# GLOBAL CLIMATE BULLETIN
# n°182 - AUGUST 2014

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# I. DESCRIPTION OF THE CLIMATE SYSTEM (JUNE 2014)

## I.1.OCEANIC ANALYSIS

### I.1.a Global Analysis

At the Surface (fig. 1) :

Some evolutions in the equatorial waveguide ; especially a slight warming in the Eastern Pacific and cooling close to the dateline, cooling on the Western part of the Indian Ocean and over the Atlantic. The Tropical North Atlantic remains mostly colder than normal while the Indian Ocean is warmer than normal more or less everywhere. The largest evolutions are over the Northern Hemisphere : warming over the Pacific from West Tropics to East Sub-Tropics followed on East by a cooling from Mid-Latitudes up to Hawaii, mostly warming over the mid-latitudes of North Atlantic.

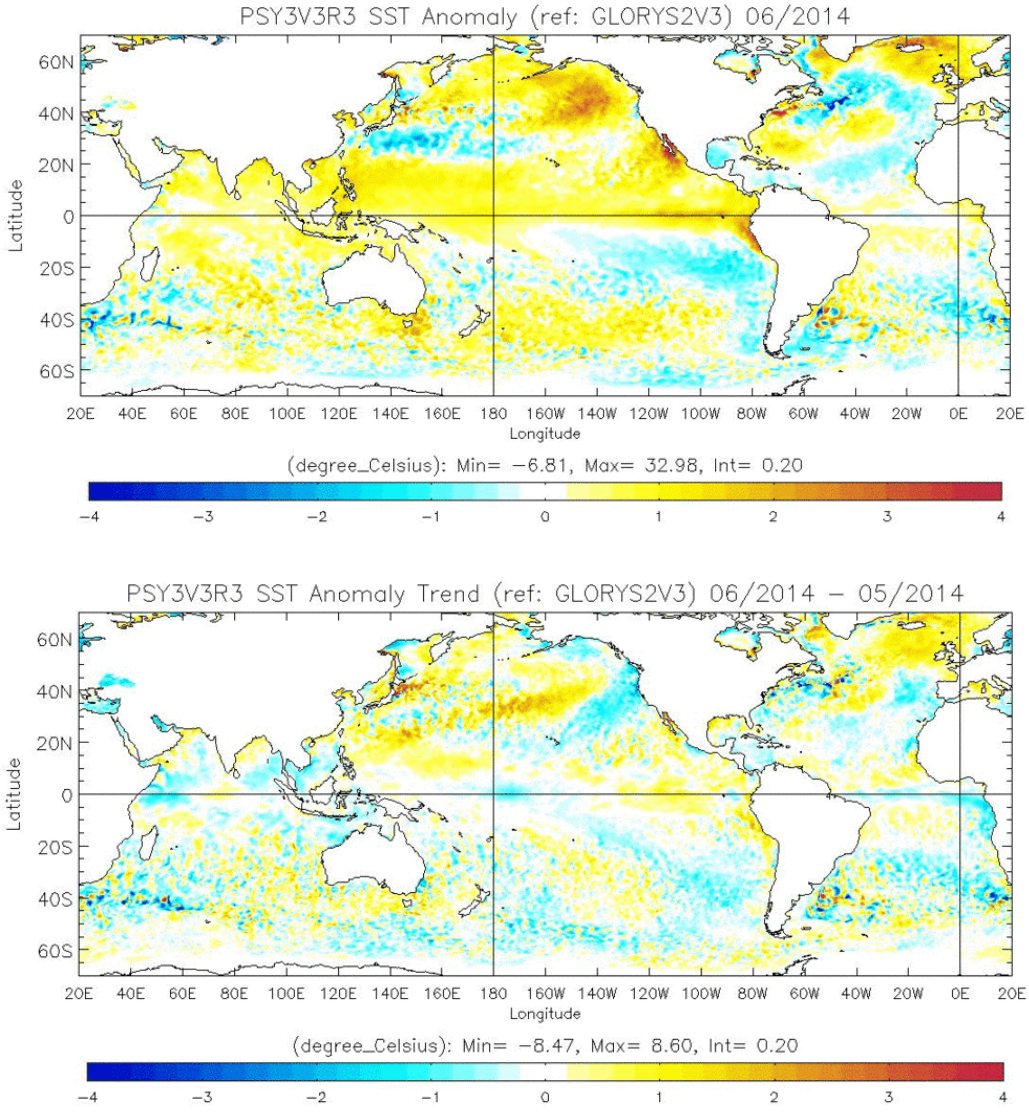



**fig.1: top : SSTs Anomalies (°C) (reference Glorys 1993-2009); bottom : SST tendency (current – previous month) http://bcg.mercator-ocean.fr/**

In subsurface (fig.2) :

**In the Pacific** : in the equatorial band (10°N-10°S), strong positive heat content anomalies in the Eastern Pacific along the Equator. In the Central and Western Pacific, the equatorial Pacific is close to neutral. Little traces of negative anomalies in the Western part off equator (in the Northern hemisphere close to 10°N). The Western North Pacific heat content is mostly colder than normal while it is warmer in the Eastern side.

**In the Atlantic** : in the equatorial waveguide a dipole pattern between the western (colder) and eastern (warmer) sides. Some negative anomalies over the North Tropical Atlantic and positive anomalies over the South Tropical Atlantic to the exception of coastal regions of Africa.

**In the Indian Ocean** : development of negative anomalies in the equatorial most Western part (extending South-East off equator) and strong positive anomalies over the Eastern part. In the Tropical Southern part of the basin mostly warmer than normal conditions consistently with SSTs.

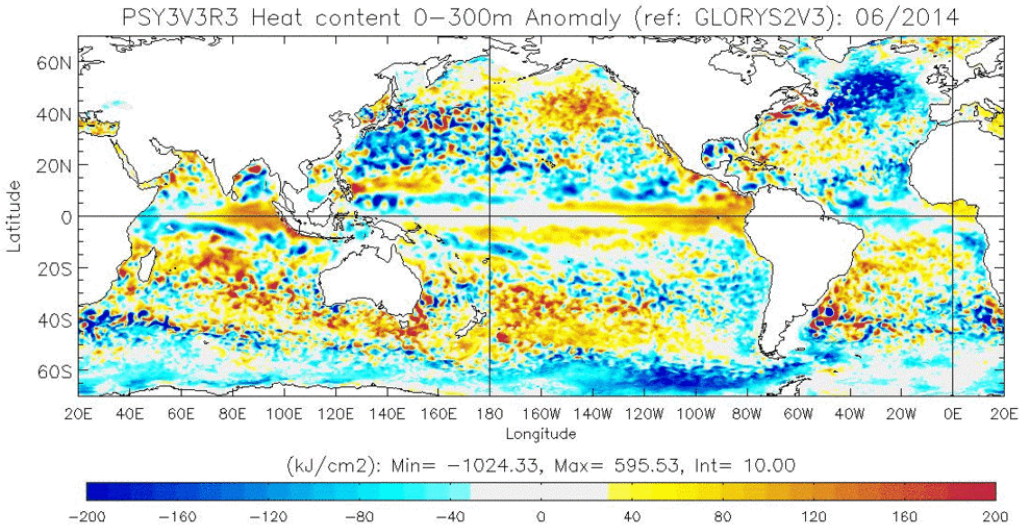



**fig.2: map of Heat Content Anomalies (first 300m) (in kJ/cm²). (reference Glorys 1992-2009)**
**http://bcg.mercator-ocean.fr/**

## I.1.b Pacific Basin (fig. 3, 4 and 5)

Most of the Equatorial region shows a positive anomaly ; the largest values are in the most Eastern part of the basin (above 1,5°C). The slightly positive SOI (0.2) is not consistent with the development of an El Niño but is consistent regarding the location of close to neutral SST anomaly close to Tahiti (note the negative anomaly in the South-East Tropics) and positive SST anomaly in the vicinity of Northern Australia.

In the Niño boxes (4, 3.4, 3 et 1+2 ; see definition in Annex) the monthly averages are respectively 0.6°C, 0.5°C, 0.9°C to 1.8°C from West to East.

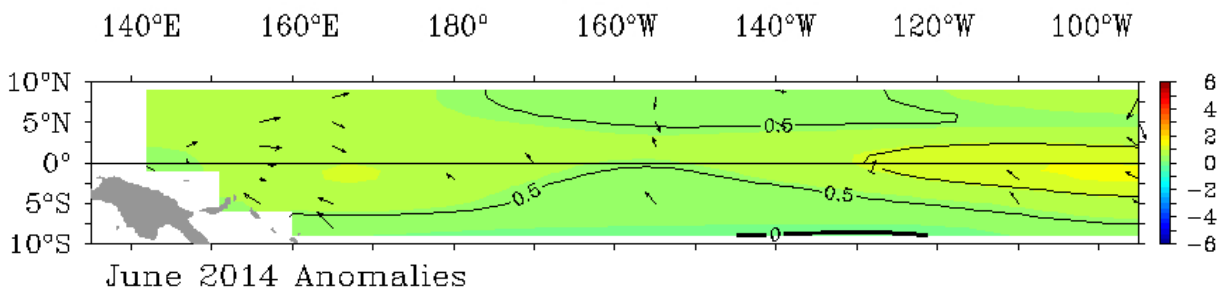



**fig.3: SST and Wind anomalies over the Equatorial Pacific from TAO/TRITON.**
**http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/monthly-summary.html**

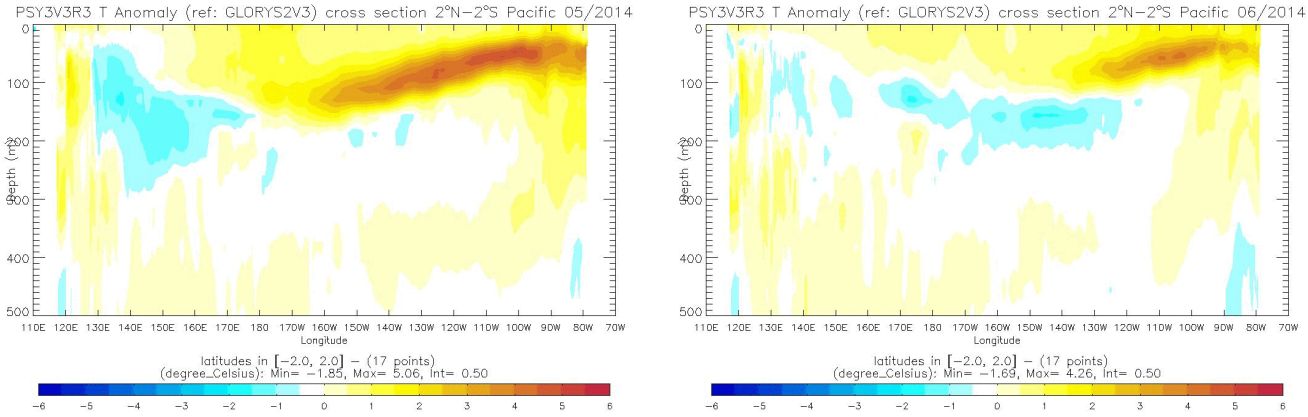



**fig.4: Oceanic temperature anomaly in the first *500 meters* in the Equatorial Pacific, in previous month (left) and current month (right) http://bcg.mercator-ocean.fr/**

*In the equatorial waveguide (fig. 4)* : A very clear propagation of a Kelvin wave (negative anomaly) under the surface (close to immersion 150m) ; the positive anomaly on the Eastern side is damped by the quoted Kelvin wave. On the Western side, the signal is now close to normal ; to be carefully monitored in the next coming months.

*The thermocline structure (fig. 5)* : Consistently with the previous comment, traces of the deepening (and propagation) of the thermocline in the Eastern part and of the Kelvin wave propagation already quoted (negative anomaly) West to the dateline.

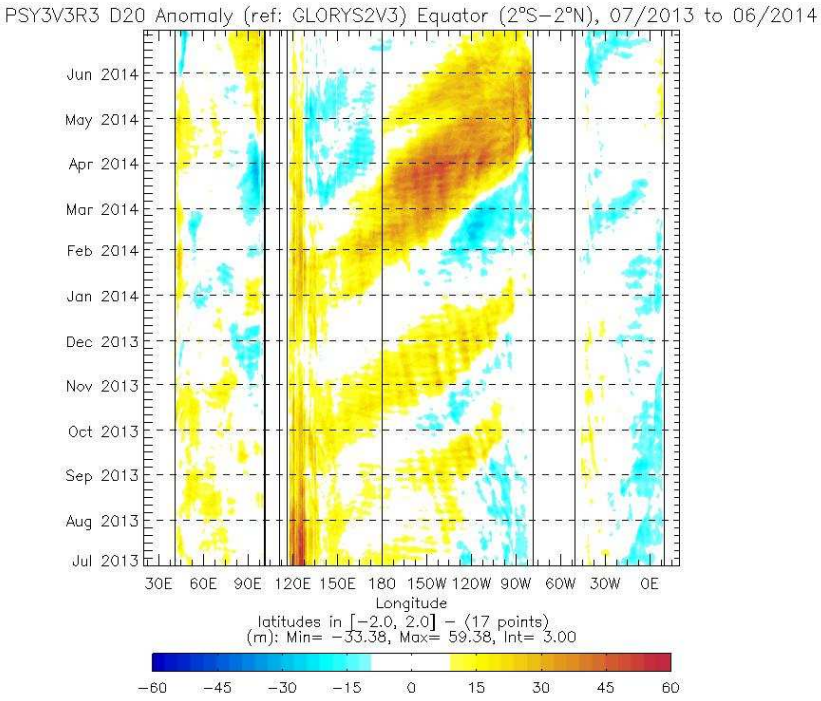



**fig.5: Hovmöller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 24 month period. http://bcg.mercator-ocean.fr/**

### I.1.c Atlantic Basin

**Northern Tropical Atlantic** : cooler than normal from Mauritania to the Caribbean and slightly warmer than normal closer to the equator. The tendency correspond to the SST anomalies (mostly cooling over cold SSTs and warming over warm SSTs).

**Equatorial waveguide** : Close to neutral but with a clear tendency to cooling ; the cold tongue could become more visible in the next. The SAT index is negative (consistent with a weakened West African

Monsoon).
**The Southern Tropical Atlantic** : Slightly Warmer than normal to the exception of the regions close to the African continent (close to Namibia/Angola ; negative anomaly). The TSA index is rapidly decreasing over the last period. The TASI index is negative (see West African Monsoon comment).
**Sea Surface Temperature near Europe** (fig.5a):
Much warmer than normal in the Arctic Sea and the North Sea with anomalies up to more than +1°C, including the areas near the coasts of Greenland, causing some enhanced melting of sea ice . Above-normal conditions in the subtropics (extending up to Florida) with likely related negative anomalies North to it. Anomalies in the Mediterranean became generally weaker compared to May, the western part is warmed than the eastern part.

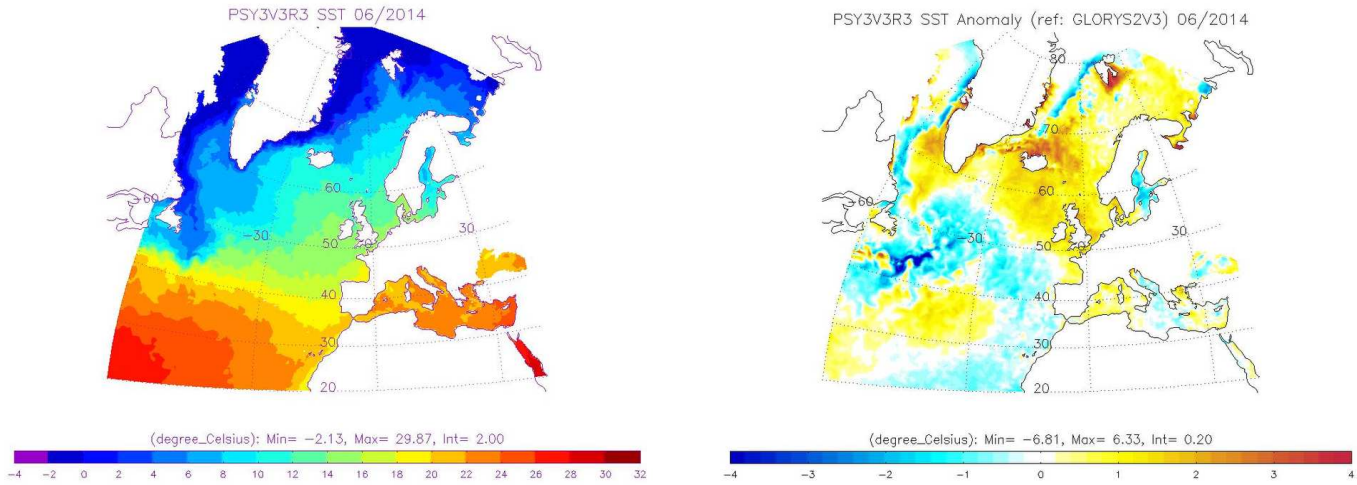



**fig.5a: left : Monthly mean SST near Europe and the Mediterranean. http://www.dwd.de/rcc-cm ; right : Corresponding monthly mean SST anomalies (1981-2010 reference). http://data.giss.nasa.gov/gistemp/maps/**

### I.1.d Indian Basin

**Southern Tropical Indian Ocean** : warmer than normal conditions over most of the basin with a cooling close to North-West Australia.
**Equatorial waveguide** : WTIO box warmer than normal but rapidly decreasing while SETIO box is warmer than normal (and quite stable). To be quoted a cooling tendency on the western side. The DMI is on the negative side.
**Northern Tropical Indian Ocean** : mostly positive anomaly and cooling tendency.

## I.2. ATMOSPHERE

### I.2.a Atmosphere : General Circulation

Velocity Potential Anomaly field in the high troposphere (fig. 6 – insight into Hadley-Walker circulation anomalies) : The MJO Index was significant only during the second decade of the month and the phase was close to the maritime continent. Negative anomalies mostly located over the Pacific while positive anomalies extend from South America up to the Maritime Continent.

**On the Pacific** : Strong Divergent circulation anomaly (upward anomaly motion) close to the dateline which extends Eastward in the Northern Hemisphere. Quite a lot of fragmented cells in the Tropics/Sub-Tropics likely dynamically forced.
**On the Atlantic** : large Convergent circulation anomaly (downward anomaly motion) close to the

Northern part of South America extending toward West Africa. This cell is located consistently with the colder than normal SSTs. Smaller/weaker cell over South Atlantic. A weak Divergent circulation anomaly over the South Brazil/Argentina. Tropical Atlantic.

**On the Indian Ocean** : quite Strong convergent circulation anomalies (downward anomaly motion) over most of the Equatorial Western part of the basin (over East Africa) and over the Southern part of the Indian sub-continent (consistent with a weakened Indian summer monsoon).

