GLOBAL CLIMATE BULLETIN
n°157 - JULY 2012

Table of Contents

I. DESCRIPTION OF THE CLIMATE SYSTEM (MAY 2012)

I.1. OCEANIC ANALYSIS

I.1.a Global Analysis (fig.1)

In the Tropical Pacific : the SST warming now visible in most of the Eastern part of the equatorial wave guide while there is only some trace of negative anomalies close to the dateline. To be quoted the SST warming in the North-Western tropical part of the Pacific.

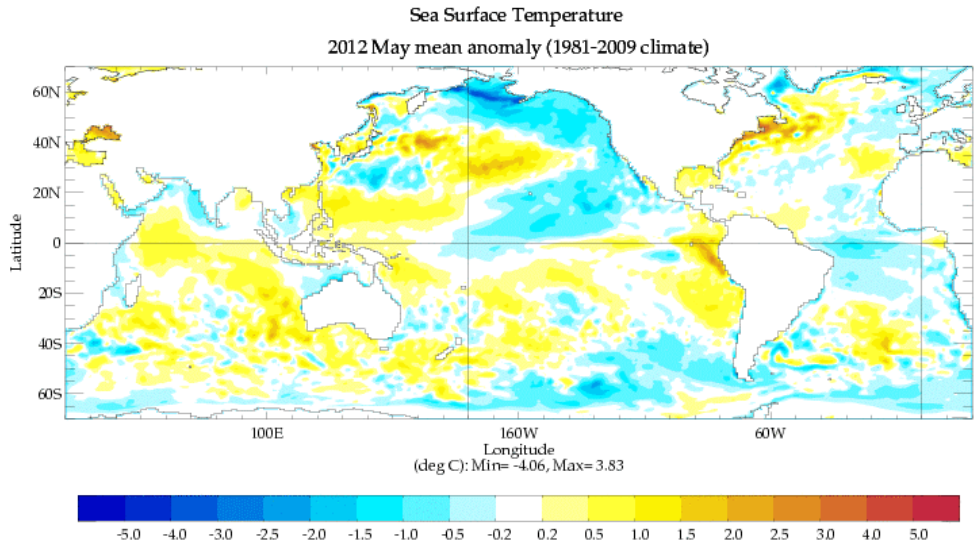


fig.1: **top : SSTs Anomalies in May 2012 (°C) (reference 1950-2008)**
bottom : SST tendency (current – previous month) **http://bcg.mercator-ocean.fr/**

For the Tropical Atlantic : warming of both the North and South Tropical Atlantic. However, the South Tropical Atlantic is colder than normal. With respect of the West African monsoon, the cold anomaly on the most eastern part of the North Tropical Atlantic is decreasing. In the equatorial waveguide, a positive anomaly appears in the most eastern part of the Guinean Gulf.
In the Indian Ocean : mostly warming North to 20°S (especially just South to the equatorial waveguide and in the North-Western part of the basin).
In subsurface (fig.2) :
In the equatorial Pacific waveguide, the heat content anomalies similar to SSTs and thermocline depth anomalies (see fig. 5). Note positive anomalies in the most Western and Eastern part and some trace of Eastward extension of the western anomaly, consistently with the vertical cross-section (see fig. 4).
In Tropical Atlantic : patterns quite fragmented and on average conditions not too far from normal.
In the Indian Ocean : heat content consistent with SST signal in the regions close to the equatorial waveguide.

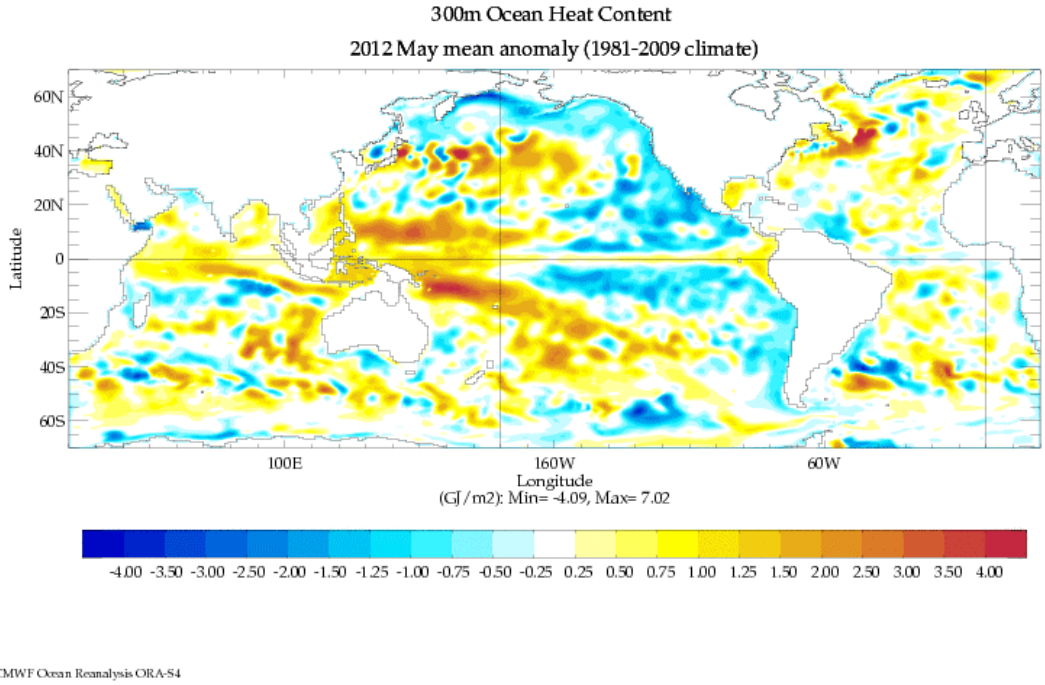


fig.2: map of Heat Content Anomalies (first 300m) in May 2012 (kJ/cm²). (reference 1950-2008)
http://bcg.mercator-ocean.fr/

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

The positive anomaly in the Eastern equatorial Pacific continue to develop. Close to the date line the negative anomaly vanishes. Over most of the equatorial part of the basin the negative zonal Trade Wind anomaly has disappeared consistently with the SOI (close to 0).

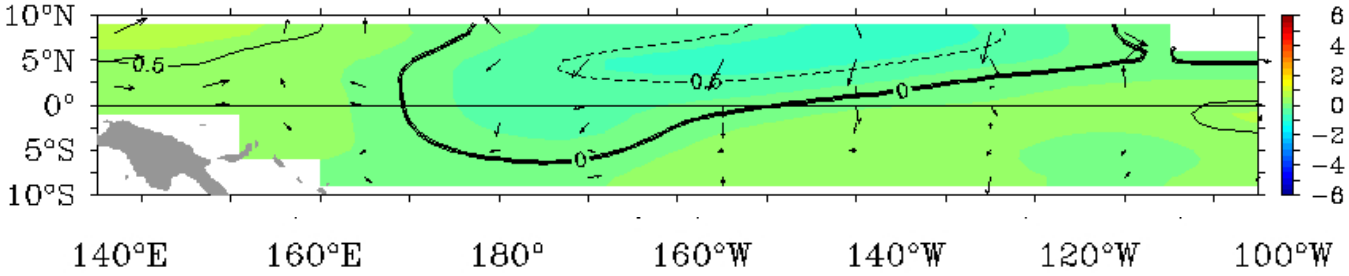


fig.3: SST Anomalies and Wind anomalies in May 2012 over the Equatorial Pacific from TAO/TRITON.
http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/monthly-summary.html

In the Niño boxes (4, 3.4, 3 et 1+2 ; see definition in Annex) the SST anomalies are now close to normal to the exception of the most Eastern part of the basin. The monthly averages in May are respectively -0,3°C, -0,1°C, 0,2°C and +1,2°C from West to East (Neutral phase and coastal event).

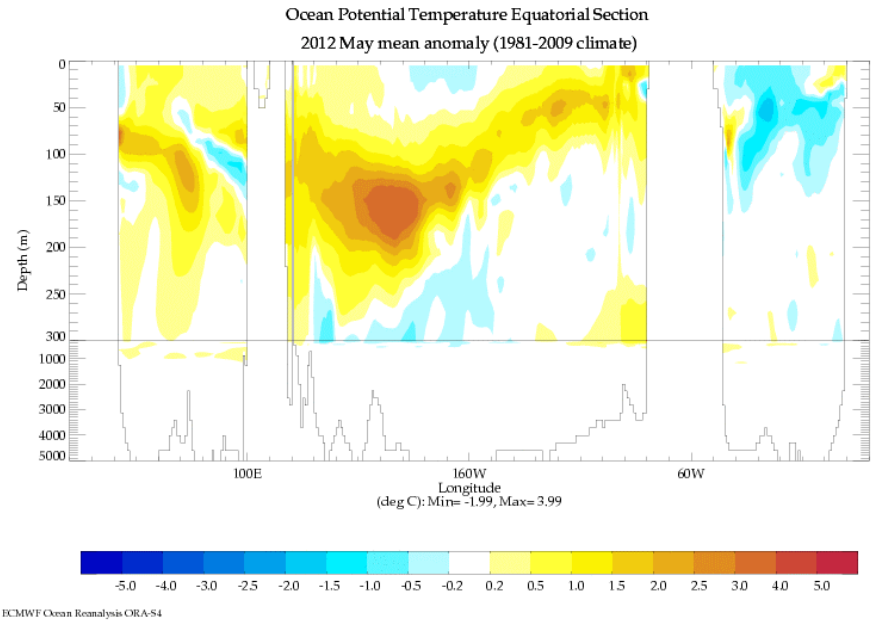


fig.4: Oceanic temperature anomaly in the first *500 metres* in the Equatorial Pacific, in May 2012 http://bcg.mercator-ocean.fr/

In the equatorial waveguide (fig. 4) : warming under the surface and Eastward propagation at the thermocline level. The last MJO forecast show little MJO activity for the next month, to the exception of the beginning of the present period close to West Africa.
The thermocline structure (fig. 5) : pattern quite complex with some positive depth anomalies on both West and East. Situation close to normal in the central part of the basin.

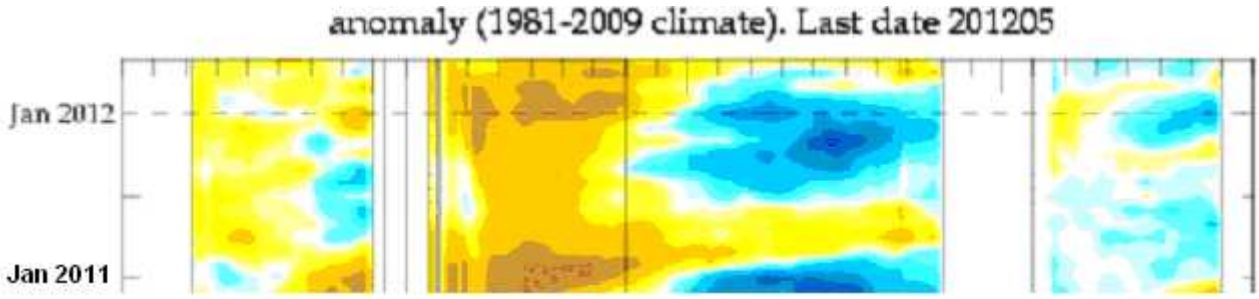


fig.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 6 month period. http://bcg.mercator-ocean.fr/

I.1.c Atlantic Basin

Northern Tropical Atlantic : little anomalies (respectively negative/positive in the Eastern/western part). The negative anomaly on the most eastern part is decreasing (in relationship with the West African Monsoon).
Equatorial waveguide : A dipole pattern (negative/positive respectively East/West) develops with a consistent signal in subsurface.
The Southern Tropical Atlantic : still negative anomaly but decreasing. Still a dipole pattern between Tropics and sub-tropics.

I.1.d Indian Basin

Southern Tropical Indian Ocean : warmer than normal (warming especially North-West to 20°S)
Equatorial waveguide : warmer than normal conditions on both Western and Eastern parts. The IOD is close a normal.

Northern Tropical Indian Ocean : warming in the Western part. Still some negative anomalies along the coast of Arabian Sea.

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) : some large scale patterns but quite a lot of sub-regional anomalies.
On the Pacific : Divergent circulation anomaly (upward anomaly motion) strong on the Western side (which extends northward and southward), noticeable on South Central and less intense over the Eastern (both equatorial and Southern). Sub-regional Convergent circulation anomalies (downward anomaly motion) on the North-Eastern (close to California) and North Central parts (close to Hawaï). Consistently with these patterns the SOI is close to 0.
On the Atlantic : Strong convergent circulation anomaly (downward anomaly motion) on Southern Atlantic. The cell close to South America is very consistent with SST evolution (negative anomaly). To be noticed the divergent circulation anomaly over West Africa (and Central Sahel). To be noticed the Dipole pattern on the Northern sub-tropics/mid-latitudes (positive/negative anomaly respectively on the Central-Western/Eastern sides)
On the Indian Ocean : quite strong positive anomaly (convergent circulation anomaly - upward anomaly motion) just South to the Indian continent and on the most Northern part of the Arabian Sea.

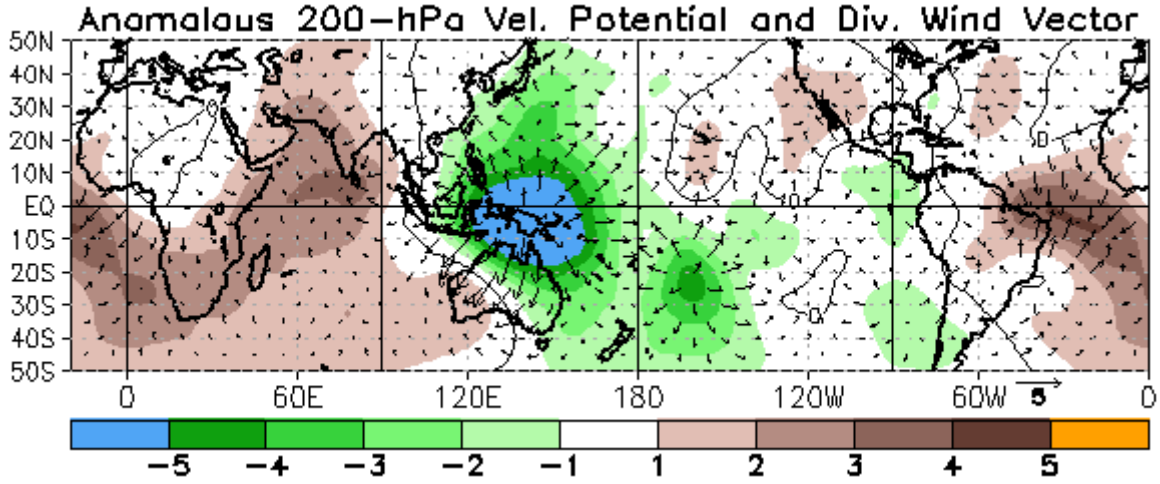


fig.6: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly for May 2012. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

Stream Function anomalies in the high troposphere (fig. 7 – insight into teleconnection patterns tropically forced) : weak signal in the Tropics likely related to a weak ocean/atmosphere coupling. Most of the signal seems to be related to the mid-latitudes/sub-tropics (especially over East Asia and North-West Africa and Europe).

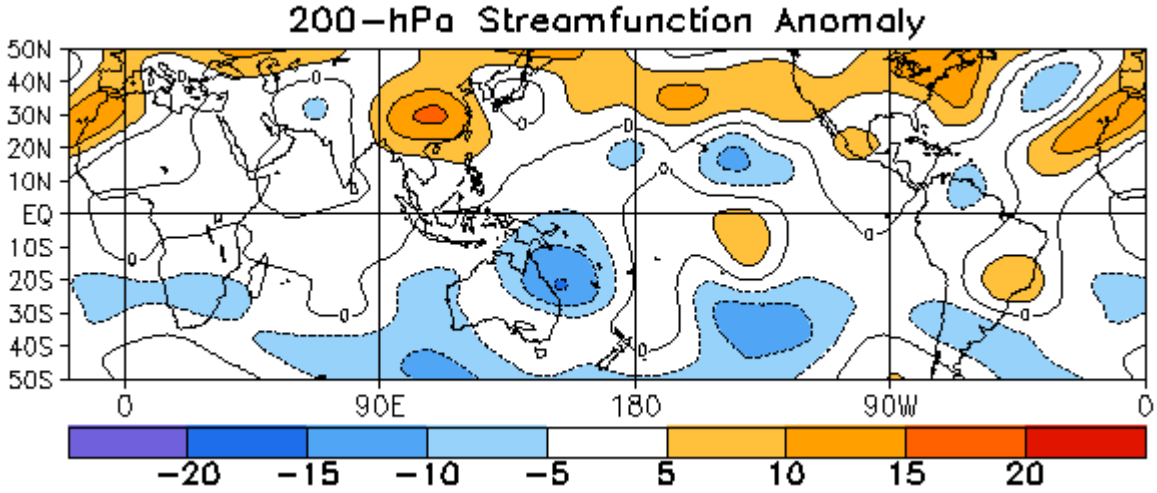


fig.7: Stream Function Anomalies at 200 hPa in May 2012.
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

Geopotential height at 500 hPa (fig. 8 – insight into mid-latitude general circulation) : In relationship with previous discussion, the main anomalies are mostly related to mid-latitude dynamic with sub-regional structure. Consequently the main active atmospheric modes in the Northern hemisphere (see next table) seems to be mostly related to mid-latitude dynamic (including WP mode strongly related to the strong positive anomaly over North-Eastern Asia).

