GLOBAL CLIMATE BULLETIN
n°169 - JULY 2013

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I. DESCRIPTION OF THE CLIMATE SYSTEM (MAY 2013)

I.1. OCEANIC ANALYSIS

I.1.a Global Analysis

At the Surface (fig. 1) :
Some evolutions in the Eastern Pacific and Tropical Indian Ocean.
For the Pacific : In the equatorial waveguide close to neutral conditions excepted in the most western and in the eastern part of the basin (respectively positive/negative anomaly) consistently with wave propagations under the surface. Strong warming close to the South American continent. East to the dateline, some warming in the Northern hemisphere and some cooling in the Southern hemisphere. To be quoted the persistent warm SSTs off equator in the North-Western part of the basin.

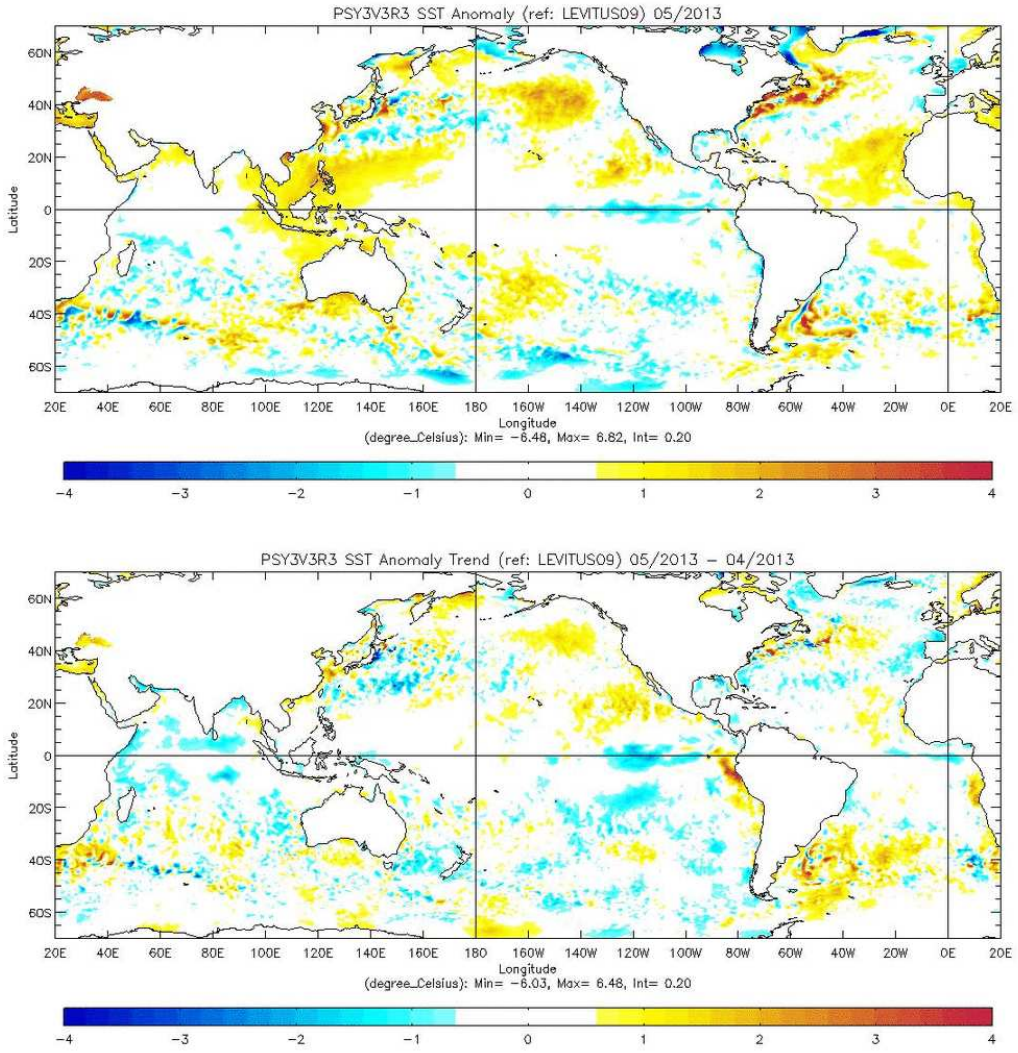


fig.1: top : SSTs Anomalies (°C) (reference 1950-2008); bottom : SST tendency (current – previous month) http://bcg.mercator-ocean.fr/

For the Atlantic : little evolution in the Tropics ; the North Tropical Atlantic remains warmer than normal while the Southern Tropical Atlantic is close to Normal. In the Guinean Gulf some cooling develops along the equator (possibly related to dynamical forcing from the monsoon flux). In the mid-latitudes of Southern hemisphere warming over the basin. Some traces of cooling in the North Atlantic from the Caribbean up to Spain.
In the Indian Ocean : mostly cooling in the Tropics (both North and South). Close to the maritime continent the SSTs remain warmer than normal. Consistently the DMI has clearly moved to the negative side despite it is still in the range of neutral conditions.
In subsurface (fig.2) :
In the Pacific : in the equatorial band (10°N-10°S), heat content anomalies mostly negative East to the dateline and positive West to this limit. Note the positive anomalies in the most Western part off equator (in the Northern hemisphere between 10°N and 20°N) which extends toward the mid-latitudes (East to the dateline). In the SPCZ region positive anomaly extends South-East toward mid-latitudes. In the mid/high latitudes of the Northern hemisphere, great consistency with the surface signal (and similar pattern than for the Tropics).
In the Atlantic : in the equatorial waveguide and along the western coast of the African continent little anomalies. Persistence of the strong positive anomaly in the North-Eastern part of the basin (close to the sub-topics) up to the equatorial region. Over South Tropics the heat content anomalies are mostly positive.
In the Indian Ocean : heat content mostly consistent with SSTs, especially close to the maritime continent and Australia. In the equatorial waveguide the main evolution is related to the cooling in the Western part of the basin (consistent with the drop of IOD).

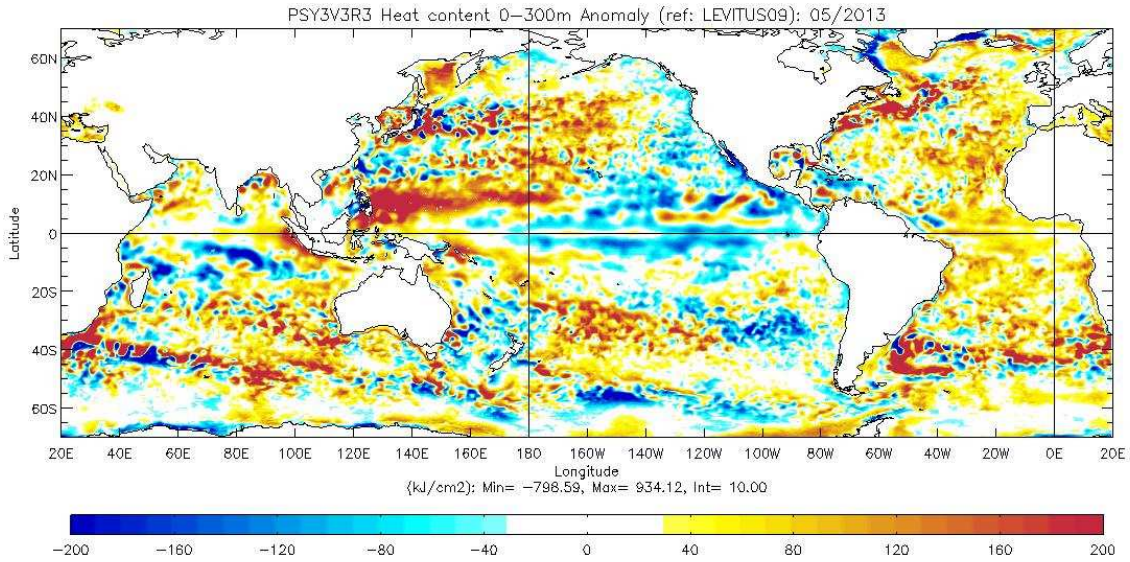


fig.2: map of Heat Content Anomalies (first 300m) (in kJ/cm²). (reference 1950-2008) http://bcg.mercator-ocean.fr/

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

A dipole pattern is visible with positive anomalies on the western side, close to normal in the Central and negative anomaly in the most Eastern part. Little trade wind anomalies over most of the basin. However, the anomalies on the most eastern side are consistent with an increased Ekman pumping. The SOI is now positive (+0.8) consistently with the dipole pattern.

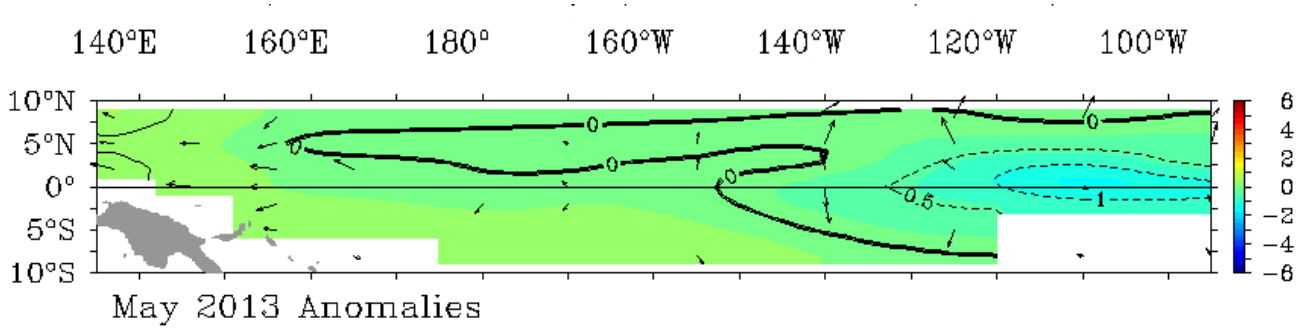


fig.3: SST Anomalies and Wind anomalies over the Equatorial Pacific from TAO/TRITON. http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/monthly-summary.html

In the Niño boxes (4, 3.4, 3 et 1+2 ; see definition in Annex) the SST anomalies illustrate the neutral conditions in the Pacific. The monthly averages are respectively -0,1°C, -0,3°C, -0,7°C and -1,4°C from West to East.

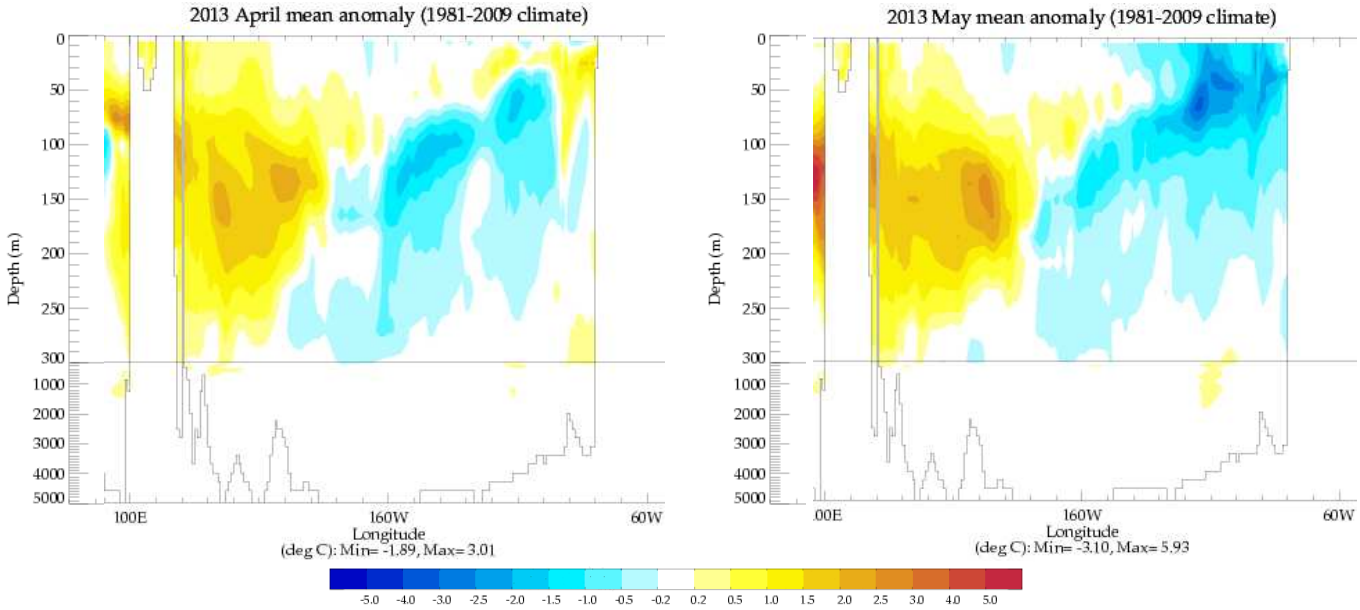


fig.4: Oceanic temperature anomaly in the first *500 metres* in the Equatorial Pacific, in previous month (left) and current month (right) http://bcg.mercator-ocean.fr/

In the equatorial waveguide (fig. 4) : still traces of propagation of Kelvin waves under the surface (colder than normal) in May from West to East. On the most Western part, the warm reservoir has developed and start some eastward propagation. This signal is to be carefully monitored with respect of next months and possible evolution for the end of this year.

The thermocline structure (fig. 5) : some traces of wave propagation signal of both anomalies as already pointed out in the previous comment. The deepening and strengthening of the warm reservoir on the most western side is visible at the end of the period.

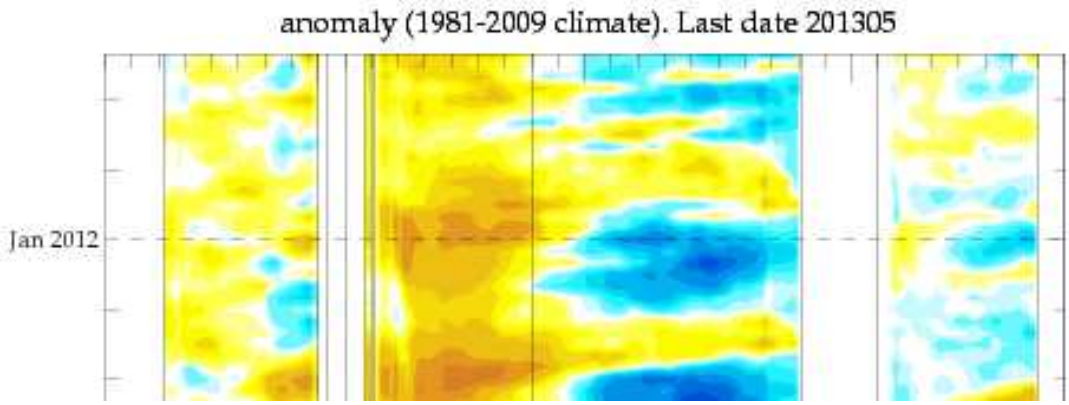


fig.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 24 month period. http://bcg.mercator-ocean.fr/

I.1.c Atlantic Basin

Northern Tropical Atlantic : mostly warmer than normal and little evolutions.
Equatorial waveguide : weak dipole structure (slightly cooler than normal on East and warmer than normal on West), with little trace of wave propagation. Guinean Gulf cooler than normal.
The Southern Tropical Atlantic : Close to normal and little evolutions.

I.1.d Indian Basin

Southern Tropical Indian Ocean : mostly cooling on the Western side. Warmer than normal between Australia and the maritime continent.
Equatorial waveguide : drop of warm conditions on the western side is conspicuous while a strong positive anomaly is present close to the maritime continent. The DMI clearly moved on the negative side.
Northern Tropical Indian Ocean : close to normal more or less everywhere.

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) : quite fragmented cells partly related to MJO activity (in the Tropics) as there is only little SST forcing and partly related to mid-latitude atmospheric activity.
On the Pacific : Divergent circulation anomalies (downward anomaly motion) off Equator in the Central Pacific. In addition, some regional Divergent circulation anomaly (upward anomaly motion). Note the linkage to other patterns of the Eastern Indian Ocean and of South-America.
On the Atlantic : Divergent circulation anomalies (downward anomaly motion) over the Southern Tropical Atlantic (likely in relationship with sub-regional dynamical forcing). In the Northern hemisphere, to be quoted the positive anomaly (upward anomaly motion) across West Africa up to the Mediterranean basin. (likely related to mid-latitude / tropics interaction). In the Southern hemisphere, to be quoted the negative anomaly in the vicinity of Amazonian regions.
On the Indian Ocean : Divergent circulation anomaly (upward anomaly motion) between the maritime continent and Australia consistently with the SSTs and IOD drop. Also a negative anomaly over the Arabian sea. Mostly positive anomaly (convergent circulation anomaly - downward anomaly motion) over South-Western part of the basin.

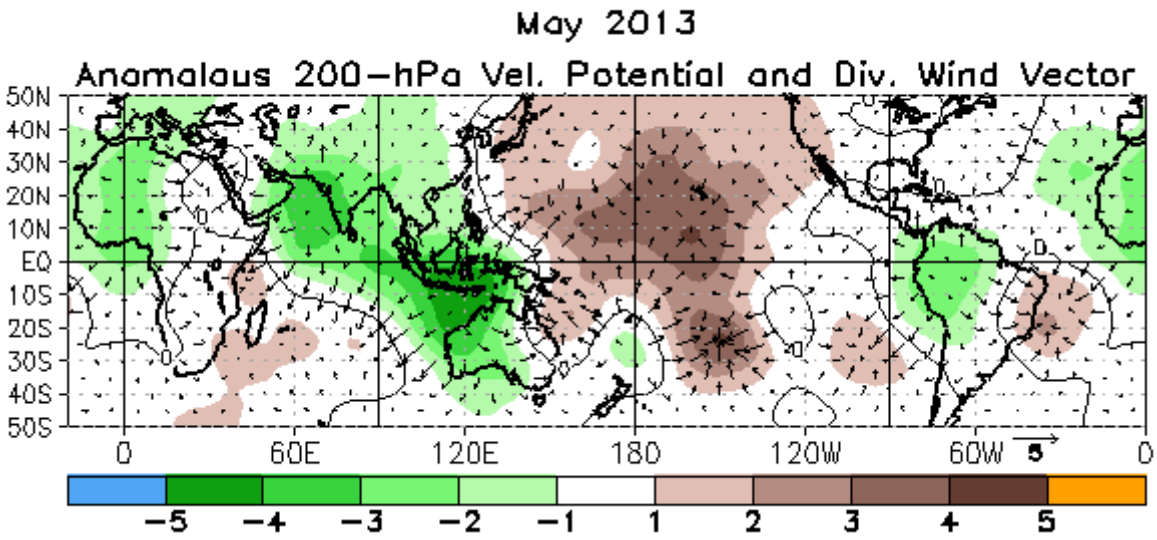


fig.6: Velocity Potential Anomalies at 200 hPa and associated divergent circulation. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

Stream Function anomalies in the high troposphere (fig. 7 – insight into teleconnection patterns tropically forced) : the strongest signal is likely related to Sub-Tropics/Mid-Latitude activity. The Tropical Velocity Potential anomalies seem to have little impact onto the atmosphere of the mid-latitudes and even in the Tropics.

