GLOBAL CLIMATE BULLETIN
n°183 - SEPTEMBER 2014

Table of Contents

I. DESCRIPTION OF THE CLIMATE SYSTEM (JULY 2014)

I.1.OCEANIC ANALYSIS

I.1.a Global Analysis

At the Surface (fig. 1) :

In the equatorial waveguide ; over the Pacific clear decrease of the positive anomaly with temperatures close to normal in the Central Pacific. Nevertheless in spite of the negative tendency across all the basin, the Eastern part keep noticeable positive anomalies. Strong cooling over the Atlantic and alsosome colling in the Western Indian Ocean.

Over the Tropics, mostly warmer than normal in the North Pacific and also over the South western Indian Ocean. Trace of slight warming of the North Tropical Atlantic.

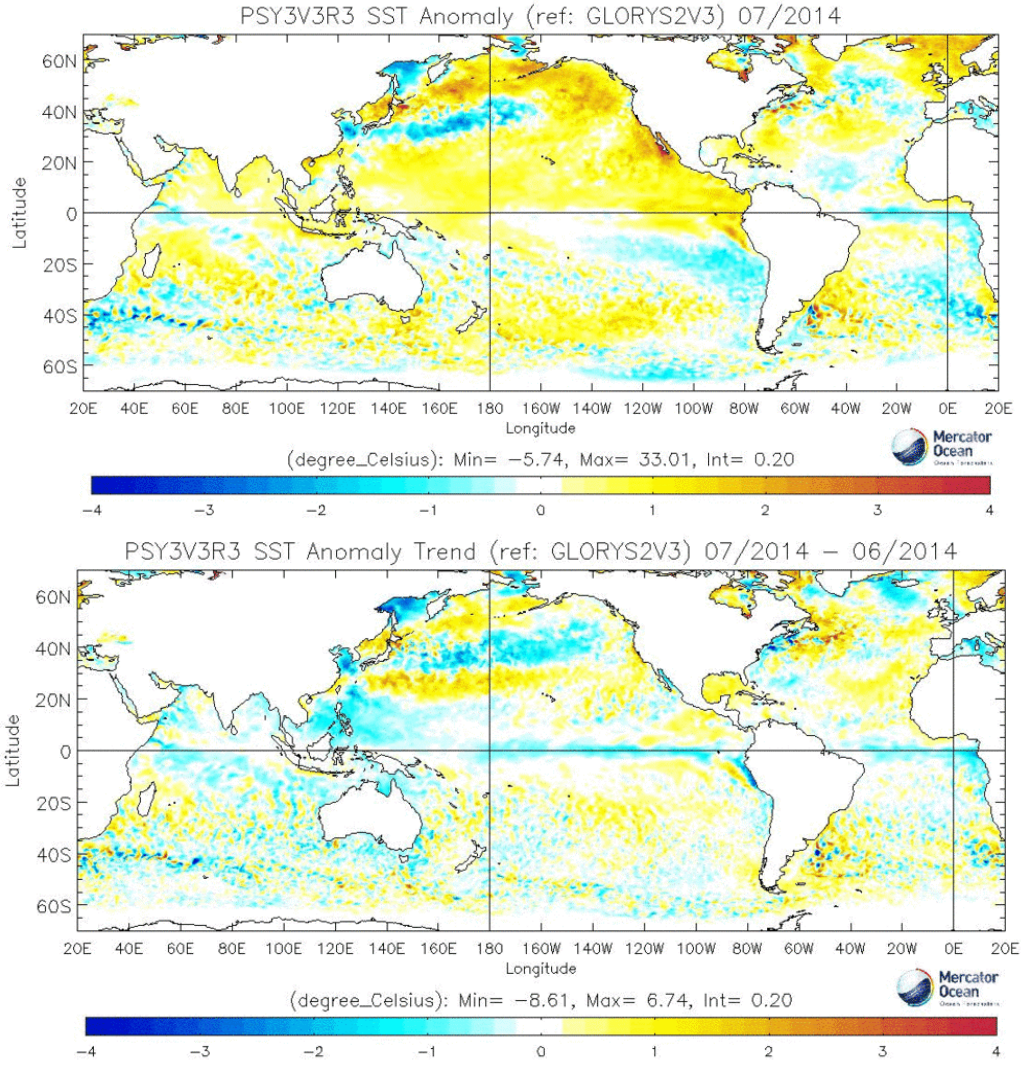


fig.1: top : SSTs Anomalies (°C) (reference Glorys 1993-2009); bottom : SST tendency (current – previous month) http://bcg.mercator-ocean.fr/

In subsurface (fig.2) :

In the Pacific : in the equatorial band (10°N-10°S), positive heat content anomalies in the Southern Pacific off Equator (less visible in the Northern hemisphere). In the Equatorial Eastern Pacific, the anomaly is negative consistently with the sub-surface dynamic.

In the Atlantic : in the equatorial waveguide colder than normal conditions consistently with the surface signal. 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.

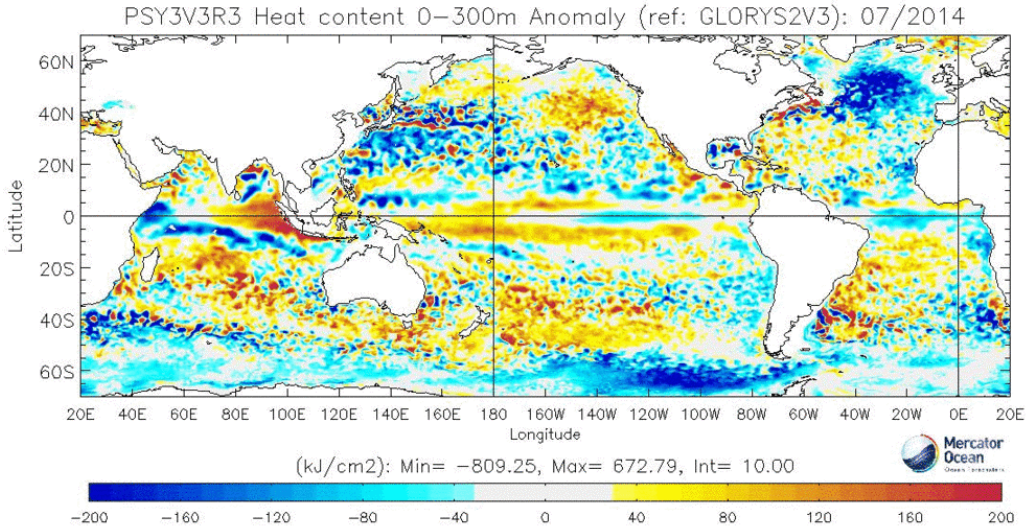


fig.2: map of Heat Content Anomalies (first 300m) (in kJ/cm^2). (reference Glorys 1992-2009)
http://bcg.mercator-ocean.fr/

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

Noticeable evolution in the equatorial regions (cooling). Along the Equator still mostly positive values with some differences, slightly positive on the Western side, close to neutral in the Central part and more positive on the Eastern side. The Trade Wind anomalies are close to neutral to the exception pf the most western side (positive anomalies) likely related to the MJO activity. The slightly negative SOI (-0.2) is consistent with the Trade Wind anomalies.

In the Niño boxes (4, 3.4, 3 et 1+2 ; see definition in Annex) the monthly averages are respectively 0.3°C, 0.2°C, 0.7°C to 1.4°C from West to East.

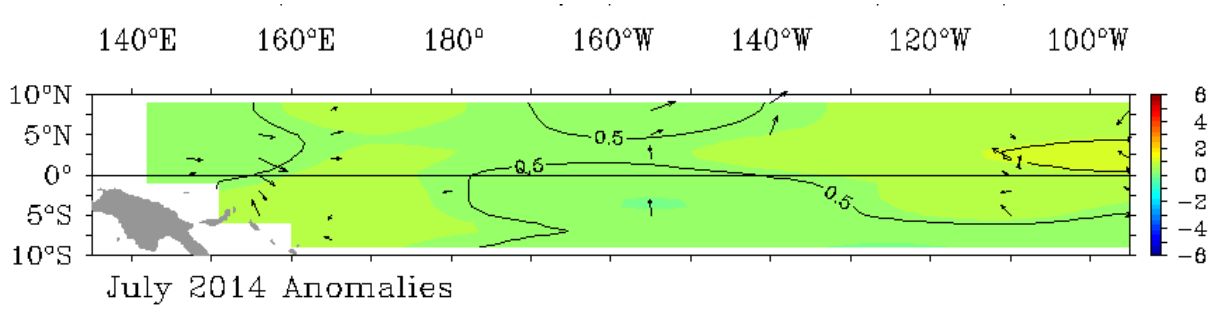


fig.3: SST and Wind anomalies over the Equatorial Pacific from TAO/TRITON.
http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/monthly-summary.html

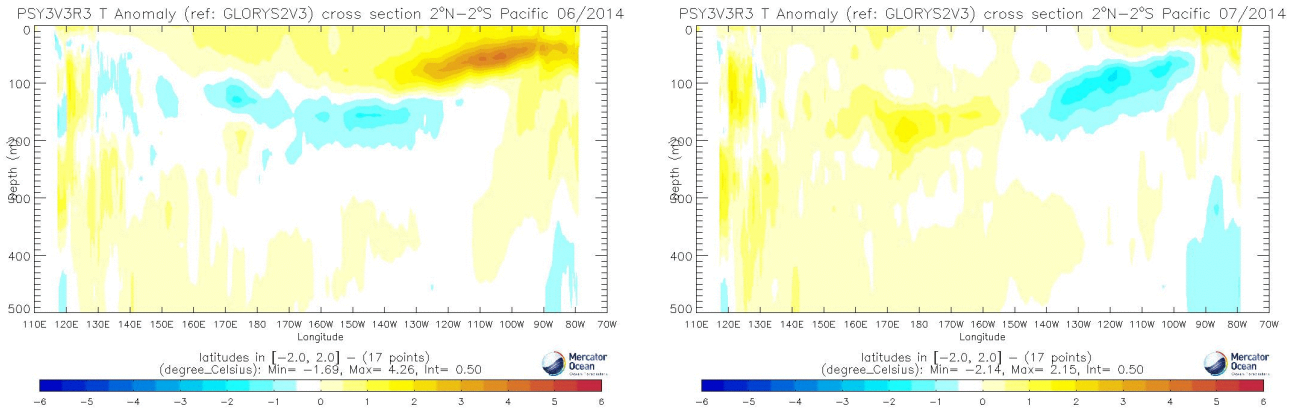


fig.4: Oceanic temperature anomaly in the first *500 meters* in the Equatorial Pacific, in previous month (left) and current month (right) http://bcg.mercator-ocean.fr/

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 close to normal ; nevertheless the positive anomalies appearing in the Western and centre of the basin have to be carefully monitored in the next coming months in relationship with the reactivation of an El Niño at fall.

The thermocline structure (fig. 5) : Consistently with the previous comment, the thermocline anomaly pattern is close to normal to the little exception of the quoted sub-surface anomalies.

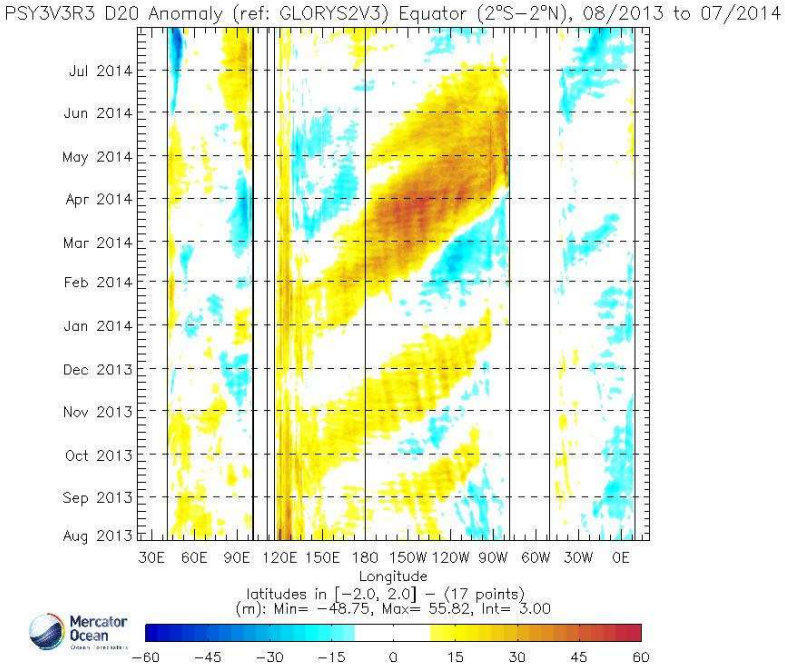


fig.5: Hovmöller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 24 month period. http://bcg.mercator-ocean.fr/

I.1.c Atlantic Basin

Northern Tropical Atlantic : mostly cooler than normal from Mauritania to the Caribbean and slightly warmer than normal closer to the equator and over the sub-tropics.

Equatorial waveguide : Cooler than normal with a clear tendency to cooling ; the cold tongue is now more visible. The SAT index is positive (consistent with a weakened West African Monsoon) but moving toward close to neutral conditions on time.

The Southern Tropical Atlantic : on average close to neutral to the exception of the regions close to the African continent (close to Namibia/Angola ; negative anomaly).
The TASI index is mostly negative (consistent with a weakened West African Monsoon) but moving toward close to neutral conditions with time.
Sea Surface Temperature near Europe (fig.5a):
Warmer than normal over most of the area north to 55°N. In contrast some cooler than normal conditions in the centre of the basin in the mid latitudes and close to the Iberic Peninsula. In the central subtropical North Atlantic, a warm anomaly.
Anomalies in the western Mediterranean are negative in relationship with the atmospheric circulation over the western façade of Europe (and lower than normal surface pressure and consequently enhanced wind).

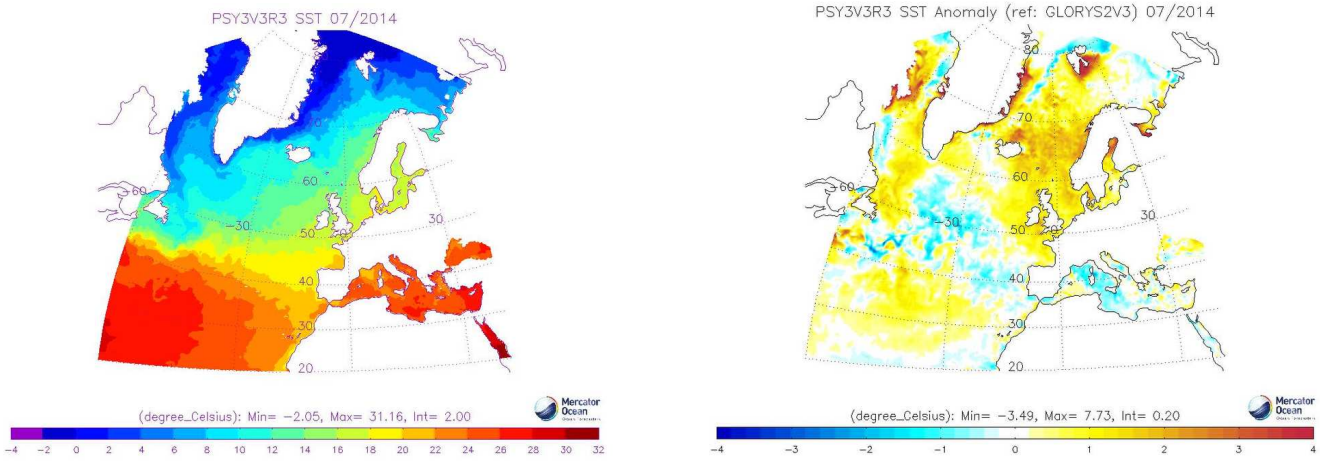


fig.5a: left : Monthly mean SST near Europe and the Mediterranean. http://www.dwd.de/rcc-cm ; right : Corresponding monthly mean SST anomalies (1981-2010 reference). http://data.giss.nasa.gov/gistemp/maps/

I.1.d Indian Basin

Southern Tropical Indian Ocean : warmer than normal conditions over most of the basin with a cooling from North-West Australia up to the equator (in the western part).
Equatorial waveguide : Dipole-like pattern ; colder than normal in Western part and warmer than normal in Eastern part. The tendency on West tends to strengthen this dipole. 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 was active during most of the month (excepted for the first week of July). The active phases were first over the maritime continent and then over the Western Pacific. 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) over the Warm Pool (likely related to MJO activity) which extends Eastward in the Northern Hemisphere (consistently with the SSTs). Convergent circulation anomalies cells in the Tropics/Sub-Tropics partly dynamically forced.
On the Atlantic : large Convergent circulation anomaly (downward anomaly motion) close to the Northern coast 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, and Tropical Atlantic. The divergent circulation is likely strongly influenced by the convergent circulation anomaly close to the Eastern coast of Africa (see next §).
On the Indian Ocean : very Strong convergent circulation anomalies (downward anomaly motion) over most of the Equatorial Western part of the basin (and a large portion of East Africa) and over the Southern part of the Indian sub-continent (consistent with a weakened Indian summer monsoon). Possibly related partly to the MJO activity and partly to some "local" Ocean/Atmosphere coupling.