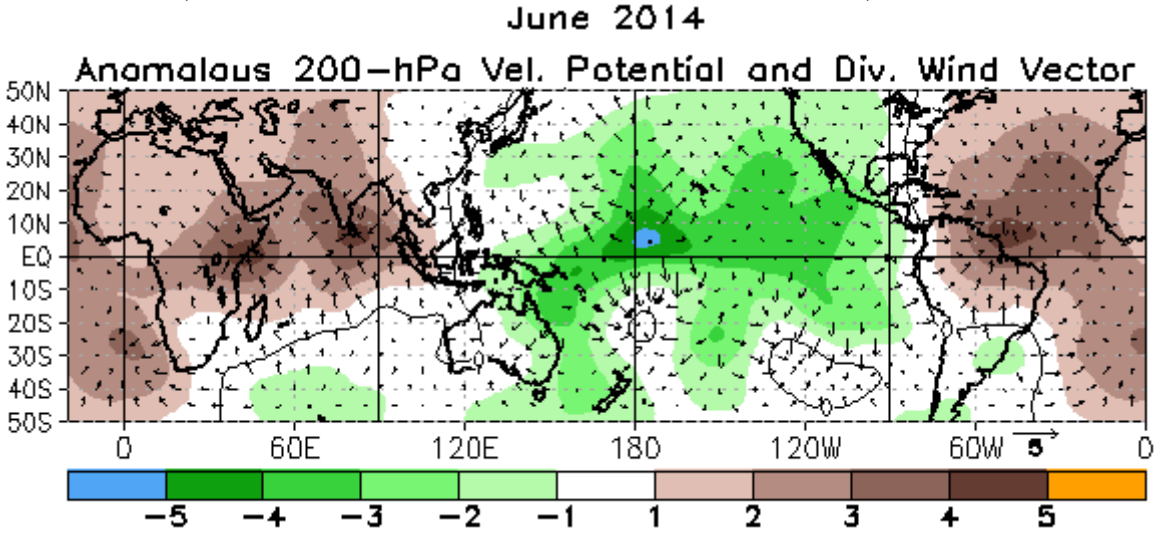



**fig.6: Velocity Potential Anomalies at 200 hPa and associated divergent circulation. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).**
**http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml**

Stream Function anomalies in the high troposphere (fig. 7 – insight into teleconnection patterns tropically forced) : No clear signal in the inter-tropical band which could be directly associated to some tropical SST forcing. The cells are difficult to interpret as "canonical" teleconnection patterns and seem to be related to the local/regional signal. Quasi No signal in the Northern hemisphere which could be related to some tropical forcing.

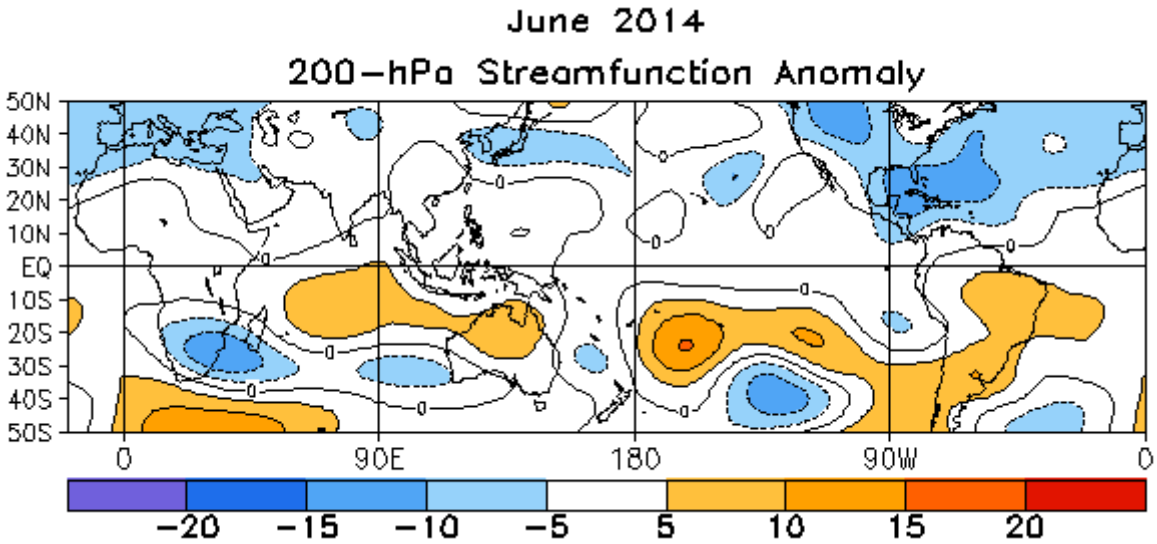



**fig.7: Stream Function Anomalies at 200 hPa.**
**http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml**

Geopotential height at 500 hPa (fig. 8 – insight into mid-latitude general circulation) : Consistently with the previous analysis, little anomalies coming from the Tropics. A strongest positive anomaliesy seem to be more related to mid/high latitude activity.

Nevertheless some modes appear to be active, but likely die to projection effects rather than real mode activity. Mostly one can quote the PNA (-1.7), the East Atlantic (-1.0). To some extent one can quote also the NAO mode (-0.7).

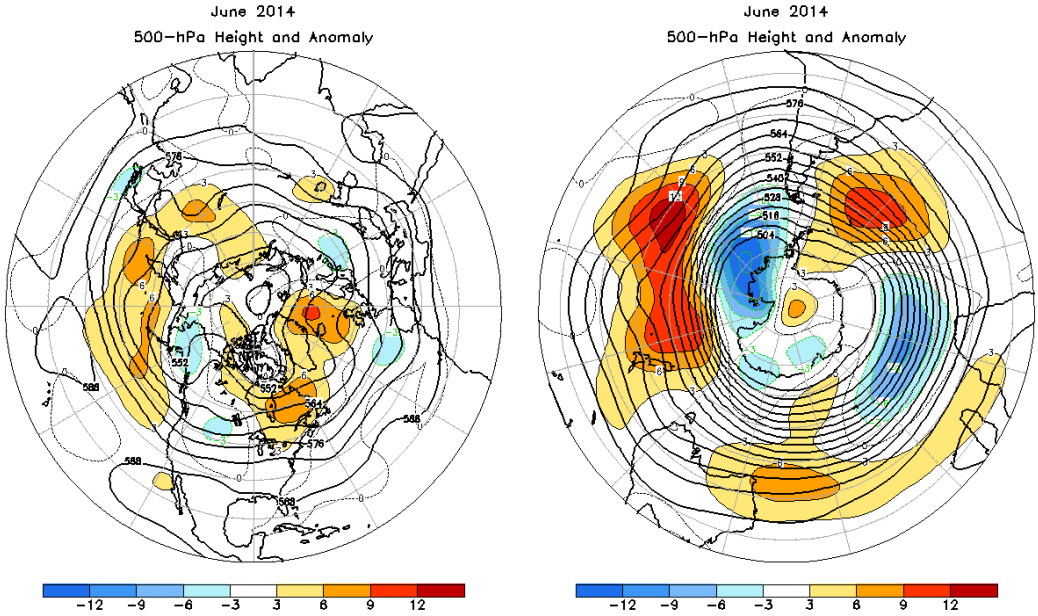



**fig.8: Anomalies of Geopotential height at 500hPa (left North Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige9.shtml, and right South Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige15.shtml)**

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

| MONTH | NAO | EA | WP | EP-NP | PNA | TNH | EATL/WRUS | SCAND | POLEUR |
|---|---|---|---|---|---|---|---|---|---|
| **JUN 14** | **-0.7** | **-1.0** | **-0.3** | **-0.7** | **-1.4** | **---** | **0.0** | **0.2** | **0.0** |
| MAY 14 | -0.8 | 0.4 | -0.9 | 0.8 | -0.6 | --- | -1.4 | -0.5 | 1.0 |
| APR 14 | 0.2 | 0.5 | -1.4 | 0.1 | 0.0 | --- | 1.2 | -0.7 | 1.0 |
| MAR 14 | 0.4 | 0.9 | -0.4 | 1.2 | 0.5 | --- | -0.1 | -0.5 | 0.0 |
| FEB 14 | 1.1 | 2.2 | -1.4 | 0.3 | -1.6 | 0.3 | -1.9 | 1.1 | -1.9 |
| JAN 14 | -0.2 | 1.4 | 0.5 | 1.1 | 0.6 | 1.6 | -1.3 | 1.7 | -0.8 |

http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/table3.shtml

Sea level pressure and circulation over Europe and the Mediterranean regions (fig. 8a)

North Atlantic high pressure shifted far to the north. This is typical for a negative EA and NAO pattern. The Icelandic Low normally is very weak in June, but this year it disappeared completely on monthly average.

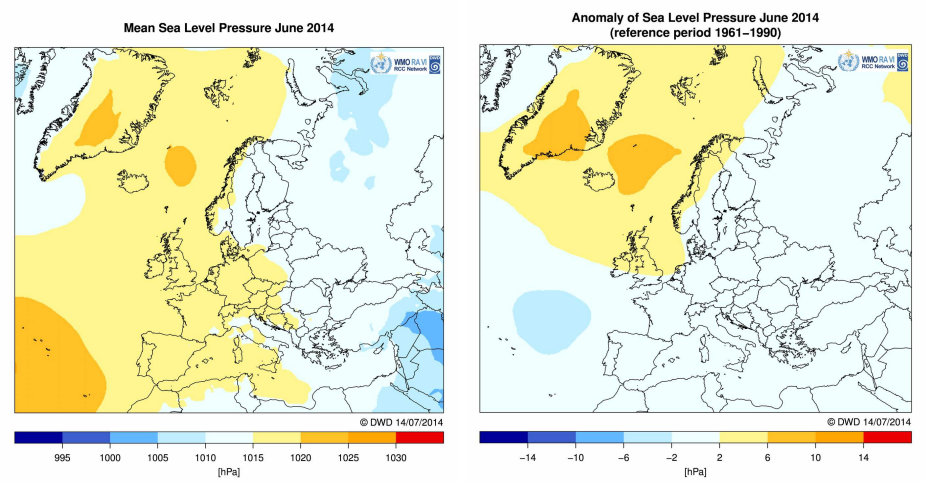



**fig.8a: Monthly mean SLP over Europe (left) and corresponding anomalies (right). http://www.dwd.de/rcc-cm**

## I.2.b Precipitation

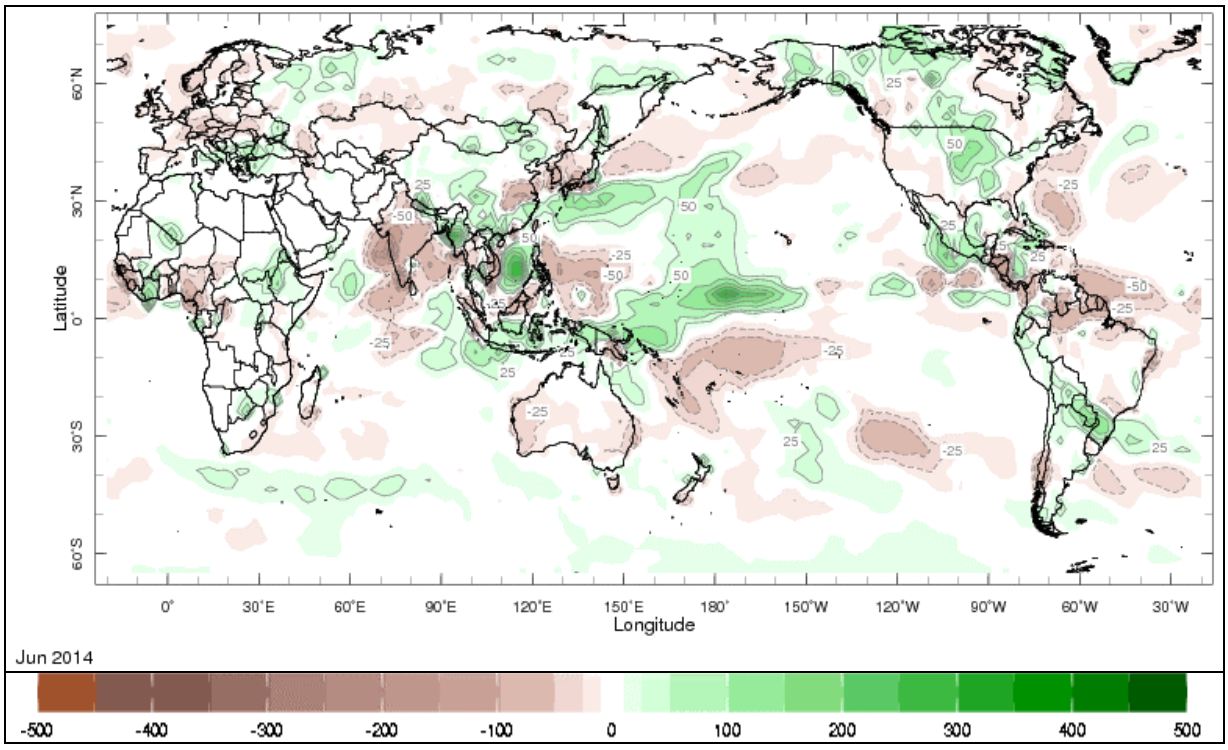



**fig.9: Rainfall Anomalies (in mm) (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.**
**http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/**

**Intertropical zones (including sub-tropics)** : some good consistency with the Velocity Potential anomalies, in the vicinity of the Indian sub-continent (drier than normal), close to the dateline (wetter than normal). Good consistency on North-Eastern South America (-) abd Outh-Brazil (+). The traces of the MJO activity are likely visible over the maritime continent. Less consistency over West or East Africa.
**Mid-latitudes** : a lot of contrasted anomalies (likely in relationship with the little predictability on seasonal scales already pointed out). mostly drier than normal over the Eastern part of the Asian continent including the region in the vicinity of the Bay of Bengal.

**Rainfall anomalies in Europe**:

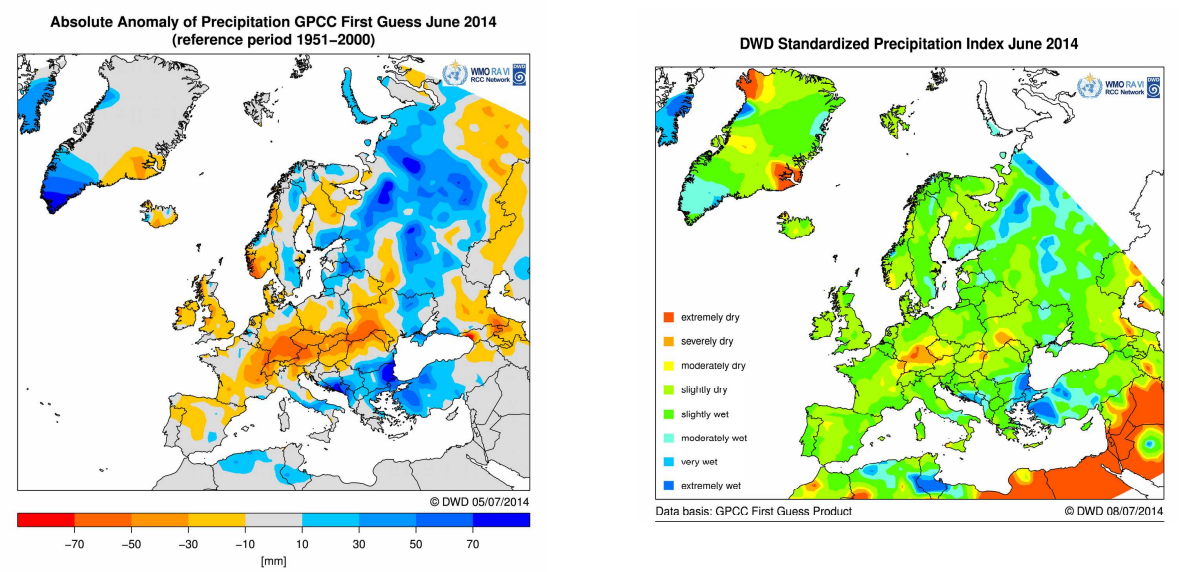



**fig.10: Left: Absolute anomaly of precipitation in the RA VI Region (Europe), data from GPCC (Global Precipitation Climatology Centre – reference 1951-2000), http://www.dwd.de/rcc-cm.**
**Right: Percentiles of precipitation. Data from NOAA Climate Prediction Center, http://iridl.ldeo.columbia.edu/maproom/Global/Precipitation/Percentiles.html**

June precipitation was lower than normal in most of western, central and parts of northern Europe. Especially a large region extending from eastern France across the Alps up to the western Ukraine was particularly dry with totals partly below the 10th percentile, suggesting partly severe or locally even extreme drought. Also the North Sea area up to the Arctic region was very dry due to extended high pressure influence.
On the other hand it was clearly wetter than normal over most of eastern and southeastern Europe and western Turkey. Especially in southern parts of these areas the 90th percentile was exceeded.

## I.2.cTemperature

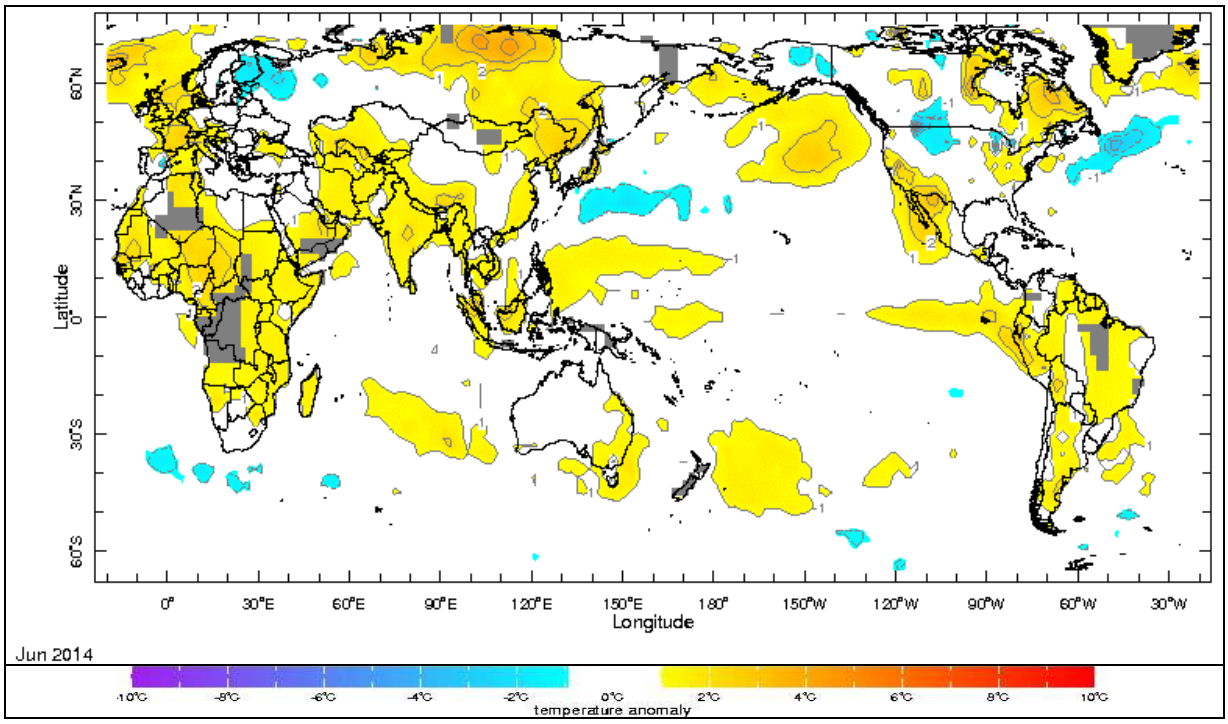



**fig.11: Temperature Anomalies (in °C) (departure to the 1979-2000 normal) http://iridl.ldeo.columbia.edu/maproom/.Global/.Atm_Temp/Anomaly.html**

Strong warm anomalies over Siberia (consistent with Z500 anomaly) extending southward up to South-East Asia. Positive anomalies from Western Europe up to most of the African continent, also over the Indian sub-continent (related to the deficit of the monsoon) and around, most of South America, South-West US and East Canada and adjacent regions. Only very little negative anomalies, in conjunction with the Tropical SSTs, this is very consistent with a June month on record in term of Global temperature.