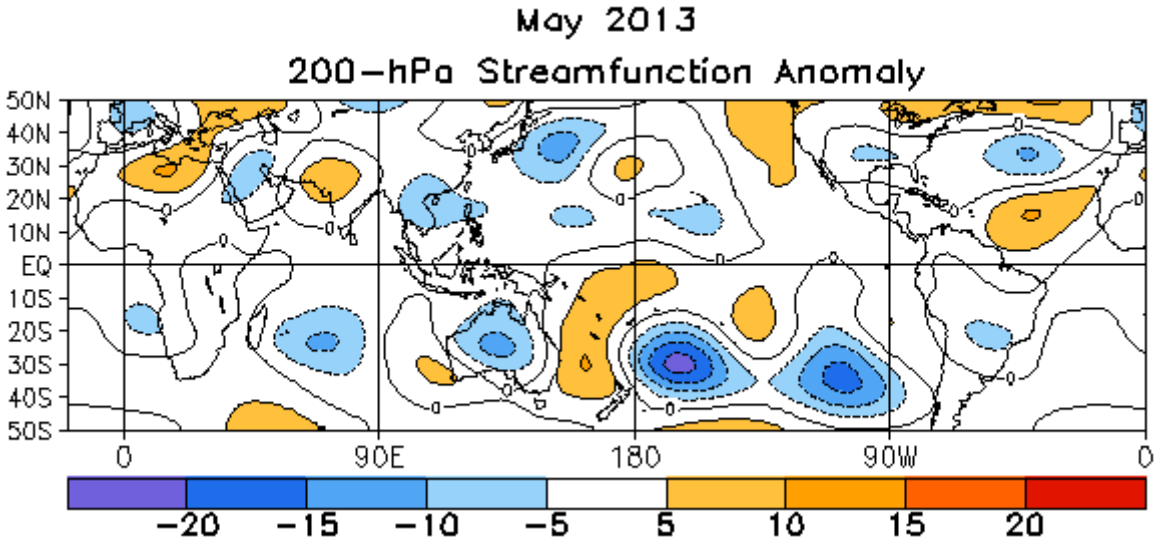


fig.7: Stream Function Anomalies at 200 hPa.
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

Geopotential height at 500 hPa (fig. 8 – insight into mid-latitude general circulation) : Consistently with the previous analysis, there is only little anomalies coming from the Tropics. The greatest anomalies are observed in the High and mid-latitudes of the Pacific and across the Atlantic. Over the Western façade of Europe the anomaly is consistent with disturbed summer circulation observed. Consistently, the main active modes are the WP (-1.1) and, over Europe, the East/Atlantic West Russia mode (-2.1). The NAO is on the positive side (+0.6).

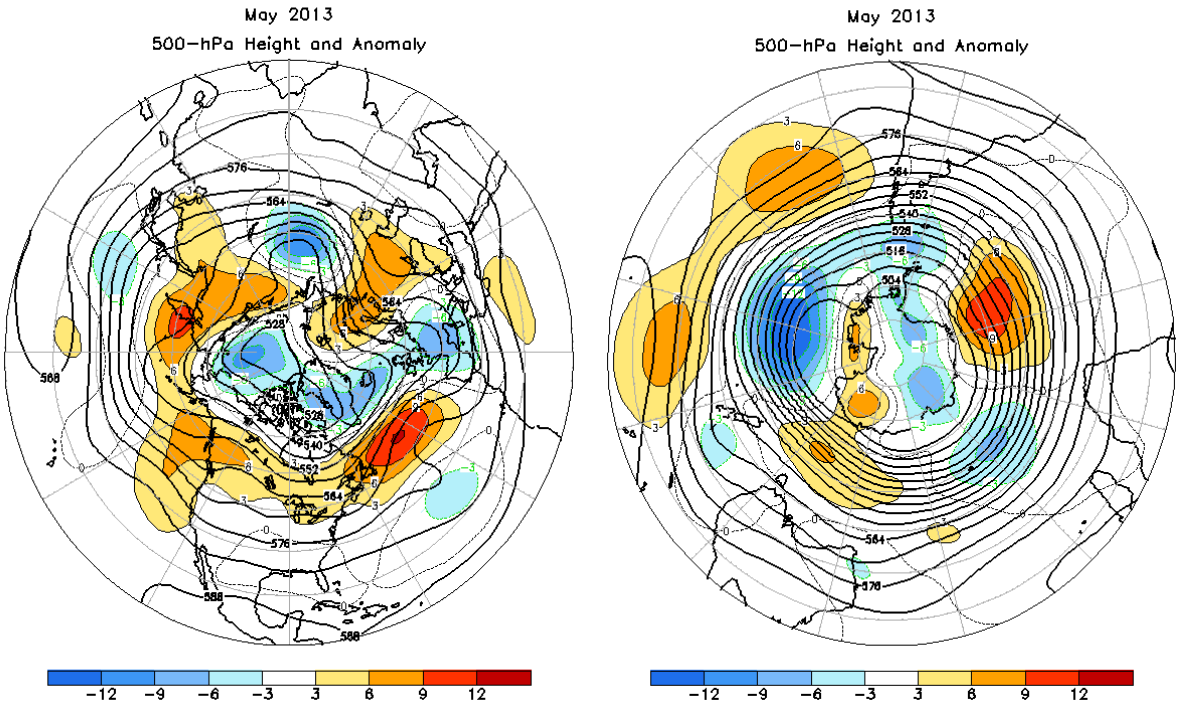


fig.8: Anomalies of Geopotential height at 500hPa (left North Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige9.shtml, and right South Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige15.shtml)

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
MAY 13	**0.6**	**0.1**	**-1.1**	**-0.3**	**-0.2**	**---**	**-2.1**	**0.5**	**0.0**
APR 13	0.6	1.3	-1.9	1.2	-1.8	---	0.4	-1.1	-1.6
MAR 13	-2.1	-0.2	0.6	0.7	-0.3	---	2.3	-0.6	-1.9
FEB 13	-1.0	0.1	1.5	-0.9	0.3	0.9	-1.3	1.0	0.3
JAN 13	-0.1	0.9	0.1	0.1	0.1	1.3	0.5	0.1	-1.9
DEC 12	0.1	0.7	-0.6	---	-1.3	-1.3	-0.9	2.0	0.4

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

I.2.b Precipitation

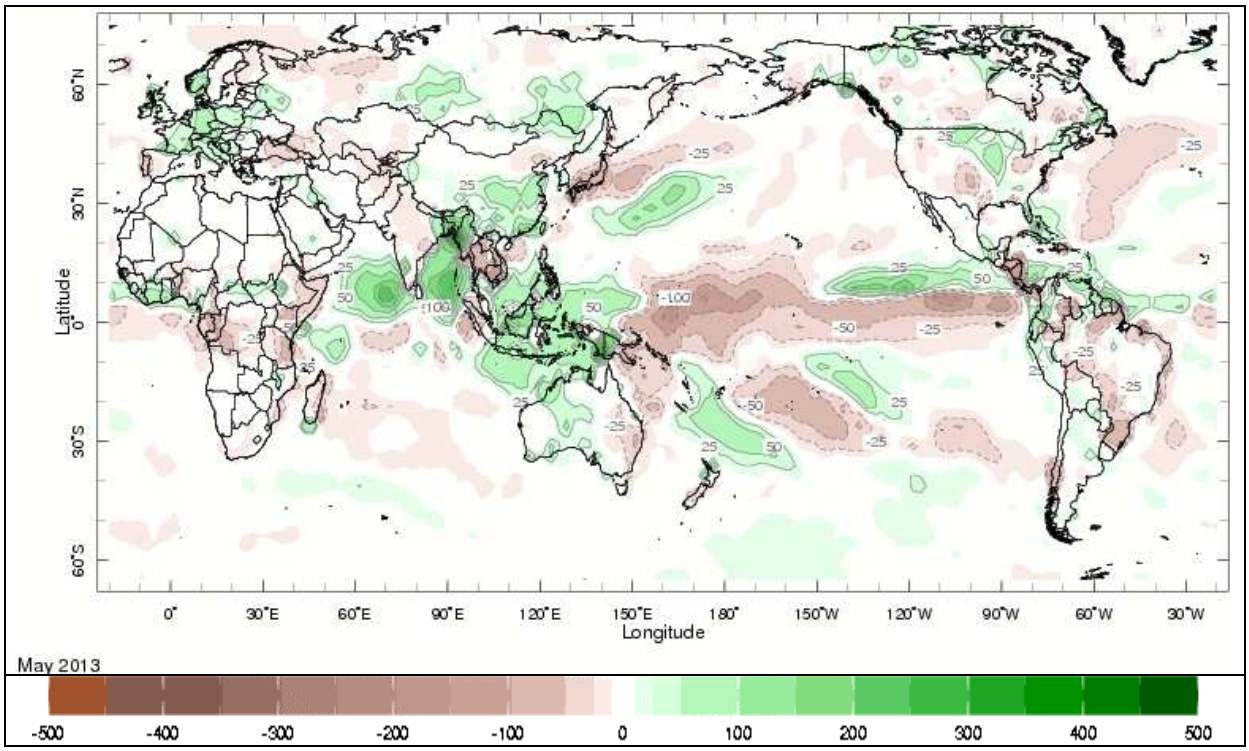


fig.9: Rainfall Anomalies (in mm) (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.
http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/

Most of the rainfall patterns in the Topics are consistent with the Velocity Potential anomaly field.

Pacific : good consistency with the convergent Circulation anomalies in the Central Pacific and associated Divergent circulation anomalies; especially the tripole pattern starting in the vicinity of the SPCZ region.

Atlantic/Africa : negative anomaly along the coastal area of Northern and in the most southern part of Brazil. Positive anomalies over the coastal area of the most Northern part of South-America. Drier than normal conditions over Equatorial Africa and Great Horn of Africa regions and Wetter than normal conditions over the Southern regions of West Africa.

Indian Ocean : Clear patterns of positive anomalies consistent with the velocity potential field close to the maritime continent which extend over the Bay of Bengal. To be quoted the large positive anomaly in the North-Western ocean while dry conditions exist over a large portion of the Indian continent.

Australia : Dry conditions over the Eastern side and wet conditions close to the Indian Ocean.

North America : Dipole pattern over the Great Plains (mostly dry/wet in the South/North) and some dry conditions across Canada.

Europe : Clear dipole consistently with the geopotential height ; wet in the mid-latitudes and dry in the most northern regions. Tendency to dry conditions close to the black sea and the most Eastern European regions (especially in the North).

I.2.cTemperature

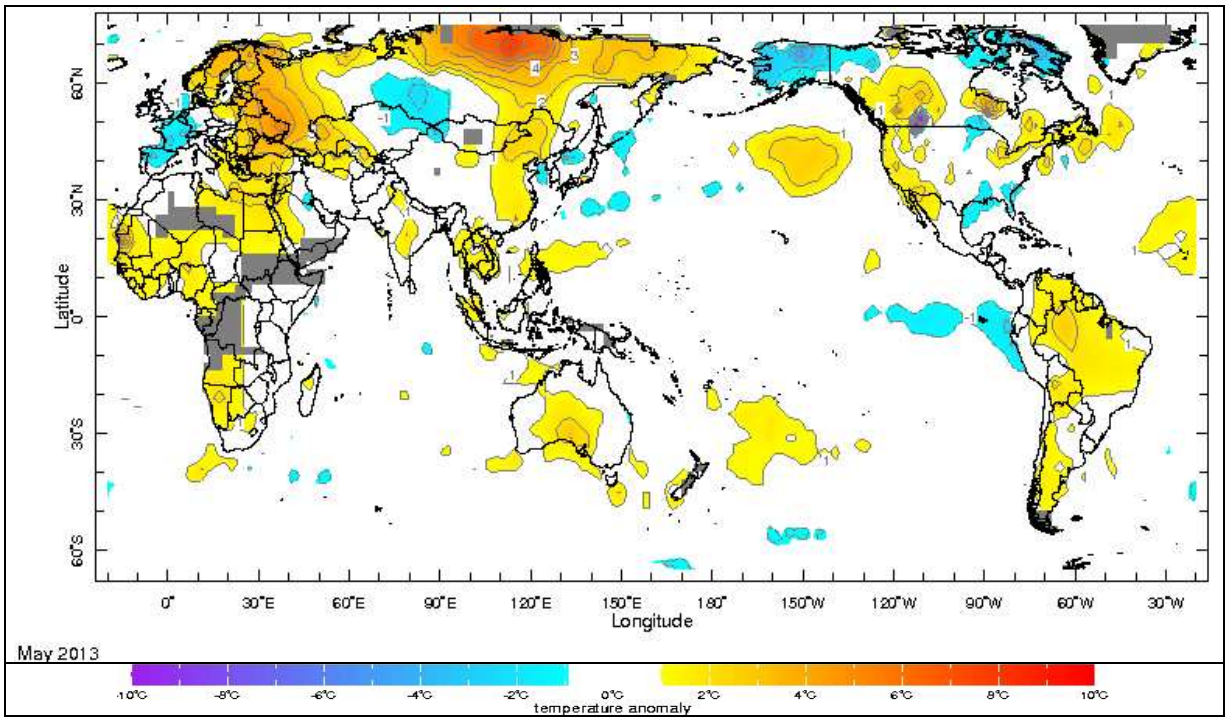


fig.10: Temperature Anomalies (in °C) (departure to the 1979-2000 normal)
http://iridl.ldeo.columbia.edu/maproom/.Global/.Atm_Temp/Anomaly.html

North-America : Dipole anomalies on the Western side; Colder than normal conditions over most of Alaska and positive anomalies over Canada and along the coast of US.
South-America : mostly Warmer than normal conditions everywhere.
Australia : some traces of Warmer than normal conditions in the Southern part.
Asia : Strong Warm anomaly over Siberia extending over Western China up to South-East Asia. Negative anomaly over the South-Western Siberia.
Africa : Warmer than normal conditions over the West Africa extending toward the Eastern part of the Mediterranean basin. Also some warmer than normal conditions over Namibia and Angola.
Europe : Warmer than normal conditions over most of South-Eastern European regions extending Northward up to Scandinavia. Colder than normal conditions in France and Spain.

I.2.d Sea Ice

In Arctic (fig. 11 - left) : well below normal sea-ice extension especially over the Atlantic side (negative anomaly close to 2 standard deviation).
In Antarctic (fig. 11 - right) : well above normal sea-ice extension anomaly with some large regional modulation.

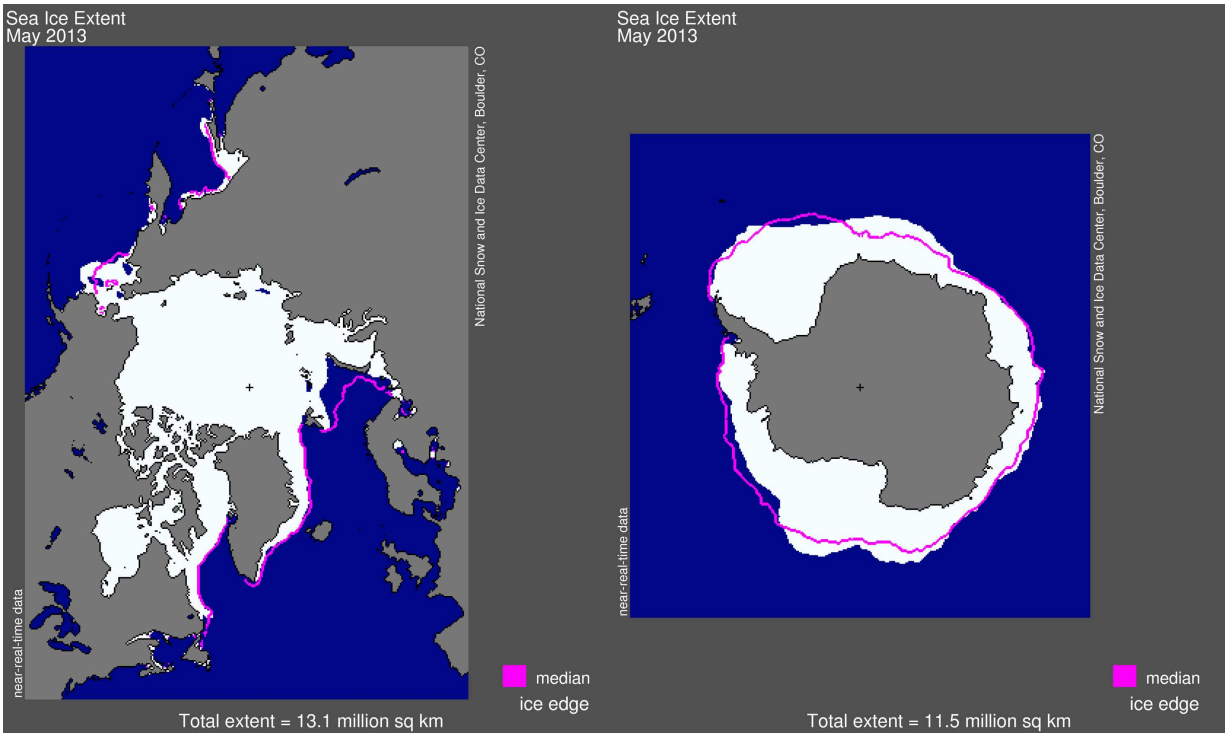


fig.11: Sea-Ice extension in Arctic (left), and in Antarctic (right). The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