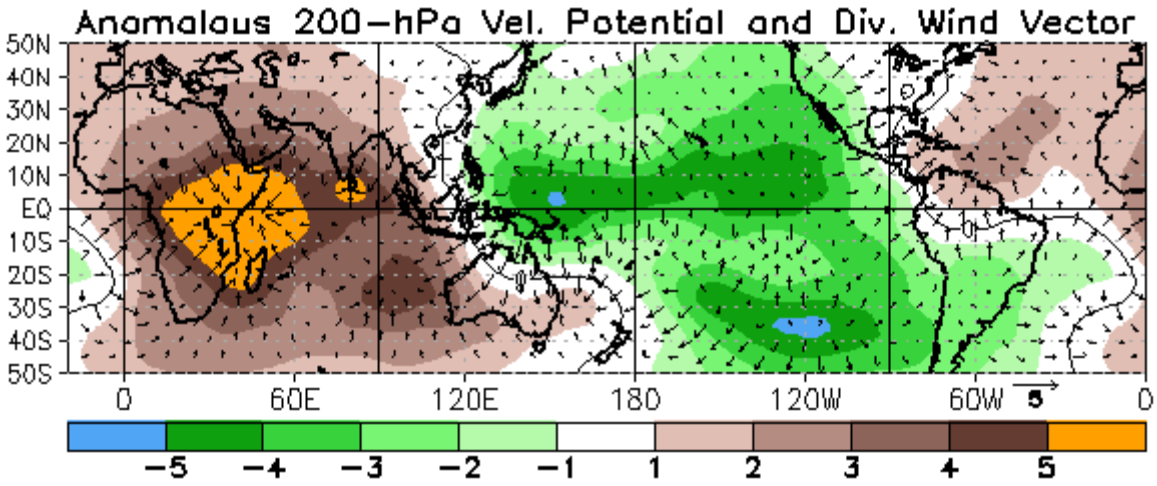


fig.6: Velocity Potential Anomalies at 200 hPa and associated divergent circulation. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

Stream Function anomalies in the high troposphere (fig. 7 – insight into teleconnection patterns tropically forced) : No clear signal in the inter-tropical band (including the Pacific area) 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. To be noticed the general signal in mid-high latitudes of both hemispheres.

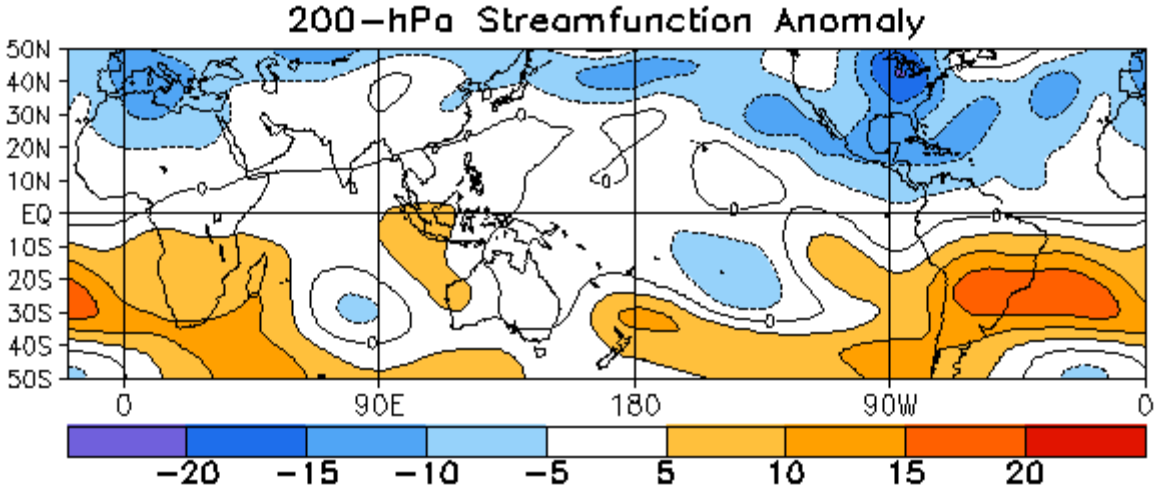


fig.7: Stream Function Anomalies at 200 hPa.
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

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

Nevertheless some modes appear to be active, but partly due to projection effects rather than real mode activity (see e.g. WP). Mostly one can quote the West Pacific (-1.6), the Scandinavian (1.6). To some extent one can quote also the EA mode (0.6) possibly related to the Azores Anticyclone location.

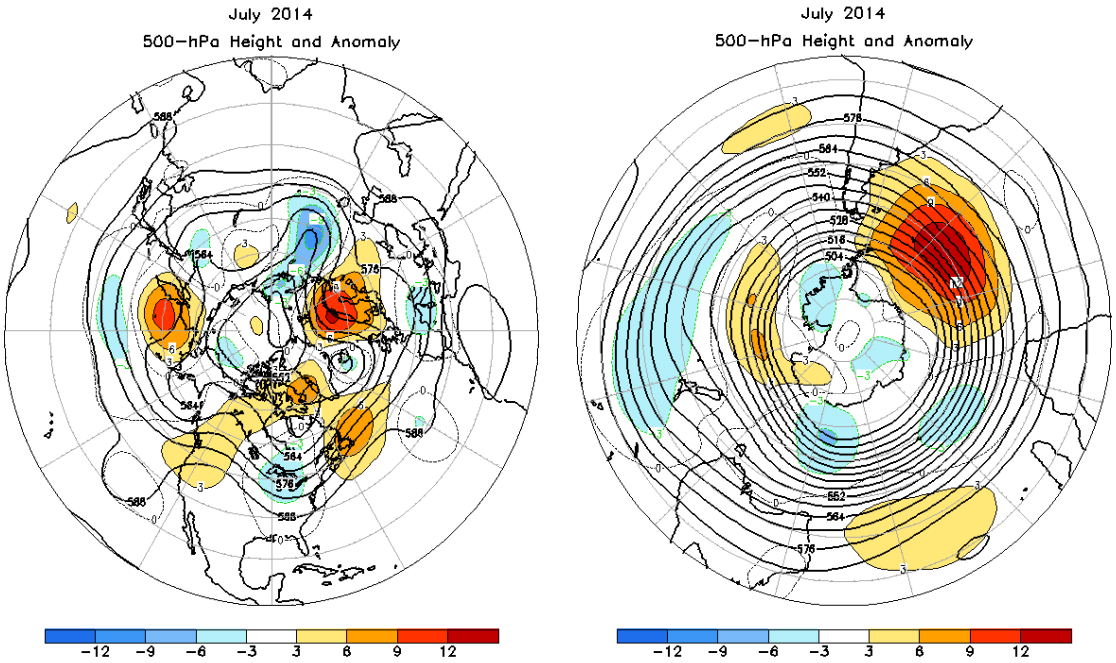


fig.8: Anomalies of Geopotential height at 500hPa (left North Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige9.shtml, and right South Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige15.shtml)

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
JUL 14	**0.2**	**0.6**	**-1.6**	**0.3**	**0.5**	**---**	**-0.3**	**1.6**	**-0.9**
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

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

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

Little anomalies over the mid-latitudes of East Atlantic. Strong positive anomaly over North Scandinavia (consistently with the SC mode activity) but with lower than normal MSLP from Island up to the Adriatic sea which explain (at least partly) why the SC mode is not associated this year with high temperature over Western Europe.

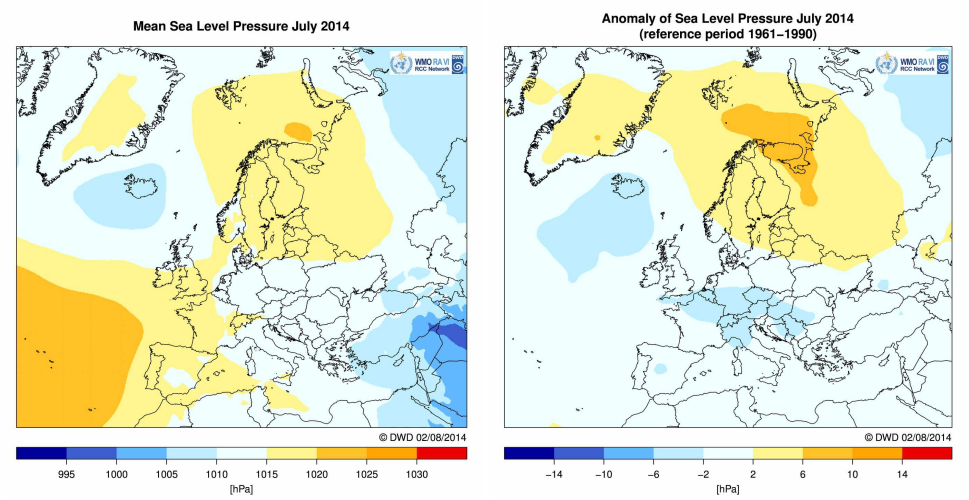


fig.8a: Monthly mean SLP over Europe (left) and corresponding anomalies (right). http://www.dwd.de/rcc-cm

I.2.b Precipitation

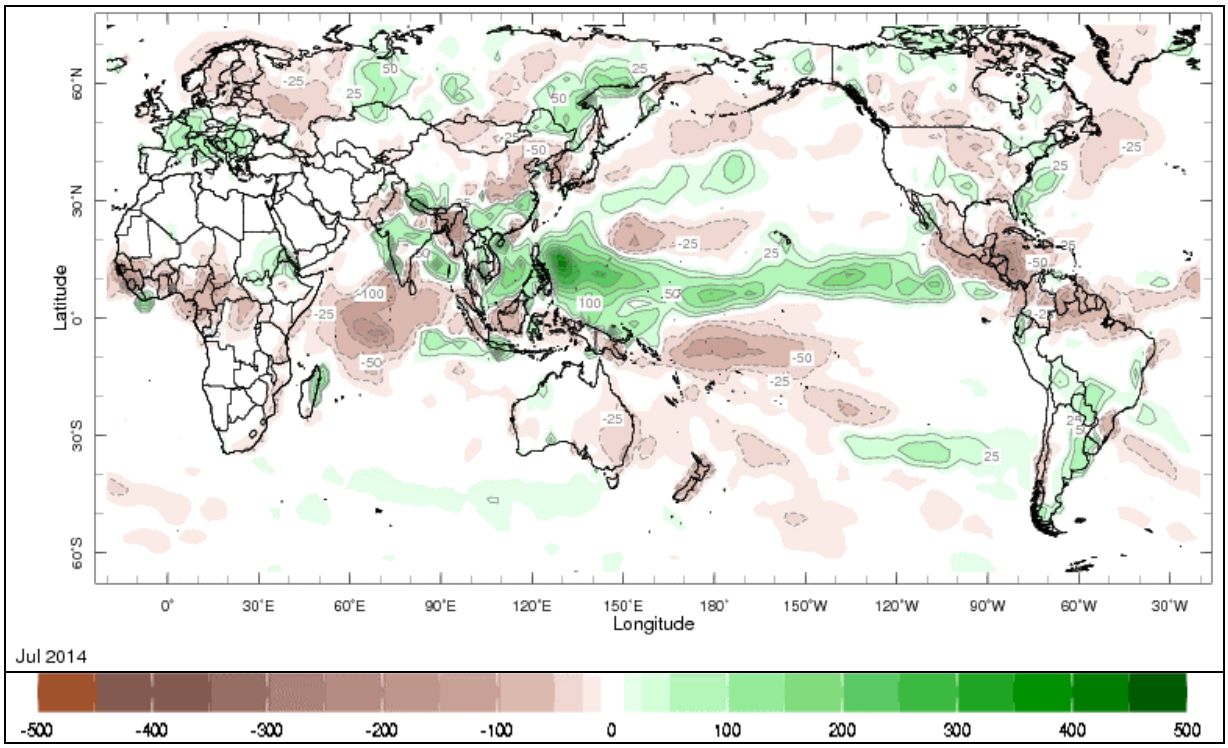


fig.9: Rainfall Anomalies (in mm) (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.
http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/

Intertropical zones (including sub-tropics) : Good consistency with the Velocity Potential anomalies across the Tropical zones ; especially in the vicinity warm pool and across the northern Pacific (wetter than normal), over the western part of the Indian Ocean (drier than normal), over Central and West Africa dn the Northern South and Central America (drier than normal).
Mid-latitudes : a lot of contrasted anomalies (likely in relationship with the little predictability on seasonal scales already pointed out). Dipole patterns over the Eastern part of the Asian continent and over Europe.

Rainfall anomalies in Europe:

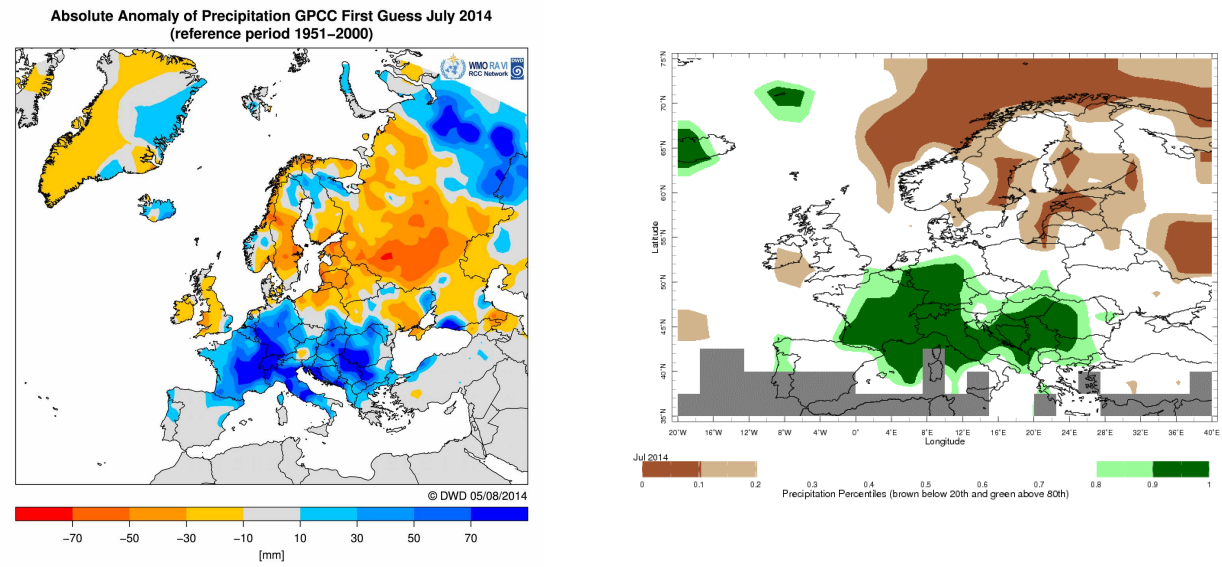


fig.10: Left: Absolute anomaly of precipitation in the RA VI Region (Europe), data from GPCC (Global Precipitation Climatology Centre – reference 1951-2000), http://www.dwd.de/rcc-cm.
Right: Percentiles of precipitation. Data from NOAA Climate Prediction Center, http://iridl.ldeo.columbia.edu/maproom/Global/Precipitation/Percentiles.html

A conspicuous dipole pattern is observed in July. Wetter than normal conditions over France up to the Black Sea and Drier than normal conditions over the Eastern and Northern regions. Especially over a large region extending from France across the Alps up to the Black Sea the precipitations were Above the 90th percentile, suggesting partly severe or locally even extremely wet conditions. Also regions in the vicinity of the Baltic Sea area were very dry (Below the 10 th percentile) due to extended high pressure influence.

I.2.cTemperature

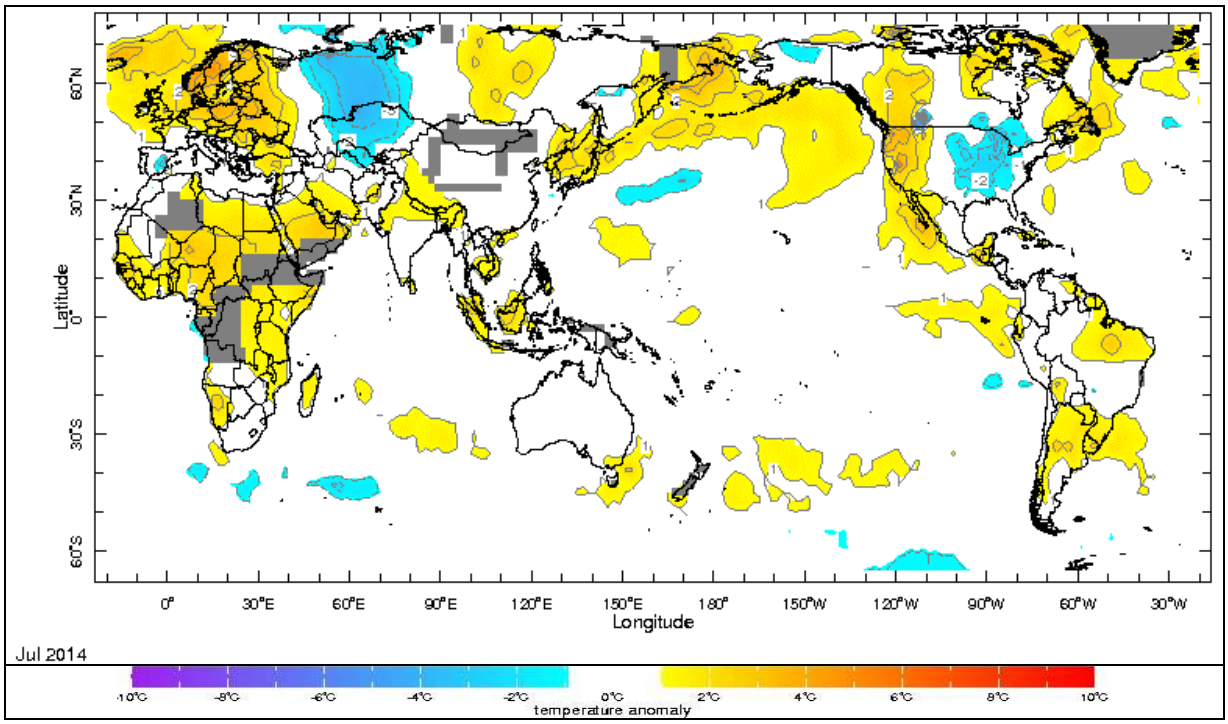


fig.11: Temperature Anomalies (in °C) (departure to the 1979-2000 normal) http://iridl.ldeo.columbia.edu/maproom/.Global/.Atm_Temp/Anomaly.html

Strong warm anomalies over Scandinavia (consistent with Z500 anomaly) extending south-Eastward up to the Black Sea while the most Eastern part of Europe is under Below normal temperatures. A large portion of the African continent faces positive anomalies. The coastal areas of East Asia and West North America have above normal conditions conversely to the Eastern US and great plains.