**Temperature anomalies in Europe**:
June 2014 was very warm especially in western Europe, the North Sea and western European Arctic regions including most of Greenland, Iceland and Svalbard, but also the Alpine region, most of the Mediterranean and in the east the Caucasus region and western Kazakhstan. Particularly in western Europe the 90$^{th}$ percentile was exceeded locally.
In contrast, it was clearly colder than normal in northeastern Europe, especially close to the Baltic sea, where the temperatures were below 20$^{th}$ percentile. This was due to some temporary outbreaks of cold polar air.

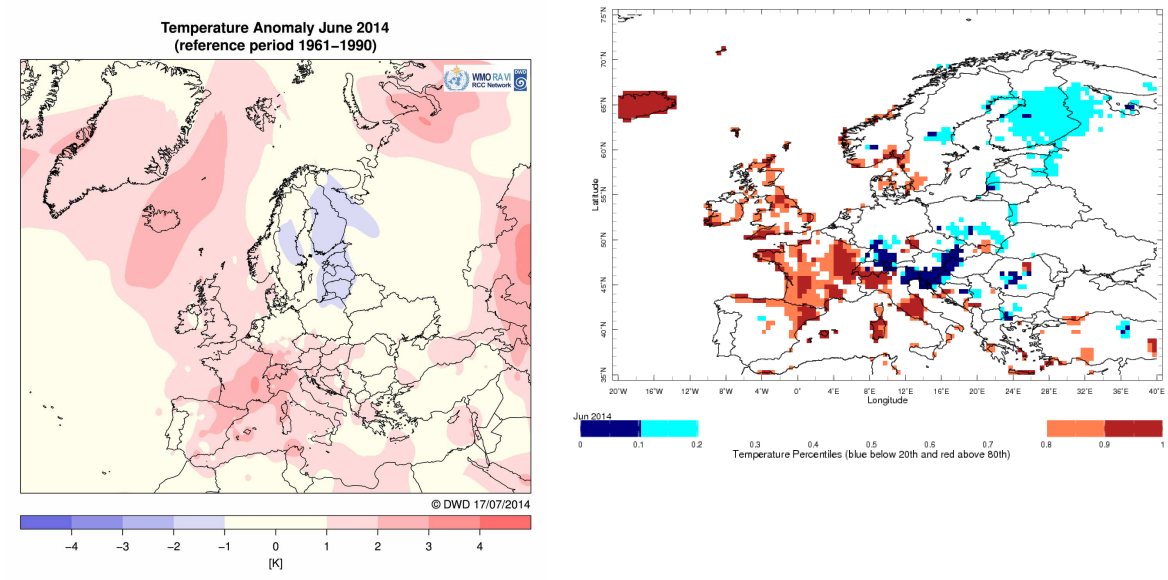



**fig.12: left : Absolute anomaly of temperature in the RA VI Region (Europe), data from Deutscher Wetterdienst (DWD); http://www.dwd.de/rcc-cm . Right : Percentiles of temperature. Data from NOAA Climate Prediction Center, http://iridl.ldeo.columbia.edu/maproom/Global/Atm_Temp/Percentiles.html .**

## I.2.d Sea Ice

**In Arctic** (fig. 15&15bis- left) : below normal sea-ice extension (negative anomaly close to 2 standard deviations).
**In Antarctic** (fig. 15&15bis - right) : well above normal sea-ice extension anomaly (on record).

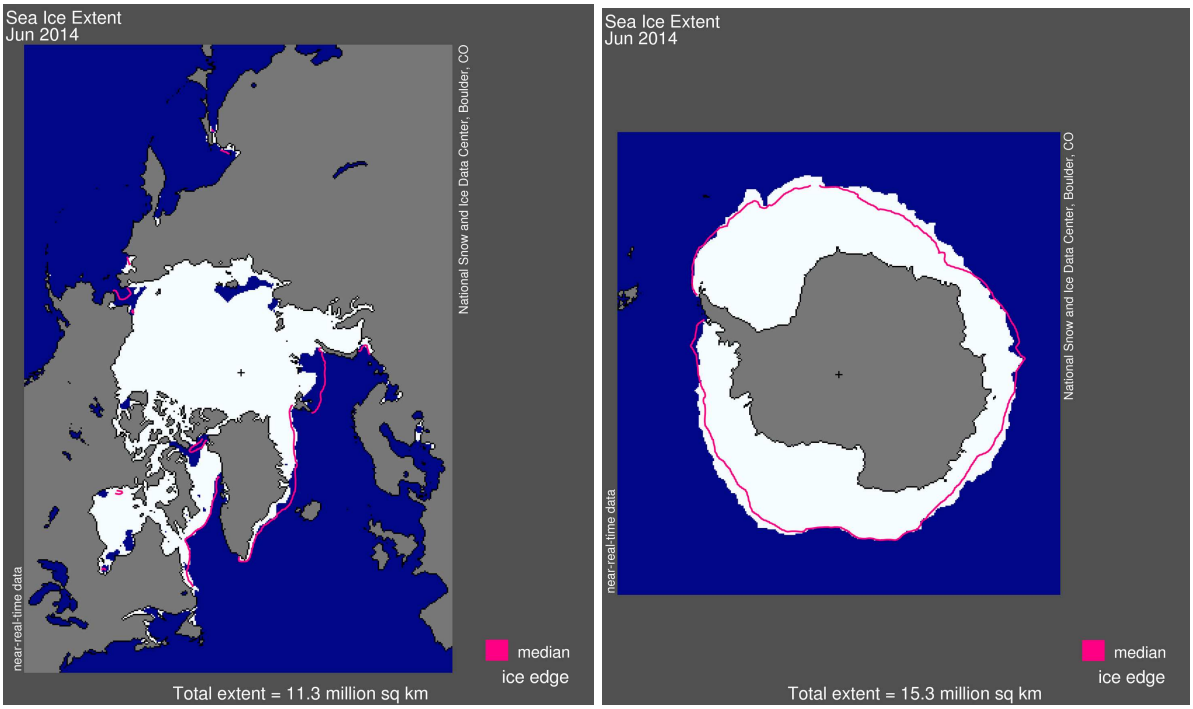



**fig.13: Sea-Ice extension in Arctic (left), and in Antarctic (right). The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/**

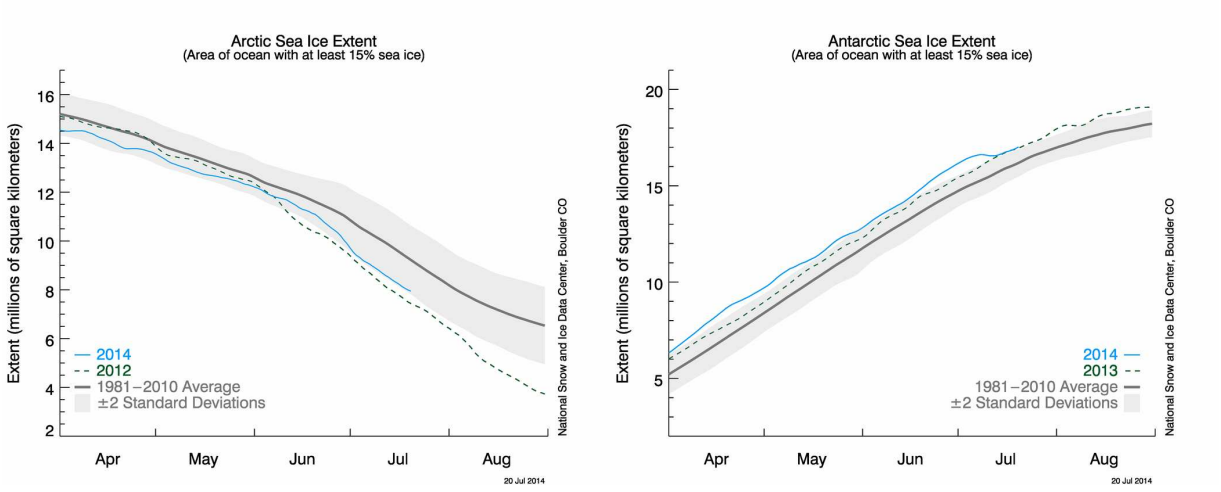



**fig. 15bis : Sea-Ice extension evolution from NSIDC**
**http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png**

# II. SEASONAL FORECASTS FOR ASO FROM DYNAMICAL MODELS

## II.1.OCEANIC FORECASTS

### II.1.a Sea Surface Temperature (SST)

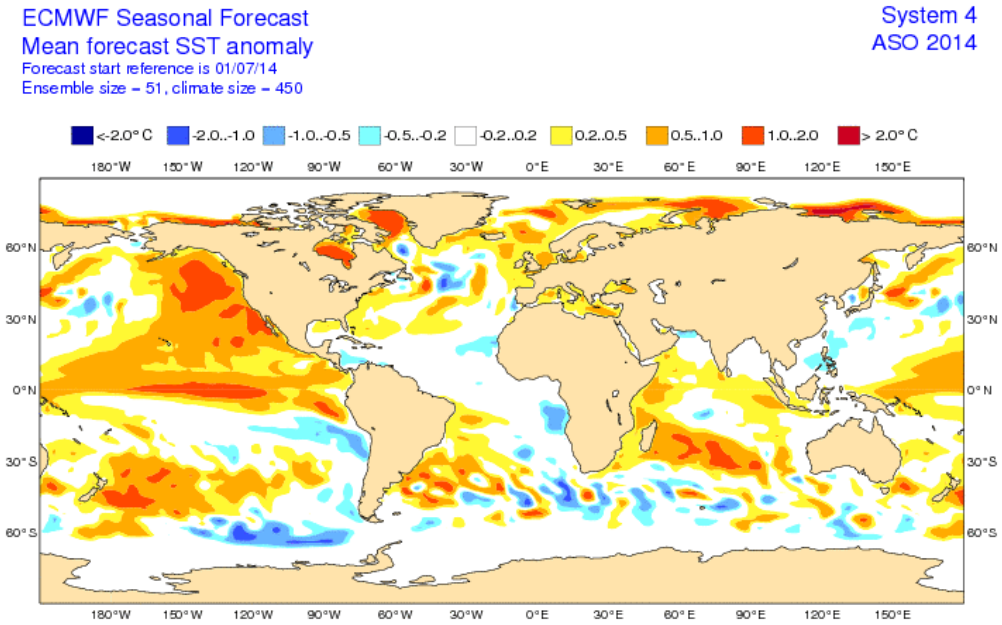



**fig.14: SST anomaly forecast (in °C) from ECMWF.**
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

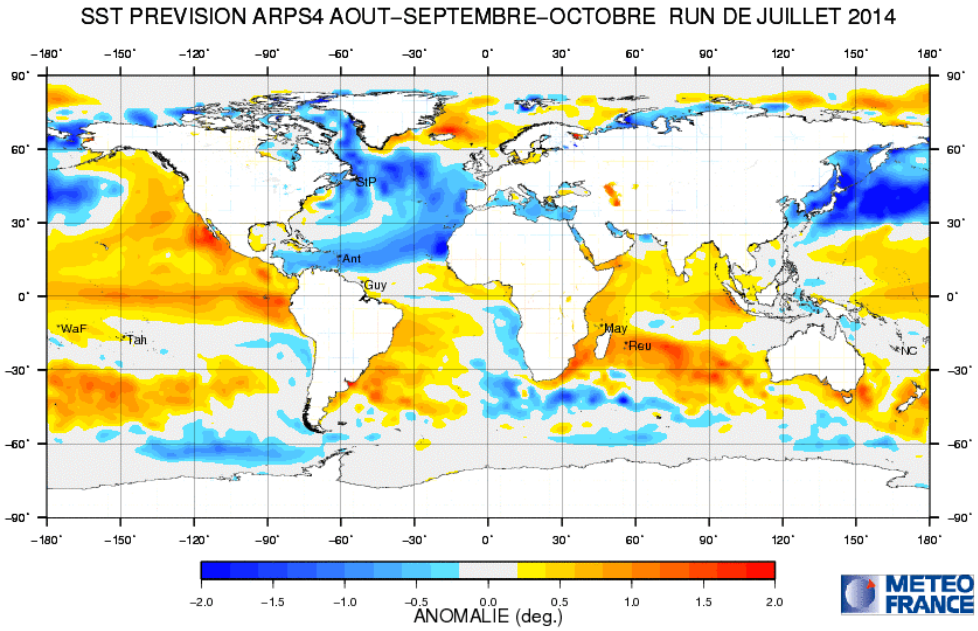



**fig.15: SST Anomaly forecast (in°C - recalibrated with respect of observation) from Météo-France.**
**http://elaboration.seasonal.meteo.fr/**

For the 2 individual models :
Whatever the differences in the post-processing of the anomalies (including reference period for the hindcast ; 81-2010 for ECMWF and 91-2010 for MF system 4), fairly consistent SST forecasts (taking into account the hindcast period differences), over both Hemispheres.
**Pacific** : Clear warmer than normal conditions in the equatorial waveguide. ECMWF is warmer than MF in the Niño 3.4 area while MF is warmer close to South America. The positive anomaly extends westward up to the dateline (and beyond) in both models. Positive anomalies over the North Eastern Pacific in both models and negative in MF in the North Western Pacific. Both models give indication of negative anomalies in the South Eastern Tropics.
**Atlantic** : equatorial waveguide close to normal (warmer than normal in MF in the Guinean Gulf). Some consistency for negative anomalies in the North Tropical part (more developed in MF partly related to the hindcast issue). In the Southern Hemisphere, Warmer than normal conditions in the South Western Tropics and Sub-Tropics and Colder than normal conditions close to the African continent.
**Indian Ocean** : Warmer than normal conditions more or less everywhere. Especially strong positive anomalies from Eastern sub-tropics up to Madagascar. IOD on the negative side despite the positive anomalies on both side of the basin.

In Euro-SIP :
Some robust patterns appear in the tropics everywhere to the exception of the Atlantic. More or less the same comments than for the individual models.
**Pacific** : The positive anomaly in the equatorial waveguide region from the most Eastern part up to the dateline (and beyond). The most positive zone corresponds roughly speaking to the Niño 3.4 area. Quite consistent patterns in the subtropics and the mid-latitudes of both hemispheres.
**Atlantic** : close to neutral over the Equatorial waveguide. Some traces of Colder than normal conditions in the Northern Tropics. The Southern Tropics are close to neutral to the exception of the coastal African regions. It should be quoted that the EuroSIP synthesis is strongly modified (with respect of the previous comments) ; NCEP forecast being very different on the Southern Atlantic (mostly negative anomalies).
**Indian Ocean** : Same patterns than for the individual models (mostly warmer than normal conditions).

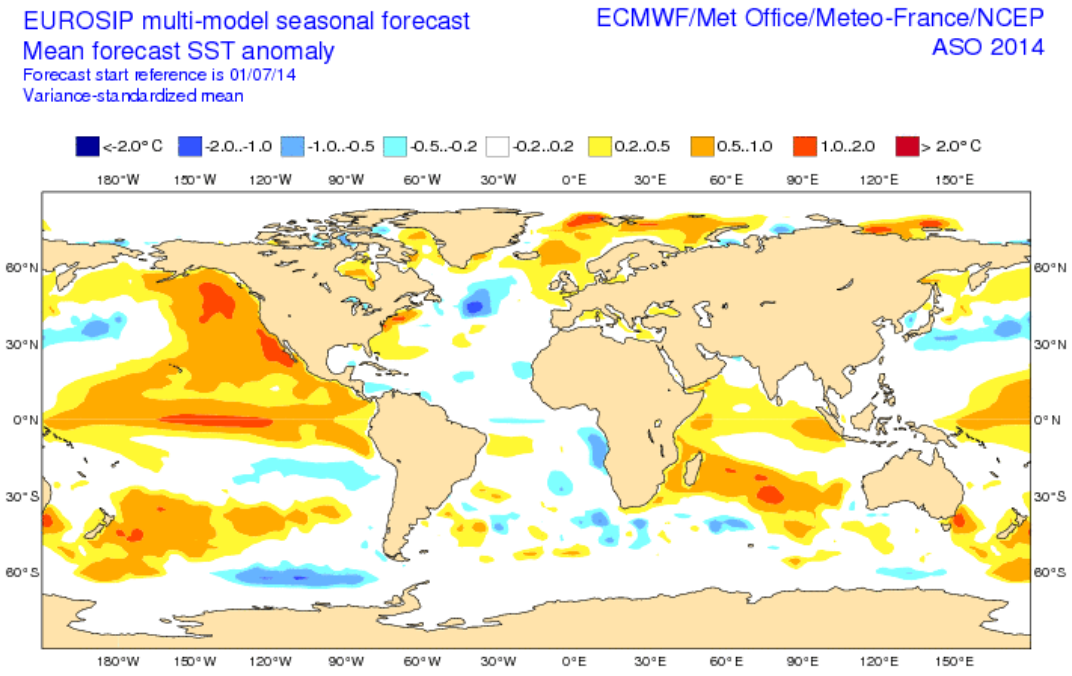



**fig.16: SST Forecasted anomaly (in °C) from Euro-SIP. http://www.ecmwf.int/**

## II.1.b ENSO Forecast :

### Forecasted Phase : Close to El Niño threshold conditions

**For ASO** : the majority of the dynamical models stay in the range of neutral conditions at the beginning of the targeted period. However, they are indicating a warming on time in the Niño 3.4 area. Most of them are reaching the Niño threshold at the end of the period and go beyond after. Only 2 models stay close to neutral at the end of the period (end of Fall and beginning of Winter).