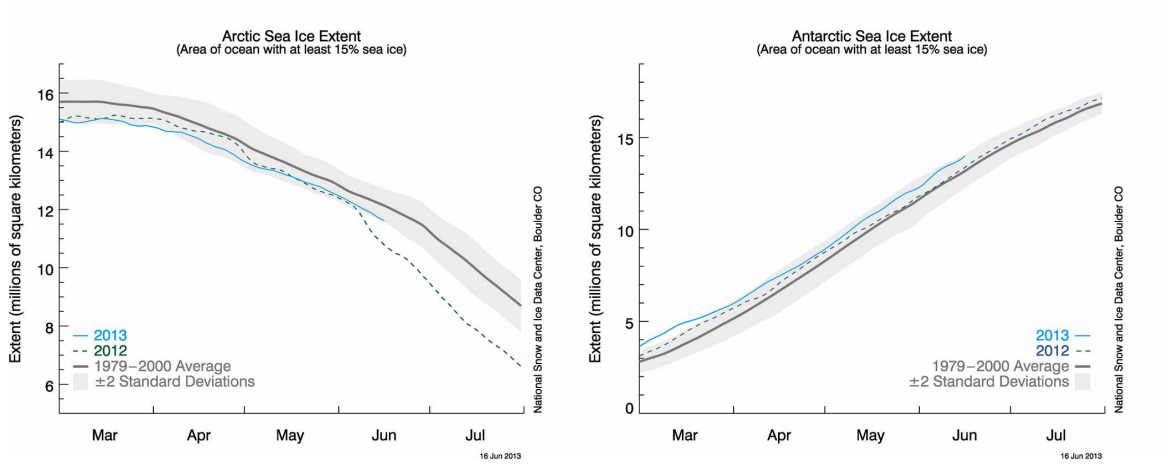


fig. 9bis : Sea-Ice extension evolution from NSIDC
http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png

II.SEASONAL FORECASTS FOR JAS FROM DYNAMICAL MODELS

II.1. OCEANIC FORECASTS

II.1.a Sea Surface Température (SST)

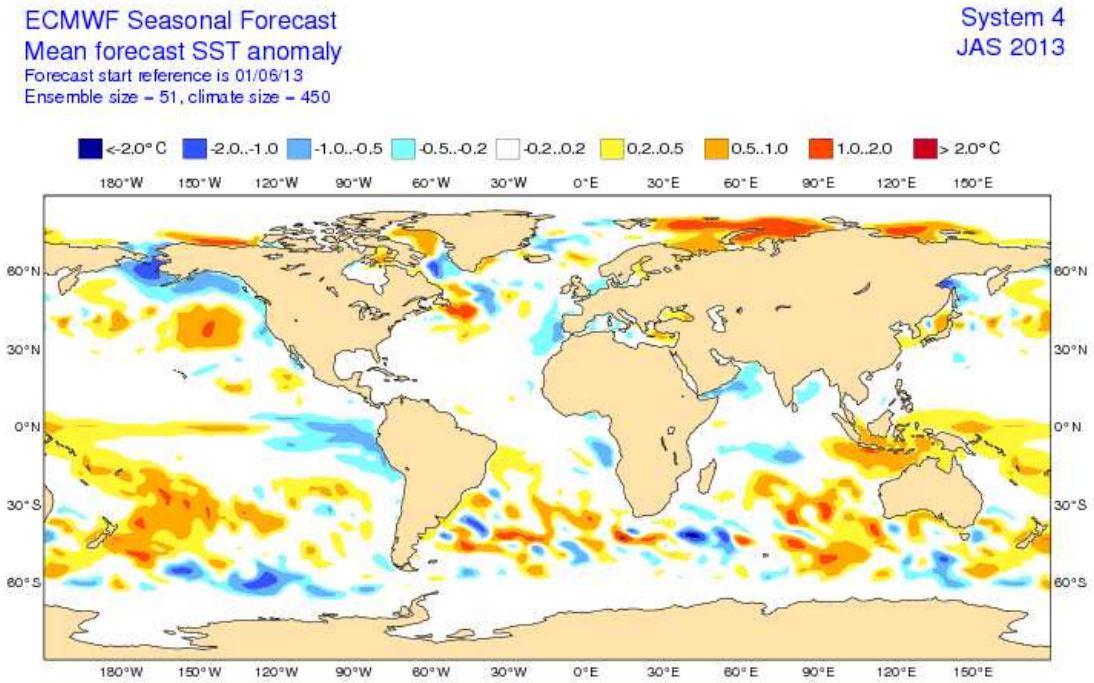


fig.12: SST anomaly forecast (in °C) from ECMWF for JAS, issued in June.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

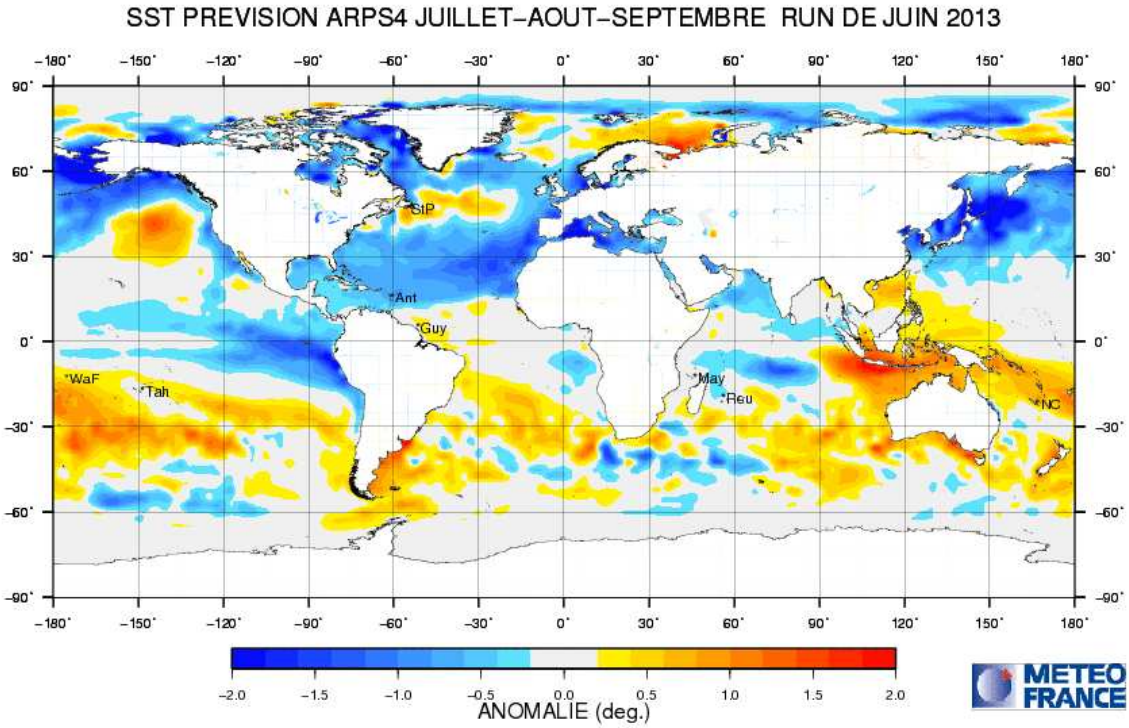


fig.13: SST Anomaly forecast (recalibrated with respect of observation) from Météo-France for JAS, issued in June. http://elaboration.seasonal.meteo.fr/

For the 2 individual models :
The main difference is seen over the Tropical North Atlantic and then in the mid-latitudes of the Northern Pacific 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).
Pacific : along the equator the conditions are quite similar in both models with cold conditions on the most eastern side and some warmer than normal conditions in the western part of the basin. The difference in the equatorial and central part of the basins are likely related to the difference in the hindcast periods.
Atlantic : in both model consistency in Southern Tropical (and sub-tropical) Atlantic. There is more differences on the Northern Hemisphere from the Caribbean up to the western façade of Europe (mostly neutral in ECMWF and mostly colder than normal in MF). In both models a positive anomaly close to New Foundland. The difference is very likely not only related to the hindcast issue.
Indian Ocean : consistent forecast in both models. East to 90°E warmer than normal conditions especially in the vicinity of the maritime continent and Australia. Mostly Colder than normal conditions in the Western Tropical part (North to Madagascar).
In Euro-SIP :
Some robust patterns appear in the tropics and across the Atlantic.
Pacific : Equatorial waveguide : close to normal excepted over the most Western and most Eastern part of the basin (respectively weak positive and negative anomalies). Cold anomaly developing along the coast of South America. Quite consistent patterns in the sub-tropics and the mid-latitudes of both hemispheres, especially the warmer than normal conditions over the Southern Pacific.
Atlantic : Weak signal over the Tropics and sub-tropics (both South and North). However, the negative anomaly band from the Caribbean up to Spain seems to be robust.
Indian Ocean : weak signal over most of the basin to the exception of warmer than normal conditions on the South and Eastern part of the basin, especially close to Australia and the maritime continent. Note the negative anomalies already pointed out in the individual model analysis.

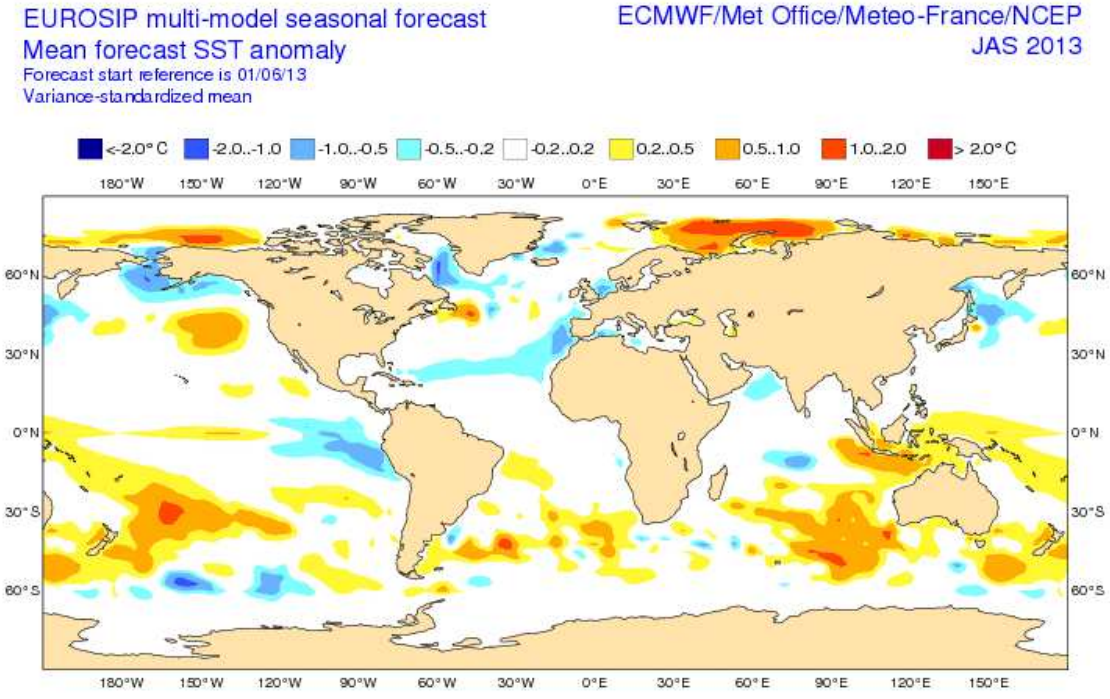


fig.14: SST Forecasted anomaly (in °C) from Euro-SIP for JAS, issued in June.

II.1.b ENSO Forecast :

Forecasted Phase for JAS : neutral

For JAS : the majority of the models indicate close to neutral conditions for the targeted period despite some are close to both Niña and Niño thresholds. Most of the dynamical models show a tendency to a slight warming on time.

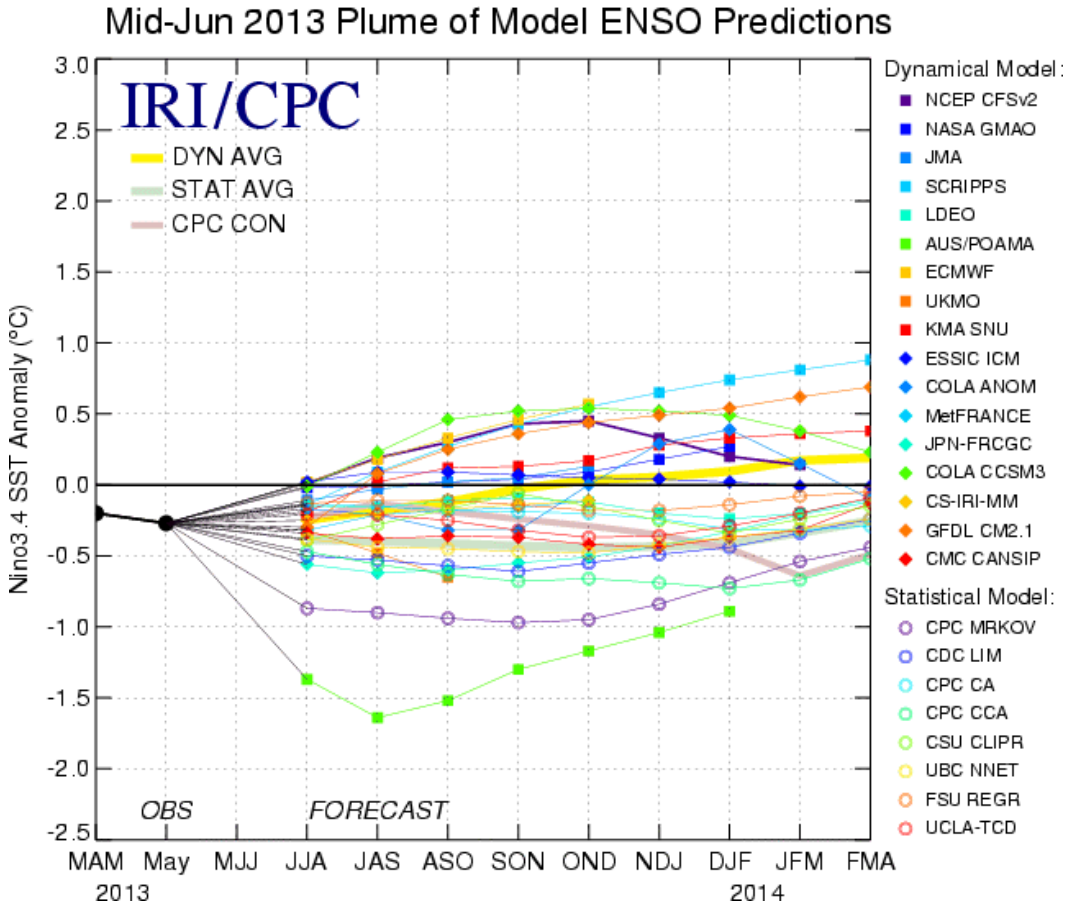


fig.15: Synthesis of Niño 3.4 forecasts (120° to 165°W) issued in June by IRI :
http://iri.columbia.edu/climate/ENSO/currentinfo/SST_table.html

Plumes from Météo-France and ECMWF for the 3 Niño boxes (see definition in Annex – fig. 16) :
In both models and on average, the prevailing conditions are in the normal range for JAS. Both models are indicating a progressive warming. One can notice that also in both models the spread dramatically increases from the Centre up to the East of the basin and in time (very likely in relationship with the actual prevailing conditions). Some members are close to La Niña conditions while somothers are close to El Niño conditions. In EuroSIP Plumes, close to normal conditions on average and large spread indicating a large uncertainty.

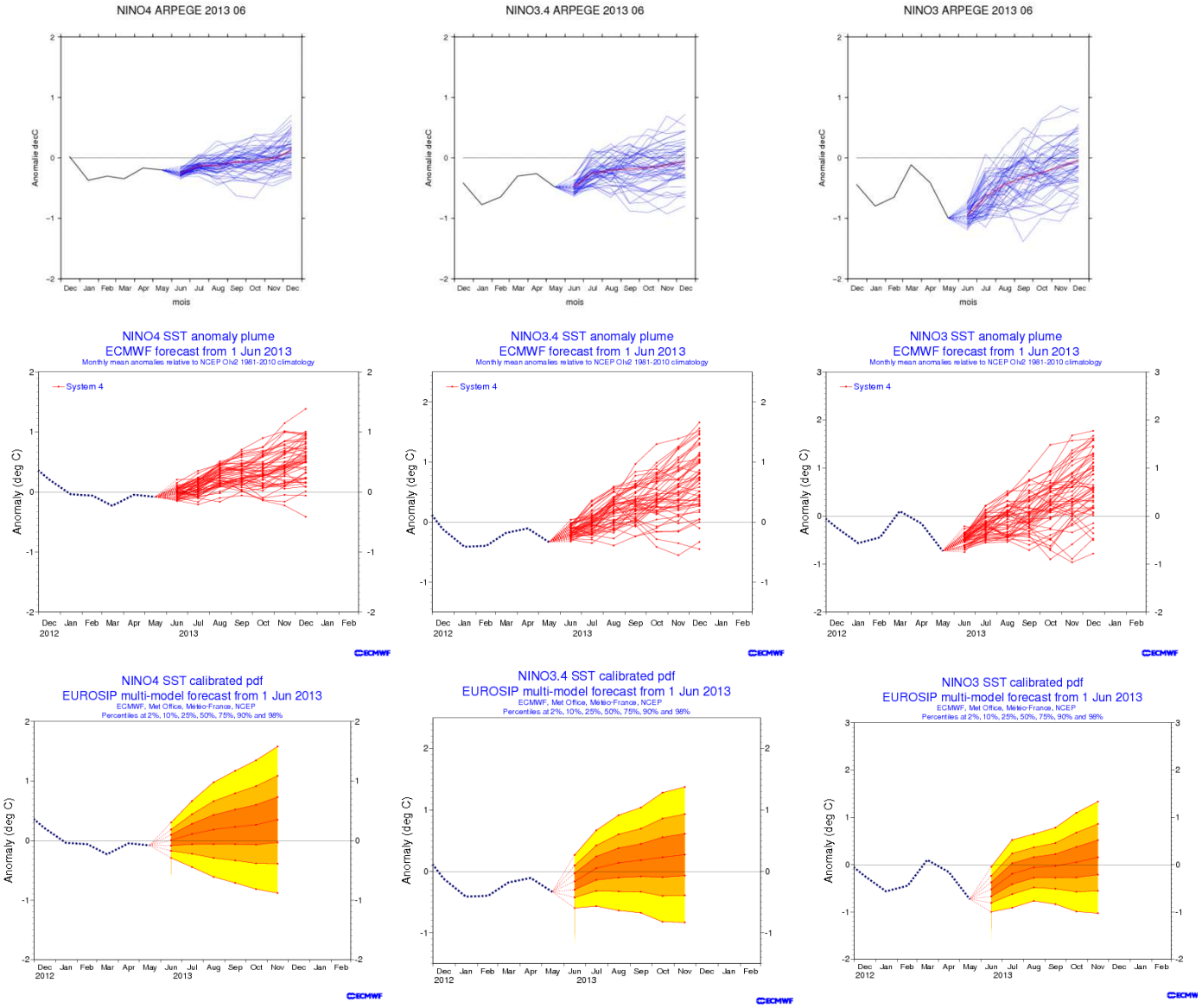


fig.16: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members - and EuroSIP (bottom) – recalibrated distributions - issued in June (http://www.ecmwf.int/)

II.1.c Atlantic Ocean forecasts :