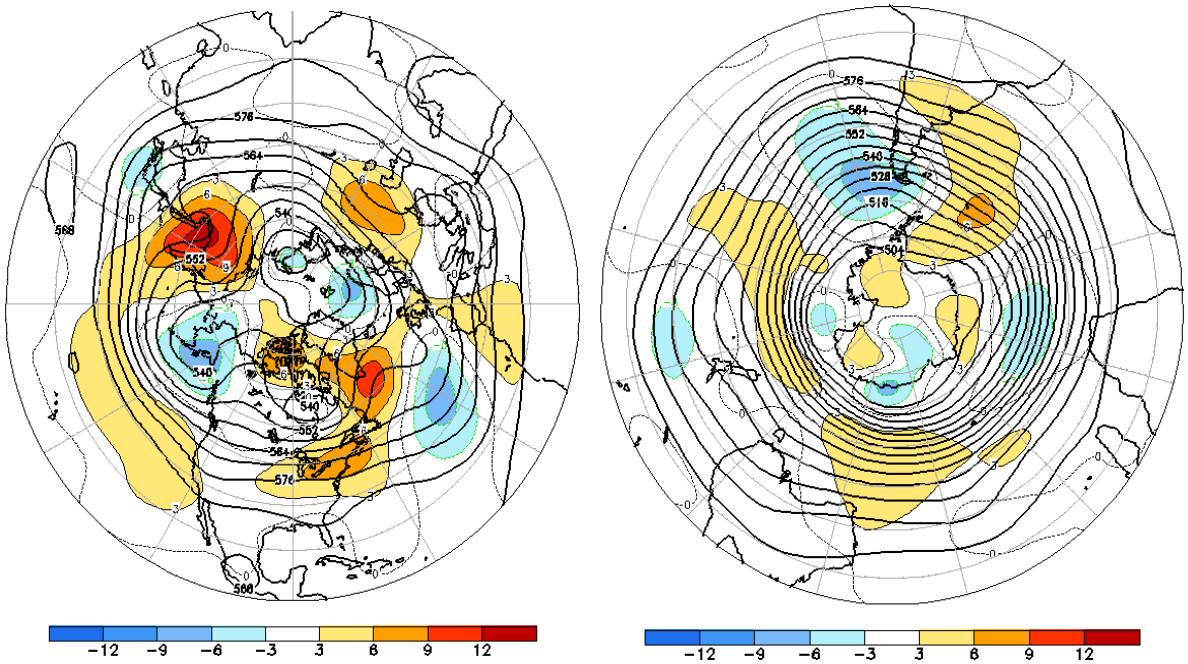


fig.8: Anomalies of Geopotential height at 500hPa in May 2012 (left North Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige9.shtml, and right South Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige15.shtml)

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

MONTH	NAO	EA	WP	EP-NP	PNA	TNH	EATL/WRUS	SCAND	POLEUR
MAY 12	-0.8	0.5	-1.7	-1.5	-0.3	---	-0.5	-0.6	-0.1
APRIL 12	0.4	-0.3	-0.3	0.3	-0.1	---	-1.6	-0.9	-1.0
MAR 12	0.9	-0.6	0.8	-2.6	-0.2	---	1.3	-0.5	-1.4
FEB 12	0.0	-1.7	1.0	-0.3	0.7	0.4	-0.6	0.3	0.2
JAN 12	0.9	-1.8	-1.6	-1.9	0.1	-0.2	-0.5	0.6	-2.3
DEC 11	2.2	0.1	-0.4	---	0.1	0.7	-0.5	0.5	0.7

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

I.2.b Precipitation

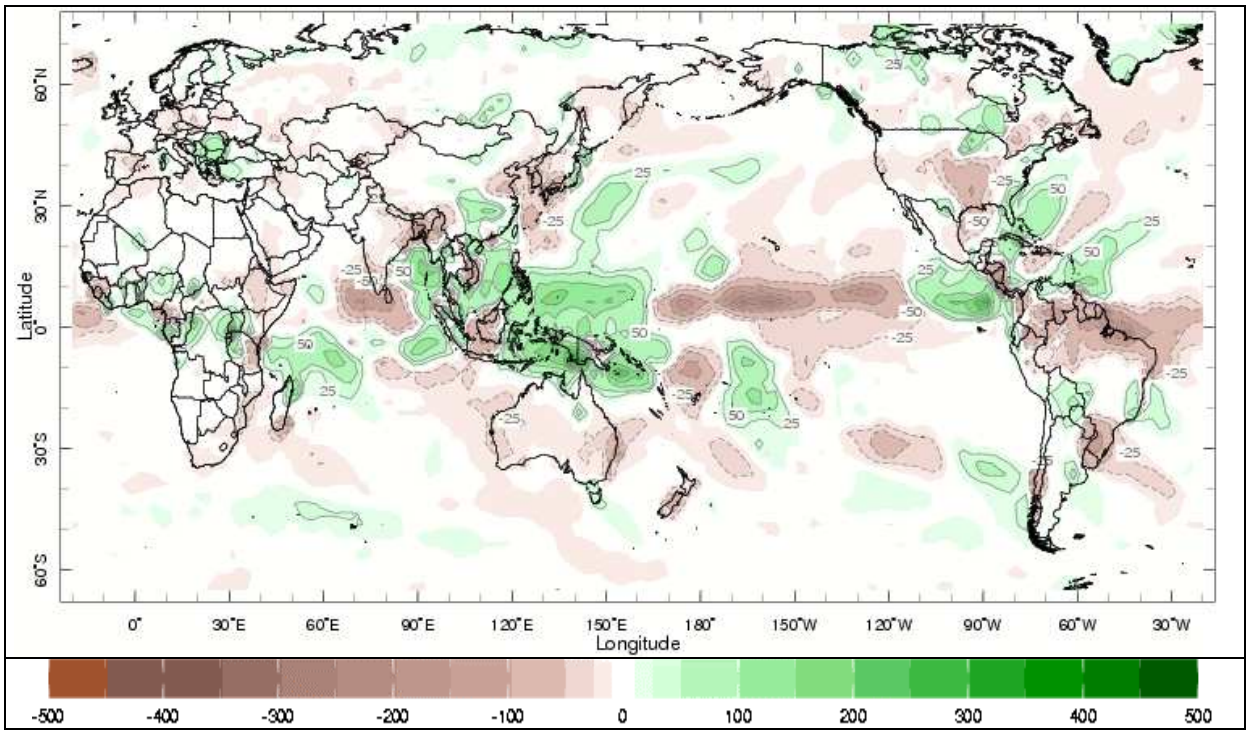


fig.9: Rainfall Anomalies (mm) in May 2012 (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.
http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/

Pacific : Good consistency with the Divergent/Convergent Circulation anomalies over the Western (strong positive anomaly), North Central (negative anomaly) and Eastern equatorial (positive anomaly) parts.
Atlantic : strong negative anomaly over equatorial ocean and North Eastern South America, a tripole structure over the Caribbean (consistent with velocity potential anomaly field and sub regional patterns) and positive anomalies in The Guinean Gulf and the south part of Central and Eastern Sahel.
Indian Ocean : strong negative anomaly over Sri-Lanka and neighbouring regions. The positive anomalies over South-West and North-East regions are more related to sub-regional patterns.
In Europe : negative anomalies over Spain related the Geopotential anomalies and positive anomalies over the South-East regions.

I.2.cTemperature

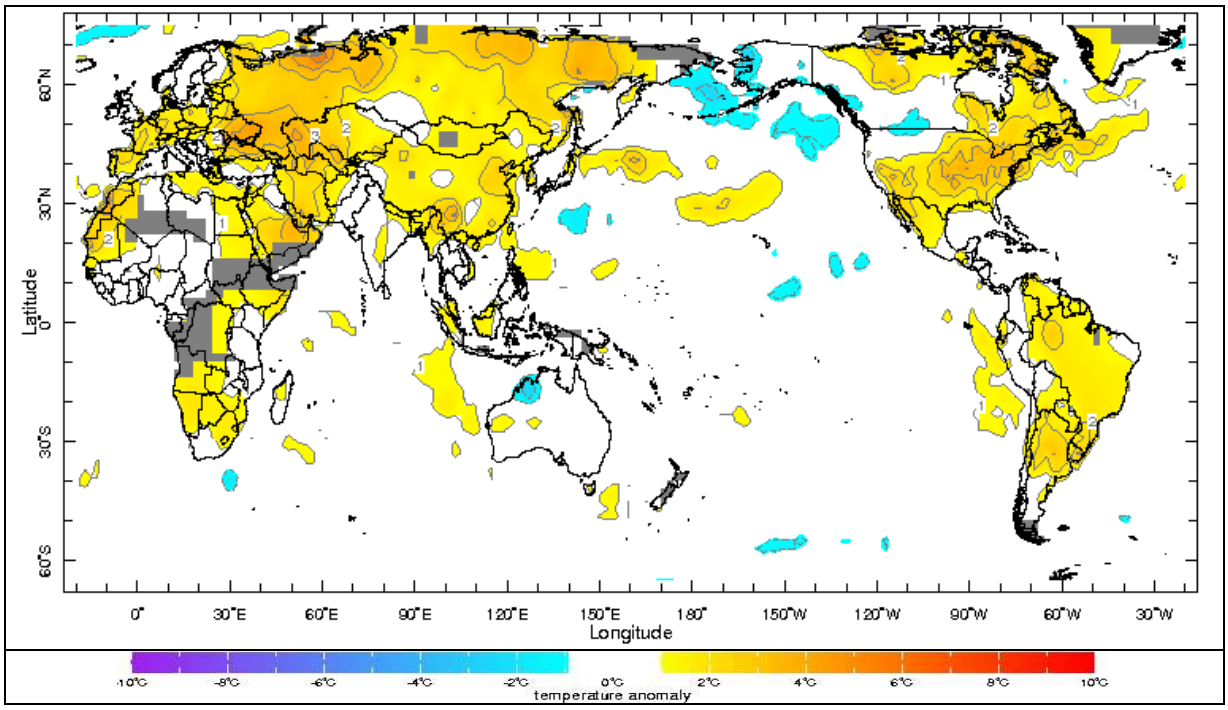


fig.10: Temperature Anomalies (°C) in May 2012 (departure to the 1979-2000 normal) http://iridl.ldeo.columbia.edu/maproom/.Global/.Atm_Temp/Anomaly.html

North-America : Warmer than normal conditions over all the Eastern part of the continent which extend up to California and Mexico.
South-America : Warmer than normal conditions over most of the continent.
Australia : Close to normal conditions
Asia : Warmer than normal conditions everywhere excepted over India (Close to normal).
Africa : Warmer than normal conditions excepted over the central part of West Africa and regions close to the Guinean Gulf (close to normal).
Europe : mostly Above normal conditions everywhere excepted over Scandinavian regions.
This signal is likely at least partly related to the climate change.

I.2.d Sea Ice

In Arctic (fig. 11 - left) : dramatic decrease of the sea-ice extension anomaly (now close to 2007 value) with some regional modulation in the Barents Sea (large deficit) and in the Bering Sea (some excess).
In Antarctic (fig. 11 - right) : close to normal sea-ice extension anomaly with some regional modulation.

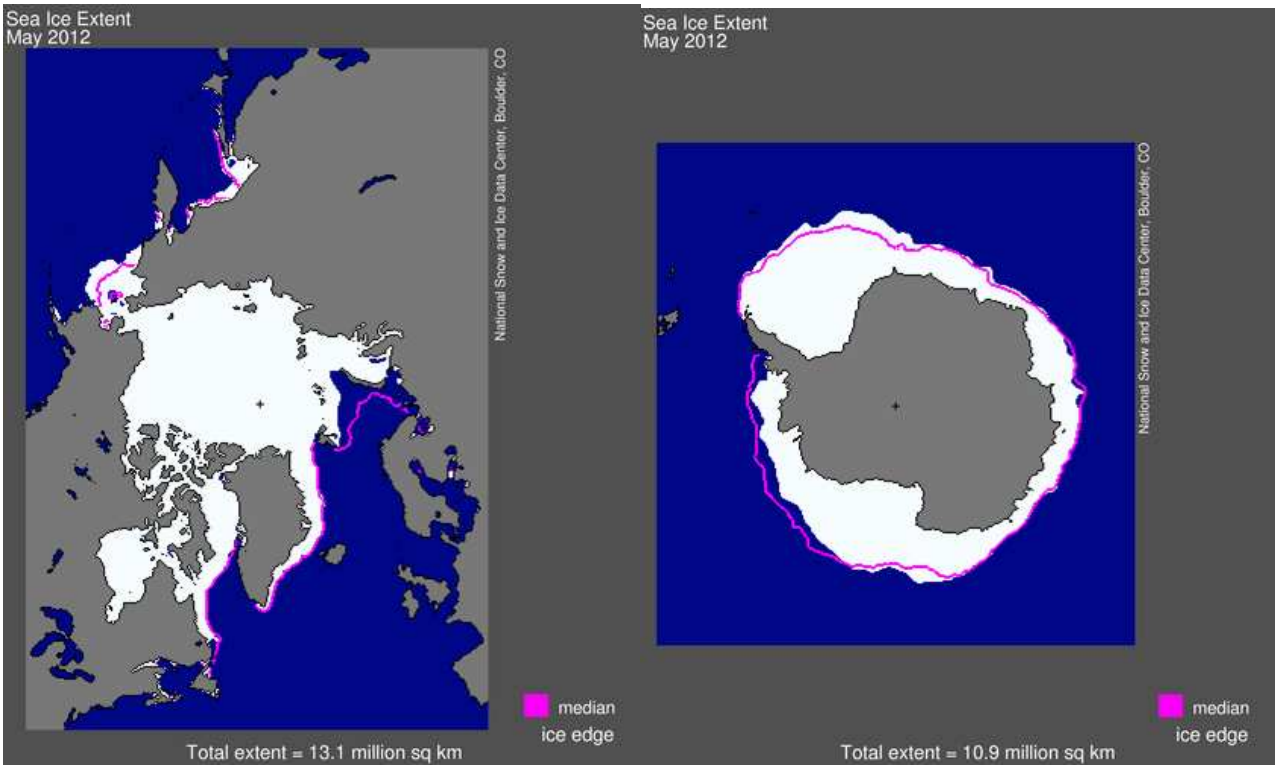


fig.11: Sea-Ice extension in Arctic (left), and in Antarctic (right) in May 2012. The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

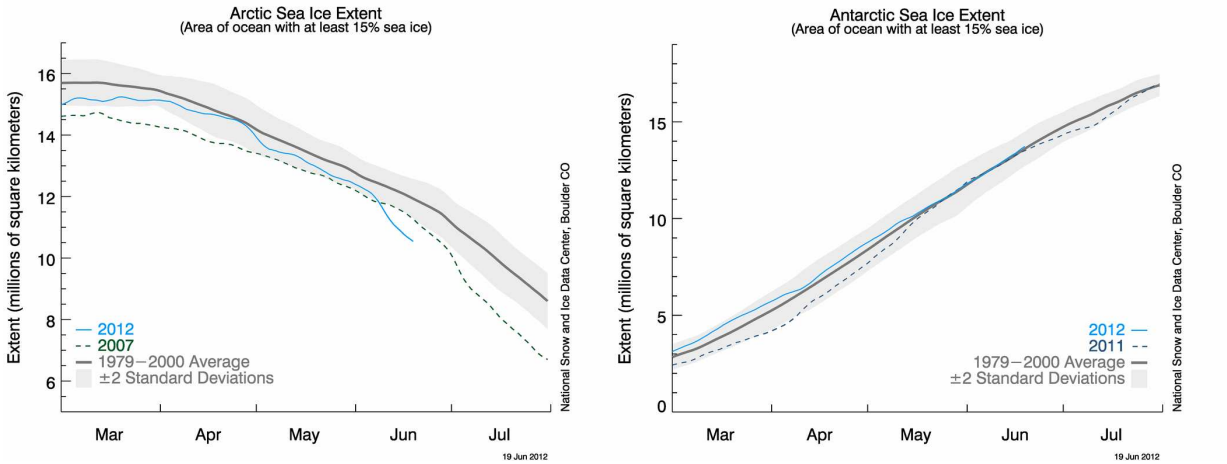


fig. 9bis : Sea-Ice extension evolution from NSIDC
http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png

II.SEASONAL FORECASTS FOR JAS FROM DYNAMICAL MODELS

II.1. OCEANIC FORECASTS

II.1.a Sea Surface Température (SST)

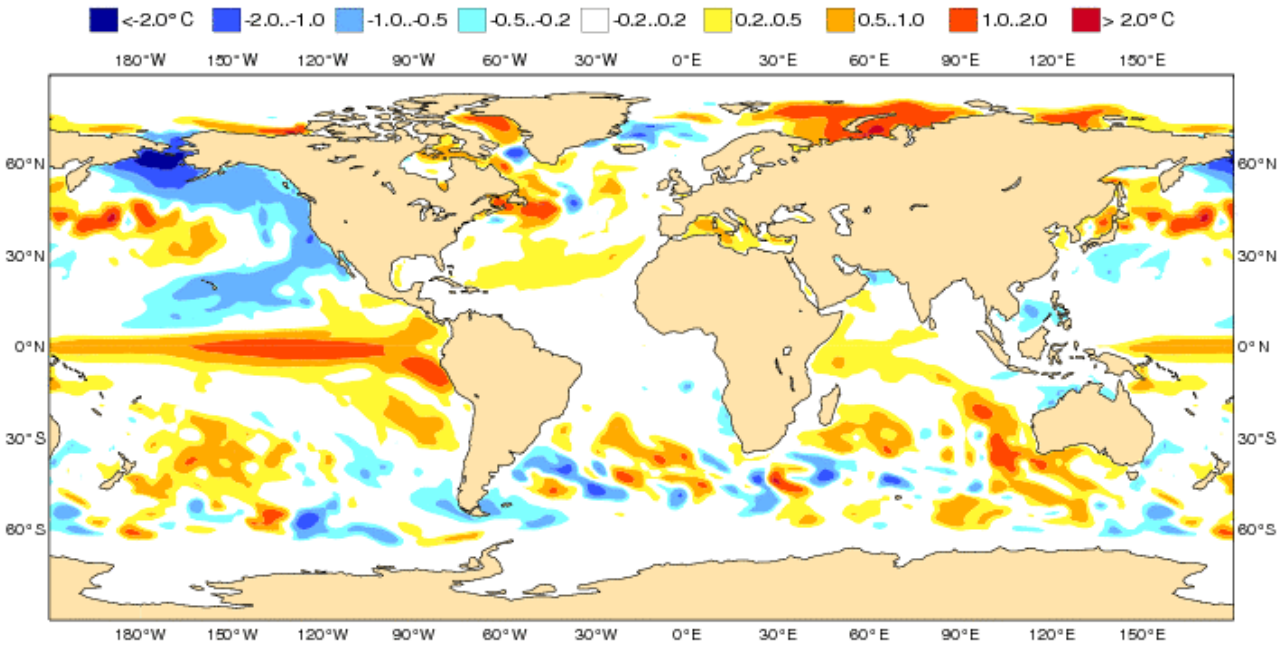


fig.12: SST anomaly forecast (in °C) from ECMWF for July-August -September, issued in June.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

