GLOBAL CLIMATE BULLETIN
n°193 – July 2015

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I. DESCRIPTION OF THE CLIMATE SYSTEM (MAY 2015)

I.1. OCEANIC ANALYSIS

I.1.a Global analysis

In the Pacific ocean :

All along the equatorial waveguide on the surface (fig.I.1.1, I.1.2 and I.1.3): positive SST anomalies in the central and eastern basin with a maximum at around 170 ° W and another stronger near the Peruvian coasts. A cooling trend west of the international date line and a marked warming in the far eastern part.

In the equatorial waveguide in the subsurface (fig.I.1.4 and I.1.5): strong contrast between the West (cold anomaly) and east (warm anomaly). This contrast was reinforced in April and May in connection with the arrival of a Kelvin wave off the South American coast (fig. I.1.5).

Niño monitoring: Niño 3.4 index up to 1.3 ° C by the end of May, corresponding to a moderate El Niño. Niño 4 index down slightly, while other indices continued to rise.

Elsewhere : In the northern hemisphere: weakening of the structure of the positive PDO (NOAA index ~ 0.4), with anomalies remaining positive along the North American coast.

In the southern hemisphere: cold anomaly along the SPCZ.

In the Indian Ocean :

Persistent warm anomaly over much of the basin. The DMI index is slightly positive.

In the Atlantic:

Cooling trend over the western equatorial waveguide surface and development of the cold tongue in the subsurface. Surface warming over eastern TNA box. Cooling of the Gulf of Mexico. In the North Atlantic, the horseshoe pattern of Newfoundland to Ireland and off West Africa coast tends to diminish in favor of a zonal contrast.

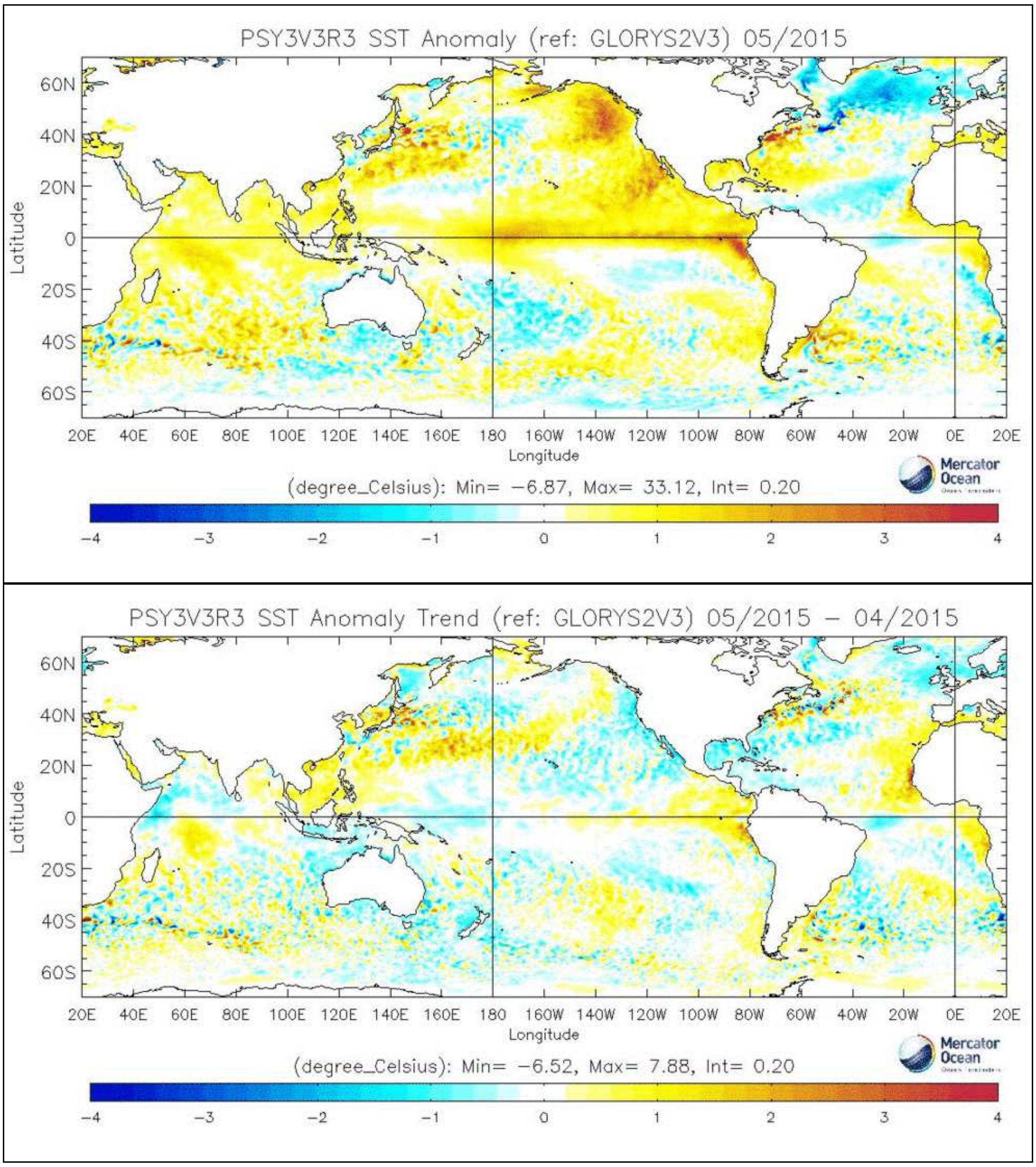


fig.I.1.1: top : SSTs Anomalies (°C) . Bottom : SST tendency (current – previous month), (reference Glorys 1992-2009). http://bcg.mercator-ocean.fr/

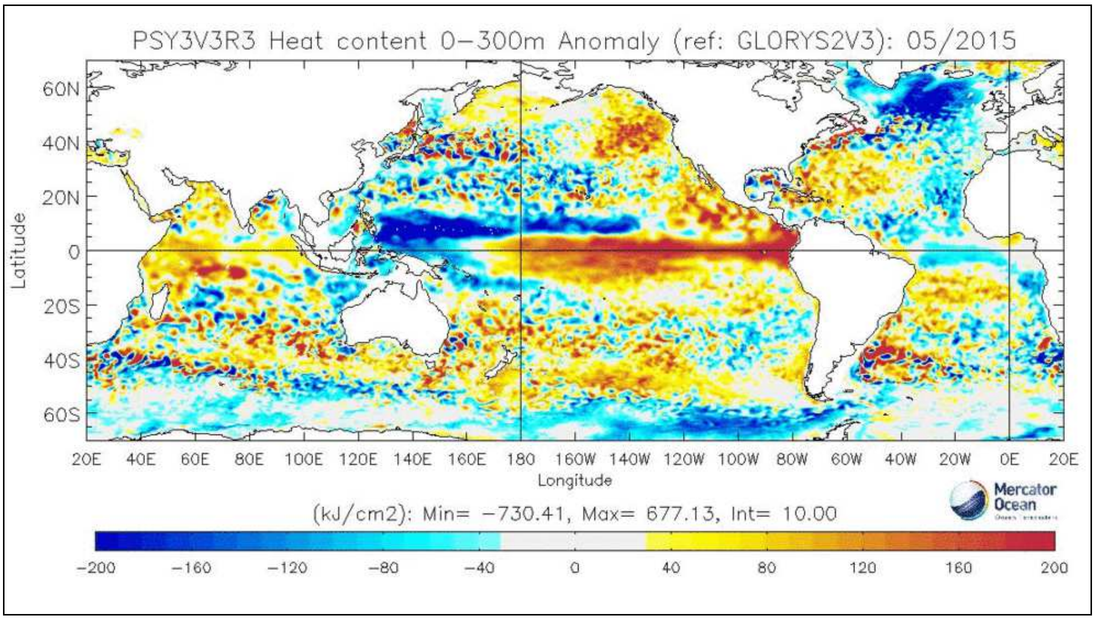


fig.I.1.2: map of Heat Content Anomalies (first 300m, kJ/cm2, reference Glorys 1992-2009)

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

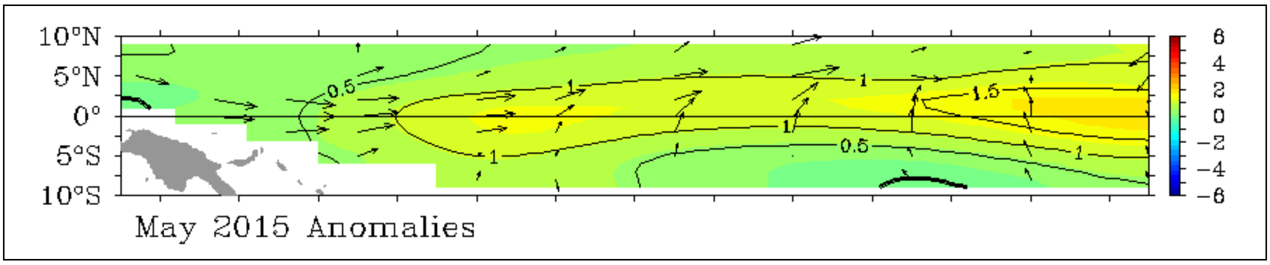


fig.I.1.3: SST Anomalies and Wind anomalies over the Equatorial Pacific from TAO/TRITON.

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

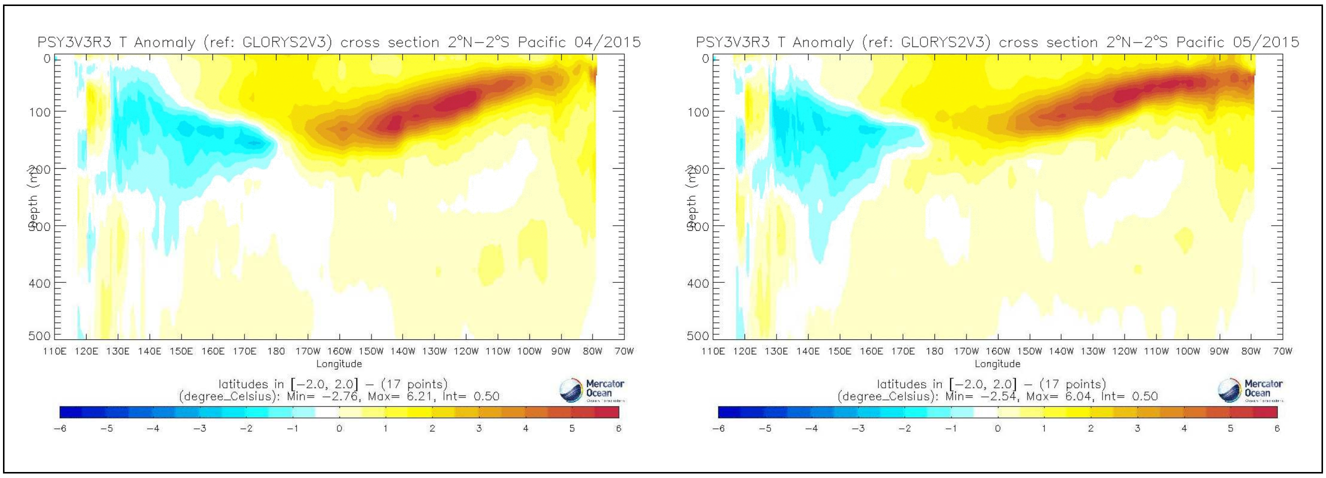


fig.I.1.4: Oceanic temperature anomaly in the first 500 meters in the Equatorial Pacific (previous and current month), http://bcg.mercator-ocean.fr

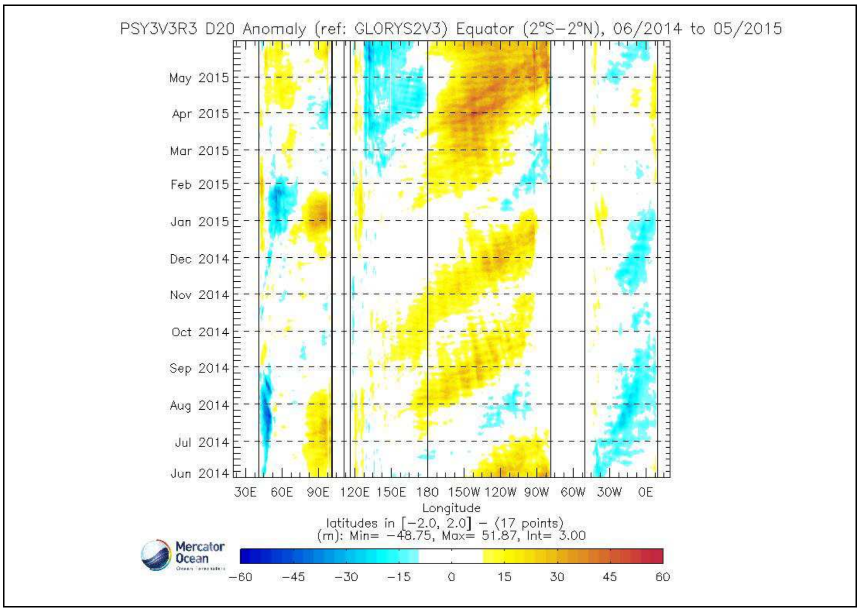


fig.I.1.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 6 month period http://bcg.mercator-ocean.fr/

I.1.b Near Europe

Still warmer than normal in the Arctic Sea north of Iceland, without much change to the previous month.

Colder-than-normal area south of Greenland/Iceland extended further eastwards to the North Sea, partly even to the Baltic Sea, due to cold air advection from that part of the North Atlantic further eastward.

In the subtropical North Atlantic more or less close to normal near Europe.

Much of the Mediterranean and the Black Sea has warmed more than normal. Just a small area south of France is slightly colder than normal.

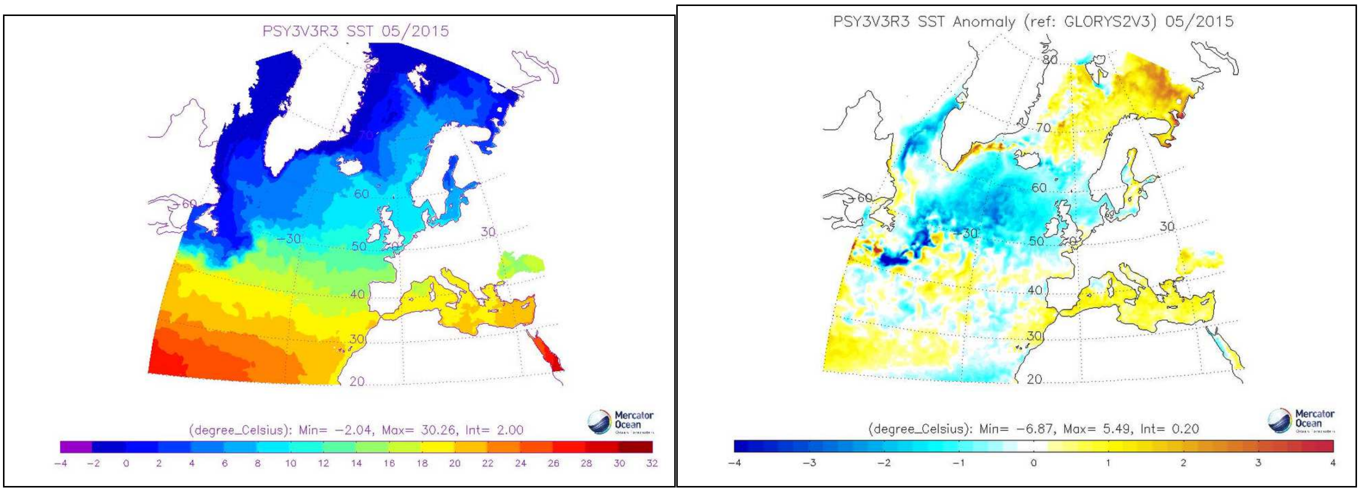


fig.I.1.6 : Mean sea surface temperature in the RA VI Region (Europe) and anomaly (reference Glorys 1992-2009). http://bcg.mercator-ocean.fr/

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) :

Over the equatorial Pacific Ocean, a persistent significant upward motion anomaly extends far to the east of the international date line, linked with the SST anomalies.

