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# GLOBAL CLIMATE BULLETIN n°159 - SEPTEMBER 2012

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# I. DESCRIPTION OF THE CLIMATE SYSTEM (JULY 2012)

## I.1. OCEANIC ANALYSIS

### I.1.a Global Analysis

At the Surface (fig. 1) :
In the Tropical Pacific : in the equatorial wave continuation of the SST warming in the Eastern part up to the dateline to the exception of the most eastern part where the positive anomaly decreases (in the Niño 1+2 box). Little evolutions in the mid-latitudes of the Southern hemisphere. In the mid/high latitudes of the Northern hemisphere, strengthening of the Horse Shoes shape negative anomaly and the associated positive anomaly (West and Centre of the basin).

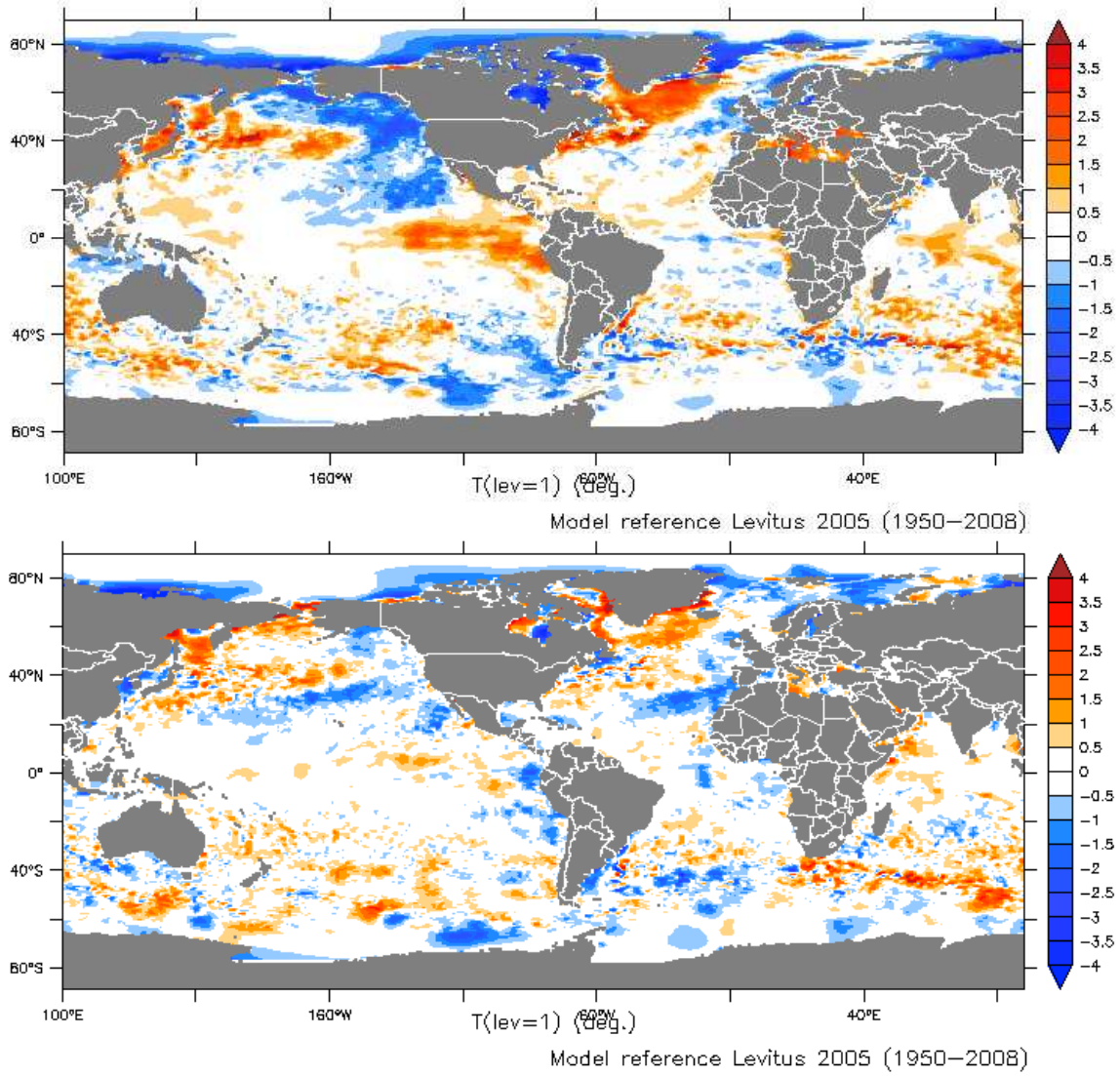



**fig.1: top : SSTs Anomalies in July 2012 (°C) (reference 1950-2008)**
**bottom : SST tendency (current – previous month) http://bcg.mercator-ocean.fr/**

For the Tropical Atlantic : little evolution in the equatorial band with still a positive anomaly in the Guinean Gulf. In the Southern hemisphere, still a dipole pattern (Colder / Warmer than normal) between the Tropics and the mid-latitudes. The strip of positive anomaly from the Caribbean up to Spain has dramatically decreased despite the tripole-like pattern remains still visible over the Northern Atlantic.
In the Indian Ocean : Mostly warmer than normal from West Australia up to the Great Horn of Africa.
In subsurface (fig.2) :
In the equatorial Pacific waveguide, heat content anomalies similar to SSTs and thermocline depth anomalies (see fig. 5). Note still positive anomalies in the most Western part (both around 10°N and S) while the signal is very weak at the surface. In the mid/high latitudes of the Northern hemisphere, great consistency with the surface signal.
In Tropical Atlantic : Little evolution. Patterns quite fragmented and quite similar to previous month (average conditions not too far from normal). Persistence of the positive anomaly in the North-Western part of the basin (close to the mid-latitudes)
In the Indian Ocean : heat content consistent with SST signal in the regions close to the equatorial waveguide and Australia. Little evolutions with respect of previous month

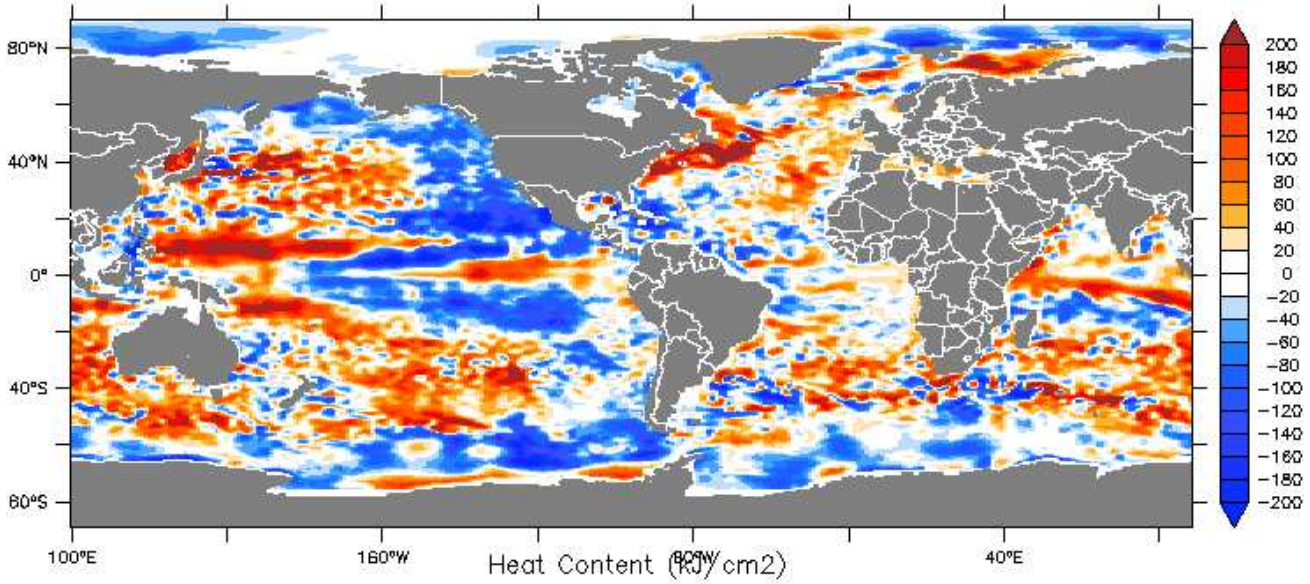



**fig.2: map of Heat Content Anomalies (first 300m) in July 2012 (kJ/cm²). (reference 1950-2008)**
http://bcg.mercator-ocean.fr/

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

The positive anomaly starting from the Eastern part is now conspicuous and continue to develop. Little Trade Wind anomalies over most of the equatorial part of the basin to the exception of regions close to the deadline (Northern Hemisphere) likely in relationship with enhanced convection (West to the dateline). Consistently, the SOI is close to 0.

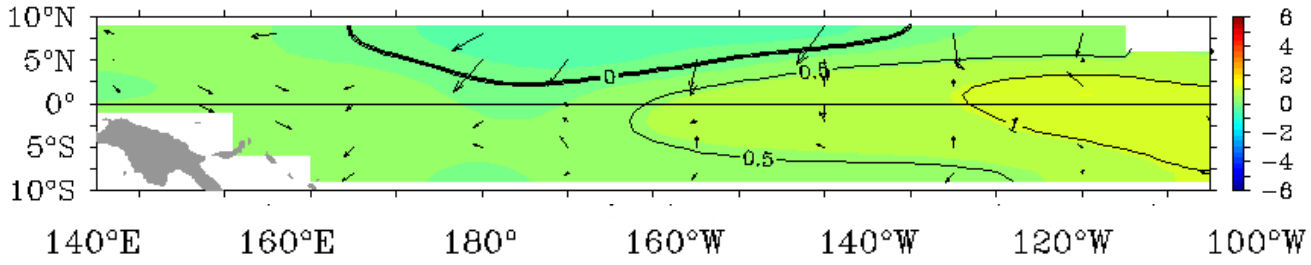



**fig.3: SST Anomalies and Wind anomalies in July 2012 over the Equatorial Pacific from TAO/TRITON.**
http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/monthly-summary.html

In the Niño boxes (4, 3.4, 3 et 1+2 ; see definition in Annex) the SST anomalies illustrate the warming continuation (excepted in Niño 1+2 box). The monthly averages in July are respectively

0,0°C, +0,6°C, +1,0°C and +1,2°C from West to East.

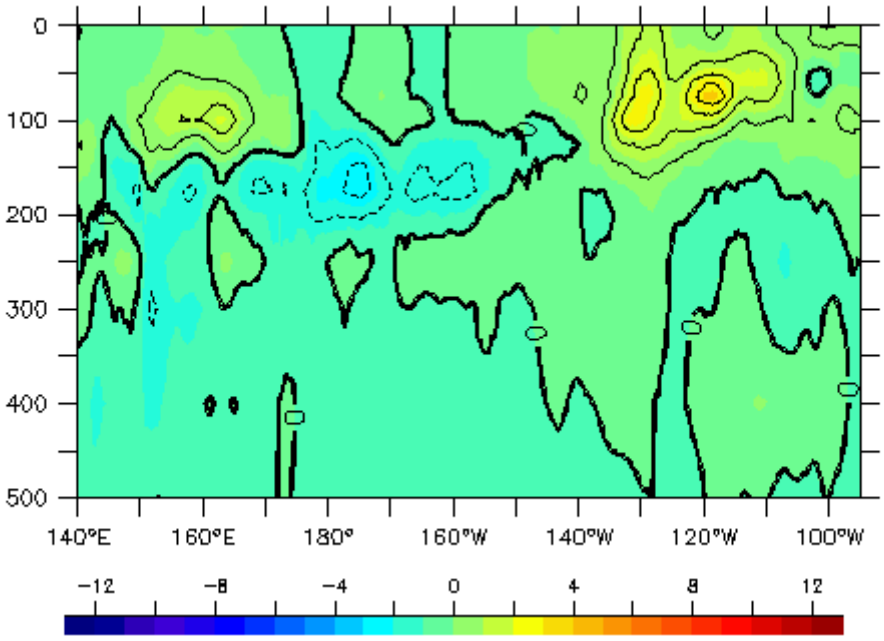



**fig.4: Oceanic temperature anomaly in the first *500 metres* in the Equatorial Pacific, in July 2012** http://bcg.mercator-ocean.fr/

In the equatorial waveguide (fig. 4) : persistence of warmer than normal conditions under the surface on the Eastern part (excepted close to the Eastern coast). Cooling on the most western part but still a warm reservoir close to 100m depth. A negative anomaly develops in the Central part close to the 150m depth. The last MJO forecast shows little MJO activity for the next month.
The thermocline structure (fig. 5) : Deeper than normal over the eastern part and close to normal In the western part. Some thinner than normal signal is visible on the most western and central parts of the basin.

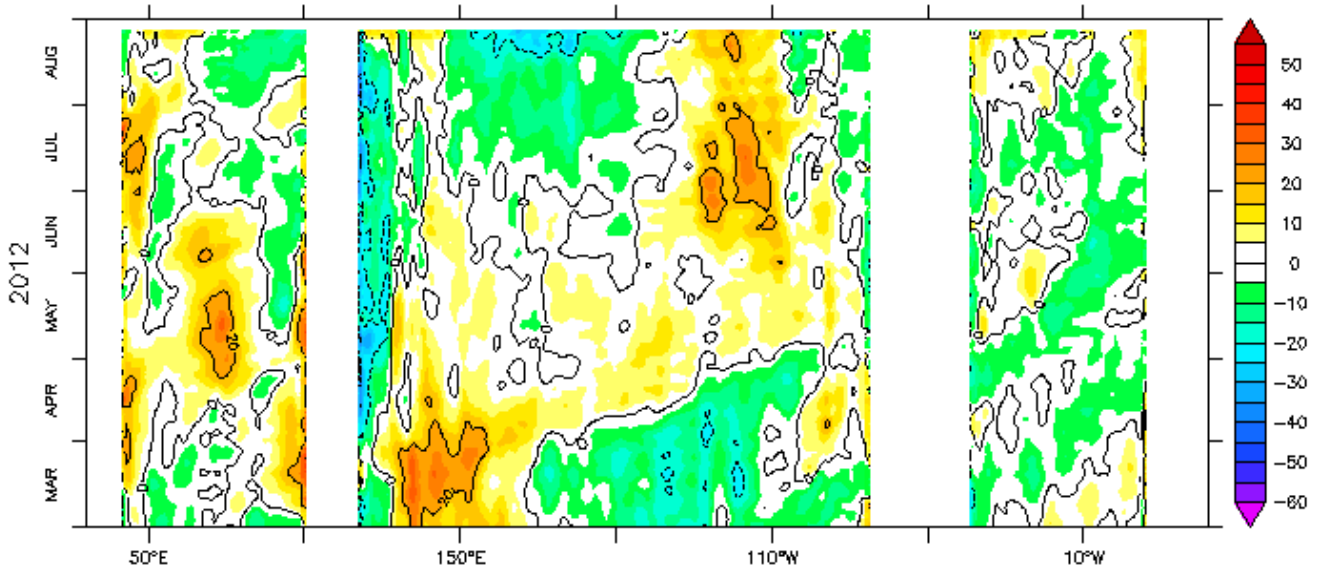



**fig.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 12 month period.** http://bcg.mercator-ocean.fr/

## I.1.c Atlantic Basin

Northern Tropical Atlantic : little anomalies (some positive but weak in the western part).

Equatorial waveguide : extinction of the negative anomaly on the western part while in the Eastern part (Guinean Gulf) there is a weak but persistent positive anomaly.
The Southern Tropical Atlantic : still negative anomaly but decreasing. Still a dipole pattern between Tropics and sub-tropics. Continuation of the warming along the western coast (South America).

### I.1.d Indian Basin

Southern Tropical Indian Ocean : warmer than normal especially West to Australia up to Madagascar.
Equatorial waveguide : some warmer than normal conditions in Western and close to normal in Eastern parts. The IOD is still now positive.
Northern Tropical Indian Ocean : Weak negative anomalies along the coast of Arabian Sea and warming just South to India.

## 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) : a 2 wave number pattern is visible just North to the equator. Generally speaking the patterns are not fully consistent with an El Niño development.
On the Pacific : strong and strengthening Divergent circulation anomaly (upward anomaly motion) on the Western side (which extends northward, southward and interestingly toward the dateline). Sub-regional Divergent circulation anomalies in the Southern hemisphere (close to 20°S) and especially close to Easter Island. Convergent circulation (downward anomaly motion) anomaly on the North-Eastern Pacific, West to California.
On the Atlantic : Strong and large convergent circulation anomaly (downward anomaly motion) on Southern Atlantic which extends up to North-Eastern coast of South America and the Caribbean. Divergent circulation anomaly close to Sudan.
On the Indian Ocean : positive anomaly (convergent circulation anomaly - downward anomaly motion) just South to the Indian continent less intense than the previous month.

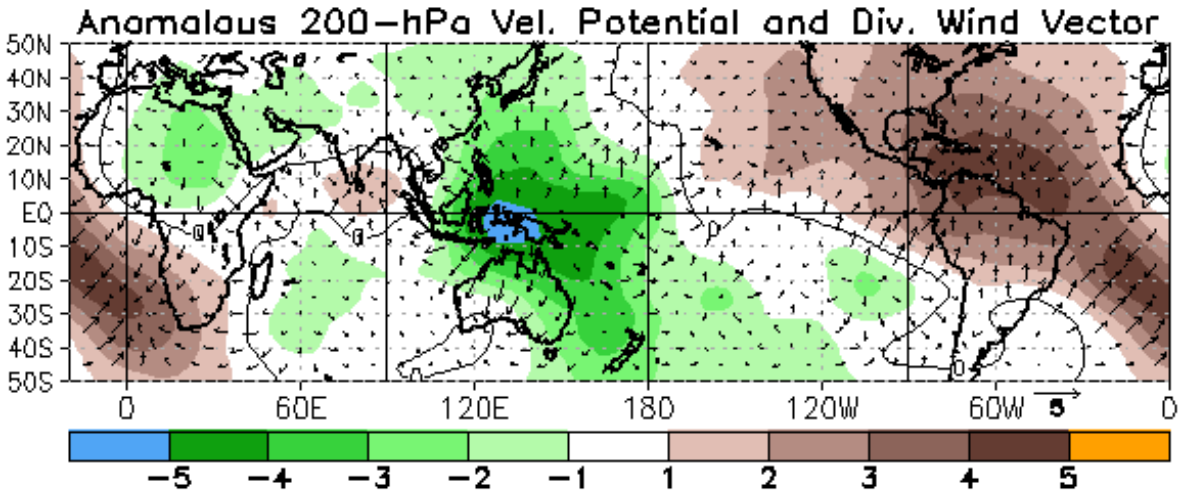



**fig.6: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly in July 2012. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly). http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml**

Stream Function anomalies in the high troposphere (fig. 7 – insight into teleconnection patterns tropically forced) : still weak signal in the Tropics likely related to a weak ocean/atmosphere coupling. Some traces

of possible teleconnection for regions surrounding the Pacific. However, a large part of the signal seems to be related to the mid-latitudes/sub-tropics (especially over Europe and Mediterranean regions).