Forecasted Phase: ***close to normal in both Tropics***

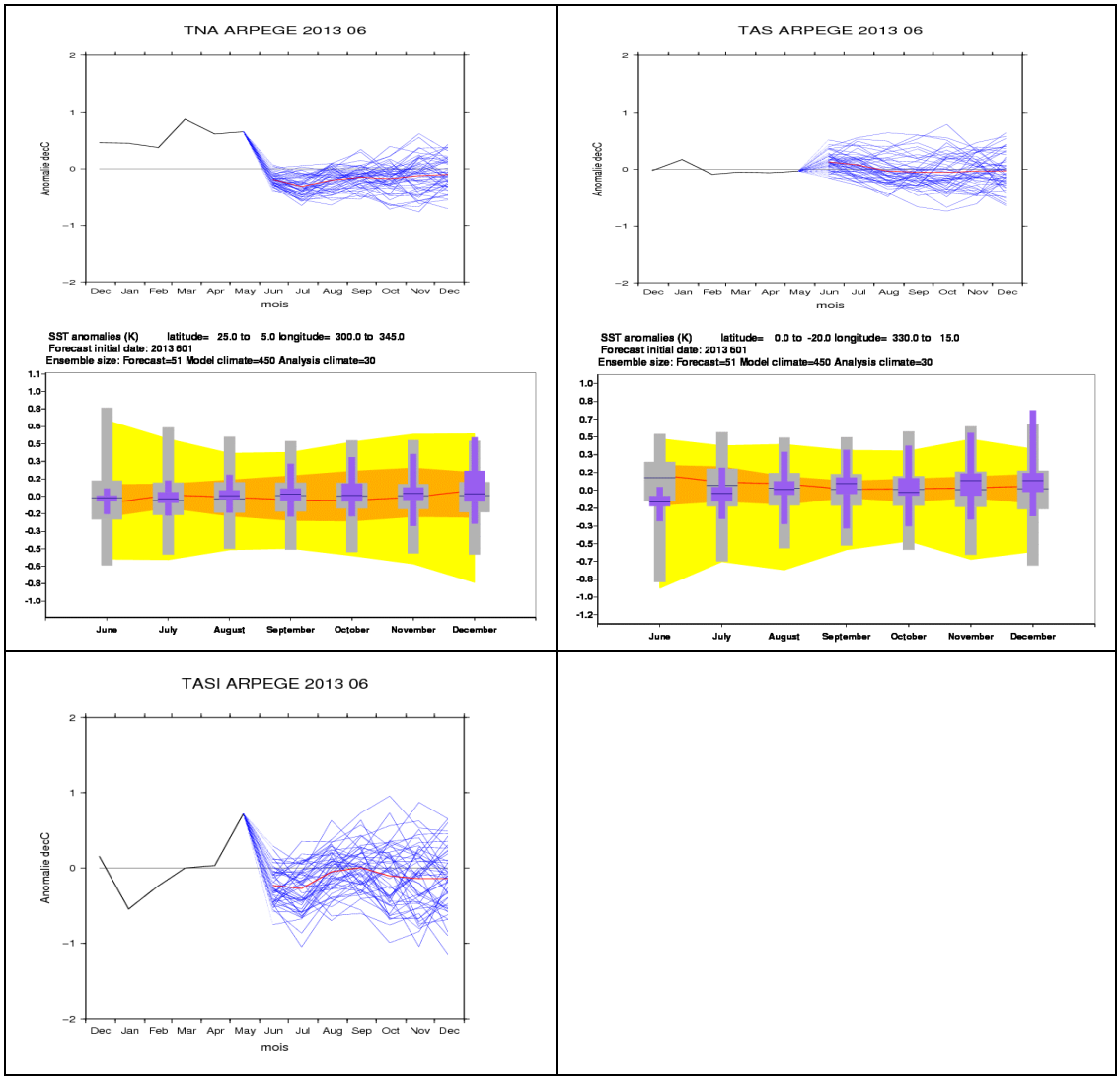


fig.17: SSTs anomaly forecasts in the Atlantic Ocean boxes from Météo-France and ECMWF, issued in June, plumes / climagrams correspond to 51 members and monthly means.

North Tropical Atlantic : Close to normal conditions in ECMWF and slightly colder than normal in MF. So taking into account the difference in hindcast periods it could be reasonably consistent (and with a reasonable spread).

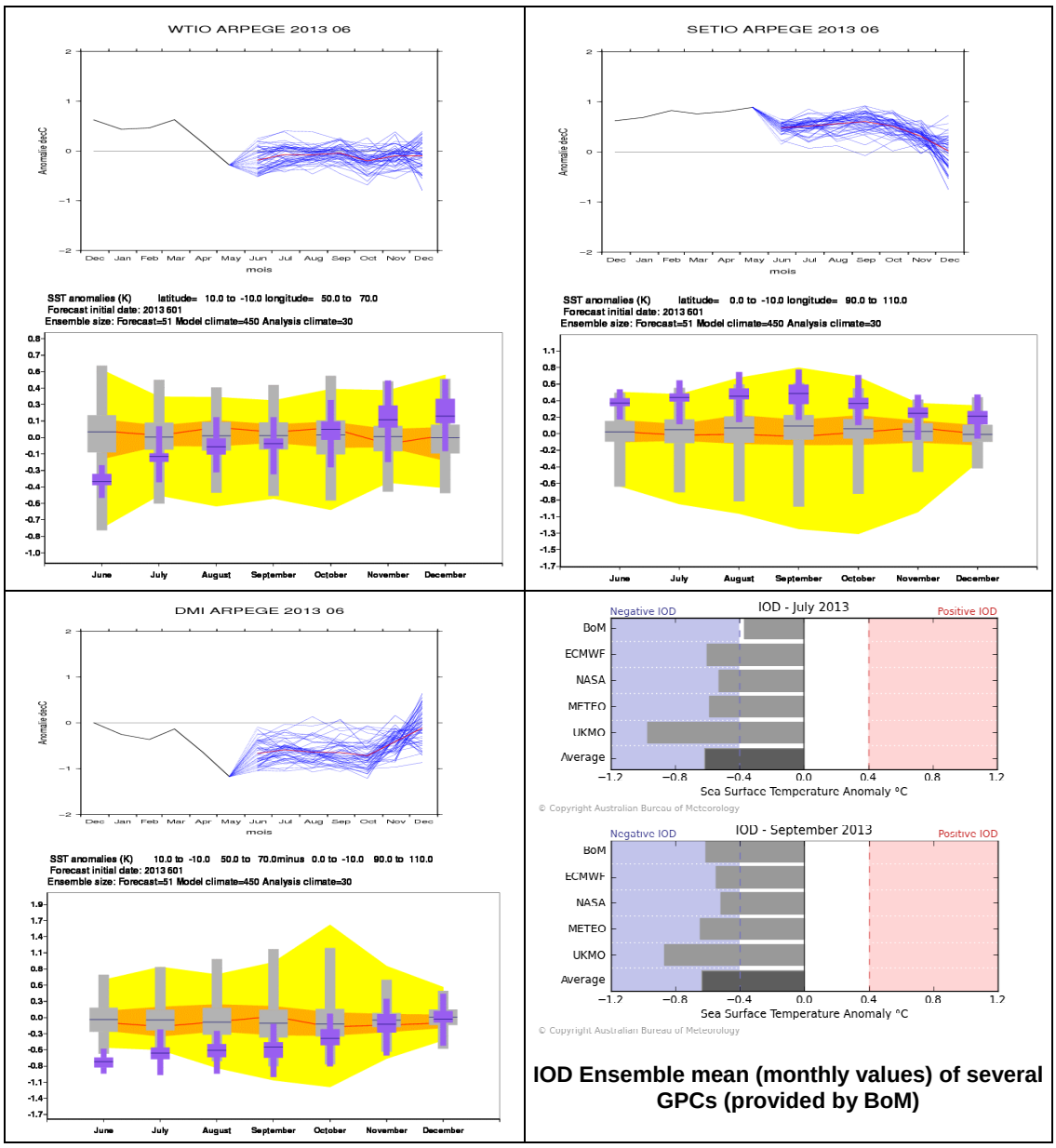
South Tropical Atlantic : in both models close to normal conditions.

The inter-hemispheric SST gradient should be slightly positive (especially looking to ECMWF forecast) bu the spread is quite large.

TASI : the TASI index is slightly negative in JAS for MF. However the spread is large and there is the hindcast issue.

II.1.d Indian Ocean forecasts :

Forecasted Phase: *IOD on the negative side*



IOD Ensemble mean (monthly values) of several GPCs (provided by BoM)

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

In WTIO : Consistent signal in both models in terms of evolutions. (Slightly in MF) Colder than normal conditions progressively moving to close to normal conditions; both models with reasonable spread and stable conditions along the whole period.

In SETIO : Above normal conditions in both models consistently with the Western Pacific SSTs behaviour. Consistent signal in ECMWF and little spread in both models.

DMI (IOD) : Negative phase of the IOD in both models (in relationship with SETIO evolutions) and little spread in ECMWF. This tendency is confirmed by other models.

II.2. GENERAL CIRCULATION FORECAST

II.2.a Global Forecast

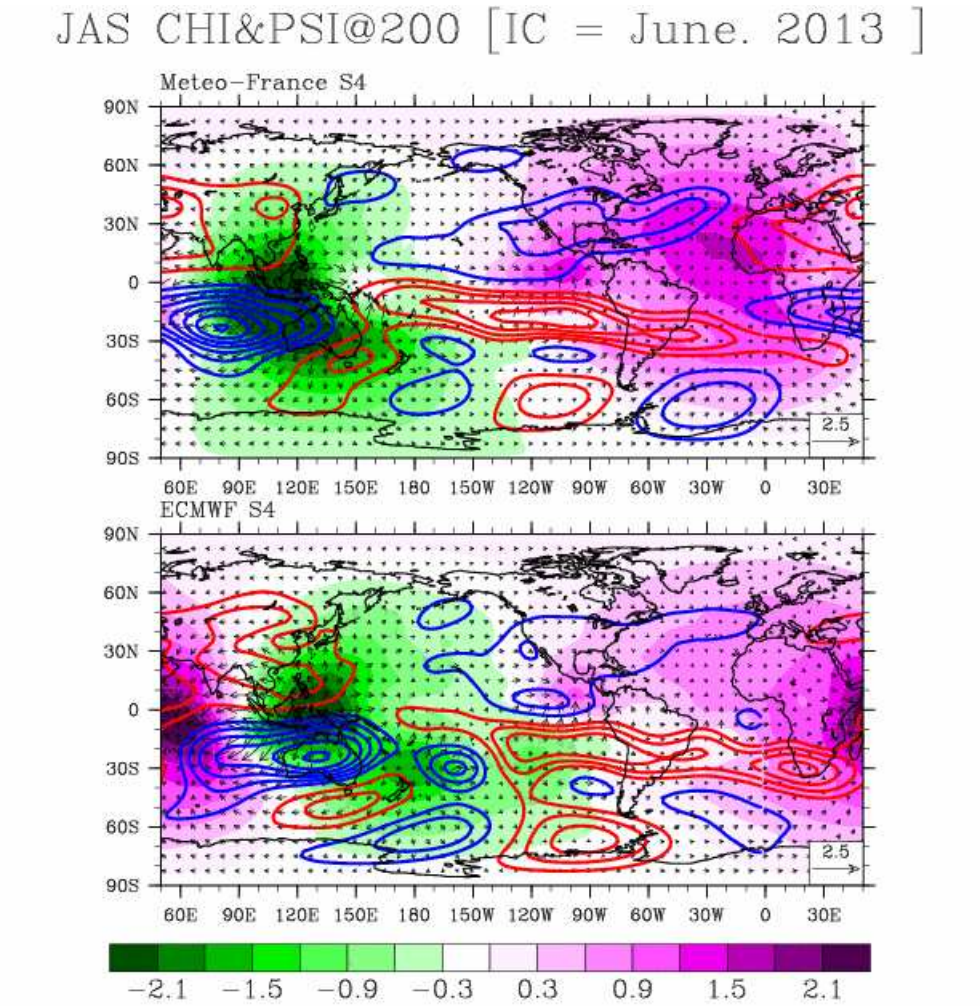


fig.19: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), associated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa for JAS, issued in June by Météo-France (top) and ECMWF (bottom).

Velocity potential anomaly field (cf. fig. 19 – insight into Hadley-Walker circulation anomalies) :
in the Tropics : atmospheric response quite consistent over the Pacific. Weak Tropics/Mid-Latitudes linkage in the Northern Hemisphere likely in relationship with a large uncertainty related to the Tropical Oceanic basin behaviours.

Over the Pacific : Good consistency between the 2 models on both the Western and Eastern parts ; negative anomaly over the maritime continent and the warm pool and positive anomaly close to Central America. Consequently Divergent circulation anomaly (upward motion) over the West Tropics extending mainly toward Australia and New-Zealand. On the Eastern part of the basin convergent circulation anomaly (downward anomaly motion). The MF response is stronger on both side than ECMWF one.

Over Indian Ocean : Divergent circulation anomaly (extension from the Western Pacific cell) and ; some enhanced convergent circulation anomaly over South-West Indian Ocean in ECMWF (only weak signal in MF).

Over Atlantic : less consistency between the 2 models. In MF there is a downward motion anomaly close to the western cost of West Africa (likely related to the colder than normal SSTs) while the signal is weak in ECMWF.

Stream Function anomaly field (cf. fig. 19 – insight into teleconnection patterns tropically forced) :
In both models, over the Pacific the atmospheric response is quite consistent in both hemispheres. However, there is little influence over the mid-latitudes of the Northern hemisphere. Over the Atlantic there is less consistency. However, associated to the convergent anomaly over the most eastern part of the Pacific, there is cyclonic circulation anomalies in both hemispheres which extend eastward and toward sub-tropics. They can be interpreted as a tropical influence. However, the signal remains weak across the Atlantic sector. So it's seems difficult to infer any specific atmospheric response related to a Tropical forcing. As a conclusion the predictability is still limited over mid-latitudes regions everywhere in the Northern Hemisphere and especially over Europe. One can infer some predictability in the Tropics over the Pacific and Eastern Indian Ocean regions.

II.2.b North hemisphere forecast and Europe

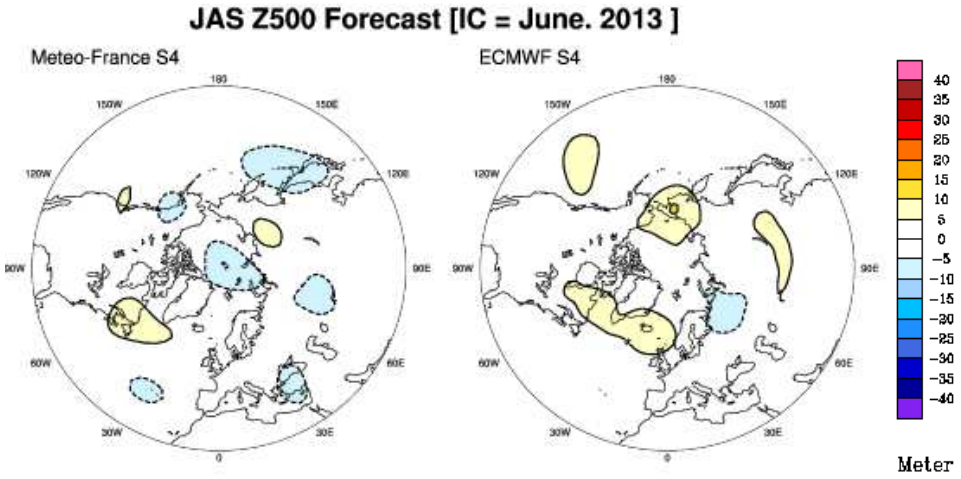


fig.20: Anomalies of Geopotential Height at 500 hPa for JAS, issued in June, from Euro-SIP. http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip

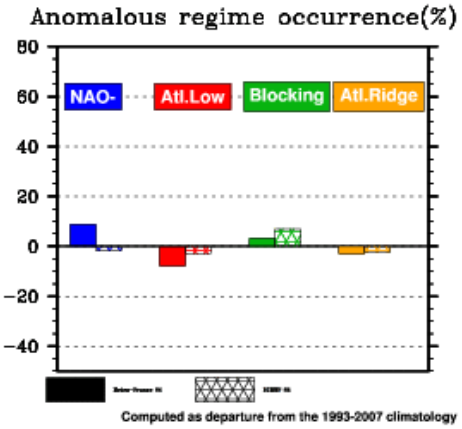


fig.21: North Atlantic Regime occurrence anomalies from Météo-France and ECMWF : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.

Geopotential height anomalies (fig. 20 – insight into mid-latitude general circulation anomalies) :
As seen on the Stream Function anomalies, there is a weak signal in Stream Function Anomalies. So it's difficult to interpret these anomalies with respect of tropical forcing sources. The differences between the two models can likely be related to the model uncertainty.
North Atlantic Circulation Regimes (fig. 21) : As a consequence, there is only little signal in the mid-latitudes geopotential forecasts so no signal in the regimes forecast.
General atmospheric circulation in MF in the low troposphere (see fig. 22) : the zonal and meridionnal circulation over Europe don't show strong signal. In addition, due to the limited predictability, these patterns are not directly interpretable in term of teleconnection pattern.

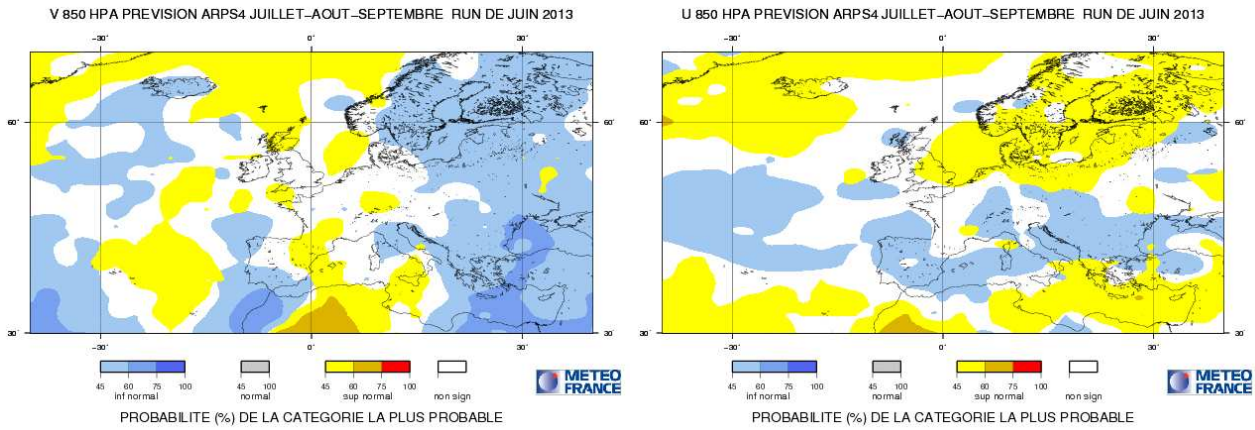


fig.22: Most likely category for the meridional (left) and zonal (right) wind at 850 hPa for JAS, issued in June from Météo-France.