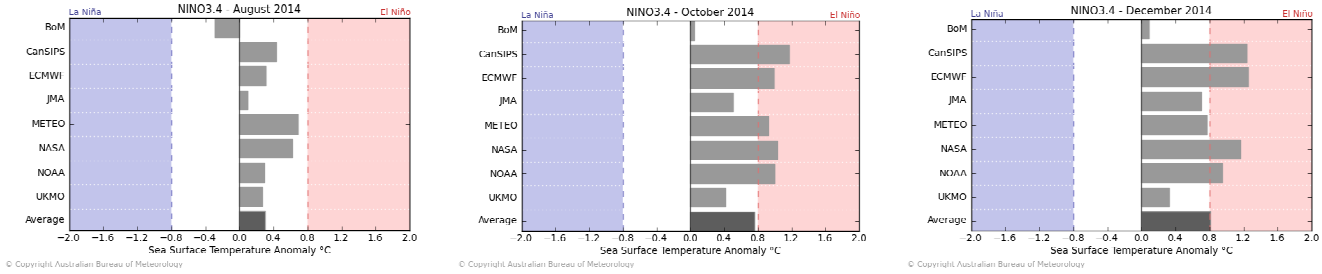
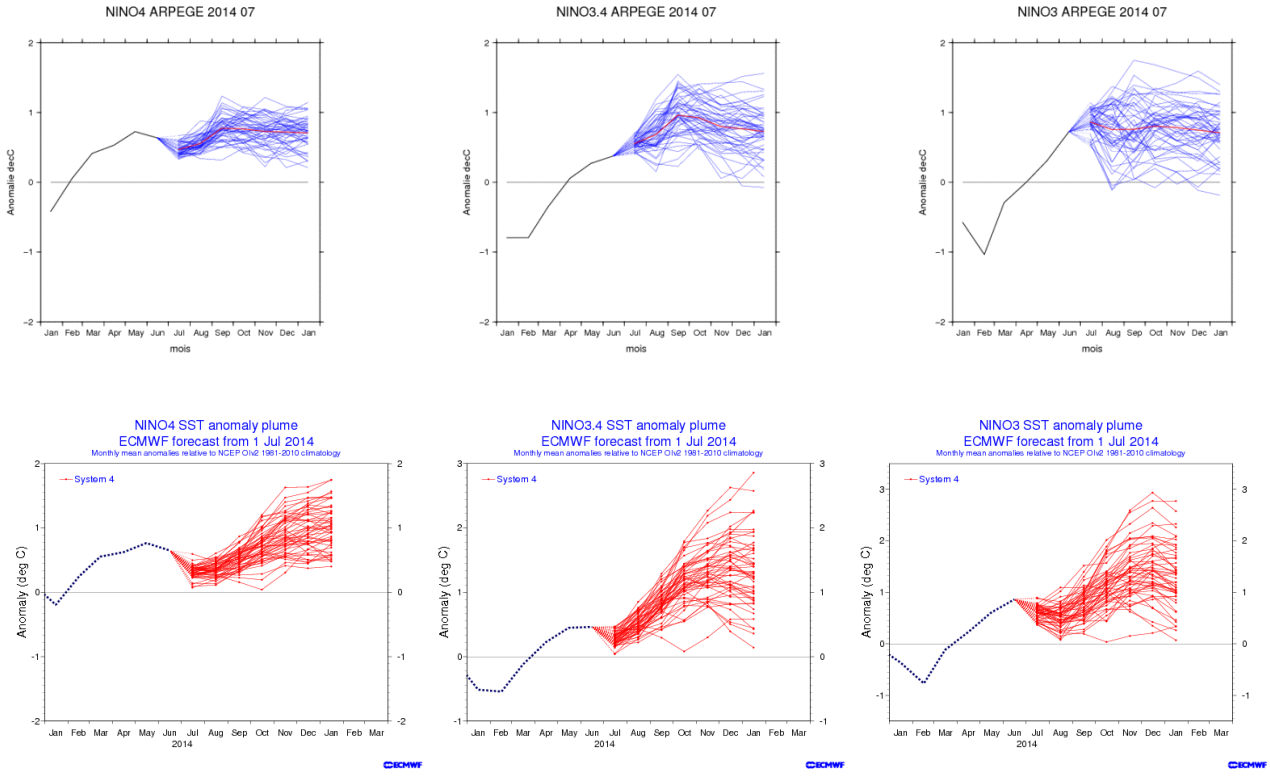



**fig.17: Synthesis of Niño 3.4 forecasts from several GPC by BoM :**
**http://www.bom.gov.au/climate/ahead/model-summary.shtml#tabs=Pacific-Ocean**

Plumes from Météo-France and ECMWF for the 3 Niño boxes (see definition in Annex – fig. II.1.5) : In both models and on average, prevailing conditions close to Niño threshold for ASO. In both models the warming trend is consistent with the previous forecasts and the uncertainty comparable. In EuroSIP Plumes, close to Niño threshold on average. The spread indicates a quite large uncertainty with respect of the previous month.



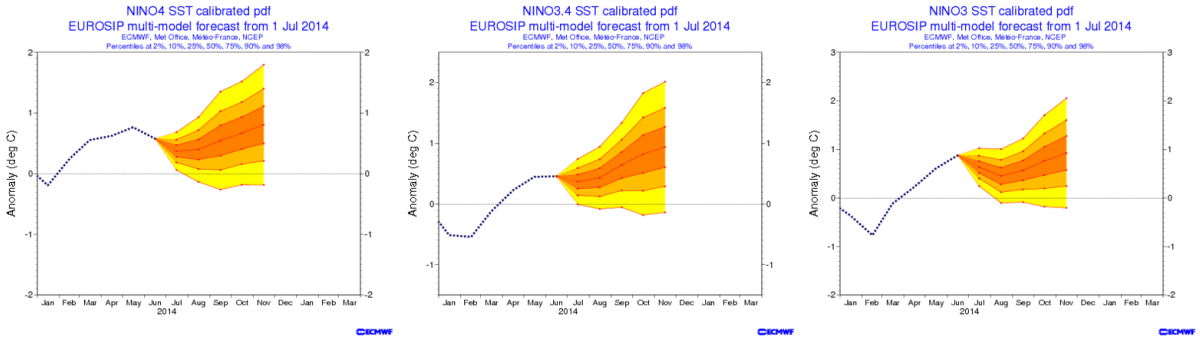



**fig.18: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members - and EuroSIP (bottom) – recalibrated distributions.**
**( http://www.ecmwf.int/ )**

## II.1.c Atlantic Ocean forecasts :

**Forecasted Phase: Below Normal in the Northern and close to normal in the Southern Tropics - TASI on the negative side**

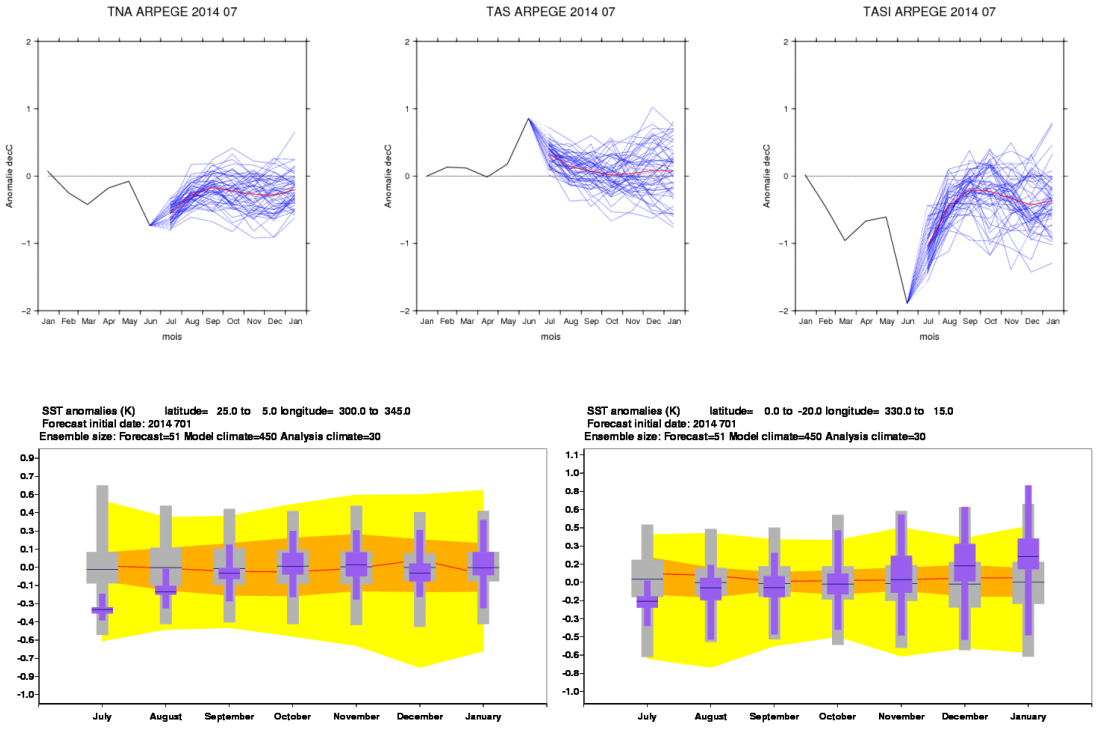



**fig.19: SSTs anomaly forecasts in the Atlantic Ocean boxes from Météo-France (top) and ECMWF (bottom), plumes / climagrams correspond to 51 members and monthly means.**

Consistent behaviour between the 2 models over the targeted period.
**North Tropical Atlantic** : Colder than normal conditions in both models with a progressive warming.
**South Tropical Atlantic** : Above Normal conditions in MF and below normal in ECMWF returning to Normal in both models.
**TASI** : in MF, the TASI index is negative for ASO with a tendency to return to neutral conditions at Fall. In ECMWF, the general behaviour is quite comparable in spite of the differences between TNA and TSA forecasts.
**Guinean Gulf** : Above Normal in MF with a return to Neutral conditions at Fall.

## II.1.d Indian Ocean forecasts :

**Forecasted Phase: West and East warmer than normal conditions**
**IOD close to normal**

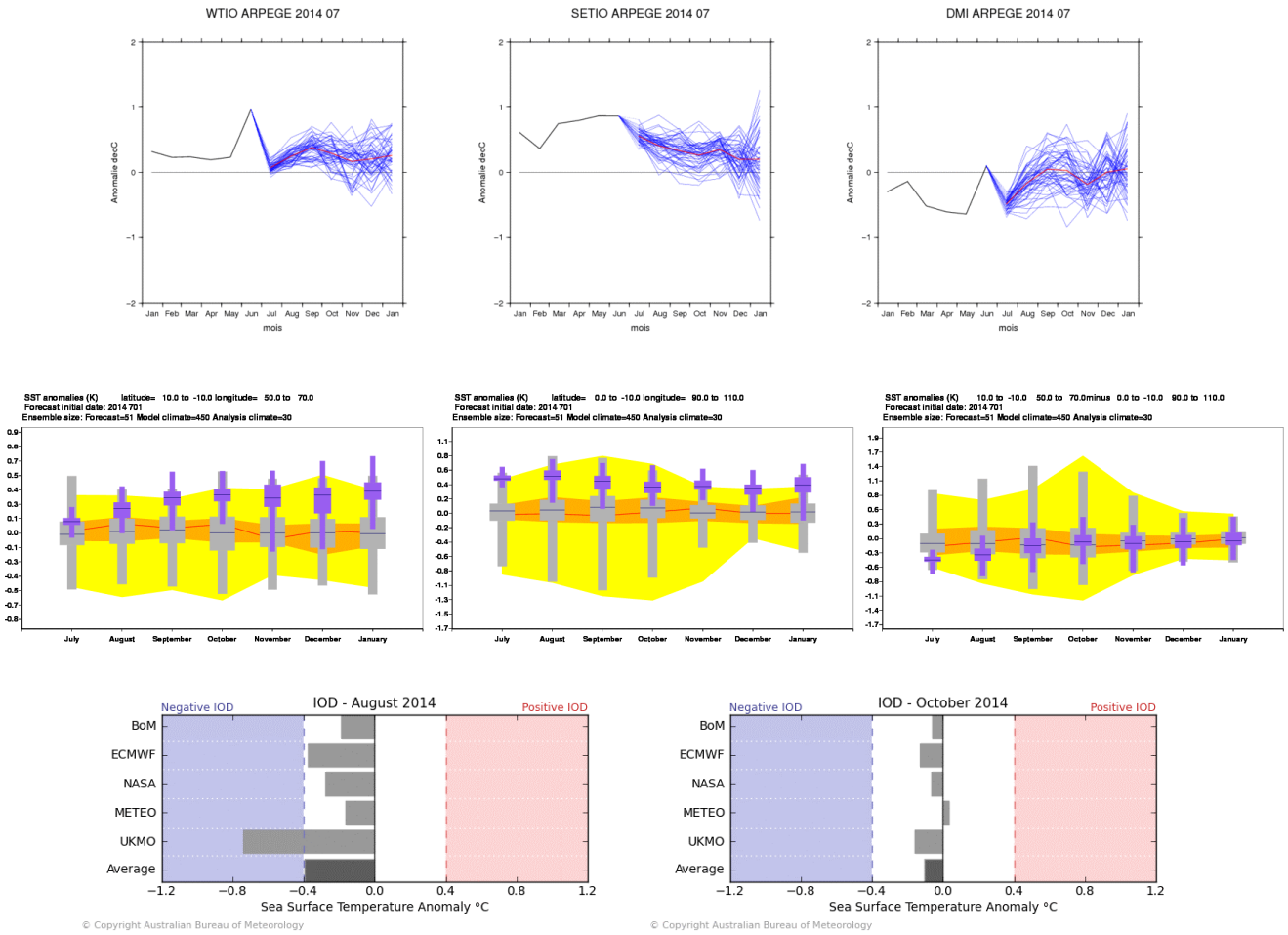



**fig.20: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France (top), ECMWF (middle), plumes / climagrams correspond to 51 members and monthly means. Synthesis for IOD (bottom) for several GPCs from BoM http://www.bom.gov.au/climate/ahead/model-summary.shtml#tabs=Indian-Ocean**

Quite consistent behaviour between the 2 models.
**In WTIO** : warmer than normal with a slight warming on time. Not too much uncertainty.
**In SETIO** : Above normal conditions. Spread comparable with WTIO.
**DMI (IOD)** : starting on the negative side and returning close to normal at Fall.

# II.2. GENERAL CIRCULATION FORECAST

## II.2.a Global Forecast

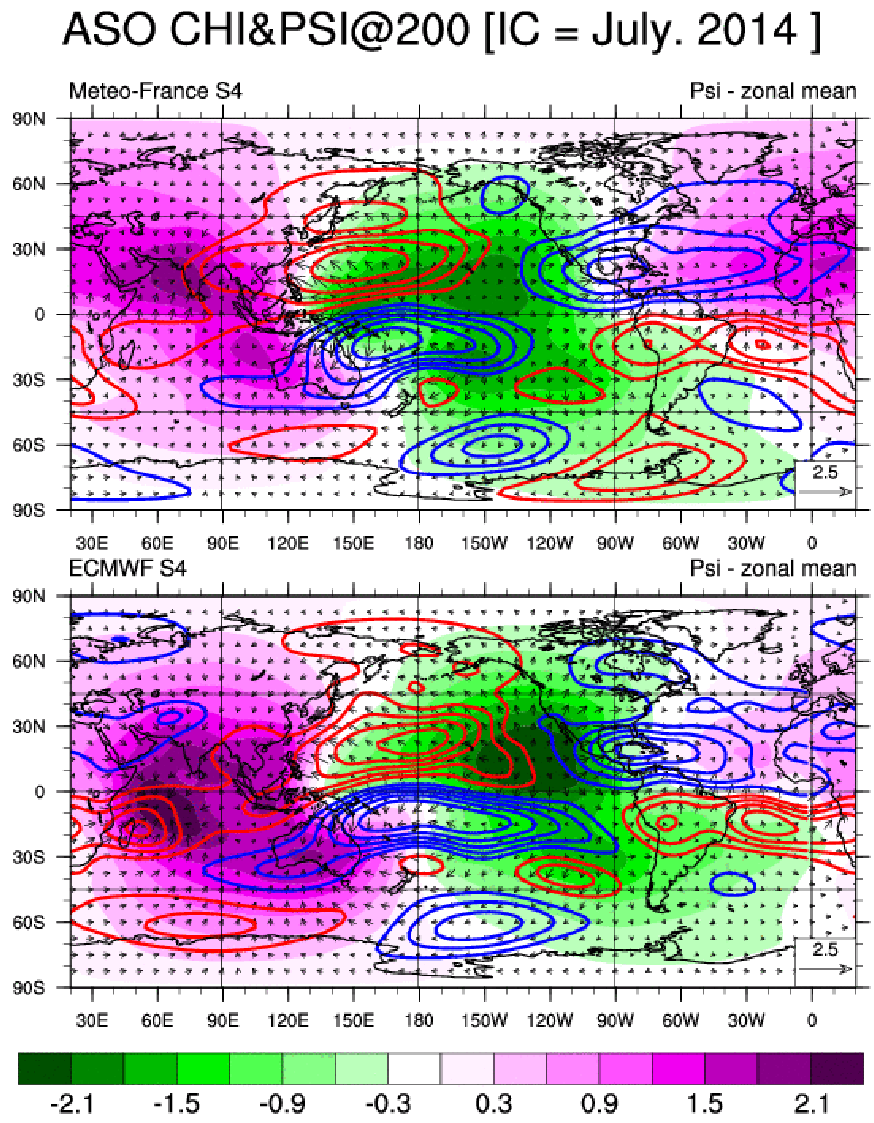



**fig.21: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), associated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa by Météo-France (top) and ECMWF (bottom).**

Velocity potential anomaly field (cf. fig. 21 – insight into Hadley-Walker circulation anomalies) : some consistency between the 2 models in the Tropical Indian Ocean and Atlantic, but also some large differences in the Central Pacific.

**Over the Pacific**, The divergent circulation anomaly is quite consistent between the two models. However, the strongest Large Scale Convection response is shifted eastward in ECMWF. This response could be consistent with the differences in the warm event development (more intense in ECMWF). The JMA forecast is a mix between MF and ECMWF ; namely with and Eastward shift of the main convective response but with also a marked cell West to the dateline (like MF). So the interpretation could be that these solution are in the range of the model uncertainty. This could be related to the weak ocean/atmosphere coupling currently observed (see SOI index comment).

**Over the Atlantic**, quite consistent response (Convergent circulation anomaly - downward anomaly

motion) over the West African continent and the North Tropical Atlantic. In JMA, the positive anomaly exists but weaker and more marked over the Southern part of the basin.
**Over the Indian Ocean** : A quite strong convergent circulation anomaly in both models. It is more spread over the half western part of the tropical ocean in ECMWF and more located in the Northern Hemisphere in MF. These responses are consistent with the one from JMA (especially ECMWF).

Stream Function anomaly field (cf. fig. 21 – insight into teleconnection patterns tropically forced) : Quite good consistency over the Tropical regions (between 30°N and 30°S). The interpretation of these patterns can be associated in the Pacific to the SST forcing (West to the dateline). Nevertheless, the signal is clearly trapped within the sub-tropical regions. The JMA forecast is quite similar to the 2 models across the tropical regions.

As a conclusion **the predictability** likely exists in the vicinity of the Pacific basin, over the Indian Ocean (especially within the sub-tropical and tropical regions) and in the Tropics in the vicinity of the Atlantic sector (Caribbean, South America and Africa especially South to the equator). Over mid-latitudes regions of the Northern Hemisphere, one could consider that the signal is poorly influenced by the Tropics to the possible exception of the Eastern façade of Canada. For the Western façade of Europe and North Africa, one should consider that no significant predictability will be present for the ASO period.