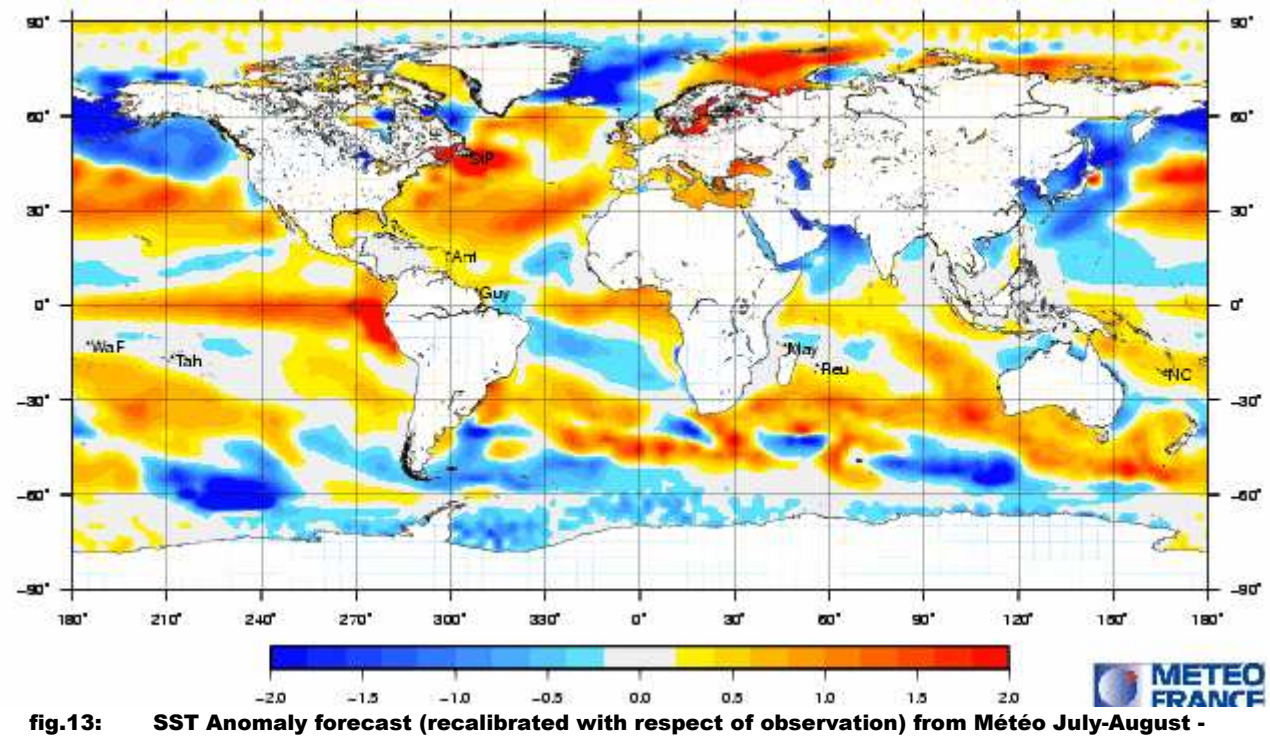


fig.13: SST Anomaly forecast (recalibrated with respect of observation) from Météo July-August - September, issued in June. http://elaboration.seasonal.meteo.fr/

For the 2 individual models :

At large scale very consistent over most of the Tropics despite some sub-regional differences.
Pacific : along the equator warmer than normal conditions ; warmer than normal conditions at the sub-tropical latitudes (both South and North) to the exception of the Western side. In the North Tropical area, colder than normal conditions. Some difference over the SPCZ region (warmer than normal in MF and close to Normal in ECMWF). Then there is large differences over the North West and North East areas.
Atlantic : Warmer than normal scenario in the North-West Tropics. Close to normal in the equatorial waveguide for ECMWF and warmer than normal for MF. Colder/warmer than normal in South Tropics/South sub-Tropics for MF and close to normal/warmer than normal for ECMWF and the same regions.
Indian Ocean : warmer than normal in the South sub-tropics and close the equatorial waveguide. Colder than normal in the Arabian Sea for MF ; the same anomaly being visible only in coastal regions in ECMWF.
There is more differences in the mid-latitudes ; they likely can be related to model uncertainty and resolution.

In Euro-SIP :
Patterns very similar to one already presented on individual models in relationship with the consistency of forecasts of individual models at large scales.
Equatorial waveguide : warmer than normal conditions everywhere.
Atlantic : Close to Normal conditions in the Tropics.
Indian Ocean : mostly warmer than normal conditions in the Southern part of the basin (especially close to West Australia) and the sub-tropics.

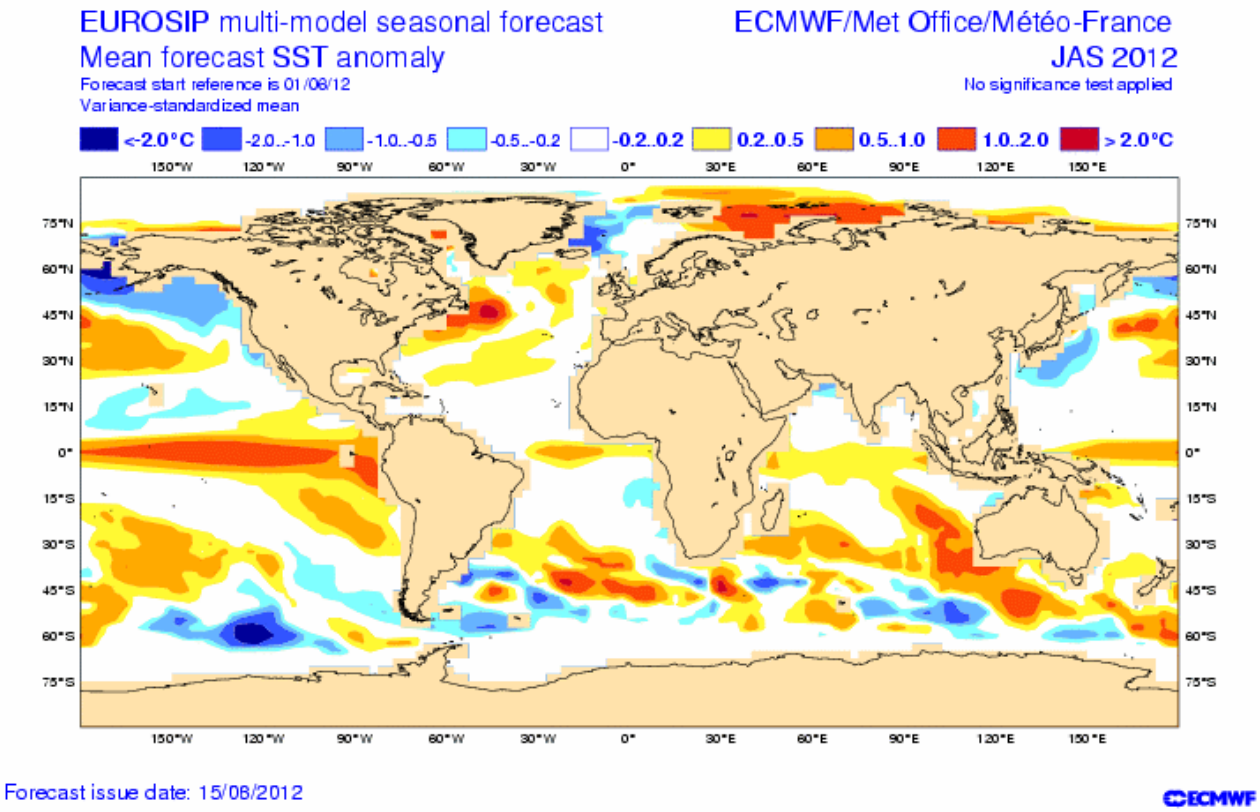


fig.14: SST Forecasted anomaly (in °C) from Euro-SIP valid for July-August-September, issued in June.

II.1.b ENSO Forecast :

Forecasted Phase for JAS : weak El Niño

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

For July-August-September : most of dynamical models give above normal conditions (just above El Niño threshold). Continuation of the warming along summer or fall period. For the statistical models, they are forecasting close to neutral conditions, which seems to be not surprising as in term of historical data such an evolution is quite rare. However, the question of the development of an El Niño event for the end of this year becomes really relevant.

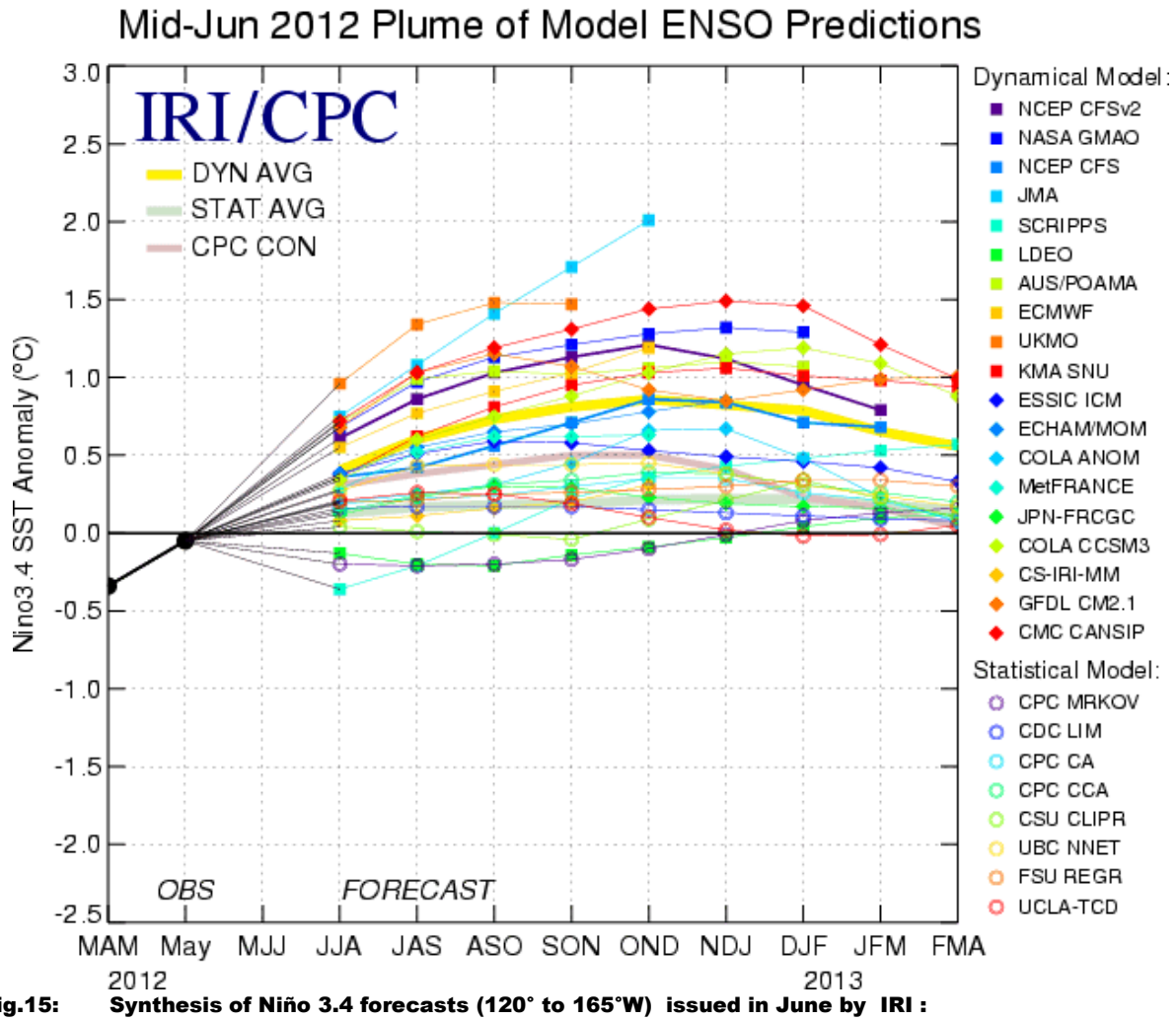


fig.15: Synthesis of Niño 3.4 forecasts (120° to 165°W) issued in June by IRI : http://iri.columbia.edu/climate/ENSO/currentinfo/SST_table.html

In the following table (from IRI) : current SST thresholds to decide the nature of forecasted event for the Niño3.4 box (« El Niño », « La Niña » or « Neutral ». These values depend on the season and a situation is considered as « Neutral » if the forecast is within theses critical values. The 3 last lines give the 3-month mean of the different categories of models. The Dynamical model average reflects the weak El Niño conditions while the statistical model average stay within neutral conditions.

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

Plumes from Météo-France and ECMWF for the 3 Niño boxes (see definition in Annex – fig. 16) :
In both models a warming up to El Niño threshold during summer period (a bit earlier in MF) and mostly a continuation of this warming along the 7 months of the forecast. Spread very large in ECMWF and quite normal in MF.

NIÑO 4 NIÑO 3.4 NIÑO 3

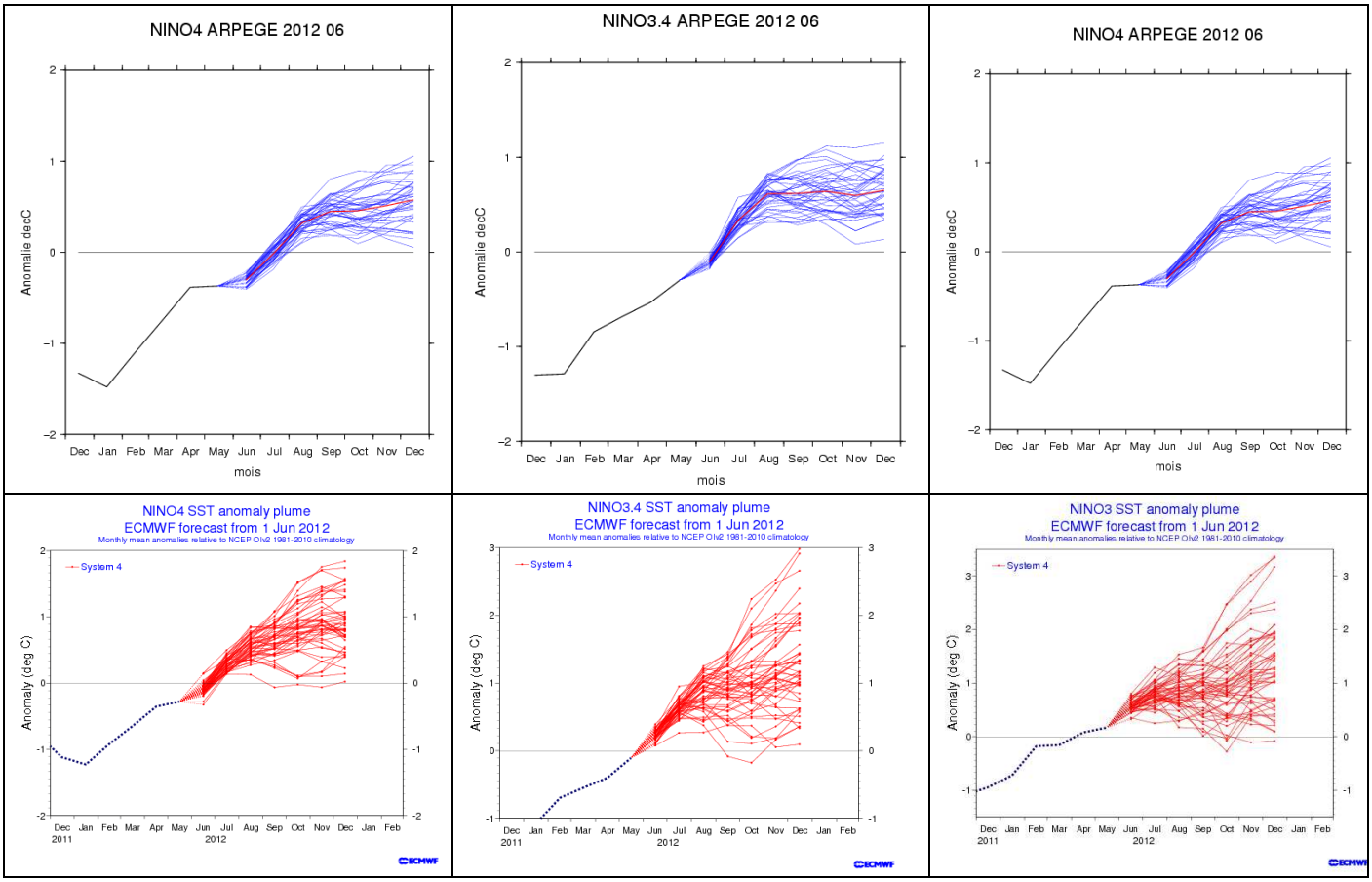


fig.16: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (bottom) issued in June, monthly mean for individual membres. (http://www.ecmwf.int/)

II.1.c Atlantic Ocean forecasts :

Forecasted Phase: ***Close to normal in the North/South Tropical parts***

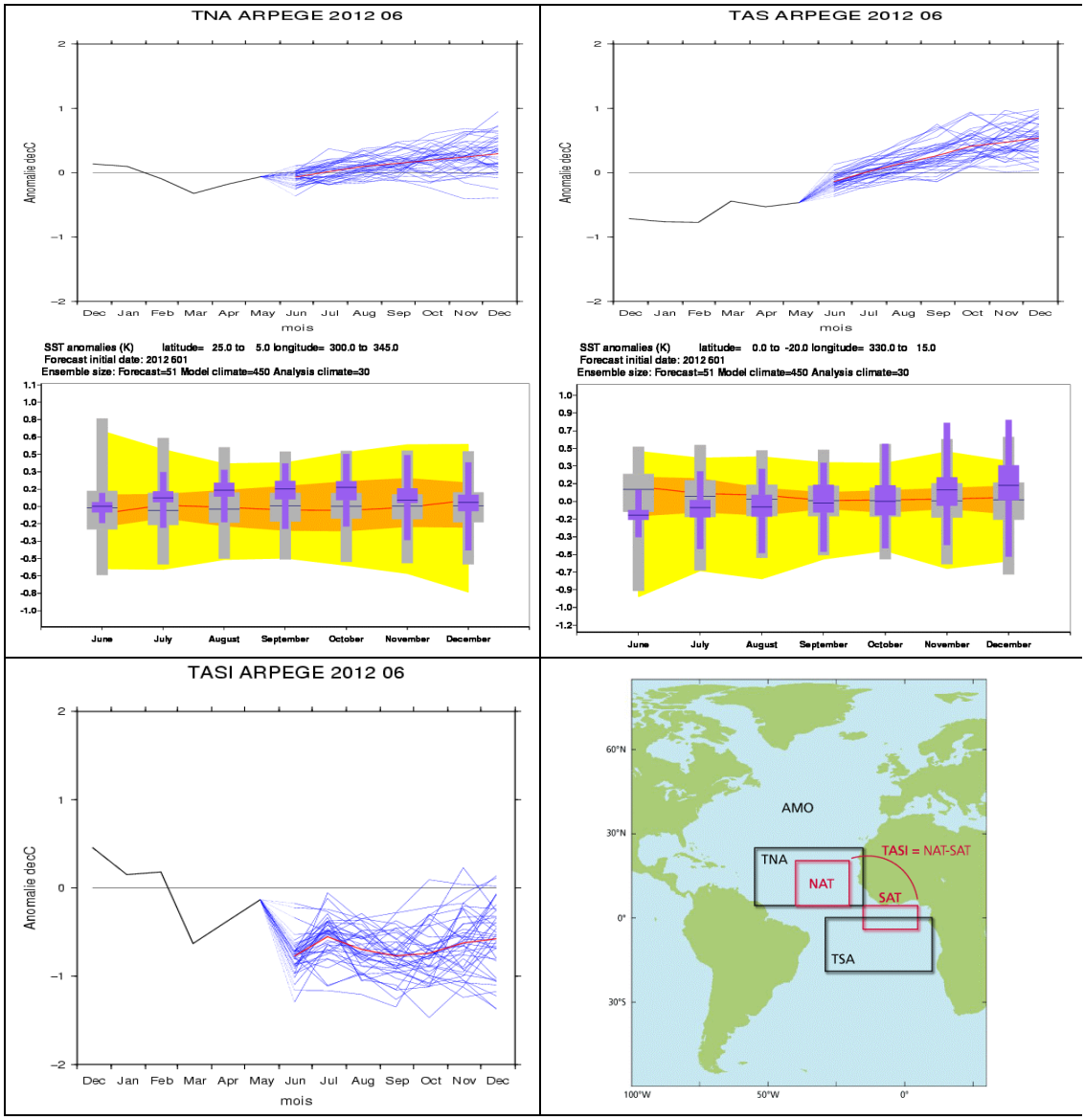


fig.17: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, issued in June, plumes / climagrams correspond to 41 / 51 members and monthly means.