II.3. IMPACT : TEMPERATURE FORECASTS

II.3.a ECMWF

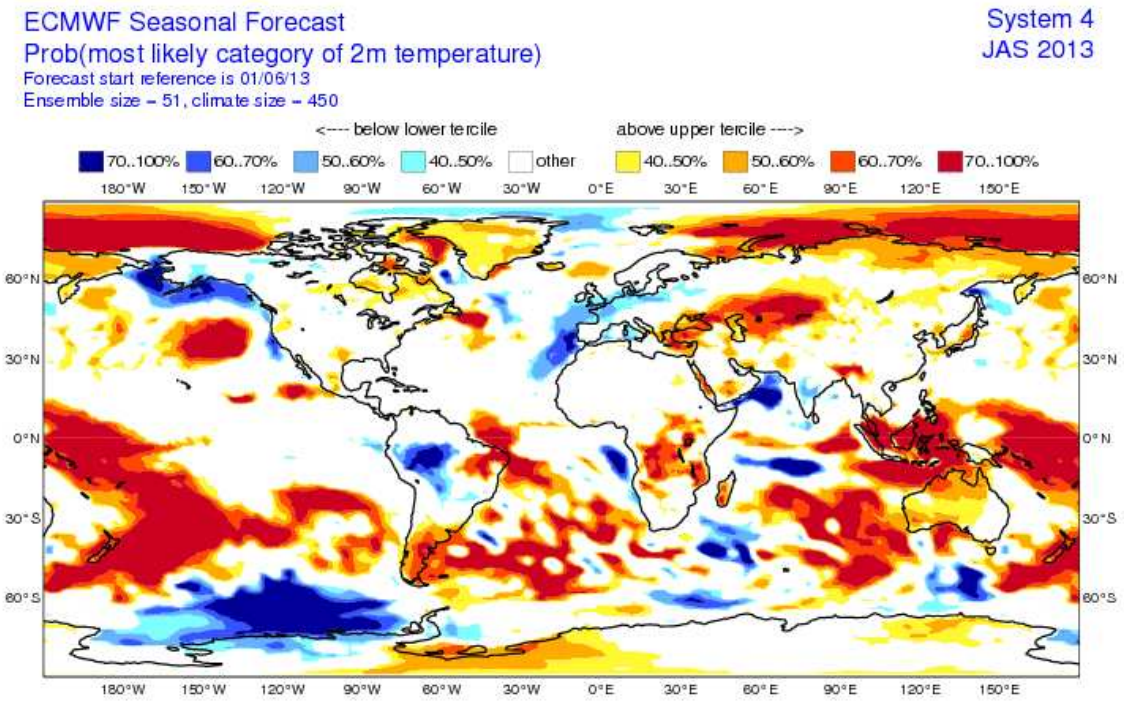


fig.23: Most likely category probability of T2m from ECMWF for JAS, issued in June. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

II.3.b Météo-France

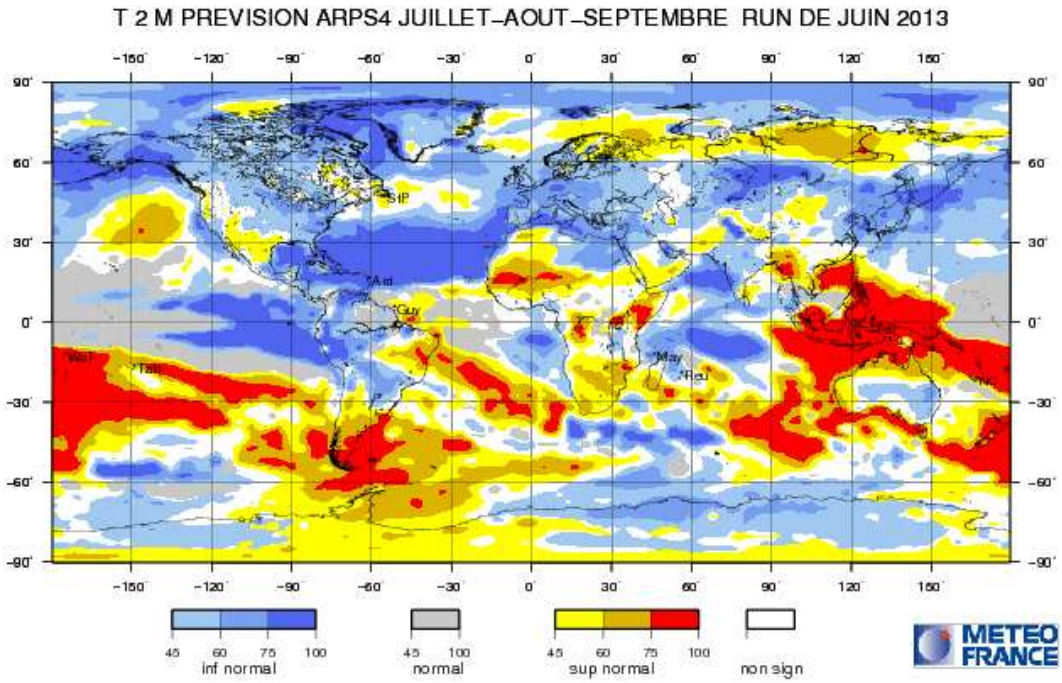


fig.24: Most likely category of T2m for JAS, issued in June. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.3.c Met Office (UKMO)

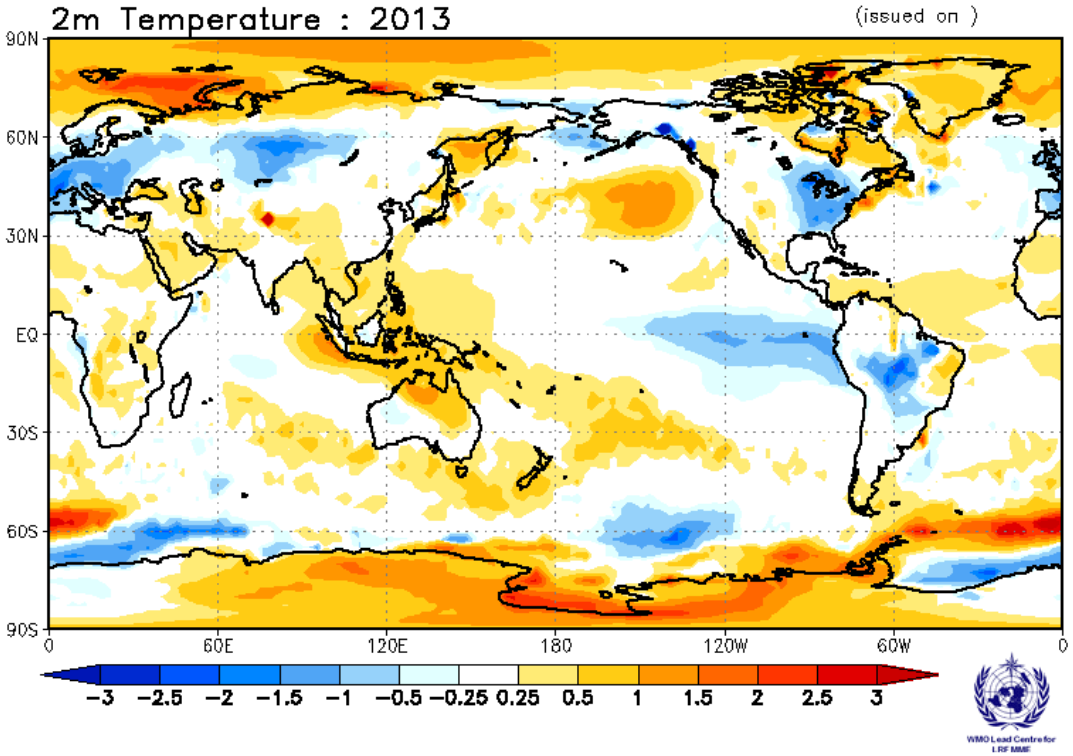


fig.25: T2m anomaly for JAS, issued in June from UK Met Office. https://www.wmolc.org/

II.3.d Climate Prediction Centre (CPC)

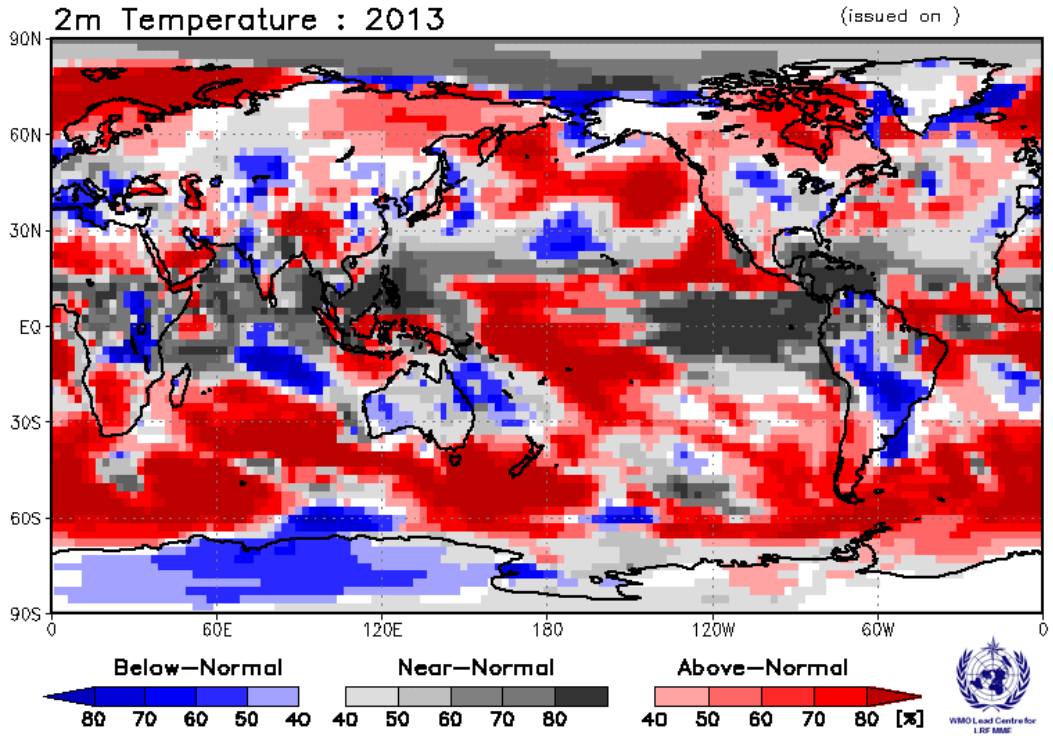


fig.26: Most likely category of T2m Anomaly for JAS, issued in June from CPC. https://www.wmolc.org/

II.3.e Japan Meteorological Agency (JMA)

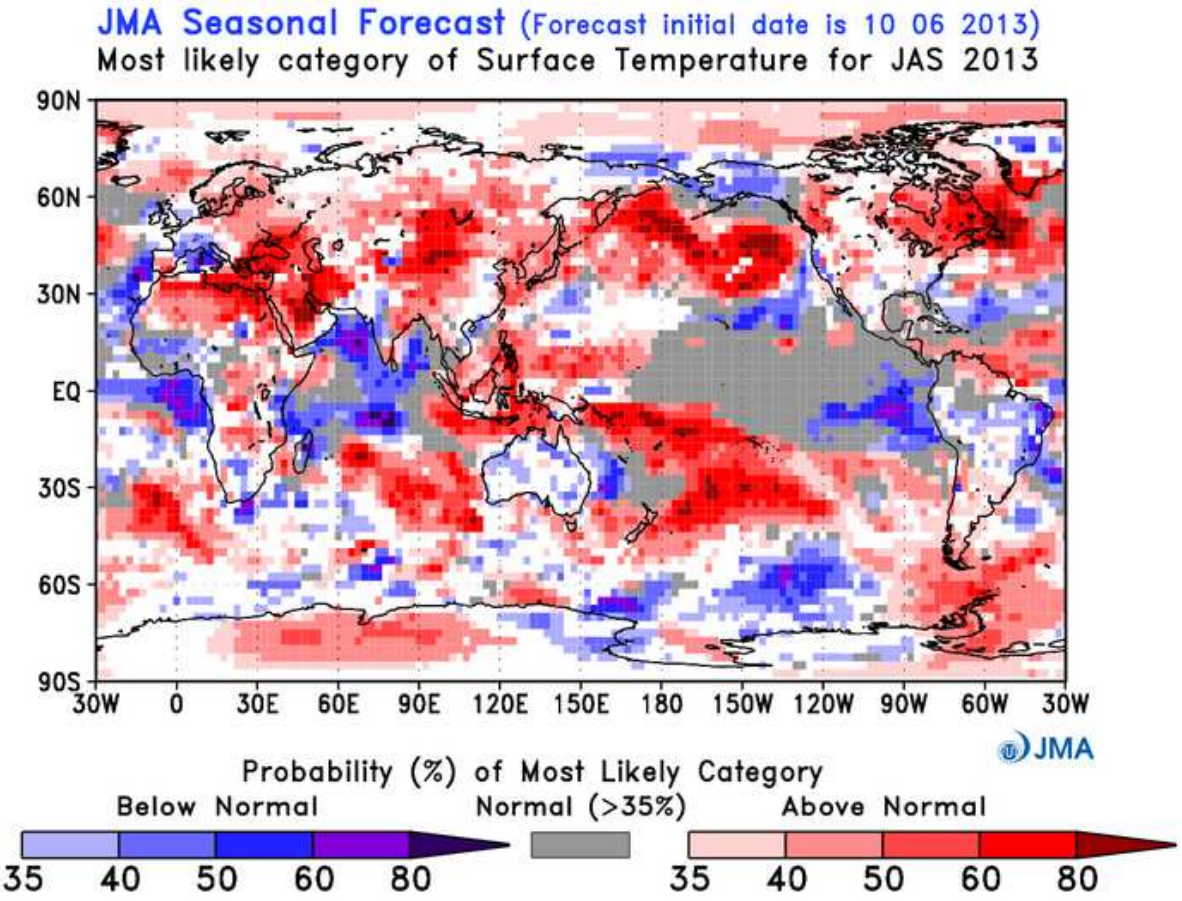


fig.27: Most likely category of T2m for JAS, issued in June. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/

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

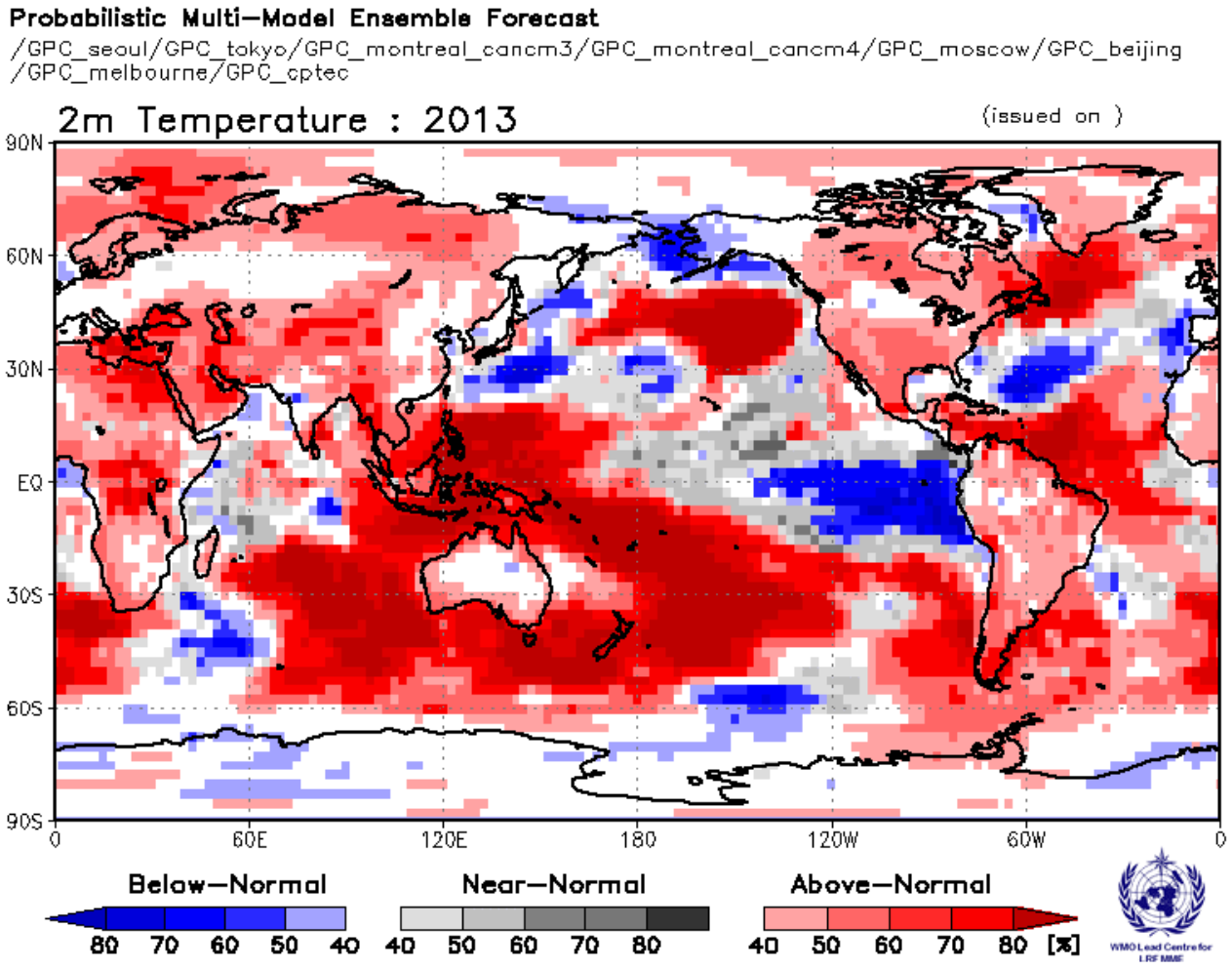


fig.28: T2m MME Anomaly for JAS, issued in June from LC-MME. The MME composition corresponds to the GPCs not used in EuroSIP https://www.wmolc.org/

