WMO RA VI Pilot RCC-Network

METEO FRANCE Toujours un temps d'avance

GLOBAL CLIMATE BULLETIN n°158 - AUGUST 2012

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I. DESCRIPTION OF THE CLIMATE SYSTEM (JUNE 2012)

I.1. OCEANIC ANALYSIS

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

In the Tropical Pacific : Clear strengthening and westward expansion of the SST warming from East up to the dateline in the equatorial wave guide. Weakening of positive anomalies on the western part including the extension toward the sub-tropics. Little evolutions in the mid-latitudes.

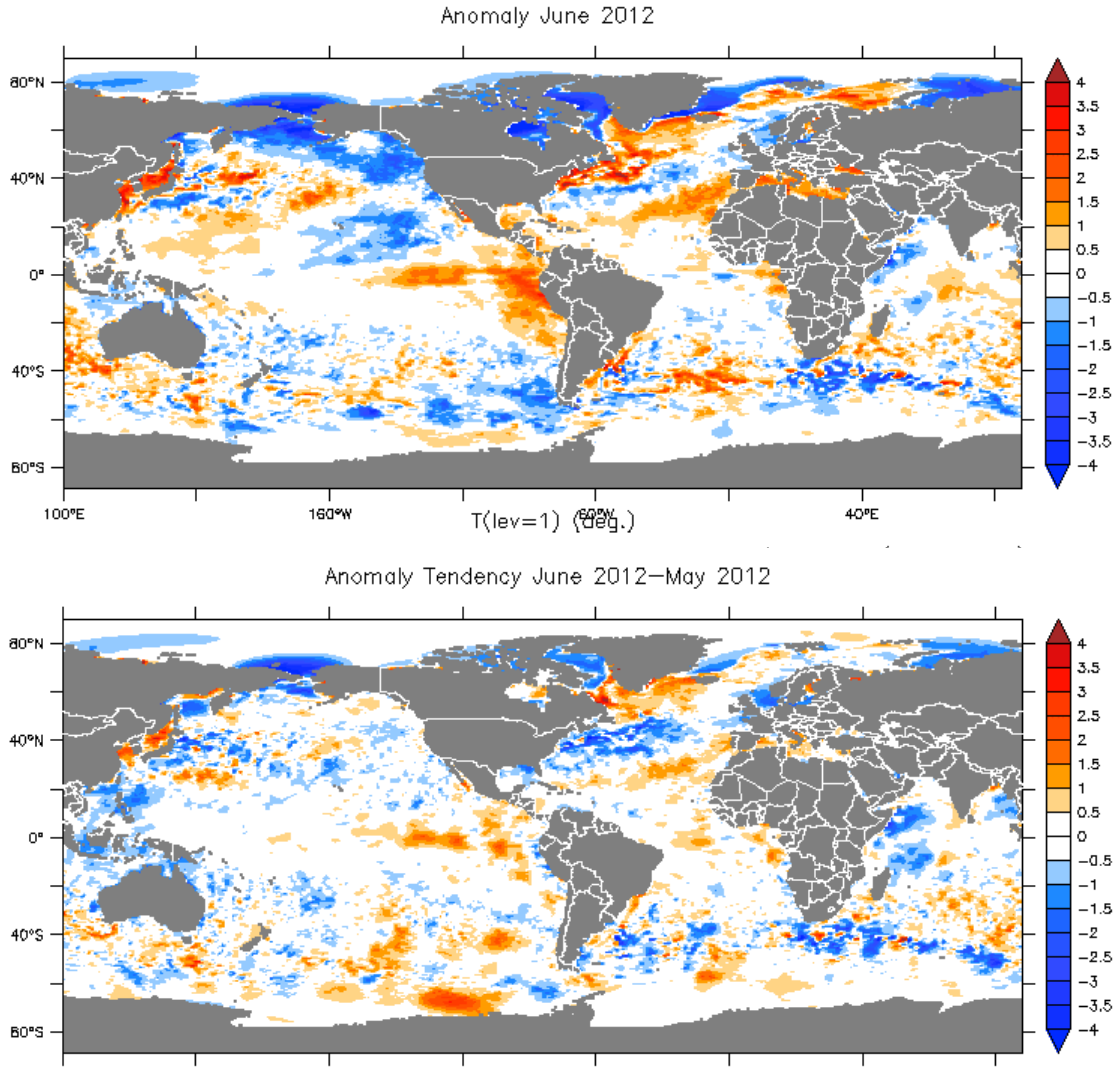


fig.1: **top : SSTs Anomalies in June 2012 (°C) (reference 1950-2008)**
bottom : SST tendency (current – previous month) http://bcg.mercator-ocean.fr/

For the Tropical Atlantic : Still warming of both North and South Tropical Atlantic. However, the South Tropical Atlantic remains slightly colder than normal. In the equatorial waveguide, a positive anomaly develops in the Guinean Gulf. A strip of positive anomaly from the Caribbean up to Spain contributes now to a tripole-like pattern across North Atlantic .