Temperature anomalies in Europe:
July 2014 was very warm especially in the vicinity of the Baltic sea wher most of the observations are Above the 90 th percentile.
In contrast, it was clearly colder than normal in some countries of the SEE region, especially close to Slovenia and the Adriatic sea.

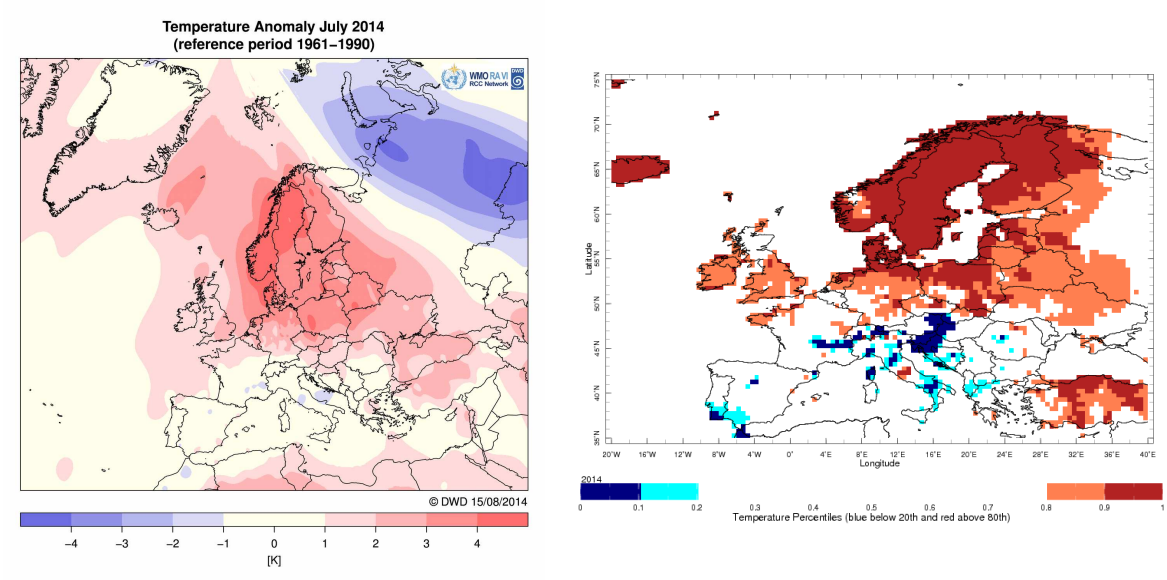


fig.12: left : Absolute anomaly of temperature in the RA VI Region (Europe), data from Deutscher Wetterdienst (DWD); http://www.dwd.de/rcc-cm . Right : Percentiles of temperature. Data from NOAA Climate Prediction Center, http://iridl.ldeo.columbia.edu/maproom/Global/Atm_Temp/Percentiles.html .

I.2.d Sea Ice

In Arctic (fig. 15&15bis- left) : below normal sea-ice extension quite far from the record (2012) despite not so far from 2 std deviation.
In Antarctic (fig. 15&15bis - right) : well above normal sea-ice extension anomaly (on record).

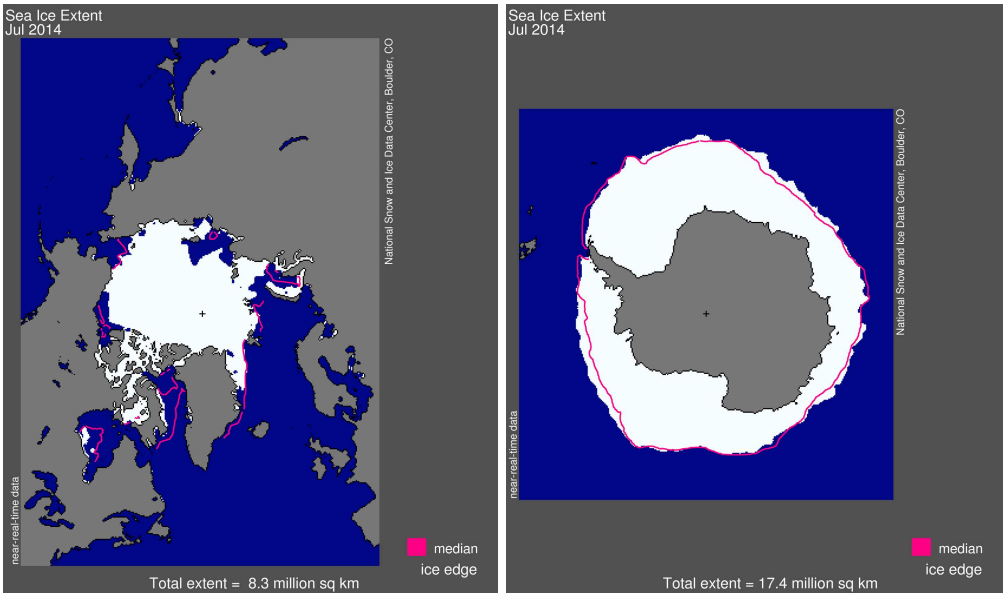


fig.13: Sea-Ice extension in Arctic (left), and in Antarctic (right). The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

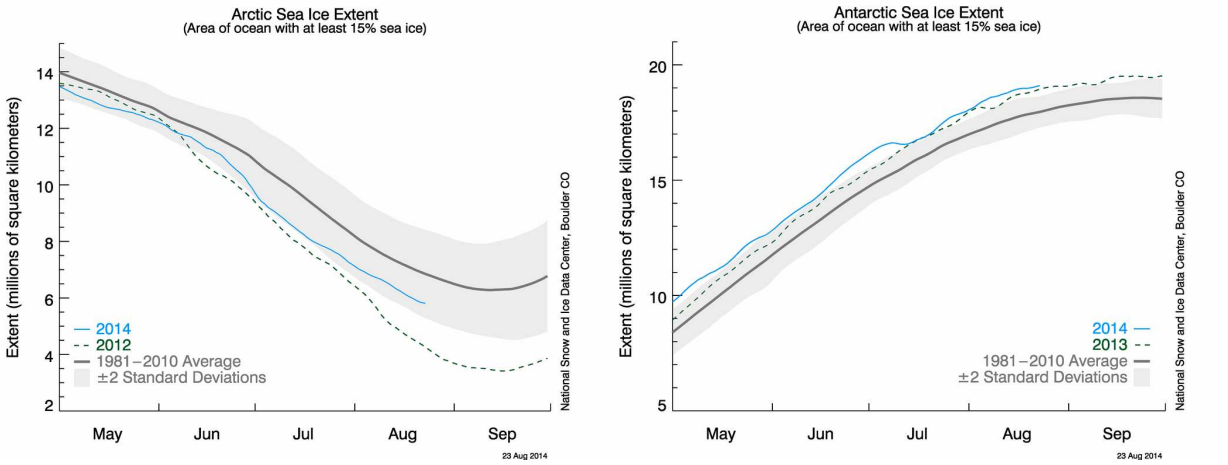


fig. 15bis : Sea-Ice extension evolution from NSIDC
http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png

II. SEASONAL FORECASTS FOR SON FROM DYNAMICAL MODELS

II.1.OCEANIC FORECASTS

II.1.a Sea Surface Temperature (SST)

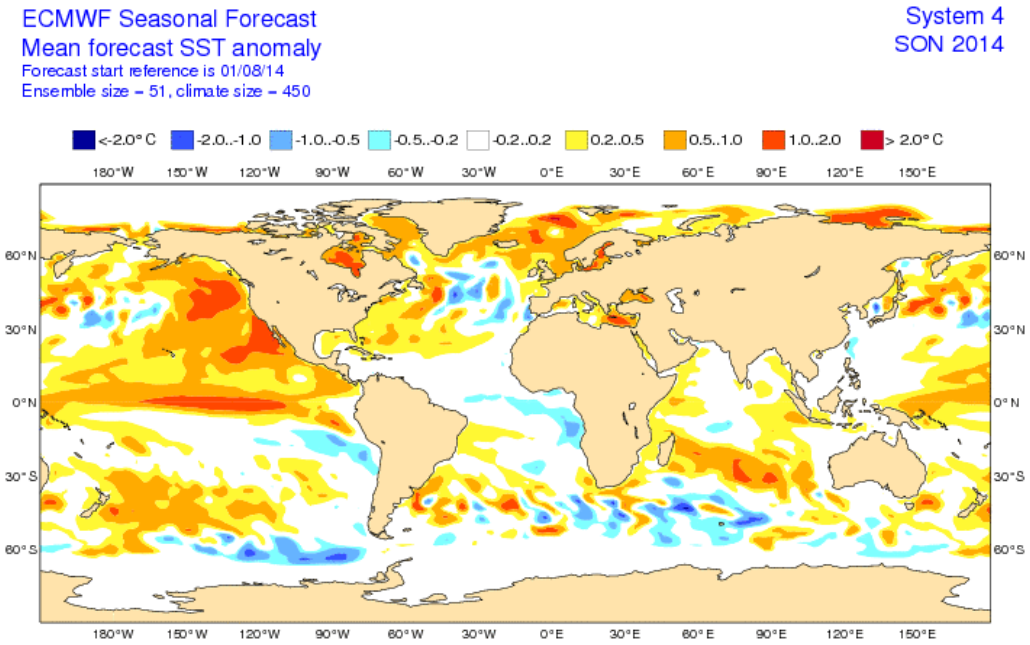


fig.14: SST anomaly forecast (in °C) from ECMWF.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

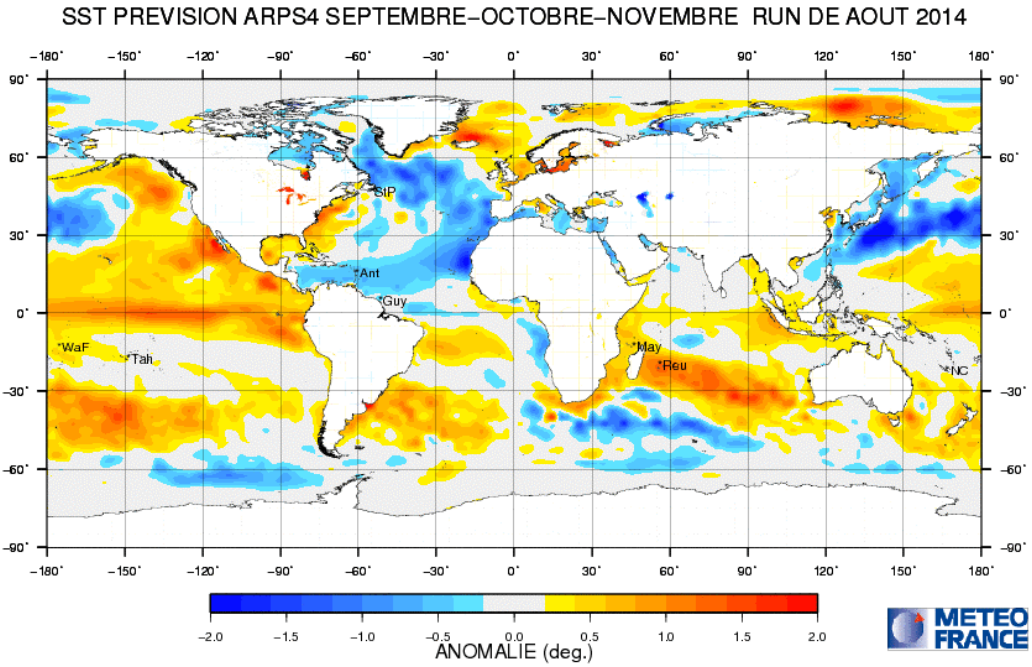


fig.15: SST Anomaly forecast (in°C - recalibrated with respect of observation) from Météo-France.
http://elaboration.seasonal.meteo.fr/

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. 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 slightly cooler than normal in both models (warmer than normal in MF in the coastal area of the Guinean Gulf). Some consistency for slight 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 from West Australia 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 area. Quite consistent patterns in the subtropics and the mid-latitudes of both hemispheres.
Atlantic : slightly colder than normal in 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.
Indian Ocean : Same patterns than for the individual models (mostly warmer than normal conditions over the Southern sub-tropics and in the Western and Eastern part of the equatorial waveguide).

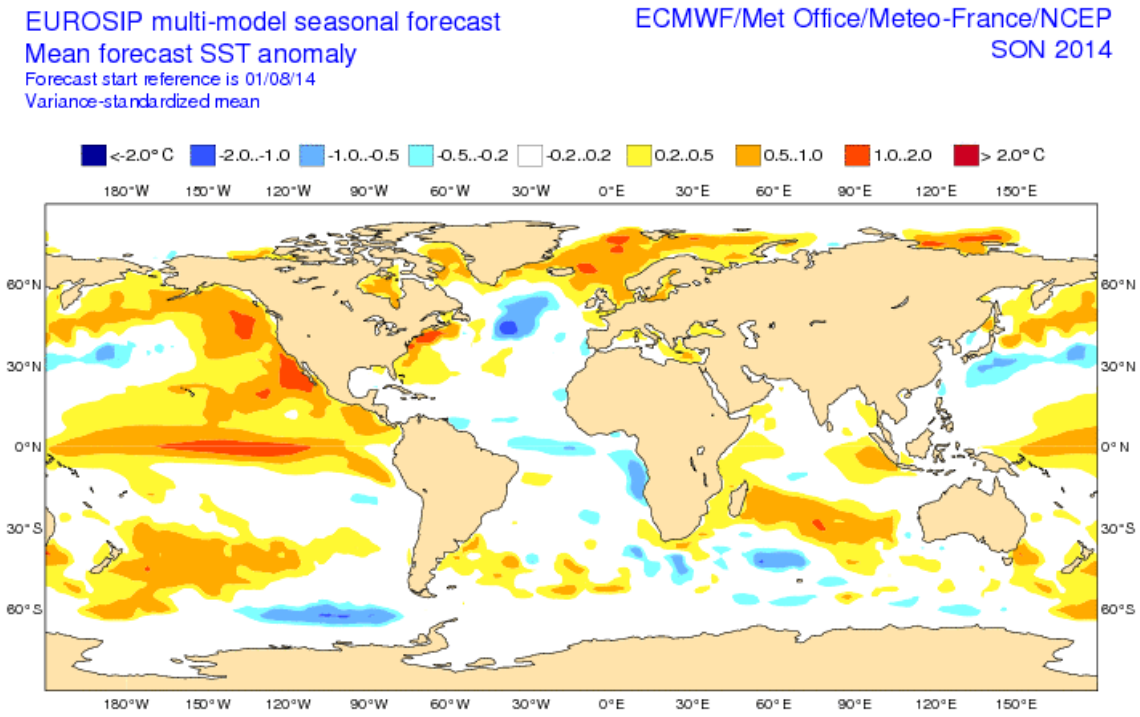


fig.16: SST Forecasted anomaly (in °C) from Euro-SIP. http://www.ecmwf.int/

II.1.b ENSO Forecast :

Forecasted Phase : Close to El Niño threshold conditions evolving progressively toward a weak to moderate El Niño

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).