Strong subsidence anomaly on the maritime continent and to a lesser intensity on the Indian Ocean and the tropical Atlantic.

The SOI is negative in May (-0.7), which abounds in the direction of ocean-atmosphere coupling (consistent with El Niño). Other atmospheric components also show an ocean-atmosphere coupling: weakening of the trade winds in the equatorial Pacific waveguide (and even a shift to westerly winds between 135 ° W and 170 ° W), excess rainfall in the center of the tropical Pacific Ocean (see precipitation map below).

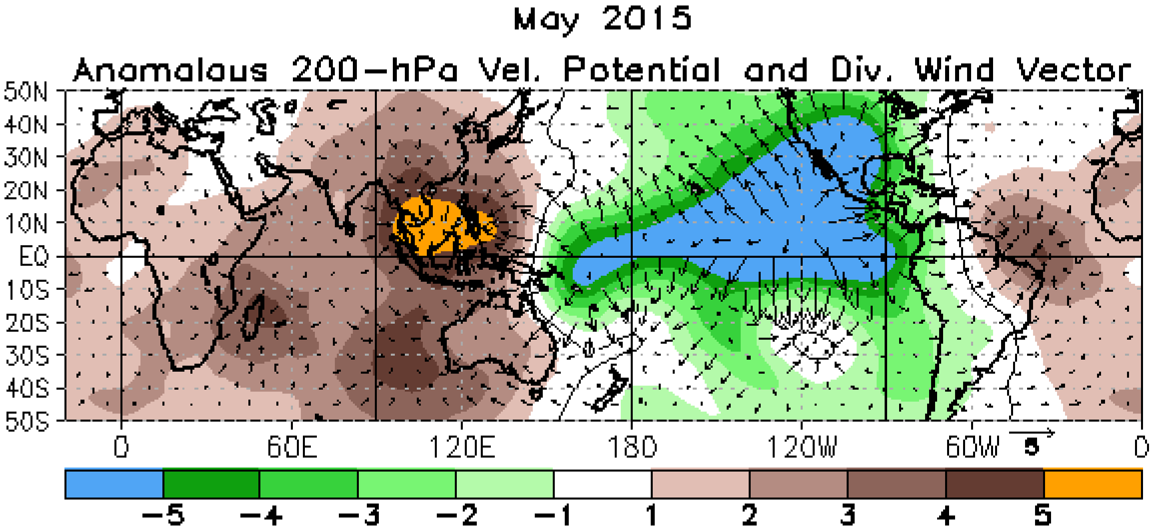


fig.I.2.1: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).

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

MJO (fig. I.2.b):

MJO has not been active in May.

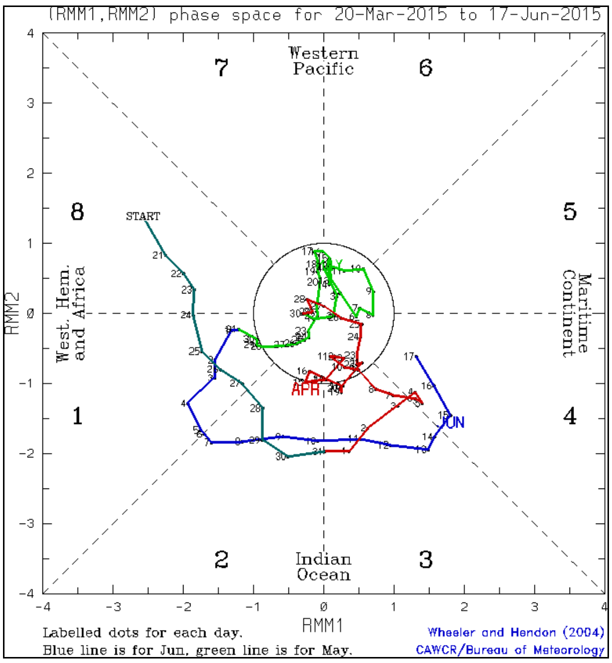


fig.I.2.b: indices MJO http://cawcr.gov.au/staff/mwheeler/maproom/RMM/phase.Last90days.gif

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

Atmospheric reaction to the diabatic heating on the Pacific with coherent structures with the model of Gill (pairs anticyclonic circulations both sides of the equator). On the eastern Pacific, a teleconnection seems to be emerging to Southern California and the eastern USA. The anomaly of the anticyclonic circulation in the Iberian Peninsula does not seem of tropical origin.

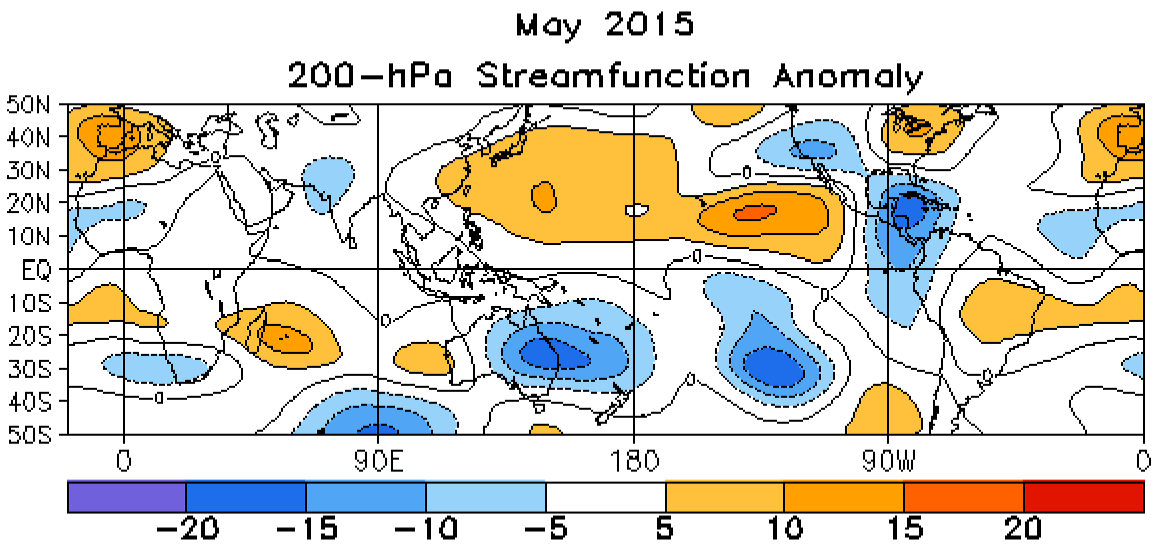


fig.I.2.2: Stream Function Anomalies at 200 hPa.

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

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

In the northern hemisphere: circulation regime NAO+ and EA +. For now, there is no evidence of PNA + response in north america.

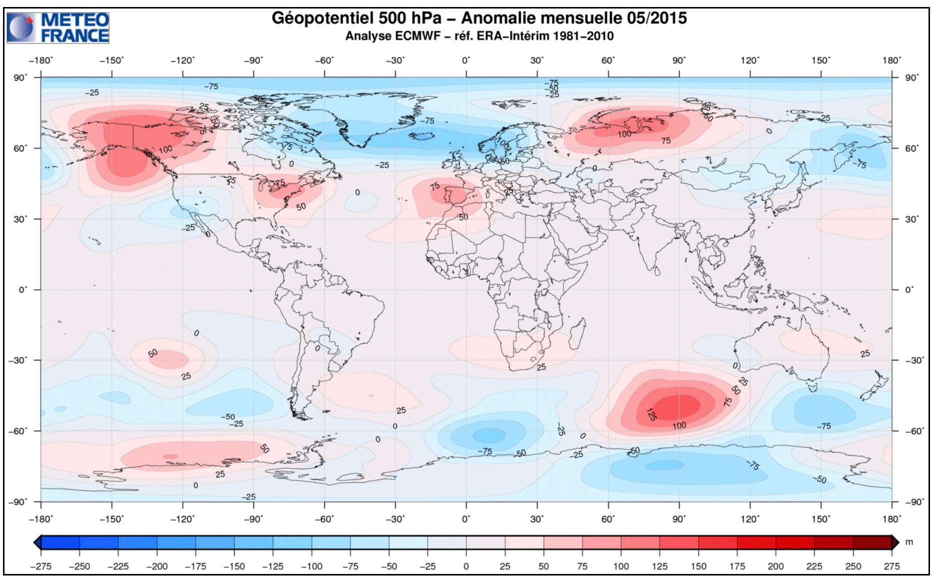


fig.I.2.3: Anomalies of Geopotential height at 500hPa (Meteo-France)

MONTH	NAO	EA	WP	EP-NP	PNA	TNH	EATL/WRUS	SCAND	POLEUR
MAY 15	0.2	0.7	2.1	0.5	-0.1	---	-1.5	-2.1	0.5
APR 15	0.6	0.9	1.2	-0.4	-0.4	---	1.1	-1.5	-0.9
MAR 15	1.1	1.2	0.4	1.1	-0.5	---	0.3	0.4	0.7
FEB 15	1.1	0.0	-1.4	1.2	0.5	0.7	-0.9	-0.4	2.1
JAN 15	1.6	1.1	-0.2	1.3	0.1	0.4	-0.2	-0.2	0.0
DEC 14	1.6	-0.6	-0.1	---	0.4	-0.2	-0.4	-0.4	-0.9

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

Notable low pressure anomaly zone extending from eastern Canada to northern Europe. On the other hand, only a slight positive anomaly of the Azores High, but also extending quite far to the east until southeastern Central Europe. Some notable low pressure activity over eastern Europe/Turkey/eastern Mediterranean.

More than two thirds of the days in May 2015 had Atlantic Low circulation types, especially occurring in the first half of the month.

Like in April 2015, the Scandinavian pattern (SCAND) is the most dominant pattern, even more now (-2.1). It explains both the low pressure over northern Europe and the high pressure over the southern half of Europe. An additional, but smaller contribution comes from the East Atlantic pattern, which continued to be slightly positive (+0.7). In contrast, the North Atlantic Oscillation (NAO) has close to neutral conditions. The East Atlantic – West Russia pattern (EATL/WRUS) switched from a positive to a negative mode of -1.5, but is not very consistent to the actual SLP distribution.

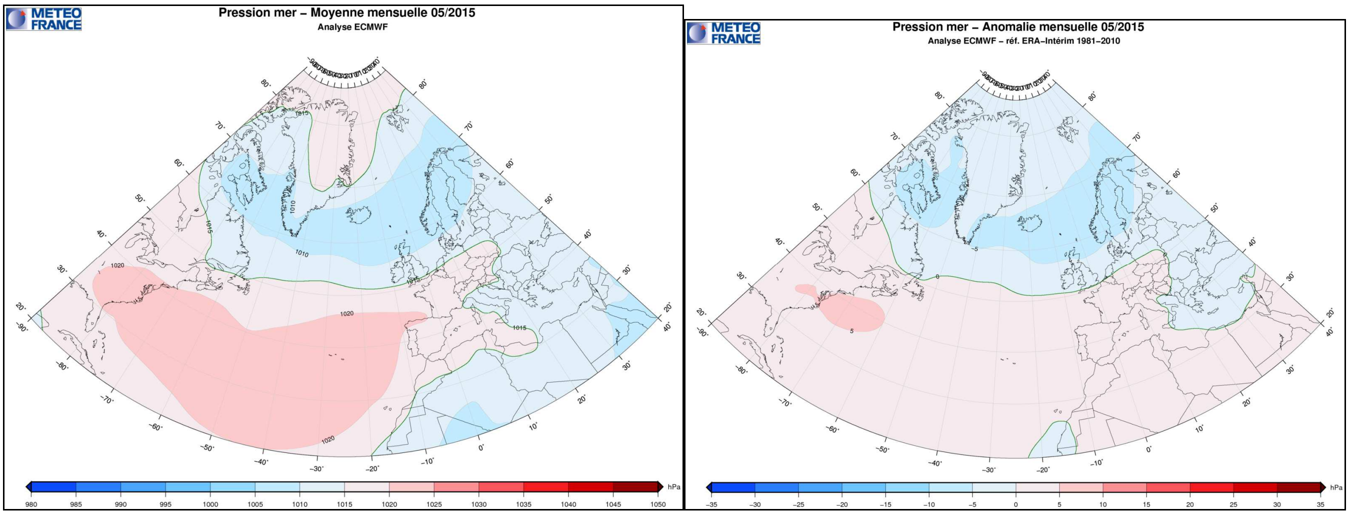


fig.I.2.4: Mean sea level pressure in the RA VI Region (Europe) (top) and 1981-2010 anomalies (bottom).

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

NAO was slightly negative at the beginning of May 2015 and slightly positive at the end of the month, which averages out to near zero on monthly mean. In contrast, AO was significantly positive most of the month, indicating only weak exchange between air masses between the Arctic and middle latitudes.

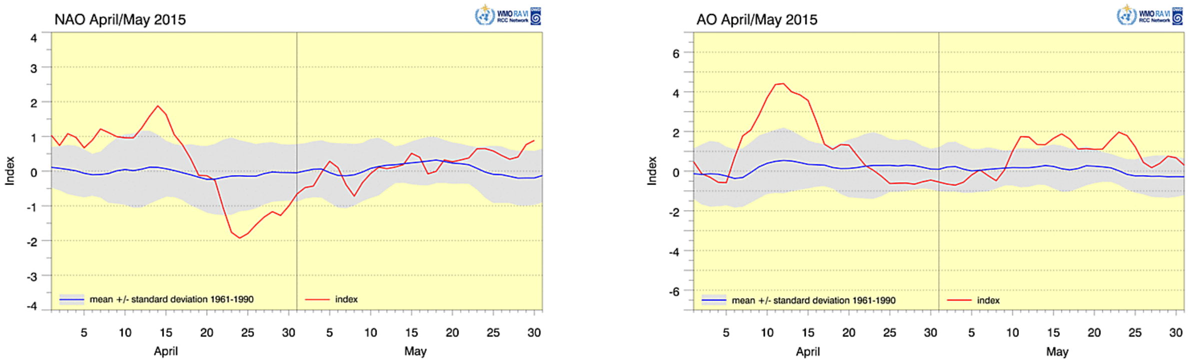


fig.I.2.5: North Atlantic Oscillation (NAO, left) and Arctic Oscillation (AO, right) indices with 1961-1990 mean standard deviation (shading). http://www.dwd.de/rcc-cm , data from NOAA CPC: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml

I.2.b Precipitation

The trace of the El Niño event is clearly visible on the tropical Pacific Ocean, maritime continent and northern South America.

