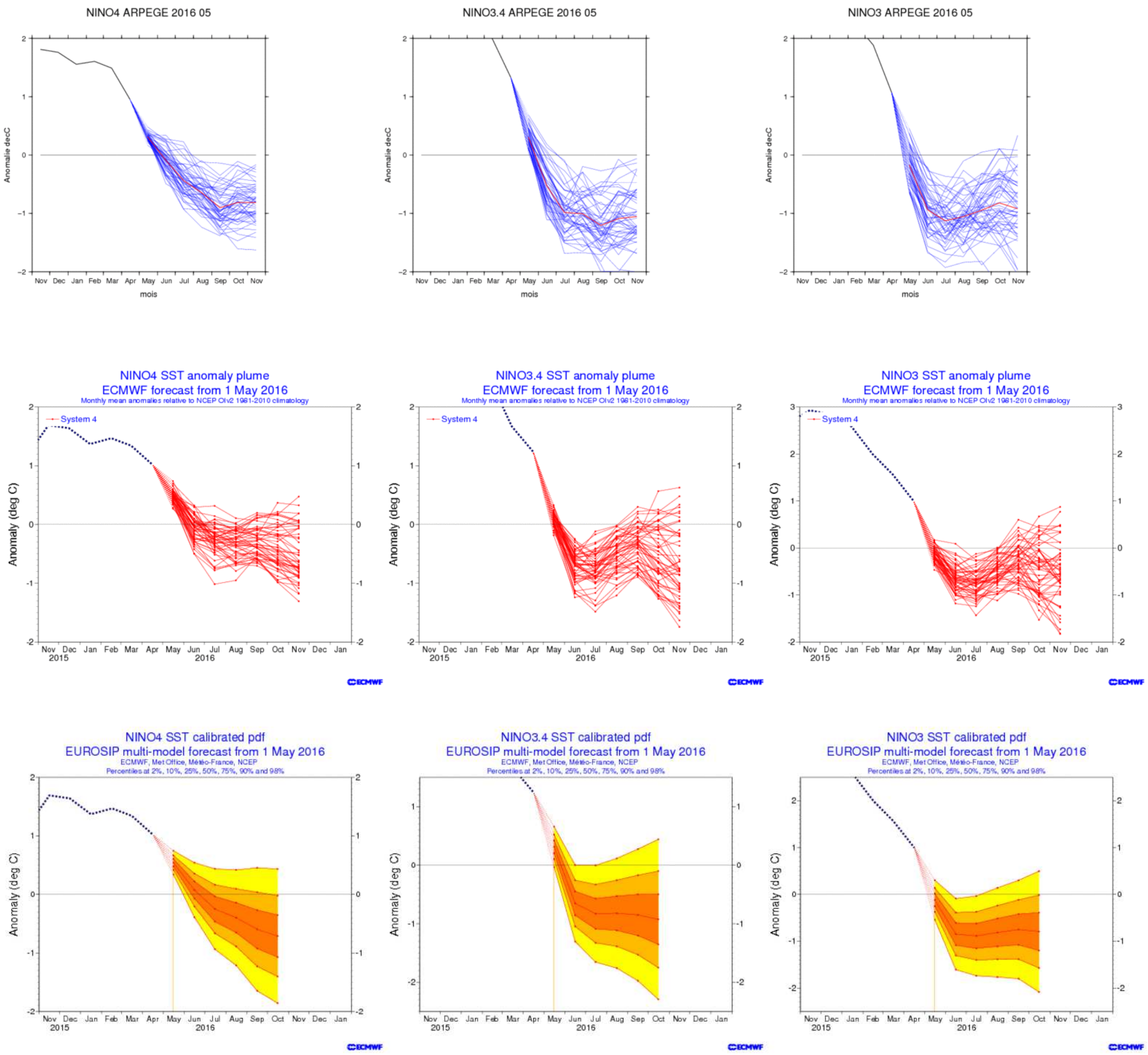


fig.II.1.5: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members - and EuroSIP (bottom) – recalibrated distributions - (http://elaboration.seasonal.meteo.fr , http://www.ecmwf.int/)

II.1.c Atlantic ocean forecasts

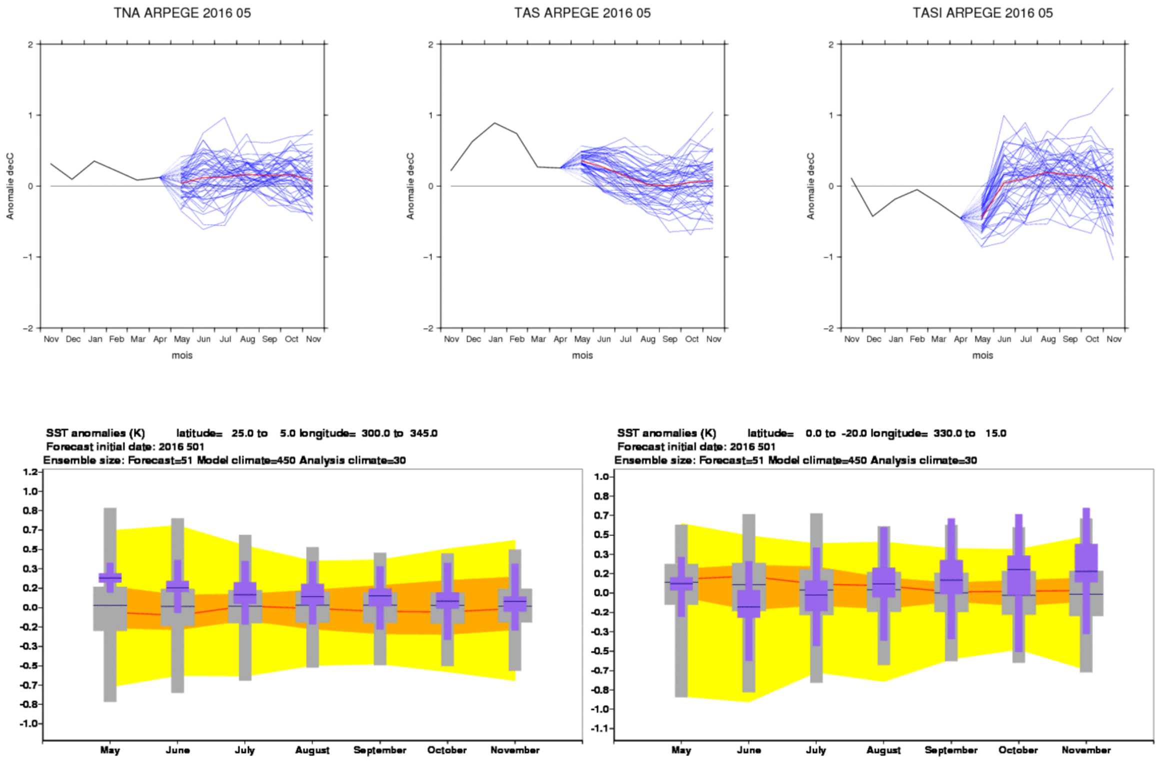
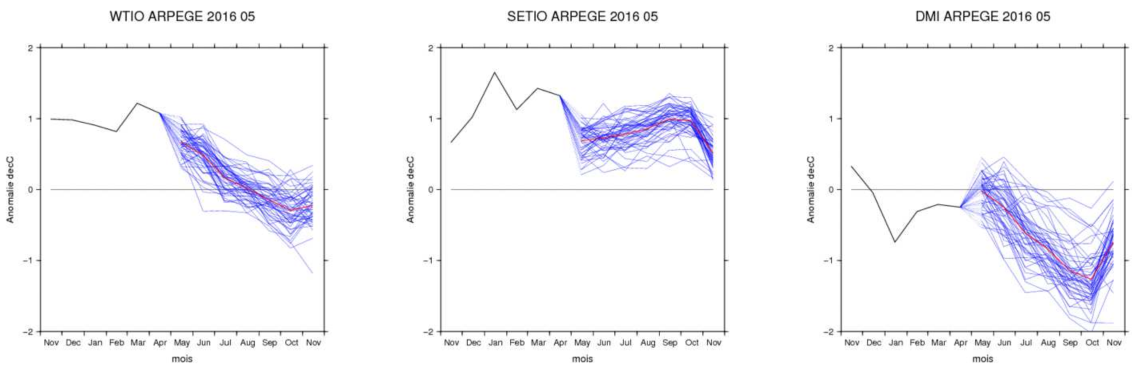