North Tropical Atlantic : in both models close to normal conditions with a slight but continuous warming.
South Tropical Atlantic : in both models same time tendency starting with slightly cold conditions and a continuous warming leading to close to normal conditions.
TASI : the TASI index is negative (likely related to the MF warm bias). But, looking to ECMWF, remark very similar behaviour of TNA and TSA (with a more rapid warming in TSA). So TASI should stay close to neutral.

II.1.d Indian Ocean forecasts :

Forecasted Phase: ***Close to normal then warming in the West/East equatorial part***

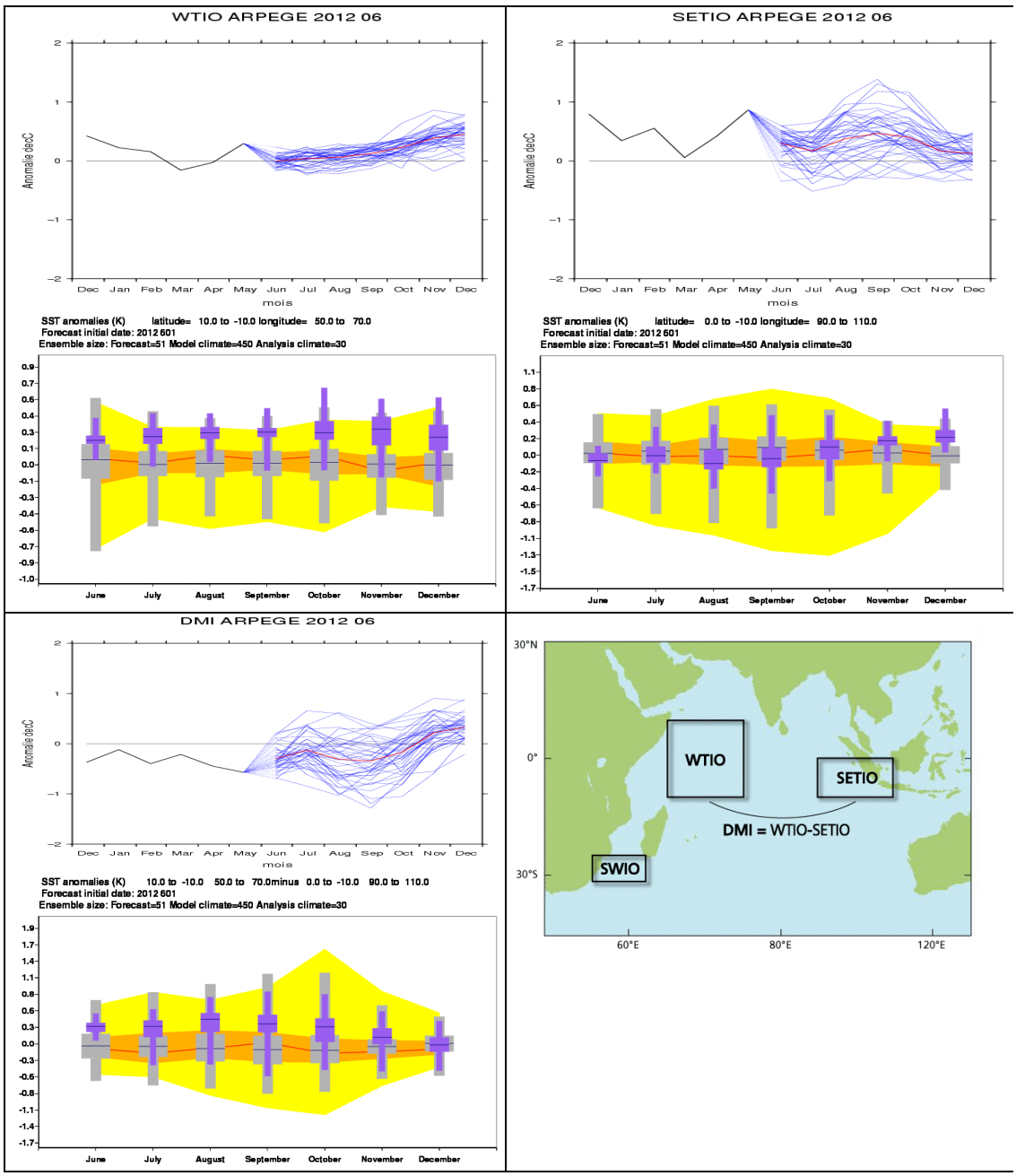


fig.18: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, issued in June, plumes / climagrams correspond to 41 / 51 members and monthly means.

In WTIO : MF start close to normal and indicates a warming along the period. ECMWF is warmer than normal and quite stable along the period.
In SETIO : Close to normal in ECMWF and warmer than normal in MF. More spread in SETIO than in WTIO.
DMI : positive phase in ECMWF and negative in MF (large spread in MF and less spread in ECMWF).

II.2. GENERAL CIRCULATION FORECAST

II.2.a Global Forecast

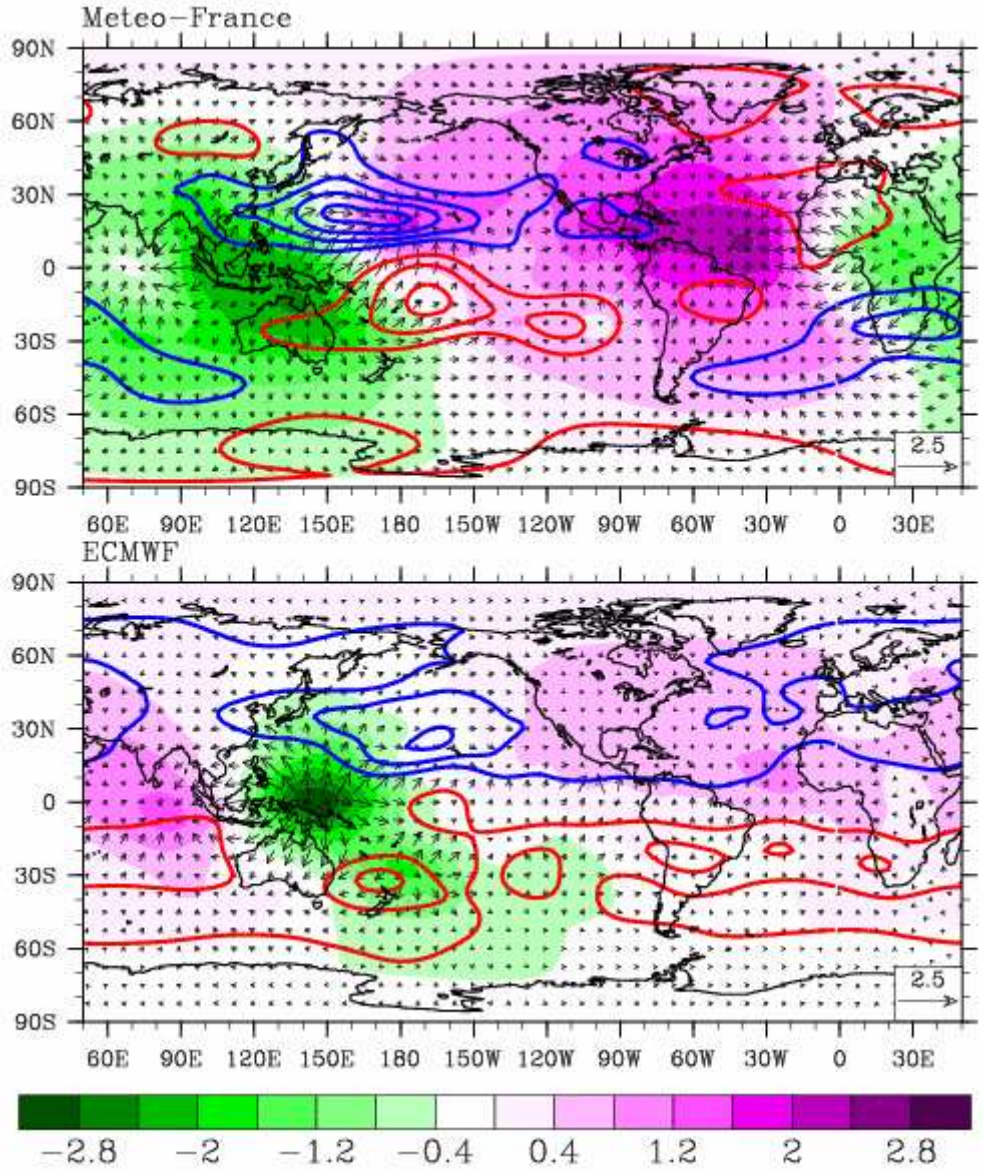


fig.19: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), asociated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa for July-August -September, issued in June by Météo-France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

Velocity potential anomaly field (cf. fig. 19 – insight into Hadley-Walker circulation anomalies) :
in the Tropics a 1 wave number pattern in both models (ECMWF and Meteo-France) and a stronger atmospheric response in MF vs ECMWF. Velocity Potential anomalies not fully consistent with an El Niño development (likely in relationship with the weak ocean/atmosphere coupling).
Over the Pacific : strong atmospheric response with a divergence anomaly (upward motion) over the West Pacific more intense but less expanded in ECMWF. In MF clear northward extension over South-East Asia and in both models southward extension toward New-Zealand. Convergent circulation anomaly (downward motion) close to Central America and West to Hawaï.
Over Indian Ocean : convergent circulation anomaly (downward motion) just South to India (westward shifted in MF vs ECMWF).

Over Atlantic : convergent circulation anomaly (downward motion) over the North Tropical Atlantic (close to coast of West Africa in ECMWF and westward shifted in MF). To be quoted the strong divergence anomaly (upward motion) over East Africa in MF (same but very weak signal in ECMWF).
Stream Function anomaly field (cf. fig. 19 – insight into teleconnection patterns tropically forced) :
In both models weak atmospheric response (to the exception of West Pacific) and signal mostly trapped within the Tropics.
These differences could likely be related to model uncertainty and especially to differences in the sensitivity to oceanic forcing. In conclusion the predictability is difficult to assess.

II.2.b North hemisphere forecast and Europe

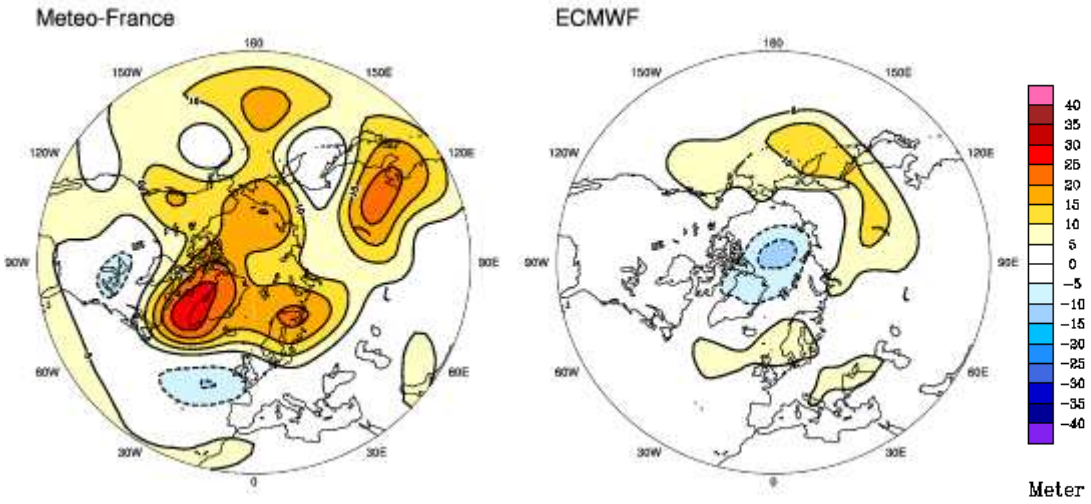


fig.20: Anomalies of Geopotential Height at 500 hPa for July-August -September, issued in June from Météo-France (left) and ECMWF (right).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip

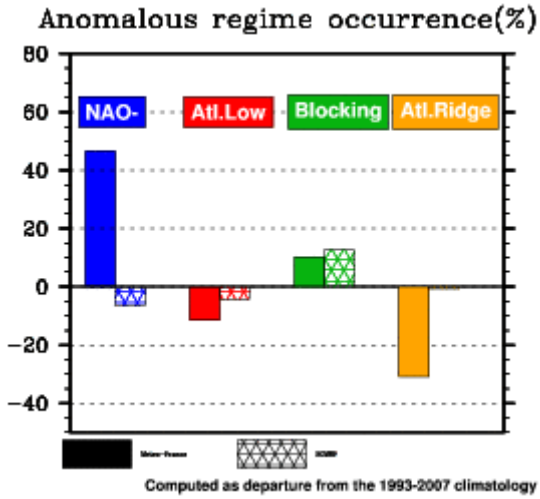


fig.21: North Atlantic Regime occurrence anomalies from Météo-France and ECMWF : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.

Geopotential height anomalies (fig. 20 – insight into mid-latitude general circulation anomalies) : very different atmospheric response in both models. In ECMWF a few anomalies (related to the weakness of the atmospheric response (see Stream function). In MF strong negative phase of the AO (positive and weak in ECMWF).
North Atlantic Circulation Regimes (fig. 21) : weak signal in ECMWF (slight increase of blocking regime

occurrence). In MF strong increase of NAO – (consistently with AO signal) and strong decrease of Atlantic Ridge. Some possible interaction Tropics/Mid-latitude over the Western façade of Europe.
General atmospheric circulation in MF in the low troposphere (see fig. 22) : consistent with NAO – circulation regimes. Should infer more South-West circulation over the western façade of Europe.

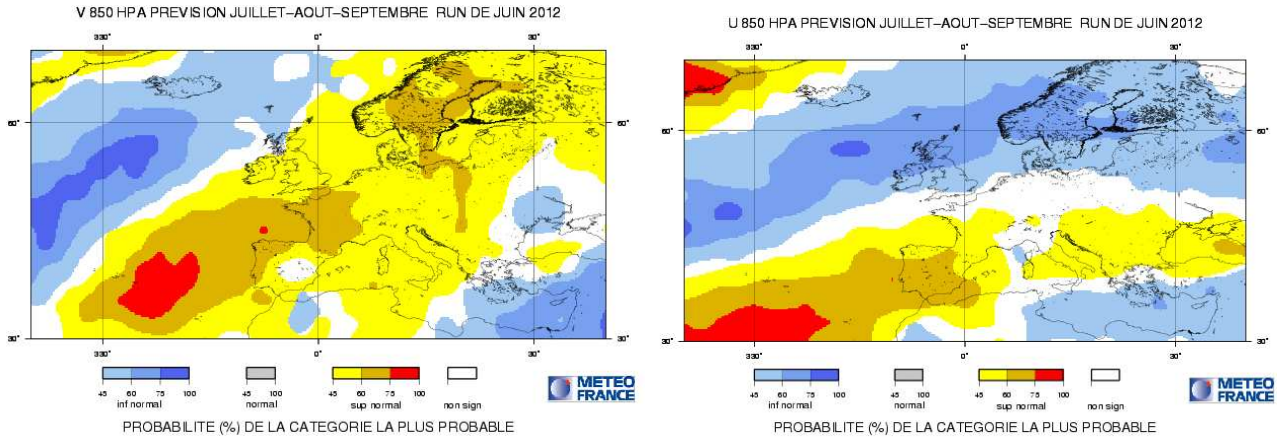


fig.22: Most likely category for the meridional (left) and zonal (right) wind at 850 hPa for July-August-September, issued in June from Météo-France.