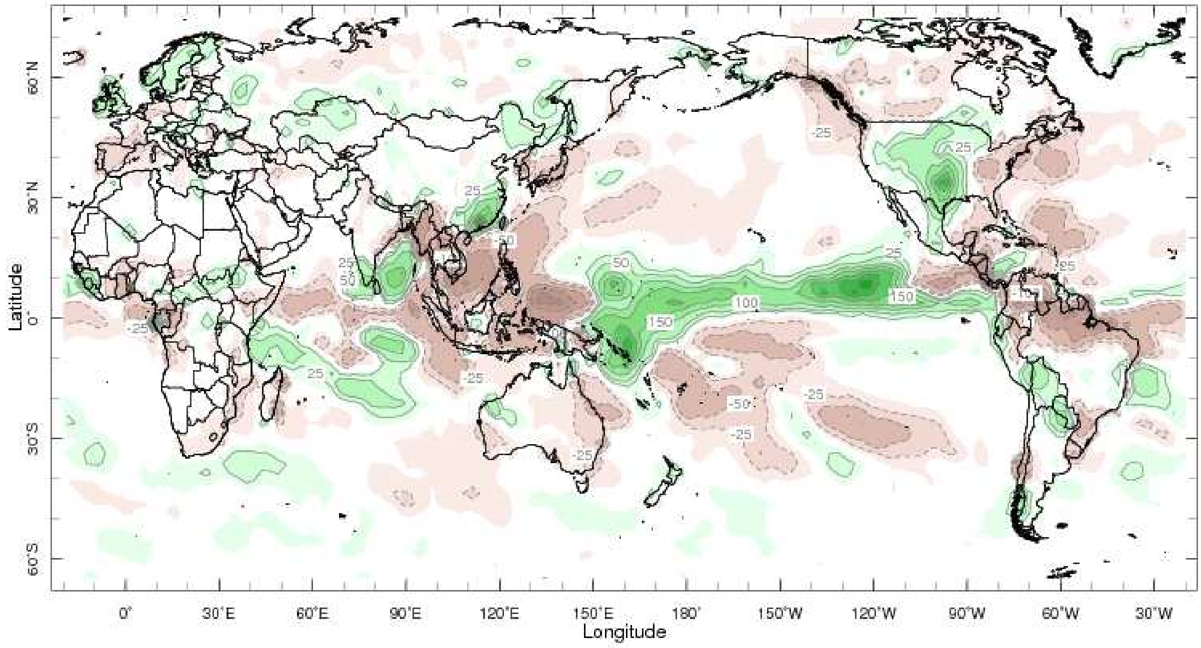


fig.I.2.4: Rainfall Anomalies (mm) (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.

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

Precipitation anomalies in Europe:

Precipitation was particularly high in Scotland and Scandinavia / northernmost Germany, reflecting the low pressure pattern and exceeding the 90th percentile. Also the Alpine region was very wet (orographical lifting) and parts of eastern Europe and Turkey (many local thunderstorms). In contrast, other areas were very dry, especially one area extending from Iberia to Poland/Baltic countries, and another one over parts of the Balkan Peninsula. Parts of Spain, southern France and Germany had severe or extreme drought conditions during extended high pressure influence. In Spain and southern France, precipitation totals were below the 10th percentile.

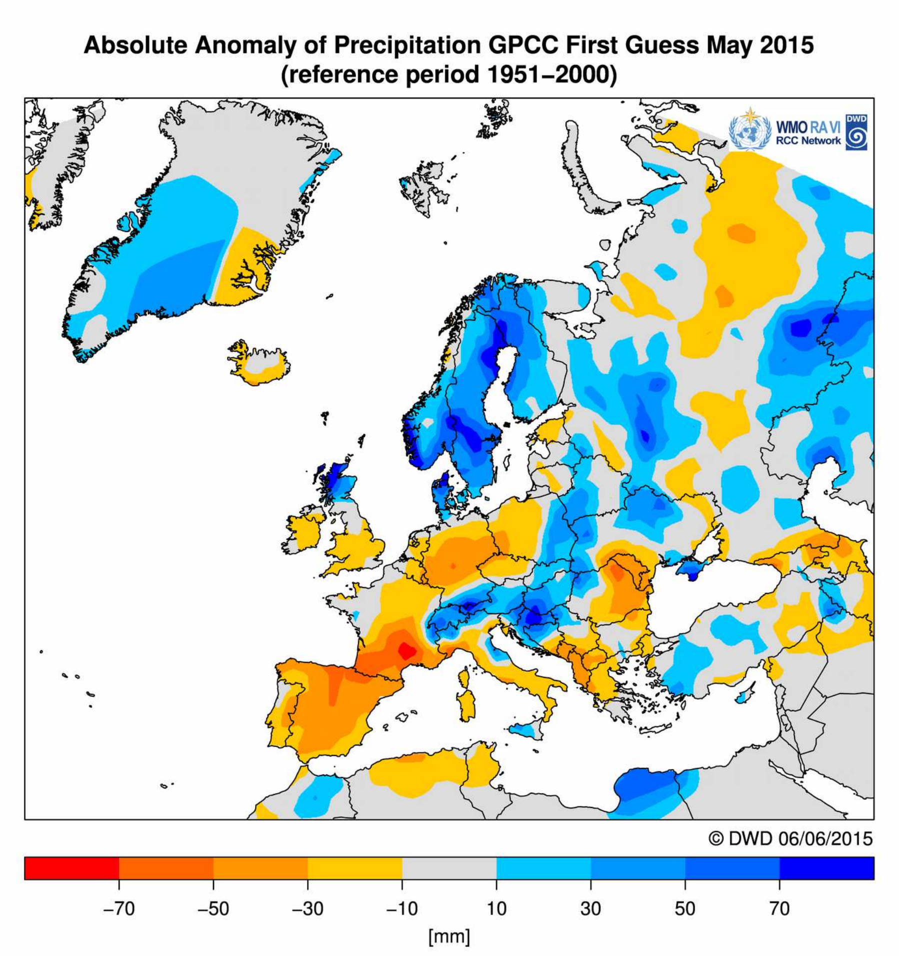


fig.I.2.5: Left: Absolute anomaly (1951-2000 reference) of precipitation in the RA VI Region (Europe), data from GPCC (Global Precipitation Climatology Centre), http://www.dwd.de/rcc-cm. Right: Percentiles of precipitation, 1981-2010 reference. Data from NOAA Climate Prediction Center, http://iridl.ldeo.columbia.edu/maproom/Global/Precipitation/Percentiles.html

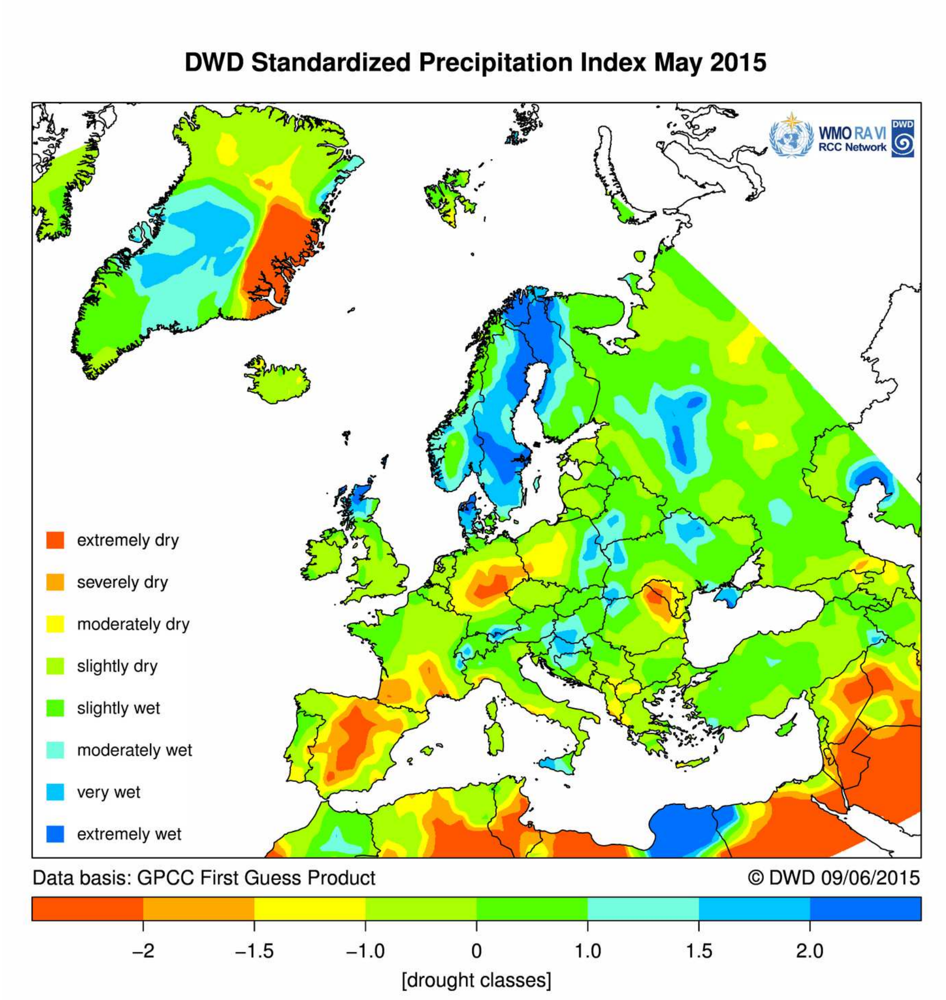


fig. I.2.5a: Standardized Precipitation Index with DWD modification (DWD-SPI), http://www.dwd.de/rcc-cm .

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	+16.9 mm	+0.548
Southern Europe	- 12.3 mm	- 0.399

I.2.c Temperature

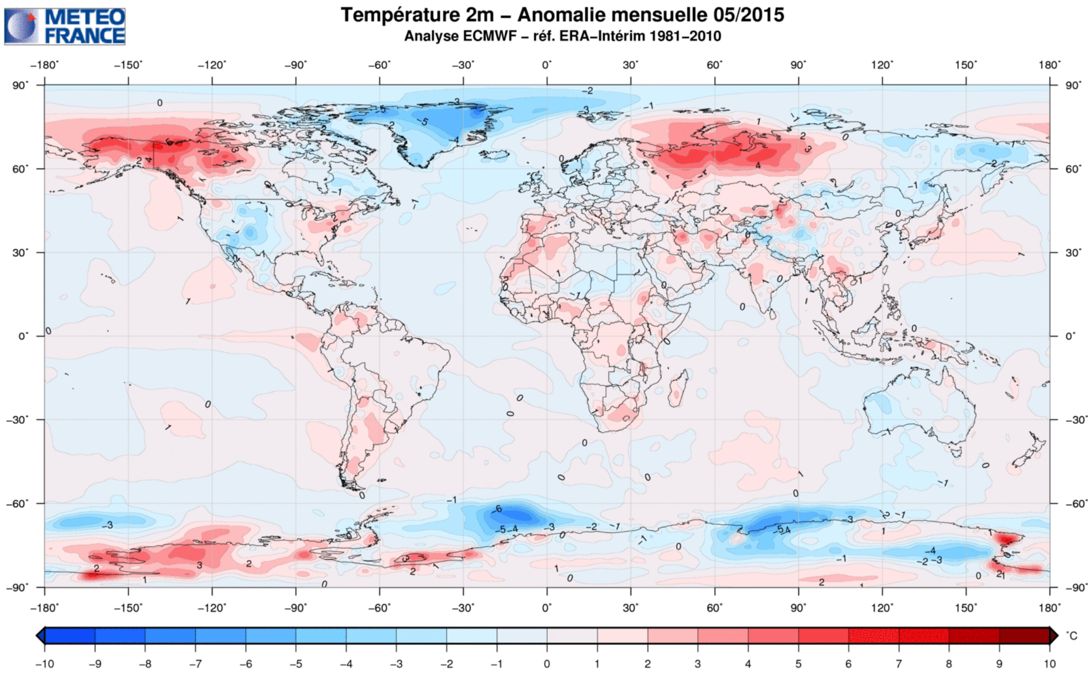
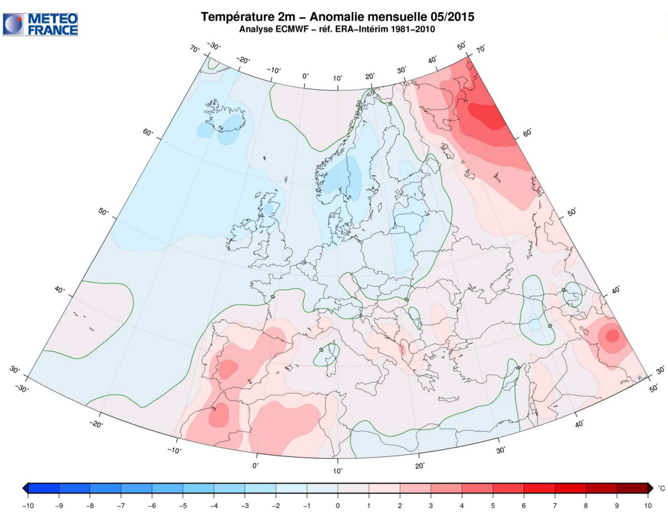


fig.I.2.8: Temperature Anomalies (°C) (Meteo-France)

Temperature anomalies in Europe:

May was colder than normal in northern, western, central and parts of eastern Europe, reflecting again the low pressure area leading cold air to these parts. The southern and easternmost parts of Europe were warmer than normal, due to high pressure influence in the southwest and warm air advection in the east.