II.3.g Euro-SIP

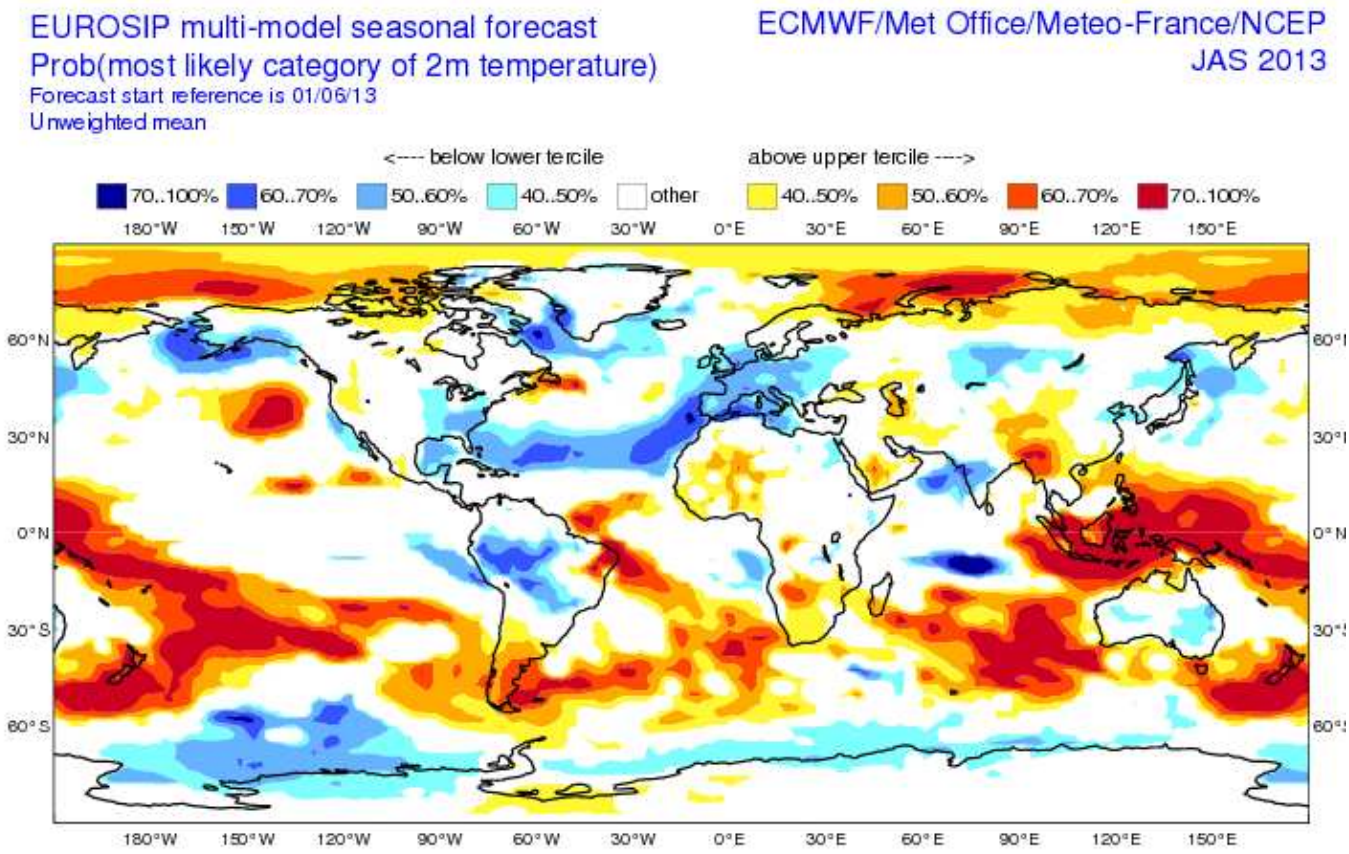


fig.29: Multi-Model Probabilistic forecasts for T2m from EuroSip for JAS, issued in June. (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).

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

North-America : Little signal across the North American continent. Colder than normal over the coastal area of Alaska and East US.

South-America : Some consistent signal in the vicinity of Amazonian regions (colder than normal) and over the coastal areas of Brazil and the most southern part of the continent (warmer than normal).

Australia : traces of colder than normal over the Eastern part of the country.

Asia : Warmer than normal conditions over the maritime continent, close to Myanmar and Bengla Desh and close to the Caspian sea. Colder than normal conditions over part of India and between the Lake Baikal and the Lake Balkhash.

Africa : Warmer than normal conditions over the Southern Africa and West Africa.

Europe : colder than normal conditions over Western and Central Europe and some traces of warmer than normal conditions close to the Caspian sea.

II.4. IMPACT : PRECIPITATION FORECAST

II.4.a ECMWF

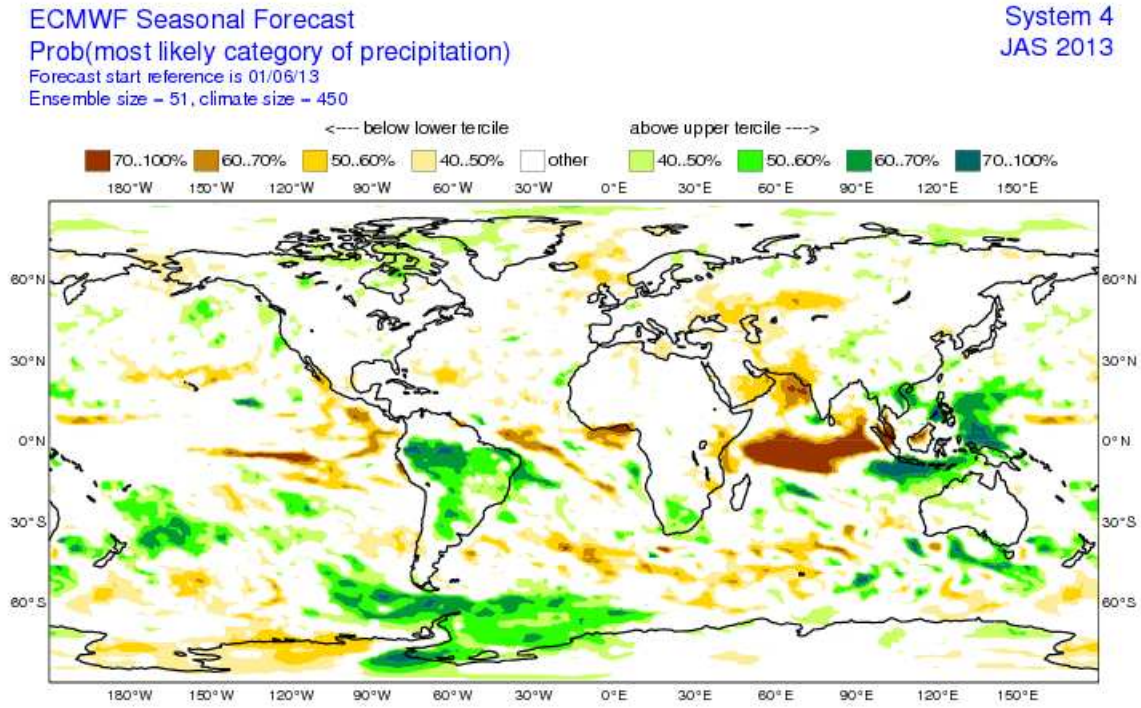


fig.30: Most likely category probability of rainfall from ECMWF for JAS, issued in June. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/charts/seasonal_charts_s2/

II.4.b Météo-France

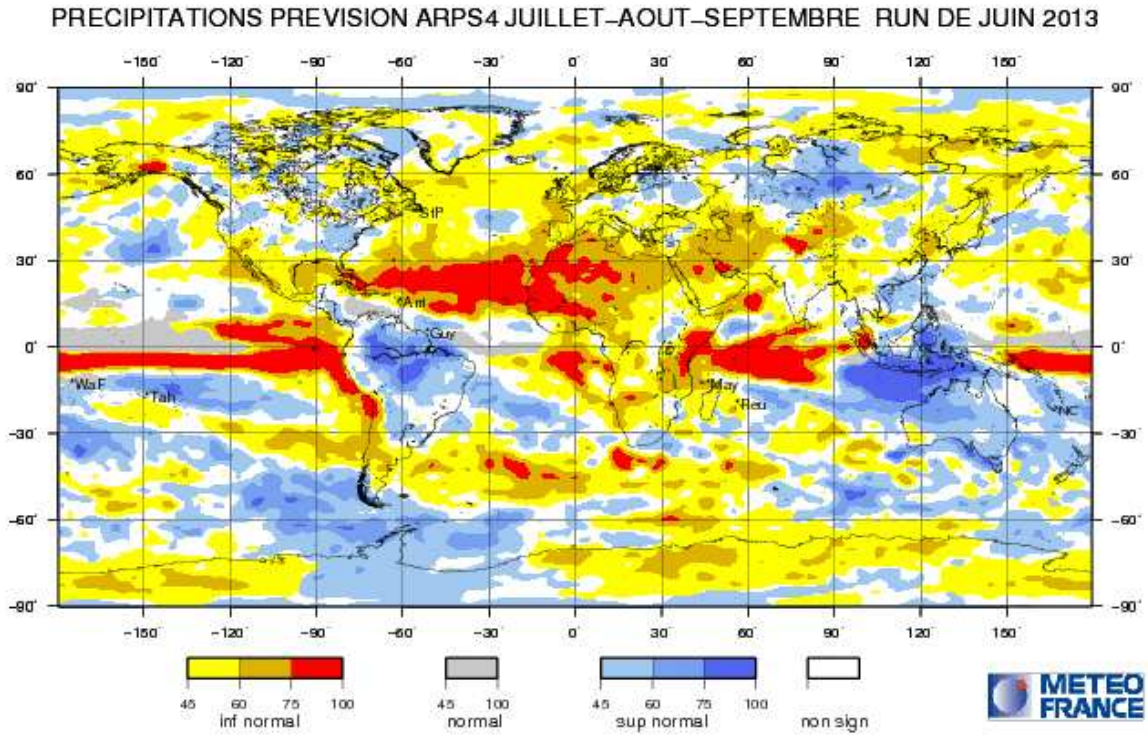


fig.31: Most likely category of Rainfall for JAS, issued in June. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Met office (UKMO)

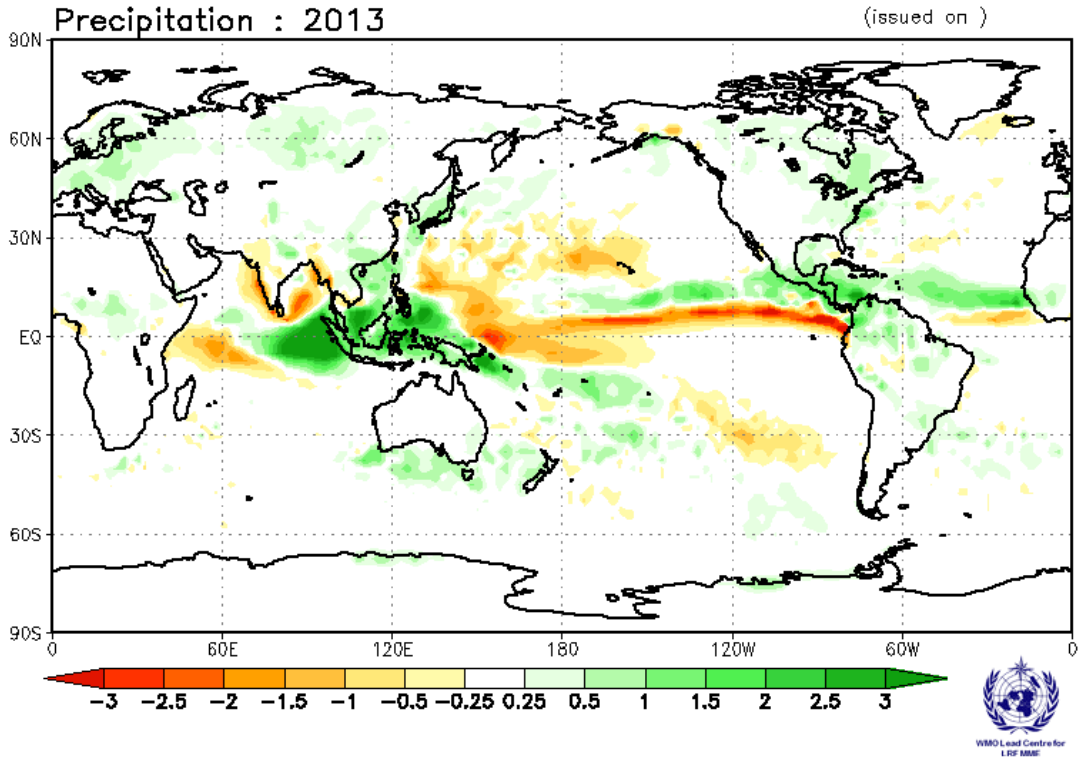


fig.32: **Rainfall anomaly for JJA, issued in June from UK Met Office.** **https://www.wmolc.org/**

II.4.dClimate Prediction Centre (CPC)

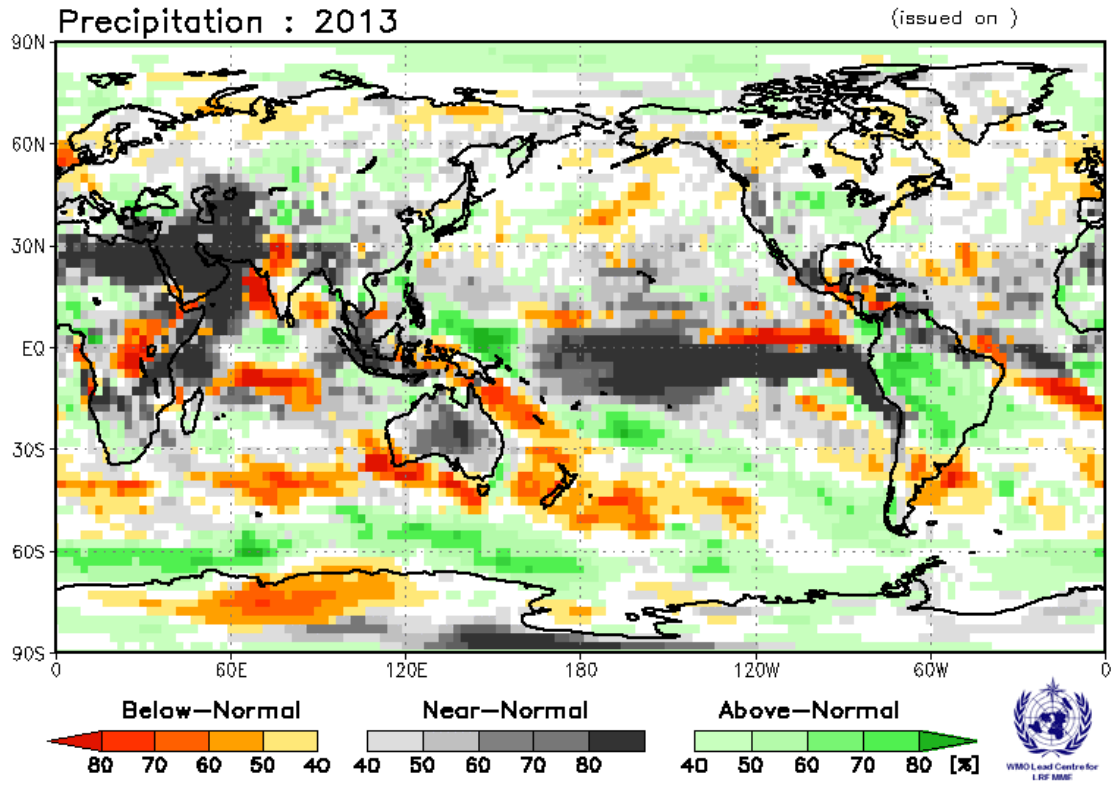


fig.33: **Most likely category of Rainfall for JAS, issued in June from CPC.** **https://www.wmolc.org/**

II.4.e Japan Meteorological Agency (JMA)

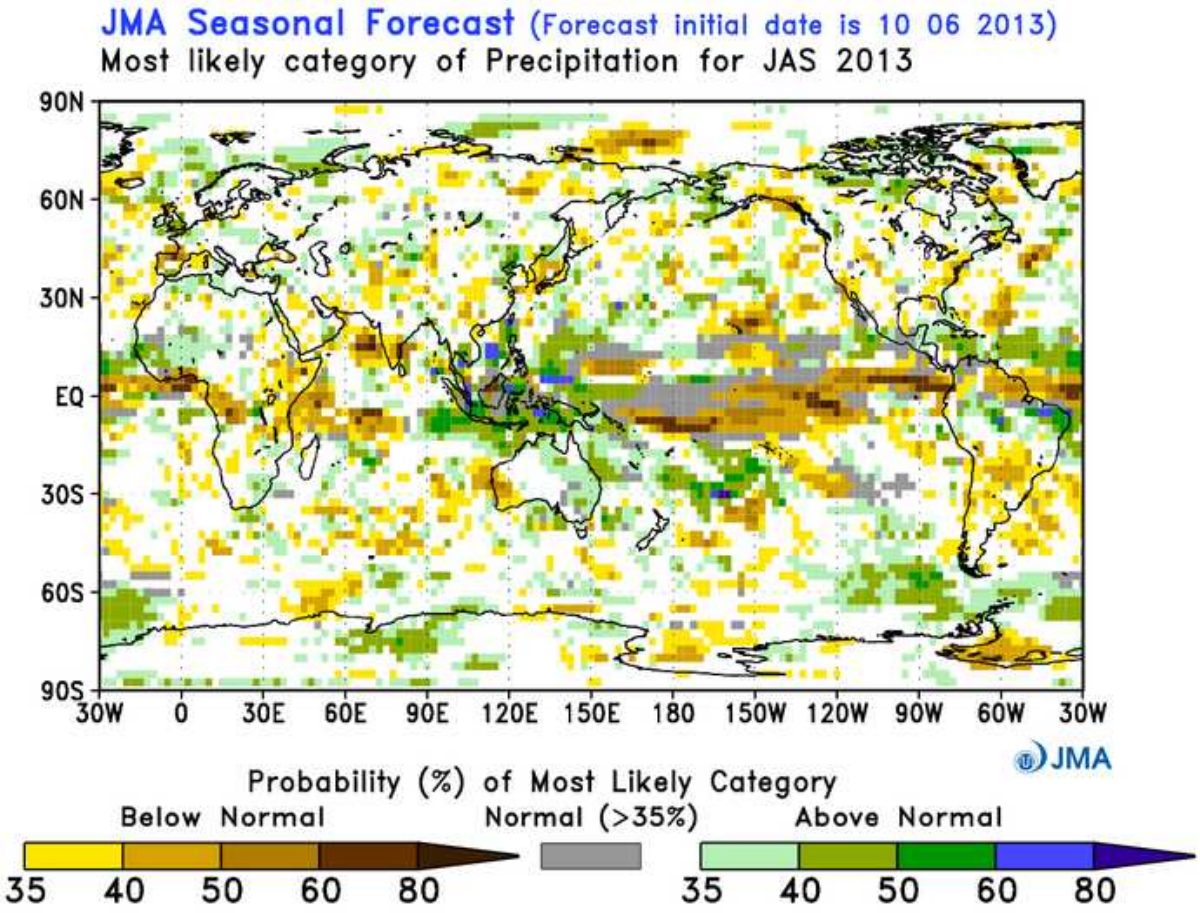


fig.34: Most likely category of Rainfall for JAS, issued in June from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/