fig.II.1.6: SSTs anomaly forecasts in the Atlantic Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

II.1.d Indian ocean forecasts



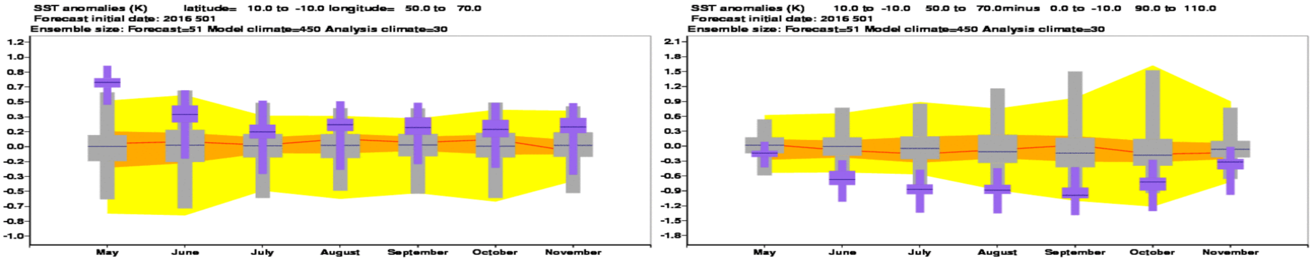


fig.II.1.7: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

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

According to the rapid evolution of oceanic conditions in equatorial Pacific (toward La Nina conditions), MF, ECMWF and JMA forecasts exhibit a dipole of upward/downward anomaly motion between Indian Ocean and Western Pacific. This pattern is consistent with a La Nina, probably reinforced by warmer than normal SST in the Indian Ocean. One can note that there are some differences between models concerning the position and the strength of the Indian pole (upward anomaly), and they are in good agreement for the west Pacific pole (downward anomaly).
Anywhere else (especially over the Atlantic), there are significant differences in terms of velocity potential anomalies. Anyway the main signal is positive (downward motion anomaly) in the western part of the Atlantic tropics.

Looking at streamfunction anomaly fields, the signal seems to be trapped in the tropics for the Northern hemisphere. In other words, no trace of teleconnection toward mid-latitudes in the Northern hemisphere. However, the main poles (over Africa, Indian Ocean, Asia, Australia, and Western Pacific) are consistent and could reinforce the confidence in the forecast for these regions.

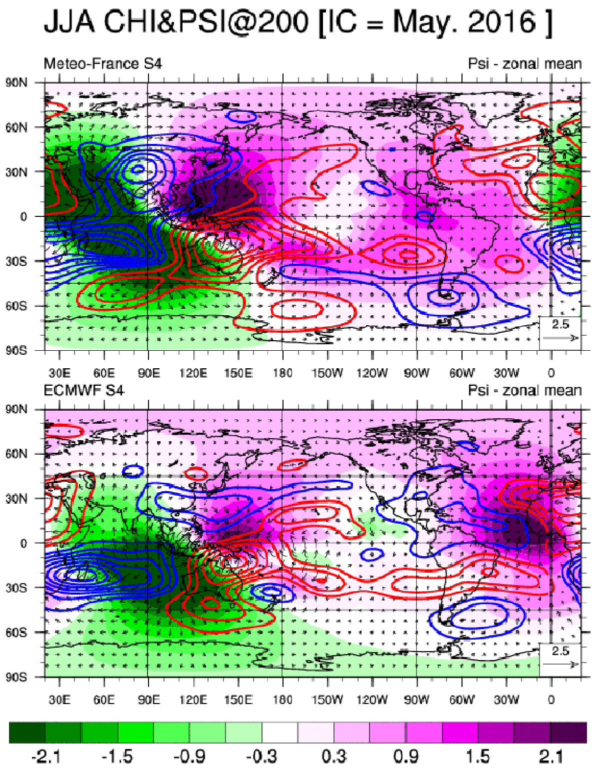


fig.II.2.1: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), associated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa by Météo-France (top) and ECMWF (bottom).

II.2.b North hemisphere forecast and Europe

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

In northern hemisphere mid-latitudes, large spread in GPC forecasts. Also a large spread within EUROSIP, as illustrated below with MF and ECMWF.
Over North Atlantic and Europe, no dominant circulation pattern for JJA. The only consistent signal between some models and consistent with streamfunction maps is a positive anomaly in subtropics (around 30°N West of Iberian peninsula) and a negative anomaly to the north of it. It corresponds to a positive phase of the East Atlantic variability mode. Note that this mode has been positive for more than 6 months.
However in terms of weather regime, MF and ECMWF are very different.

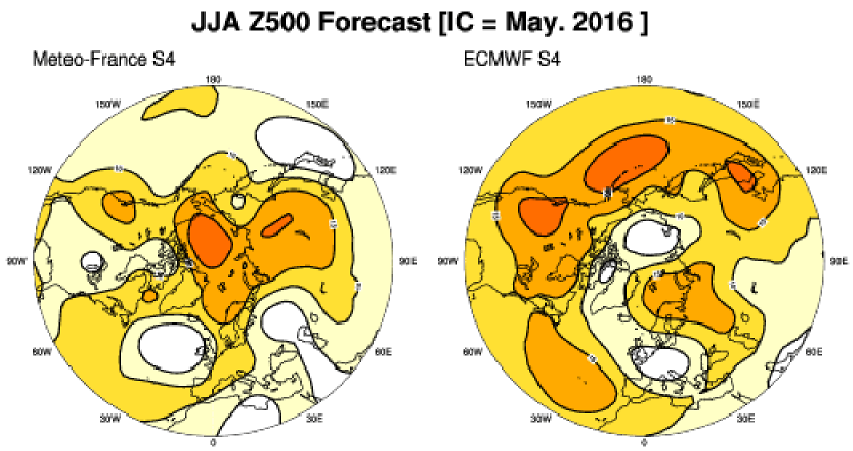


fig.II.2.2: Anomalies of Geopotential Height at 500 hPa from Météo-France (left) and ECMWF (right).