II.3. IMPACT : TEMPERATURE FORECASTS

II.3.a ECMWF

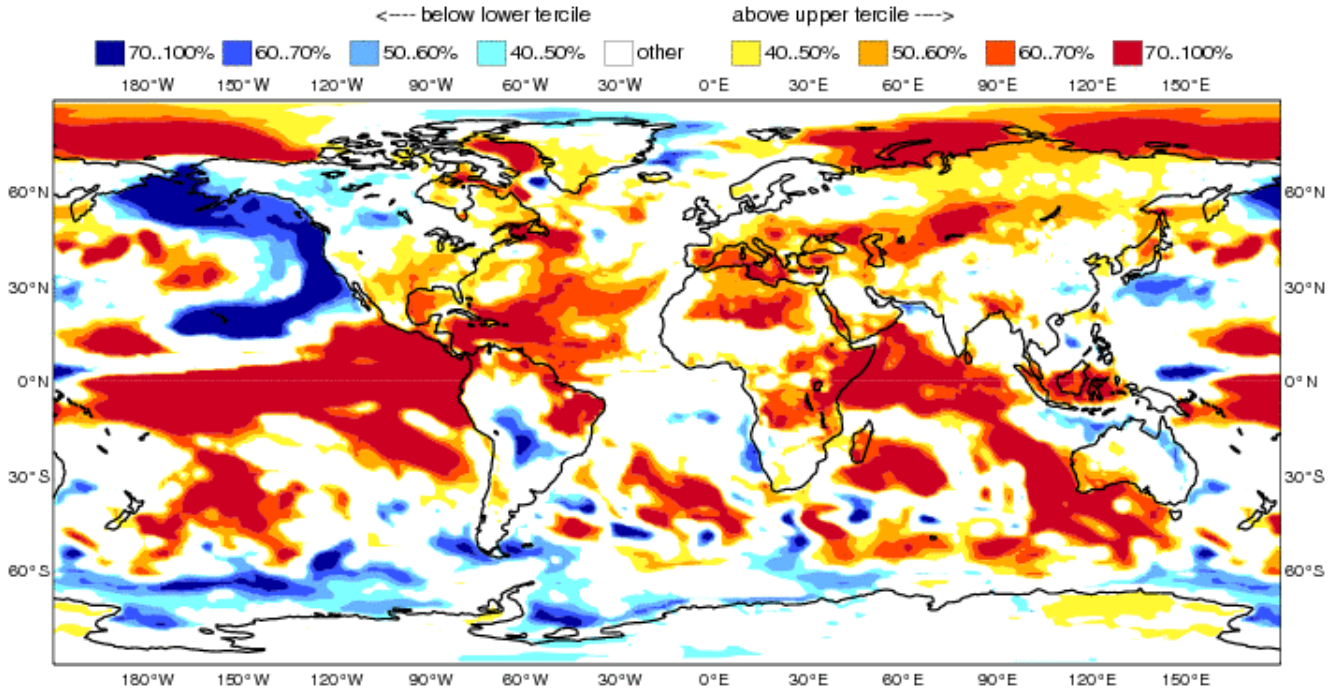


fig.23: Most likely category probability of T2m from ECMWF for July-August-September, issued in June. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

II.3.b Météo-France

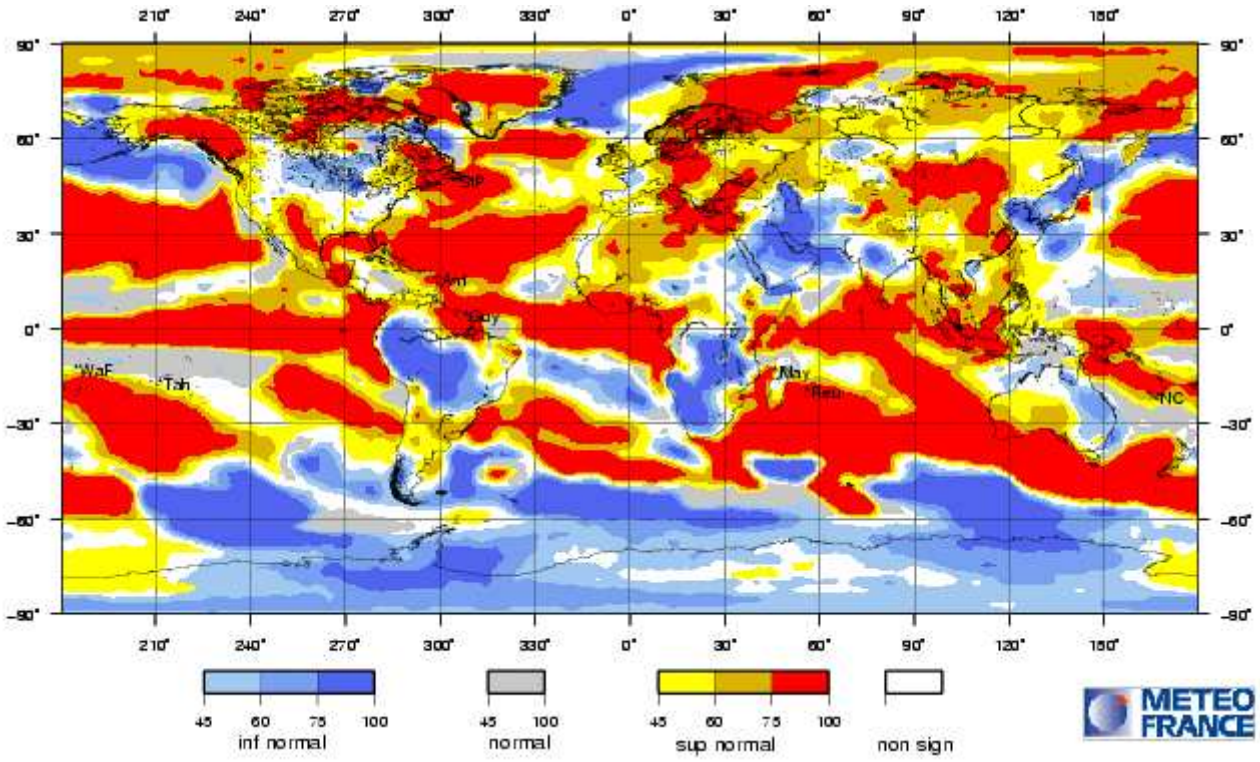


fig.24: Most likely category of T2m for July-August-September, issued in June. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.3.c Met Office (UKMO)

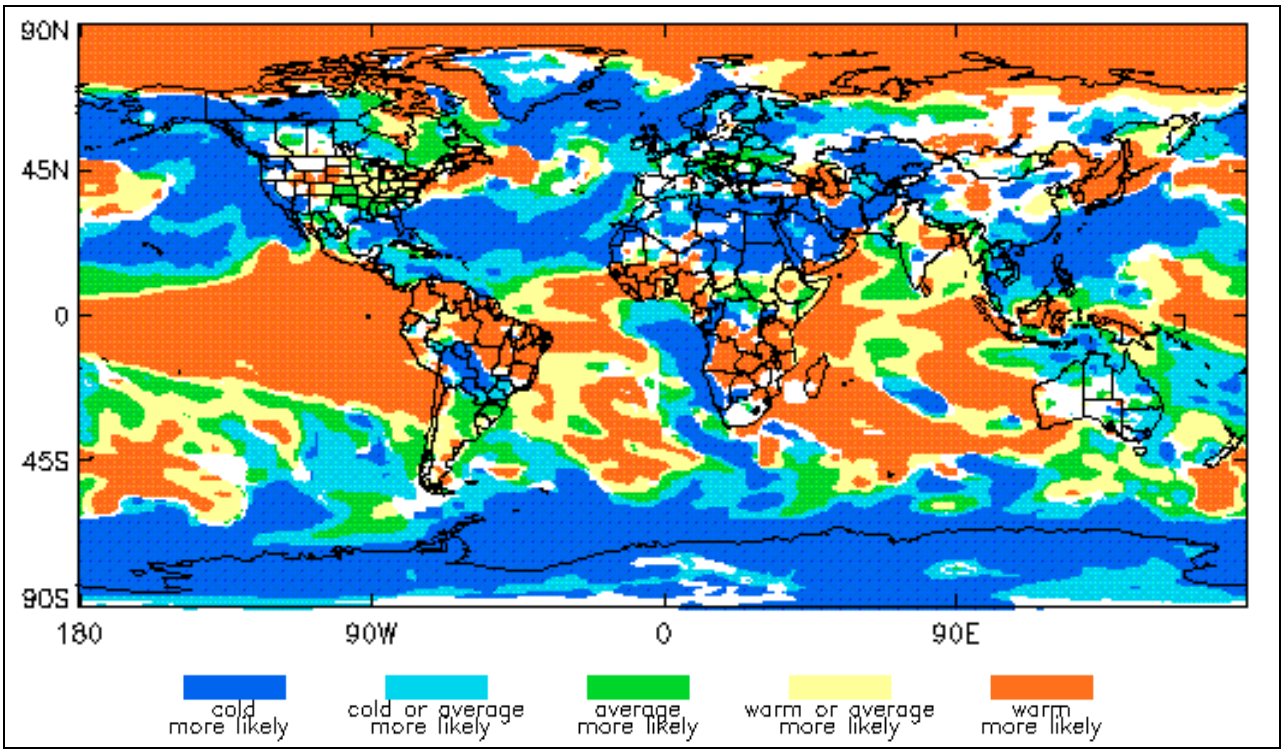


fig.25: Most likely category of T2m for July-August-September, issued in June from UK Met Office. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://www.metoffice.gov.uk/

II.3.d Japan Meteorological Agency (JMA)

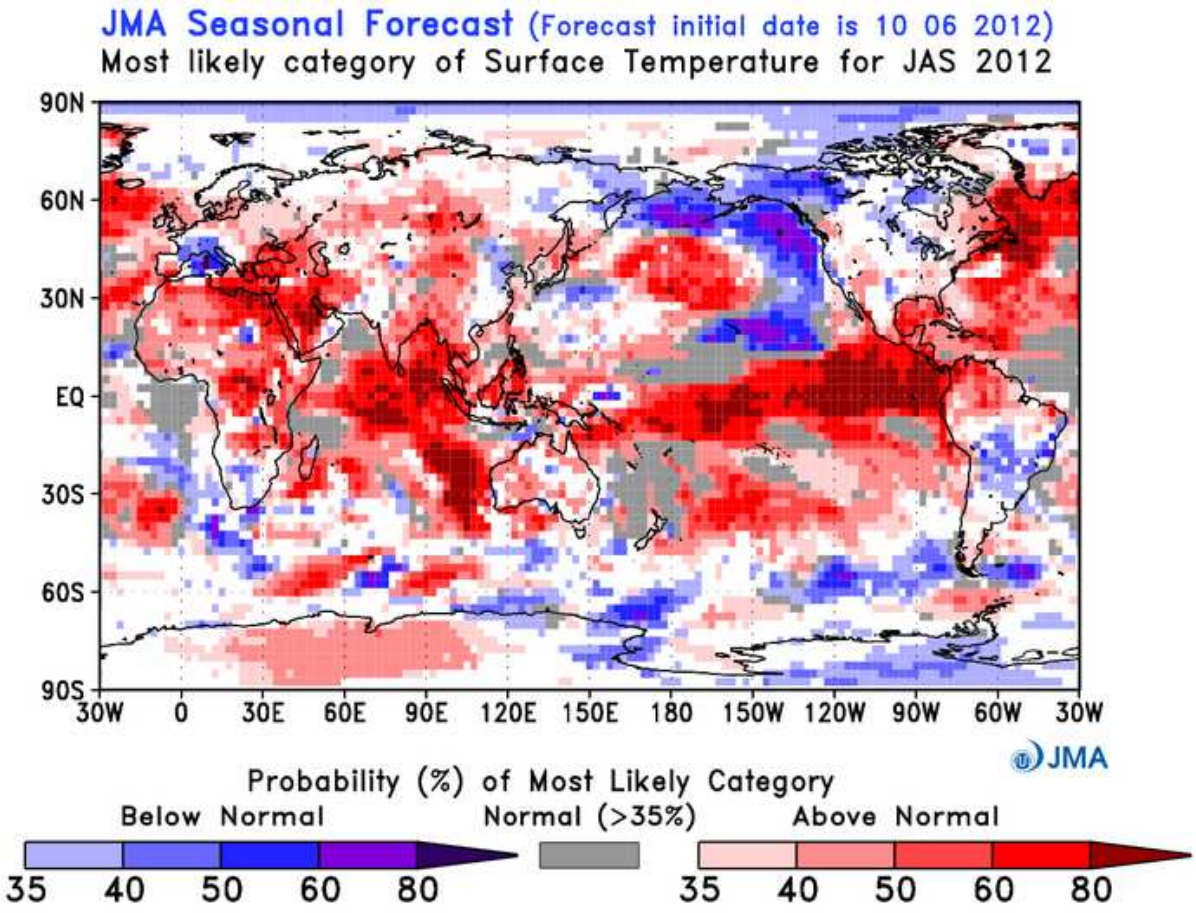


fig.26: Most likely category of T2m for July-August-September, issued in June from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.

http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.html

II.3.e Euro-SIP

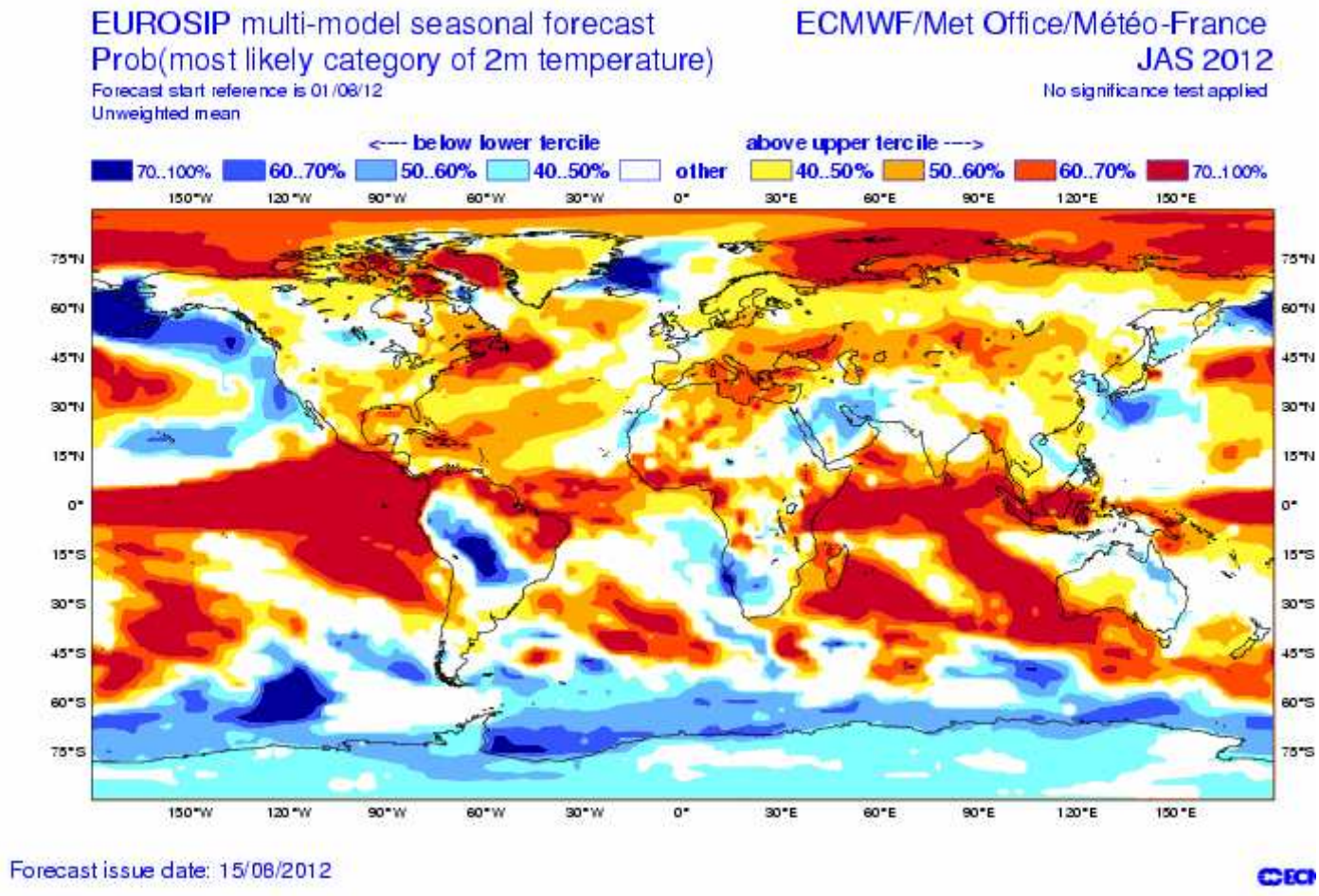


fig.27: Multi-Model Probabilistic forecasts for T2m from EuroSip for July-August-September, issued in June. (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).

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

North-America : Warmer than normal conditions over all the Eastern part of the continent with extension up to California and Central America.
South-America : Warmer than normal conditions over Northern part of the continent and western coastal. Area. Colder than normal scenario just East of Cordillera of the Andes (Perou, Bolivia, Brazil).
Australia : Warmer than normal on the South-West and Close to normal elsewhere.
Asia : Warmer than normal conditions should prevail above 30°N. Close to normal over India and Below normal on the Arabic Peninsula.
Africa : Warmer than normal conditions for regions close to the Mediterranean basin, regions close to the Guinean Gulf and over East Africa. Below normal conditions over regions close to Namibia.
Europe : mostly Above normal conditions everywhere excepted over France and Benelux. Strong signal over Mediterranean regions and central Europe.
Also to be quoted the above normal conditions over Greenland (see sea-ice section).