## II.2.b North hemisphere forecast and Europe

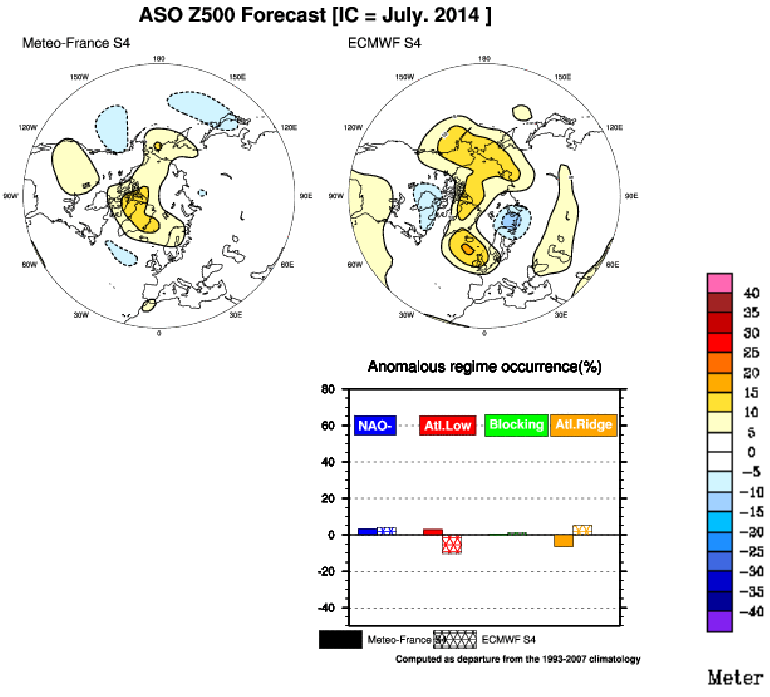



**fig.22: Anomalies of Geopotential Height (top) at 500 hPa from Meteo-France (left) and ECMWF (right). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip and North Atlantic Regime occurrence anomalies (bottom) from Météo-France and ECMWF : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.**

Geopotential height anomalies (fig. 22 – insight into mid-latitude general circulation anomalies) : Consistently with the previous discussion, there is only little signal in Geopotential Height anomalies.

North Atlantic Circulation Regimes (fig. 22) : As a consequence, no consistency and no signal in the regime forecasts.

# II.3. IMPACT : TEMPERATURE FORECASTS

## II.3.a ECMWF

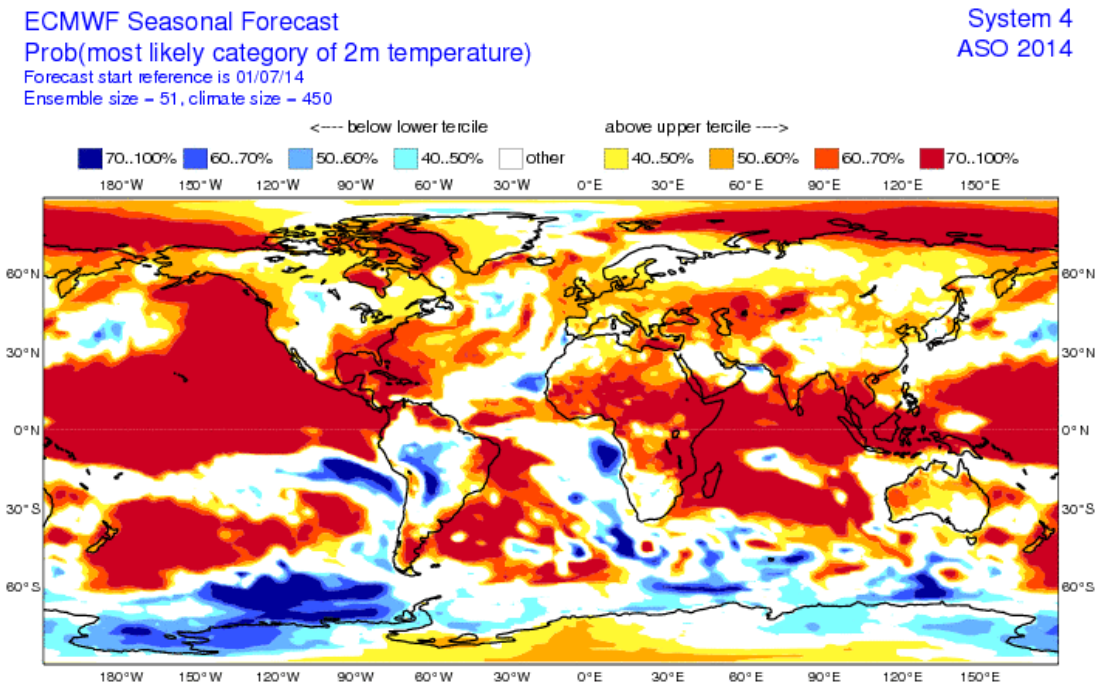



**fig.23: Most likely category probability of T2m from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).**
**http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/**

## II.3.b Météo-France

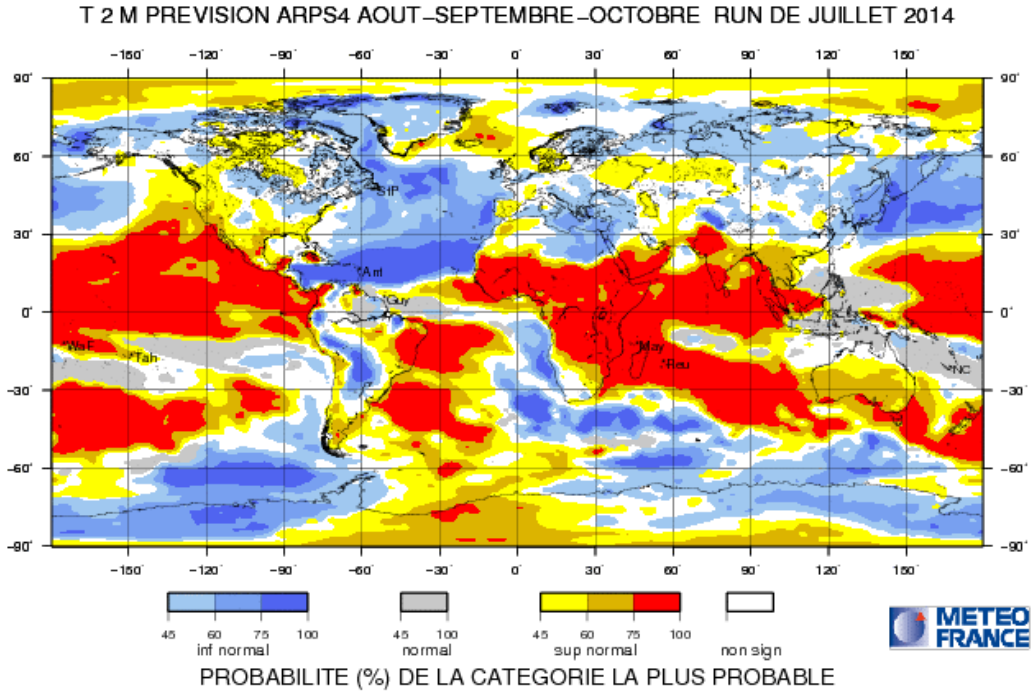


**fig.24: Most likely category of T2m from Meteo-France. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/**

## II.3.c Met Office (UKMO)

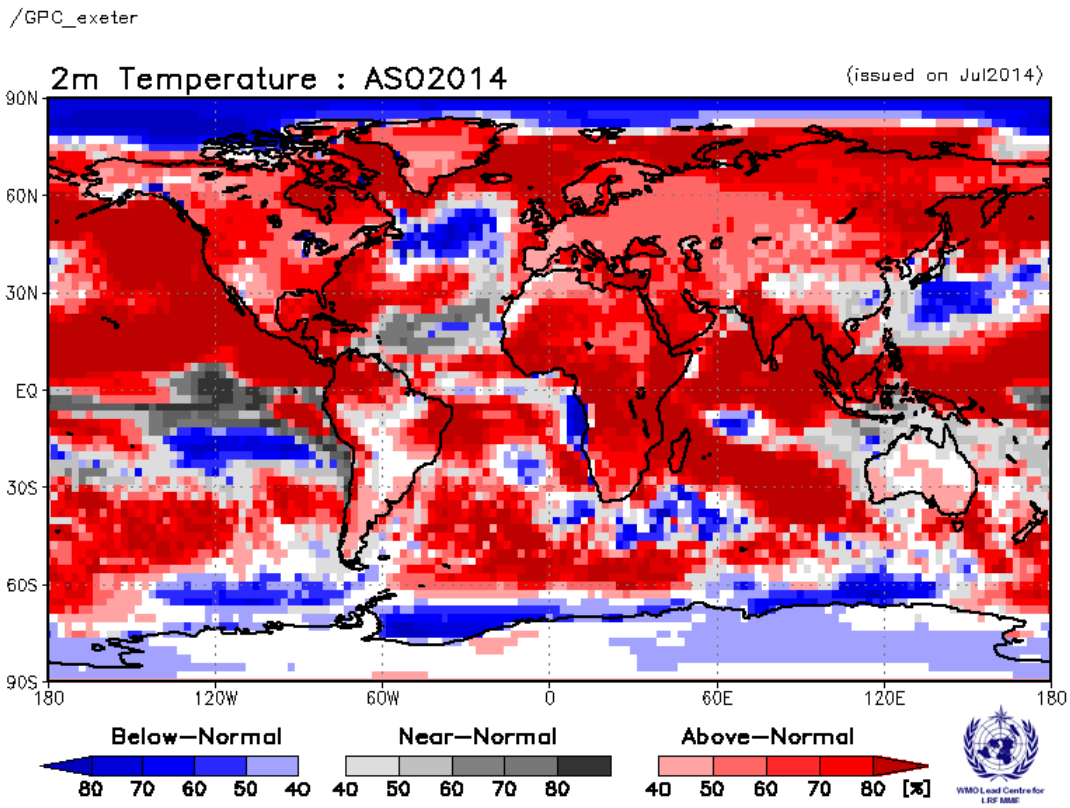



**fig.25: Most likely category of T2m from UK Met Office. https://www.wmolc.org/**

## II.3.d Climate Prediction Centre (CPC)

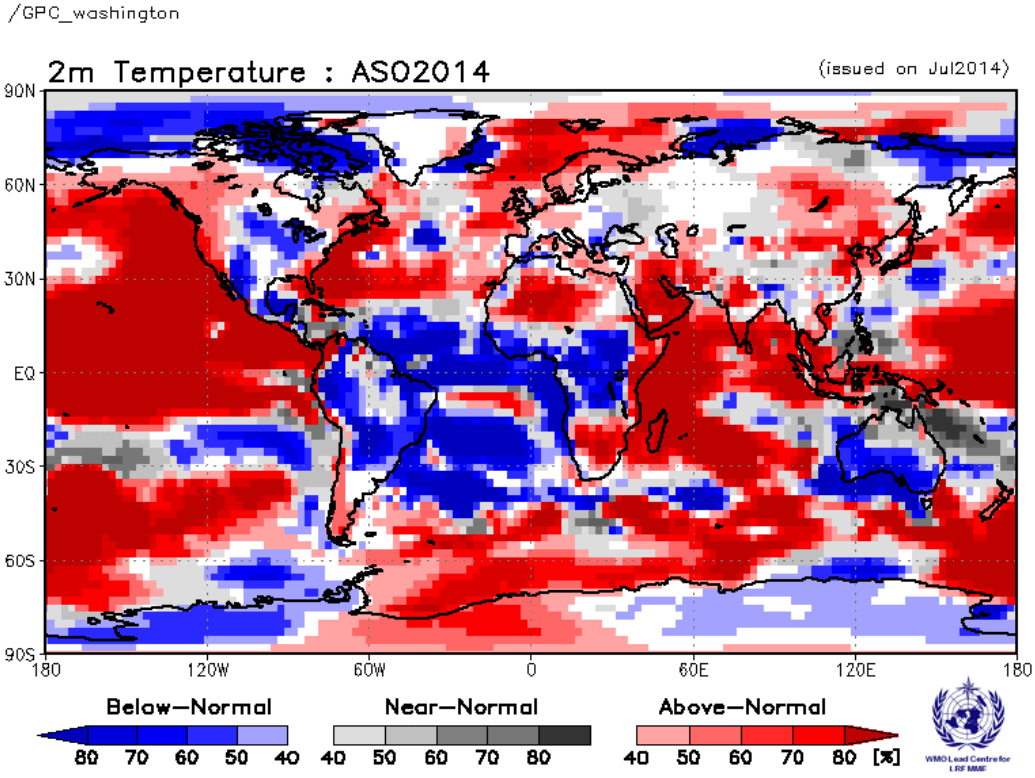



**fig.26: Most likely category of T2m from CPC. https://www.wmolc.org/**

## II.3.e Japan Meteorological Agency (JMA)

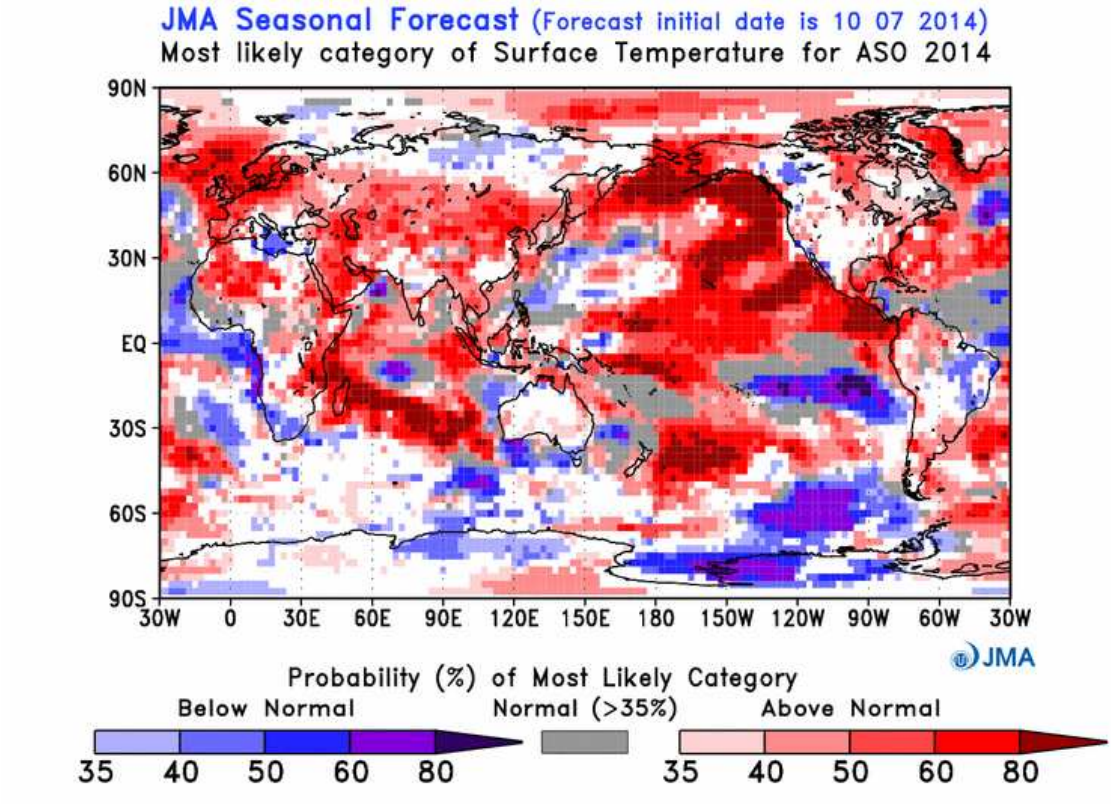



**fig.27: Most likely category of T2m from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/**

## II.3.f Lead Centre on Multi Model Ensemble (LCMME)

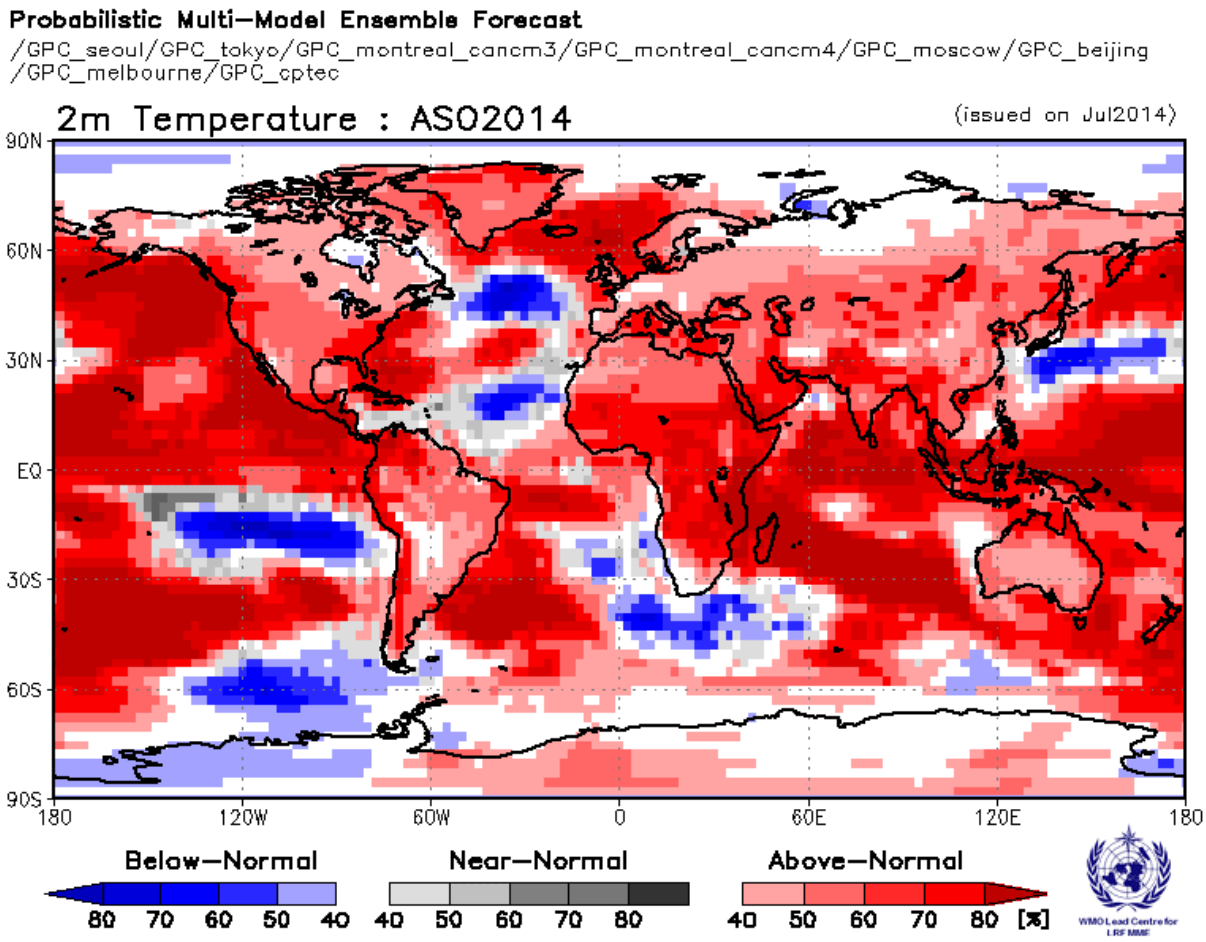



**fig.28: MME most likely category of T2m from LC-MME. The MME composition corresponds to the GPCs not used in EuroSIP https://www.wmolc.org/**