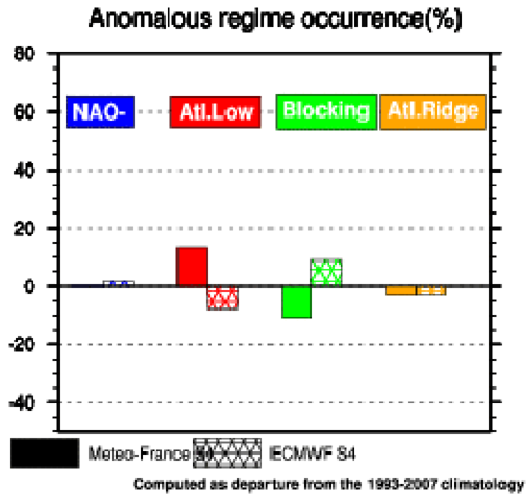


fig.II.2.3: North Atlantic Regime occurrence anomalies from Météo-France and ECMWF : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.

II.3. IMPACT: TEMPERATURE FORECASTS

Widespread warm anomalies forecast all over the world. Few exception over maritime areas (often associated with negative SST anomalies: equatorial Pacific, North Atlantic), and very few over continents. Over Europe, the cold oceanic influence should be still important in the very western regions: from the British Isles (especially Ireland) to Portugal (weaker influence). Elsewhere, an East Atlantic like circulation should lead to an enhanced probability of positive anomalies. However, due to the large uncertainty concerning the position of circulation anomalies, this signal should be taken with caution: it is more probable over Mediterranean regions and Eastern Europe.

II.3.a ECMWF

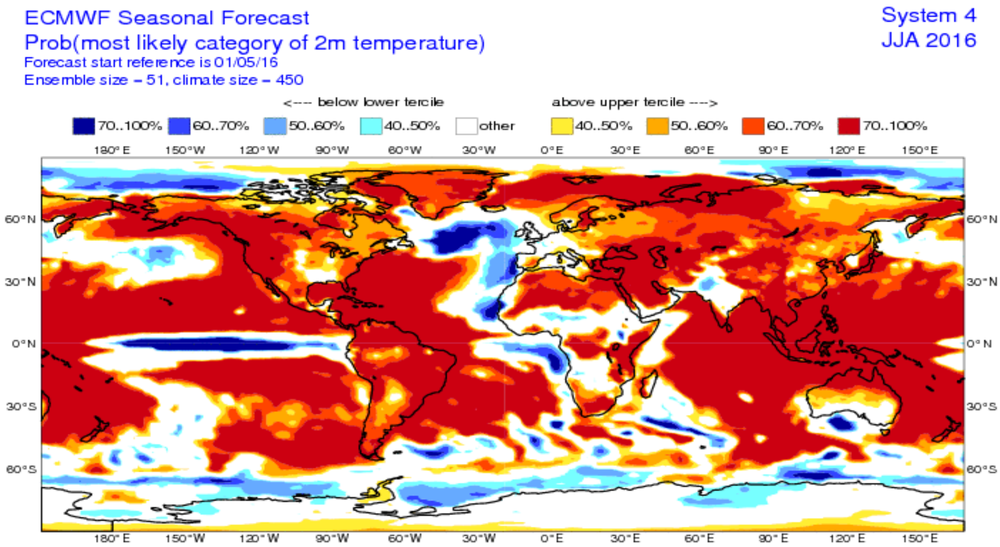


fig.II.3.1: Most likely category probability of T2m from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/

II.3.b Météo-France

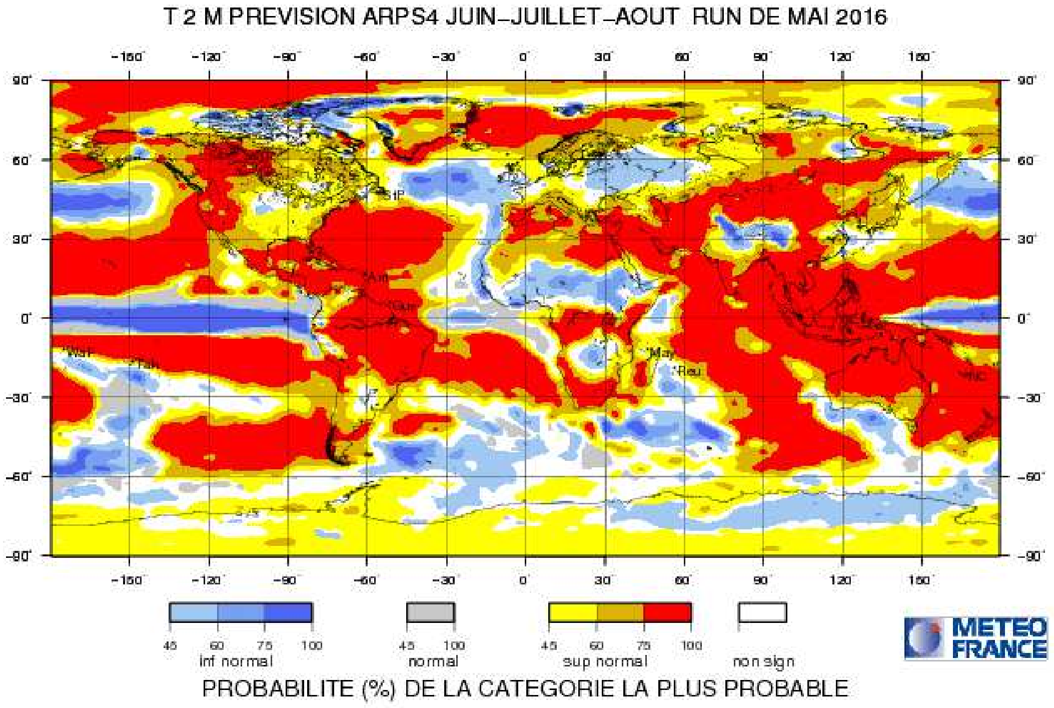


fig.II.3.2: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.3.c Japan Meteorological Agency (JMA)