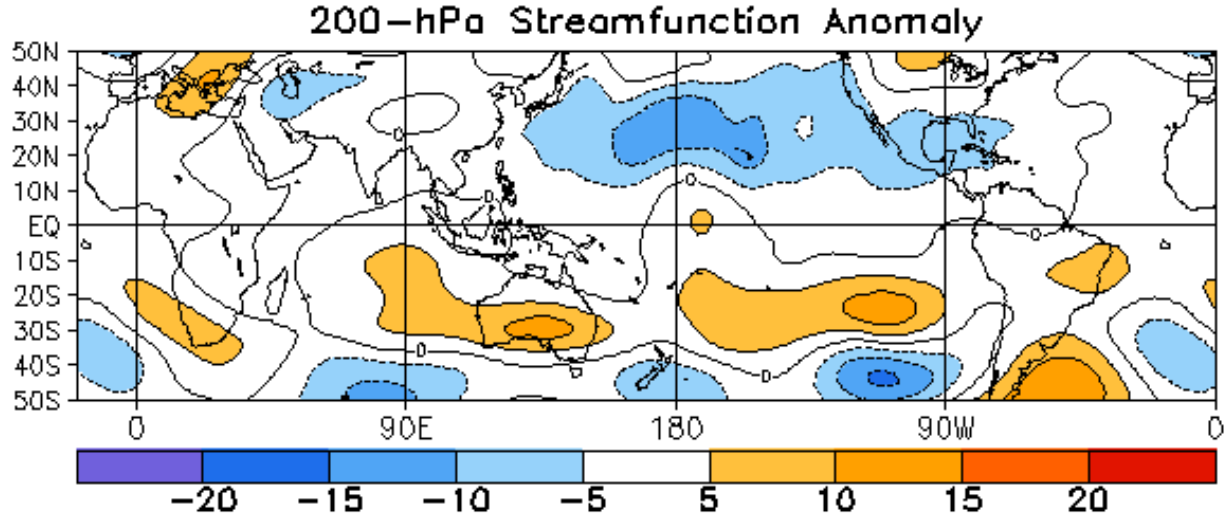



**fig.7: Stream Function Anomalies at 200 hPa in July 2012.**
**http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml**

Geopotential height at 500 hPa (fig. 8 – insight into mid-latitude general circulation) : In relationship with previous discussion, the main anomalies are mostly related to mid-latitude dynamic with sub-regional structure. Consequently the main active atmospheric modes in the Northern hemisphere (see next table) seems to be mostly related to mid-latitude dynamic. For Europe, note the NAO mode (-1,3 – summer mode) and some positive geopotential height anomalies from Central Europe up to the Mediterranean basin. To be quoted the positive anomaly over the Great Lake region.

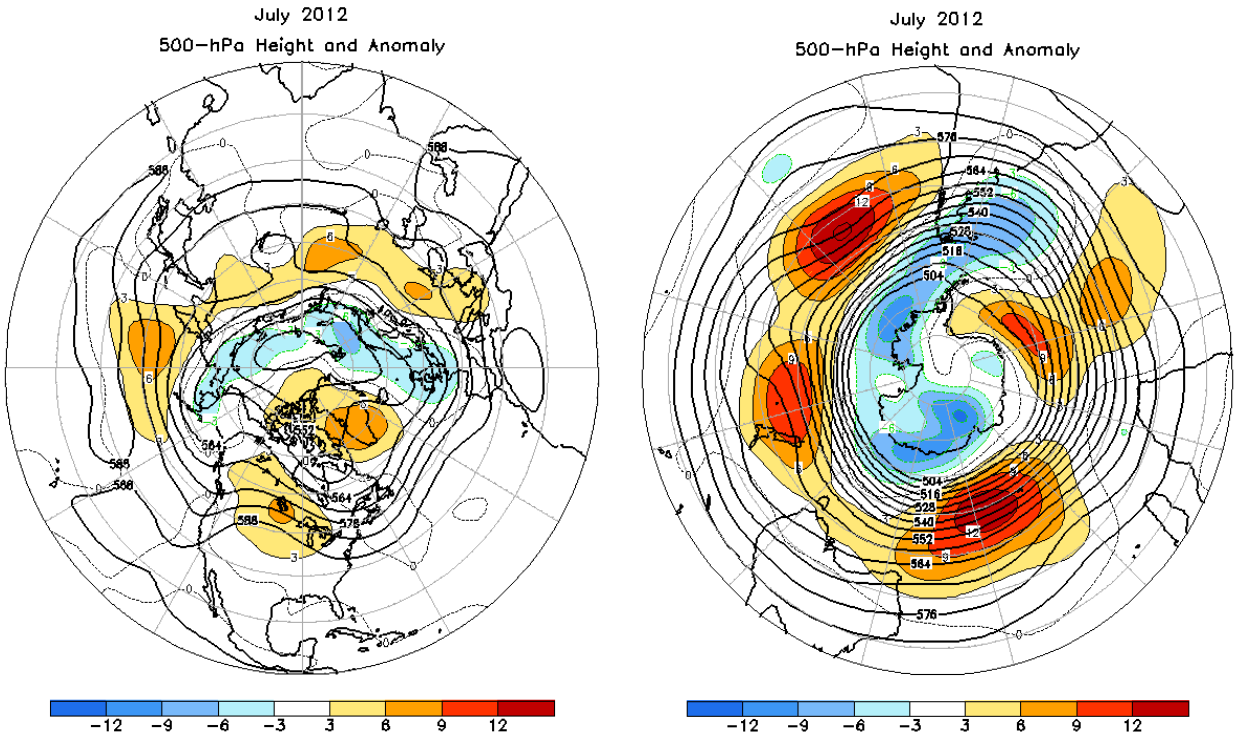



**fig.8: Anomalies of Geopotential height at 500hPa in July 2012 (left North Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige9.shtml, and right South Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige15.shtml)**

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 |
|---|---|---|---|---|---|---|---|---|---|
| **JUL 12** | **-1.3** | **1.0** | **0.6** | **-1.0** | **-0.6** | **---** | **-1.4** | **-0.6** | **1.0** |
| JUN 12 | -2.2 | -0.1 | -1.4 | -0.9 | -0.4 | --- | 0.0 | -1.4 | -1.8 |
| MAY 12 | -0.8 | 0.5 | -1.7 | -1.5 | -0.3 | --- | -0.5 | -0.6 | -0.1 |
| APR 12 | 0.4 | -0.3 | -0.3 | 0.3 | -0.1 | --- | -1.6 | -0.9 | -1.0 |
| MAR 12 | 0.9 | -0.6 | 0.8 | -2.6 | -0.2 | --- | 1.3 | -0.5 | -1.4 |
| FEB 12 | 0.0 | -1.7 | 1.0 | -0.3 | 0.7 | 0.4 | -0.6 | 0.3 | 0.2 |

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

## I.2.b Precipitation

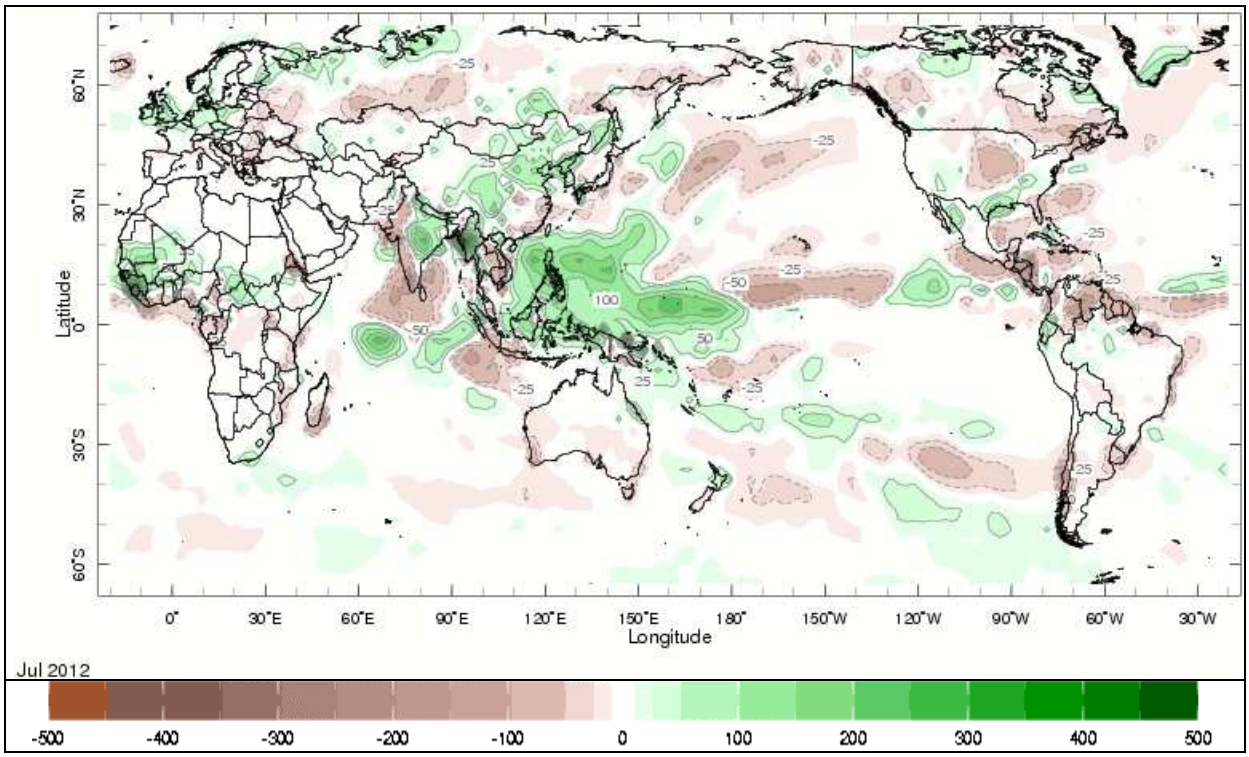



**fig.9: Rainfall Anomalies (mm) in July 2012 (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.**
**http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/**

Pacific : Good consistency with the Divergent/Convergent Circulation anomalies over the Western (strong positive anomaly) and Central (negative anomaly).
Atlantic : strong negative anomaly over the North of South (and Central) America. and positive anomalies over Sahel (especially over the western part). Drier than normal conditions over regions close to the Guinean Gulf. The relationship with the velocity potential field anomaly is unclear.
Indian Ocean : strong negative anomaly over most of the South and Western coast of India. Positive anomalies on the North Eastern side possibly in relationship with the strong Divergent Circulation anomaly (see fig. 6) on the western Pacific.
Australia, some traces of negative anomalies, especially over Southern regions (both East and West).
Over Europe : to be quoted the contrast between North-West (wet) and Central and South-East Europe (dry) consistently with the Geopotential anomalies.

## I.2.cTemperature

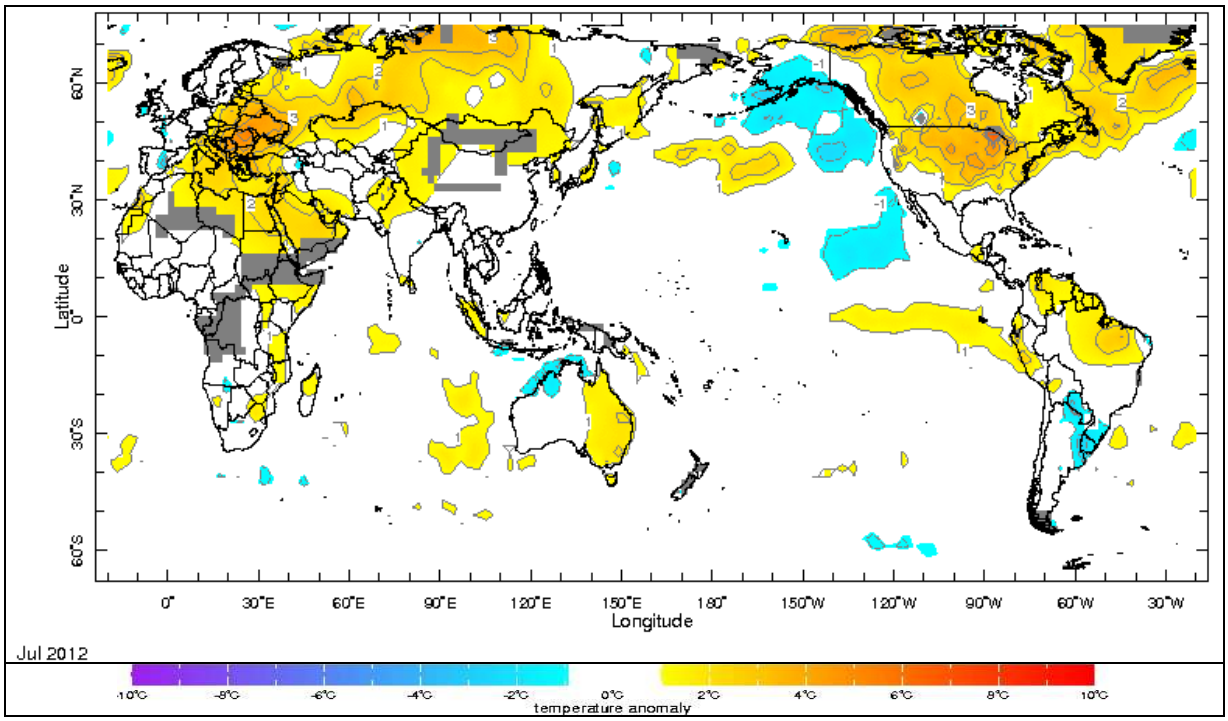



**fig.10: Temperature Anomalies (°C) in July 2012 (departure to the 1979-2000 normal)** http://iridl.ldeo.columbia.edu/maproom/.Global/.Atm_Temp/Anomaly.html

North-America : Warmer than normal conditions over a large portion of the continent which extends southward over the Great Plain up to Mexico borders to the South and northward to Greenland. Negative anomaly over Alaska (see SST).
South-America : Warmer than normal conditions over the Northern part of the continent.
Australia : Warmer than normal conditions on the Eastern part.
Asia : Warmer than normal conditions excepted over India and South-East Asia (close to normal).
Africa : Warmer than normal conditions over North and Eastern Africa (including the Arabic Peninsula). Close to Normal over West and South Africa.
Europe : Above normal conditions over Central and regions close to the Mediterranean basin (especially on the eastern side). Close to normal conditions on the Western façade.
This signal is likely at least partly related to the climate change.

## I.2.d Sea Ice

In Arctic (fig. 11 - left) : continuation of the dramatic decrease of the sea-ice extension (negative anomaly still below 2007 value) with some regional modulation in the Barents Sea (very large deficit).
In Antarctic (fig. 11 - right) : slightly above normal sea-ice extension anomaly with some regional modulation.

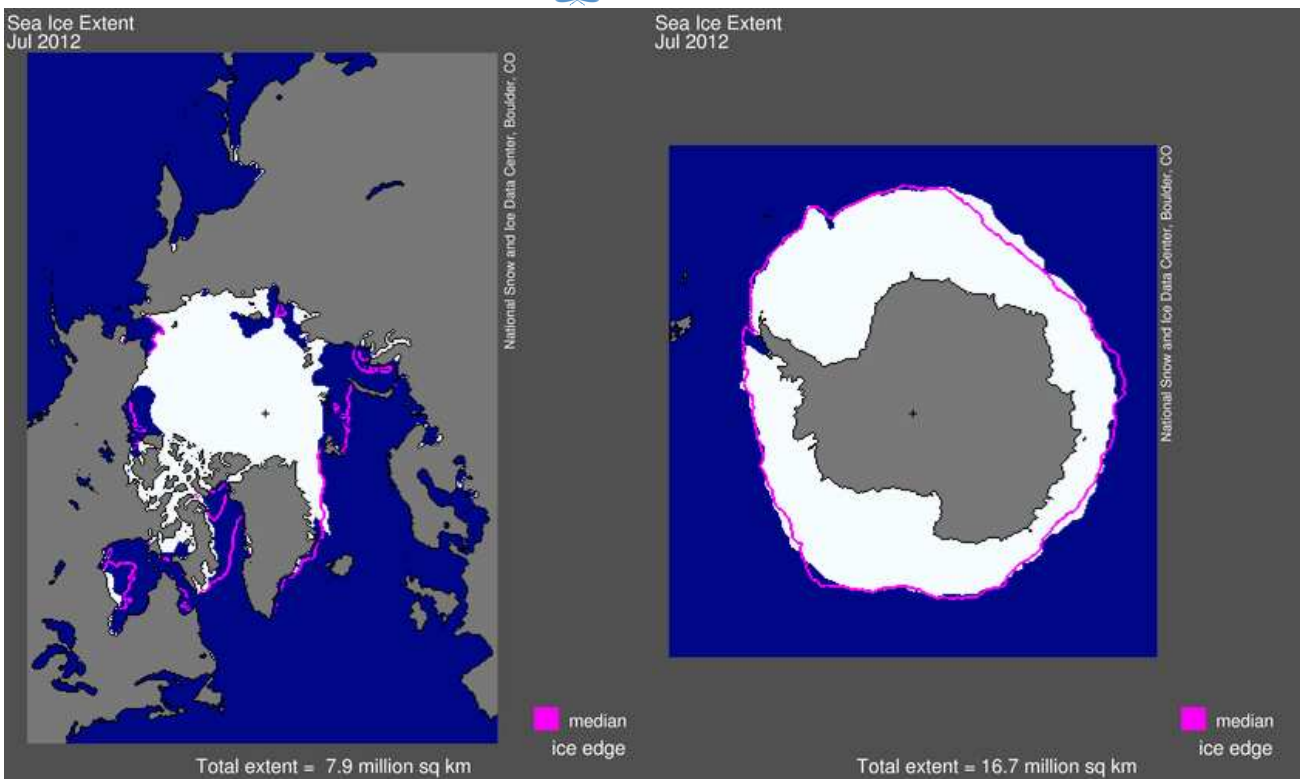



**fig.11: Sea-Ice extension in Arctic (left), and in Antarctic (right) in July 2012. The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/**