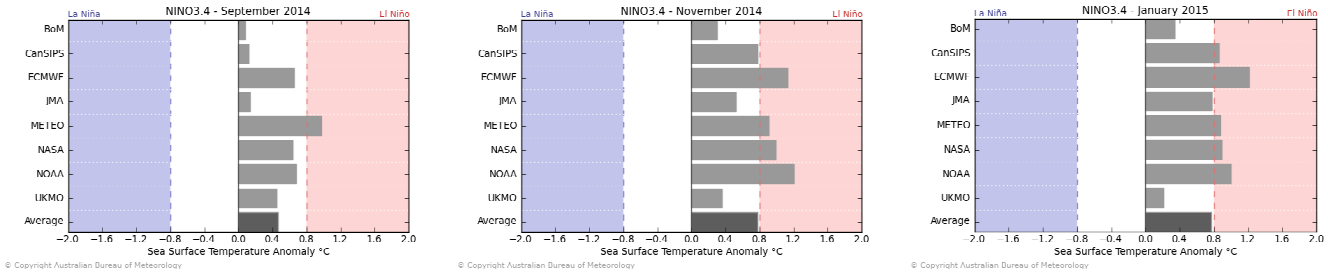
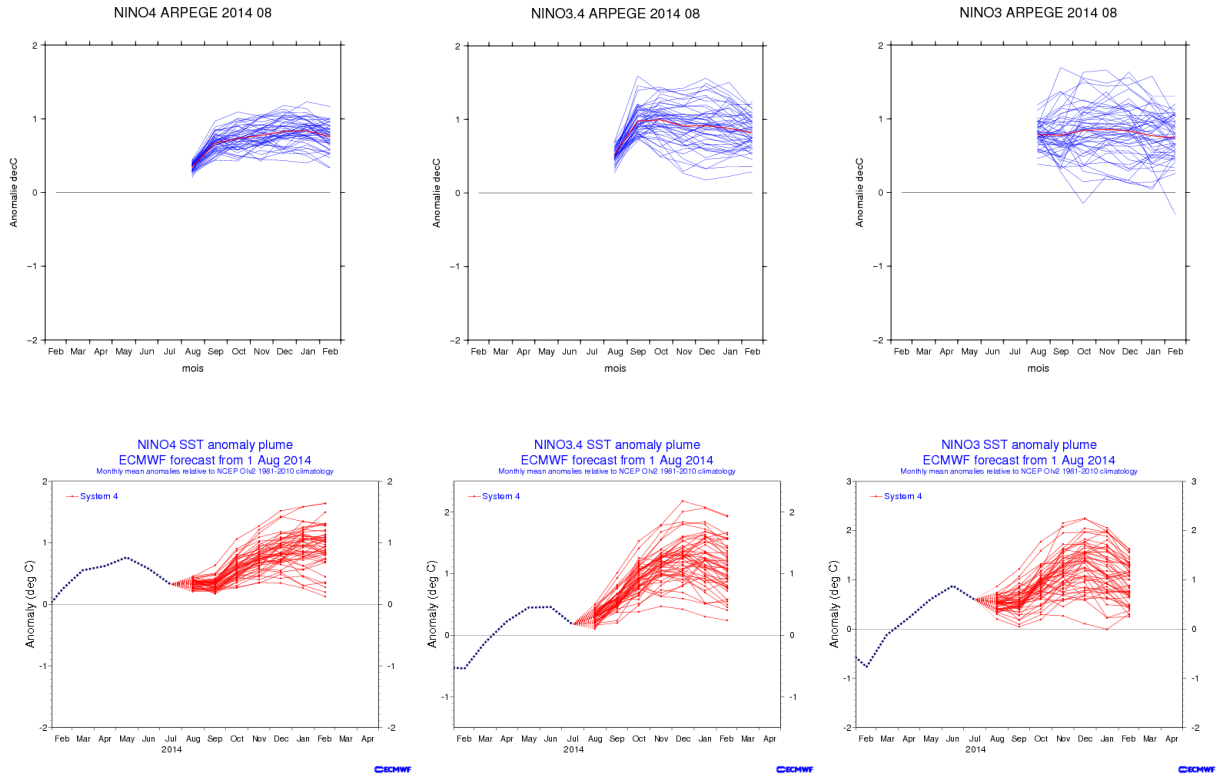


fig.17: Synthesis of Niño 3.4 forecasts from several GPC by BoM :
http://www.bom.gov.au/climate/ahead/model-summary.shtml#tabs=Pacific-Ocean

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 SON. In both models the warming trend is consistent with the previous forecasts and the uncertainty comparable. The spread increases from West to East where it indicates a quite large uncertainty. The largest values are reached in the Niño 3 area. In EuroSIP Plumes, close to Niño threshold on average.



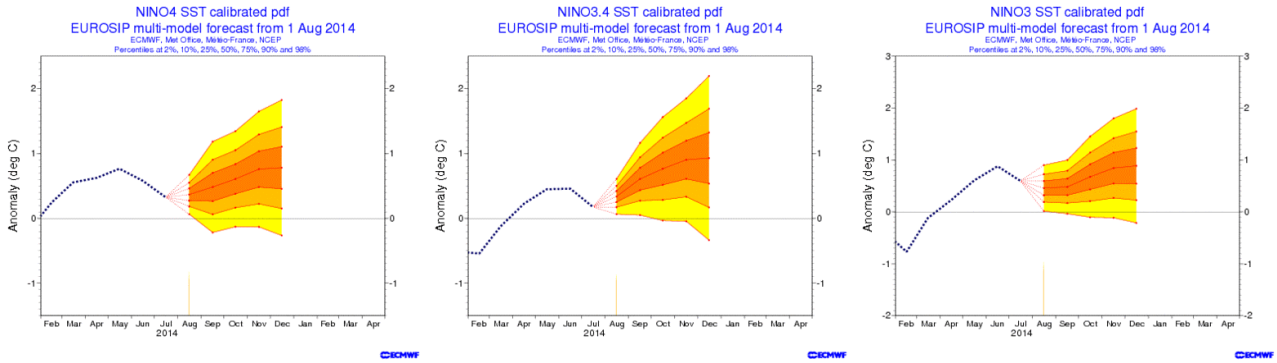


fig.18: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members - and EuroSIP (bottom) – recalibrated distributions.
(http://www.ecmwf.int/)

II.1.c Atlantic Ocean forecasts :

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

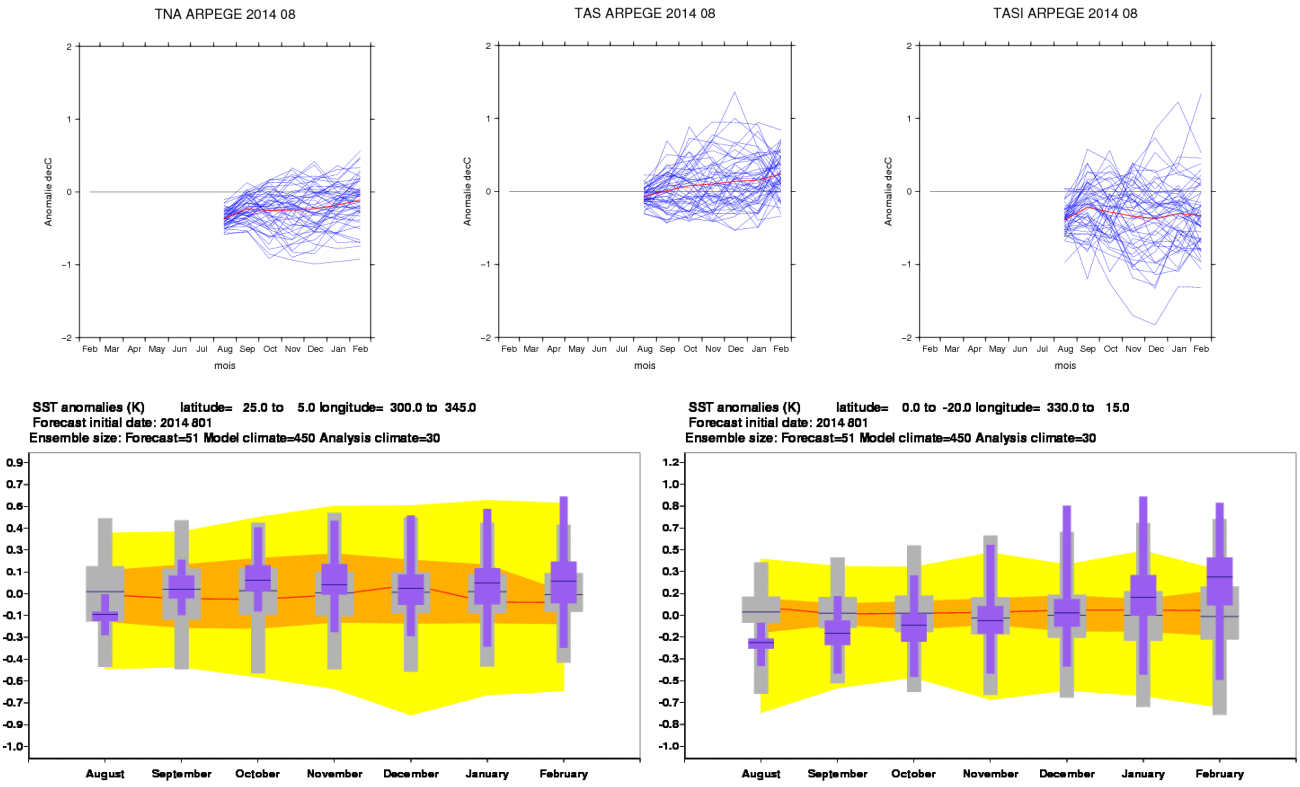


fig.19: SSTs anomaly forecasts in the Atlantic Ocean boxes from Météo-France (top) and ECMWF (bottom), plumes / climagrams correspond to 51 members and monthly means.

Not too much consistency between the 2 models over the targeted period.
North Tropical Atlantic : starting with Colder than normal conditions with a progressive warming to reach Warmer than normal conditions at fall in ECMWF while MF stay into Below normal conditions ; the difference could be partly related top the hindcast issue.
South Tropical Atlantic : Below Normal in ECMWF returning to Normal. In spite of the same tendency on time, MF start close to normal and move toward slightly Above normal conditions.
TASI : the TASI index is negative in MF.
Guinean Gulf : Close to Neutral conditions in MF.

II.1.d Indian Ocean forecasts :

Forecasted Phase: West and East warmer than normal conditions
IOD on the negative side returning close to normal

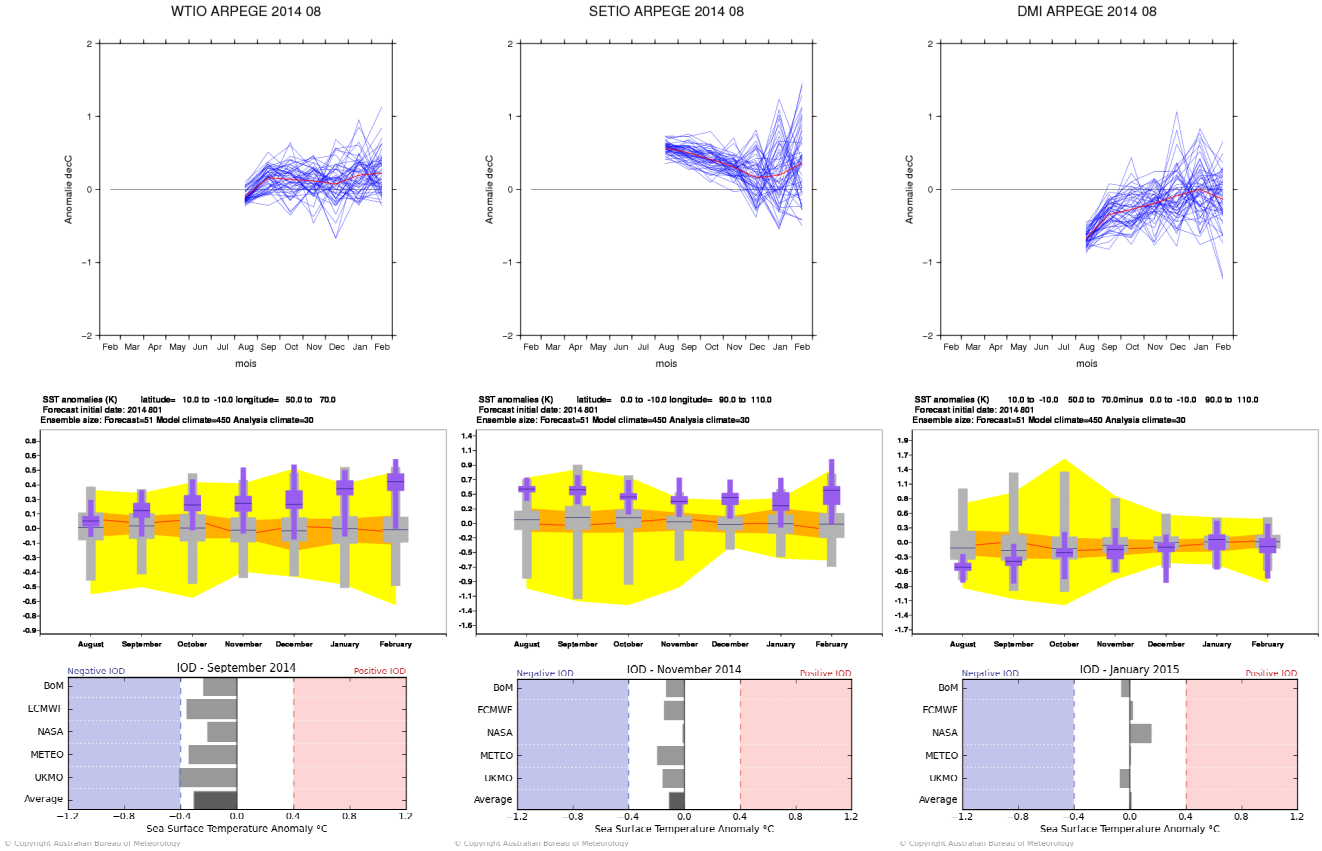


fig.20: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France (top), ECMWF (middle), plumes / climagrams correspond to 51 members and monthly means. Synthesis for IOD (bottom) for several GPCs from BoM http://www.bom.gov.au/climate/ahead/model-summary.shtml#tabs=Indian-Ocean

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

II.2. GENERAL CIRCULATION FORECAST

II.2.a Global Forecast

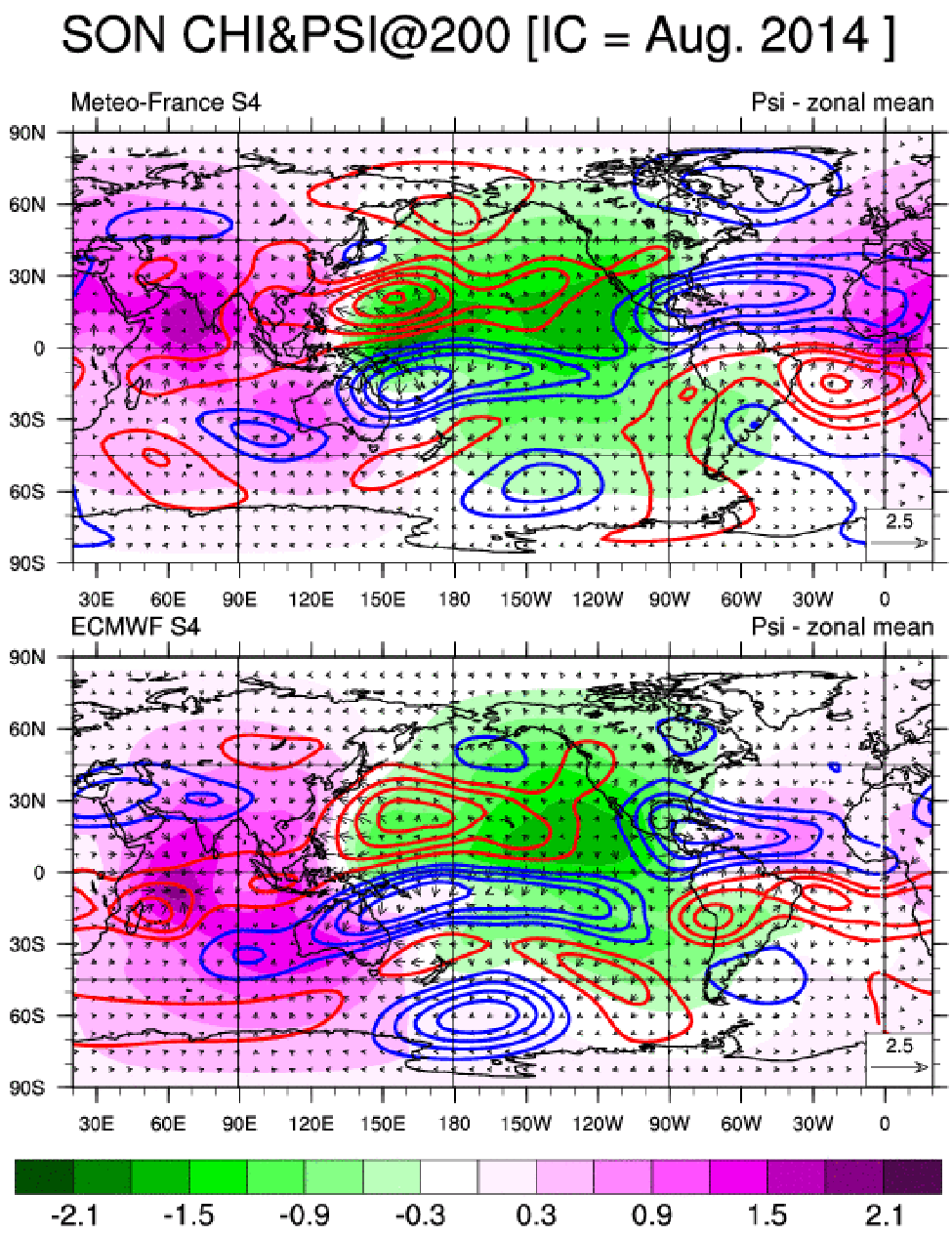


fig.21: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), associated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa by Météo-France (top) and ECMWF (bottom).

Velocity potential anomaly field (cf. fig. 21 – insight into Hadley-Walker circulation anomalies) : Quite good consistency between the 2 models in the Tropical Indian Ocean and Pacific.
Over the Pacific, The divergent circulation anomaly is quite consistent between the two models. However, the Large Scale Convection response over the warm pool is stronger in MF. So the interpretation could be that the differences between the 2 models are in the range of the model uncertainty. This could be still related to the weak ocean forcing observed (see SOI index comment) and consequently a weak Ocean/Atmosphere coupling. This time the JMA forecast is different with a strong atmospheric

response (enhanced Large Scale Convection) close to the western coastal areas of America.
Over the Atlantic, less consistency over the West African continent and the North Tropical Atlantic. The MF convergent circulation is stronger and extends on a wider range compared to ECMWF one. The current forecast from JMA is again quite different with weak anomalies (the positive).
Over the Indian Ocean : A quite strong convergent circulation anomaly in the Western part of the basin in both models. However, there are differently located ; South to the equator in ECMWF while North in MF. These responses are not consistent with the one from JMA.

Stream Function anomaly field (cf. fig. 21 – insight into teleconnection patterns tropically forced) : Quite good consistency over the Tropical regions (between 20°N and 20°S) and to some extent in the mid-latitudes of the Southern Hemisphere. The interpretation of these patterns can be associated in the Pacific to the SST forcing (West to the dateline). Some signal of teleconnection are visible starting from the warm pool . related to the differences already pointed out in the Velocity Potential fields, not real consistency the JMA forecast is quite different across the tropical regions.

As a conclusion **the predictability** should exist in the vicinity of the Pacific basin, over the Indian Ocean (especially within the tropical regions) and in the Tropics in the vicinity of the Atlantic sector (Caribbean, South America and part of Africa).
Over mid-latitudes regions of the Northern Hemisphere, one could consider that the signal is poorly influenced by the Tropics to the exception of the regions close to the Pacific. For the Western façade of Europe, one should consider that no significant predictability will be present for the SON period. This conclusion could be disputable for part of North Africa (differently located with respect of both models).