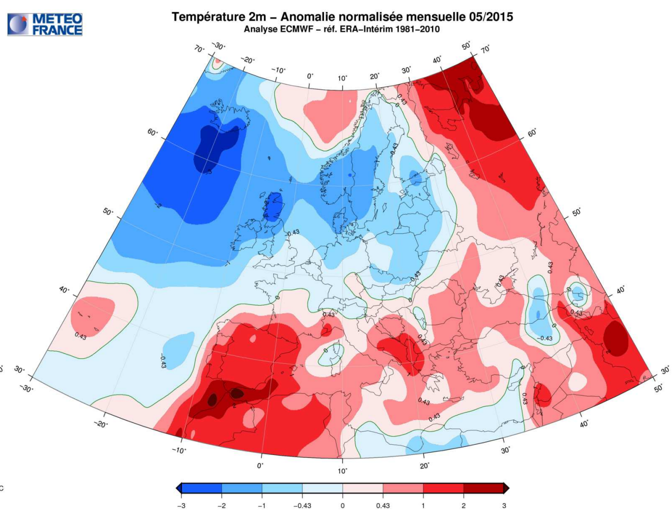


fig.I.2.9: Left graph: Absolute anomaly of temperature in the RA VI Region (Europe). Right graph: Standardized temperature anomalies

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	-0.4°C
Southern Europe	+1.7°C

I.2.d Sea ice

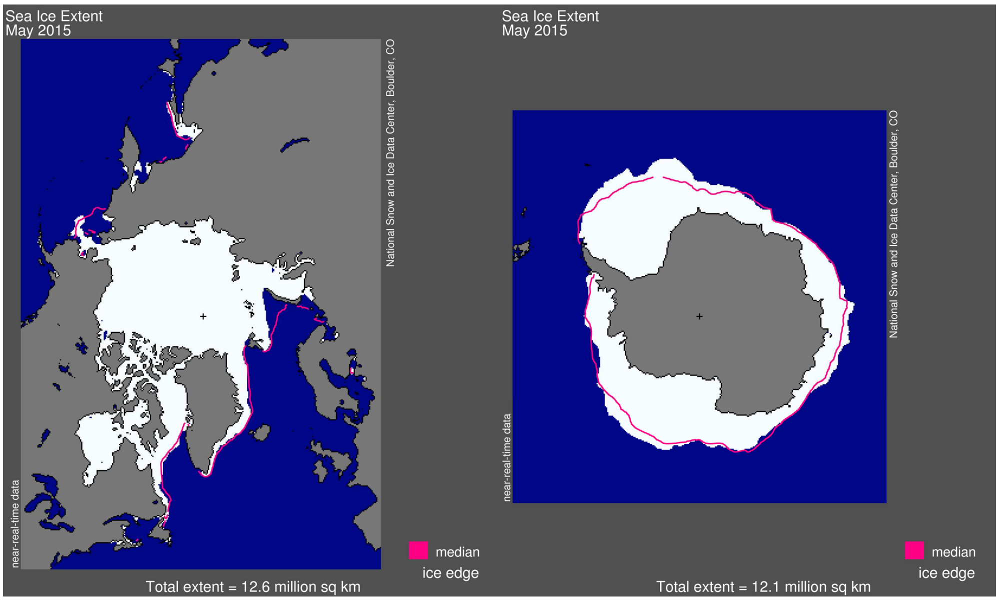


fig.I.2.15: Sea-Ice extension in Arctic (left), and in Antarctic (right). The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

In Arctic (fig. 1.2.15 and 1.2.16 - left): persistent significant deficit (~ -2 std), mainly in the Pacific and in the Barents Sea. It is in the records years of lower extension of ice in late winter.

In Antarctic (fig. 1.2.15 and 1.2.16 - right): Large surplus (+2 std) persistent.

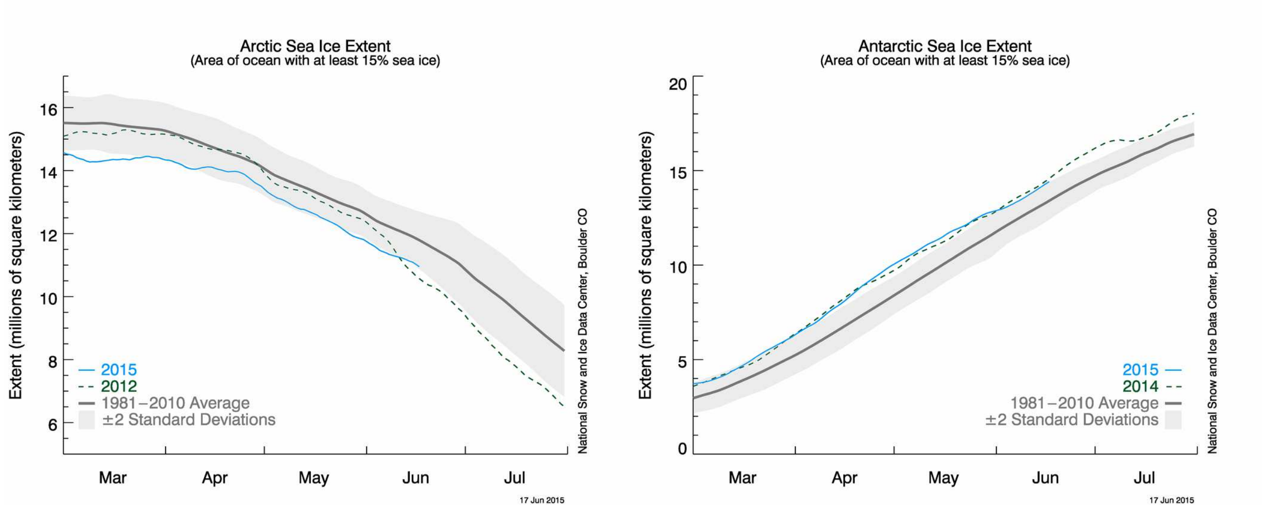


fig. I.2.16 : Sea-Ice extension evolution from NSIDC.

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

II. SEASONAL FORECAST FROM DYNAMICAL MODELS

II.1.OCEANIC FORECASTS

II.1.a Sea surface temperature (SST)

Very good overall consistency of structures anomalies between

Pacific Ocean: all models predict a strengthening of the surface warm anomaly and its extension to the east along the equator to the coasts of South America. Also large area of warm anomaly along the western coast of North America.

Indian Ocean: generalized warm anomaly. The IOD should remain slightly positive.

Atlantic Ocean: significant differences from one model to another. Cold anomaly rather marked along the equator in NCEP to the Gulf of Guinea, same (less marked) with ECMWF and warm anomaly with ARPEGE.

In the Northern Hemisphere cold anomaly marked Labrador to British Isles (probably the remains of NAO + circulation that occurs over several months). Warm anomaly in the southwest of the Tropical Atlantic (extension along the US coast).

Mediterranean Sea: should keep warm anomalies.

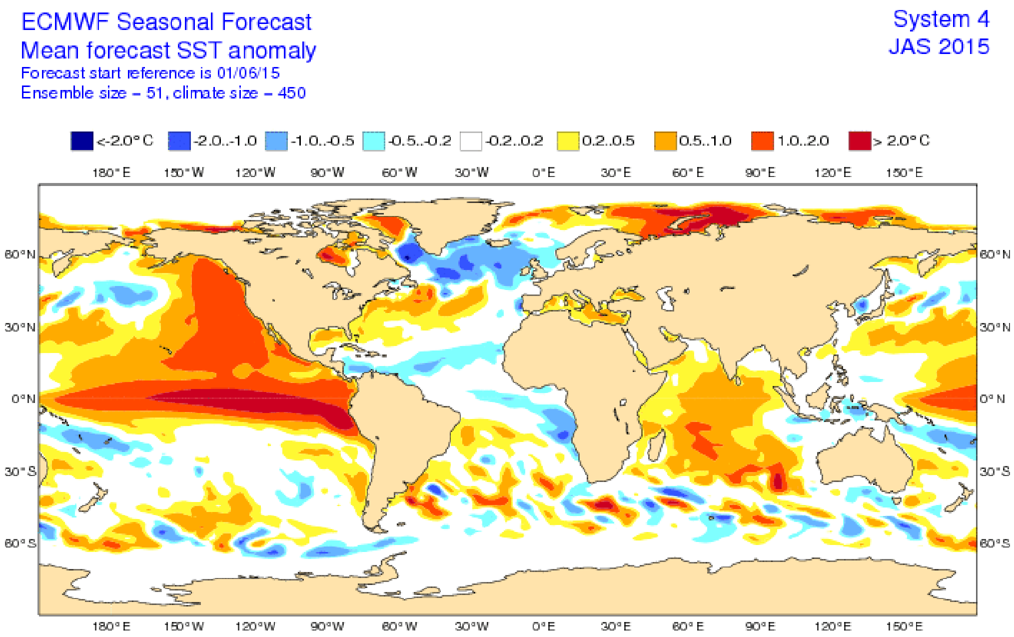


fig.II.1.1: SST anomaly forecast from ECMWF

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

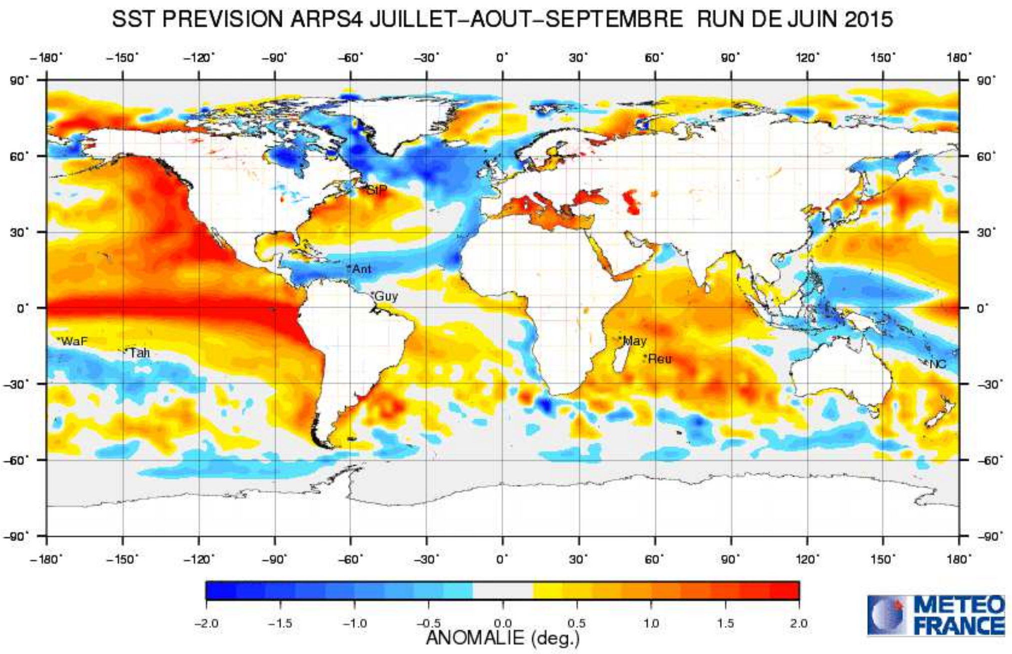


fig.II.1.2: SST Anomaly forecast from Meteo-France (recalibrated with respect of observation).

http://elaboration.seasonal.meteo.fr

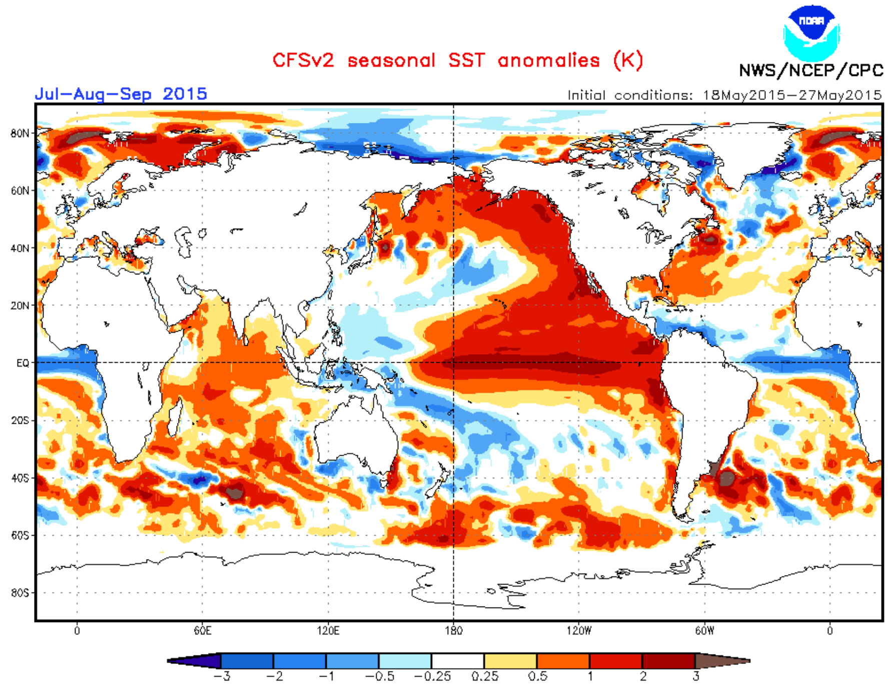


fig.II.1.3: SST anomaly forecast from NCEP.

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

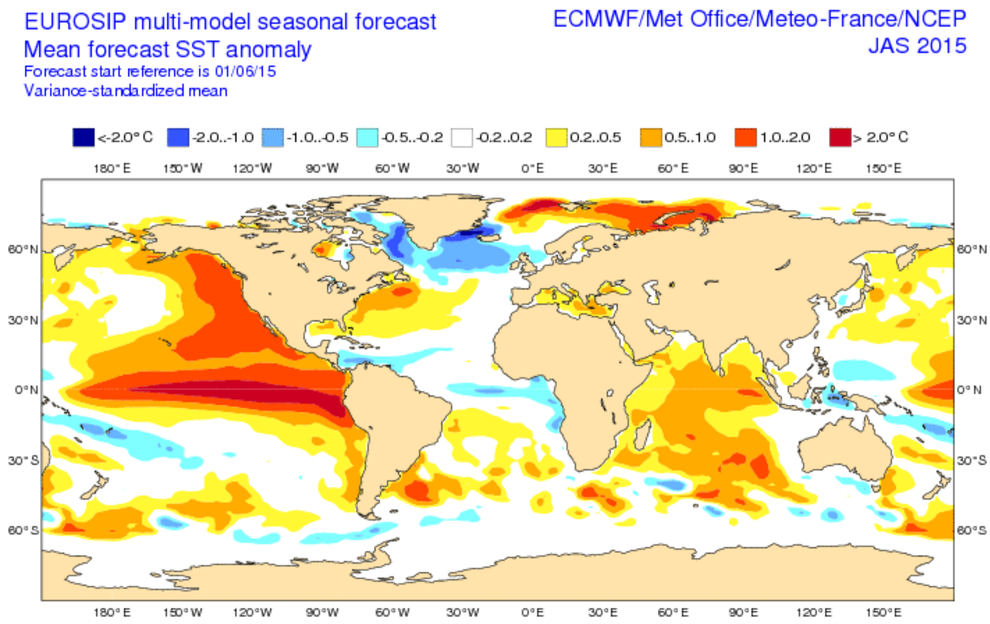


fig.II.1.4: SST Forecasted anomaly from Euro-SIP

II.1.b ENSO forecast

Forecast Phase: El Niño

For the next 3 months, all the models we analyzed keep the El Niño phenomenon and, mostly, accentuate the warming in the most east boxes. Two-thirds of the models predict a high intensity for the phenomenon in the early fall despite becoming greater dispersion.

Beyond this horizon, uncertainty about the intensity of the phenomenon is large, even if the probability that the El Niño phenomenon continues beyond the northern summer is high.