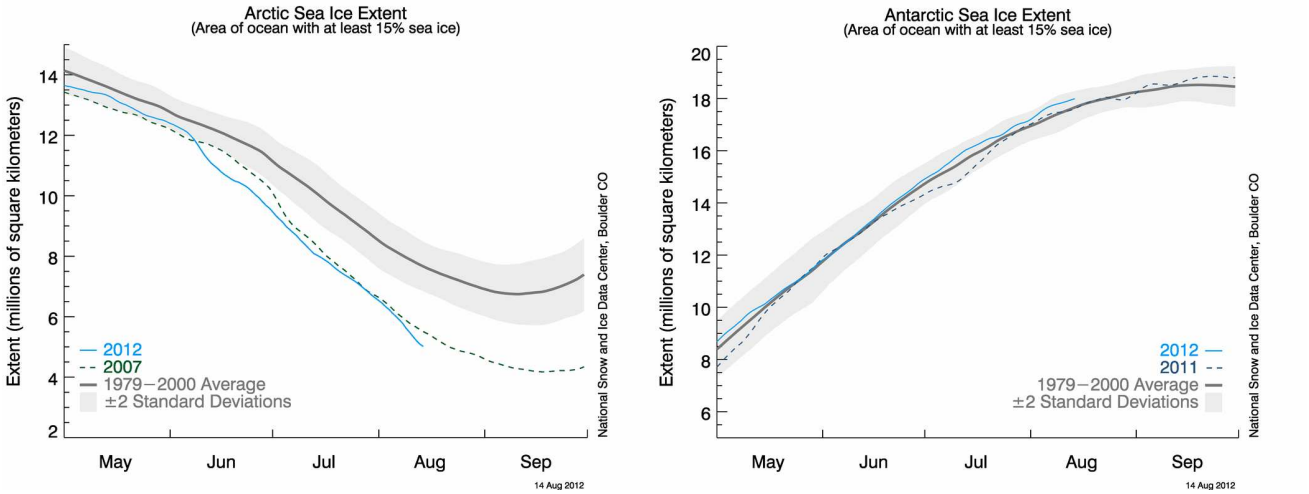



**fig. 9bis : Sea-Ice extension evolution from NSIDC**
**http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png**

# II.SEASONAL FORECASTS FOR SON FROM DYNAMICAL MODELS

## II.1. OCEANIC FORECASTS

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

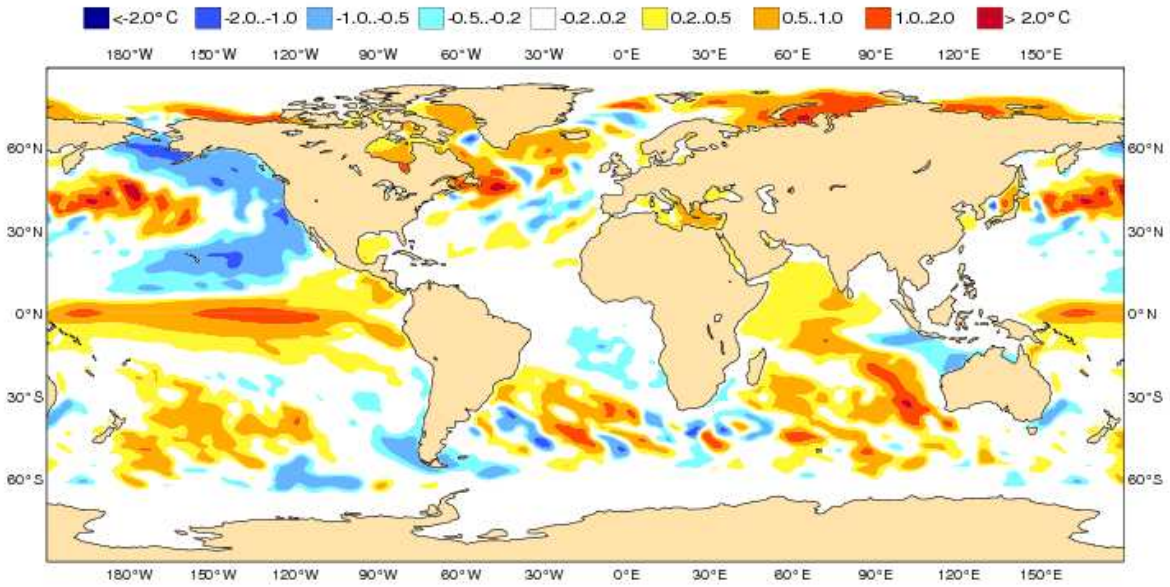



**fig.12: SST anomaly forecast (in °C) from ECMWF for SON, issued in August.**
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

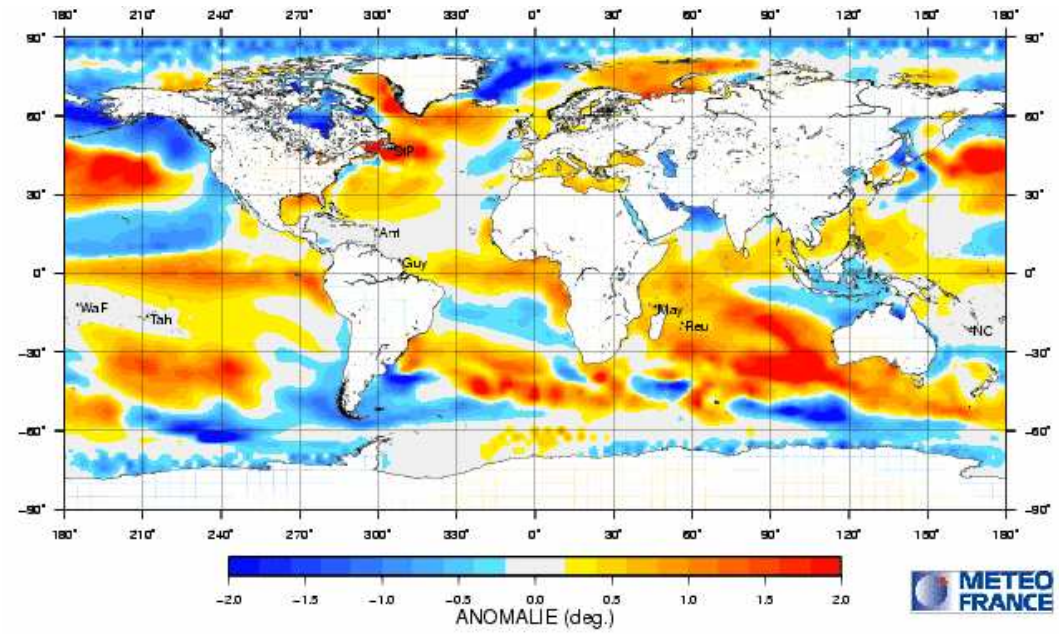



**fig.13: SST Anomaly forecast (recalibrated with respect of observation) from Météo-France for SON, issued in August. http://elaboration.seasonal.meteo.fr/**

For the 2 individual models :
At large scale very consistent over most of the Tropics despite some sub-regional differences.
Pacific : along the equator warmer than normal conditions ; warmer than normal conditions at the sub-tropical latitudes (both South and North). In the North Tropical area, colder than normal conditions

extending along the western coast of US and Canada. Over the SPCZ region warmer than normal conditions in both MF and ECMWF.
Atlantic : both models consistent over the South Atlantic (colder /Warmer than normal in the Tropics/sub-Tropics) and the mid-latitudes of the Northern hemisphere. Weak signal (close to normal) in the equatorial waveguide for ECMWF while it is warmer than normal for MF. Still some differences over the Caribean (warmer/close to normal for ECMWF/MF).
Indian Ocean : Very consistent patterns in both models. Warmer than normal more or less everywhere to the exception of the region between Australia and the maritime continent. Some colder than normal conditions in the most Northern part of Arabian Sea.
To be quoted that there is only little differences in the mid-latitudes.

In Euro-SIP :
Patterns very similar to one already presented on individual models in relationship with the consistency of forecasts of individual models at large scales.
Equatorial waveguide : warmer than normal conditions more or less everywhere (including Atlantic).
Atlantic : Close to Normal conditions in the Northern Tropics.
Indian Ocean : mostly warmer than normal conditions to the exception of regions close to Australia and the maritime continent.

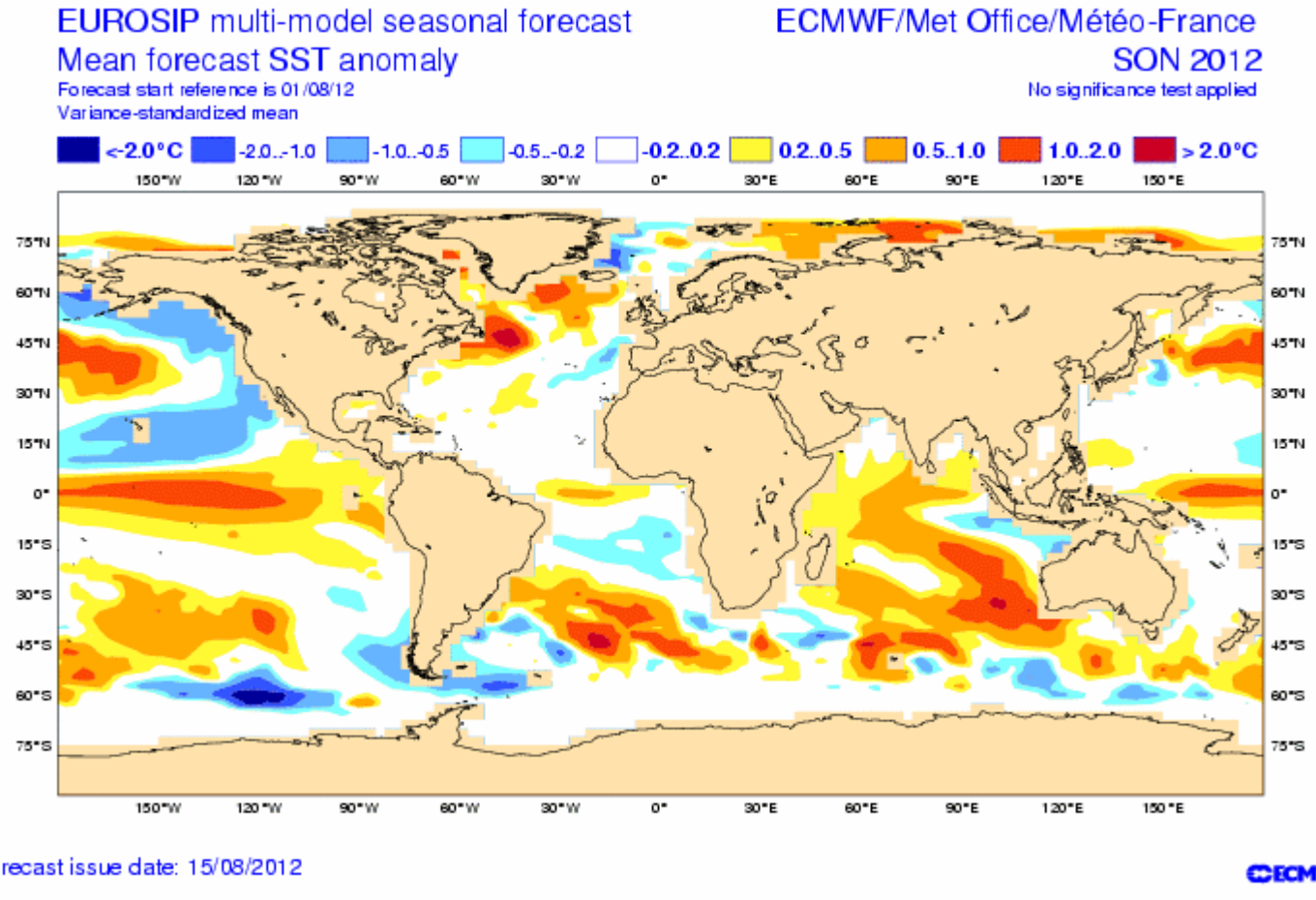



**fig.14:** ***SST Forecasted anomaly (in °C) from Euro-SIP valid for SON, issued in August.***

## II.1.b ENSO Forecast :

### Forecasted Phase for SON : weak (possibly moderate) El Niño

Synthesis of several model forecast for the Niño 3.4 box from IRI (see definition in Annex) including models from Euro-Sip and statistical models. Ensemble mean on figure 15 (circle for statistical models and squares for dynamical coupled models). The average of all dynamical models corresponds to the yellow thick line.

For SON : a large set of dynamical models give above normal conditions (sometime well above El Niño threshold) and continuation of the warming along fall period. Interestingly, a majority of models indicate a decrease of the warm event during the winter period. For the statistical models, they are mostly forecasting still warmer than normal conditions but mostly below the Niño threshold. So an El Niño event is expected from fall up to the end of this year ; however, the intensity should be weak (possibly moderate).

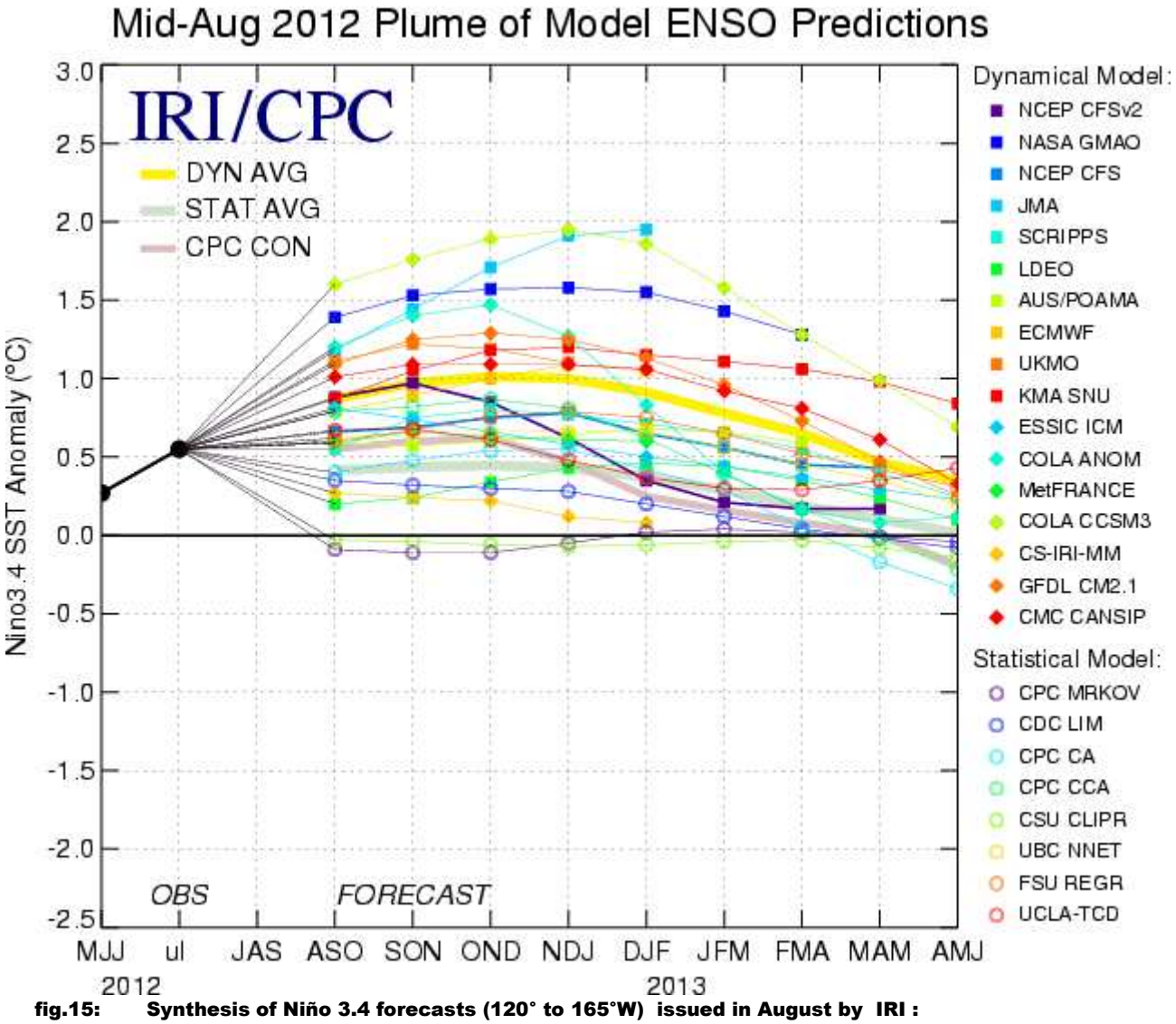



**fig.15: Synthesis of Niño 3.4 forecasts (120° to 165°W) issued in August by IRI : http://iri.columbia.edu/climate/ENSO/currentinfo/SST_table.html**

In the following table (from IRI) : current SST thresholds to decide the nature of forecasted event for the Niño3.4 box (« El Niño », « La Niña » or « Neutral ». These values depend on the season and a situation

is considered as « Neutral » if the forecast is within theses critical values. The 3 last lines give the 3-month mean of the different categories of models. The Dynamical model average reflects the weak El Niño conditions while the statistical model average stay within neutral conditions.

| SEASON | ASO | SON | OND | NDJ | DJF | JFM | FMA | MAM | AMJ |
|---|---|---|---|---|---|---|---|---|---|
| **Value « La Niña »**<br>**Value « El Niño »** | ***-0,55***<br>***0,50*** | ***-0,75***<br>***0,70*** | ***-0,75***<br>***0,75*** | ***-0,70***<br>***0,70*** | ***-0,65***<br>***0,65*** | ***-0,55***<br>***0,50*** | ***-0,45***<br>***0,40*** | ***-0,40***<br>***0,40*** | ***-0,45***<br>***0,45*** |
| *Average, statistical models* | **0.4** | **0.4** | **0.4** | **0.4** | **0.4** | **0.3** | **0.2** | **0.1** | **0** |
| *Average, dynamical models* | **0.9** | **1.0** | **1.0** | **1.0** | **0.9** | **0.8** | **0.7** | | |
| **Average, all models** | **0.7** | **0.8** | **0.8** | **0.8** | **0.7** | **0.6** | **0.5** | **0.3** | **0.2** |

Plumes from Météo-France and ECMWF for the 3 Niño boxes (see definition in Annex – fig. 16) :
In both models a warming up to El Niño threshold during fall period (a bit earlier in MF) and mostly a continuation of this warming along the 7 months of the forecast for MF while there is more uncertainty in ECMWF and some indication of possible decrease of the event during the winter period.