## II.3.g Euro-SIP

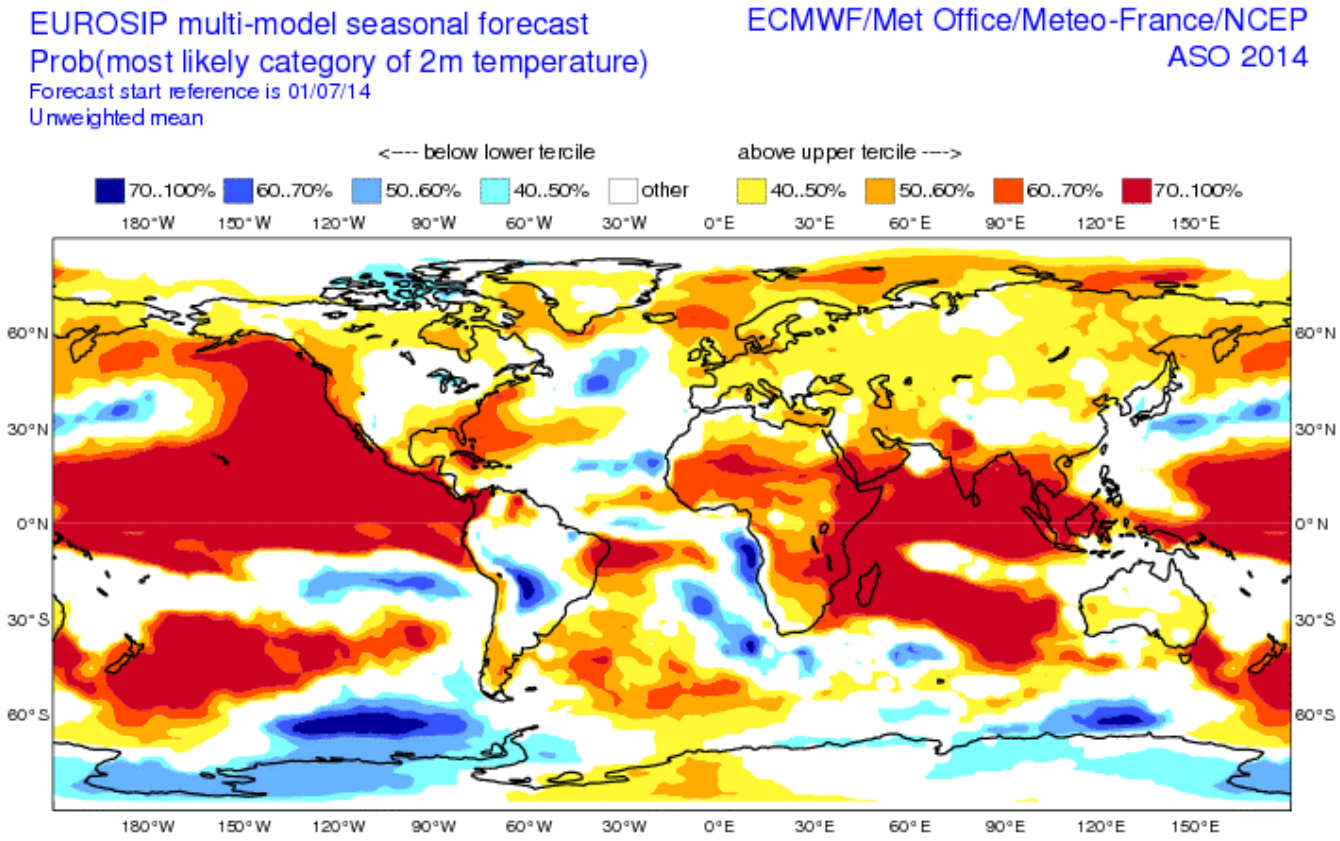



**fig.29: Multi-Model Probabilistic forecasts for T2m from EuroSip.**
**(2 Categories, Below and Above normal – White zones correspond to No signal and Normal).**

http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmv2/param_euro/seasonal_charts_2tm/

**North-America** : enhanced probabilities for warm anomalies over the Western coast of USA and Canada. Also warmer than normal along the Eastern coastal regions of USA.
**Central-America** : globally warmer than normal extending toward the North Caribbean.
**South-America** : Some consistent signal over the North-Western coastal part of the continent (warmer than normal) and the Northern regions (on the Atlantic and Nordeste – warmer than normal).
**Australia** : little warmer than normal signal across the continent.
**Asia** : Mostly Warmer than normal conditions above 30°N. Warmer than normal conditions over most of the Indian sub-continent (likely in relationship with a weak monsoon) and South-East Asia and the maritime continent.
**Africa** : Mostly warmer than normal over most of the continent ; especially along the Eastern coast.
**Europe** : Slightly enhanced probabilities for Warmer than normal conditions over most of the continent. Considering the absence of predictability, this signal is likely related to the climate trend.

# II.4. IMPACT : PRECIPITATION FORECAST

## II.4.a ECMWF

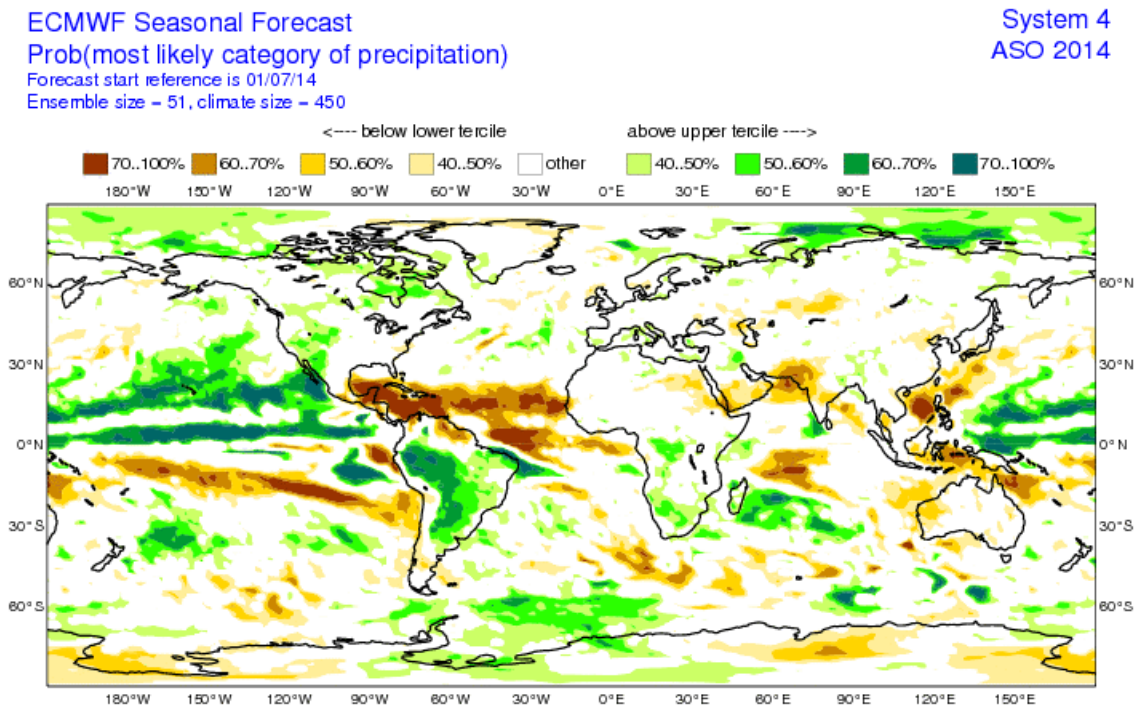



**fig.30: Most likely category probability of rainfall from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).**
**http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/charts/seasonal_charts_s2/**