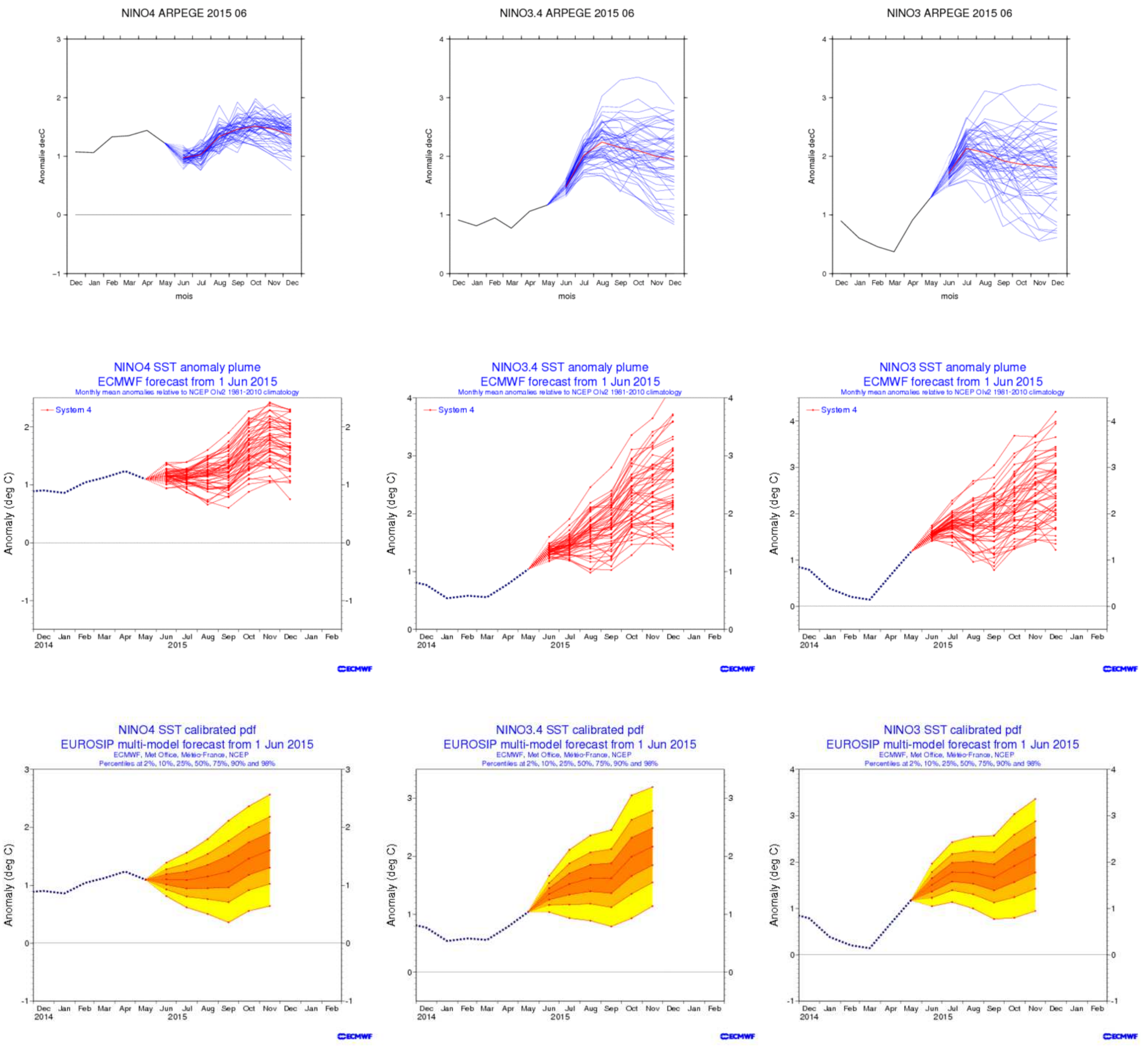


fig.II.1.5: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members - and EuroSIP (bottom) – recalibrated distributions - (http://elaboration.seasonal.meteo.fr , http://www.ecmwf.int/)

II.1.c Atlantic ocean forecasts

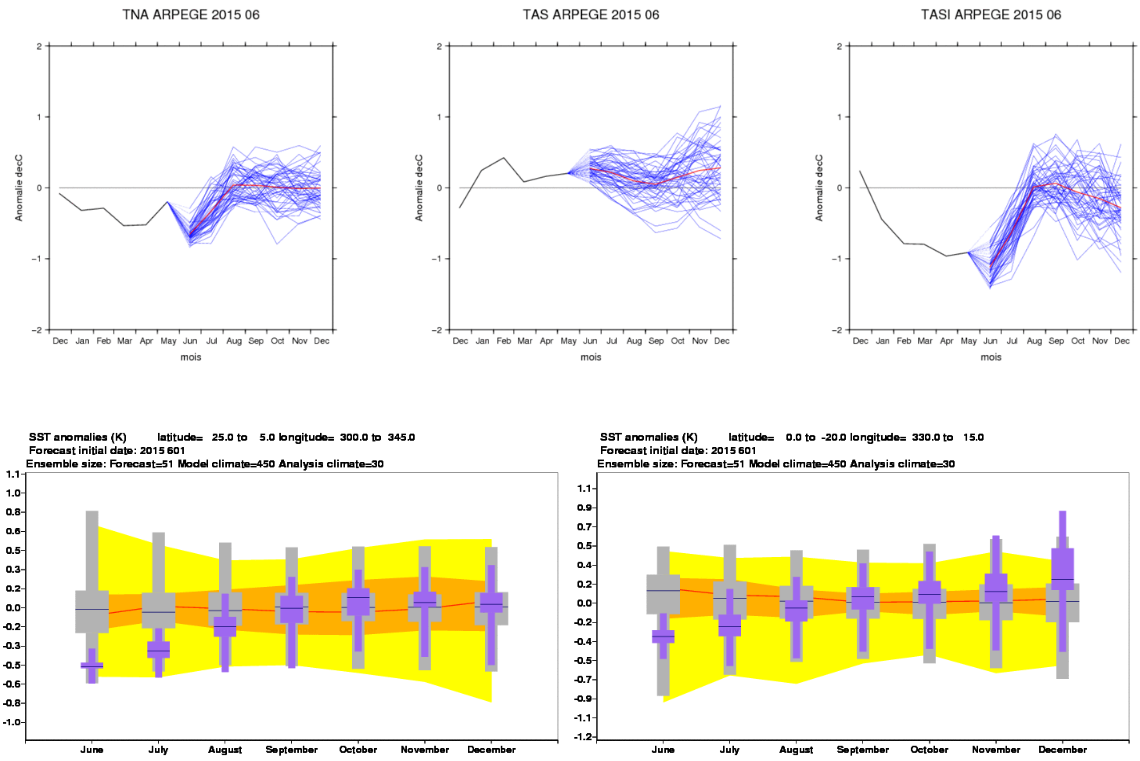


fig.II.1.6: SSTs anomaly forecasts in the Atlantic Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

II.1.d Indian ocean forecasts

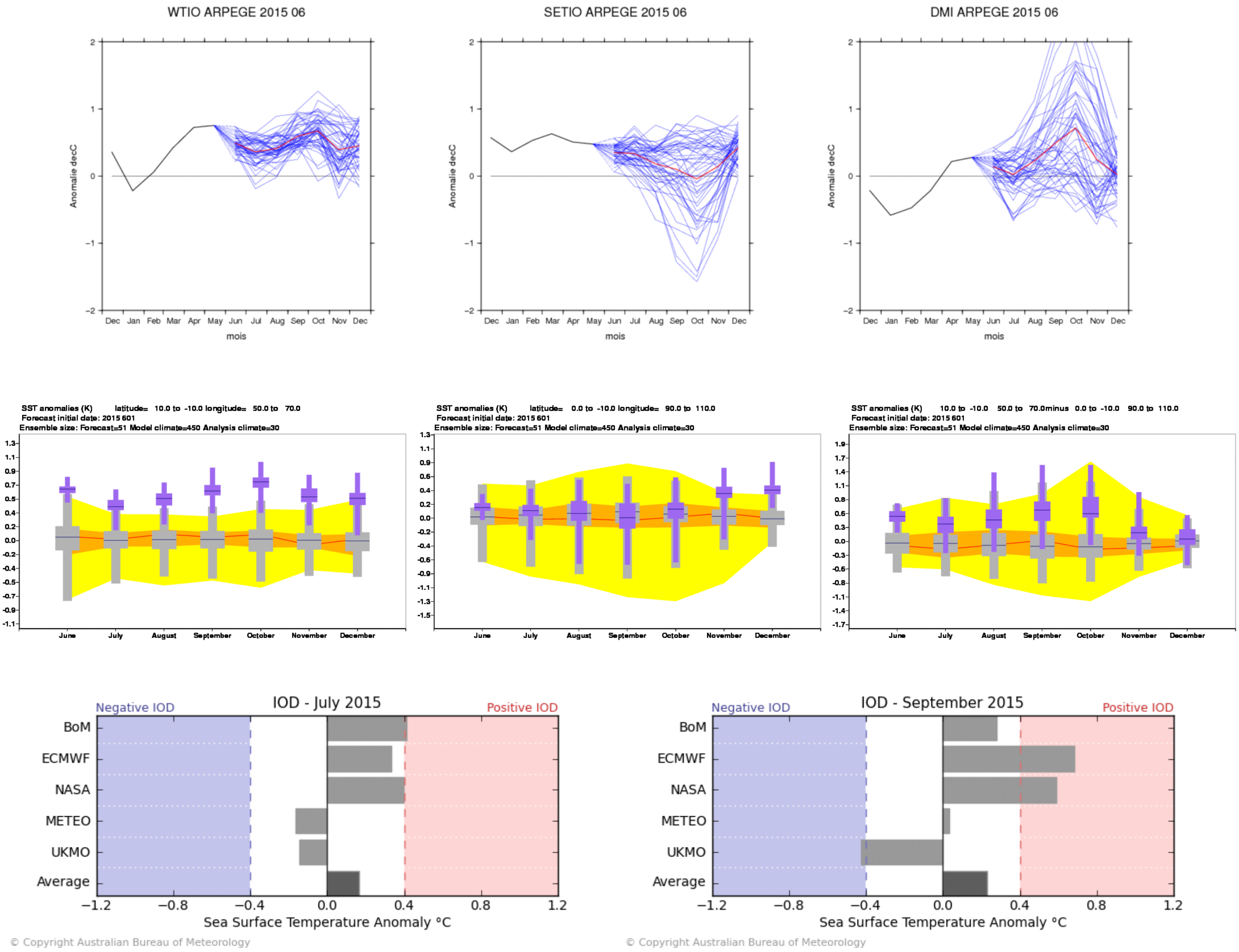


fig.II.1.7: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

II.2. GENERAL CIRCULATION FORECAST

II.2.a Global forecast

Very good consistency between ARPEGE models, ECMWF and JMA. They all provide a strong anomaly of the circulation linked to the oceanic anomalies of the equatorial Pacific.

Velocity potential anomaly field (cf. fig. II.2.1 – insight into Hadley-Walker circulation anomalies): Number Wave structure 1, so with a strong dipole anomalies: a upward anomaly across the Pacific Basin and subsidence anomaly west of Africa to Australia, via the Indian basin. One can notice a slight shift in longitude between ARPEGE and the other 2 models.

Stream Function anomaly field (cf. fig. II.2.1 – insight into teleconnection patterns tropically forced): Very good agreement between ARPEGE and ECMWF, ECMWF better developing a starting structure PNA+ (consistent ENSO+). The downside for the North Atlantic and Europe where models diverge.

But since last month, according to the response stream still seems trapped mainly in the tropical regions.

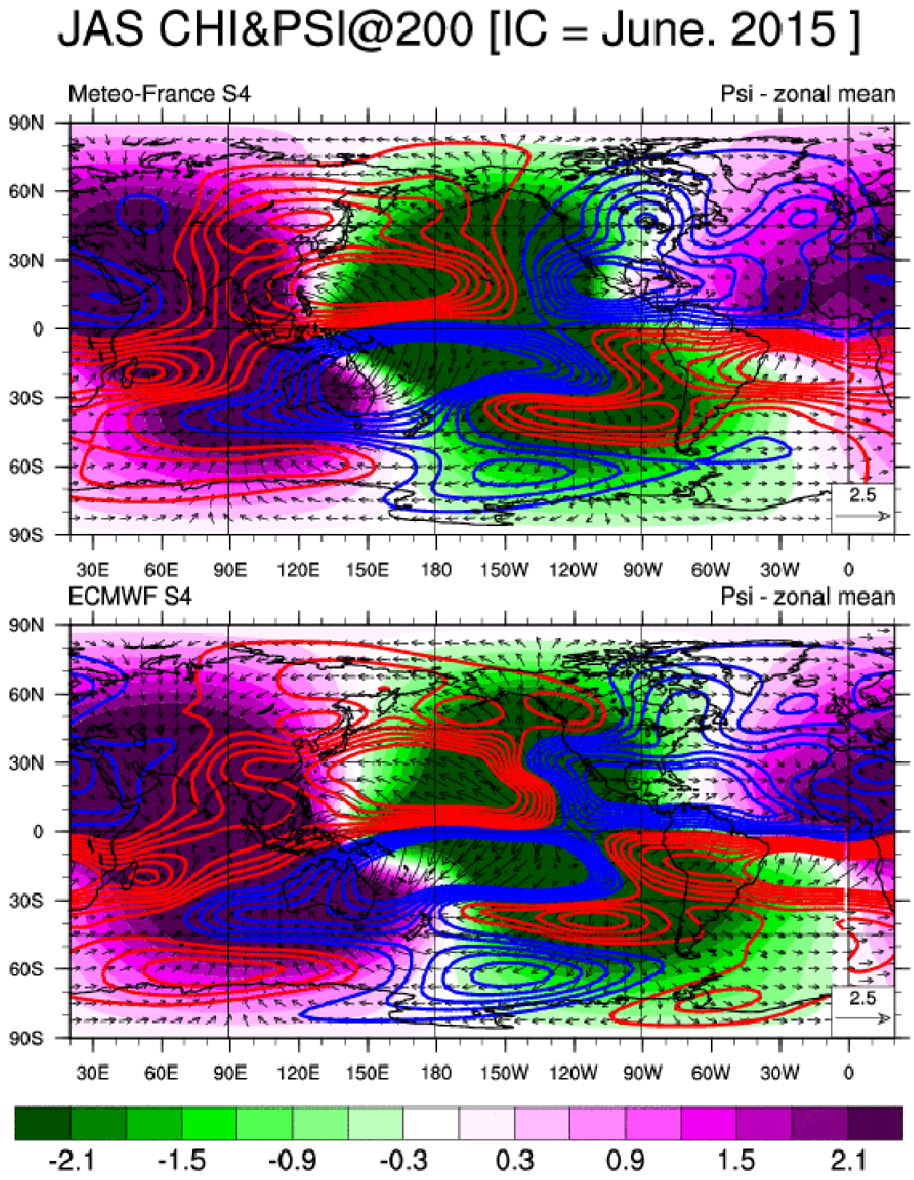


fig.II.2.1: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), associated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa by Météo-France (top) and ECMWF (bottom).

II.2.b North hemisphere forecast and Europe

Geopotential height anomalies (fig. II.2.2 – insight into mid-latitude general circulation anomalies): Anomalies of Z500 are not consistent between ECMWF and ARPEGE because the positions diverge.

The regime occurrences forecast of ARPEGE and ECMWF nevertheless have some consistency: the zonal regimes are disadvantaged (phases of the NAO) to the detriment of meridians regimes, particularly the Scandinavian blocking scheme.

So predictability is low enough for this situation.