II.3.f International Research Institute (IRI)

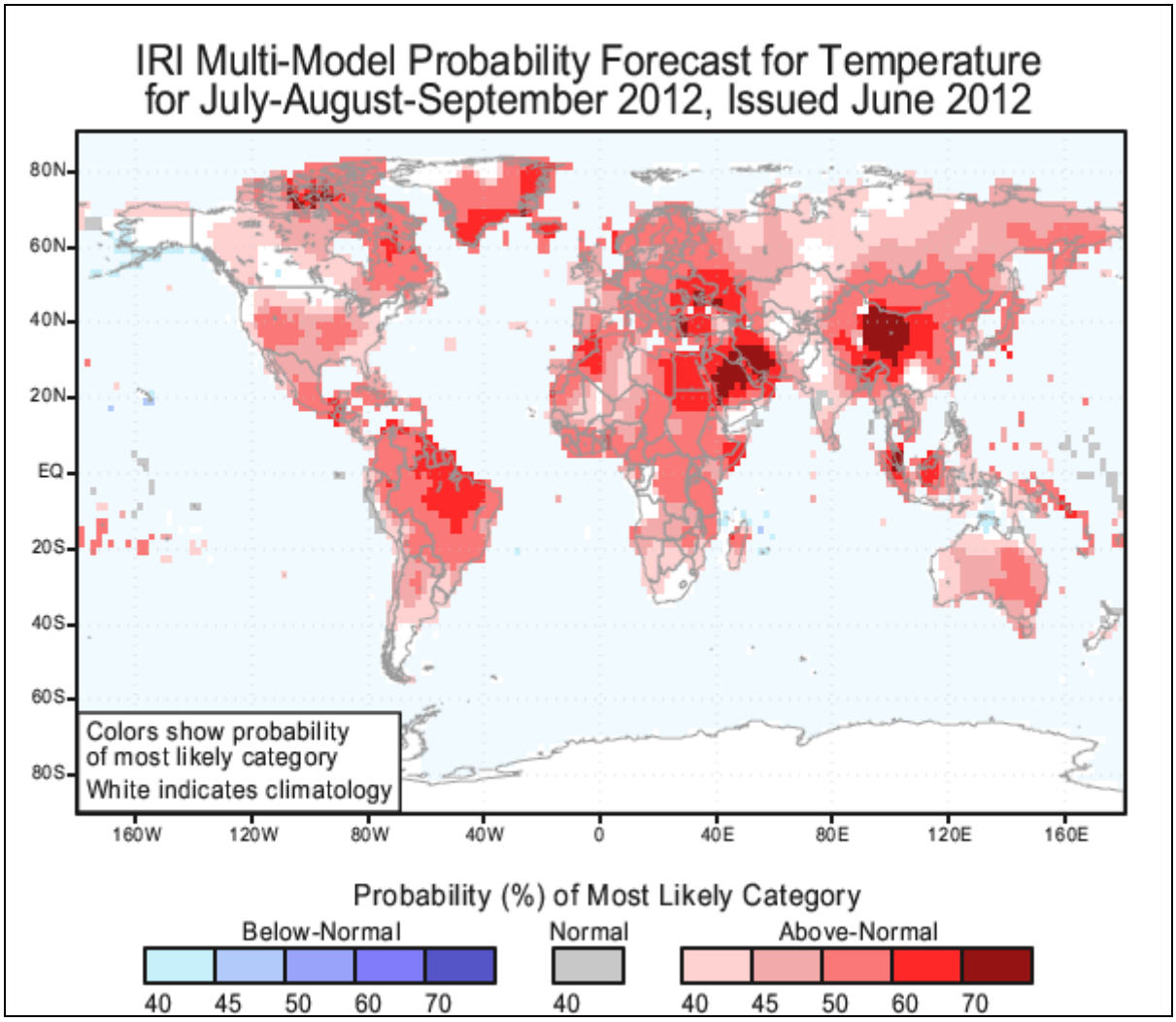


fig.28: Most likely category of T2m for July-August-September, issued in June from the IRI multi-model ensemble. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://iri.columbia.edu/climate/forecast/net_asmt/

Some similarity with Euro-Sip forecast for the mid latitudes of the Northern hemisphere, Northern part of South America, South-West of Australia, US and Central America.
But also some large differences over Australia, Africa, India, Arabic Peninsula and South America. For Europe, the tendency given by Euro-SIP (mostly Above Normal Scenario) is confirmed.
Still warmer than normal conditions expected over Greenland (see sea-ice section).

II.4. IMPACT : PRECIPITATION FORECAST

II.4.a ECMWF

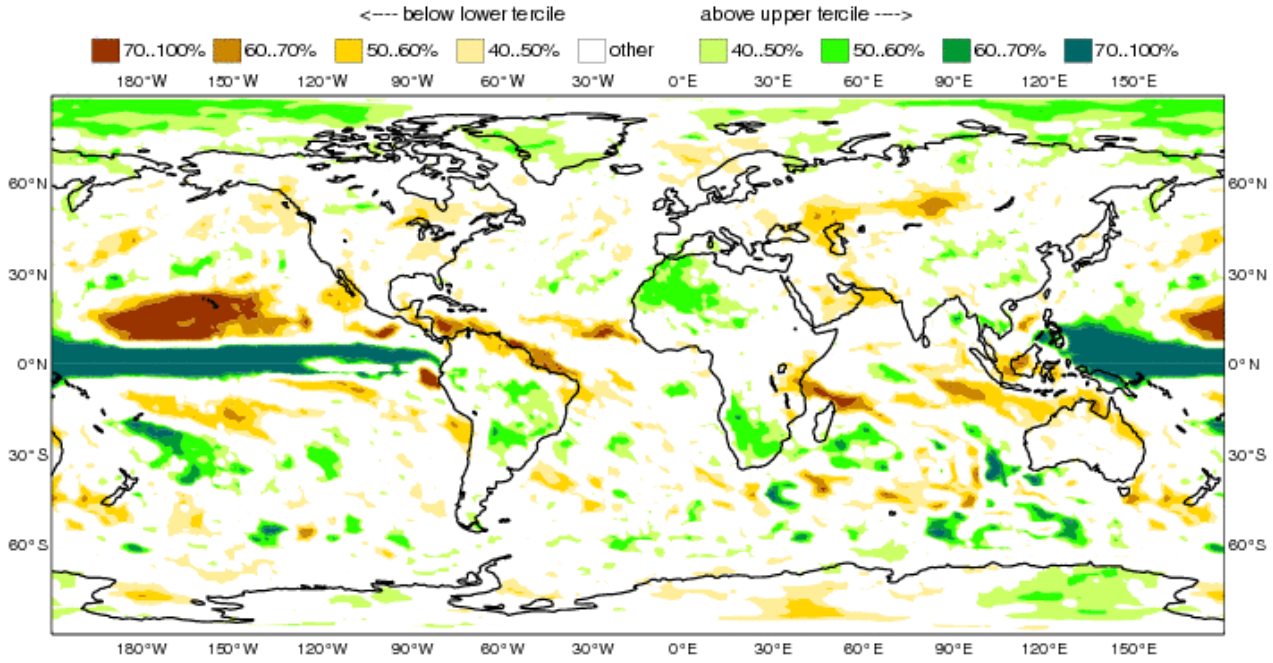


fig.29: Most likely category probability of rainfall from ECMWF July-August-September, issued in June. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/charts/seasonal_charts_s2/

II.4.b Météo-France

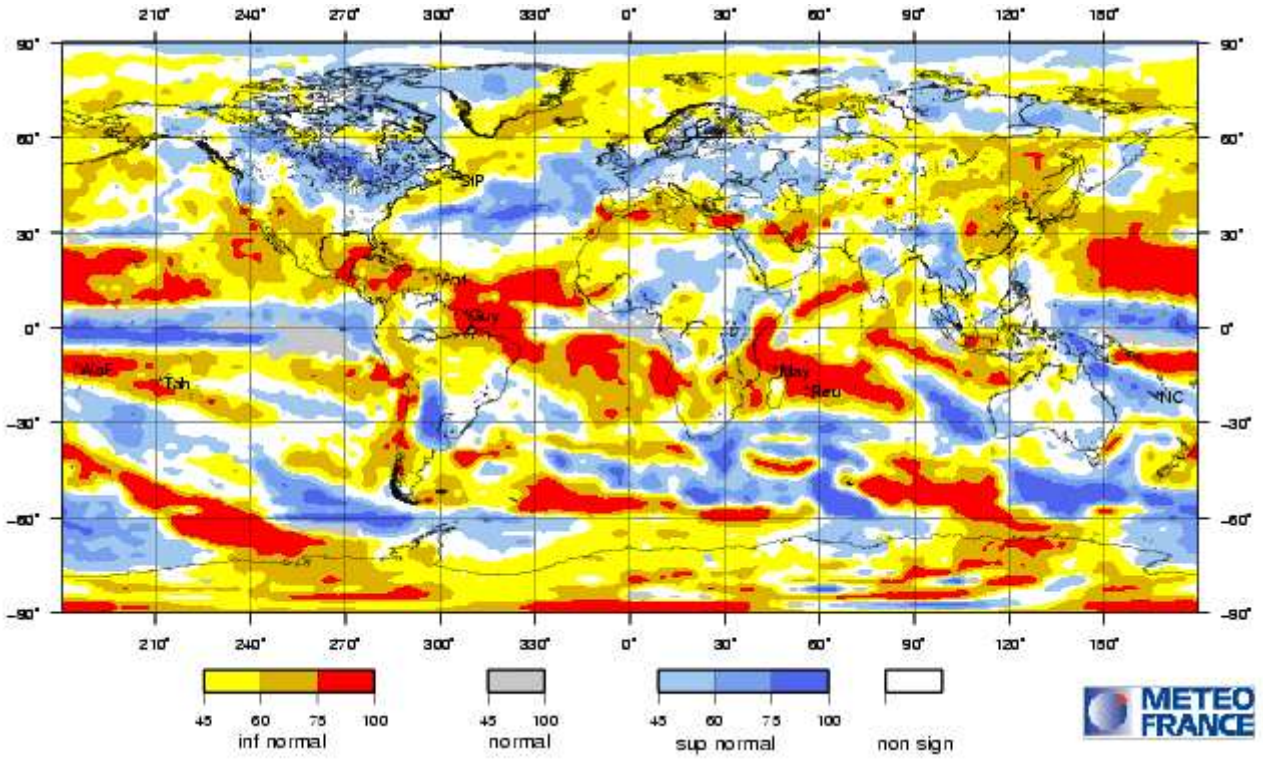


fig.30: Most likely category of Rainfall for July-August-September, issued in June. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Met office (UKMO)

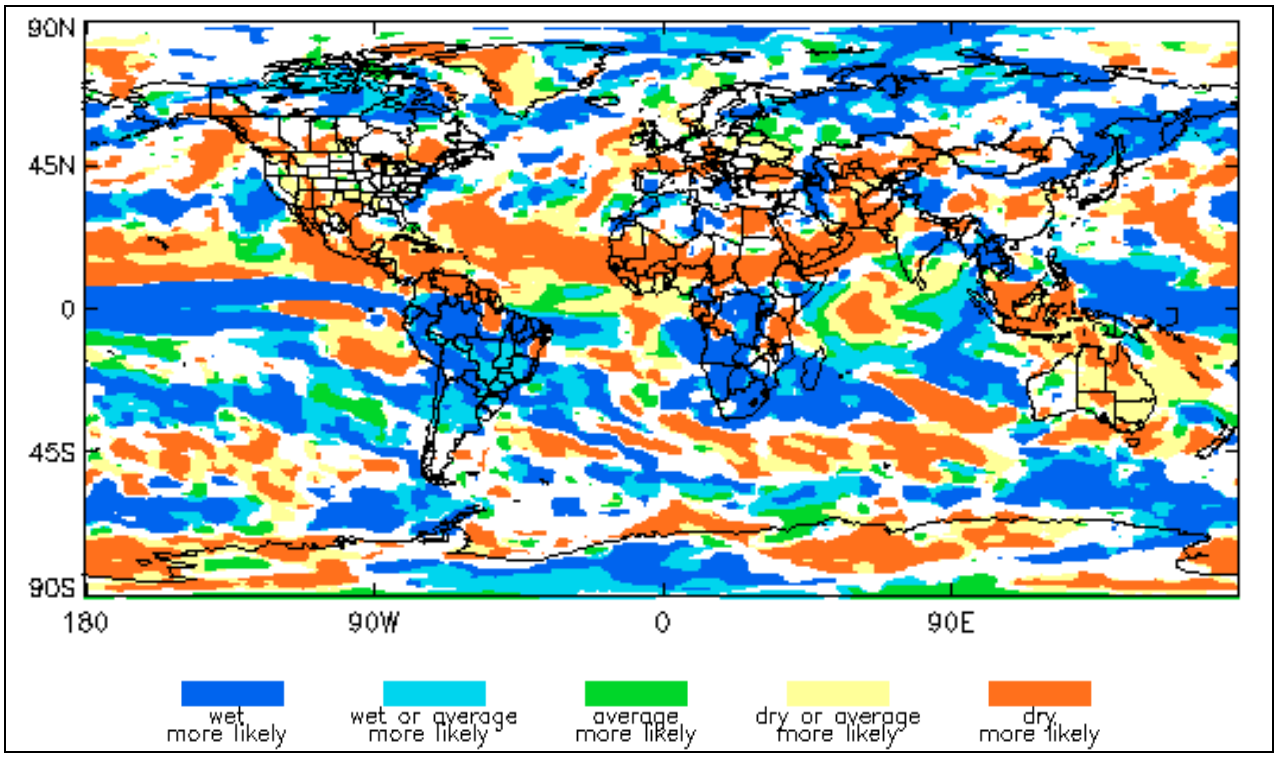


fig.31: Most likely category of Rainfall for June-July-August, issued in May from UK Met Office. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://www.metoffice.gov.uk/

II.4.d Japan Meteorological Agency (JMA)

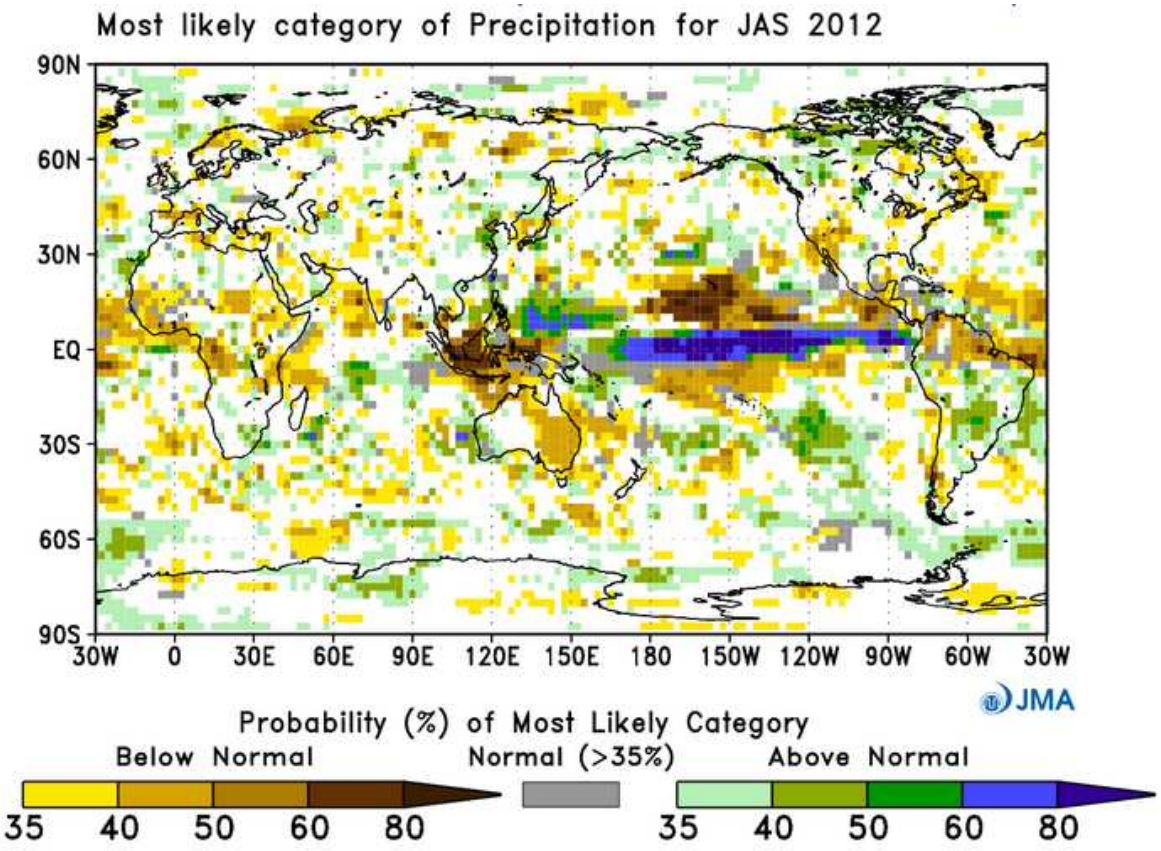


fig.32: Most likely category of Rainfall for July-August-September, issued in June from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.html

II.4.e Euro-SIP

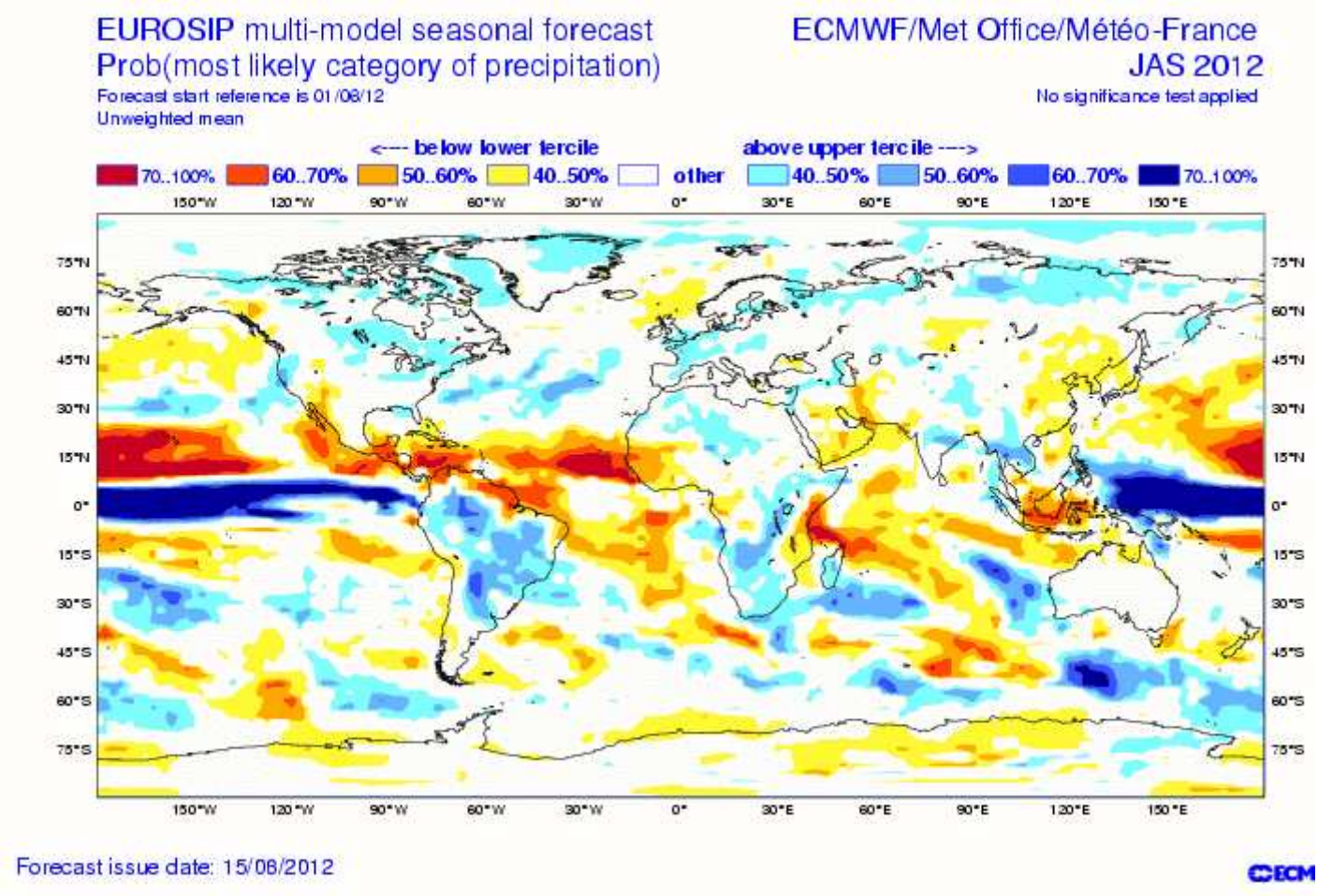


fig.33: Multi-Model Probabilistic forecasts for precipitation from EuroSip July-August-September, issued in June. (2 Categories, Below and Above normal – White zones correspond to No signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmv2/param_euro/seasonal_charts_2tm/

Some consistent signal in the Tropics : Central America, most western part of West Africa, coastal area of East Africa and Indonesia (Below normal scenario), most part of South America (Above normal scenario). To be quoted that over South Africa the Aboce normal conditions are over the dry season area.
For Europe (and more generally for the mid latitude of Northern Hemisphere) only weak signal (especially slight probability enhancement of Above normal scenario over France and neighbouring regions).
For the West African monsoon area, Below normal conditions should prevail on the western part of West Africa and along the coast of the Guinean Gulf.