NIÑO 4 NIÑO 3.4 NIÑO 3

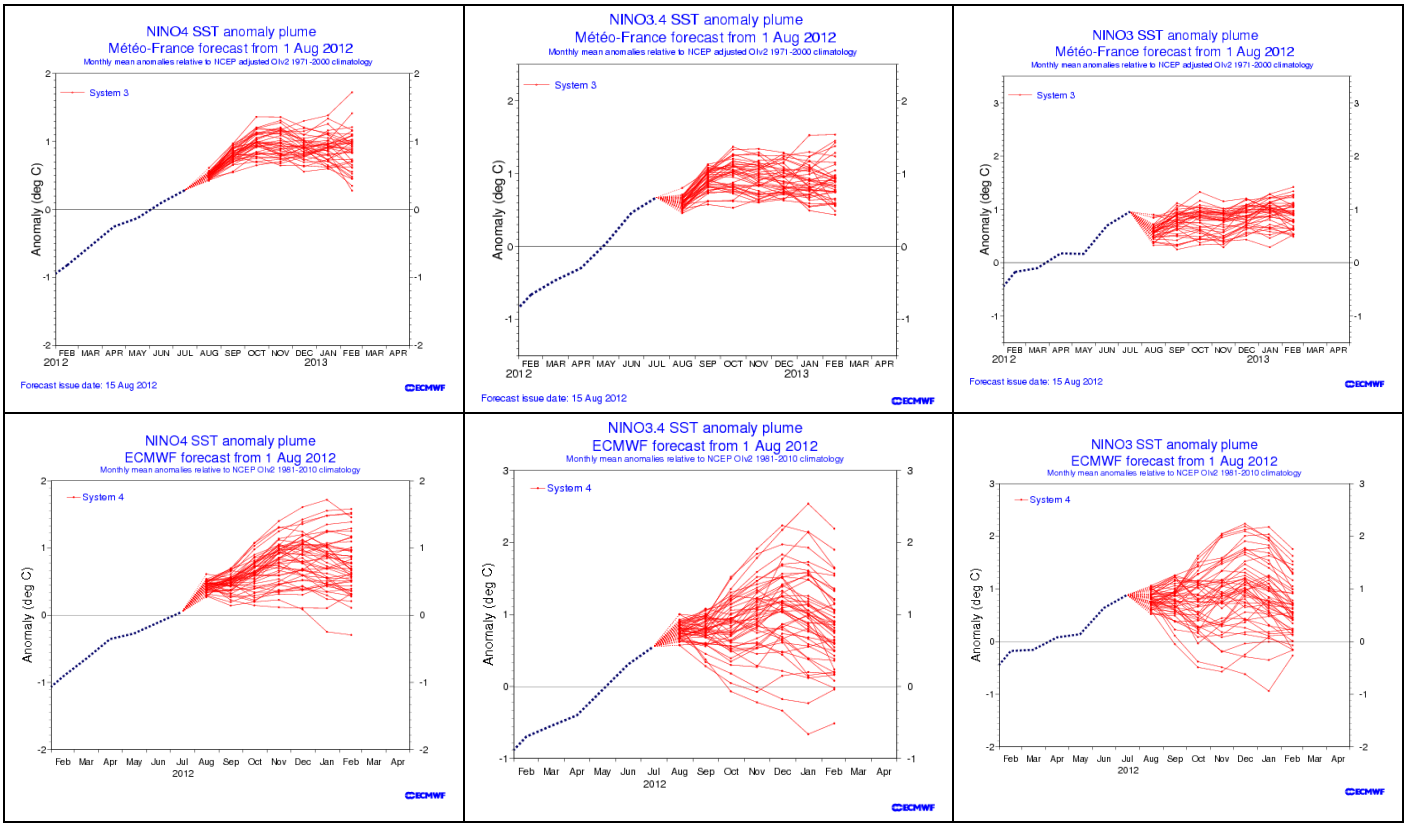



**fig.16: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (bottom) issued in August, monthly mean for individual membres. ( http://www.ecmwf.int/ )**

## II.1.c Atlantic Ocean forecasts :

**Forecasted Phase:** ***warmer than normal in the Northern/Southern Tropics***

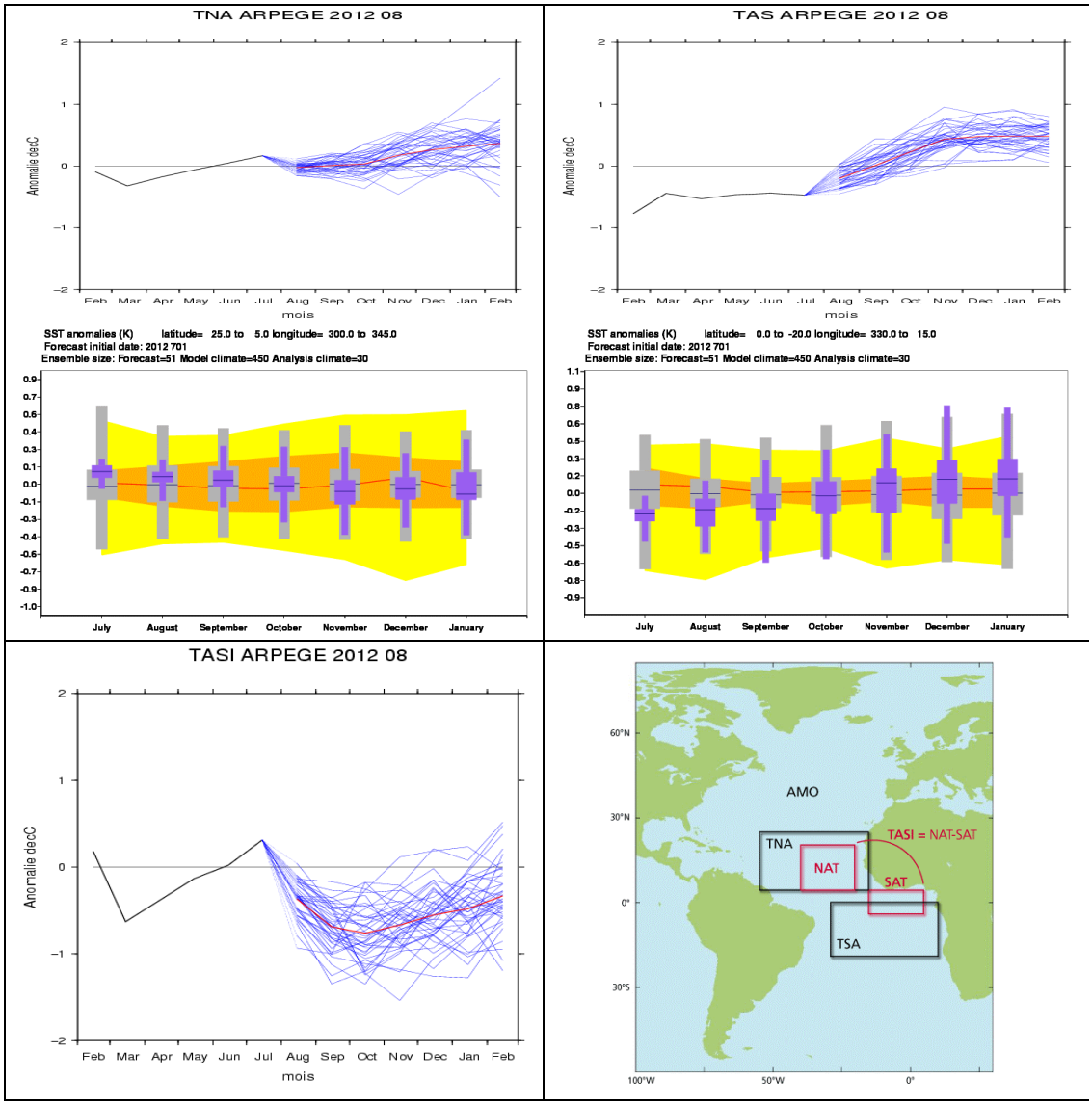



**fig.17:** ***SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, issued in August, plumes / climagrams correspond to 41 / 51 members and monthly means.***

North Tropical Atlantic : close to normal conditions with a slight but continuous warming in MF. In ECMWF, opposite evolution (warmer than normal at the beginning and return to normal conditions at the beginning of winter.

South Tropical Atlantic : in both models same time tendency starting with slightly cold conditions and a continuous warming leading to warmer than normal conditions at fall (in MF) or beginning of winter (ECMWF).

TASI : the TASI index is negative (likely related to the MF warm bias). But, looking to ECMWF, remark very similar behaviour of TNA and TSA (with a more rapid warming in TSA). So TASI should change from positive to negative phase by the end of the year.

## II.1.d Indian Ocean forecasts :

### Forecasted Phase: *Positive phase of the IOD*

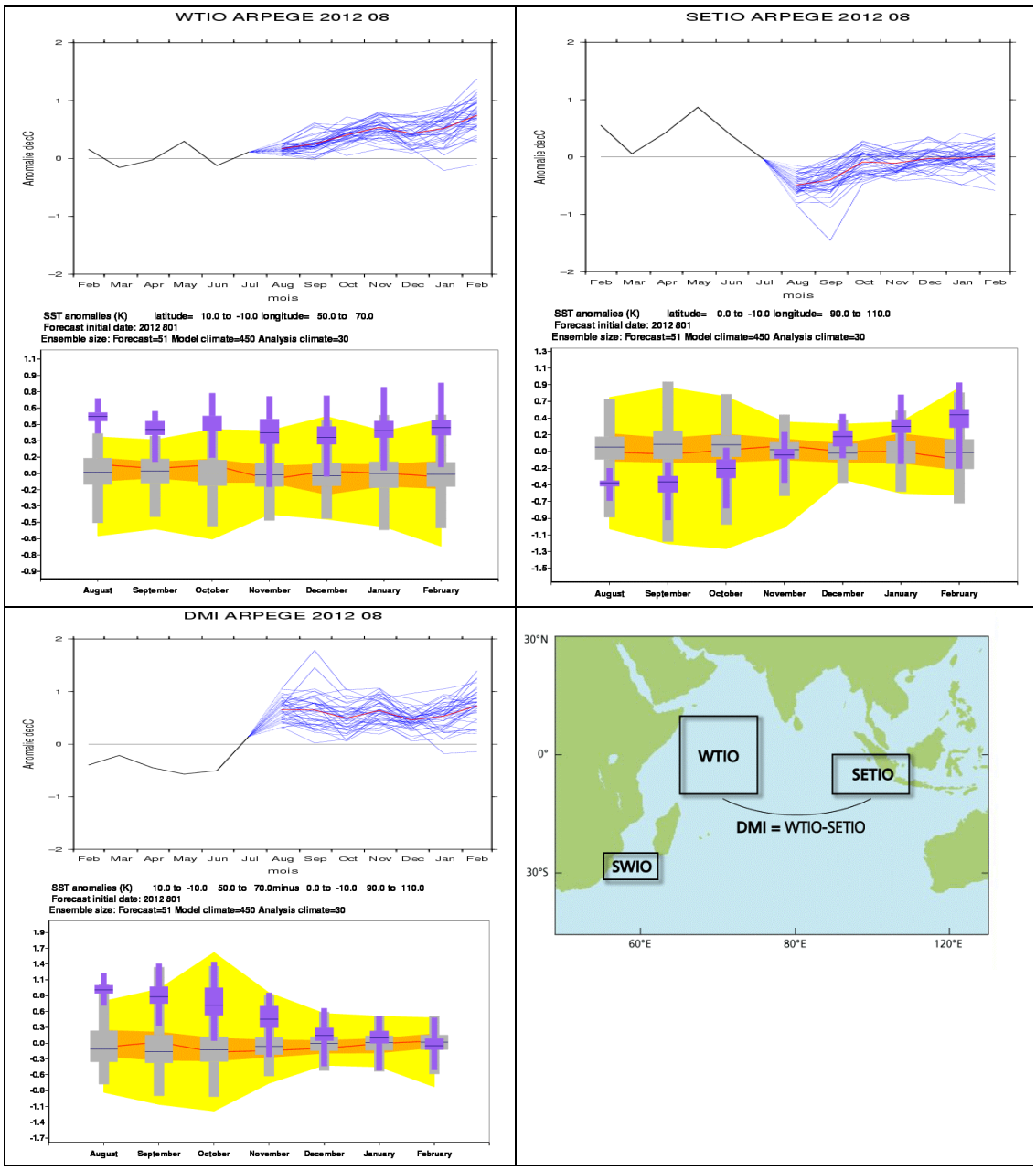



**fig.18:** ***SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, issued in August, plumes / climagrams correspond to 41 / 51 members and monthly means.***

In WTIO : MF start close to normal and indicates a warming along the period. ECMWF is warmer than normal and quite stable along the period.
In SETIO : Colder than normal in ECMWF and MF at the beginning. Then evolution to warmer than normal (ECMWF) or Close to normal (MF) conditions. To be quoted the relative little spread in both models.
DMI : good consistency between the 2 models. Positive phase quite stable in MF and evolving to close to normal conditions in ECMWF during the winter period. Not too much spread in both models (with respect of previous months.

# II.2. GENERAL CIRCULATION FORECAST

## II.2.a Global Forecast

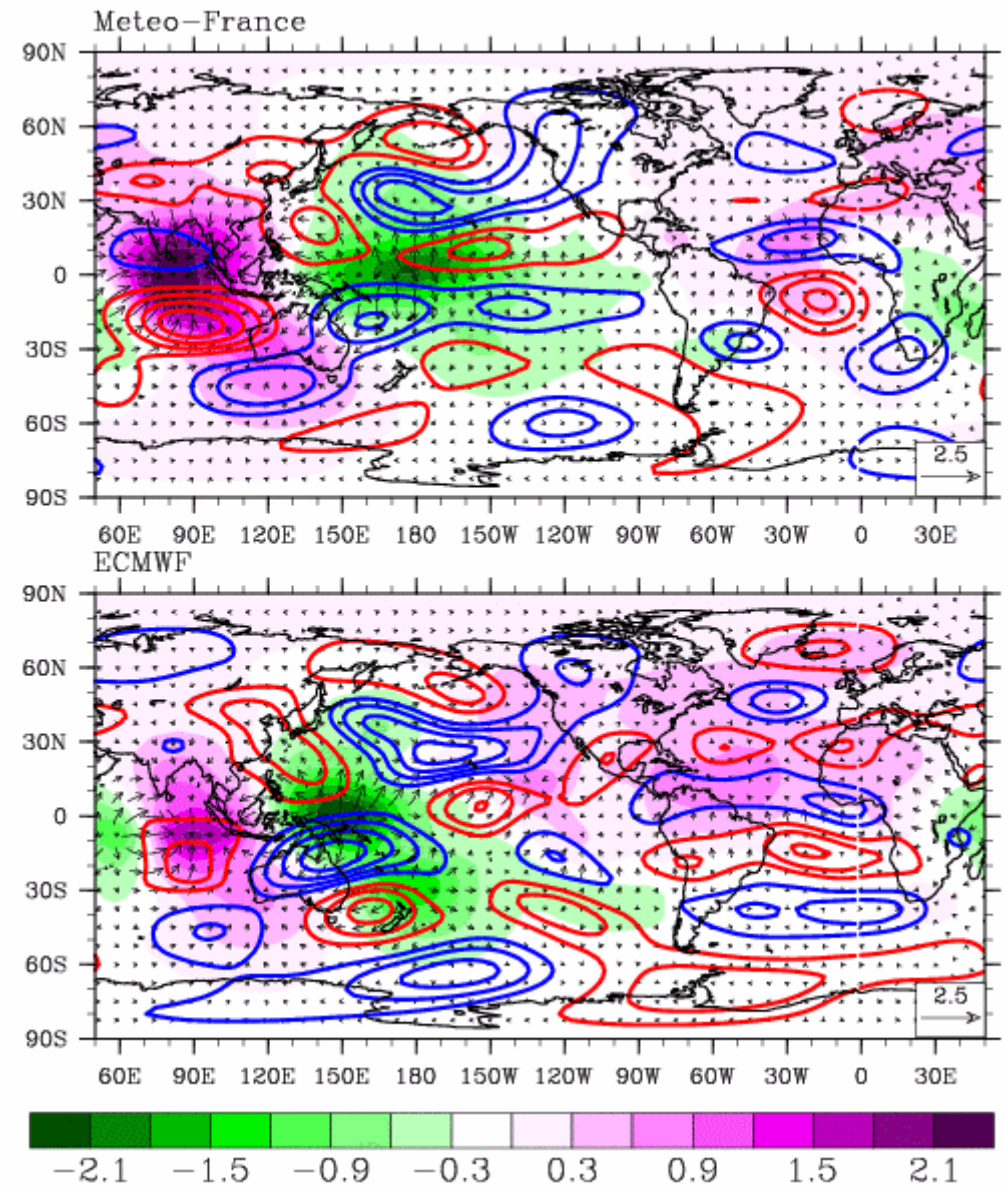



**fig.19: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), asociated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa for July-August -September, issued in August by Météo-France (top) and ECMWF (bottom).**

Velocity potential anomaly field (cf. fig. 19 – insight into Hadley-Walker circulation anomalies) :
in the Tropics a 2 wave number pattern in both models (ECMWF and Meteo-France) and a stronger atmospheric response in MF vs ECMWF. Velocity Potential anomalies not fully consistent with an El Niño development (likely in relationship with the weak ocean/atmosphere coupling). To be quoted the eastward shift of MF response over the western Pacific with respect of ECMWF (around 30° of longitude).
Over the Pacific : strong atmospheric response with a divergence anomaly (upward motion) over the Western Pacific in ECMWF and Central Pacific in MF. More intense but less expanded in ECMWF. In ECMWF convergent circulation anomaly (downward motion) just South-East of Hawaï.
Over Indian Ocean : In MF strong convergent circulation anomaly (downward motion) covering a large portion of the Eastern Indian while it is less intense in ECMWF. Close to African coasts there is a

Divergent circulation anomaly mostly located in the Southern hemisphere in MF while it is slightly northward shifted in ECMWF.
Over Atlantic : convergent circulation anomaly (downward motion) over the North Tropical Atlantic (close to coast of West Africa in MF and westward shifted in ECMWF).
Stream Function anomaly field (cf. fig. 19 – insight into teleconnection patterns tropically forced) :
In both models and conversely to the previous month, from the Pacific wave propagation toward the mid-latitudes up to Alaska (in between PNA like and WP pattern). These anomalies are likely perturbing the planetary Rossby-waves so that there is some trace over the Atlantic. In addition, some possible weak teleconection patterns seems to propagate from Africa toward Europe and more especially the Mediterranean basin.
As a conclusion, one can expect some improvement in the predictability (nevertheless still not too much) for fall and beginning of winter over Europe.

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

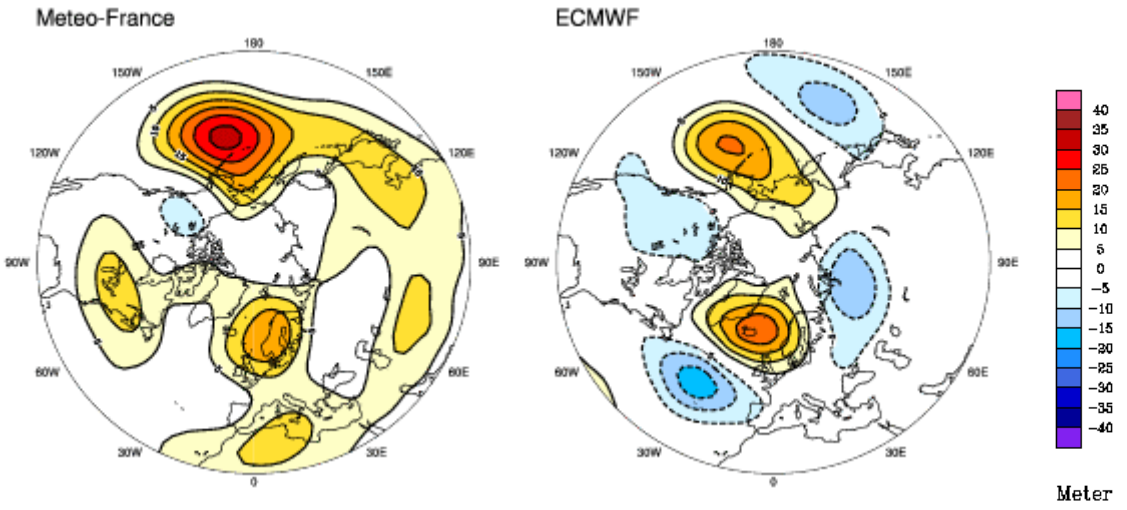



**fig.20: Anomalies of Geopotential Height at 500 hPa for July-August -September, issued in August from Météo-France (left) and ECMWF (right).**
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip

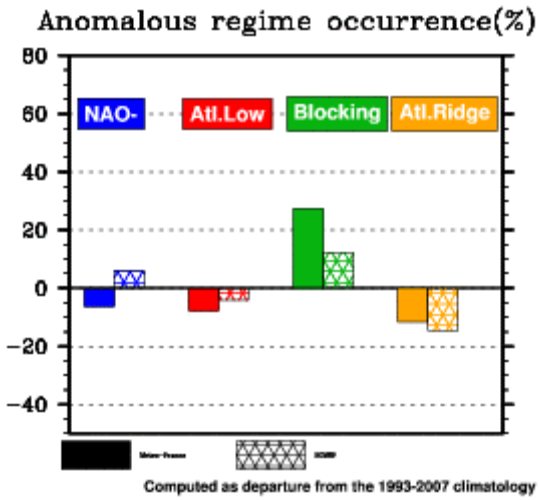



**fig.21: North Atlantic Regime occurrence anomalies from Météo-France and ECMWF : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.**

Geopotential height anomalies (fig. 20 – insight into mid-latitude general circulation anomalies) :
Some differences and some consistency in both models. Consistency mostly on the positive anomaly over or close to Scandinavian regions and over the North Pacific. Despite the difference over the Atlantic sector, there is some convergence which lead to some consistency in the circulation regime forecasts.
North Atlantic Circulation Regimes (fig. 21) : some signal in both models with an enhanced frequency of blocking regime occurrence and a deficit of Atlantic Ridge regimes. To remind that some interaction Tropics/Mid-latitude could be possible over Europe (see previous discussion).
General atmospheric circulation in MF in the low troposphere (see fig. 22) : weak signal over Europe with respect of the previous months.