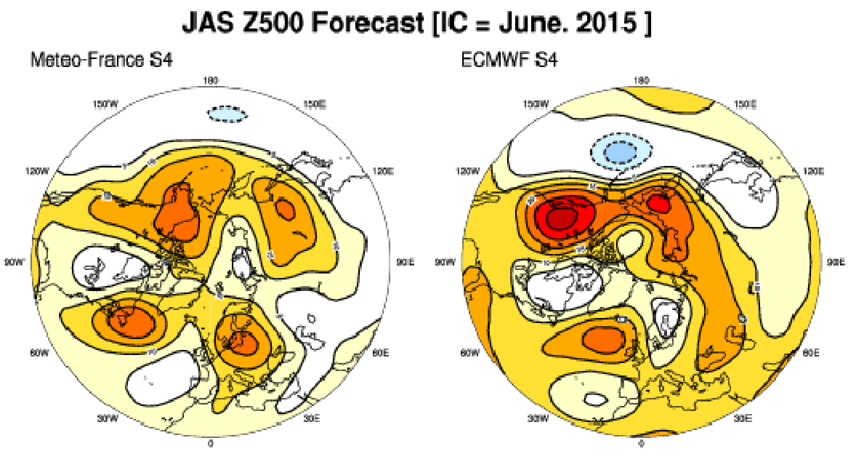


fig.II.2.2: Anomalies of Geopotential Height at 500 hPa from Météo-France (left) and ECMWF (right).

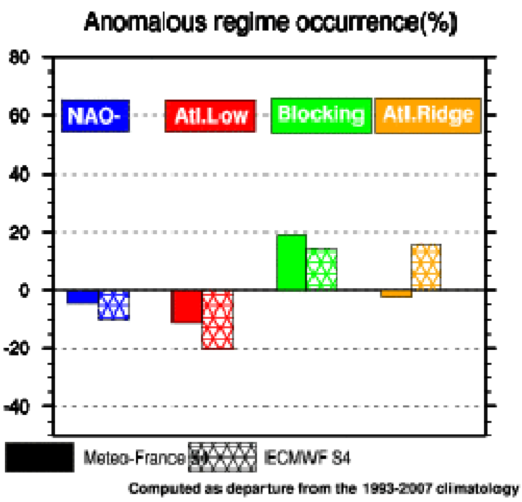


fig.II.2.3: North Atlantic Regime occurrence anomalies from Météo-France and ECMWF : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.

II.3. IMPACT: TEMPERATURE FORECASTS

Context of enhanced probability of warm anomaly over most of the globe, thanks to the PDO+ and ENSO+. The exceptions are Northern Labrador Sea and Irminger Sea (effect of SST), the center of South America, along the Benguela current, and from the Solomon Islands to French Polynesia (obs SST and forecasted) .

Signal "warmer than normal" on Europe, especially from Italy to Ukraine (through Poland). On the Western Europe, the signal is weaker. On the British Isles, it is even more of a "colder" signal. On the eastern Mediterranean, warm signal is stronger.

II.3.a ECMWF

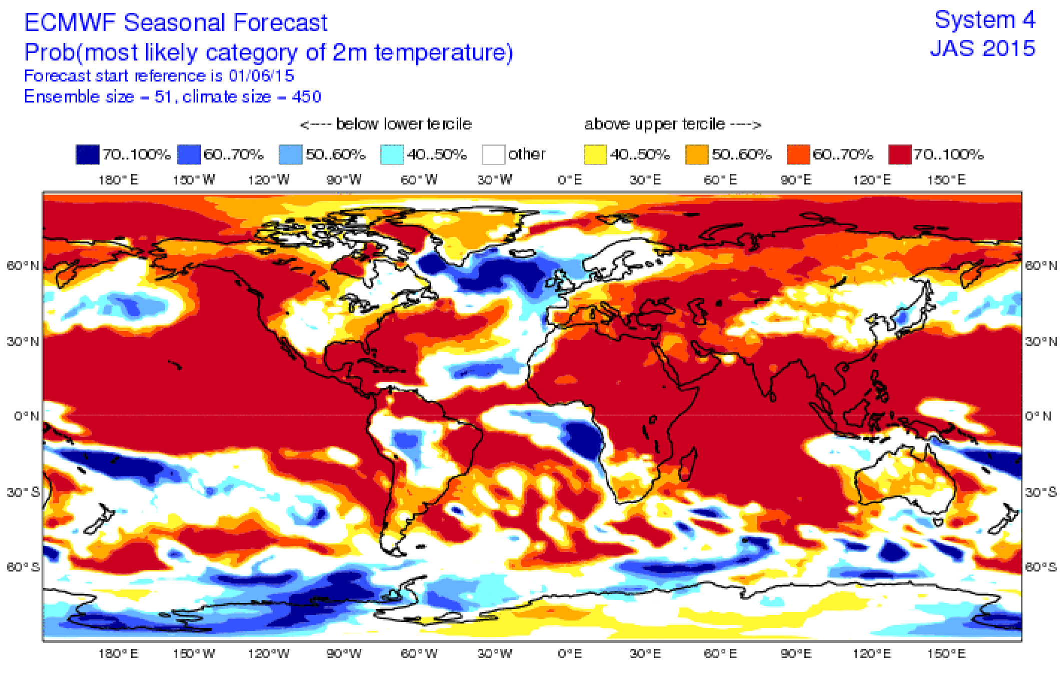


fig.II.3.1: Most likely category probability of T2m from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/

II.3.b Météo-France

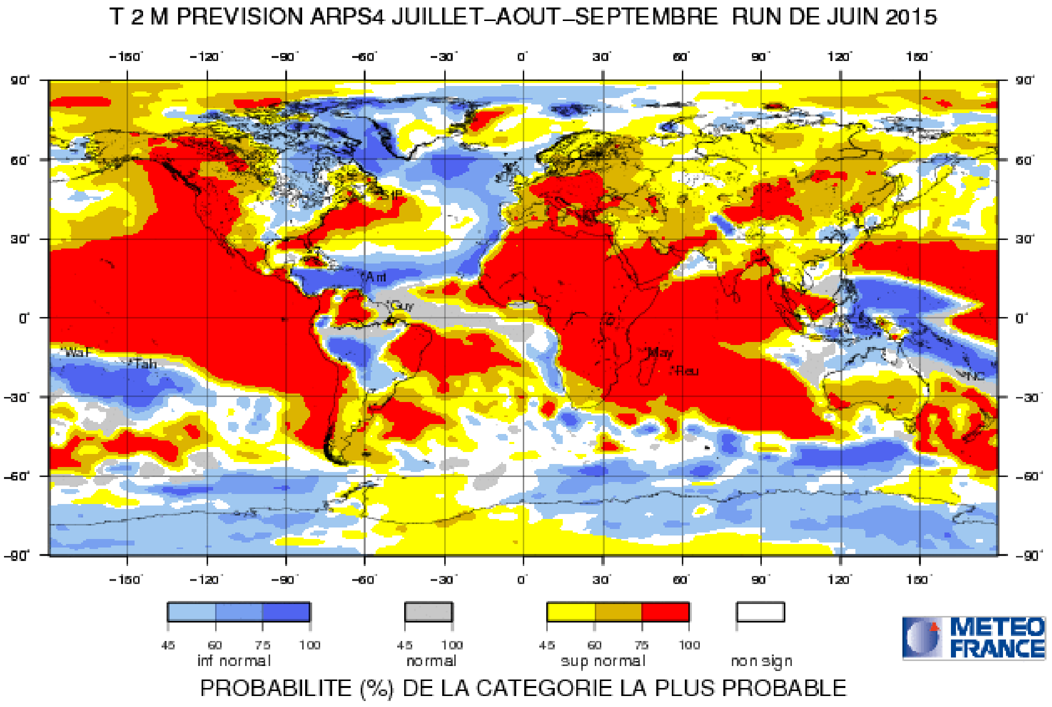


fig.II.3.2: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.3.c Japan Meteorological Agency (JMA)

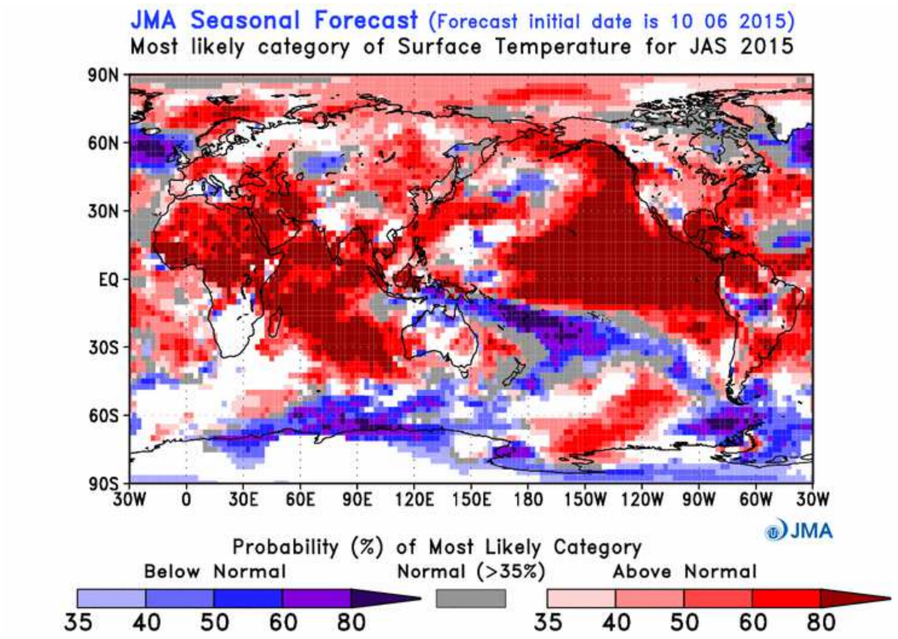


fig.II.3.3: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/3-mon/fcst/fcst_gl.php

II.3.d EUROSIP

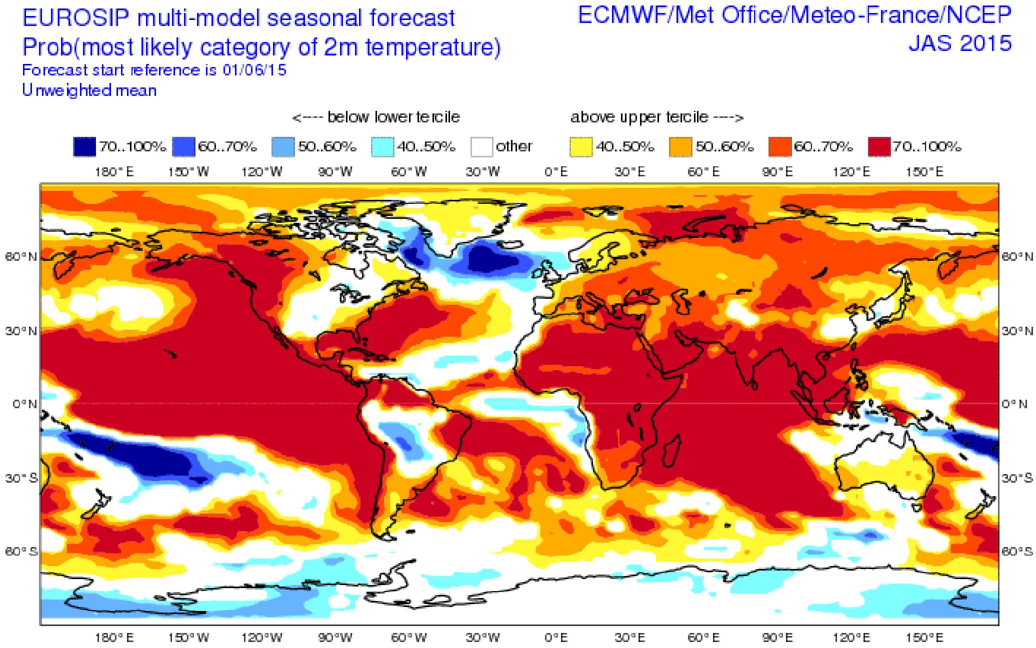


fig.II.3.4: Multi-Model Probabilistic forecasts for T2m from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).

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

II.4. IMPACT : PRECIPITATION FORECAST

In connection with the SST anomalies and Niño underway and forecasted, enhanced probability of a dry anomaly in the Atlantic between the equator and 30 ° N, on the north of South America, over maritime continent up to Cook Islands. Enhanced probability of excess precipitation in the Pacific north from Melanesia to South Americans coast and from Hawaii to the western United States, over a large part of South America.

On Europe, dry signal seems to be emerging on its northern half. Which is consistent with circulations rather meridian. On the Mediterranean, no signal except in Turkey where there is a trace of wetter signal.

II.4.aECMWF

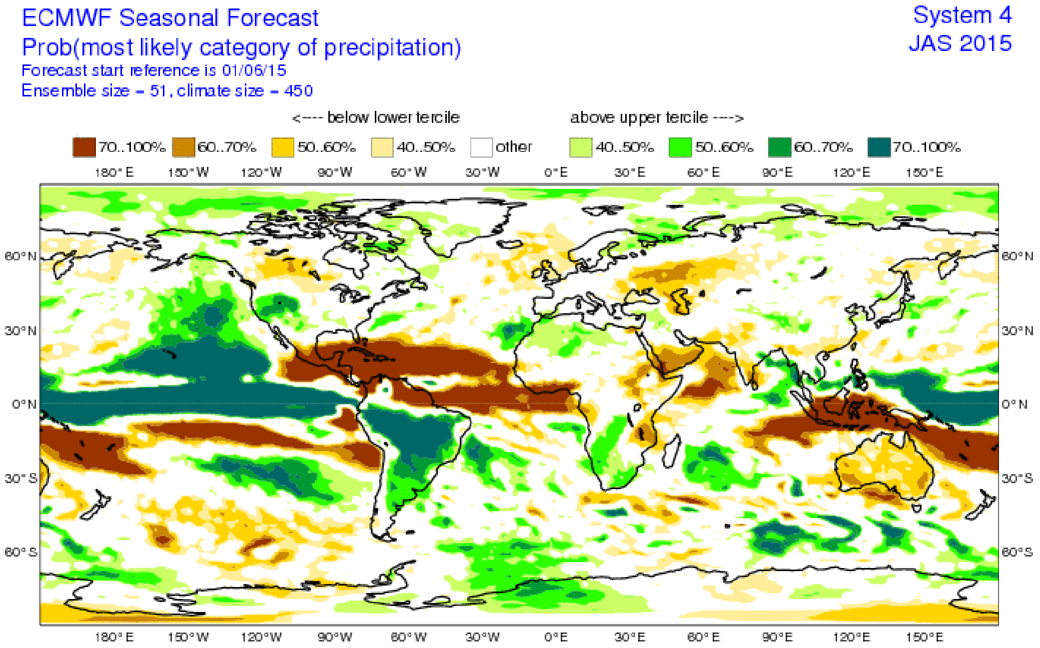


fig.II.4.1: Most likely category probability of rainfall from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/