II.2.b North hemisphere forecast and Europe

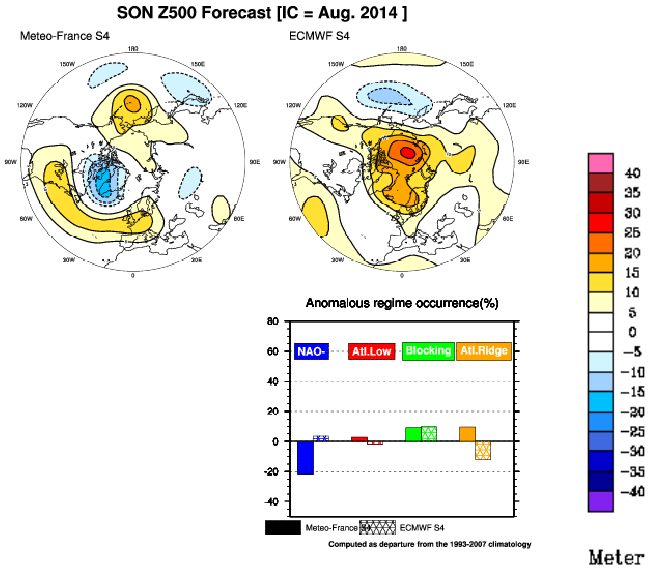


fig.22: Anomalies of Geopotential Height (top) at 500 hPa from Meteo-France (left) and ECMWF (right). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip and North Atlantic Regime occurrence anomalies (bottom) from Météo-France and ECMWF : vertical bars represent the excitation 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 some anomalies ocross the Pacific which could be related to the SST forcing but not really for the Atlantic sector.

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

II.3. IMPACT : TEMPERATURE FORECASTS

II.3.a ECMWF

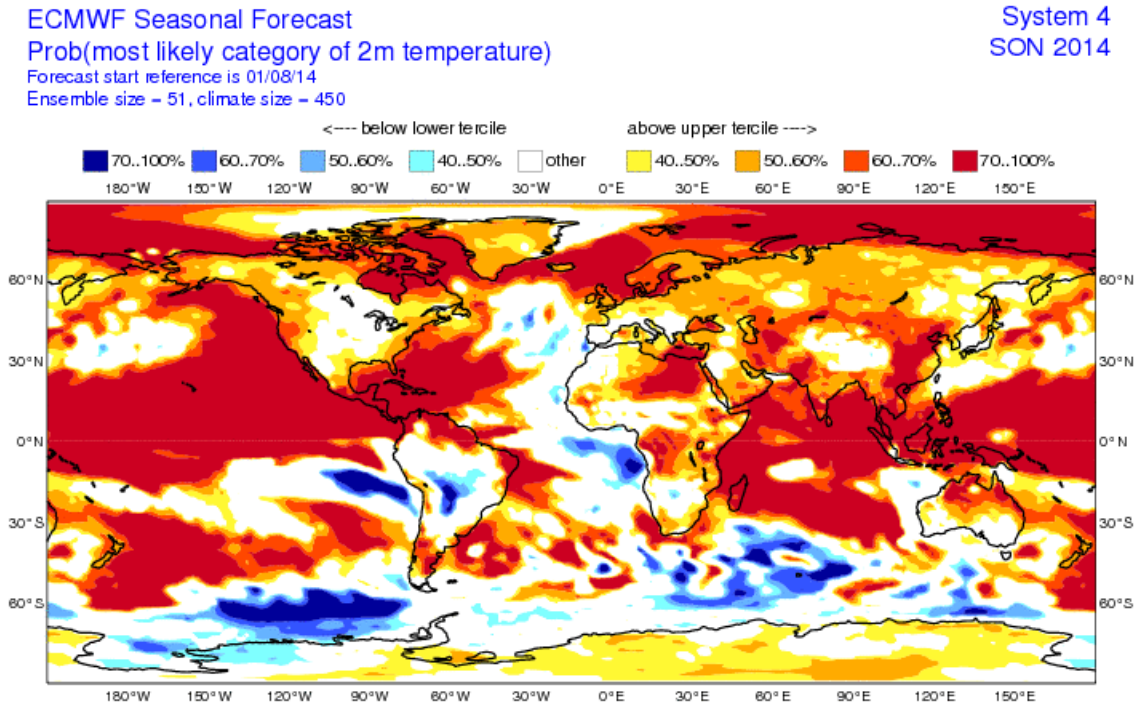


fig.23: Most likely category probability of T2m from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

II.3.b Météo-France

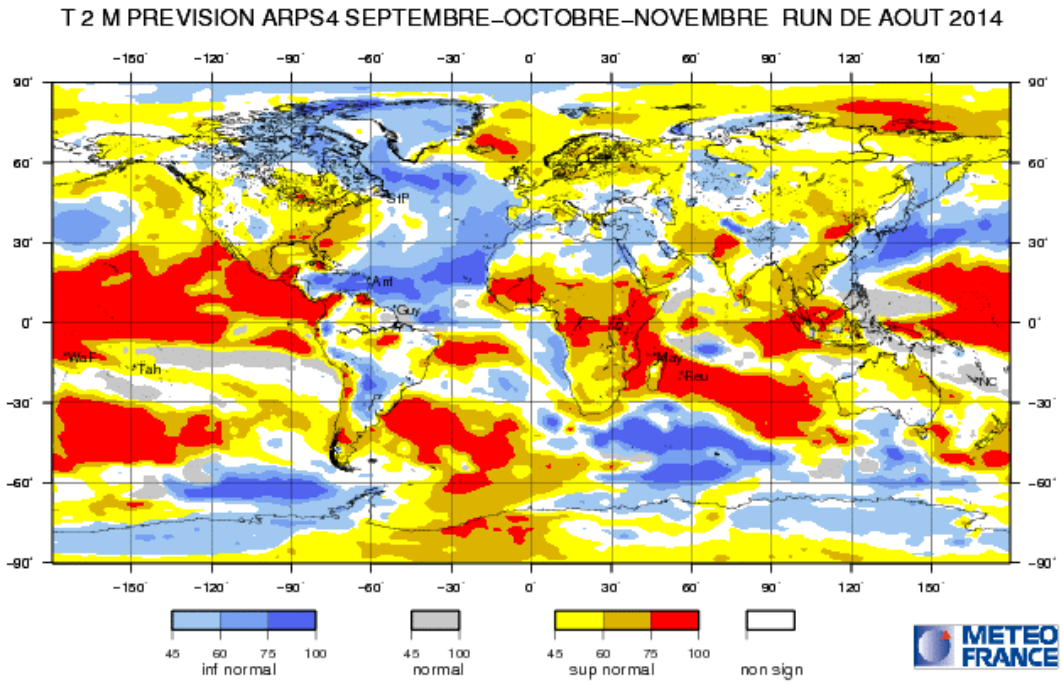


fig.24: Most likely category of T2m from Meteo-France. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.3.c Met Office (UKMO)

/GPC_exeter

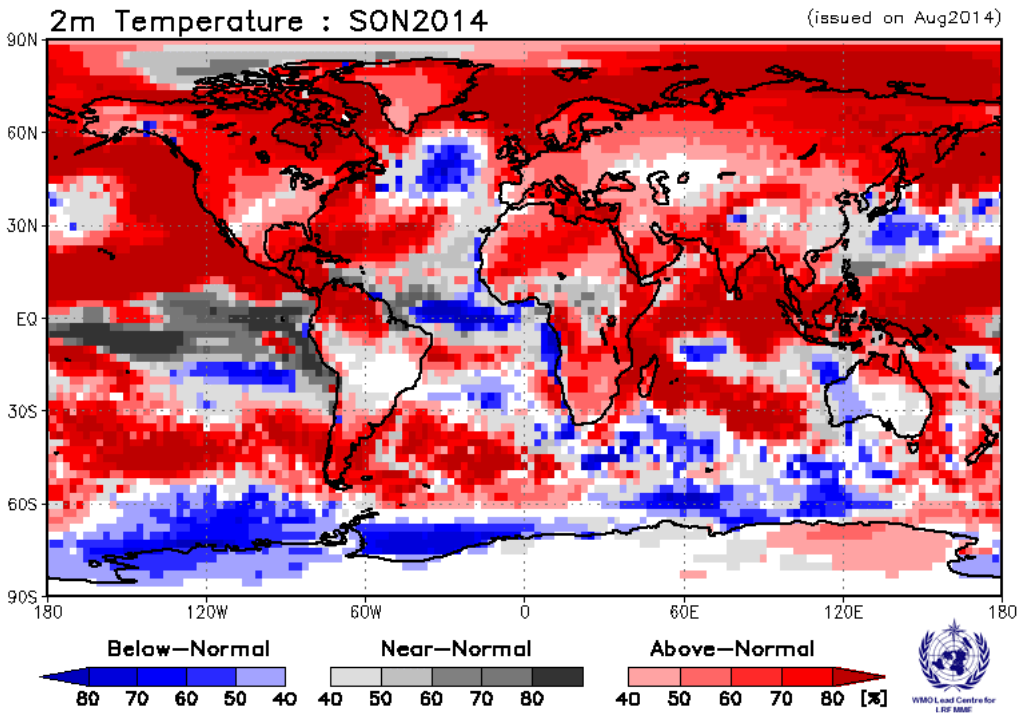


fig.25: **Most likely category of T2m from UK Met Office.** **https://www.wmolc.org/**

II.3.d Climate Prediction Centre (CPC)

/GPC_washington

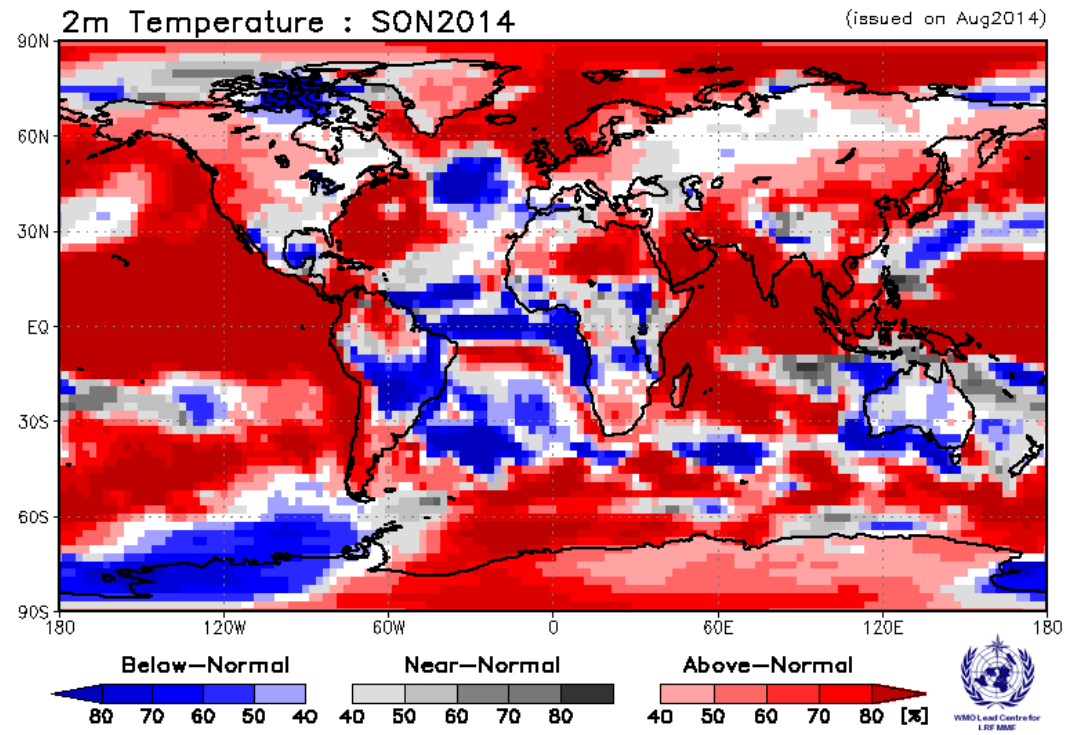


fig.26: **Most likely category of T2m from CPC.** **https://www.wmolc.org/**

II.3.e Japan Meteorological Agency (JMA)

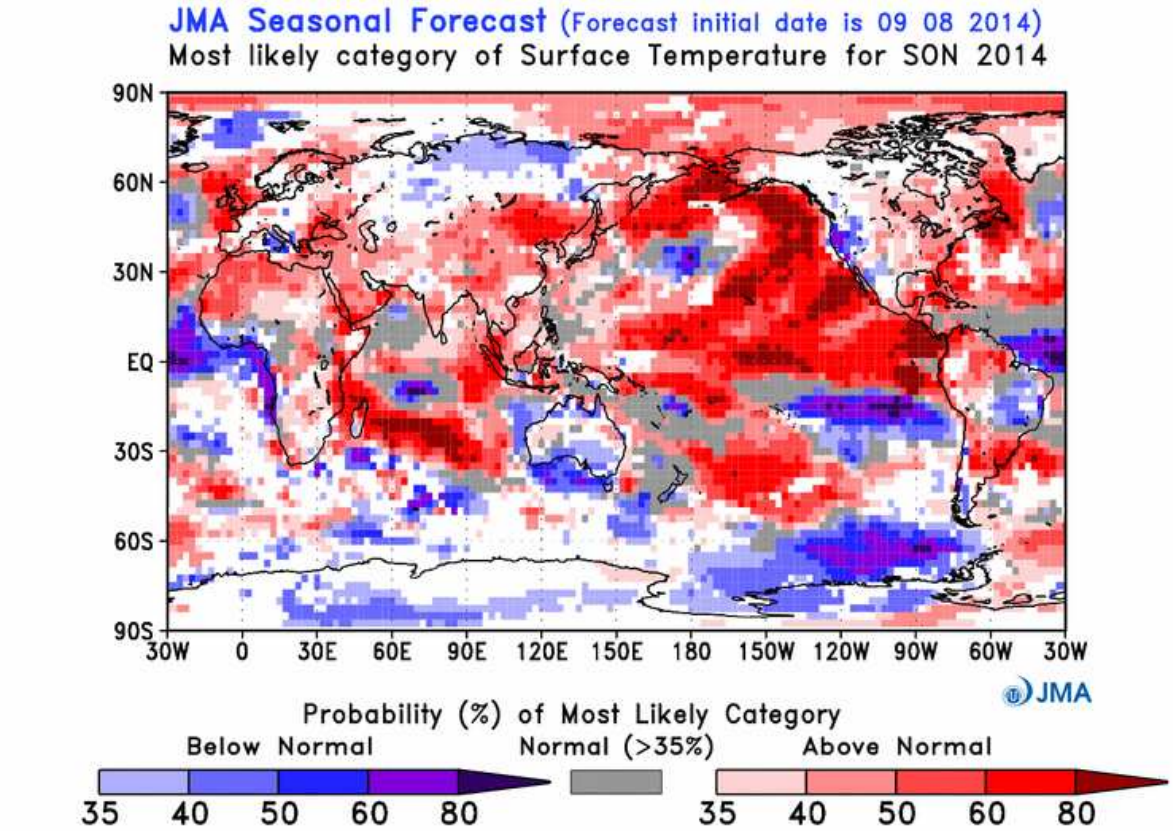


fig.27: Most likely category of T2m from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/

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

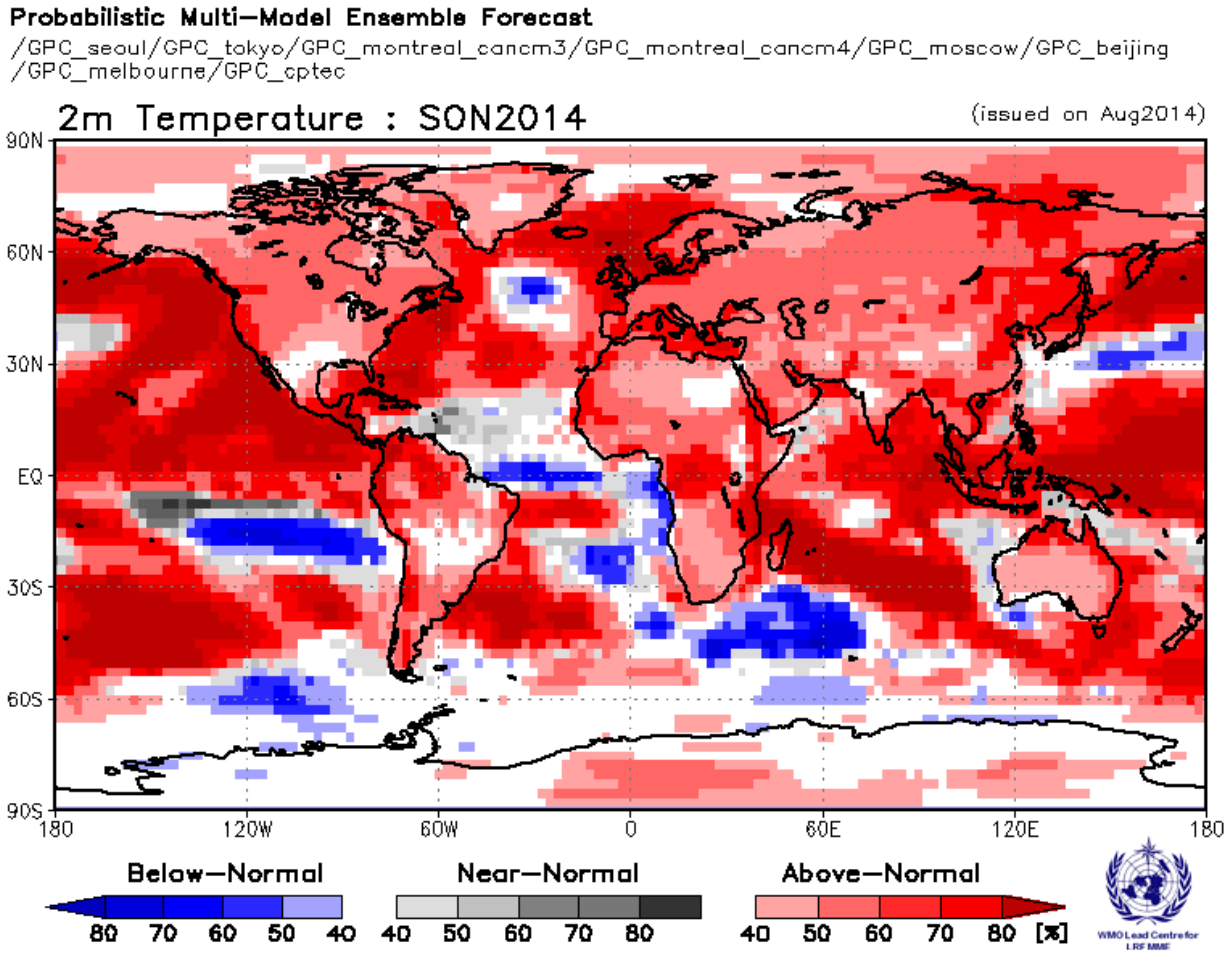


fig.28: MME most likely category of T2m from LC-MME. The MME composition corresponds to the GPCs not used in EuroSIP https://www.wmolc.org/