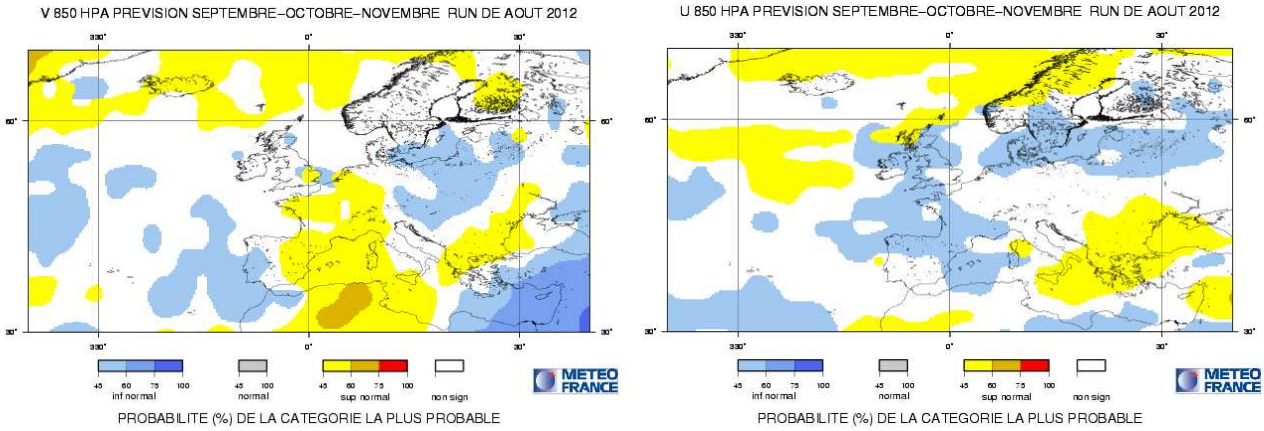



**fig.22:** ***Most likely category for the meridional (left) and zonal (right) wind at 850 hPa for August-September-October, issued in August from Météo-France.***

# II.3. IMPACT : TEMPERATURE FORECASTS

## II.3.a ECMWF

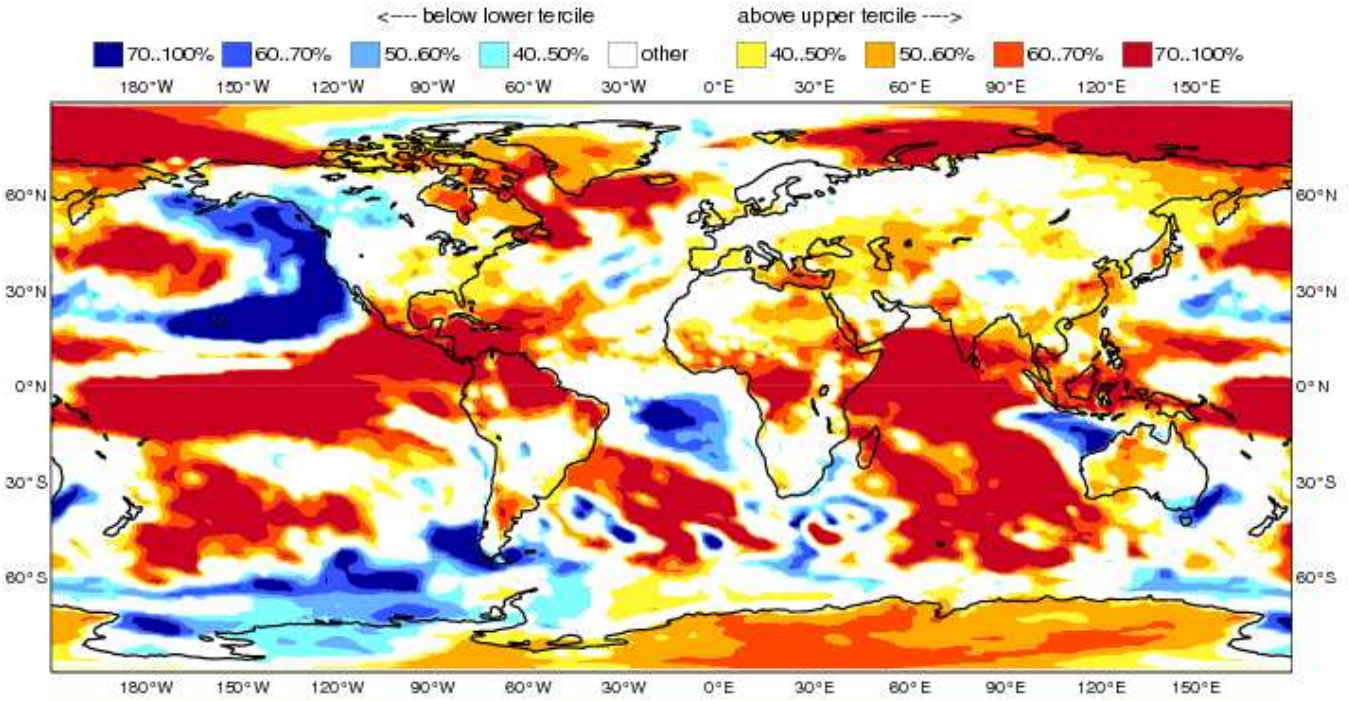



**fig.23:** **Most likely category probability of T2m from ECMWF for SON, issued in August. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).**
**http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/**

## II.3.b Météo-France

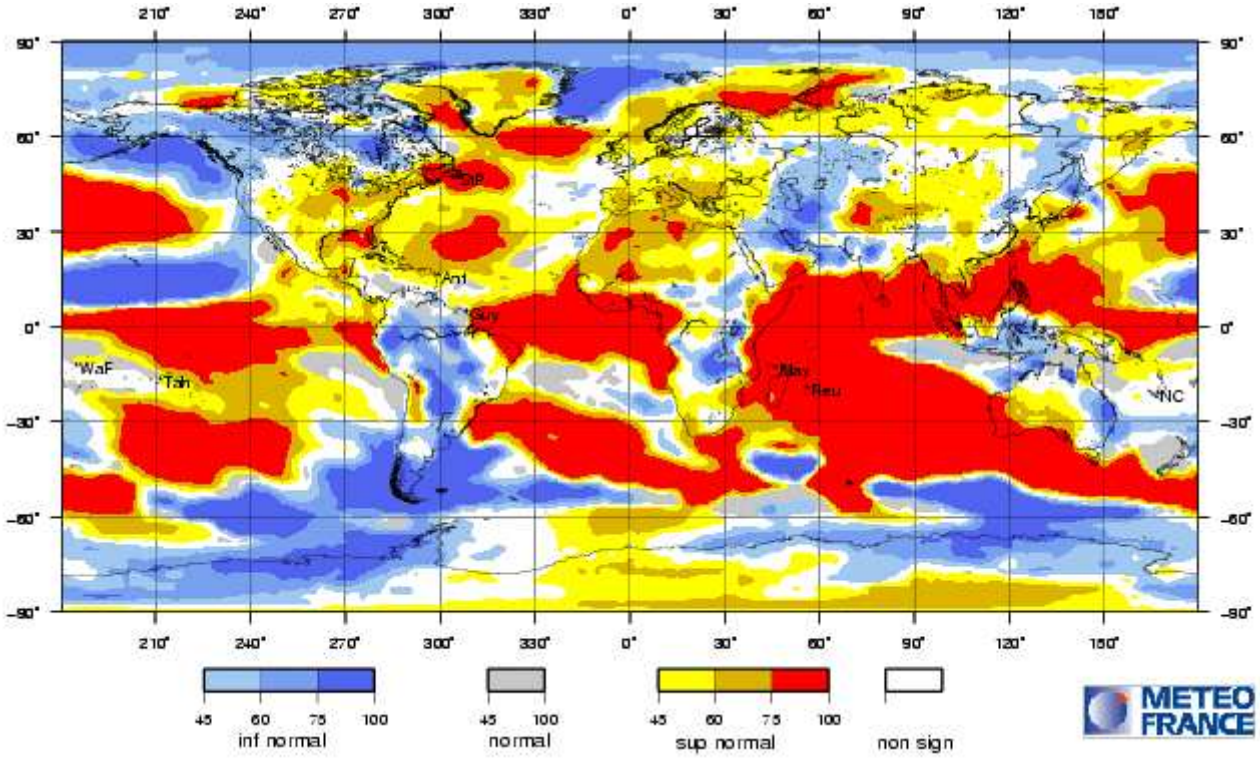



**fig.24: Most likely category of T2m for SON, issued in August. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/**

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

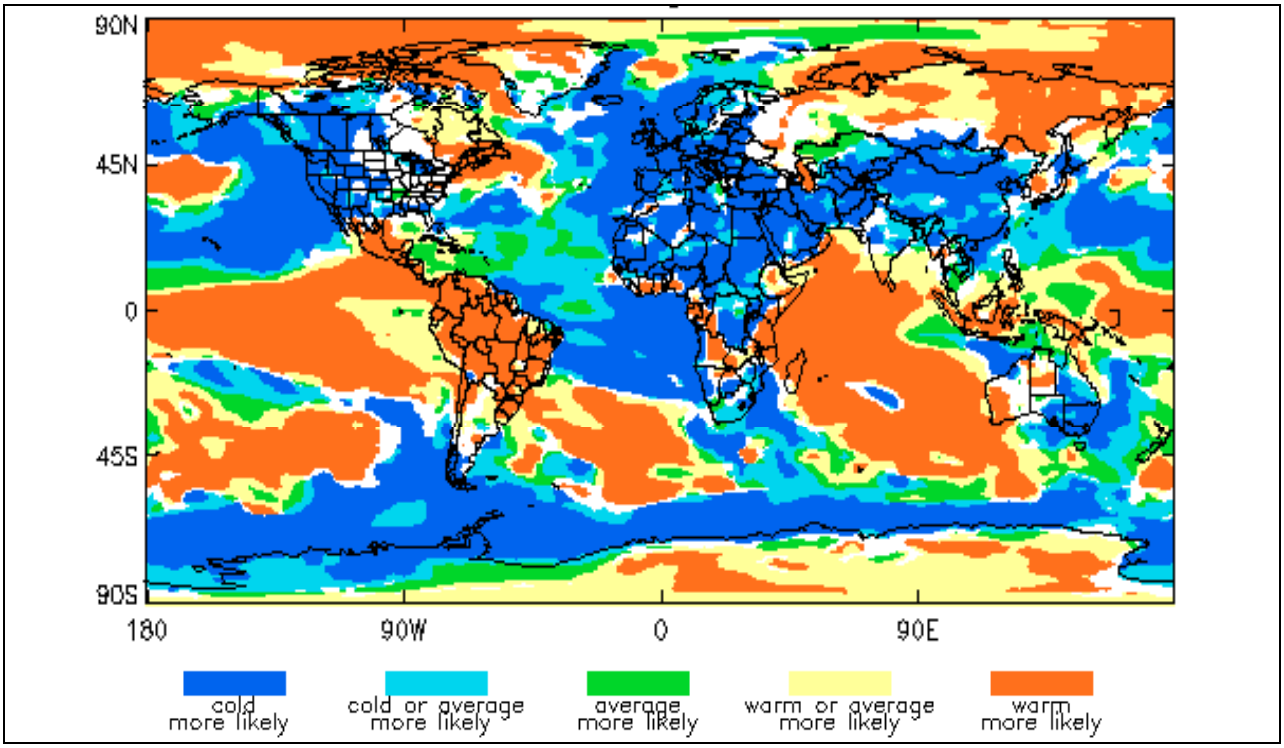



**fig.25: Most likely category of T2m for SON, issued in August from UK Met Office. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://www.metoffice.gov.uk/**

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

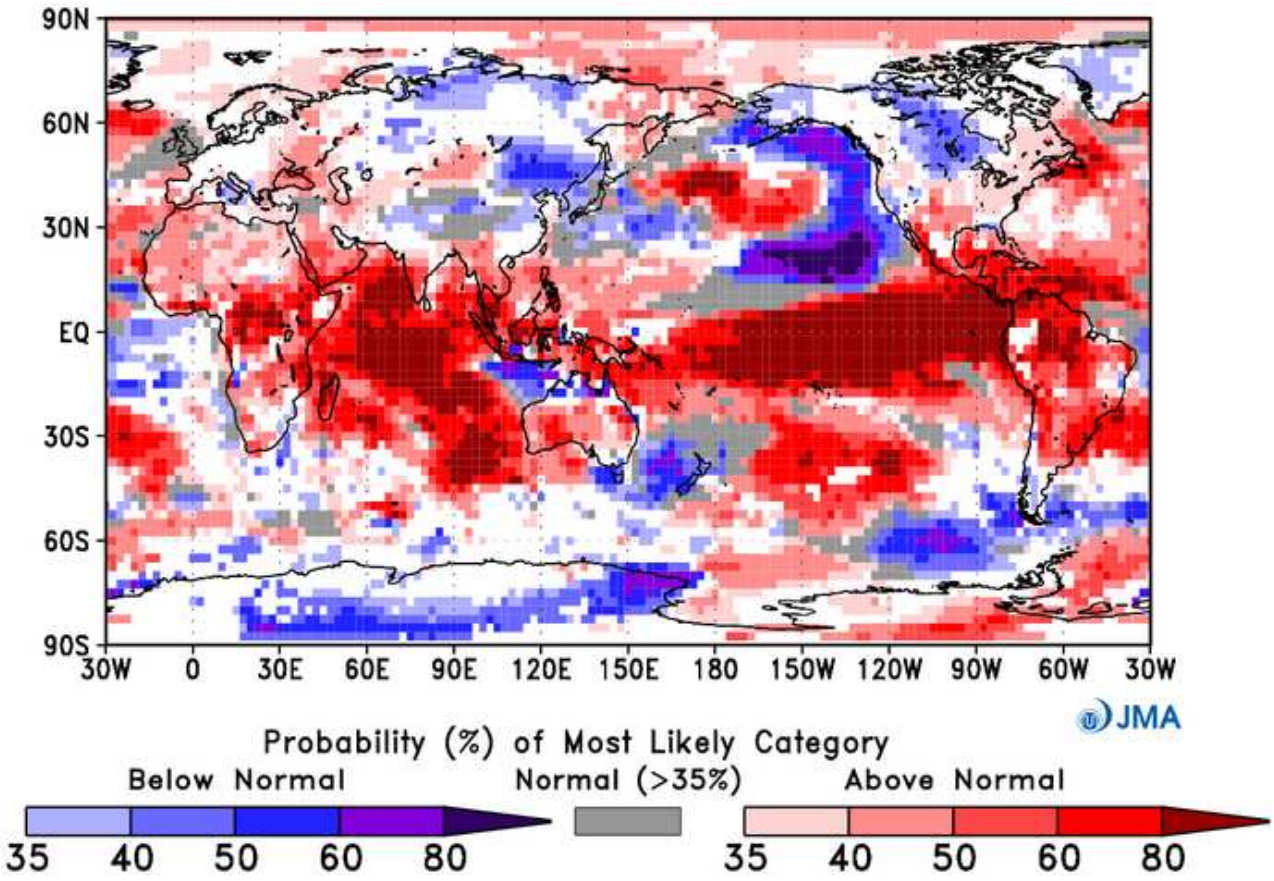



**fig.26: Most likely category of T2m for SON, issued in August from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.**
**http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.html**

## II.3.e Euro-SIP

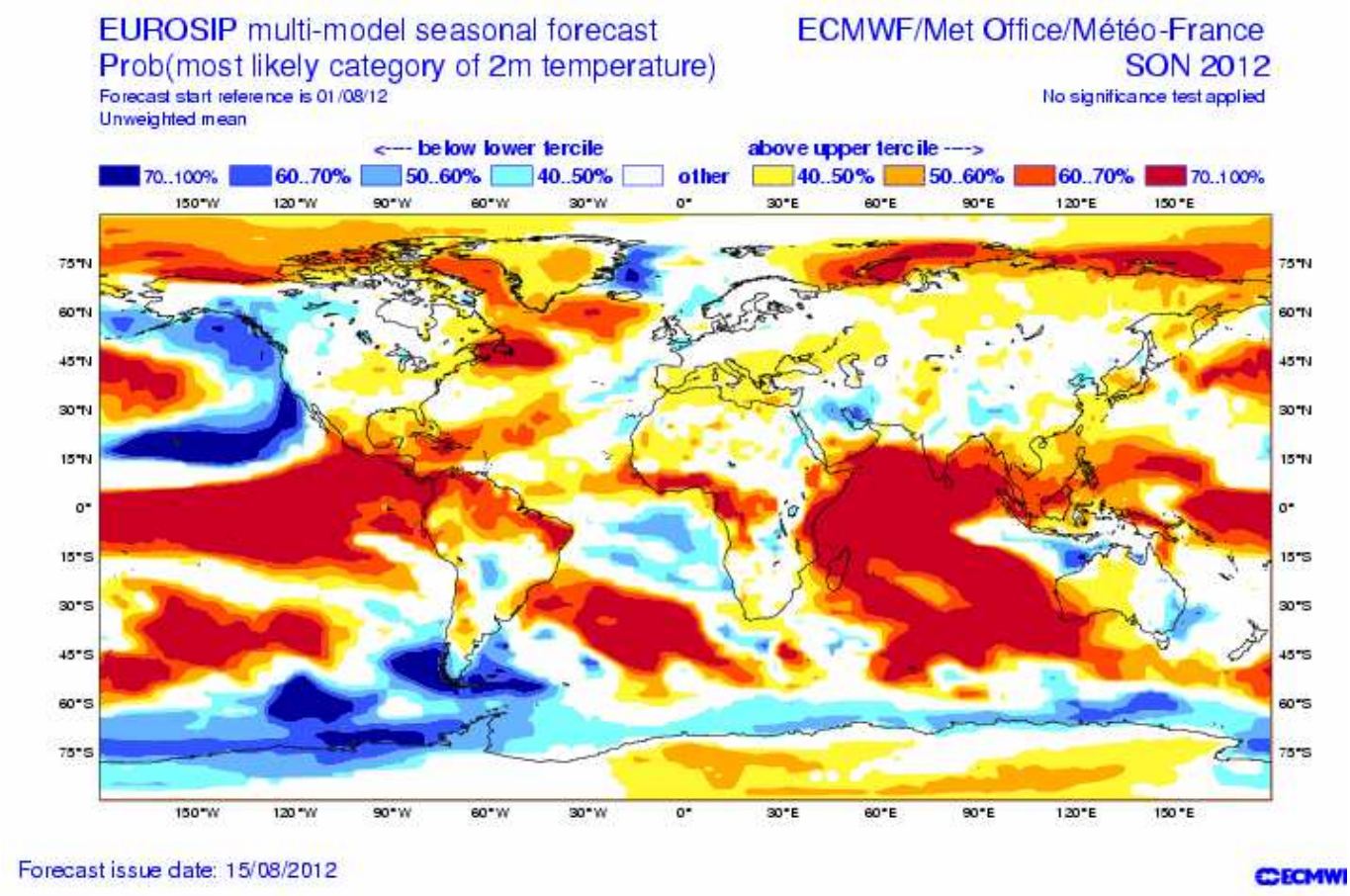



**fig.27: Multi-Model Probabilistic forecasts for T2m from EuroSip for SON, issued in August. (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).**

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

North-America : Warmer than normal conditions over all the most Eastern Canada while it is the opposite on the Western side. Some extension of the warmer than normal scenario over US (Great Lakes and Great Plains). Warmer than normal conditions around the Mexico Gulf including Central America and most of the Caribbean.
South-America : Warmer than normal conditions over Northern part of the continent and western coastal area.
Australia : Warmer than normal on the half western part (especially South-West) and some signal for below normal scenario on South-Eastern coastal regions.
Asia : Warmer than normal conditions should prevail over South-East Asia including the Southern part of India. Below normal conditions over regions close to Irak.
Africa : Warmer than normal conditions on one hand over West and Central Africa and on the other hand all along the Eastern coast of Africa (including the coastal area of the Arabic peninsula and Madagascar).
Europe : slight enhanced probabilities for warmer than normal conditions mostly for regions surrounding the Mediterranean basin.
Also to be quoted the above normal conditions over Greenland (see obs. of sea-ice ).