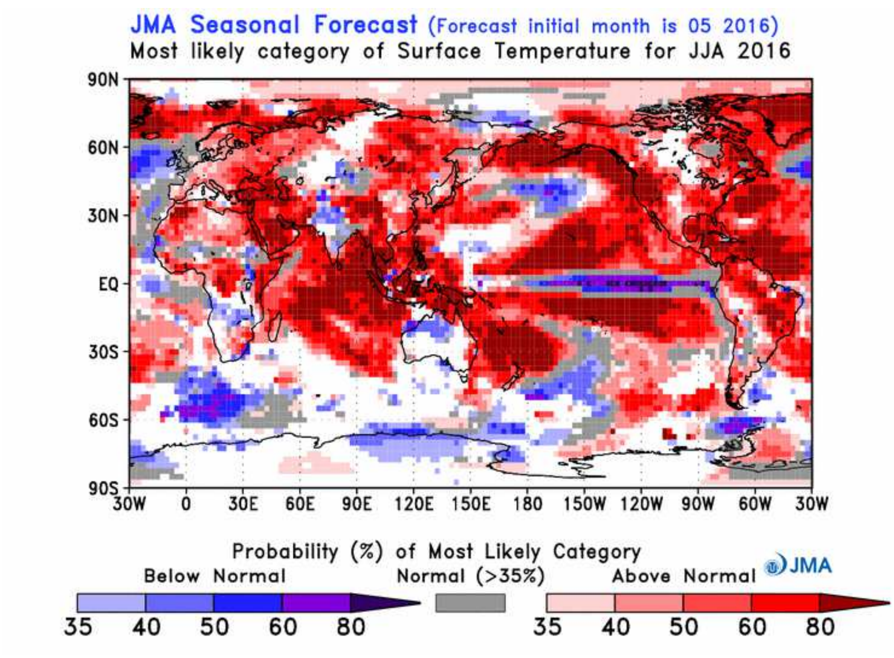


fig.II.3.3: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.php

II.3.d EUROSIP

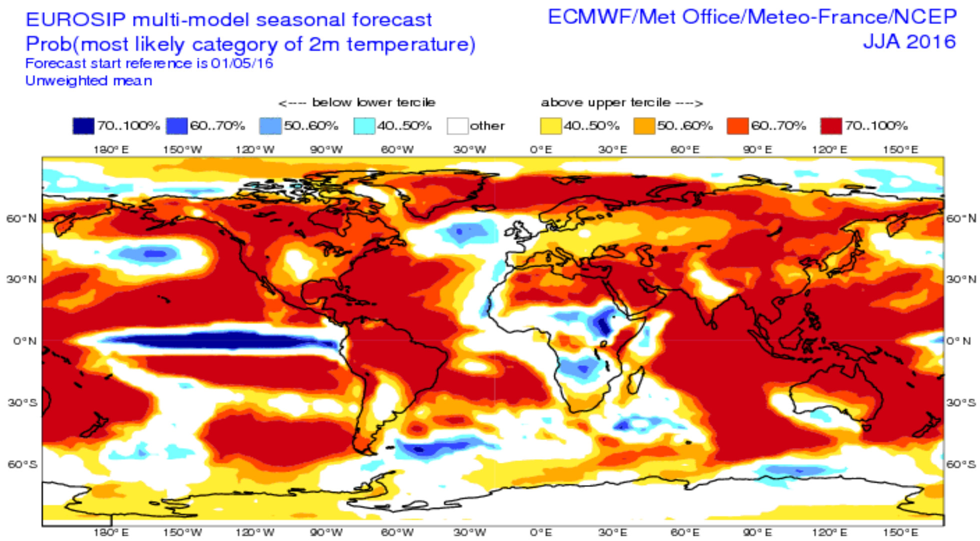


fig.II.3.4: Multi-Model Probabilistic forecasts for T2m from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).

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

II.4. IMPACT : PRECIPITATION FORECAST

Over the Pacific, associated with the emergence of a cold anomaly along the equator, a dry anomaly is forecast to develop between 5°N and 5°S. Positive rainfall anomalies should persist on both sides (see velocity potential anomalies).

Also linked to this evolution toward La Nina, a strong wet anomaly should appear over the Maritime Continent, Australia. This is consistent with the velocity potential anomaly maps, where the upward anomaly generally extends over almost the whole basin, up to Eastern Africa (north of the equator).

Conversely rainfall should be below average on the Atlantic side of West Africa: possibly a consequence of cool SST.

Over Europe, a drier than normal signal is forecasted by several models over Iberia, this is in accordance with the main probable scenario in terms of circulation. Elsewhere, no clear signal emerges.

II.4.a ECMWF

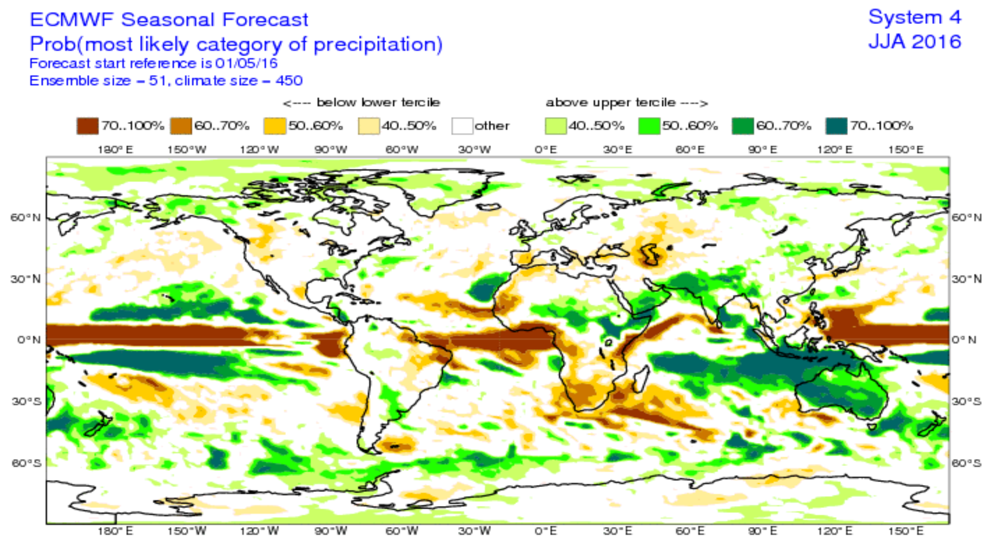


fig.II.4.1: Most likely category probability of rainfall from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/

II.4.b Météo-France

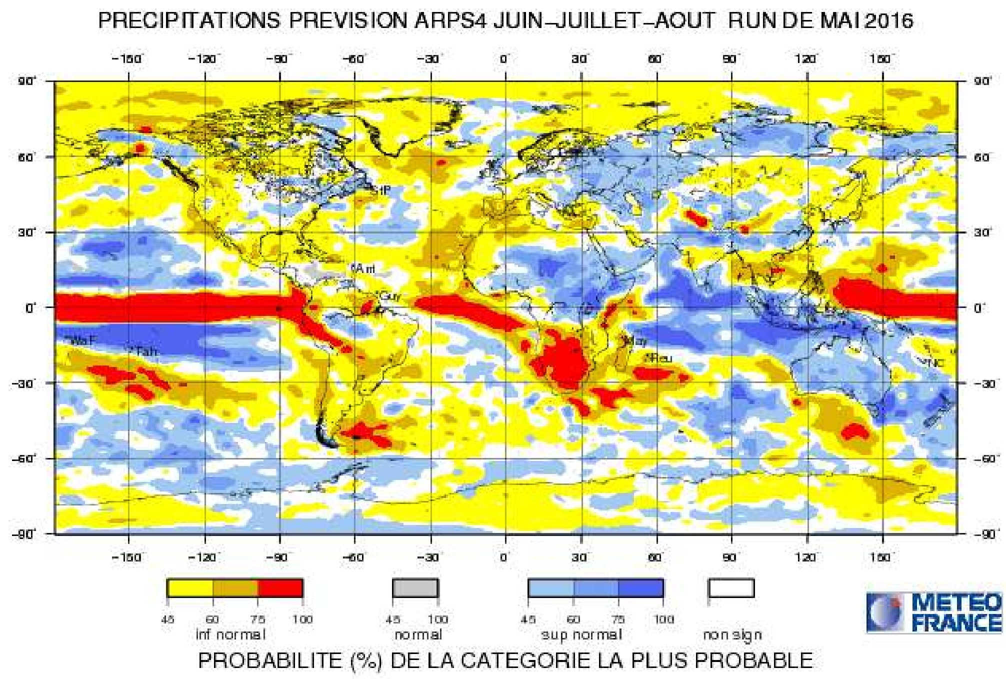


fig.II.4.2: Most likely category of Rainfall. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Japan Meteorological Agency (JMA)