II.3.g Euro-SIP

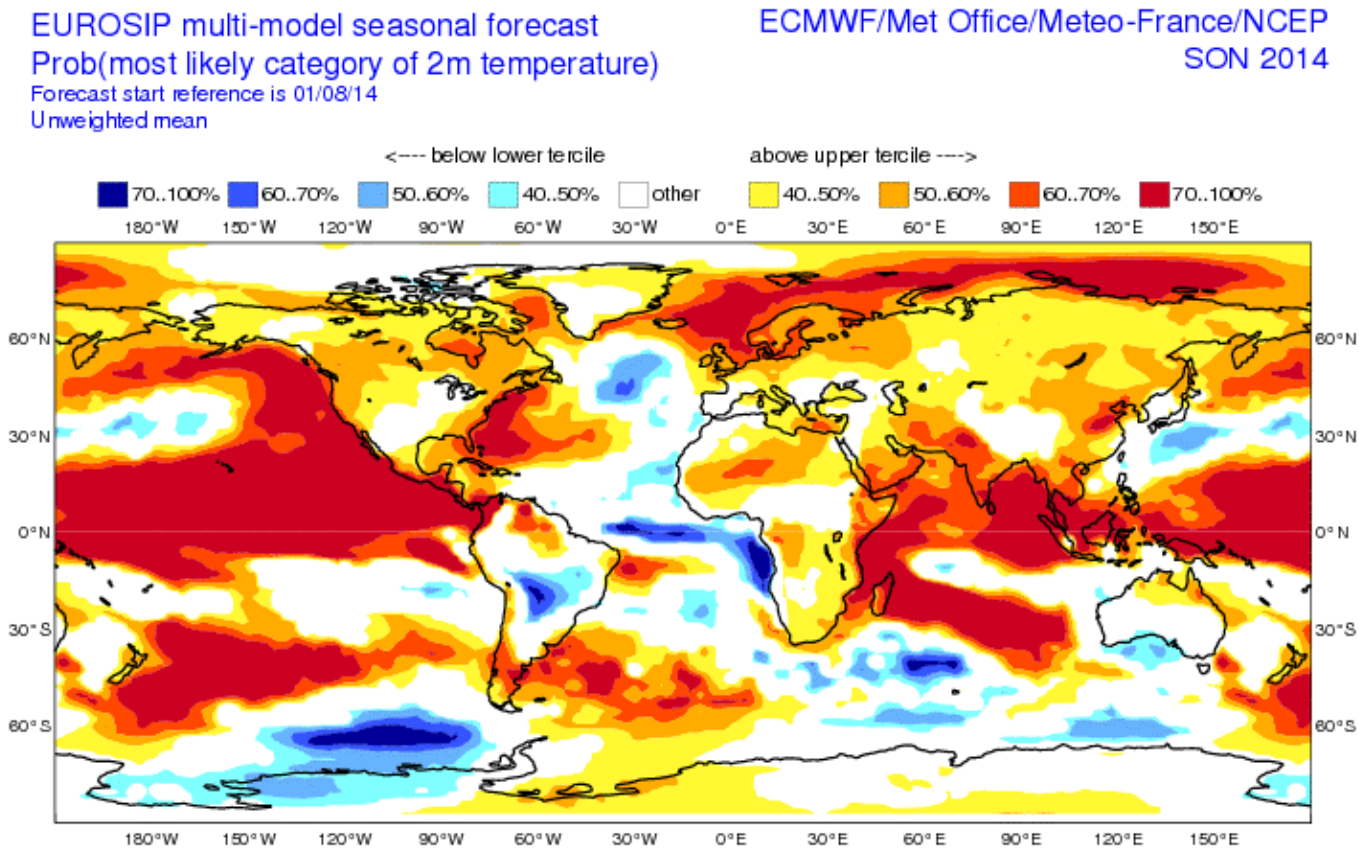


fig.29: Multi-Model Probabilistic forecasts for T2m from EuroSip.
(2 Categories, Below and Above normal – White zones correspond to No signal and Normal).

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

North-America : enhanced probabilities for warmer than normal conditions over the Western coast of USA and Canada. Also warmer than normal along the Eastern coastal regions of USA and the Gulf of Mexico.
Central-America : globally warmer than normal extending toward the North Caribbean.
South-America : Some consistent signal over the Northern part of the continent (warmer than normal). Below normal conditions in the vicinity of Bolivia.
Australia : little warmer than normal signal over the Northern coast.
Asia : Mostly Warmer than normal conditions more or less everywhere to the exception of the vicinity of the Tibetan High.
Africa : Mostly warmer than normal over a large portion of the continent ; especially along the Eastern coast.
Europe : Enhanced probabilities for Warmer than normal conditions over most of the continent above 50°N. Considering the absence of predictability, this signal could be related to the climate trend.

II.4. IMPACT : PRECIPITATION FORECAST

II.4.a ECMWF

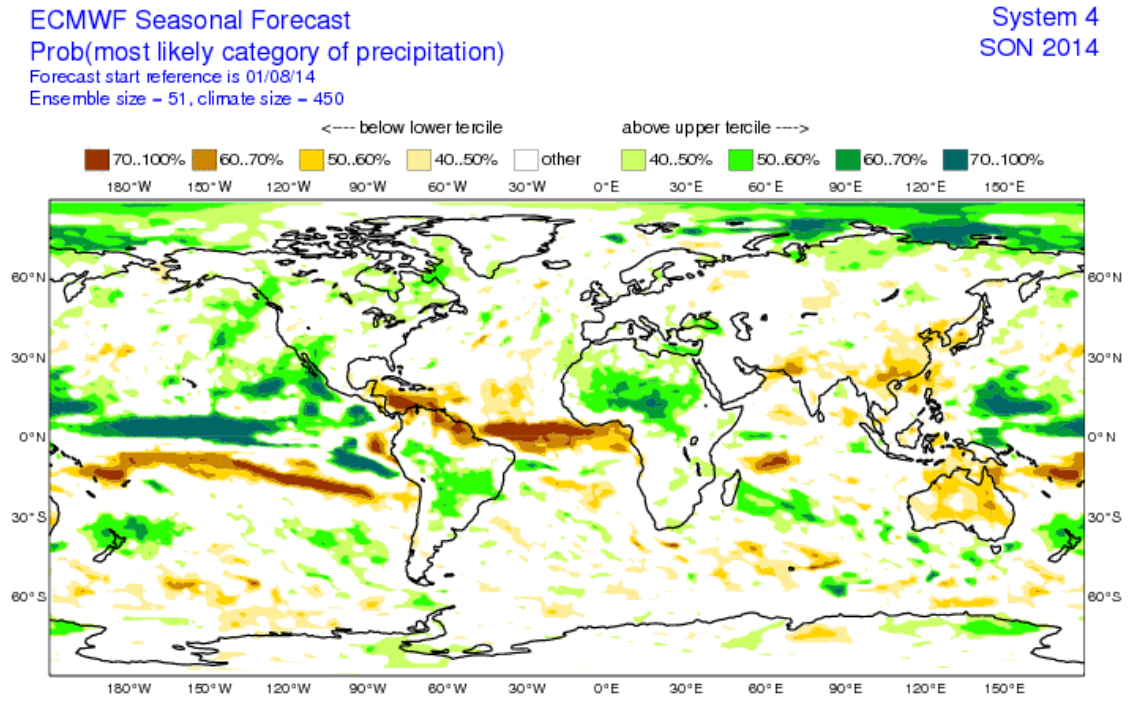


fig.30: Most likely category probability of rainfall from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/charts/seasonal_charts_s2/

II.4.b Météo-France

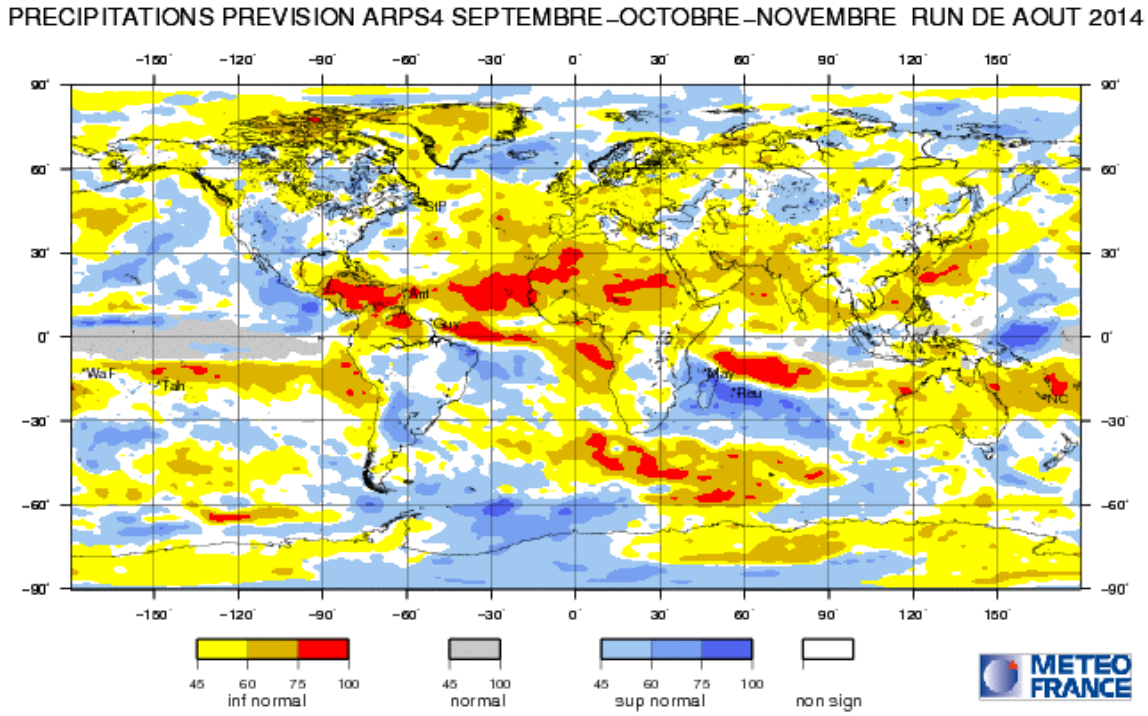


fig.31: Most likely category of Rainfall from Meteo-France. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Met office (UKMO)

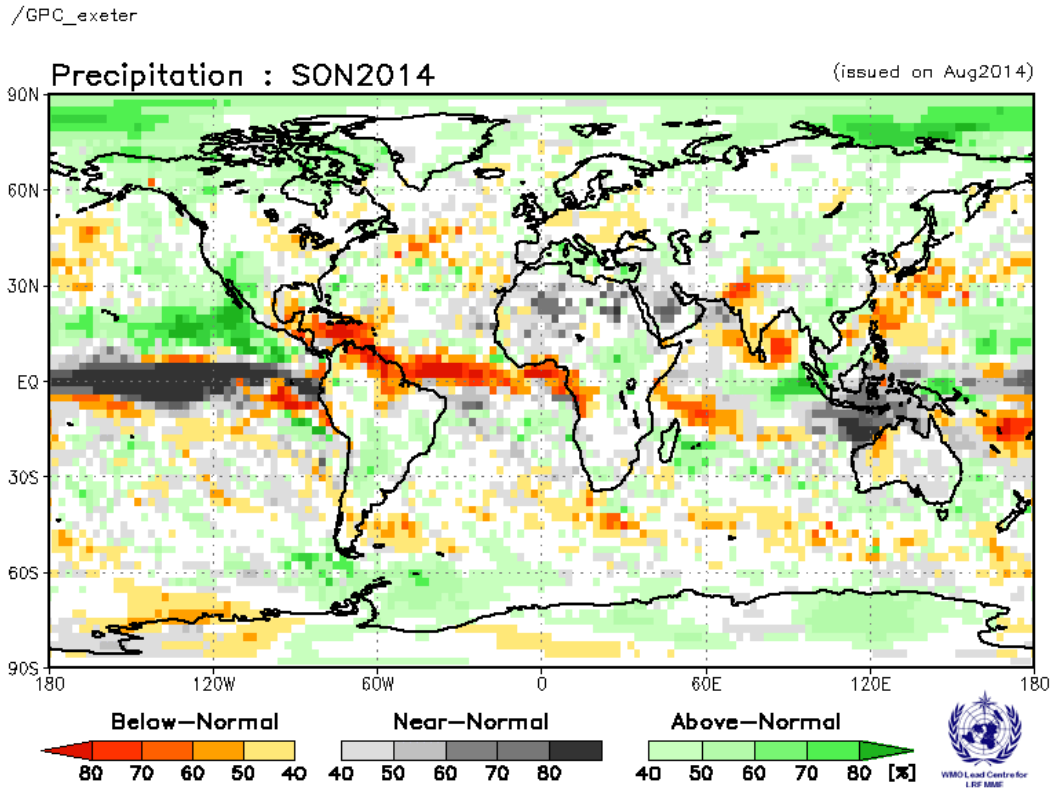


fig.32: **Most likely category of Rainfall from UK Met Office.** **https://www.wmolc.org/**

II.4.d Climate Prediction Centre (CPC)

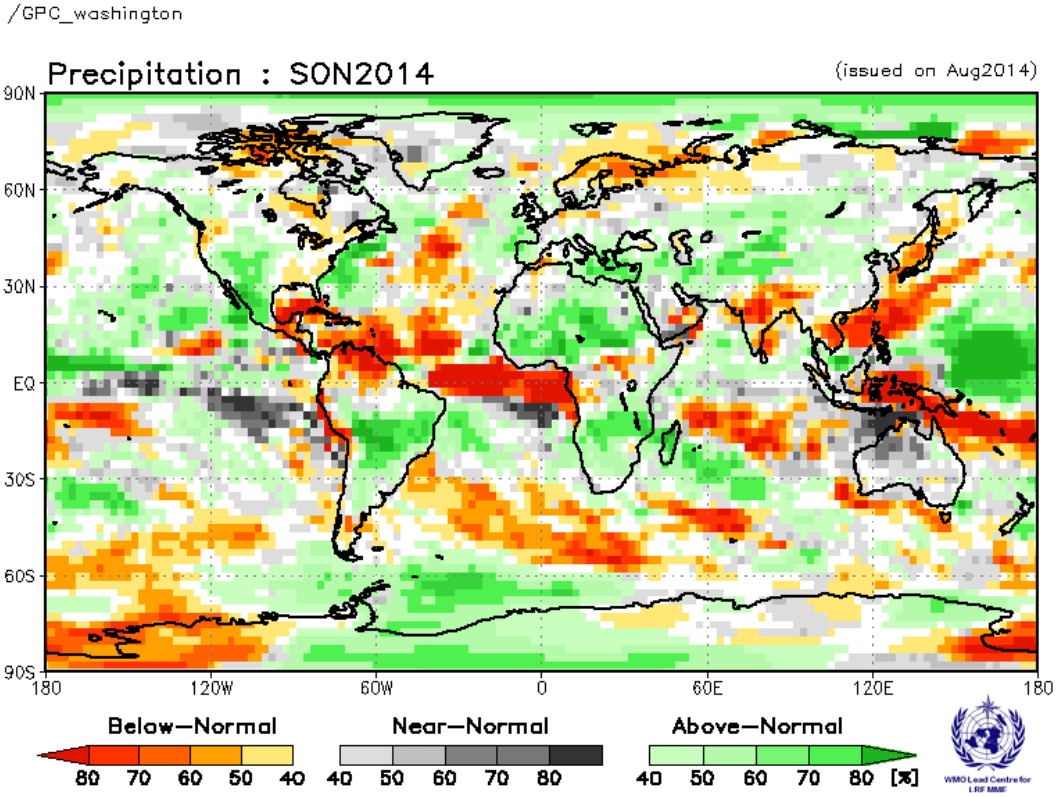


fig.33: **Most likely category of Rainfall from CPC.** **https://www.wmolc.org/**

II.4.e Japan Meteorological Agency (JMA)