## II.3.f International Research Institute (IRI)

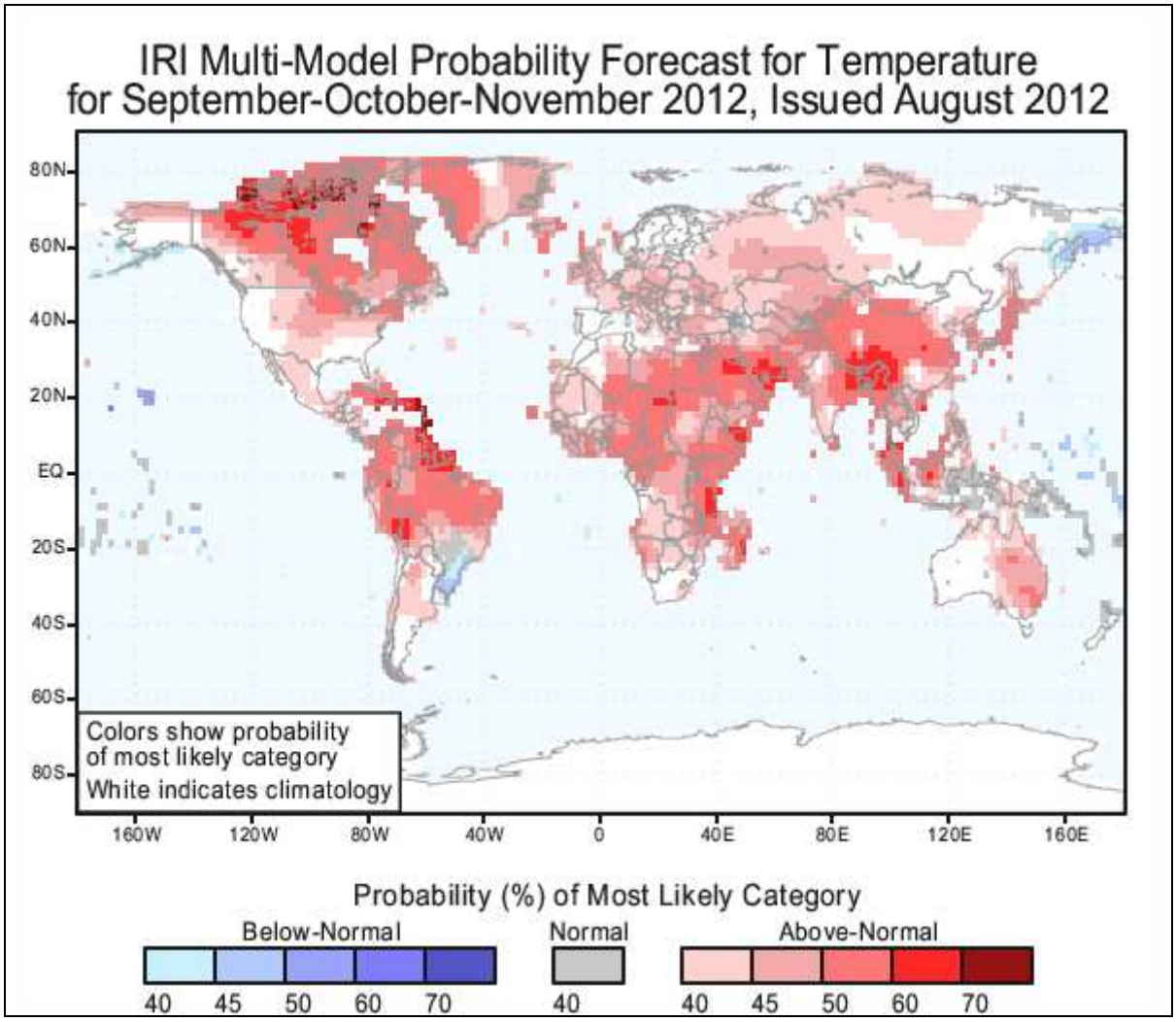



**fig.28: Most likely category of T2m for SON, issued in August from the IRI multi-model ensemble. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://iri.columbia.edu/climate/forecast/net_asmt/**

Some similarity with Euro-Sip forecast and some differences :
Similarity over East Canada, US and Central America, Northern part of South America, Western and Eastern African regions South-East Asia.
Differences over Eastern Australia, Europe, North-West Canada.
For Europe, the only convergence with Euro-SIP is for regions close to the Mediterranean sea. (mostly Above Normal Scenario).
Still warmer than normal conditions expected over Greenland (see sea-ice section).

# II.4. IMPACT : PRECIPITATION FORECAST

## II.4.a ECMWF

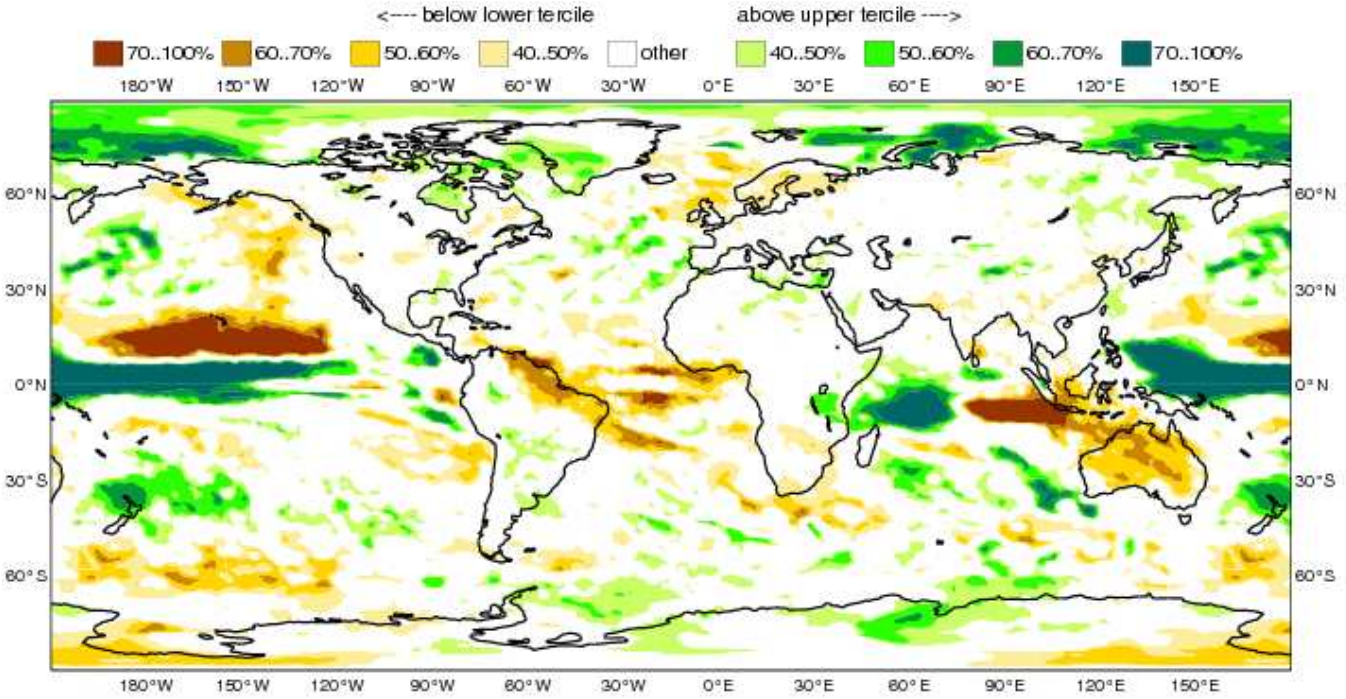



**fig.29: Most likely category probability of rainfall from ECMWF for SON, issued in August. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).**
**http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/charts/seasonal_charts_s2/**

## II.4.b Météo-France

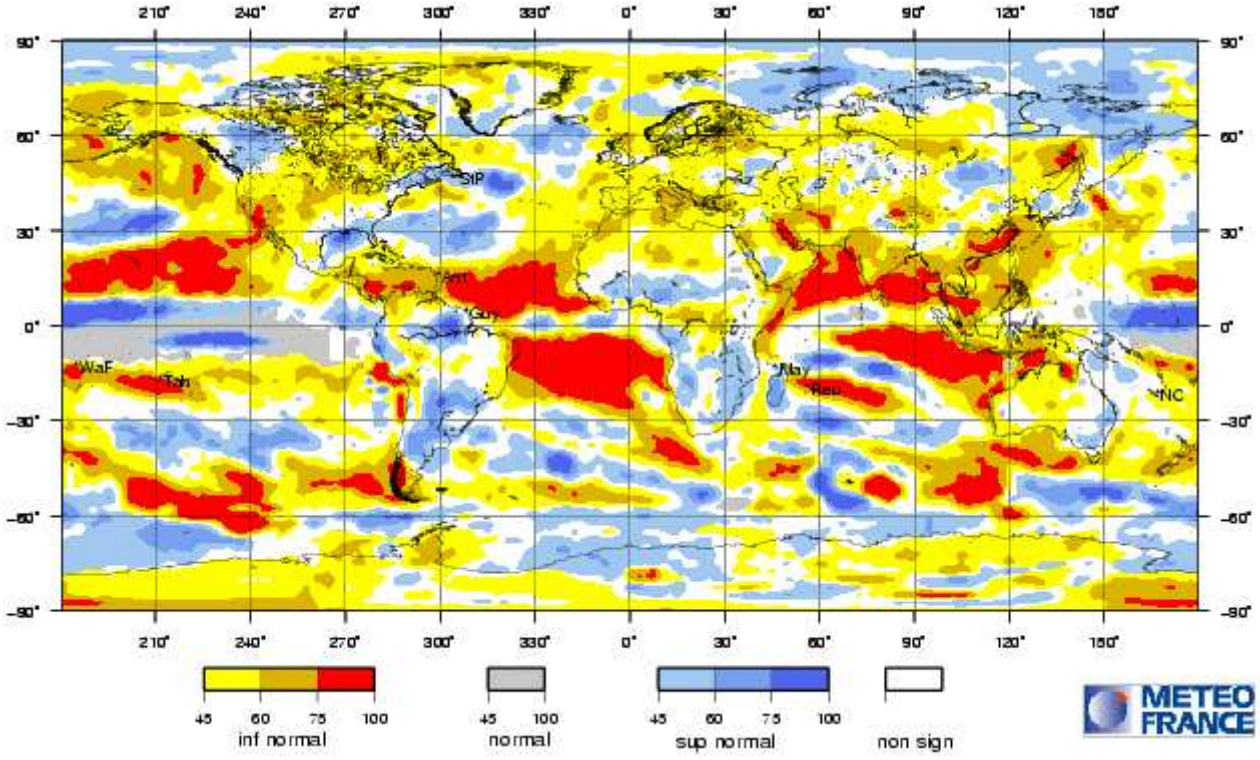



**fig.30: Most likely category of Rainfall for SON, issued in August. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/**

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

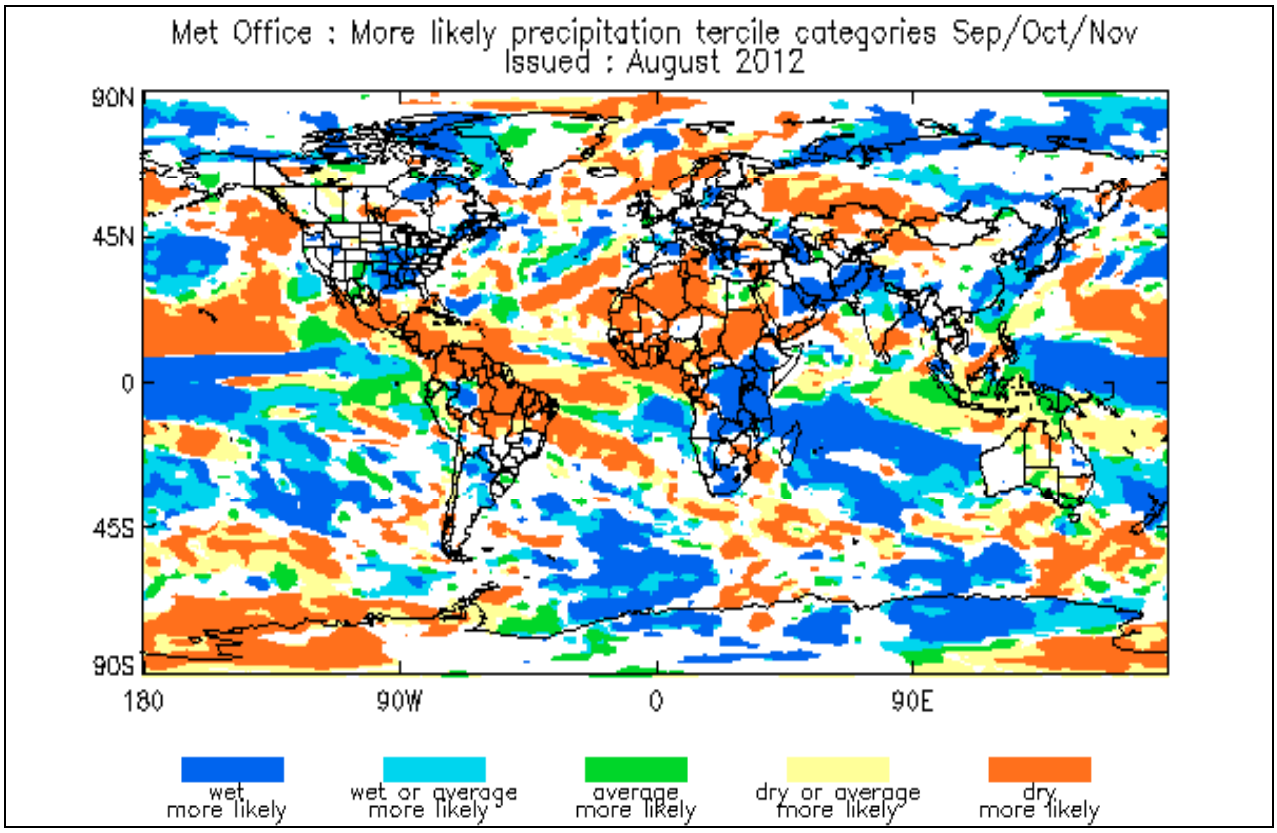



**fig.31: Most likely category of Rainfall for SON, issued in August from UK Met Office. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://www.metoffice.gov.uk/**

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

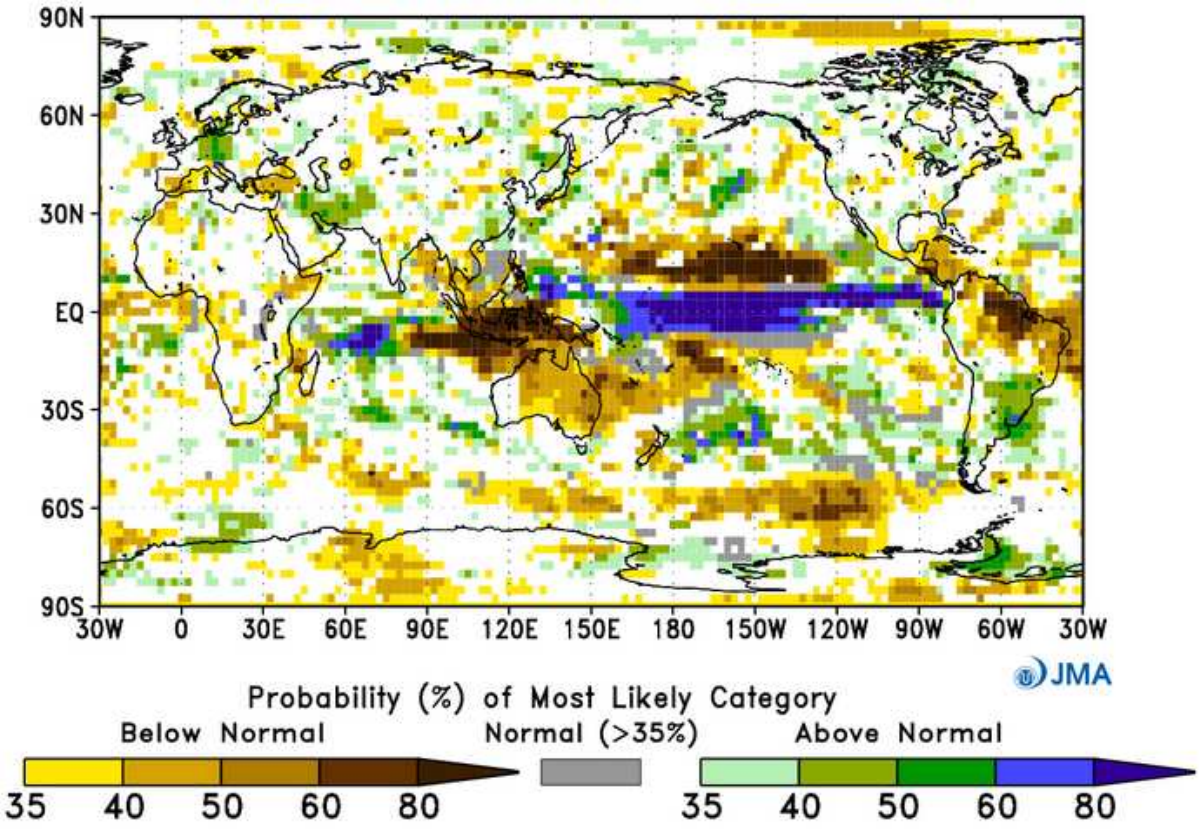


**fig.32: Most likely category of Rainfall for SON, issued in August from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.**
**http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.html**