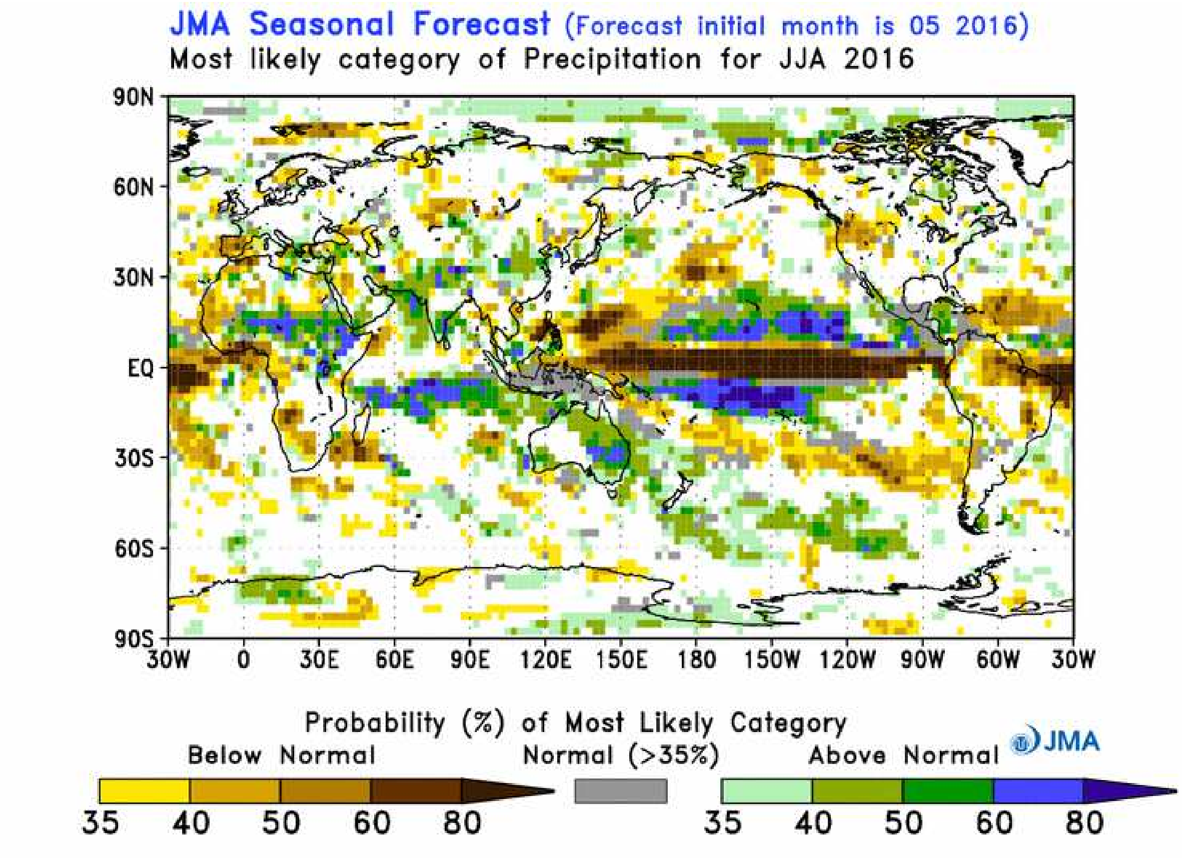


fig.II.4.5: Most likely category of Rainfall from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.php

II.4.d EUROSIP

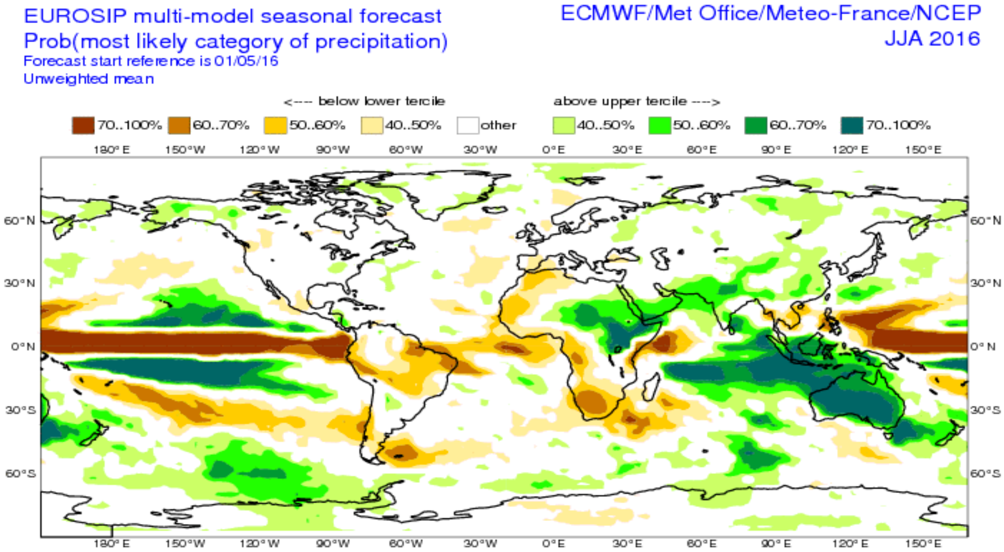


fig.II.4.7: Multi-Model Probabilistic forecasts for precipitation from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal).

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

II.5. REGIONAL TEMPERATURES and PRECIPITATIONS

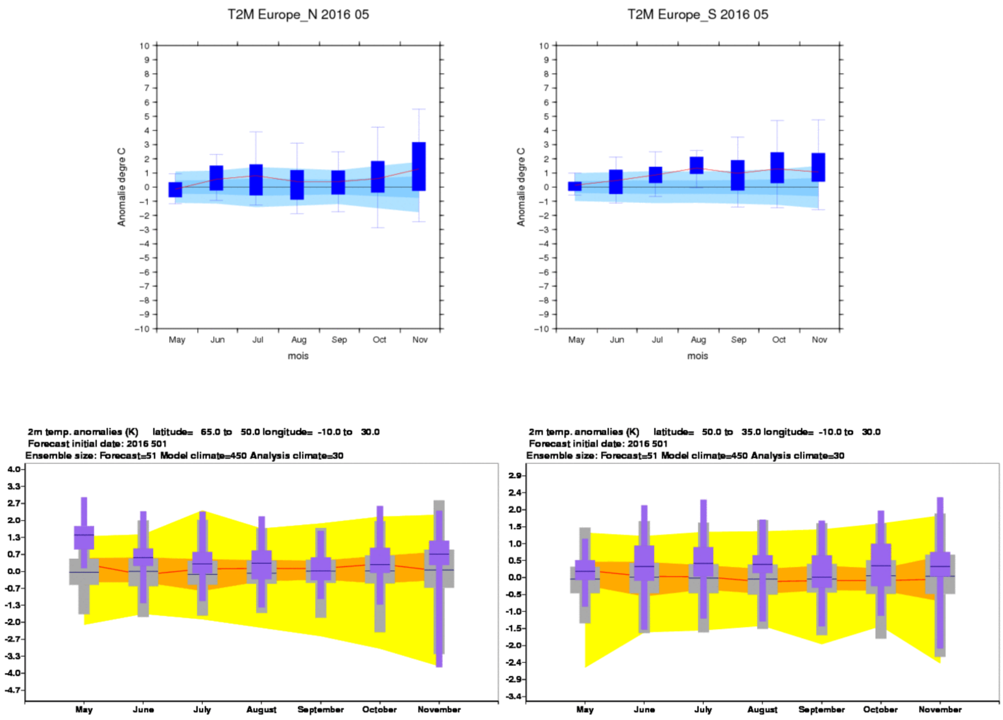


fig.II.5.1 : Climagrams for Temperature in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