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

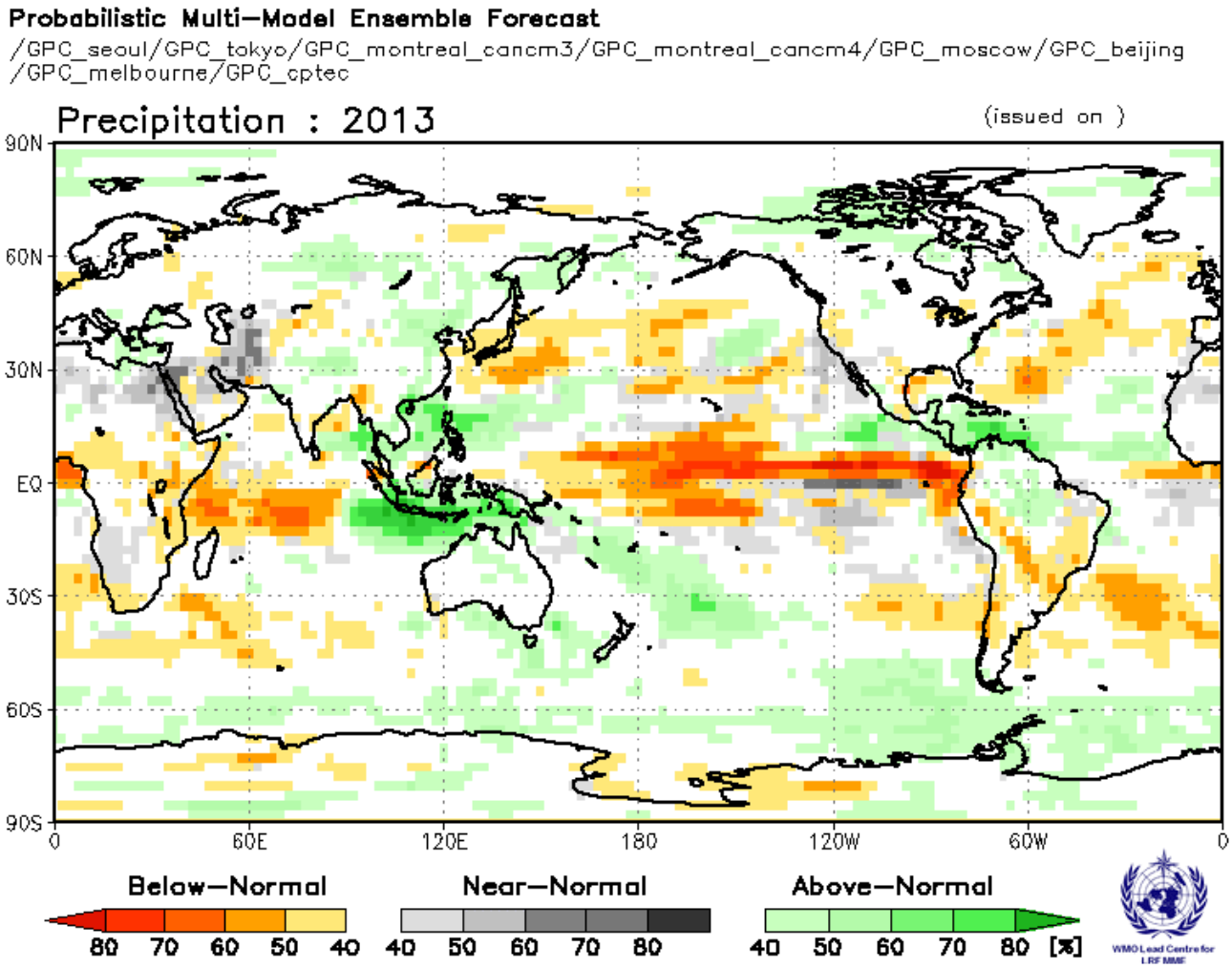


fig.35: **Rainfall MME anomaly for JAS, issued in June from LC-MME. The MME composition corresponds to the GPCs not used in EuroSIP.** **https://www.wmolc.org/**

II.4.g Euro-SIP

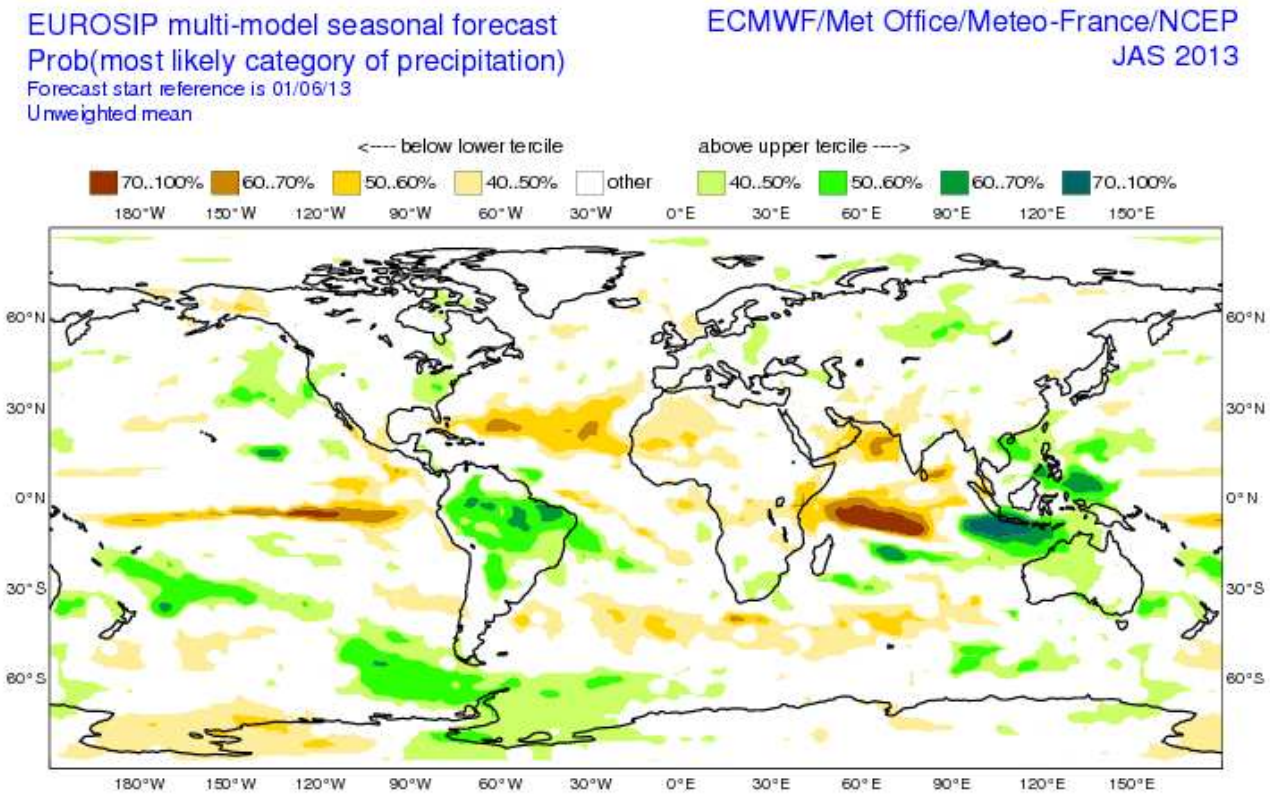


fig.36: Multi-Model Probabilistic forecasts for precipitation from EuroSip for JAS, issued in June. (2 Categories, Below and Above normal – White zones correspond to No signal).

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

Some consistent signal in the Tropics ; enhanced probabilities for wet scenarios over the maritime continent, part of Australia, A large portion of South America covering especially Brazil and Amazonian regions. Enhanced probabilities for dry scenarios over East Africa, North-West Africa, the Arabic peninsula extending up to and Pakistan and (only slightly) for Equatorial Africa.
For Europe No signal everywhere and more generally for most of the mid latitude of Northern Hemisphere, consistently with discussion on predictability and teleconnections. To be quoted the weak signal for wet scenario over part of Central Europe.

II.5. REGIONAL TEMPERATURES

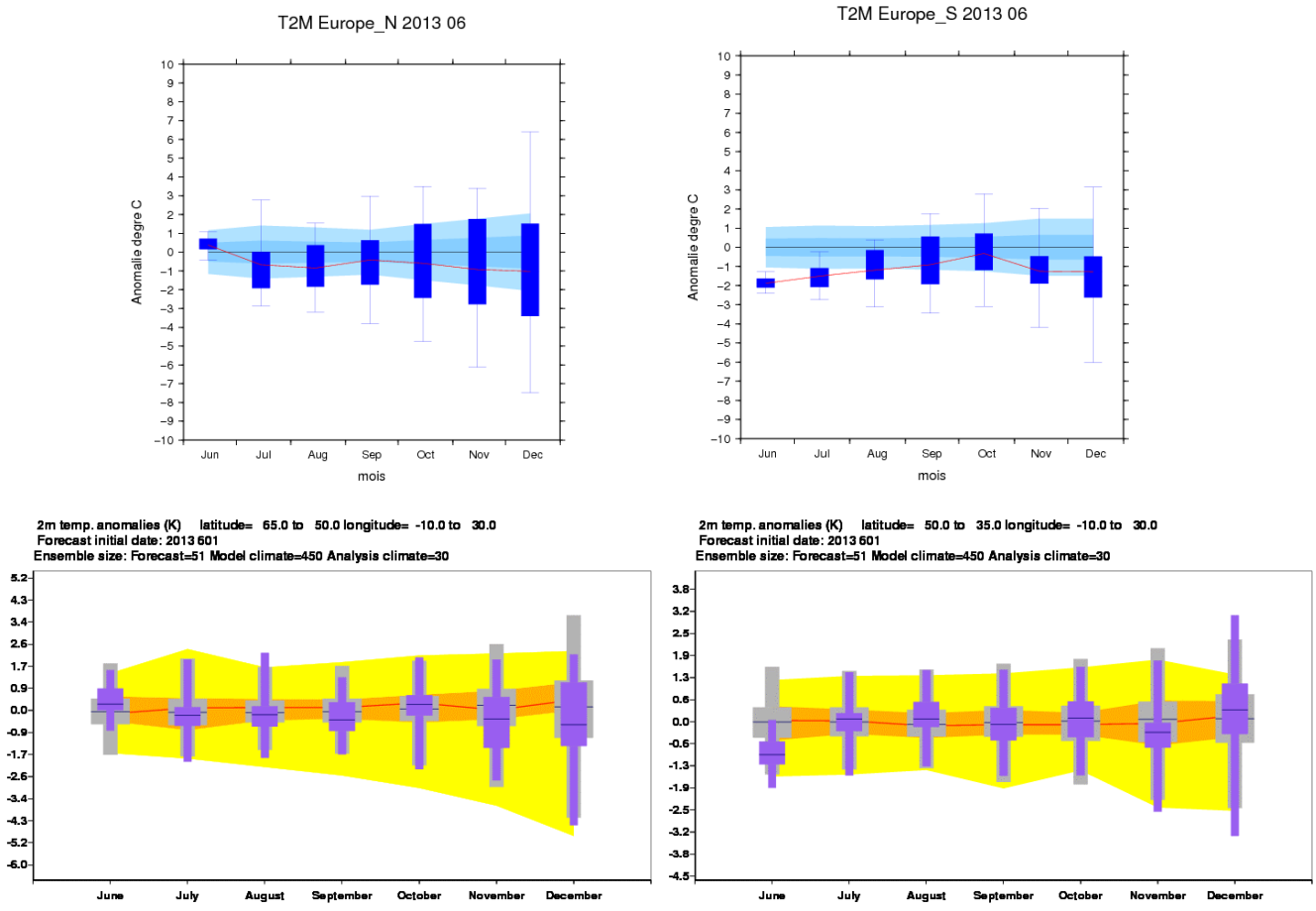


fig.37: Climagrams for T2m in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom) issued in June.

For Northern: some consistency between the 2 models. Starting with Warmer than normal conditions in June and then moving to Colder than normal conditions in JAS. Note the quite large spread (with respect of the climate reference).
For Southern Europe: some differences ; both models starting with Below normal conditions in June but then becoming slightly Above normal in ECMWF while it is still Below normal in MF.
Take care that due to the system change (from system 3 to system 4) the verification scores are not available yet.

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

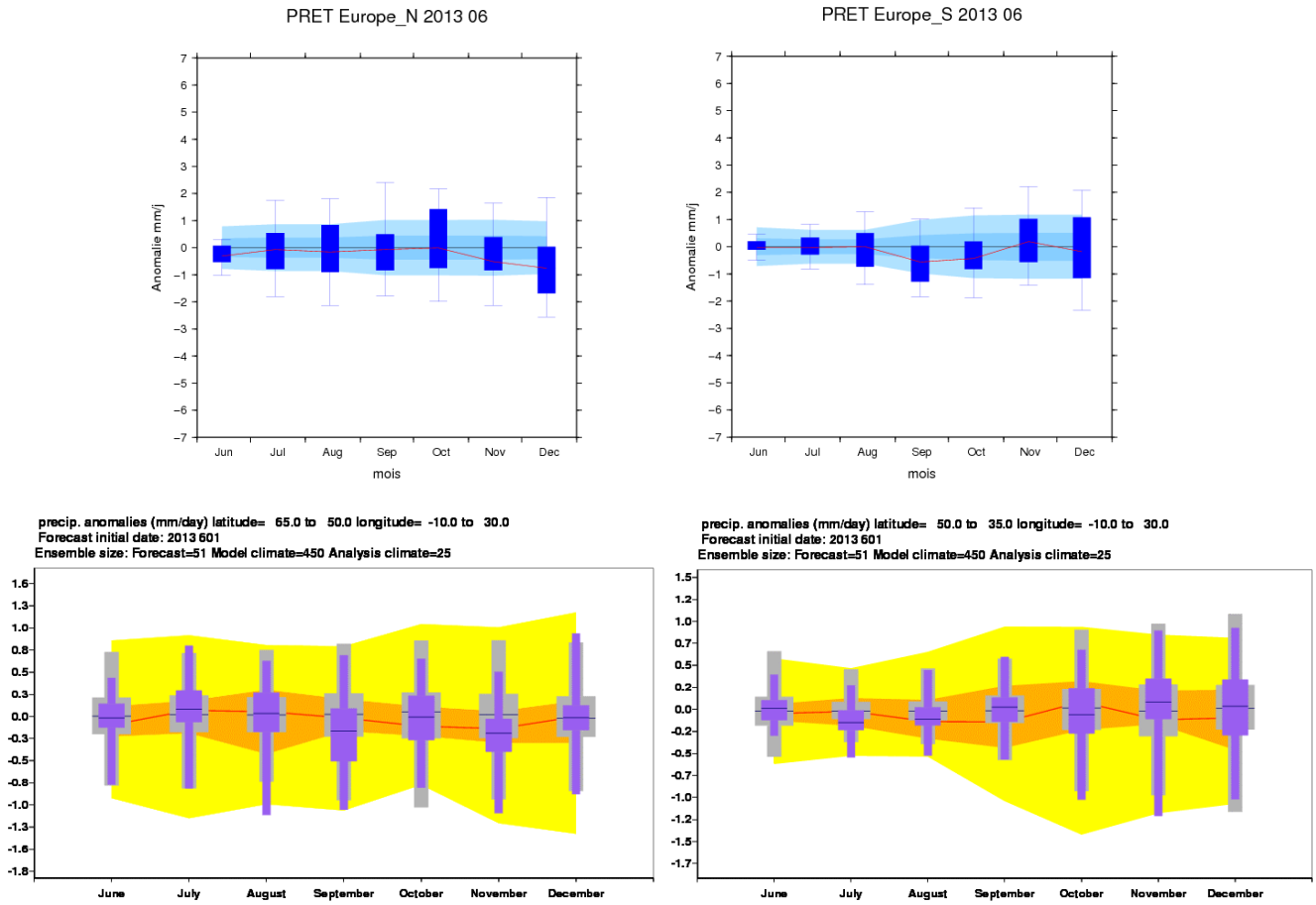


fig.38: Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom), issued in June.

For Northern Europe : Large spread in the evolution of the 2 models. Not too much consistency in the two models, Drier than normal in June and then Close to normal in MF ; close to normal in JJA and then Below normal in ECMWF. Quite large spread in both models.

For Southern Europe : Here also the spread is quite large, especially in August and September. Signal close to climatology in MF excepted in September (Below Normal). In ECMWF mostly Below normal in July and then Above normal.

Adding the low predictability and model uncertainties considerations, these intraseasonal evolutions should be considered as indicating No Signal.

Take care that due to the system change (from system 3 to system 4) the verification scores are not available yet.