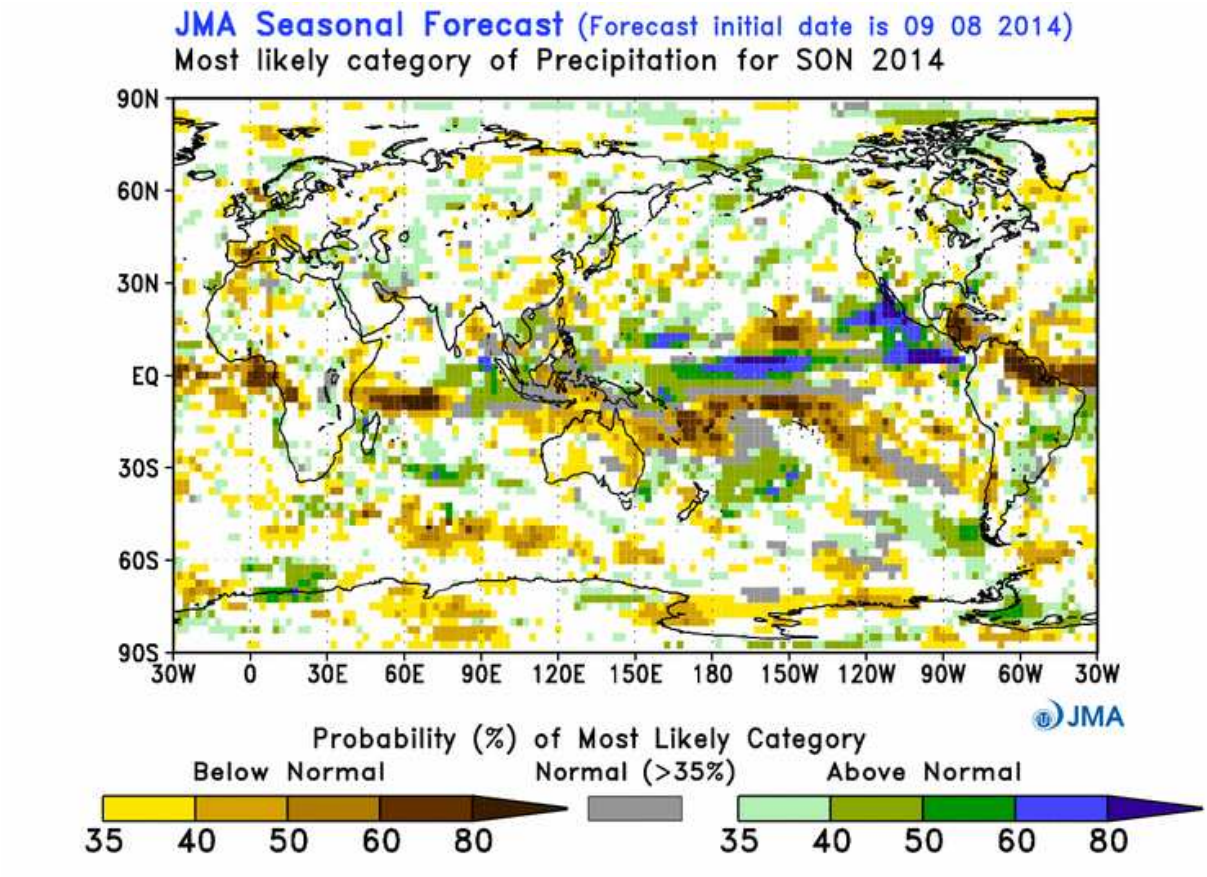


fig.34: Most likely category of Rainfall from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/

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

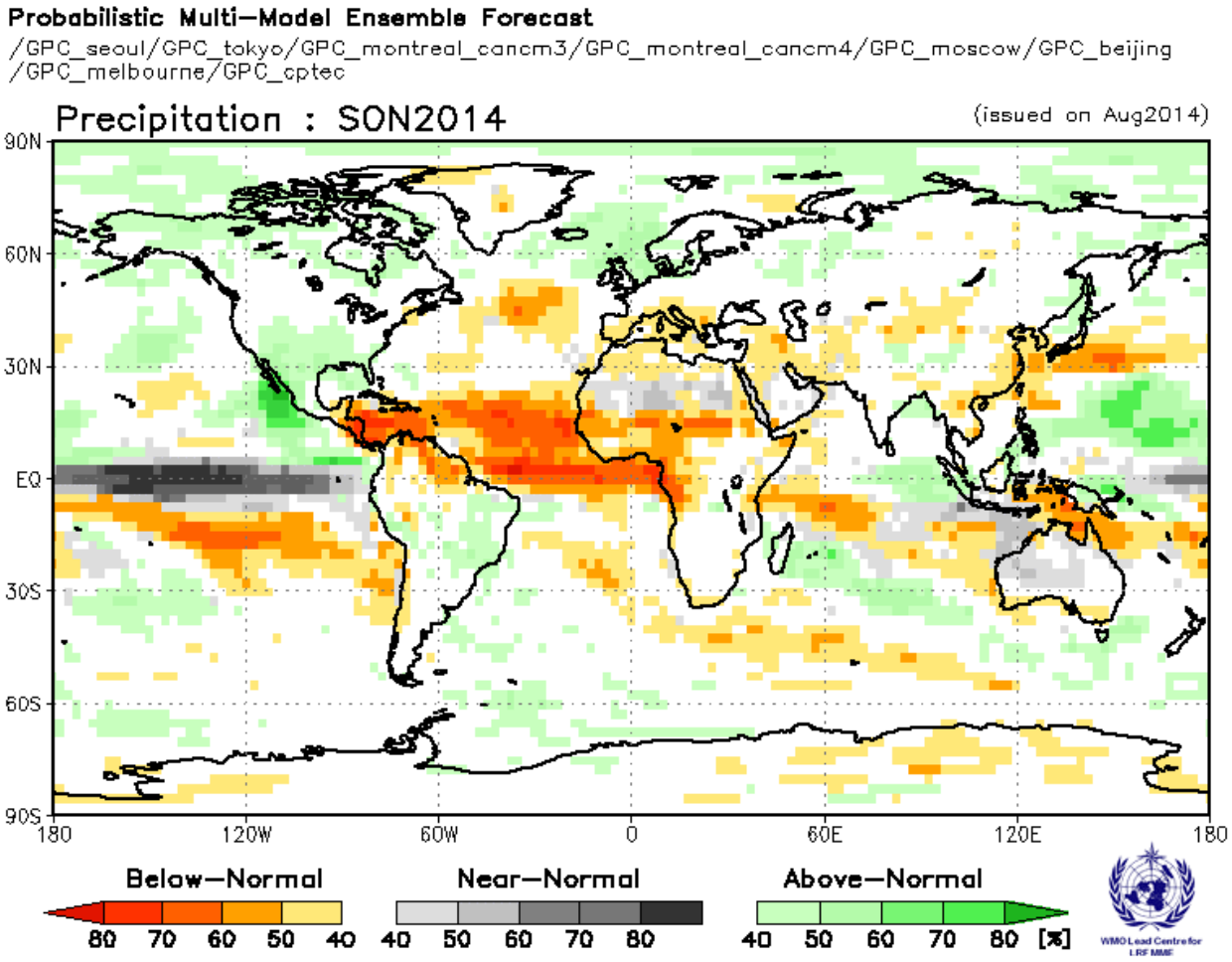


fig.35: **MME most likely category of Rainfall from LC-MME. The MME composition corresponds to the GPCs not used in EuroSIP. https://www.wmolc.org/**

II.4.g Euro-SIP

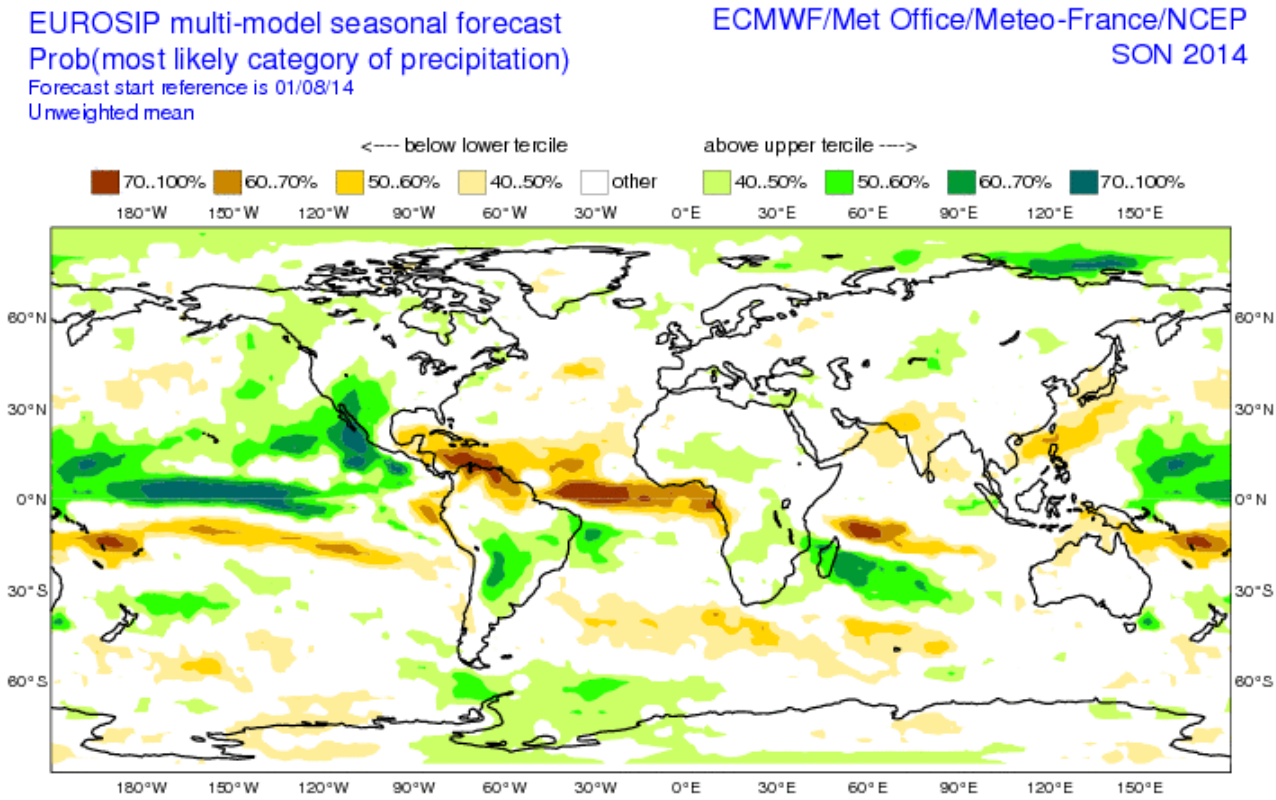


fig.36: Multi-Model Probabilistic forecasts for precipitation from EuroSip. (2 Categories, Below and Above normal – White zones correspond to No signal).

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

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. On the opposite, enhanced probabilities for dry scenario over the Caribbean and Central America extending toward the Northern coastal areas of South America, along the coastal area of the Guinean Gulf. Also to be quoted Dry scenarios over a large portion of 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

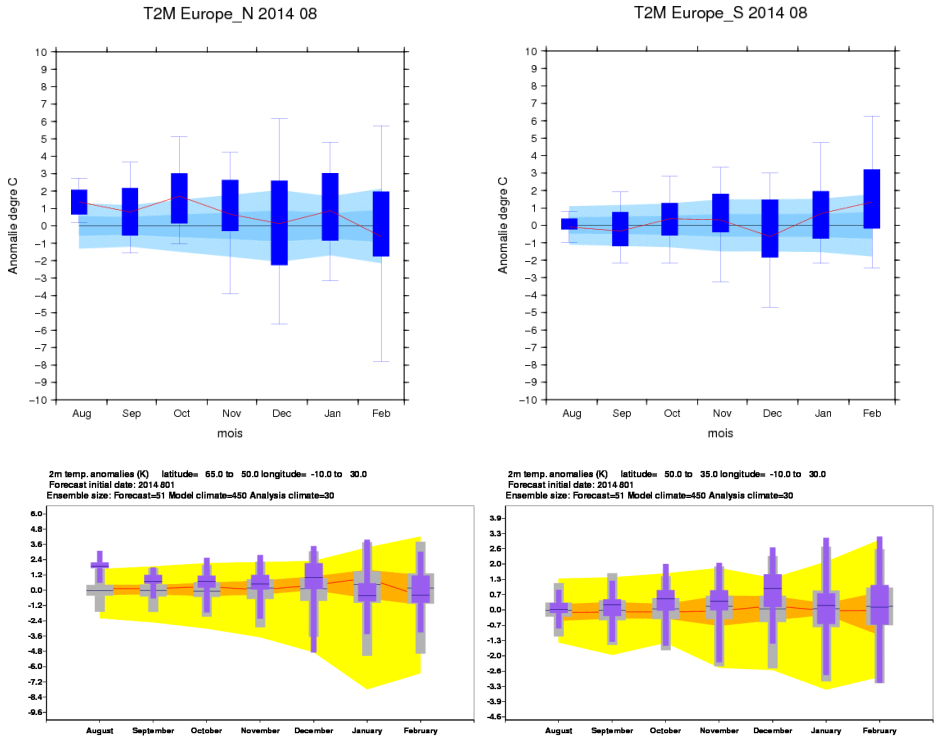


fig.37: Climagrams for T2m in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom - idem).

Some consistency between the two models (despite the differences in the Geopotential Height)

For Northern Europe : Above Normal conditions in both models and larger spread in MF.

For Southern Europe : Close to Normal and moving toward Above normal conditions. Very large spread in MF. In ECMWF, the spread increase along the period.

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

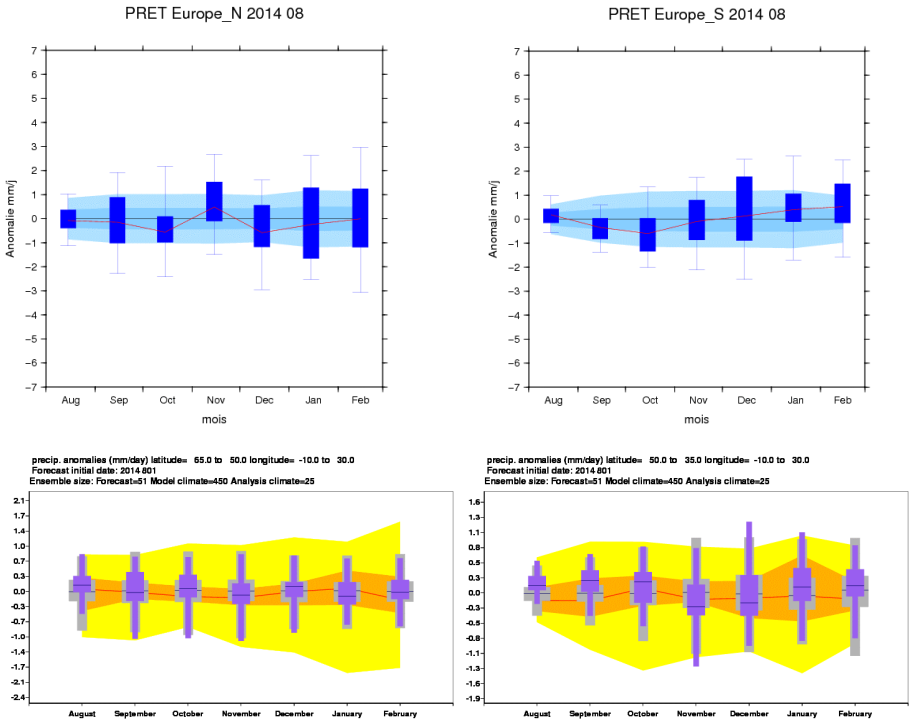


fig.38: Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom - idem).

Little consistency between the 2 models.

For Northern Europe : the signal stay in slight Above normal conditions in ECMWF while they are more Below Normal conditions (and very large spread) in MF.