## II.4.e Euro-SIP

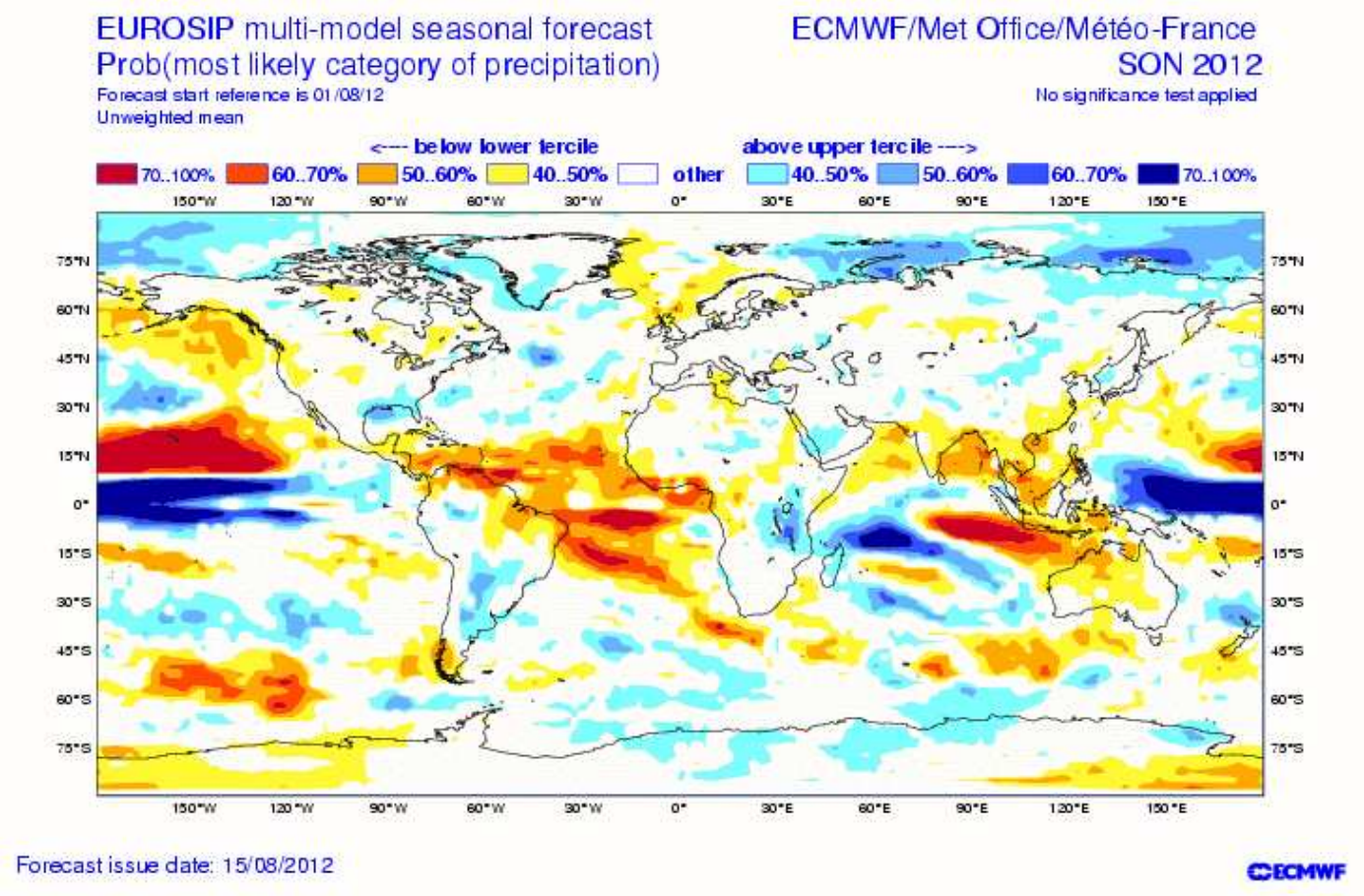



**fig.33: Multi-Model Probabilistic forecasts for precipitation from EuroSip for SON, issued in August. (2 Categories, Below and Above normal – White zones correspond to No signal).**
**http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmv2/param_euro/seasonal_charts_2tm/**

Some consistent signal in the Tropics :
Below Normal scenario over the Southern part of Central America, Northern coast of South America (including Nordeste), Coastal regions of West Africa (especially the Guinean Gulf), South East Asia and the maritime continent and the Northern side of Australia.
Above normal scenario over the region of African Great Lakes, the regions close to Argentina and obviously the Pacific equatorial waveguide (Above normal scenario).
For Europe (and more generally for the mid latitude of Northern Hemisphere) No signal prevails more or less everywhere.

## II.4.f International Research Institute (IRI)

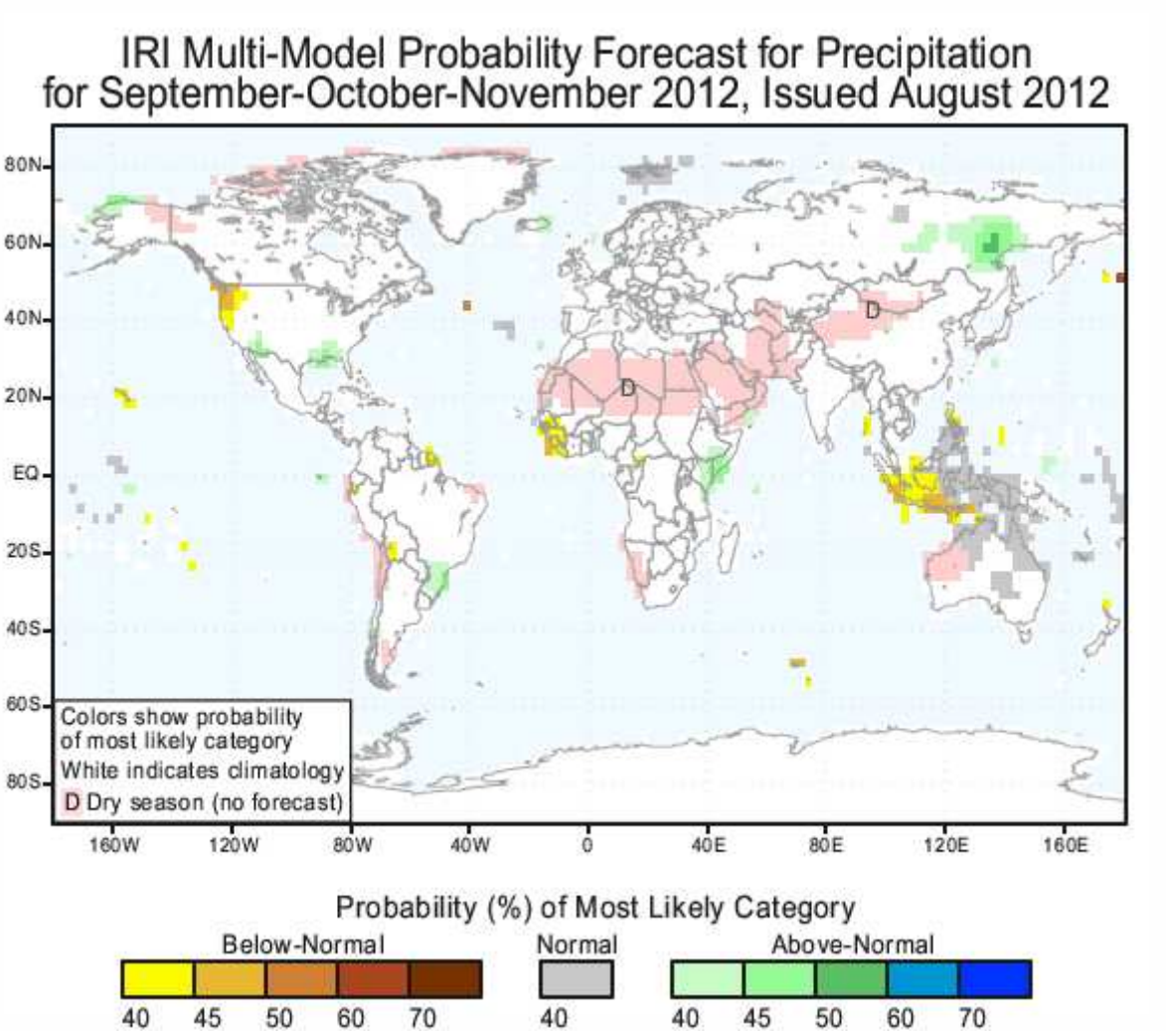



**fig.34: Most likely category of Rainfall for August-September-October, issued in August from the IRI multi-model ensemble. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://iri.columbia.edu/climate/forecast/net_asmt/**

The IRI forecast shows No Signal more or less everywhere.
However consistency with Euro-Sip can be pointed out over the maritime continent.
Consequently, over Europe, there is a clear indication for No Privileged Scenario (Climatology forecast).
Over West Africa, to be highlight the consistency is over the most Western part of the continent with some enhanced probabilities for dry conditions.

# II.5. REGIONAL TEMPERATURES

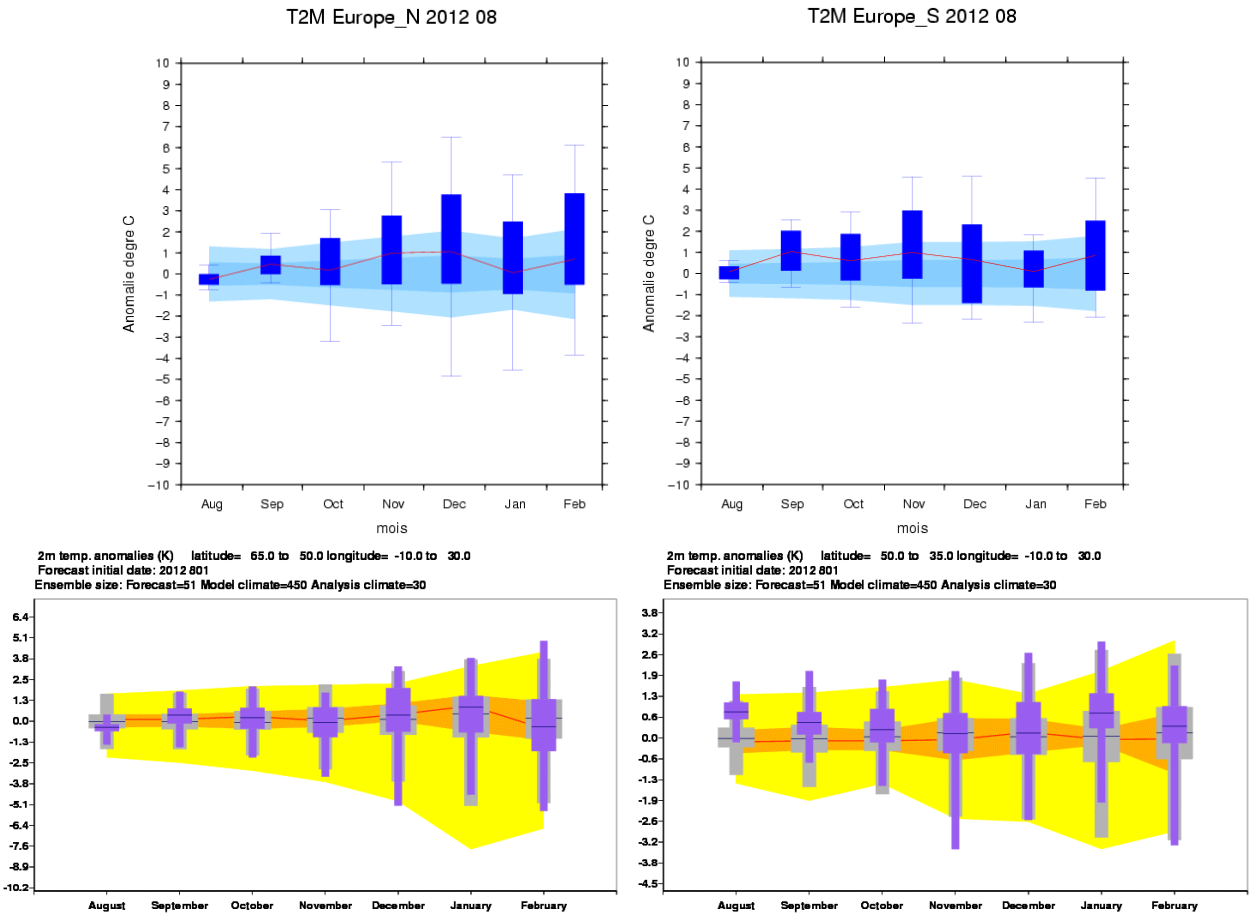



**fig.35:** ***Climagrams for T2m in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom) issued in August.***

For Northern Europe : little consistency between the 2 models (in relationship with the Z500 anomaly location difference). The differences can likely be related to the model uncertainties. In MF, ROC skill is real from August to September (close or above 0.6), slightly above climatology for October and then close to or worst than climatology.
For Southern Europe : some consistency for Above Normal conditions in SON. In MF, ROC skill in August exists (better than 0.7), in September the score is noticeable only for Above normal scenario while some score persists in October (slightly below 0.6) ; then close or worst than climatology.

***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

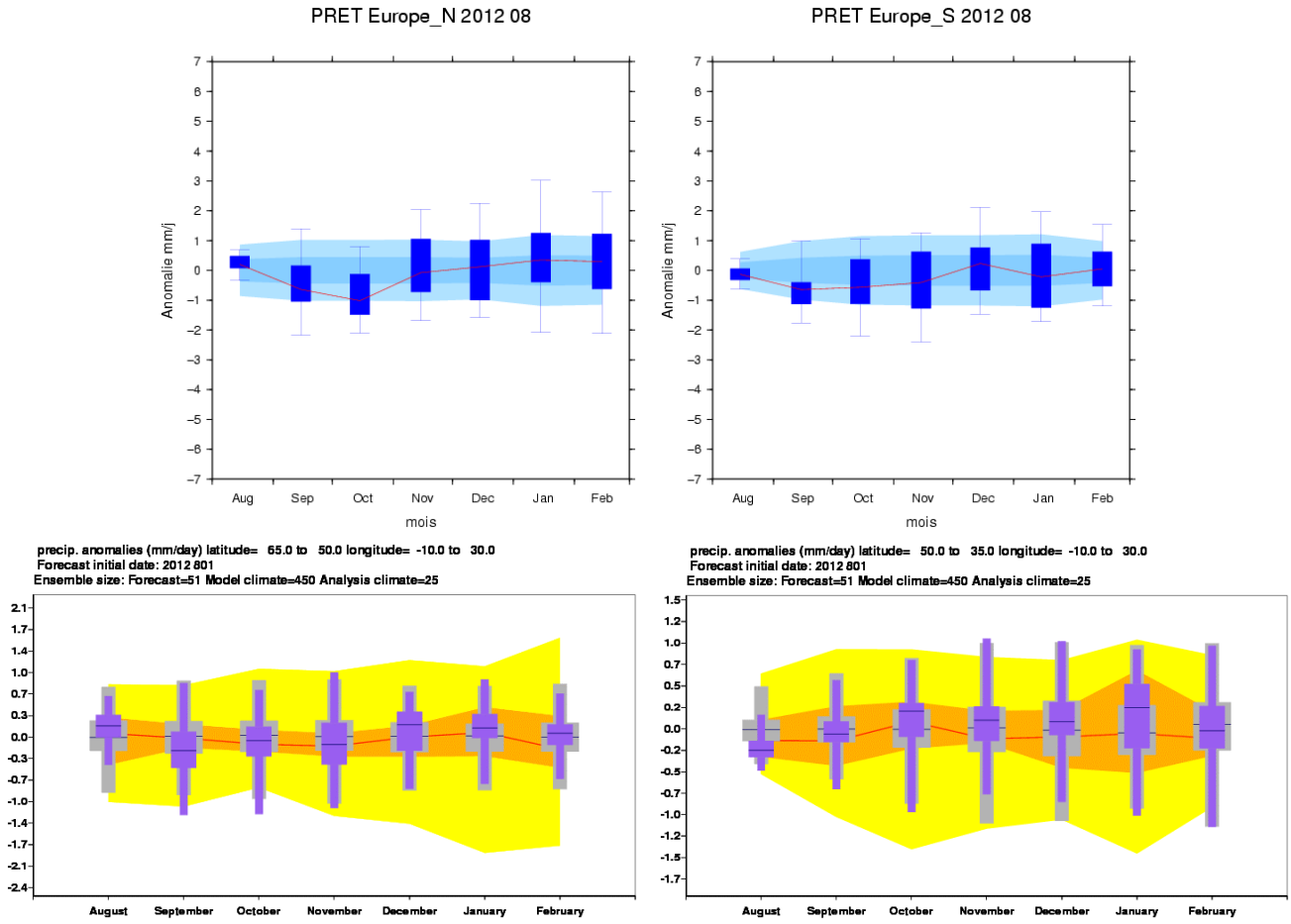



**fig.36:** ***Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom), issued in August.***

For Northern Europe : some consistent evolution in the 2 models ; starting with Above normal conditions in August, then showing Below normal scenarios in September and October to return then to climatology. In MF, ROC are close to 0.5 or worst than climatology.
For Southern Europe : little consistency between the 2 models. In MF, ROC scores show some skill from August up to November but just slightly above climatology. Then scores close or worst than climatology.
So these intraseasonal evolutions should be interpreted with caution.

***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

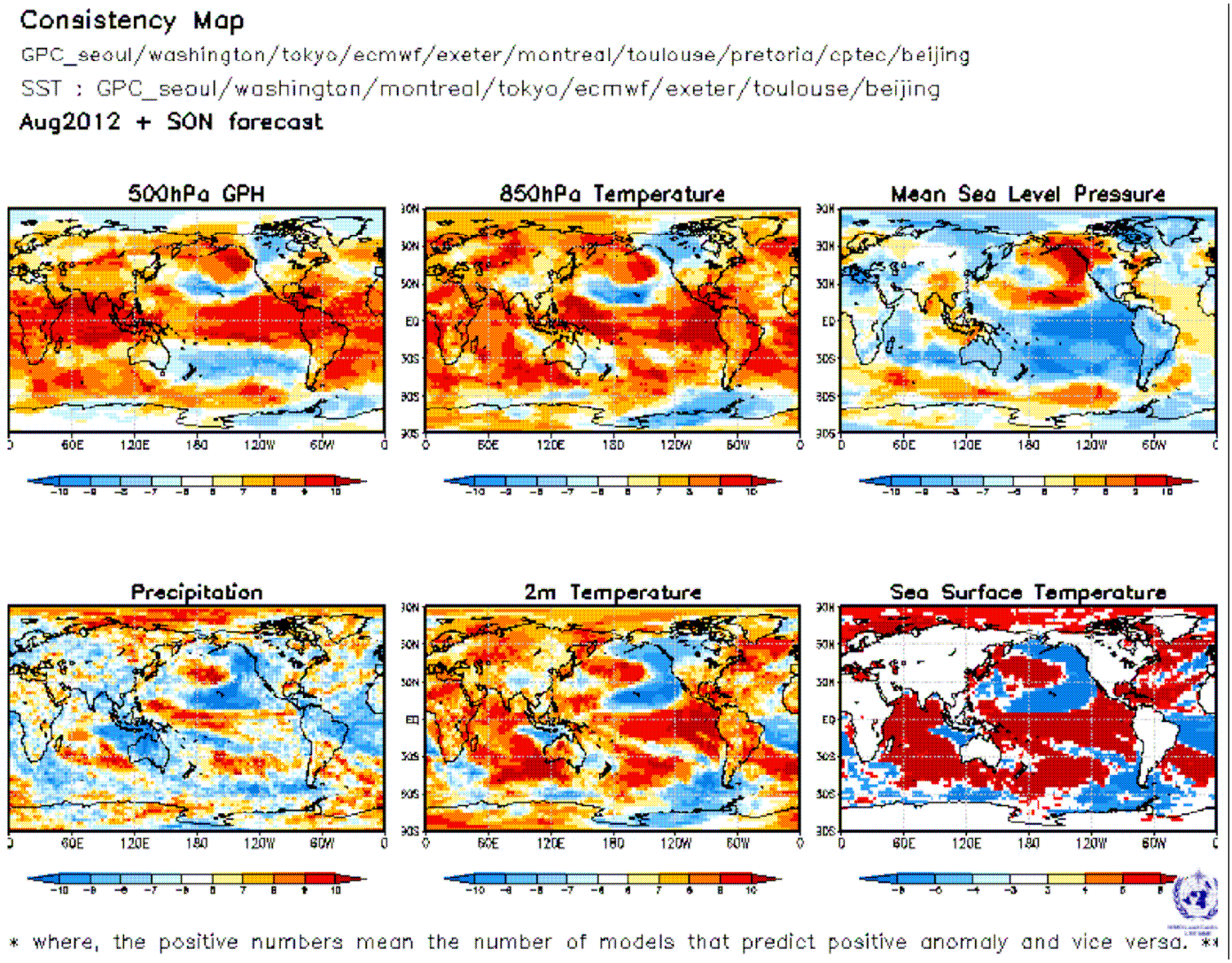



**fig.37:** ***GPCs Consistency maps from LC-MME*** *http://www.wmolc.org/*

For Z500 : some consistency over the North Atlantic high latitude and Northern Europe (Above normal conditions) looking like ECMWF pattern.
For T2m : some consistent signal over North-West Europe and regions surrounding the Mediterranean basin (Above normal scenario). Some similarity with Euro-SIP (Central and Northern South America, Australia, South-East Asia and Southern part of India).
For precipitation : less consistency but some trace of Below normal conditions for the Western façade of Europe. Some similarity with EuroSIP over Africa, Central and South America, India, South-East Asia and the maritime continent and Equatorial Pacific.