II.4.f International Research Institute (IRI)

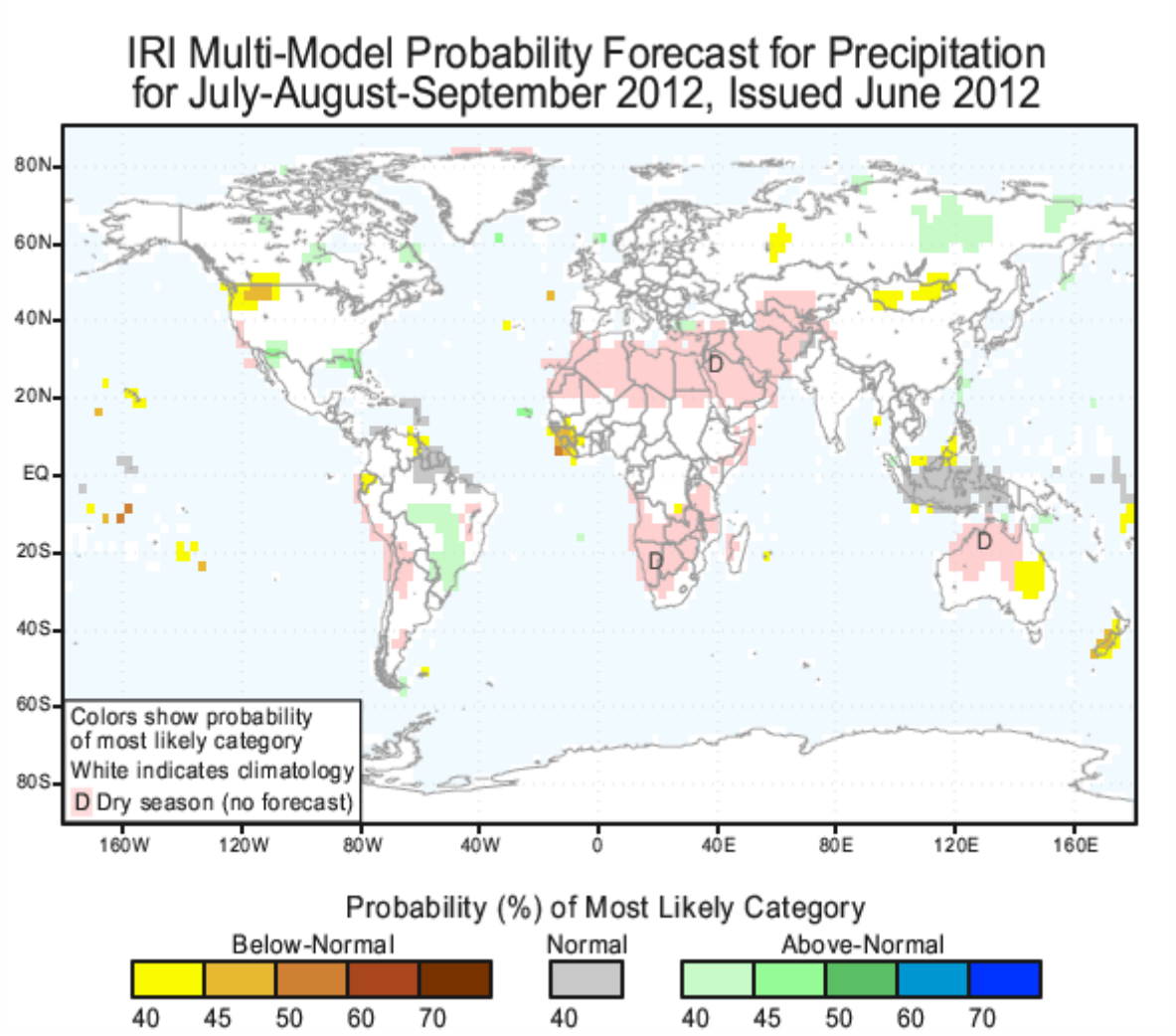


fig.34: Most likely category of Rainfall for July-August-September, issued in June from the IRI multi-model ensemble. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://iri.columbia.edu/climate/forecast/net_asmt/

The IRI forecast shows No Signal more or less everywhere.
Some consistency with Euro-Sip over South- America and North Siberia (Above Normal).
Consequently, over Europe, there is a clear indication for No Privileged Scenario (Climatology forecast).
Over West Africa, to be highlight the consistency is over the most Western part of the continent with some enhanced probabilities for dry conditions.

II.5. REGIONAL TEMPERATURES

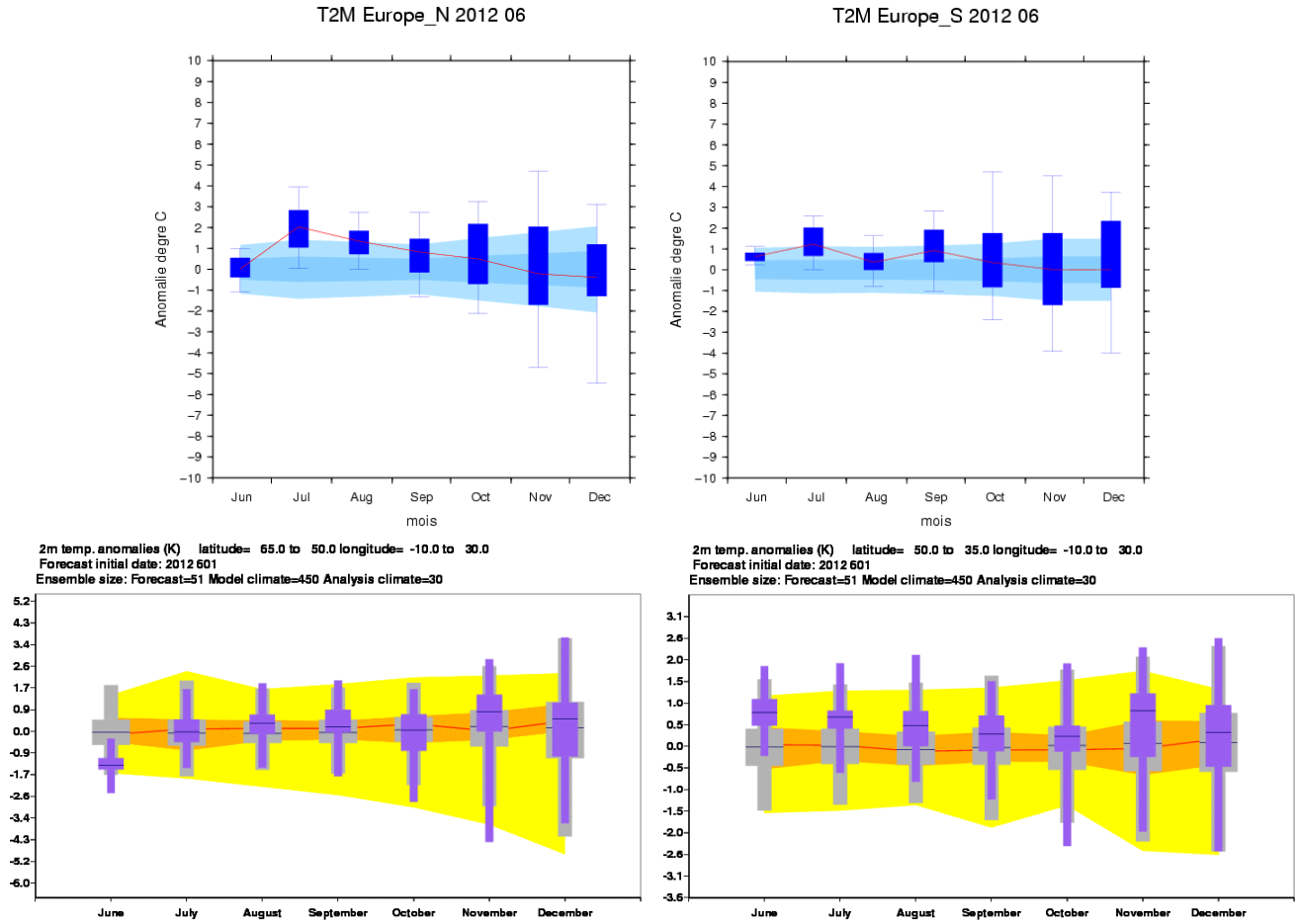


fig.35: Climagrams for T2m in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom) issued in June.

For both Northern Europe : little consistency between the 2 models. The differences can be related to the model uncertainties and to the climate trend representation (clearly overestimated in MF). In MF, ROC skill is limited in July (just above 0.5) and close to 0.6 in August and September ; then close to or worst than climatology.
For Southern Europe : consistent signal for Above Normal for Above normal conditions on JAS. In MF, ROC skill from June to September is close or better than 0.6 (it can reach even 0.7) ; then close to climatology.

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

REGIONAL PRECIPITATIONS

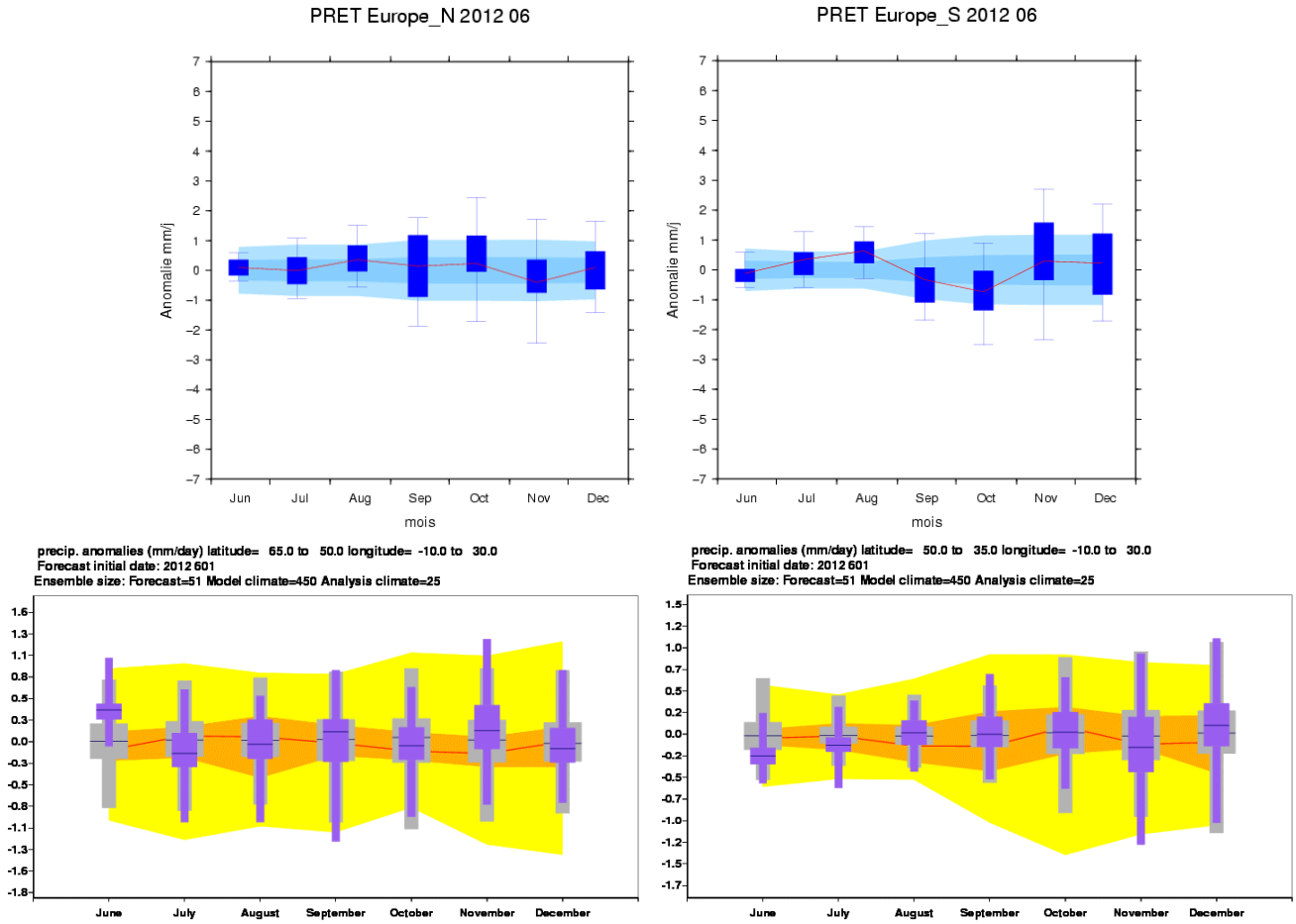


fig.36: Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom), issued in June.

For Northern Europe : both models give "No Signal" for JAS. In MF, ROC are close to 0.5 or worst than climatology.
For Southern Europe : little consistency between the 2 models. MF tends to Above normal conditions in July and August while there is "No Signal" in ECMWF. In MF, ROC scores show some skill in August and September (0.54) and close or worst than climatology for other months.
The predictability seems to be quite low (referring to the General Circulation discussion). So these intraseasonal evolution should be interpreted with caution.

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

II.6. MODEL'S CONSISTENCY

II.6.a GPCs consistency maps

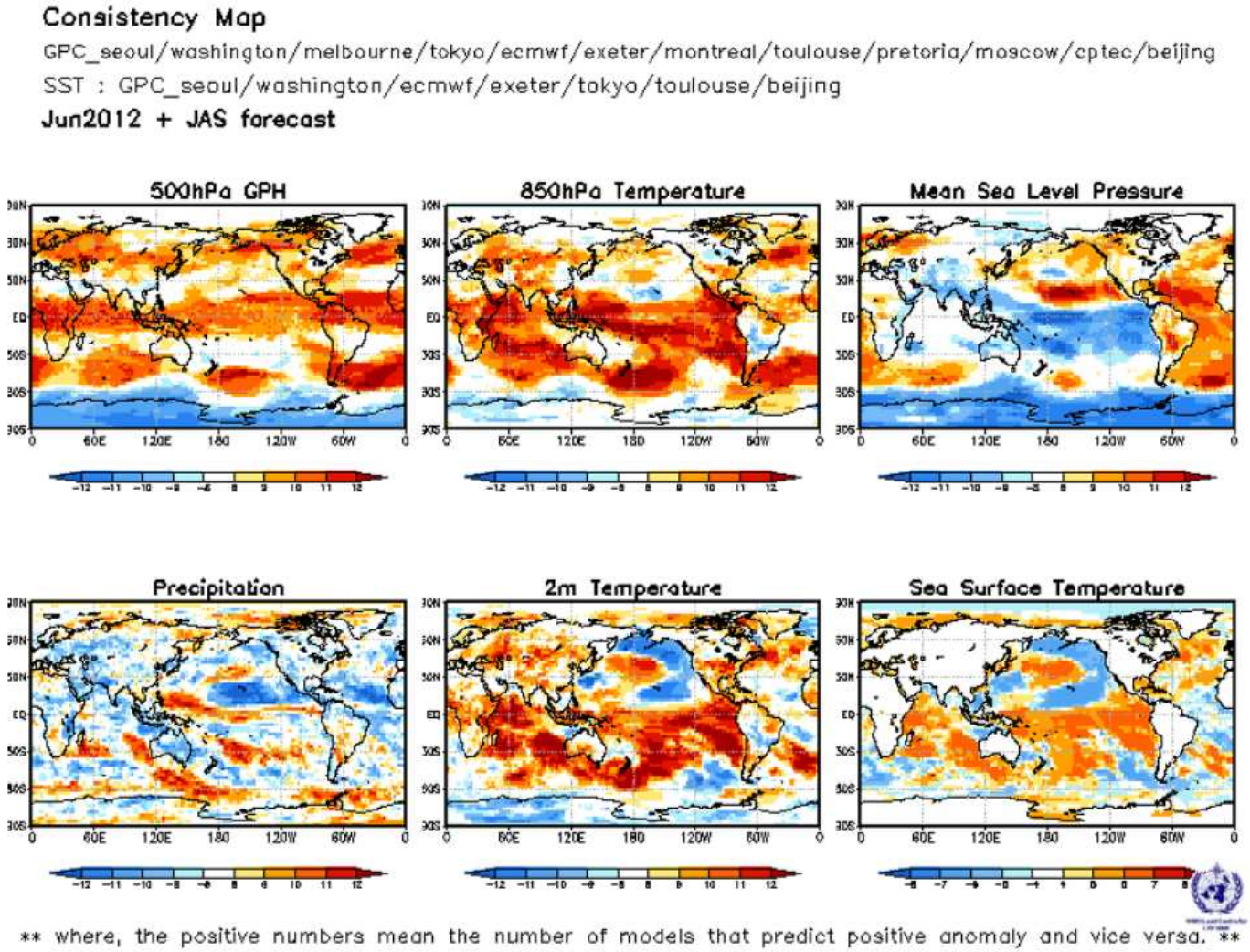


fig.37: GPCs Consistency maps from LC-MME http://www.wmolc.org/

For Z500 : some consistency over the North Atlantic mid-latitude and Eastern and Northern Europe (Above normal conditions).
For T2m : some consistent signal over Eastern Europe (Above normal scenario). Some similarity with Euro-SIP (South America, US and Central America, West Africa, Australia).
For precipitation : less consistency but some trace of Below normal conditions over Central and Eastern Europe and Above normal scenario on the Southern part of the Mediterranean basin. Some similarity with EuroSIP over Eastern and South Africa, regions close to the Arabian Sea, Indonesia, Central America and South-West US, South America.