II.4.b Météo-France

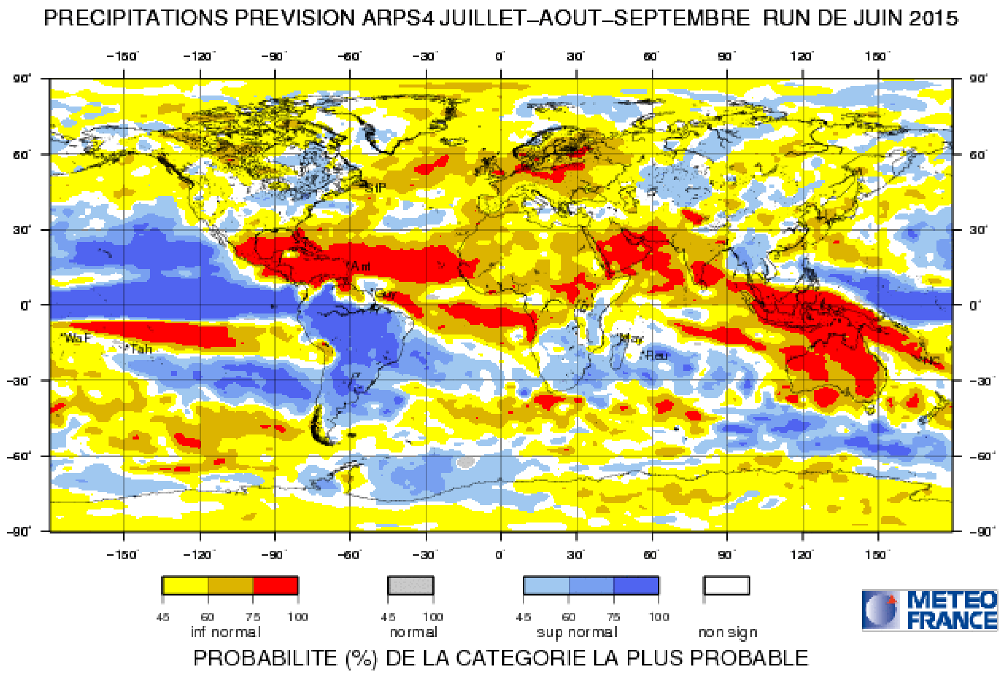


fig.II.4.2: Most likely category of Rainfall. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Japan Meteorological Agency (JMA)

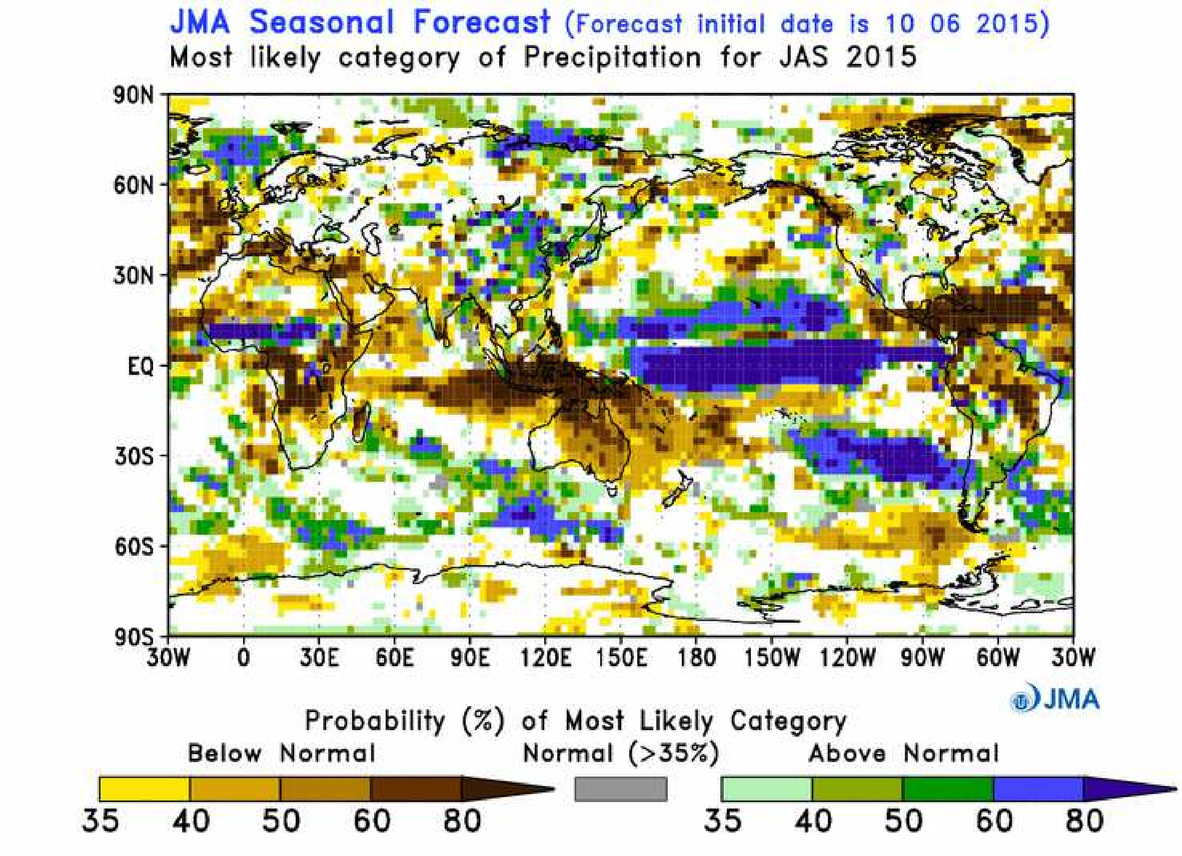


fig.II.4.5: Most likely category of Rainfall from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/3-mon/fcst/fcst_gl.php

II.4.d EUROSIP

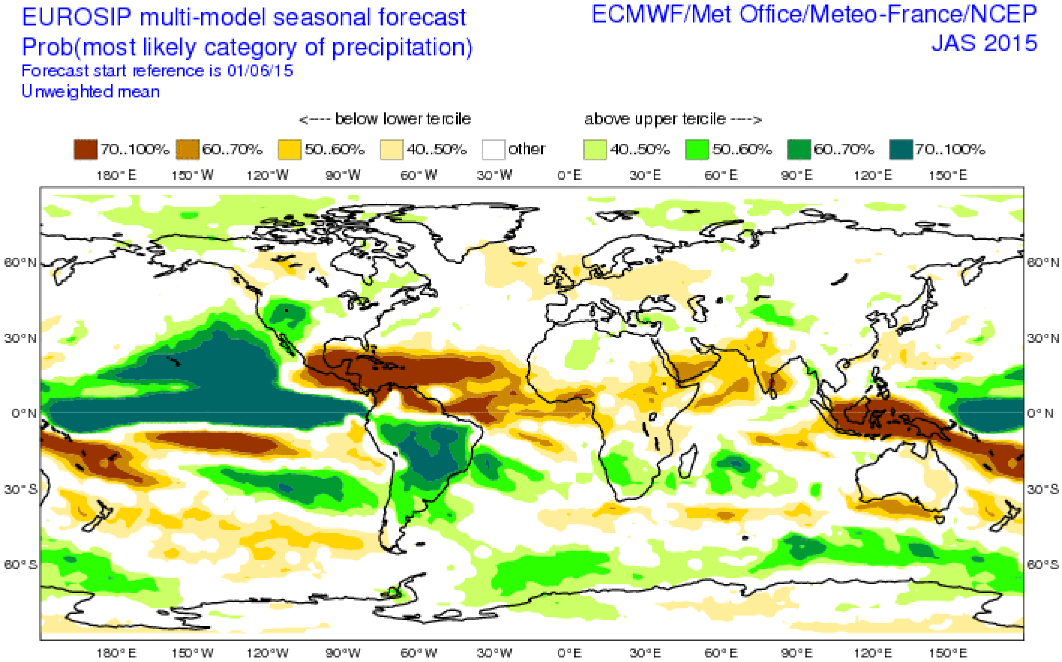


fig.II.4.7: Multi-Model Probabilistic forecasts for precipitation from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal).

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

II.5. REGIONAL TEMPERATURES and PRECIPITATIONS

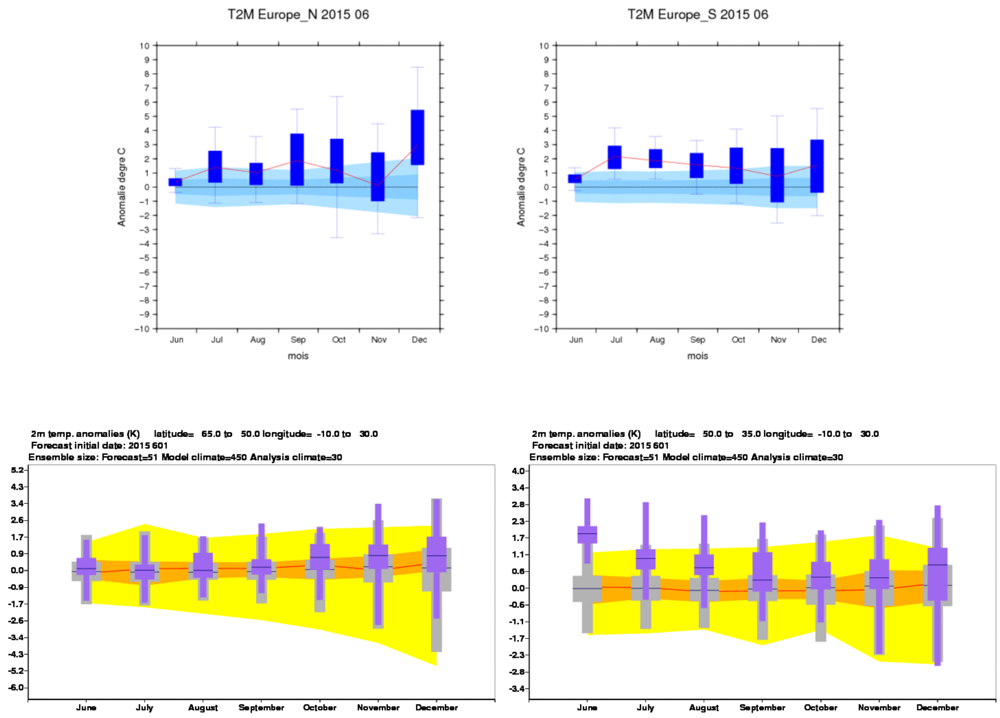


fig.II.5.1 : Climagrams for Temperature in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

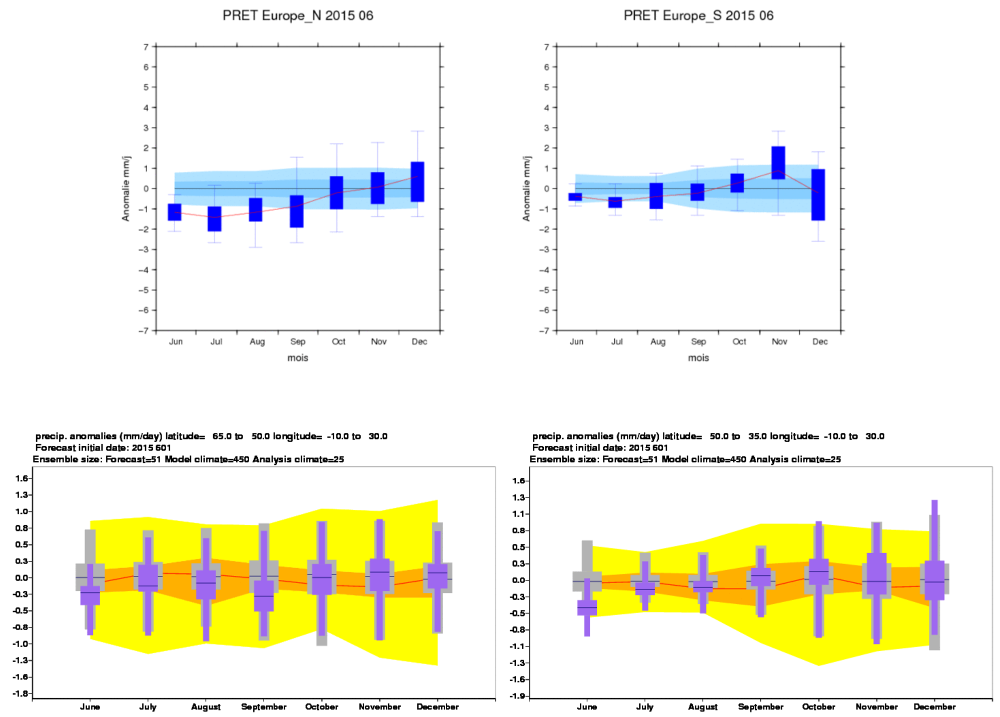


fig.II.5.2 : Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

II.6. MODEL'S CONSISTENCY : NOT AVAILABLE

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

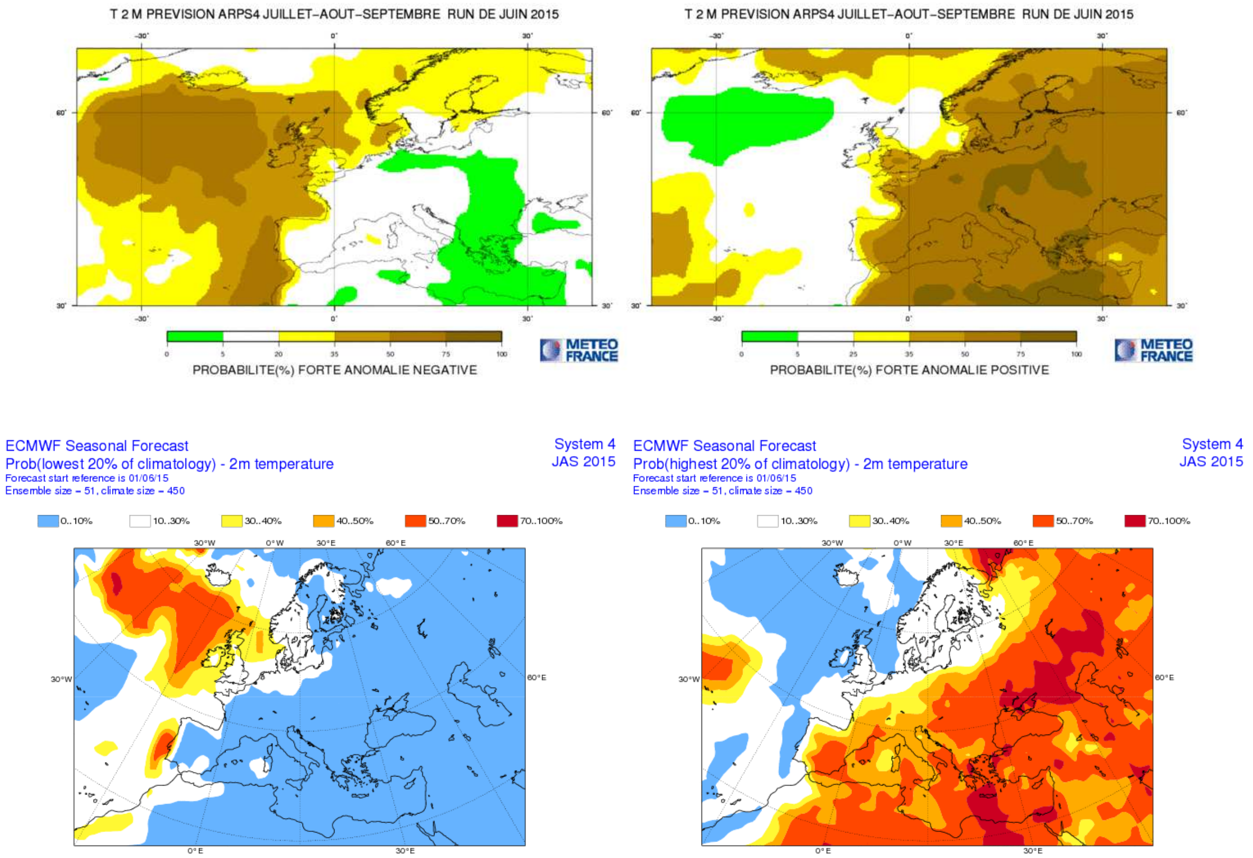


fig.II.7.1 : Top : Meteo-France T2m probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution). Bottom : ECMWF T2m probability of « extreme » below normal conditions (left - lowest ~20% of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