For Southern Europe : opposite scenarios between the 2 models ; starting close to normal and moving below normal in MF while staying 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

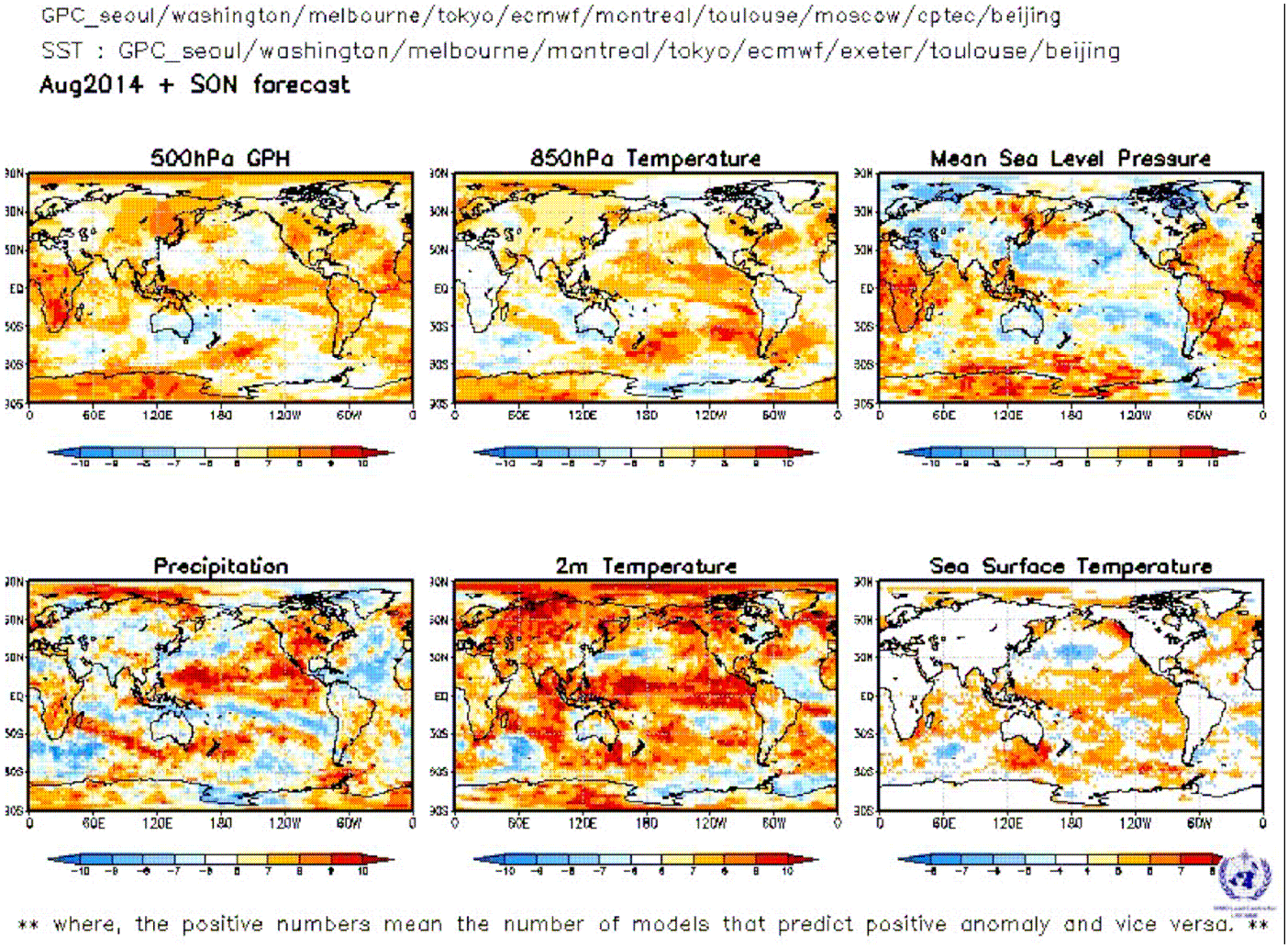


fig.39: ***GPCs Consistency maps from LC-MME*** *http://www.wmolc.org/*

For SST : Only some consistency in the SST forecasts and the Tropical regions, especially over the Pacific but also over the Indian Ocean and the Atlantic. Also some consistency in the mid-latitudes.
For Z500 : Mostly Above normal consistent signal over the Maritime continent, Africa (to the exception of the North-Eastern regions), a large portion of the Asian and American continents.
For T2m : Some very consistent signal (warmer than normal) across the Pacific, in the vicinity of the maritime continent, a large portion of Asia (to the exception of the Eastern coast) and part of West Africa. Only little areas under Below Normal conditions (Climate Change traces). To be noted the little consistency over the European (to the exception of a portion of Scandinavia and the Eastern side).
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 most of Africa South to the Equator (extending toward Madagascar), the Eastern coast of South-America (from Brazil to Argentina). The Drier than Normal scenarios are possible in the vicinity of the Gulf of Mexico, part of the Indian sub-continent (extending toward North Africa) and the part of Caribbean. Some consistency over the European continent (Above Normal scenarios close to Scandinavia).

II.7. "EXTREME" SCENARIOS

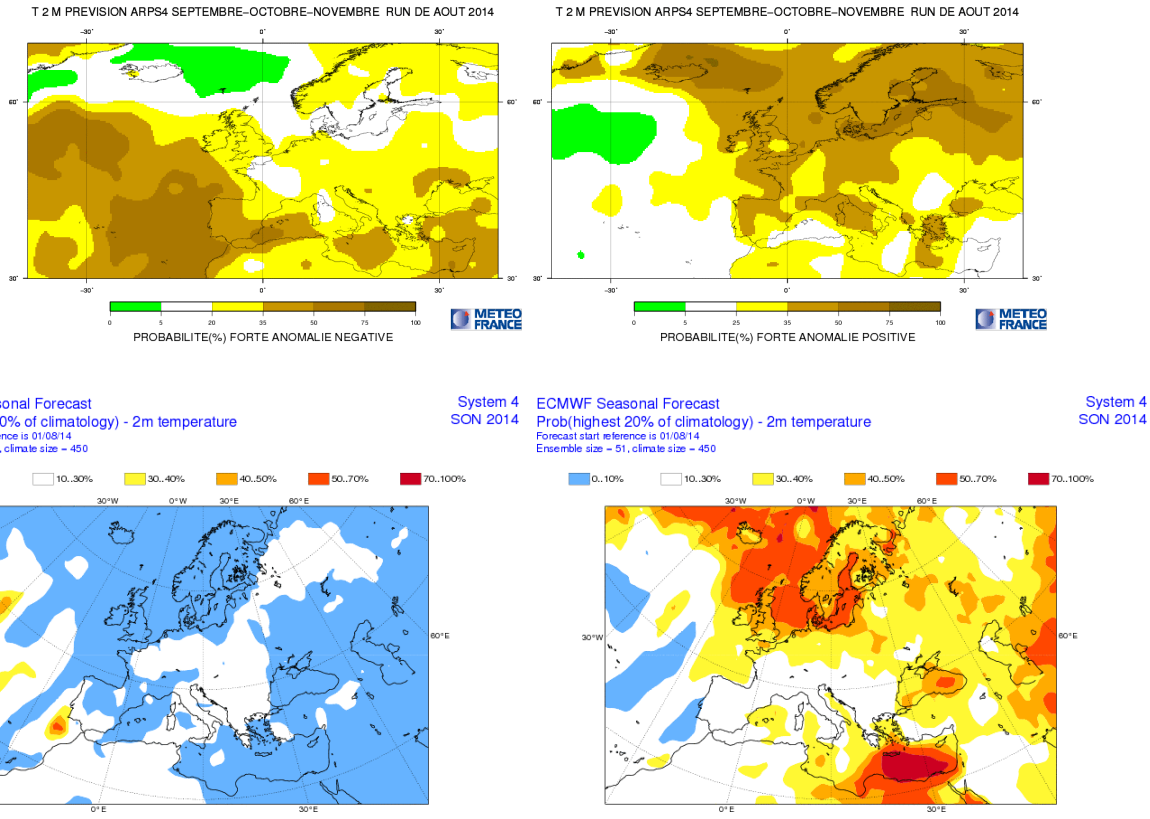


fig.40: Top : Probability of « extreme » above normal conditions from T2m for Meteo-France (left - highest ~15% of the distribution and right lowest ~15% of the distribution)
Bottom : idem from ECMWF (left - highest 20% of the distribution and right lowest 20% of the distribution).

The **Very below normal scenario** shows enhanced probabilities only in MF.
Some consistency for the **Very Above normal** scenario over regions North to 50°N, especially in the vicinity of the Baltic Sea and over Eastern areas. Also some consistency over the Eastern part of North Africa.
In MF, for the Very Below normal scenario ROC scores are rather good over the Western façade of Europe and the SEE region (with ROC ranging 0.6 up to locally 0.8). For the Very Above normal scenario, they are fairly good (between 0.6 and 0.85) also over the Western façade of Europe, close to the Black Sea and the North-Eastern African continent. So with some caution, this information could be possibly considered for the Very Above scenario especially in the vicinity of the Baltic Sea.

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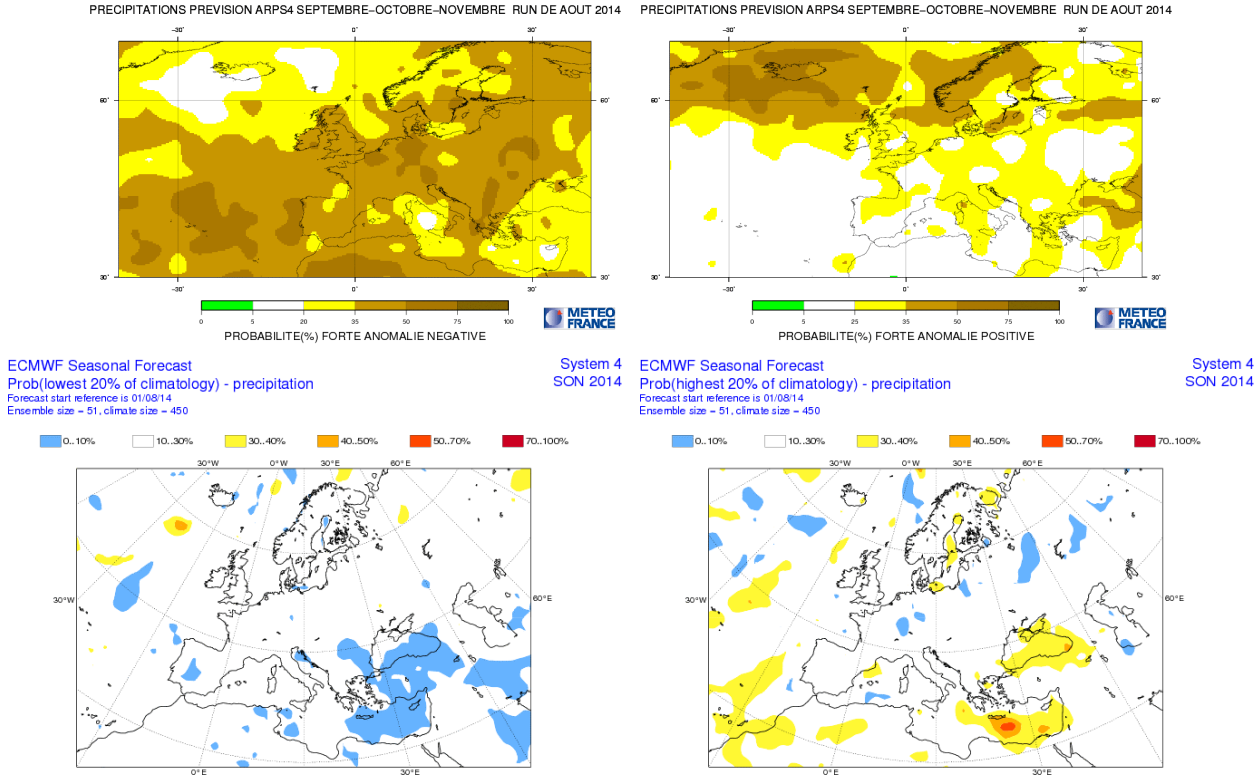


fig.41: Top : Probability of « extreme » above normal conditions for rainfall from Meteo-France (left - highest ~15% of the distribution and right lowest ~15% of the distribution)
Bottom : idem from ECMWF (left - highest 20% of the distribution and right lowest 20% of the distribution).).

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 and the North of Scandinavia for the Very Below 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 pause in the development of a warm event in the Pacific which could be reactivated at fall suggest some possible predictability, but mostly located in the Tropics (Pacific, Indian Ocean and Atlantic) or around the Pacific for extra-tropics. The predictability seems to be very weak over European regions ; some little predictability being possible over the North-Eastern African continent.
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 the entire European continent.
For temperature : if we follow the Euro-SIP forecast the Above normal scenario could be privileged for most of Northern and Eastern Europe with some enhanced probabilities. However, referring to the lack of predictability, these enhanced probabilities are at least partly the trace of the climate trend. "No Privileged" scenario should be preferable for West-Southern Europe.
Obviously, some downscaled information could detail these scenarios for specific countries or sub-regions.

Tropical Cyclone activity

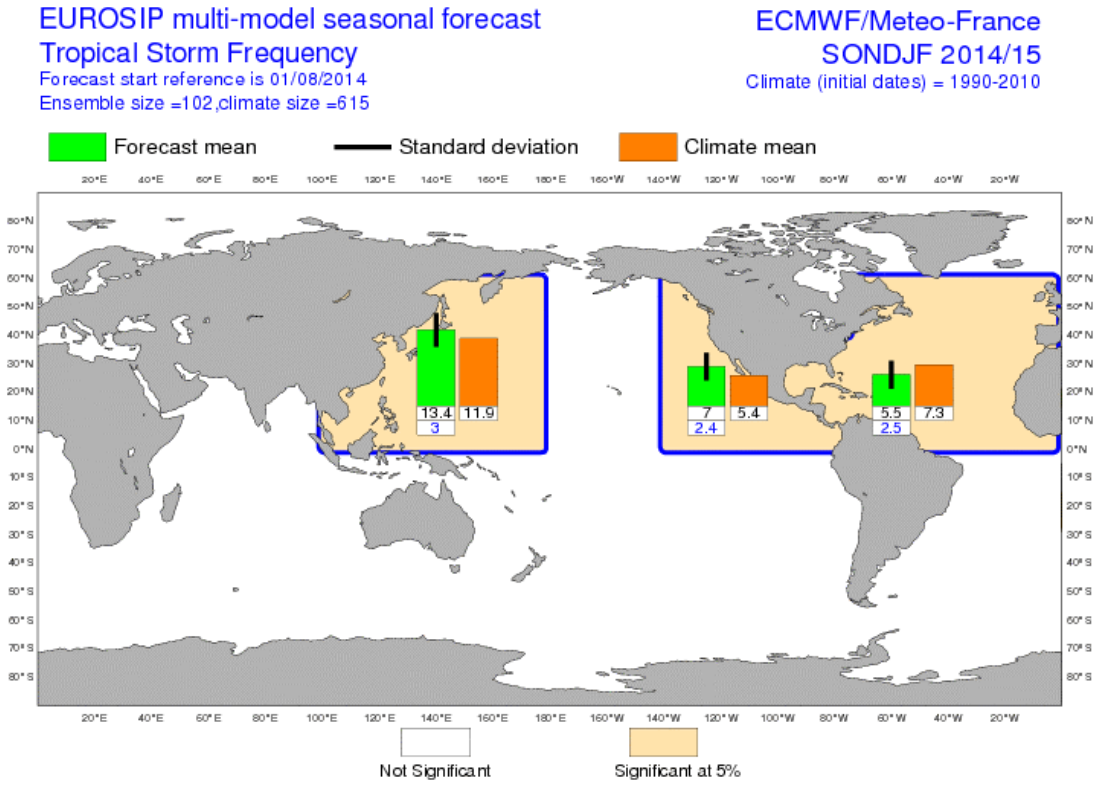


fig.42: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtrop/trop_euro/eurosip_tropical_storm_frequency/

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.

Synthesis of Temperature forecasts for September-October-November 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*	*above normal*	*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 September-October-November 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

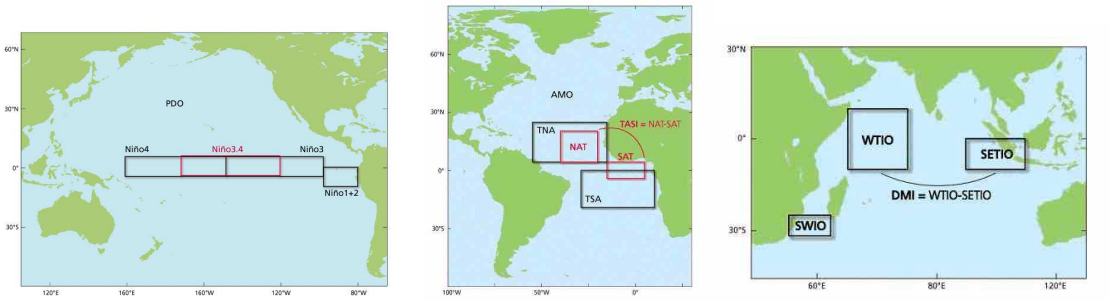
El Niño and La Niña events primarily affect tropical regions and are monitored by following the SST evolution in specific area of the equatorial Pacific.

- 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

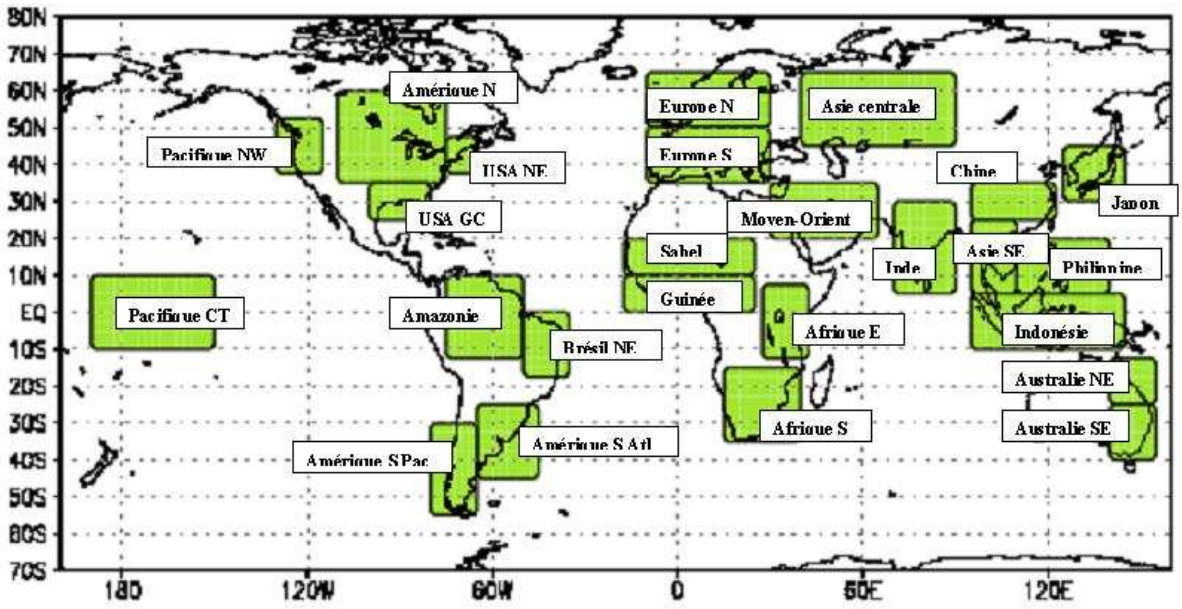
figure). It represents the Walker (zonal) circulation and its modifications. Its sign is opposite to the SST anomaly meaning that when the SST is warmer (respectively colder) than normal (Niño respectively Niña event), the zonal circulation is weakened (respectively strengthened).

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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