II.7. “EXTREME” SCENARIOS

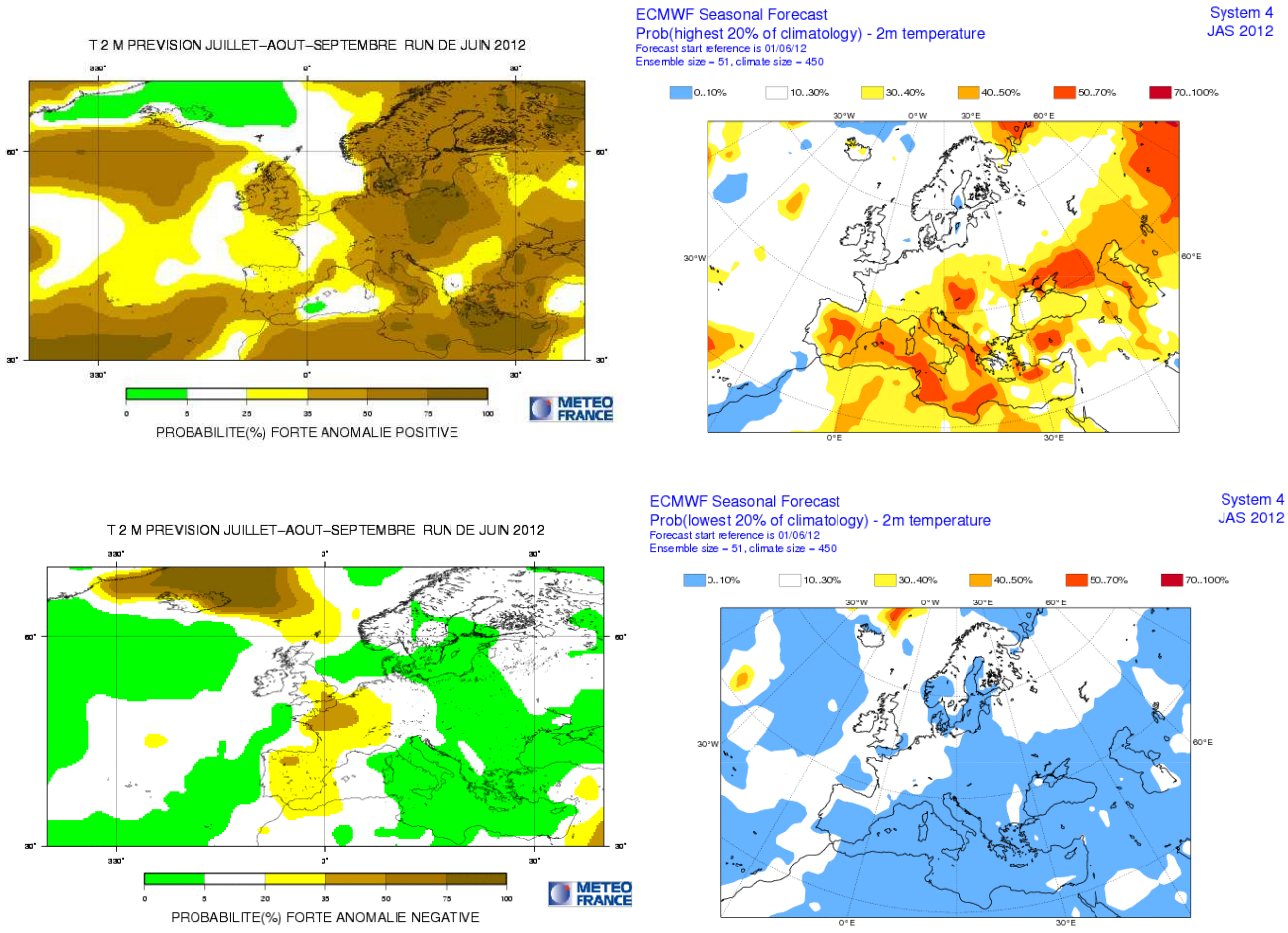


fig.38: Top : Probability of « extreme » above normal conditions for T2m for Meteo-France (left - highest ~15% of the distribution) and ECMWF (right - highest 20% of the distribution).
Bottom : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the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

Very consistent signal over South Eastern (and the Mediterranean basin) and Central Europe for enhanced probabilities of very above normal scenario.
The probability of very Below Normal scenario is very low everywhere (excepted over North-West of France in MF).
In Météo-France ROC score is clearly above climatology (locally it can reaches 0.8) over these regions. To be notice that there is some lack of skill on the most Northern part of Scandinavia, UK and some part of the Mediterranean sea.

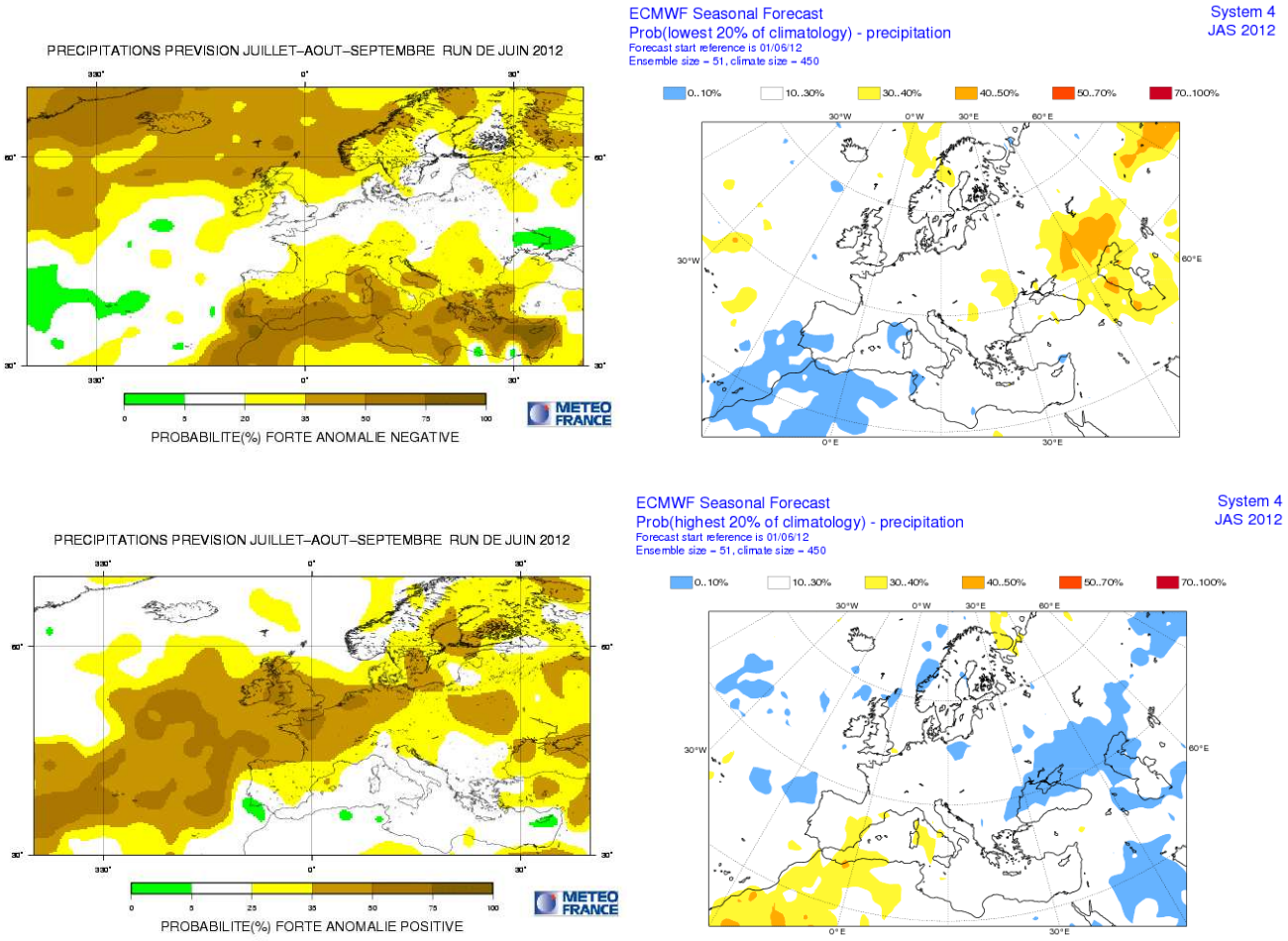


fig.39: Top : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the distribution) and ECMWF (right - lowest 20% of the distribution)
Bottom : Probability of « extreme » Above normal conditions for rainfall for Meteo-France (left - highest ~15% of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

No consistency for very Above Normal scenarios (in relationship with the differences in Z500).
For the very Below scenario, no more consistency.
When adding the low predictability consideration, it's seems difficult to infer any useful information from these forecast.

II.8. DISCUSSION AND SUMMARY

Forecast over Europe

The first comment is about the predictability. Referring to the general Circulation discussion, it seems difficult to infer a clear predictability for Europe. This could correspond to the poor consistency between the 2 models in terms of North-Atlantic Circulation Regimes (and Z500 forecasts).
For temperature, whatever the reasons, the Above Normal scenario makes sense for most of European countries to the exception of the North-Western side and regions close to France ; there is more uncertainty for the western façade of Europe. To be quoted the enhanced probability of very above normal temperature for the South-Eastern Europe and adjacent regions.
For rainfall, the low predictability leads to "No Privileged Scenario" over most of the European continent. However, some downscaled information could details these scenarios for specific countries or sub-regions.

Tropical Cyclone activity

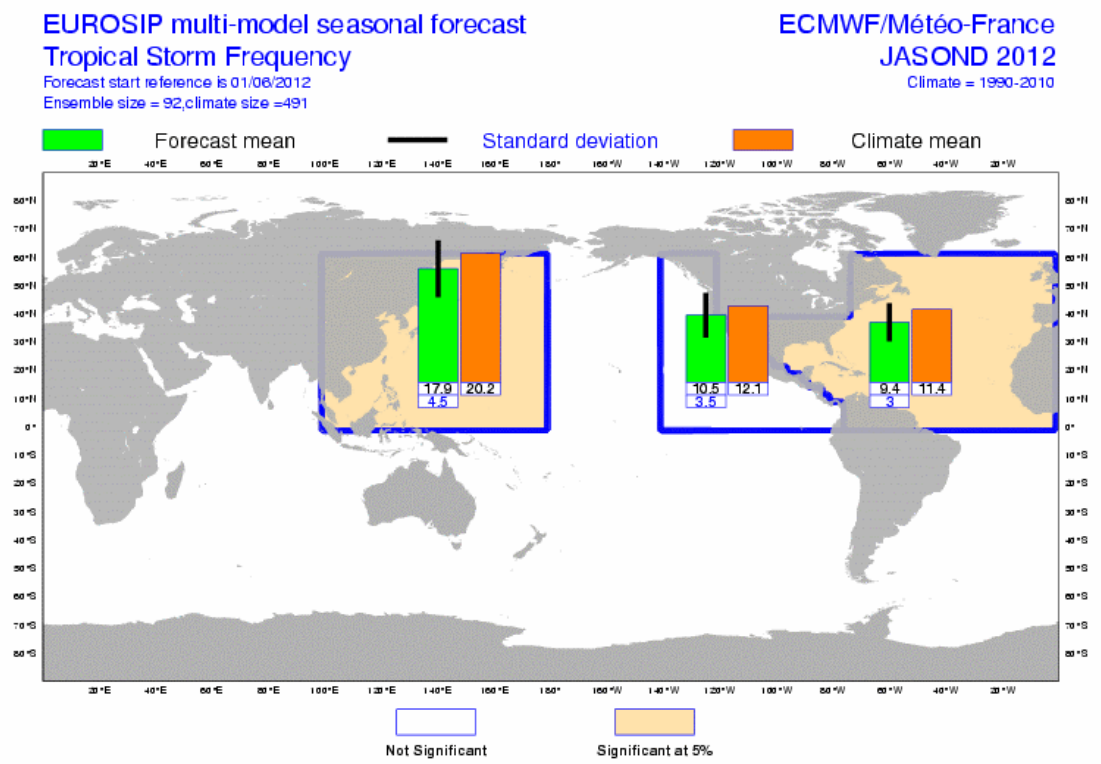


fig.40: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF) for the June to November 2012 period, issued in May.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtrop/trop_euro/eurosip_tropical_storm_frequency/

For the beginning of the season in the Northern hemisphere, Euro-Sip forecasts indicate a below to normal cyclonic activity over the Tropical Atlantic and Eastern Pacific and No Signal over West Pacific. To be notice that over the Tropical Atlantic, this is consistent with the SST evolution over the Atlantic North to the equator and to the ITCZ activity over the western part of West Africa.

Synthesis of Temperature forecasts for July-August-September 2012 for European regions

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

MODELS	Northern Europe	Southern Europe	Central Europe	Eastern Europe	SEE Region
CEP	no privileged	above normal	above normal	no privileged	above normal
MF	above normal	above normal	above normal	above normal	above normal
Met Office	below normal	no privileged	below normal	no privileged	no privileged
JMA	no signal	no privileged	above normal	above normal	above normal
synthesis	no privileged	no privileged	above normal	no privileged	above normal
IRI	above normal	above normal	above normal	above normal	above normal
Eurosip	no privileged	above normal	above normal	above normal	above normal
privileged scenario by RCC-LRF node	***no privileged scenario***	***above normal***	***above normal***	***above normal***	***above normal***

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

Synthesis of Rainfall forecasts for July-August-September 2012 for European regions

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

MODELS	Northern Europe	Southern Europe	Central Europe	Eastern Europe	SEE Region
CEP	no privileged	no privileged	no privileged	no privileged	no privileged
MF	no privileged	below normal	no privileged	no privileged	no privileged
Met Office	no privileged	no privileged	no privileged	no privileged	no privileged
JMA	no signal	no privileged	no privileged	no privileged	no privileged
synthesis	no privileged	no privileged	no privileged	no privileged	no privileged
IRI	no privileged	no privileged	no privileged	no privileged	no privileged
Eurosip	no privileged	no privileged	no privileged	no privileged	no privileged
privileged scenario by RCC-LRF node	***no privileged scenario***	***no privileged scenario***	***no privileged scenario***	***no privileged scenario***	***no privileged scenario***

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

III. ANNEX

III.1. SEASONAL FORECASTS

Presently several centres provide seasonal forecasts, especially those designated as Global Producing Centres by WMO (see http://www.wmo.int/pages/prog/wcp/wcasp/clips/producers_forecasts.html).
■ BoM, CMA, ECMWF, JMA, KMA, Météo-France, NCEP and UK Met Office have ocean/atmosphere coupled models. The other centres have atmospheric models which are forced by a SST evolution which is prescribed for the entire period of forecast.
■ IRI and Euro-SIP provide multi-model forecasts. Euro-Sip is presently composed using 3 models (ECMWF, Météo-France and UK Met Office). IRI uses several coupled and forced models optimally combined.

Seasonal forecasts use the ensemble technique to sample uncertainty sources inherent to these forecasts. Several Atmospheric and/or oceanic initial states are used to perform several forecasts with slightly different initial state in order to sample the uncertainty related to imperfect knowledge of the initial state of the climate system. When possible, the model uncertainty is sampled using several models or several version of the same model. The horizontal resolution of the Global models is currently between 100 and 300km. This mean that only Large Scale feature make sense in the interpretation of the issued forecasts. Generally speaking, the temperature forecasts show better skills than rainfall forecasts. Then, it exists a natural weakness of the seasonal predictability in Spring (ref to North Hemisphere).

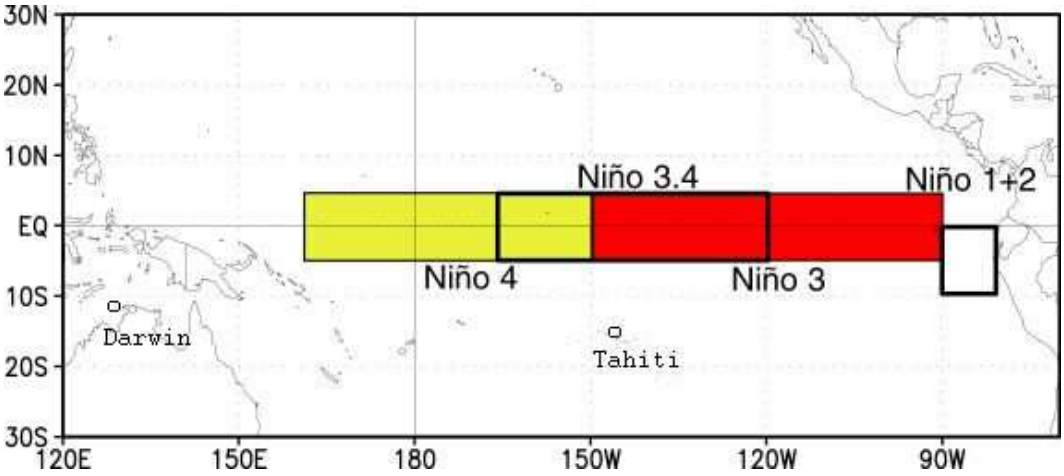
In order to better interpretate the results, it is recommended to look to verification maps and graphs which give some insight into the expected level of skill for a specific parameter, region and period. A set of scores is presented on the web-site of the Lead-Centre for Verification (see http://www.bom.gov.au/wmo/lrfvs/)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

This bulletin collects all the information available the 21st of the current month preceding the forecasted 3-month period.

III.2. « NINO » AND SOI INDICES

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

- Niño 1+2 : 0°/10°S 80W-90W ; it is the region where the SST warming is developing first at the surface (especially for coastal events).
- Niño 3 : 5°S/5°N 90W-150W ; it is the region where the interanual variability of SST is the greatest.
- Niño 4 : 5°S/5°N 160E- 150 W ; it is the region where SST evolution have the strongest relationship with evolution of convection over the equatorial Pacific.
- Niño 3.4 : 5°S/5°N 120W-170W ; it is a compromise between Niño 3 and Niño 4 boxes (SST variability and Rainfall impact).



Associated to the oceanic « El Niño / La Niña » events, and taking into account the strong ocean/atmopshere coupling, the atmosphere shows also interanual variability associated to these events. It is monitored using the SOI (Southern Oscillation Index). This indice is calculated using standardized sea level pressure at Tahiti minus standardized sea level pressure at Darwin (see above figure). It represents the Walker (zonal) circulation and its modifications. Its sign is opposite to the SST anomaly meaning that when the SST is warmer (respectively colder) than normal (Niño respectively Niña event), the zonal circulation is weakened (respectively strengthened).

III.3.LAND BOXES

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