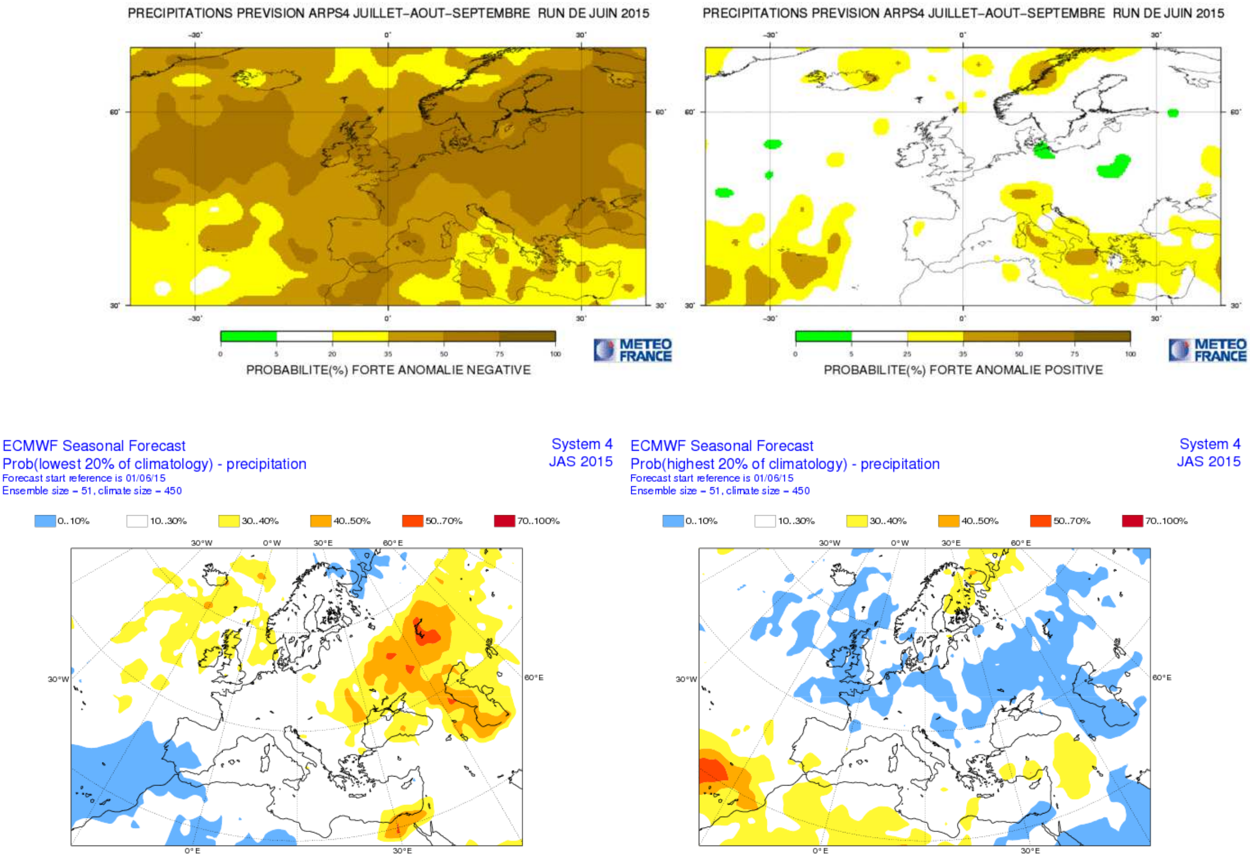


fig.II.7.2 : Top : Meteo-France rainfall probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution).
Bottom : ECMWF rainfall probability of « extreme » below normal conditions (left - lowest ~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: In a global context favorable to warm anomalies, warm signal seems to be more credible in going to the East part of Europe.

Precipitation: Small dry signal over most of northern Europe.

II.8.b Tropical cyclone activity

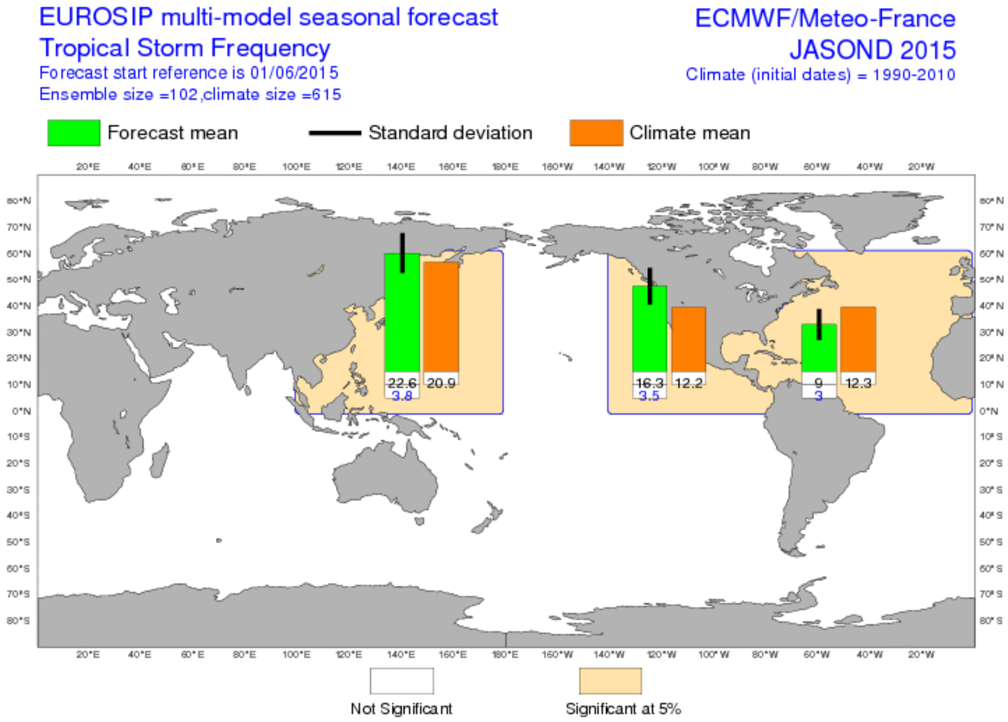


fig.II.8.1: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/

Consistent with the current El Niño phenomena (and forecasted for the coming months), the hurricane season is expected significantly weaker than normal in the Atlantic and significantly stronger over the Pacific.

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WMO RA VI
RCC Network

Synthesis of Temperature forecasts for July-August-Septembre 2015 for European regions

Results are expressed with respect of 3 possible scenarios : « Above normal », « close to normal » and « Below normal ». The limits between each category is given by the corresponding tercile such that each scenario have the same climatological probability of occurrence (33,3%). If the forecast shows no specific signal (because of low predictability and/or divergent scenarios between several models), the cell is filled in grey and "No privileged scenario" is indicated.

MODELS	**Northern Europe**	**Southern Europe**	**Central Europe**	**Eastern Europe**	**SEE Region**
MF	T Above normal (Warm)	T Above normal (Warm)	T Above normal (Warm)	T Above normal (Warm)	T Above normal (Warm)
ECMWF	No privileged scenario	T Above normal (Warm)	T Above normal (Warm)	T Above normal (Warm)	T Above normal (Warm)
JMA	No privileged scenario	T Above normal (Warm)	T Above normal (Warm)	T Above normal (Warm)	T Above normal (Warm)
synthesis	No privileged scenario	T Above normal (Warm)	T Above normal (Warm)	T Above normal (Warm)	T Above normal (Warm)
Eurosip	No privileged scenario	T Above normal (Warm)	T Above normal (Warm)	T Above normal (Warm)	T Above normal (Warm)
privileged scenario by RCC-LRF node	***no privileged scenario***	***above normal***	***above normal***	***above normal***	***above normal***

T Below normal (Cold) — T close to normal — T Above normal (Warm) — No privileged scenario

WMO RA VI
RCC Network

Synthesis of Rainfall forecasts for July-August-Septembre 2015 for European regions

Results are expressed with respect of 3 possible scenarios : « Above normal », « close to normal » and « Below normal ». The limits between each category is given by the corresponding tercile such that each scenario have the same climatological probability of occurrence (33,3%). If the forecast shows no specific signal (because of low predictability and/or divergent scenarios between several models), the cell is filled in grey and "No privileged scenario" is indicated.

MODELS	Northern Europe	Southern Europe	Central Europe	Eastern Europe	SEE Region
MF	Below normal (Dry)	Below normal (Dry)	Below normal (Dry)	Below normal (Dry)	Below normal (Dry)
ECMWF	Below normal (Dry)	No privileged scenario	No privileged scenario	No privileged scenario	No privileged scenario
JMA	Below normal (Dry)	Below normal (Dry)	Above normal (Wet)	No privileged scenario	Below normal (Dry)
synthesis	Below normal (Dry)	Below normal (Dry)	No privileged scenario	No privileged scenario	No privileged scenario
Eurosip	Below normal (Dry)	No privileged scenario	Below normal (Dry)	Below normal (Dry)	Above normal (Wet)
privileged scenario by RCC-LRF node	***Below normal***	***no privileged scenario***	***Below normal***	***Below normal***	***no privileged scenario***

- RR Below normal (Dry)
- RR close to normal
- RR Above normal (Wet)
- No privileged scenario

III. ANNEX

III.1. SEASONAL FORECASTS

Presently several centres provide seasonal forecasts, especially those designated as Global Producing Centres by WMO (see http://www.wmo.int/pages/prog/wcp/wcasp/clips/producers_forecasts.html).
■ BoM, CMA, CPTEC, ECMWF, JMA, KMA, Météo-France, NCEP and UK Met Office have ocean/atmosphere coupled models. The other centres have atmospheric models which are forced by a SST evolution which is prescribed for the entire period of forecast.
■ LC-MME and Euro-SIP provide multi-model forecasts. Euro-Sip is presently composed using 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.

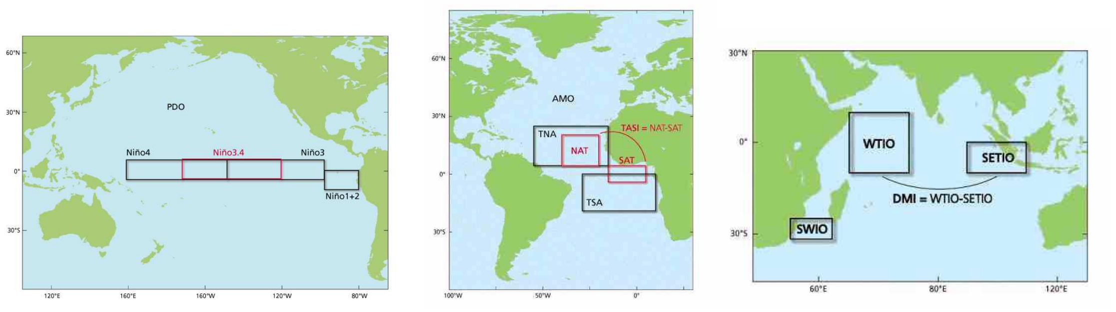
III.2. « NINO », SOI INDICES AND OCEANIC BOXES

El Niño and La Niña events primarily affect tropical regions and are monitored by following the SST evolution in specific area of the equatorial Pacific.

- Niño 1+2 : 0°/10°S 80W-90W ; it is the region where the SST warming is developing first at the surface (especially for coastal events).
- Niño 3 : 5°S/5°N 90W-150W ; it is the region where the interanual variability of SST is the greatest.
- Niño 4 : 5°S/5°N 160E- 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).

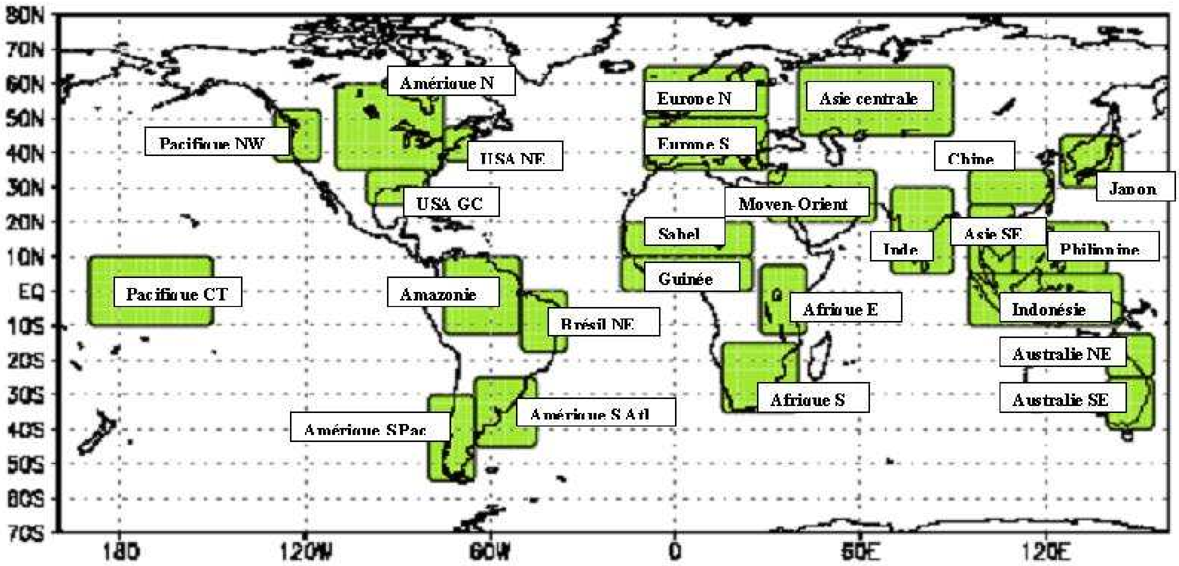
Associated to the oceanic « El Niño / La Niña » events, and taking into account the strong ocean/atmopshere coupling, the atmosphere shows also interanual variability associated to these events. It is monitored using the SOI (Southern Oscillation Index). This indice is calculated using standardized sea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



III.3.LAND BOXES

Some forecasts correspond to box averaged values for some specific area over continental regions. These boxes are described in the following map and are common to ECMWF and Météo-France.



III.4. ACKNOWLEDGEMENT

This bulletin is edited by the RCC-LRF Node of the RCC Network in Toulouse for the RA VI. It is a joint effort of the RCC-Climate Monitoring Node (led by DWD) and the RCC-LRF Node (Co-Led by Météo-France).