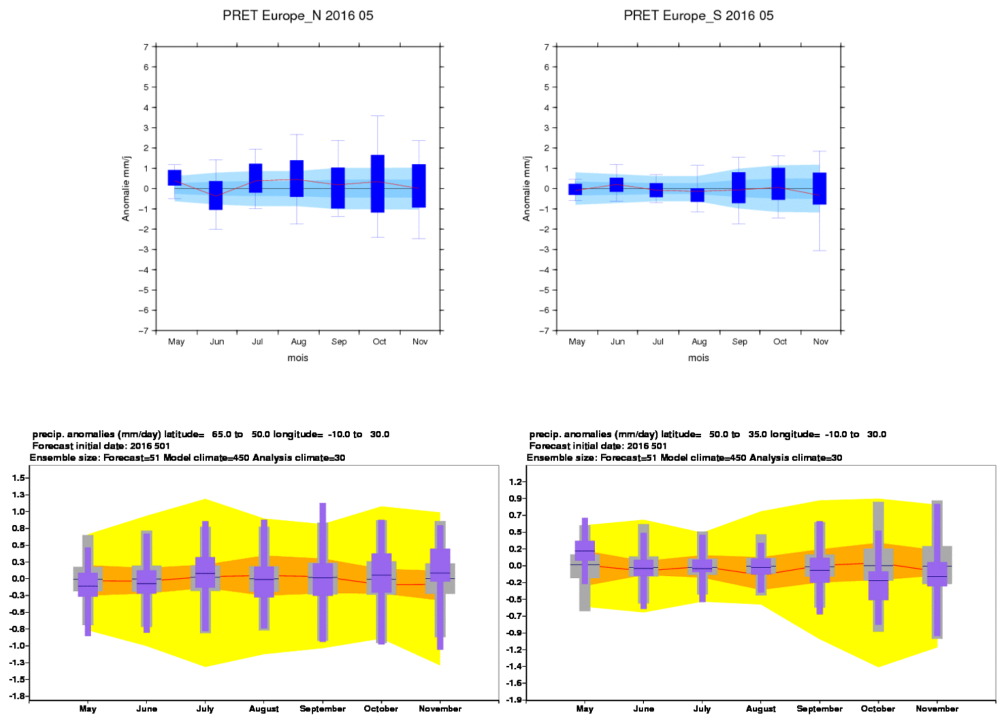


fig.II.5.2 : Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

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

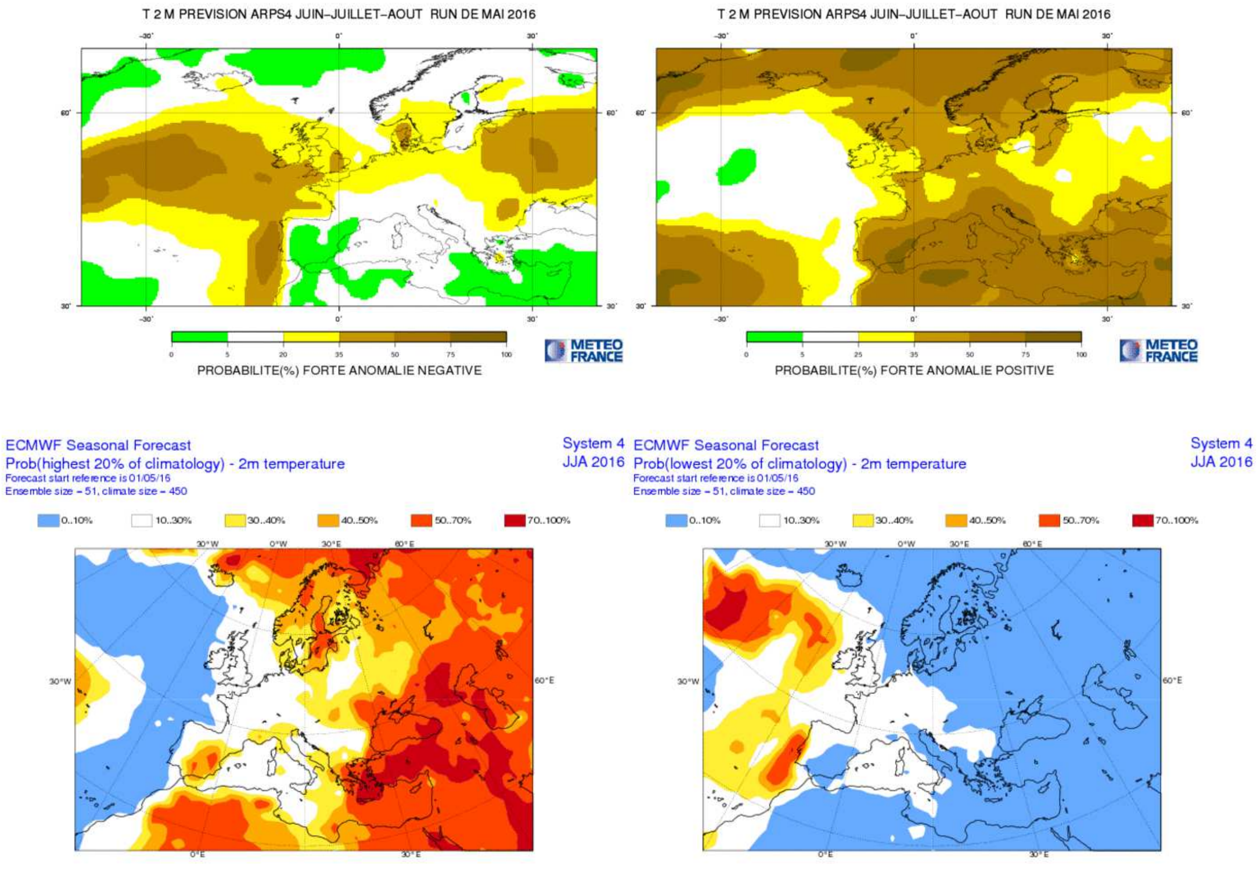


fig.II.7.1 : Top : Meteo-France T2m probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution). Bottom : ECMWF T2m probability of « extreme » below normal conditions (left - lowest ~20% of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