# II.7. "EXTREME" SCENARIOS

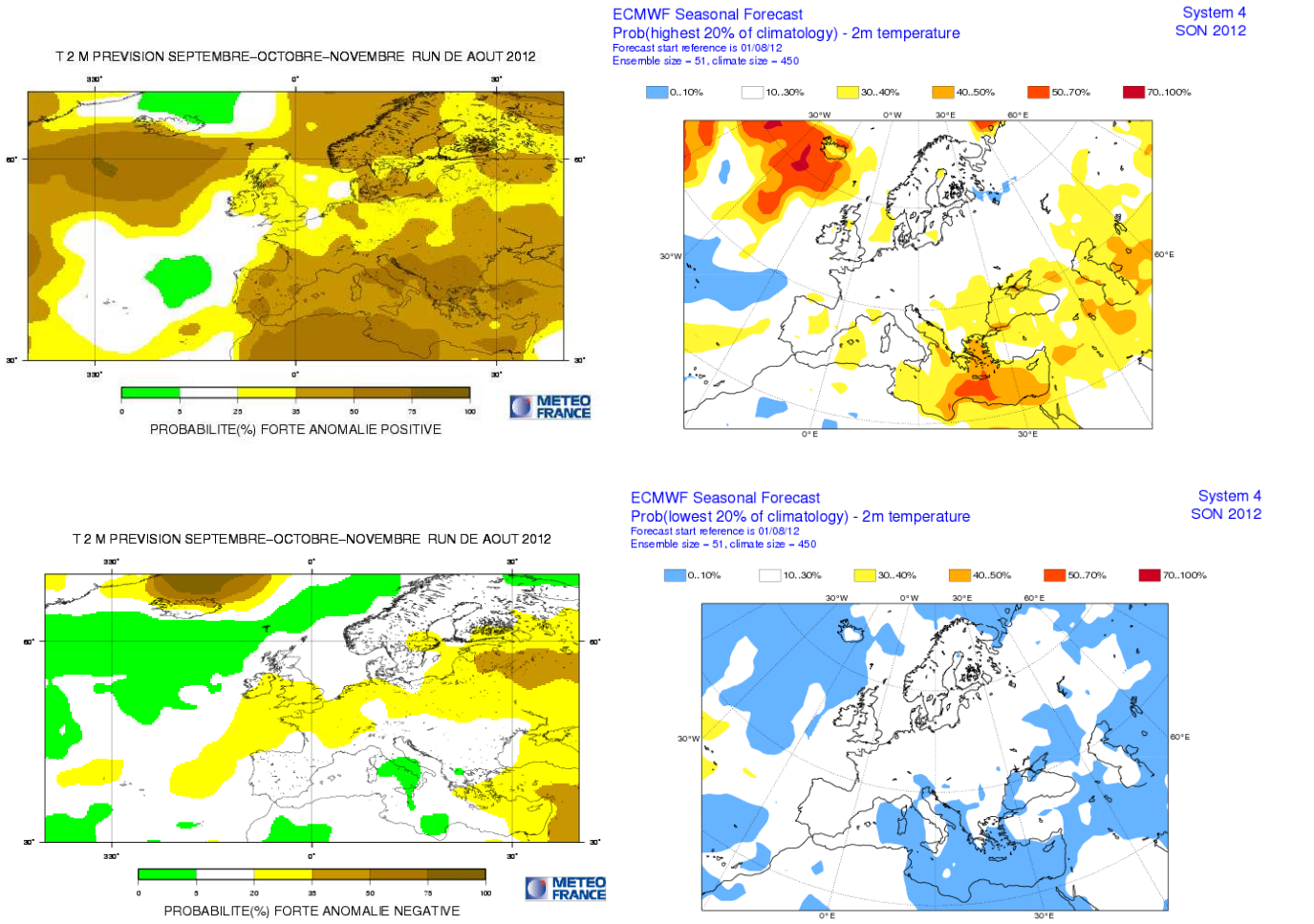



**fig.38:** ***Top : Probability of « extreme » above normal conditions for T2m for Meteo-France (left - highest ~15% of the distribution) and ECMWF (right - highest 20% of the distribution).***
***Bottom : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the distribution) and ECMWF (right – lowest 20% of the distribution).***
***For SON, issued in August.***

No consistency between the 2 models for the Very Above Normal scenario over most of the continent. The only consitent signal is for the Eastern part of the Mediterranean basin and South-East Europe.
The probability of very Below Normal scenario is enhanced mostly on the most eastern part of Europe in MF while it is close to climatology everywhere in ECMWF.
In Météo-France ROC score for the very Above scenario is above climatology over Norway and regions close to the Mediterranean sea including Turkey and the Black Sea region.
For the very Below scenario the scores are worst than climatology everywhere to the exception of little part of Norway, Eastern Spain/Portugal and part of Greece and adjacent regions.
So likely, a cautious follow up of the situation in SEE regions should be relevant.

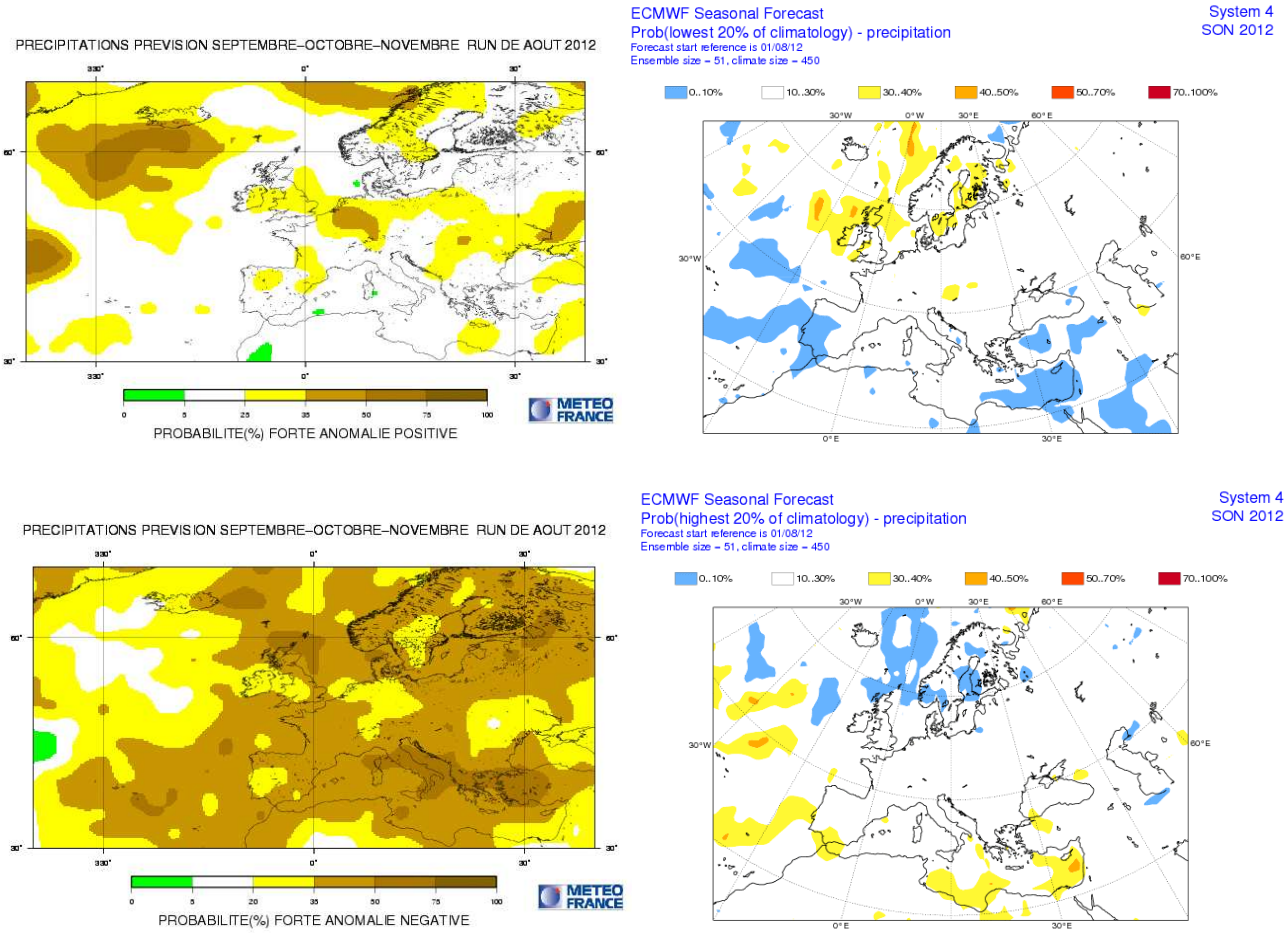



**fig.39:** ***Top : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the distribution) and ECMWF (right - lowest 20% of the distribution)***
***Bottom : Probability of « extreme » Above normal conditions for rainfall for Meteo-France (left - highest ~15% of the distribution) and ECMWF (right – highest 20% of the distribution).***
***for SON, issued in August.***

The probability of very Below Normal scenario is very high everywhere in MF while it is close to climatology in ECMWF. This is likely directly related to the differences between the Z500 anomaly location in both models ; differences mostly related to model uncertainty.
For the very Above scenario, not too much consistency.
ROC scores are close or than climatology for these scenarios (to the exception of limited numbers of grid points over France and Central Europe for the very Below Normal scenario and fragmented for the very Above Normal scenario). When adding the consideration about the rainfall predictability, it's seems difficult to infer any useful information from these forecast.

# II.8. DISCUSSION AND SUMMARY

## Forecast over Europe

For this forecast and conversely to the previous ones, it seems that some predictability (still based on weak teleconnections) is coming for the mid-latitudes of the Northern hemisphere. However and for Europe, this not infer convergent scenarios to the exception of regions close to the Mediterranean basin. This lack of convergence is likely partly due to model uncertainties, partly to the weakness of the expected teleconnections (in relationship with the forecasted ENSO evolution in the different models) and partly to the transition season targeted (SON) because the circulation regimes can have very different impact depending of the winter vs summer season.
For temperature, the Above Normal scenario seems to make sense for Southern Europe and especially for countries of the South East Europe. To be quoted the enhanced probability of very above normal temperature for the South-Eastern Europe and the Eastern Mediterranean basin.
For rainfall, "No Privileged Scenario" covers most of the European continent.
However, some downscaled information could details these scenarios for specific countries or sub-regions.

## Tropical Cyclone activity

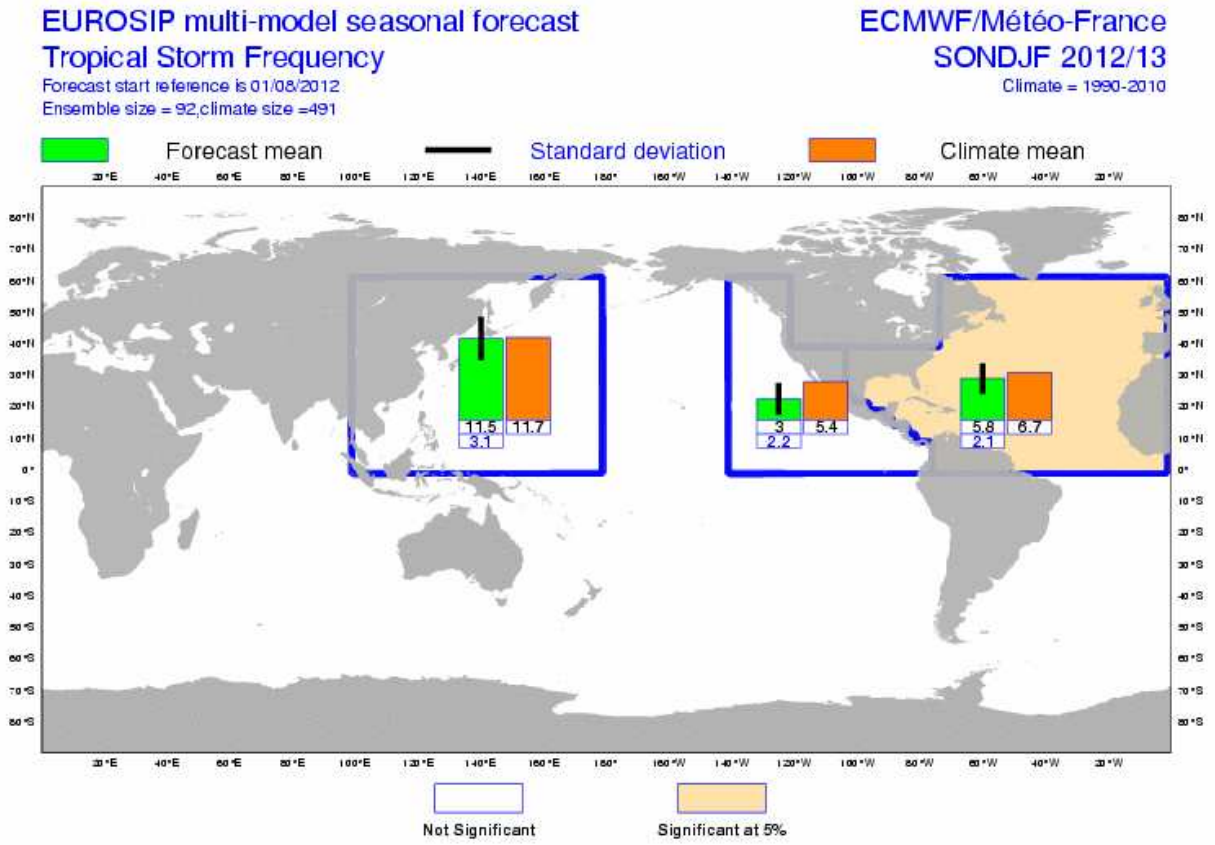



**fig.40: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF) for the August 2012 to January 2013 period, issued in August.**
**http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtrop/trop_euro/eurosip_tropical_storm_frequency/**

For the Tropical Cyclone season in the Northern hemisphere, Euro-Sip forecasts indicate a close to normal condition over the Pacific (signal not significant with respect of the climatology) and a Below normal activity over the North Tropical Atlantic.

WMO RA VI
Pilot RCC-Network

## Synthesis of Temperature forecasts for September-October-November 2012 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*** | no privileged | above normal | no privileged | no privileged | above normal |
| ***MF*** | above normal | above normal | above normal | no privileged | above normal |
| ***Met Office*** | below normal | below normal | no privileged | no privileged | below normal |
| ***JMA*** | no signal | no privileged | no privileged | above normal | above normal |
| **synthesis** | no privileged | no privileged | no privileged | no privileged | above normal |
| ***IRI*** | above normal | above normal | above normal | above normal | above normal |
| ***Eurosip*** | no privileged | above normal | no privileged | no privileged | above normal |
| **privileged scenario by RCC-LRF node** | ***no privileged scenario*** | ***above normal*** | ***no privileged scenario*** | ***no privileged scenario*** | ***above normal*** |

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

WMO RA VI
Pilot RCC-Network

# Synthesis of Rainfall forecasts for September-October-November 2012 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* | below normal | no privileged | no privileged | no privileged | no privileged |
| *MF* | below normal | below normal | below normal | below normal | below normal |
| *Met Office* | no privileged | no privileged | no privileged | no privileged | no privileged |
| *JMA* | no signal | no privileged | no privileged | no privileged | no privileged |
| **synthesis** | no privileged | no privileged | no privileged | no privileged | no privileged |
| *IRI* | no privileged | no privileged | no privileged | no privileged | no privileged |
| *Eurosip* | no privileged | no privileged | no privileged | no privileged | no privileged |
| **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, 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.
■ IRI and Euro-SIP provide multi-model forecasts. Euro-Sip is presently composed using 3 models (ECMWF, Météo-France and UK Met Office). IRI uses several coupled and forced models optimally combined.

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).

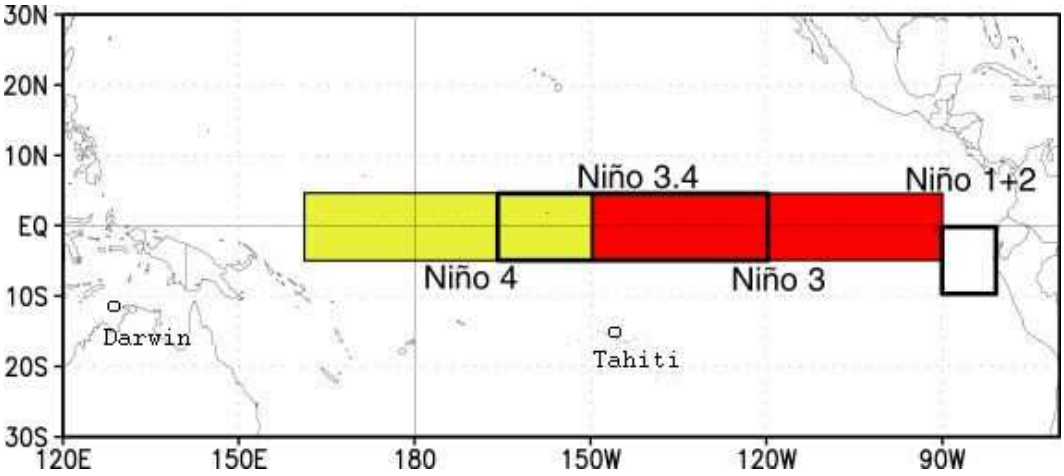
In order to better interpretate the results, it is recommended to look to verification maps and graphs which give some insight into the expected level of skill for a specific parameter, region and period. A set of scores is presented on the web-site of the Lead-Centre for Verification (see http://www.bom.gov.au/wmo/lrfvs/) ; 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 » AND SOI INDICES

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).

## 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.