## II.4.b Météo-France

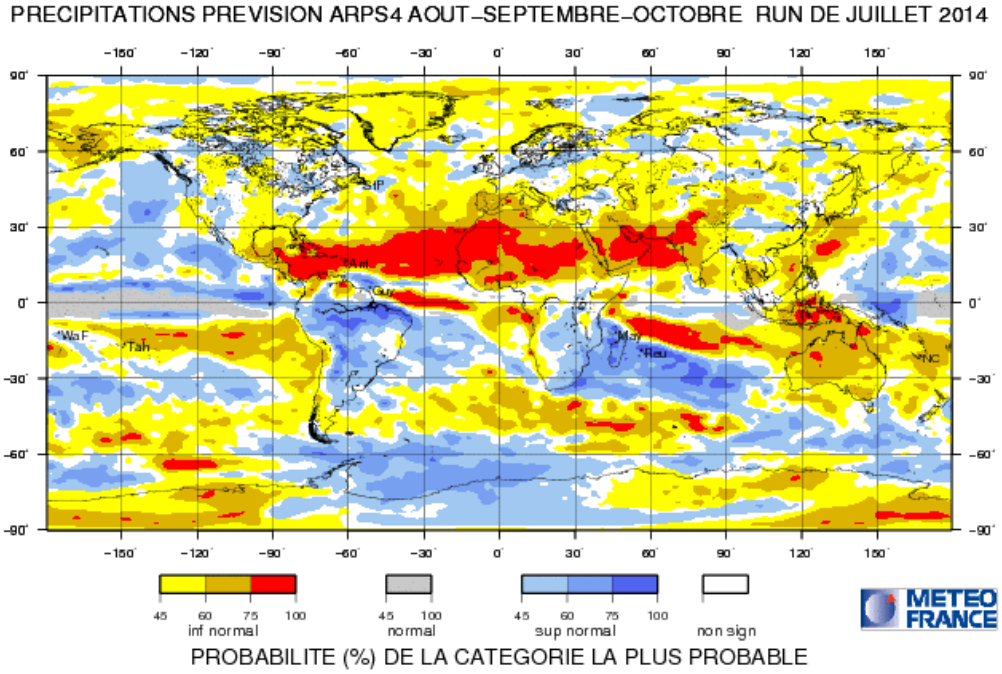



**fig.31: Most likely category of Rainfall from Meteo-France. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/**

## II.4.c Met office (UKMO)

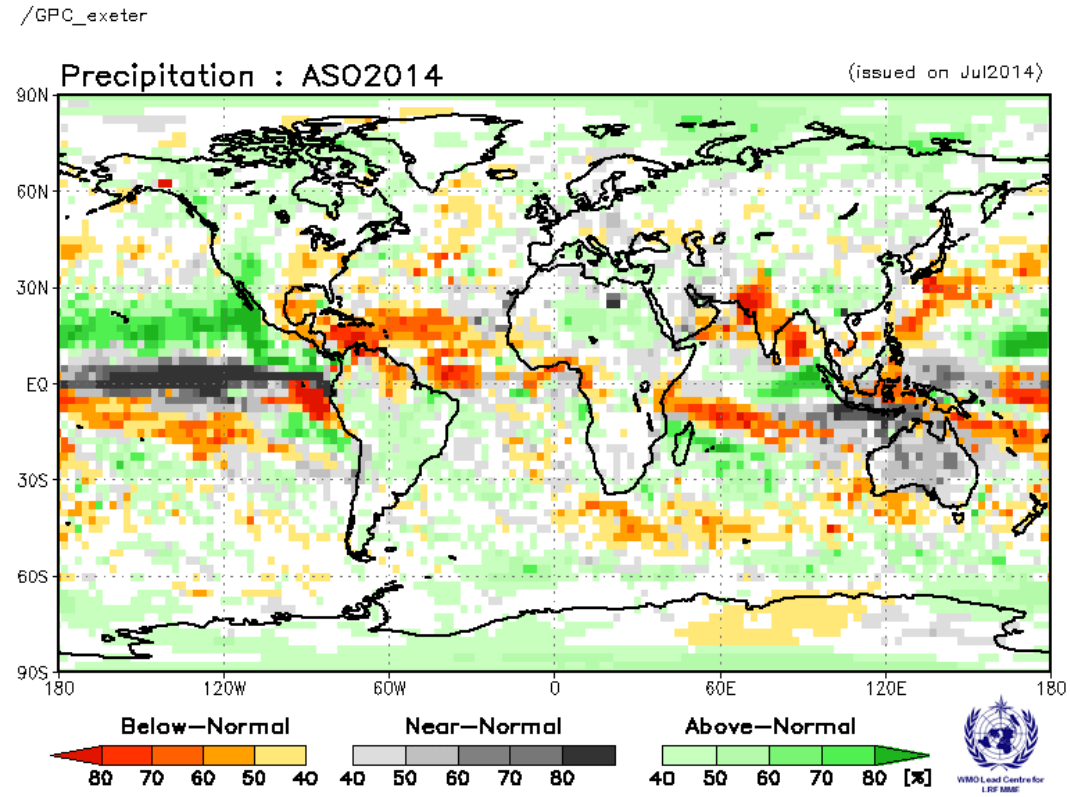



**fig.32: Most likely category of Rainfall from UK Met Office. https://www.wmolc.org/**

## II.4.d Climate Prediction Centre (CPC)

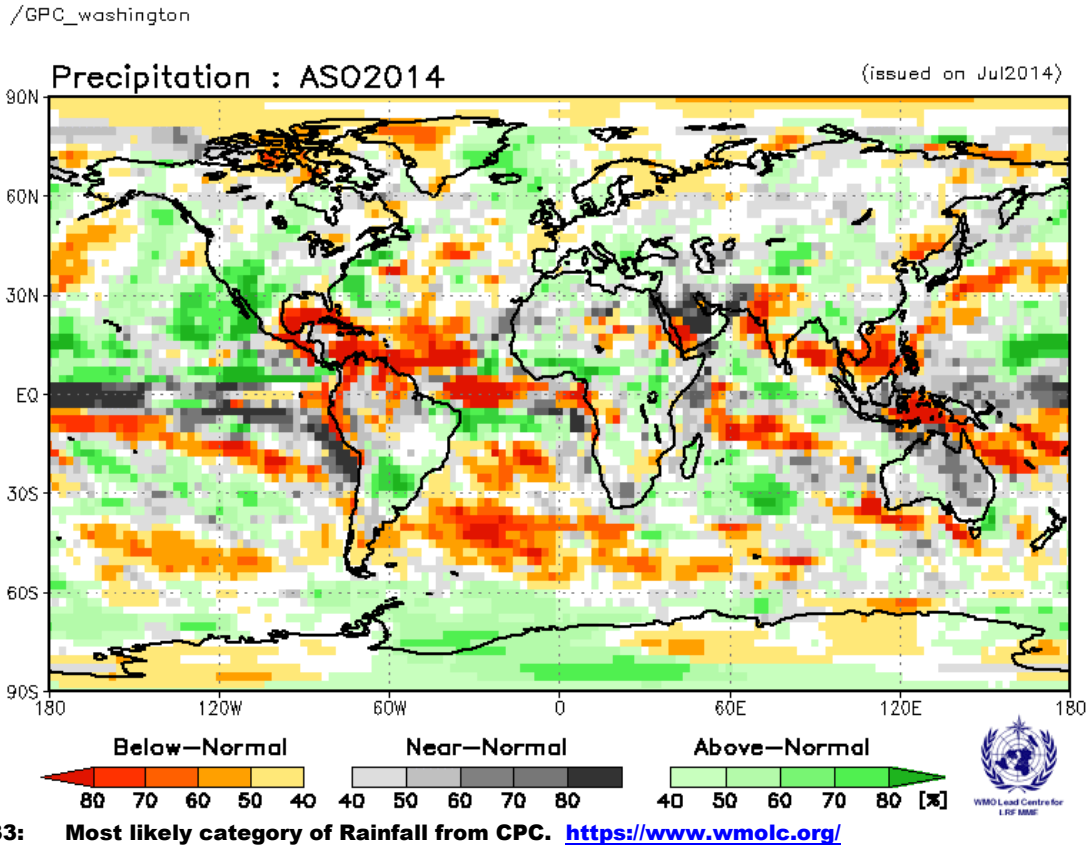



**fig.33: Most likely category of Rainfall from CPC. https://www.wmolc.org/**

## II.4.e Japan Meteorological Agency (JMA)

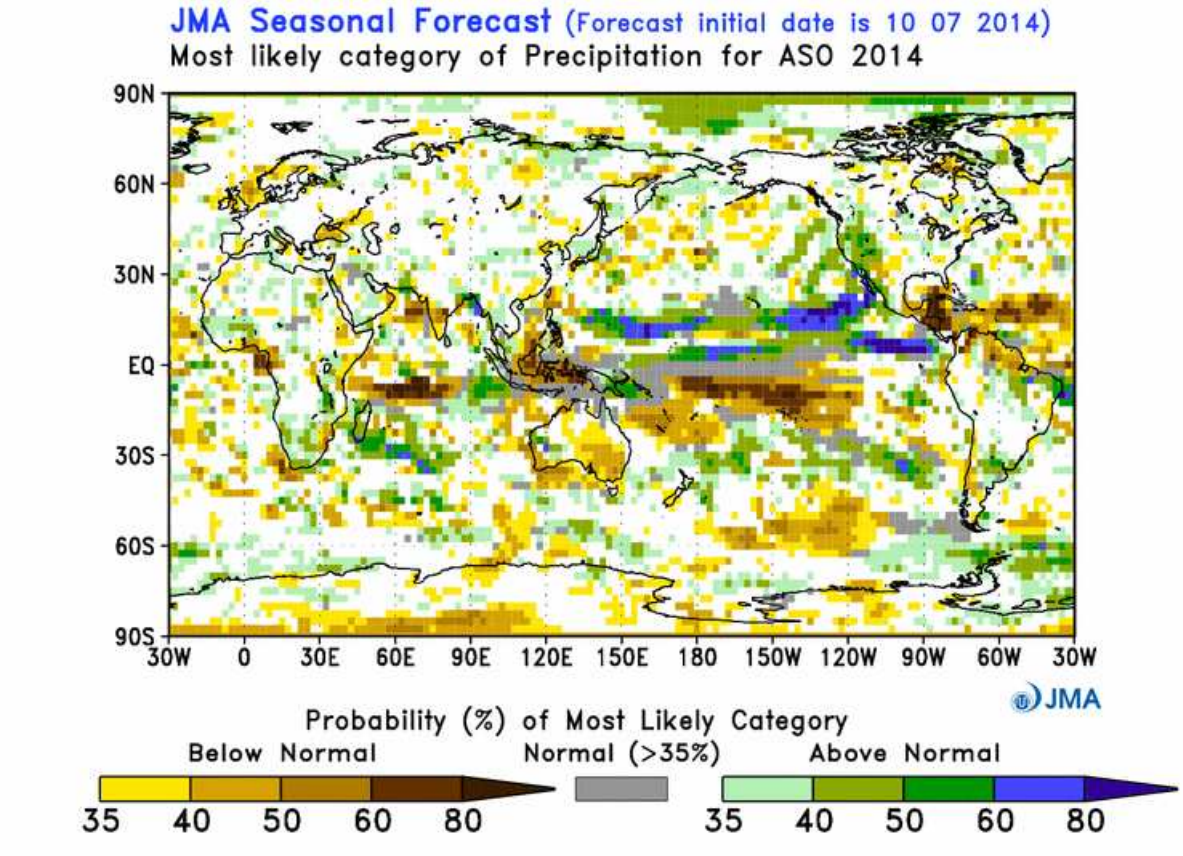



**fig.34: Most likely category of Rainfall from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/**

## II.4.f Lead Centre on Multi Model Ensemble (LCMME)

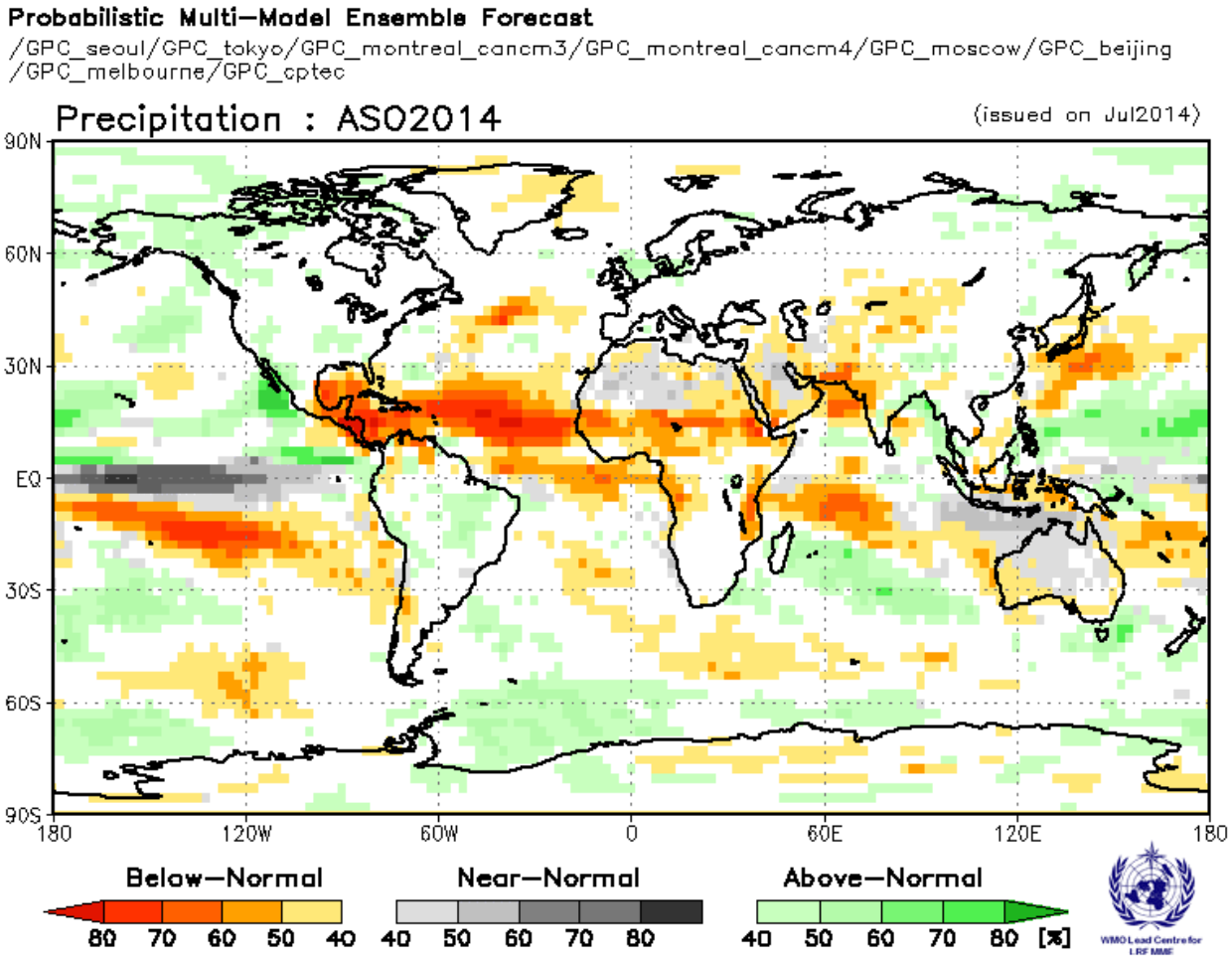



**fig.35:** **MME most likely category of Rainfall from LC-MME. The MME composition corresponds to the GPCs not used in EuroSIP. https://www.wmolc.org/**

## II.4.g Euro-SIP

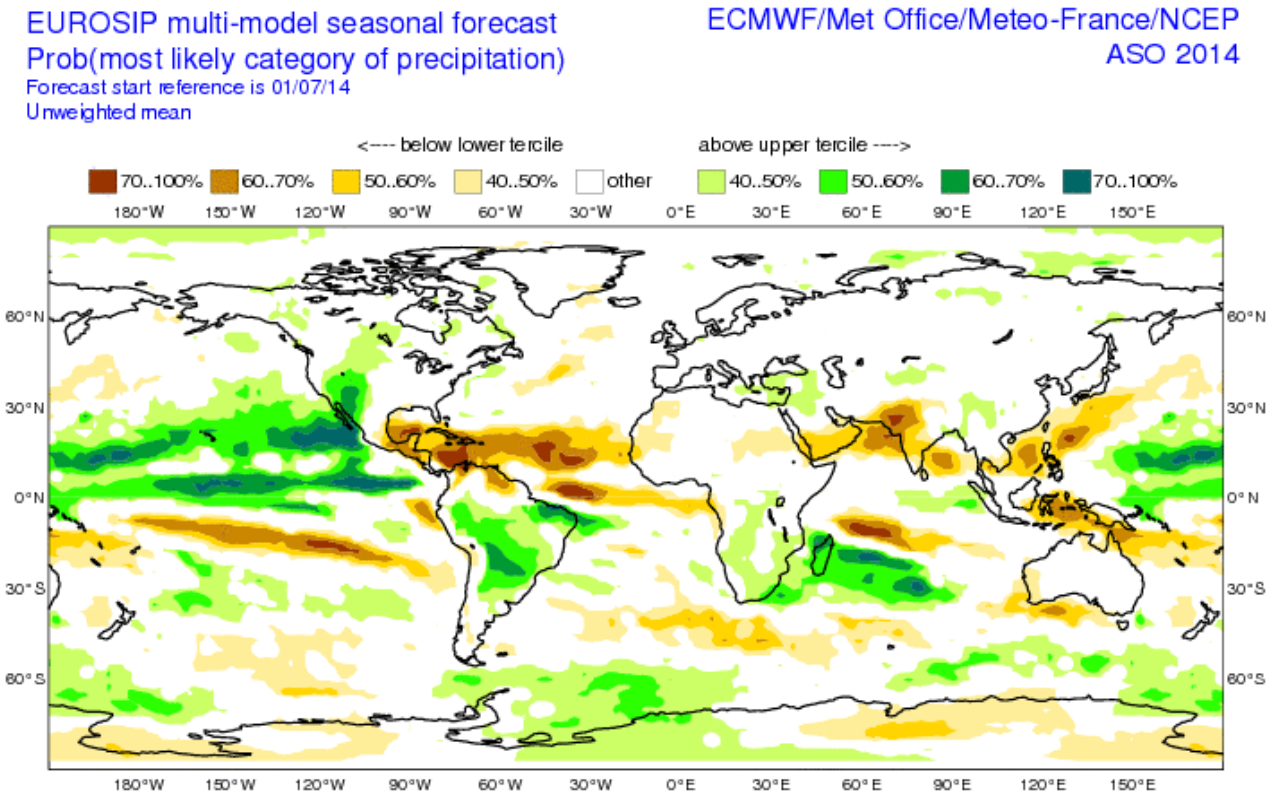



**fig.36: Multi-Model Probabilistic forecasts for precipitation from EuroSip. (2 Categories, Below and Above normal – White zones correspond to No signal).**

http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmv2/param_euro/seasonal_charts_2tm/

**In the Tropics** : some very consistent signal. Enhanced probabilities for wet scenarios across the Equatorial Pacific extending westward beyond the dateline (see previous discussions), over a large portion of South-America (Brazil, Argentina, Bolivia, …) and part of USA (Western side and the Rocky). Wet scenarios should also prevail in the vicinity of Madagascar and South Africa. On the opposite, enhanced probabilities for dry scenario over the Caribbean and Central America extending toward the Northern coastal areas of South America, over most of the Maritime continent and the most Western part of West Africa. Also to be quoted Dry scenarios over most the Indian sub-continent consistently with the atmospheric response of the models over the Indian Ocean (weakened monsoon circulation) extending toward the Arabic Peninsula.

**For Europe** : No signal more or less everywhere (consistently with the lack of predictability at seasonal scales).

# II.5. REGIONAL TEMPERATURES

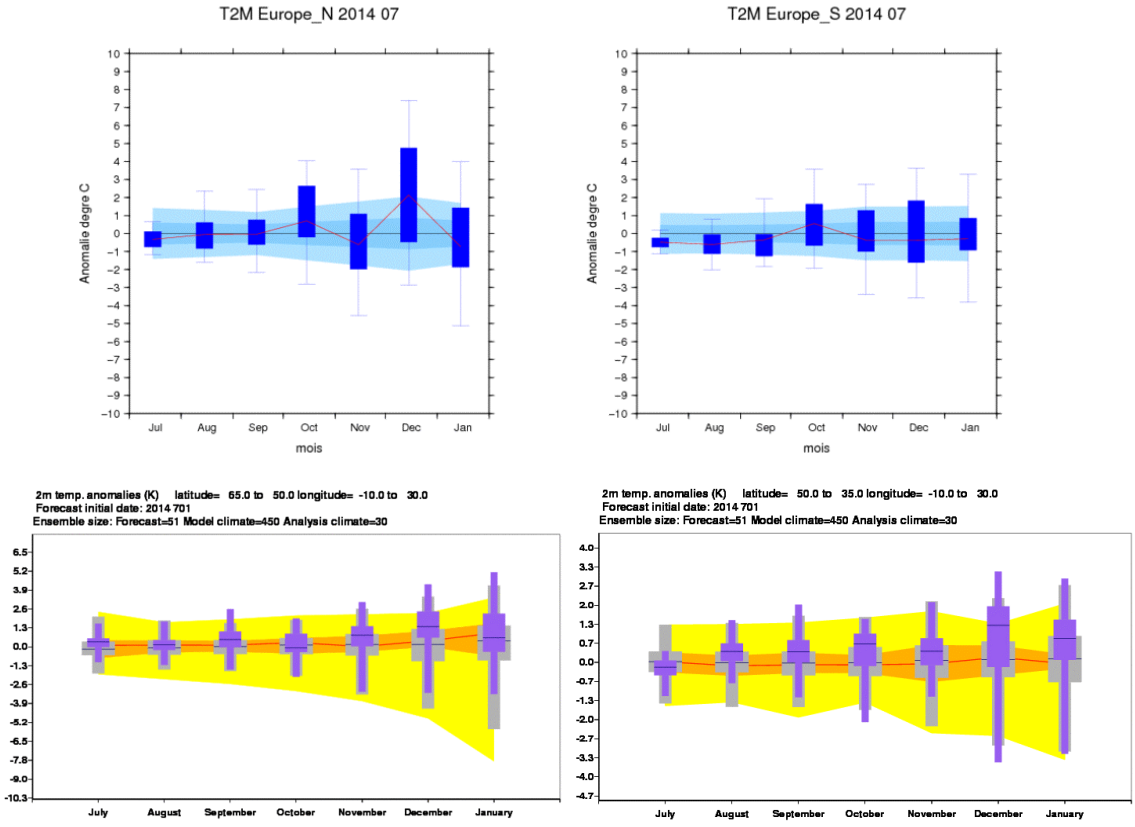



**fig.37: Climagrams for T2m in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom - idem).**

Only little consistency between the two models (see discussion on Geopotential Height)

**For Northern Europe** : Close to Normal conditions in both models and larger spread in MF.

**For Southern Europe** : mostly Below Normal for ASO and very large spread at fall in MF. In ECMWF, above normal conditions kept along the entire period. Also large spread at fall (with respect of the climate reference)..

***In Météo-France climagrams, the distributions of area averages are displayed for the seasonal forecast (dark blue boxes and wiskers), and the climate reference on the 29-year hindcast period (blue and light blue bands). The limits of the boxes (ensemble forecast) and blue band (climate reference) correspond to the upper and lower terciles. The limits of the wiskers (ensemble forecast) and light blue band (climate reference) correspond to the mean + 1 standard deviation and the mean – 1 standard deviation. The red line corresponds to the ensemble mean.***

# REGIONAL PRECIPITATIONS

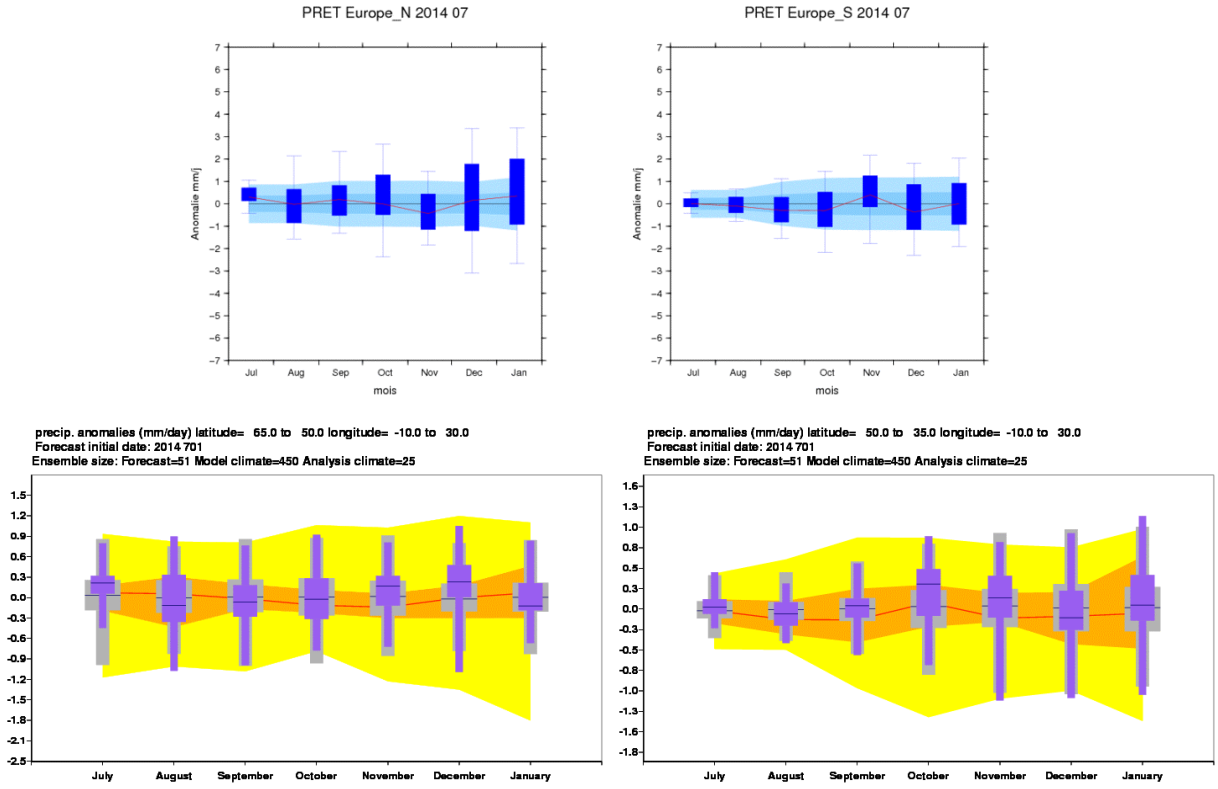



**fig.38: Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom - idem).**

Some consistency between the 2 models over Southern Europe.

**For Northern Europe** : the signal move in time from Above normal conditions (in July) to close to Normal in both models. The spread is large (even very large for MF).

**For Southern Europe** : opposite scenarios between the 2 models ; starting close to normal and moving below normal in MF while moving Above normal in ECMWF. Also here the spread is large.

***In Météo-France climagrams, the distributions of area averages are displayed for the seasonal forecast (dark blue boxes and wiskers), and the climate reference on the 29-year hindcast period (blue and light blue bands). The limits of the boxes (ensemble forecast) and blue band (climate reference) correspond to the upper and lower terciles. The limits of the wiskers (ensemble forecast) and light blue band (climate reference) correspond to the mean + 1 standard deviation and the mean – 1 standard deviation. The red line corresponds to the ensemble mean.***

# II.6. MODEL'S CONSISTENCY

## II.6.a GPCs consistency maps

GPC_seoul/washington/melbourne/tokyo/ecmwf/montreal/toulouse/moscow/cptec/beijing
SST : GPC_seoul/washington/melbourne/montreal/tokyo/ecmwf/exeter/toulouse/beijing
**Jul2014 + ASO forecast**