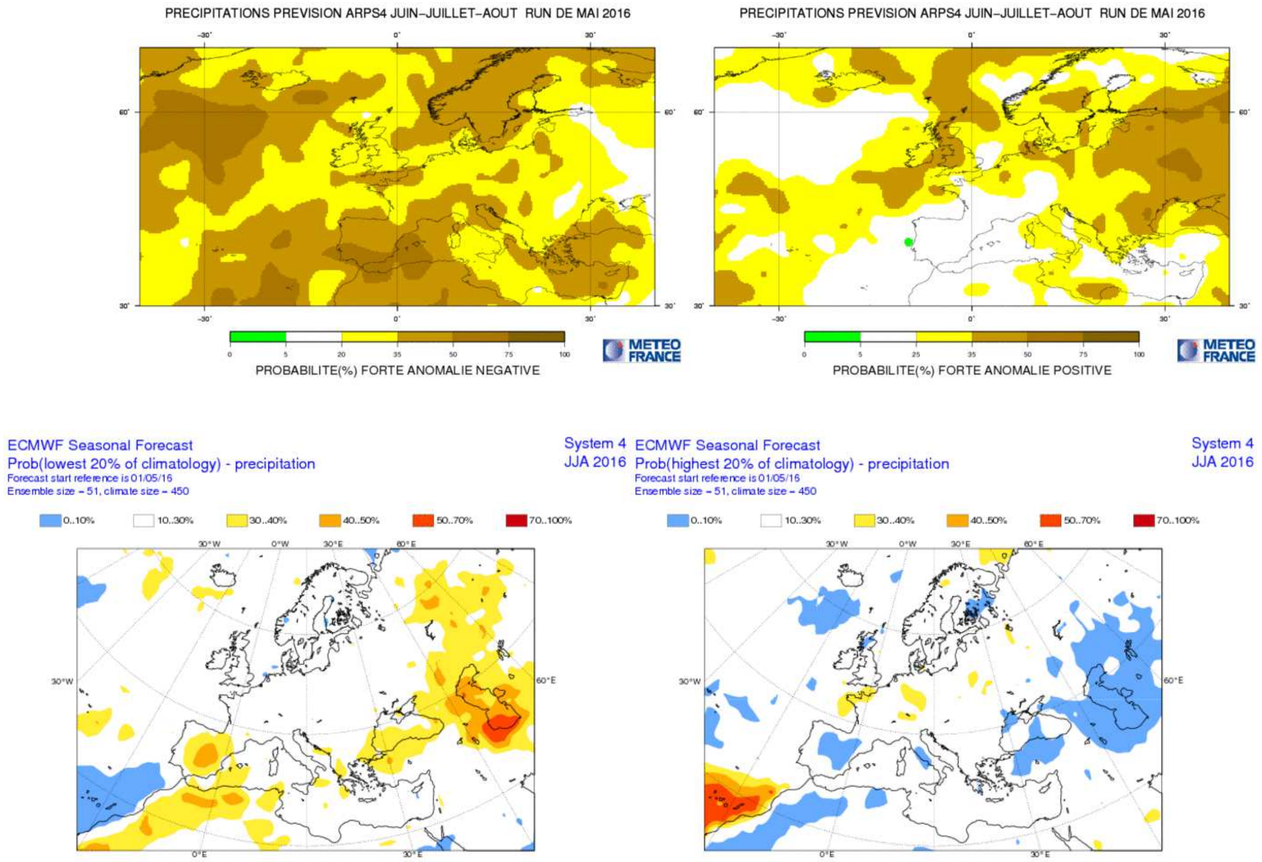


fig.II.7.2 : Top : Meteo-France rainfall probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution).
Bottom : ECMWF rainfall probability of « extreme » below normal conditions (left - lowest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

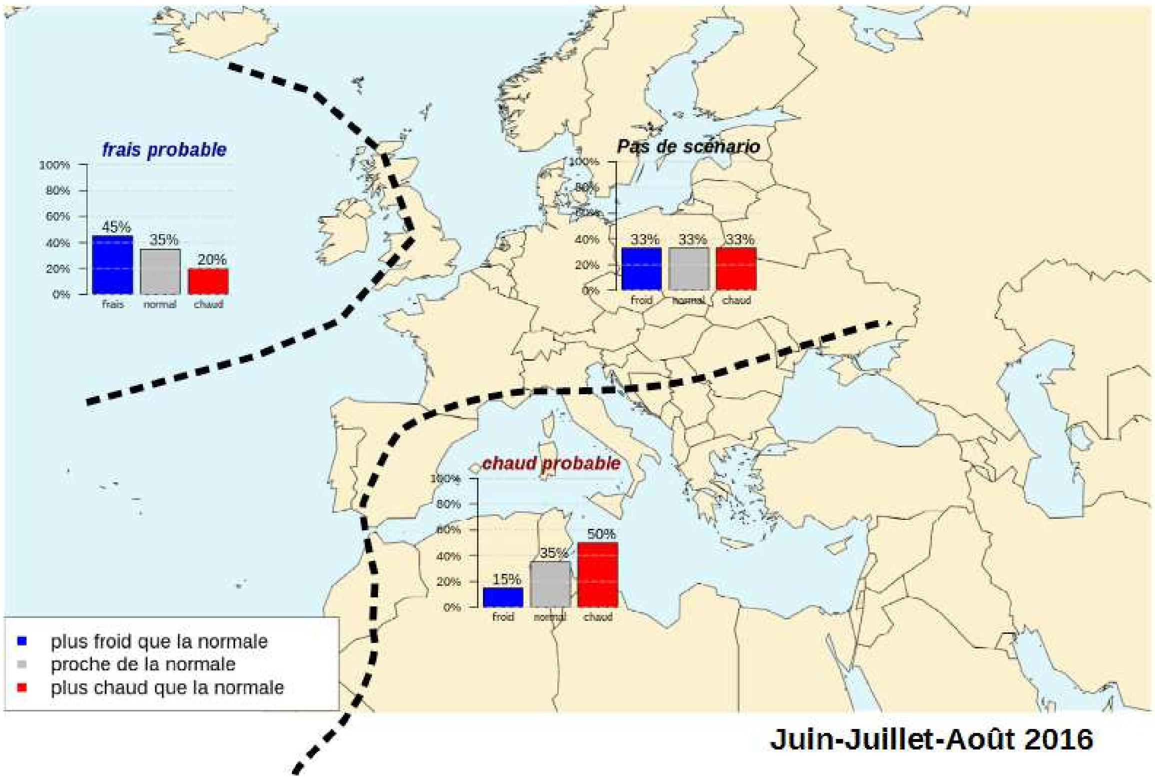
II.8. DISCUSSION AND SUMMARY

II.8.a Forecast over Europe

Temperatures: slight cool signal for the Western part of the British Isles. Moderate signal for warmer than normal conditions for Southern and Eastern Europe.