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

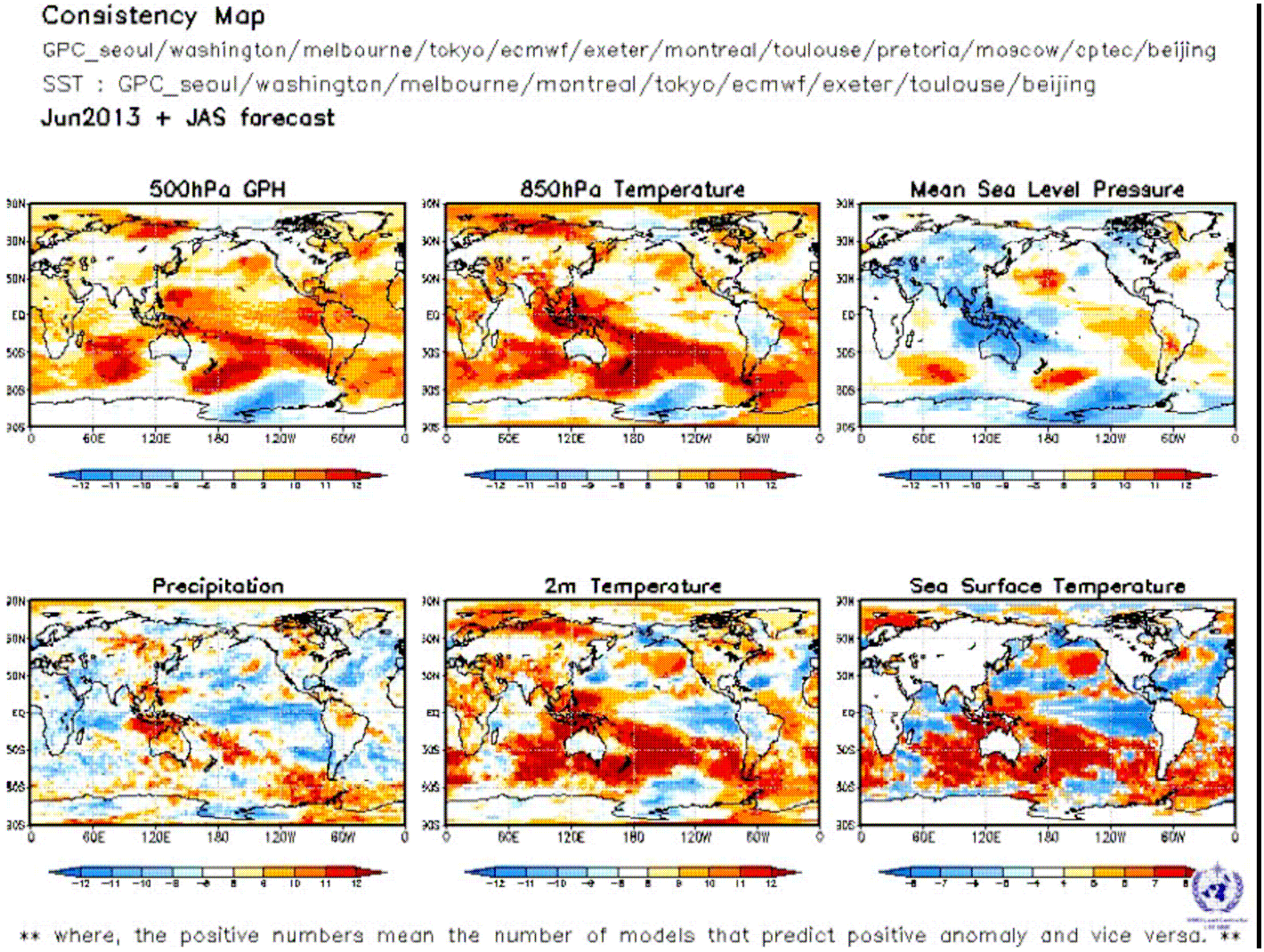


fig.39: ***GPCs Consistency maps from LC-MME*** *http://www.wmolc.org/*

For SST : Consistency across the Pacific : colder than normal in the Eastern part, warmer than normal in the Western part (especially in the Southern hemisphere). In the Indian ocean, large convergence for Above normal conditions in the Eastern part and West to Australia. The negative IOD is also conspicuous. For the Atlantic, less consistency in the Tropics. Below normal conditions the the Eastern Atlantic up to the Caribbean.

For Z500 : Little consistency in the Northern hemisphere (consistent with the predictability analysis) to the exception of the Northern part of Siberia.

For T2m : Some consistency for Above normal conditions close to the maritime continent and over some part of Africa (Guinean Gulf and Equatorial regions mostly)

For precipitation : Strong consistency in the vicinity of the maritime continent and the SPCZ (Above normal conditions). Some consistency exists over Amazonian regions, the most eastern part of South-East Asia and in the South part of Siberia (Above Normal), the Arabic Peninsula and East Africa (Below Normal)

II.7. "EXTREME" SCENARIOS

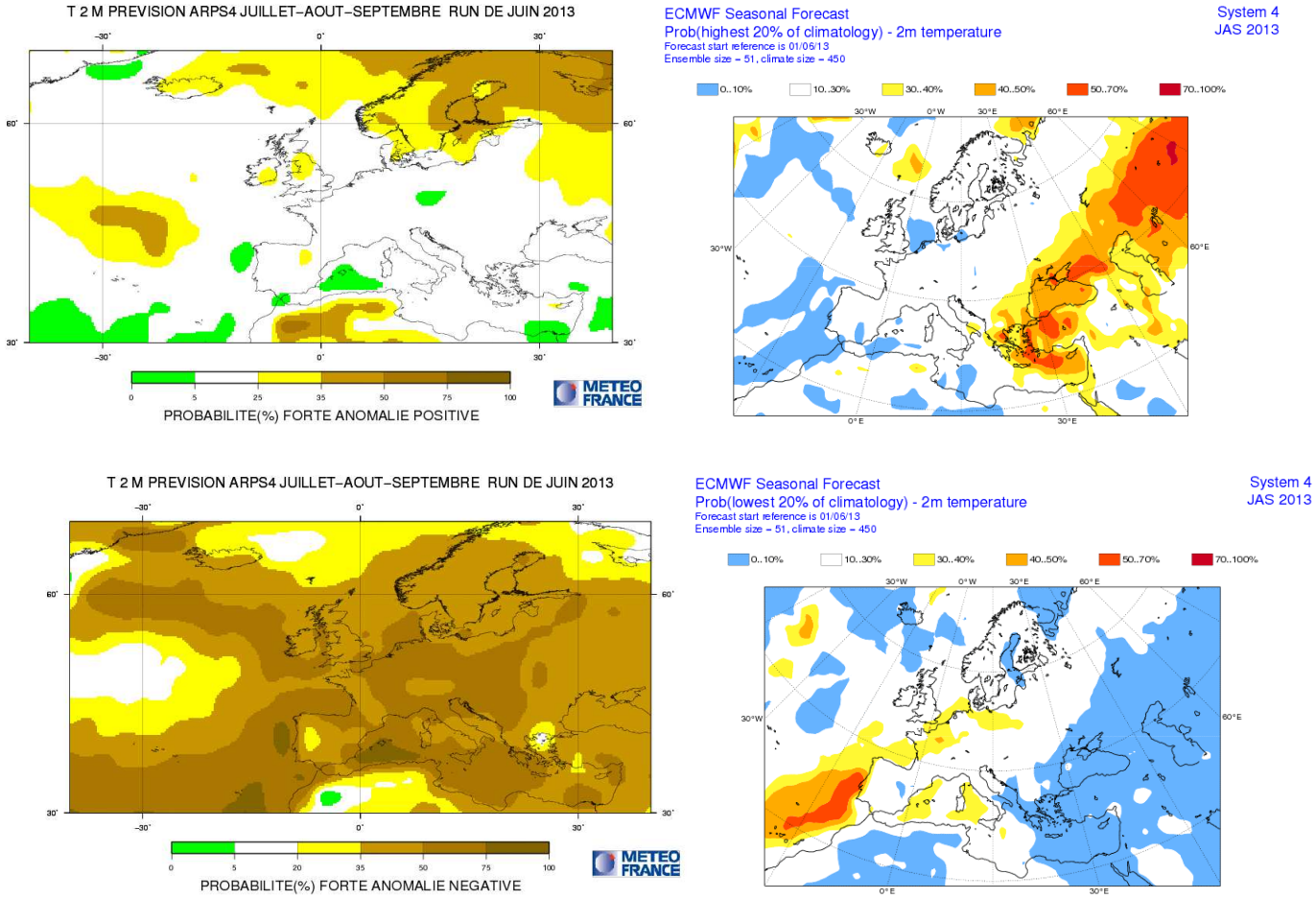


fig.40: Top : Probability of « extreme » above normal conditions for T2m for Meteo-France (left - highest ~15% of the distribution) and ECMWF (right - highest 20% of the distribution).
Bottom : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the distribution) and ECMWF (right – lowest 20% of the distribution).
For JAS, issued in June.

No consistency between the 2 models for the Very Below scenario to the exception of oceanic regions.
No consistency for very Above Normal scenario. So in relationship with the current predictability and the model uncertainties, it seems difficult to use these forecast.
Take care that due to the system change (from system 3 to system 4) the verification scores are not available yet.

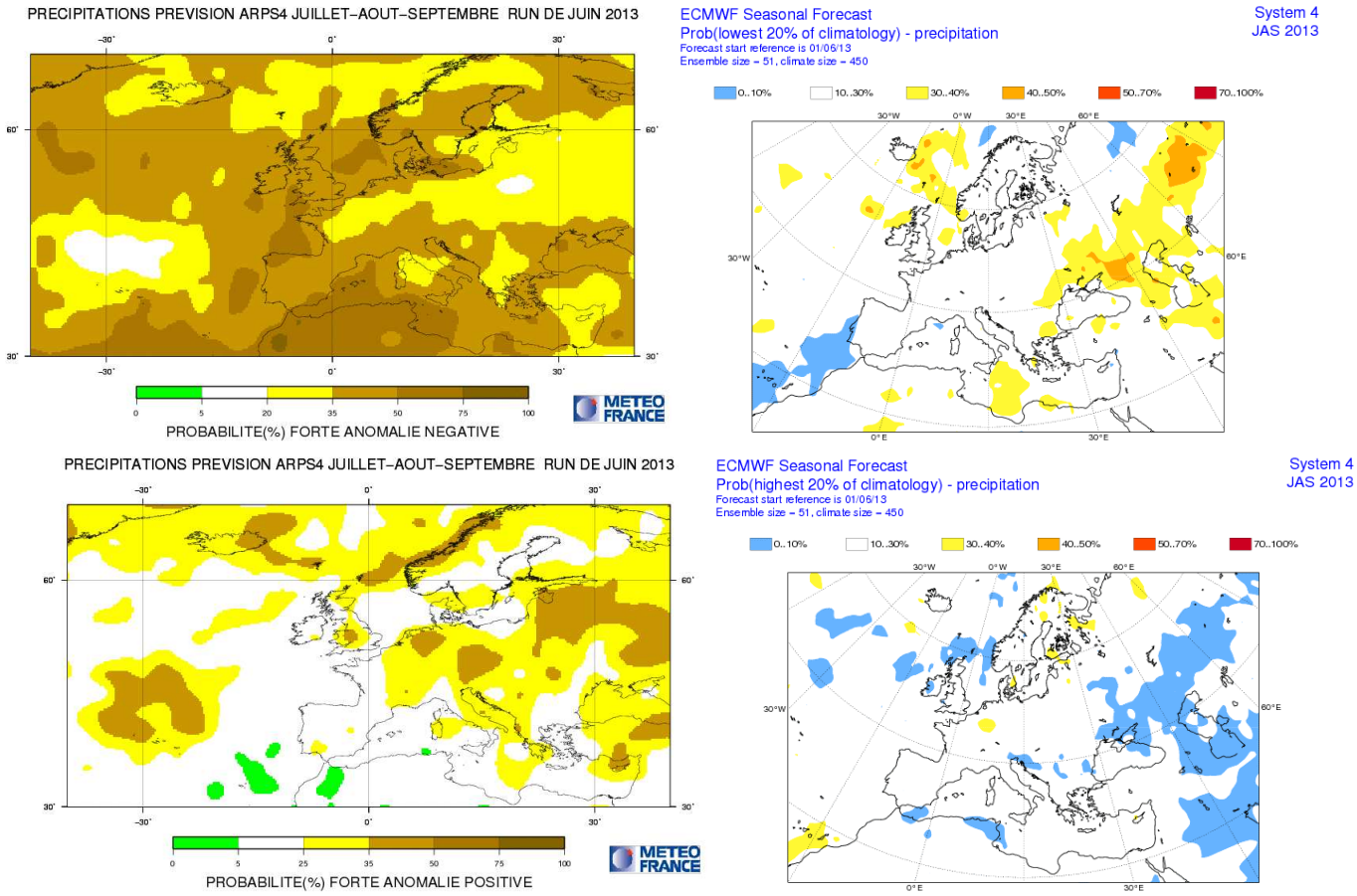


fig.41: Top : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the distribution) and ECMWF (right - lowest 20% of the distribution)
Bottom : Probability of « extreme » Above normal conditions for rainfall for Meteo-France (left - highest ~15% of the distribution) and ECMWF (right – highest 20% of the distribution).
For JAS, issued in June.

Mostly No signal in ECMWF while there are traces of divergent scenarios in MF (enhanced probabilities for both extreme scenarios over Central, Northern and Eastern Europe).
So in relationship with the current predictability and the model uncertainties, it seems difficult to use these forecast.
Take care that due to the system change (from system 3 to system 4) the verification scores are not available yet.

II.8. DISCUSSION AND SUMMARY

Forecast over Europe

For this forecast the major comment is about the current predictability in the climate system. The oceanic forcing remains quite low to the exception of the most eastern Pacific and close to the maritime continent and no teleconnection patterns toward the mid-latitudes of the Northern hemisphere seem to be present in the forecasts. As a consequence for Europe **the predictability** is still limited at seasonal scales, despite some noticeable predictability exists at the monthly scale (first month). So in such a context, 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 most of the European continent. **For temperature** : The Below normal scenario could be privileged for Southern Europe despite the weak predictability. For the other sub-regions there is No Privileged scenario even if the Southern part of Northern Europe could face Below Normal conditions. Last, whatever the final forecast, **the probability for Above normal conditions is quite low** everywhere to the exception of regions close to the Caspian sea and the most Northern costal regions.
Obviously, some downscaled information could detail these scenarios for specific countries or sub-regions.

Tropical Cyclone activity

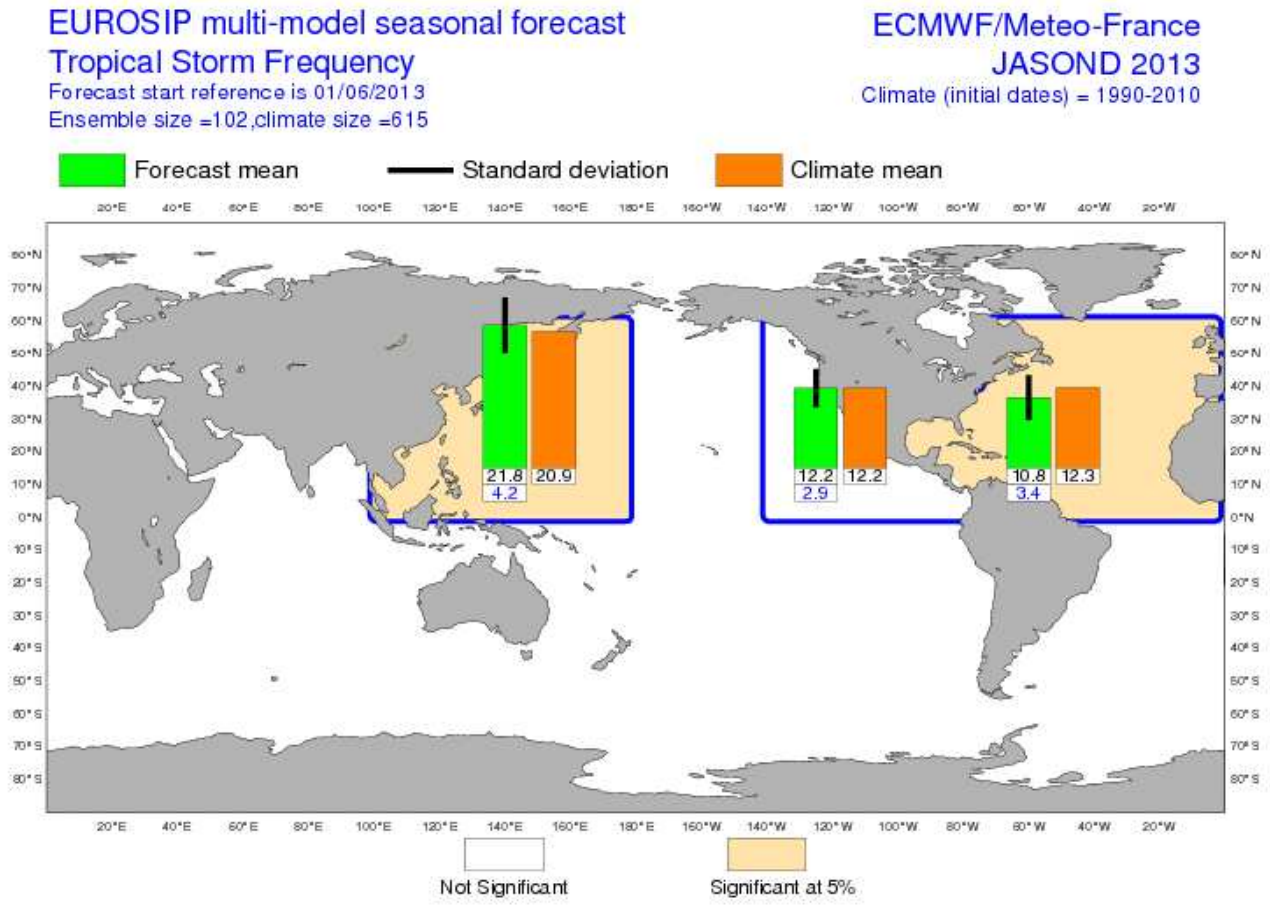


fig.42: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF) for the JASOND period, issued in June.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtrop/trop_euro/eurosip_tropical_storm_frequency/

For the Tropical Cyclone season and in relationship with the SSTs scenarios, Euro-Sip forecasts indicate an enhanced Topical Cyclone activity over the Western Pacific, close to normal condition over the Eastern Pacific and Below normal activity for the Tropical North Atlantic basin.

WMO RA VI
Pilot RCC-Network

Synthesis of Temperature forecasts for July-August-September 2013 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*	*below normal*	*no privileged scenario*	*no privileged scenario*	*no privileged scenario*

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

WMO RA VI
Pilot RCC-Network

Synthesis of Rainfall forecasts for July-August-September 2013 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

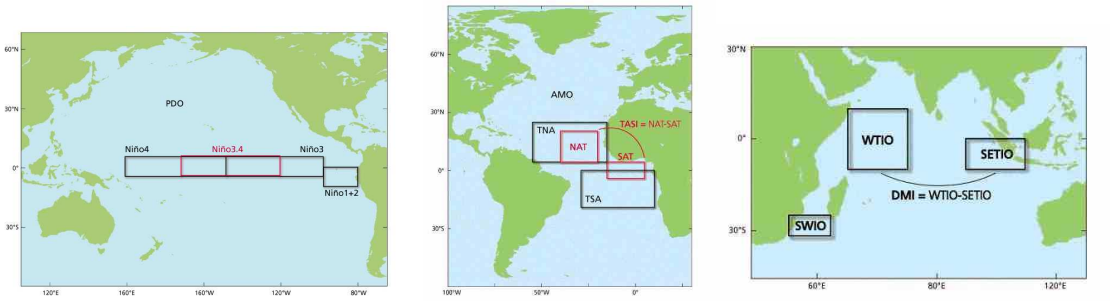
El Niño and La Niña events primarily affect tropical regions and are monitored by following the SST evolution in specific area of the equatorial Pacific.

- 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.