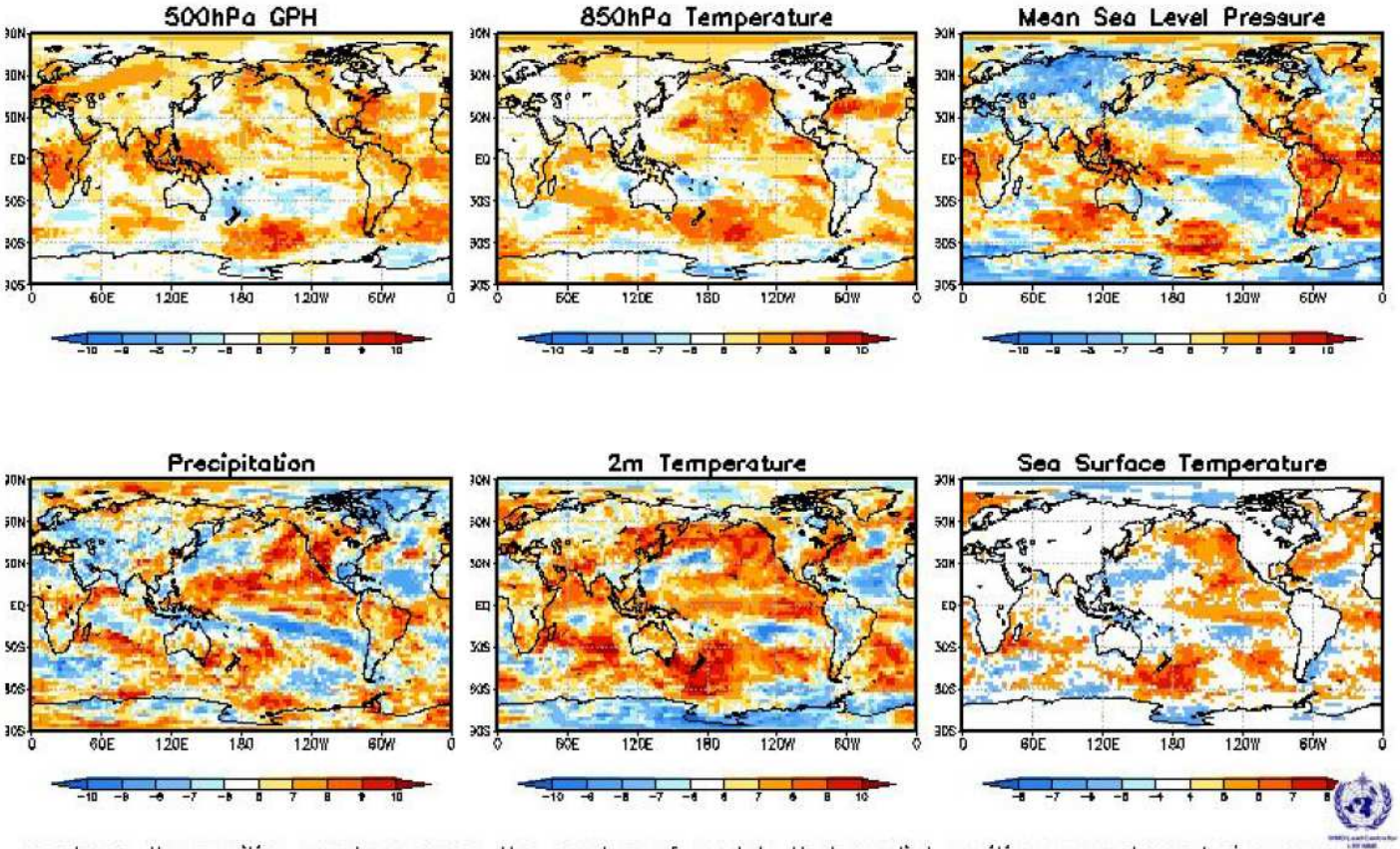



**fig.39:** ***GPCs Consistency maps from LC-MME*** *http://www.wmolc.org/*

**For SST** : Surprisingly, less consistency than expected in the SST forecasts and the Tropical regions, especially over the Pacific but also over the Indian Ocean and the Atlantic. The greatest consistency is in the sub-tropics (Southern Indian Ocean) and mid-latitudes of the Northern and Southern Hemisphere (Pacific and Atlantic to some extent).
**For Z500** : Mostly Above normal consistent signal over the Maritime continent and Africa (south to the equator). In the Northern Hemisphere, consistency for a positive anomaly in the sub-tropics (EA mode positive) and also close to Eastern coast of North America. Positive anomalies across Europe extending toward NEA regions.
**For T2m** : Some very consistent signal (warmer than normal) over the Pacific (equatorial regions, mid-latitudes of the Northern hemisphere), part of East Asia. Also around the Indian Ocean (vicinity of Madagascar, Arabic Peninsula, Pakistan, …). Some consistency for Above normal conditions over the Eastern coast of North America. Some Below Normal enhanced probabilities over the South America. To be noted the little consistency over the European (to the exception of a portion of Scandinavia).
**For Precipitation** : Some consistent signal for Above Normal conditions in the Pacific regions, over a large portion of USA (western side) and part of the Canada, over a part of South-America (especially Brazil). The Drier than Normal scenarios are possible over the maritime continent, part of the Indian

sub-continent (extending toward North Africa) and the Caribbean. Some consistency over the European continent (Below Normal scenarios from Caspian Sea up to Scandinavia).

## II.7. "EXTREME" SCENARIOS

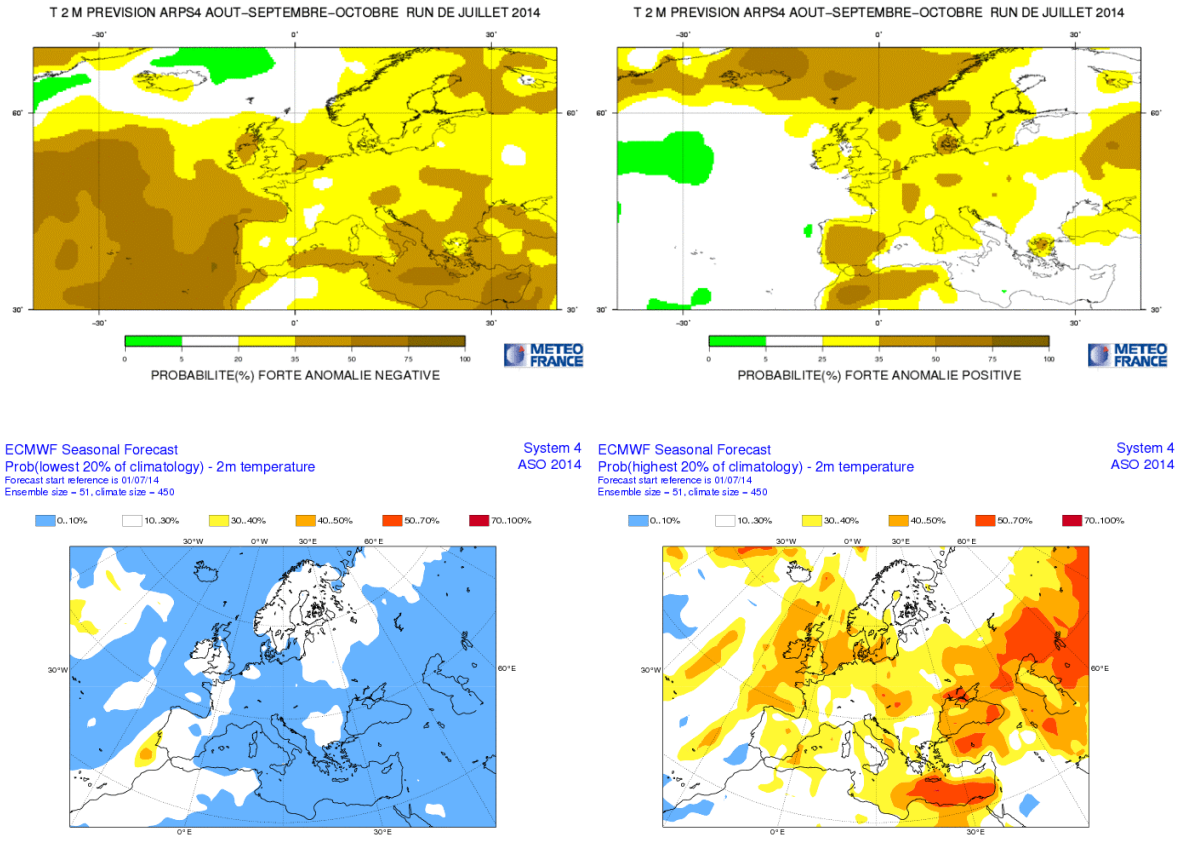



**fig.40: Top : Probability of « extreme » above normal conditions from T2m for Meteo-France ( left - highest ~15% of the distribution and right lowest ~15% of the distribution)**
**Bottom : idem from ECMWF (left - highest 20% of the distribution and right lowest 20% of the distribution).**

In relationship with the differences in the Z500 forecasts only little consistency between the 2 models. The **Very below normal scenario** shows enhanced probabilities only in MF. Some consistency for the **Very Above normal** scenario over western, central Europe and part of Scandinavia. The strongest probabilities are over the regions between the Black and the Caspian seas. .
In MF, for the Very Below normal scenario ROC scores are worst than climatology. For the Very Above normal scenario, they are fairly good (between 0.6 and 0.85) around the Mediterranean basin. So some information could be inferred from these forecasts especially over region Mediterranean region (with a significant score for the Above normal scenario).

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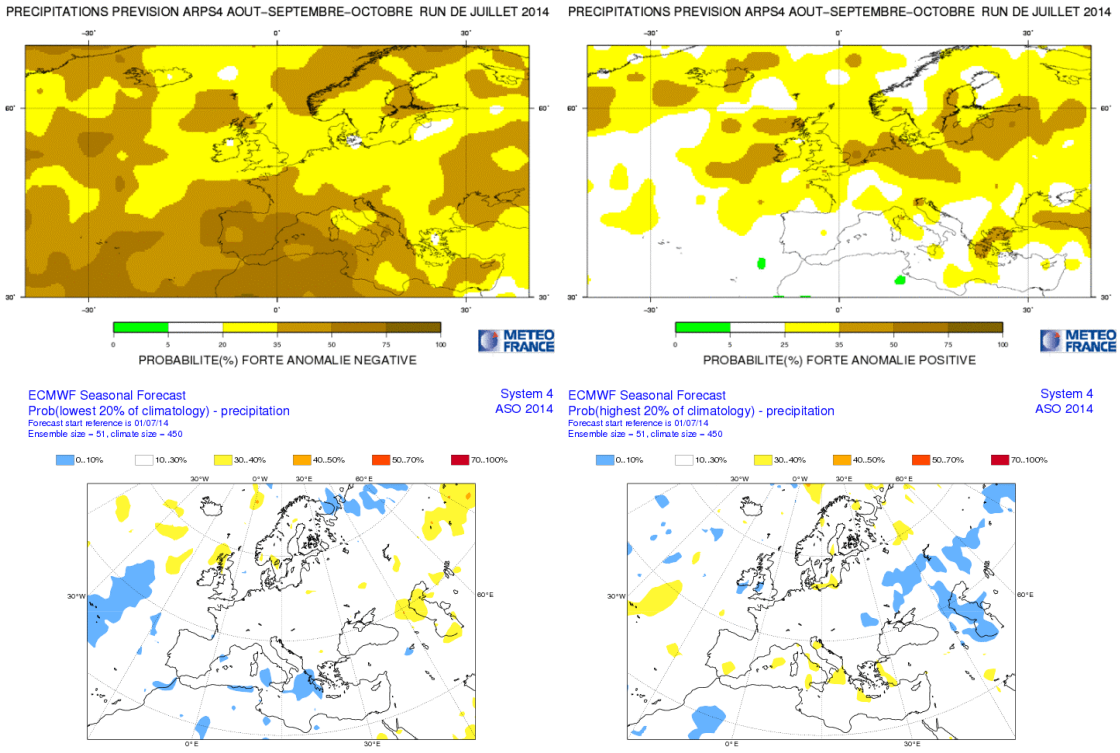



**fig.41: Top : Probability of « extreme » above normal conditions for rainfall from Meteo-France ( left - highest ~15% of the distribution and right lowest ~15% of the distribution)**
**Bottom : idem from ECMWF (left - highest 20% of the distribution and right lowest 20% of the distribution).).**

For the very Below or very Above normal scenario, mostly No signal in ECMWF. In MF there are divergent signal for extreme scenarios (enhanced probabilities for both extreme categories). The ROC scores in MF are mostly worst than climatology over most of Europe to the exception of the most Western side of Mediterranean regions for the Very Above category.
So in relationship with the current predictability and the model uncertainties, it seems **difficult to use these extreme precipitation forecasts**.

# II.8. DISCUSSION AND SUMMARY

## Forecast over Europe

For this forecast the major comment is about the **current predictability** in the climate system. The development of a warm event in the Pacific suggest some possible predictability, but mostly located in the Tropics at this stage (Pacific, Indian Ocean and Atlantic). The predictability seems to be not present over European regions.
The **EuroSIP** forecasts are likely a **good synthesis** of possible scenarios across the planet and more specifically over European regions.
**For rainfall**, "No Privileged Scenario" covers of the entire European continent to the possible exception of the vicinity of Turkey).
**For temperature** : if we follow the Euro-SIP forecast the Above normal scenario could be privileged for most of Europe with slightly enhanced probabilities. However, referring to the lack of predictability, these enhanced probabilities are likely the trace of the climate trend instead a real seasonal anomaly. So "No Privileged" scenario should be preferable to the exception of part of Scandinavia and the regions in the vicinity of the Black and Caspian seas.
Obviously, some downscaled information could detail these scenarios for specific countries or sub-regions.

## Tropical Cyclone activity

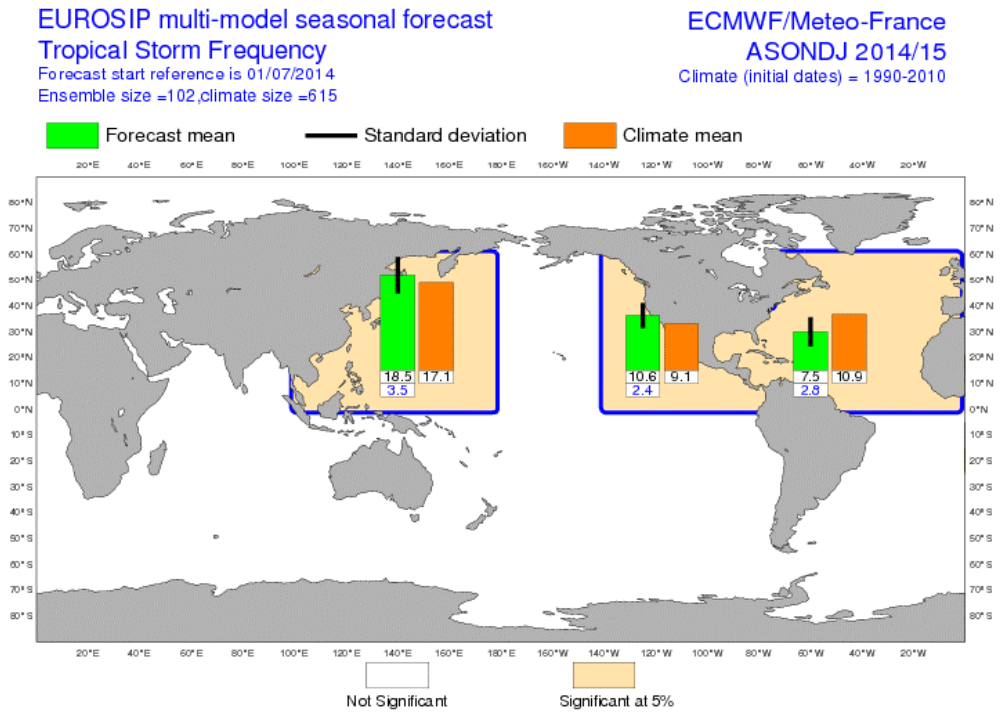



**fig.42: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF).**
**http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtrop/trop_euro/eurosip_tropical_storm_frequency/**

For the Tropical Cyclone season and in relationship with the SSTs scenarios, Euro-Sip forecasts indicate Below Normal Topical Cyclone activity over the Tropical North Atlantic (consistently with the development of the Pacific warm event and a weak African monsoon) and Above normal in the Pacific.

WMO RA VI
RCC Network

## *Synthesis of Temperature forecasts for August-September-October 2014 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 |
|---|---|---|---|---|---|
| *CEP* | | | | | |
| *MF* | | | | | |
| *Met Office* | | | | | |
| *CPC* | | | | | |
| *JMA* | | | | | |
| synthesis | | | | | |
| *LC-MME* | | | | | |
| *Eurosip* | | | | | |
| privileged scenario by RCC-LRF node | *above normal* | *no privileged scenario* | *no privileged scenario* | *no privileged scenario* | *no privileged scenario* |

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 August-September-October 2014 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 |
|---|---|---|---|---|---|
| *CEP* | | | | | |
| *MF* | | | | | |
| *Met Office* | | | | | |
| *CPC* | | | | | |
| *JMA* | | | | | |
| synthesis | | | | | |
| *LC-MME* | | | | | |
| *Eurosip* | | | | | |
| privileged scenario by RCC-LRF node | *no privileged scenario* | *no privileged scenario* | *no privileged scenario* | *no privileged scenario* | *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

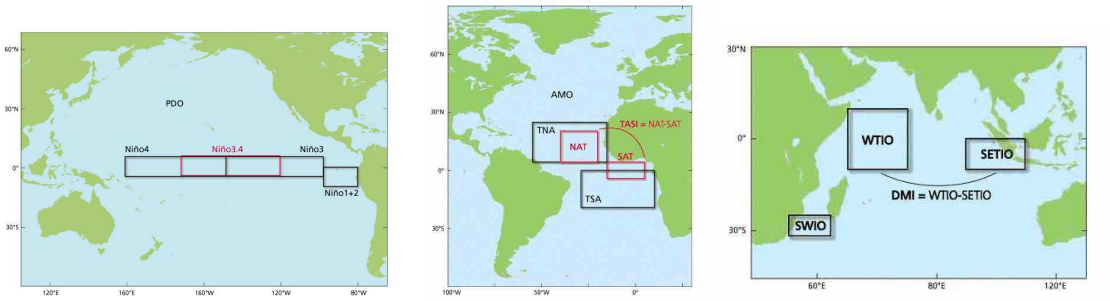
El Niño and La Niña events primarily affect tropical regions and are monitored by following the SST evolution in specific area of the equatorial Pacific.

- 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

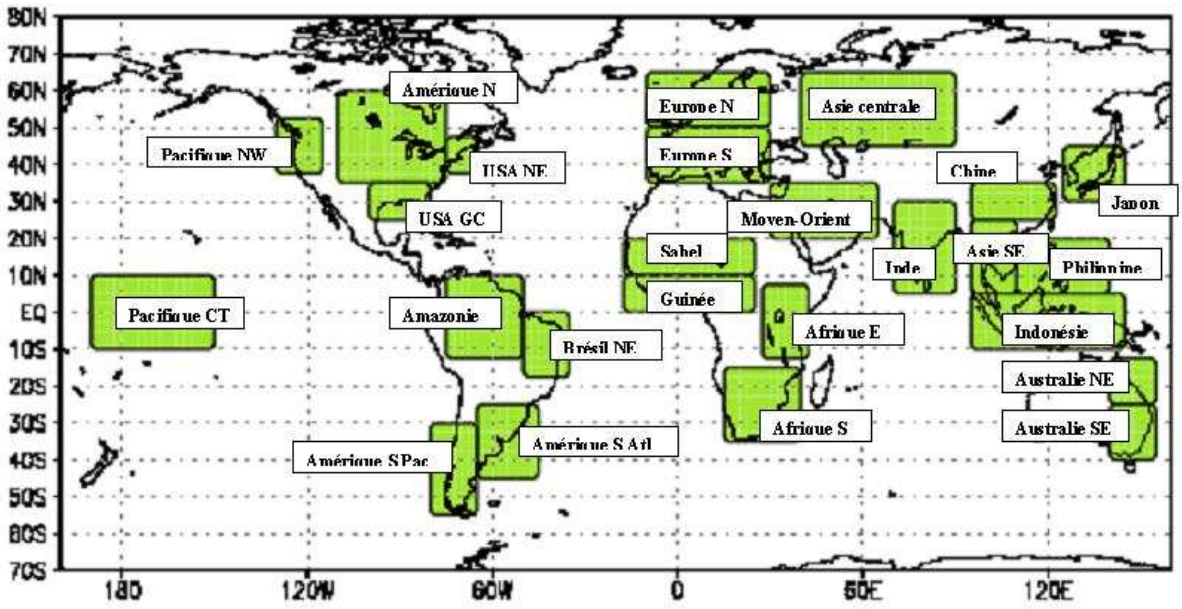
figure). It represents the Walker (zonal) circulation and its modifications. Its sign is opposite to the SST anomaly meaning that when the SST is warmer (respectively colder) than normal (Niño respectively Niña event), the zonal circulation is weakened (respectively strengthened).

***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

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