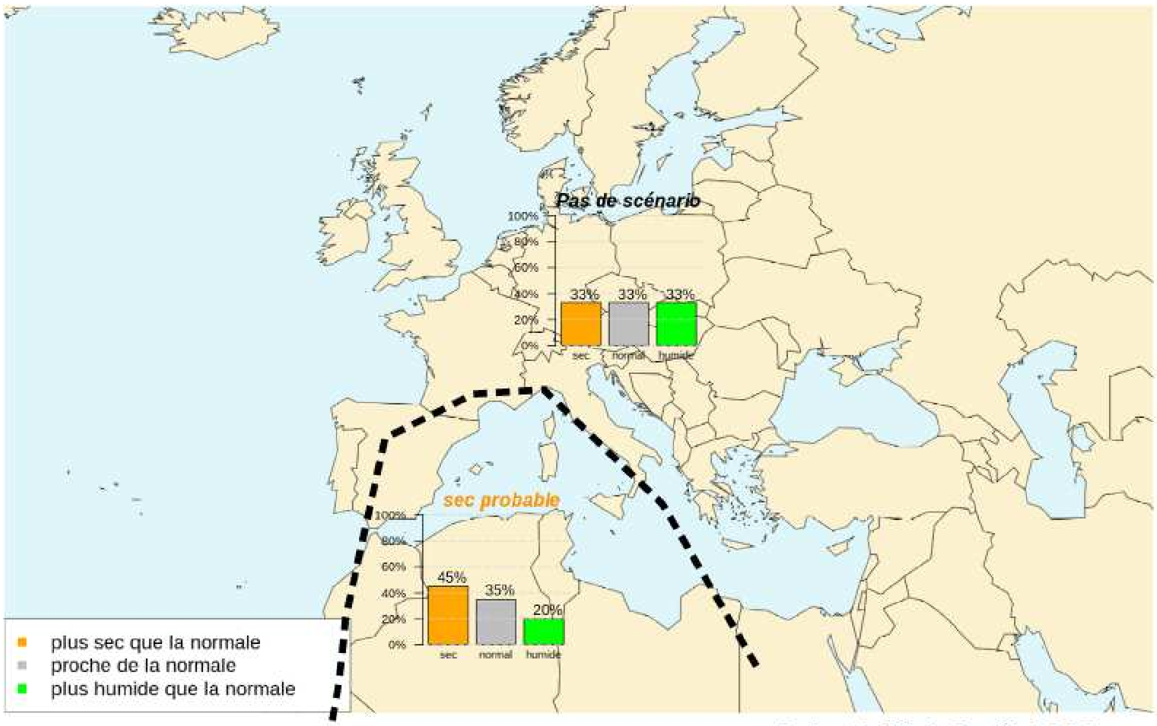
Precipitation: no scenario, except for the Iberian Peninsula region where a small dry signal seems to be emerging, in a continuation of last month forecast.

Prévisions saisonnières probabilistes de températures pour le trimestre prochain



Juin-Juillet-Août 2016

Prévisions saisonnières probabilistes de précipitations pour le trimestre prochain



Juin-Juillet-Août 2016

II.8.b Tropical cyclone activity

Above normal activity over Northeast Pacific.

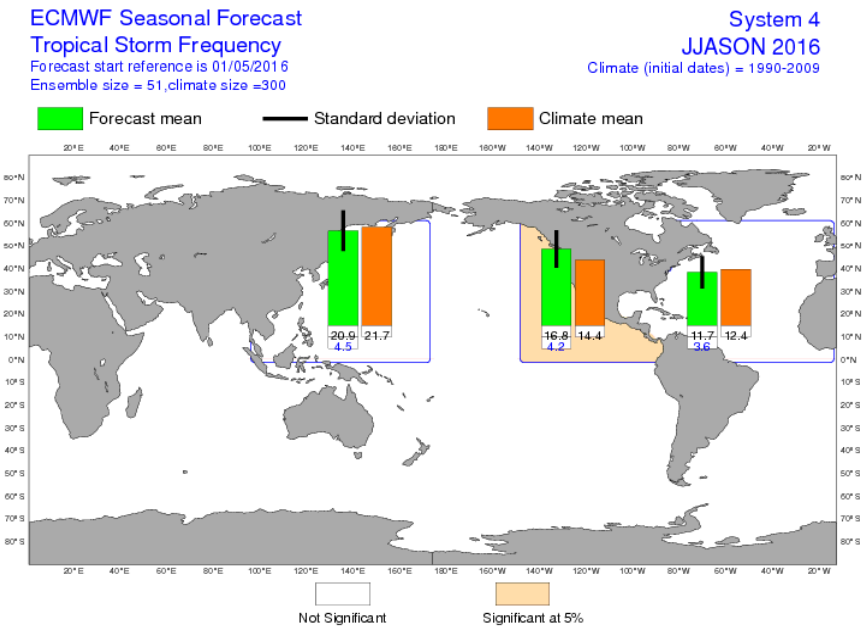


fig.II.8.1: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/

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.

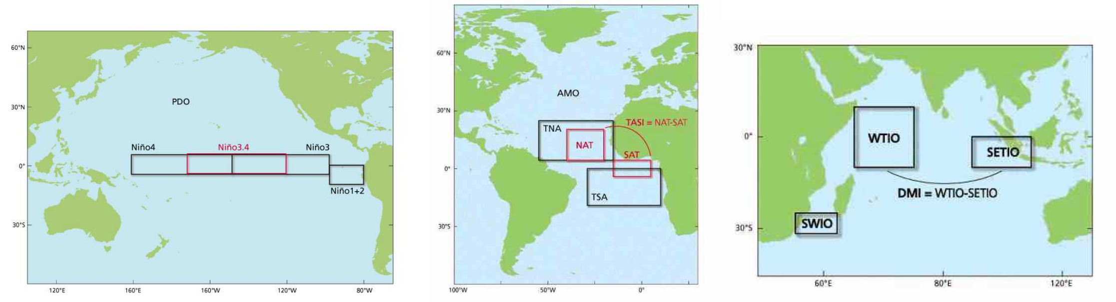
II.10. « NINO », SOI INDICES AND OCEANIC BOXES

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).

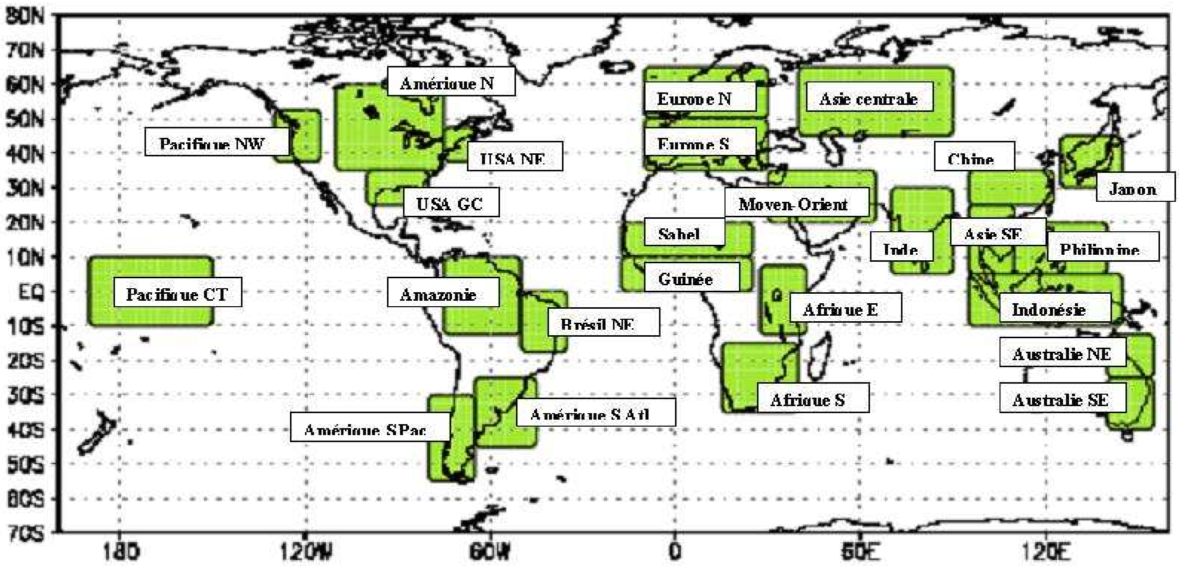
Associated to the oceanic « El Niño / La Niña » events, and taking into account the strong ocean/atmopshere coupling, the atmosphere shows also interanual variability associated to these events. It is monitored using the SOI (Southern Oscillation Index). This indice is calculated using standardized sea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