In the Indian Ocean : Little evolutions. Mostly warmer than normal from Australia up to the Great Horn of Africa.

In subsurface (fig.2) :

In the equatorial Pacific waveguide, heat content anomalies similar to SSTs and thermocline depth anomalies (see fig. 5). Note still positive anomalies in the most Western part while the signal vanishes at the surface. Not too much changes in the Eastern and Central parts.

In Tropical Atlantic : patterns quite fragmented and quite similar to previous month (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 and Australia. Little evolutions with respect of previous month

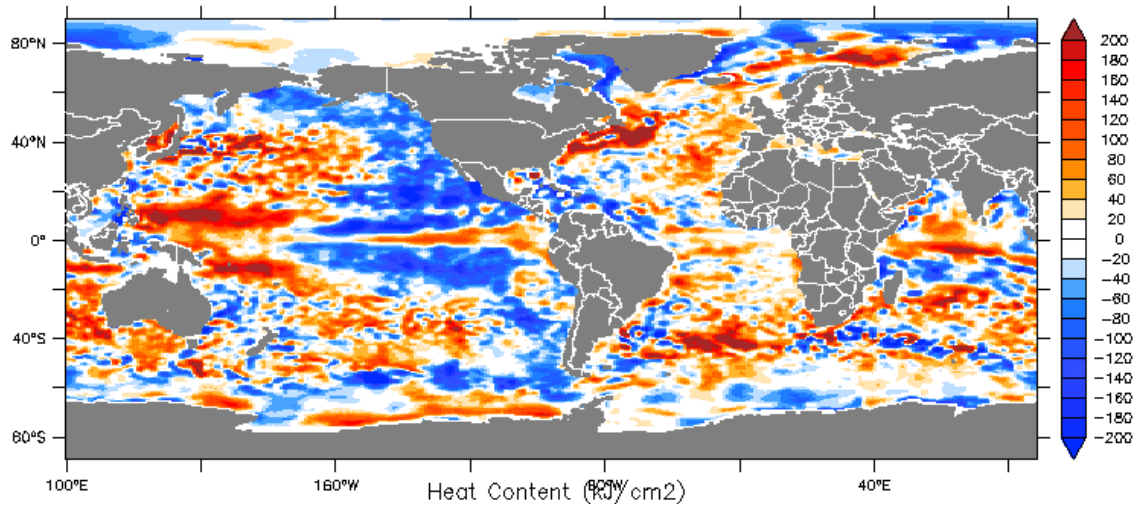


fig.2: map of Heat Content Anomalies (first 300m) in June 2012 (kJ/cm²). (reference 1950-2008)
http://bcg.mercator-ocean.fr/

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

The positive anomaly starting from the Eastern part is now conspicuous and continue to develop. Over most of the equatorial part of the basin the zonal Trade Wind anomaly is close to zero or positive (on the Eastern part) consistently with the SOI (positive + 0,4).

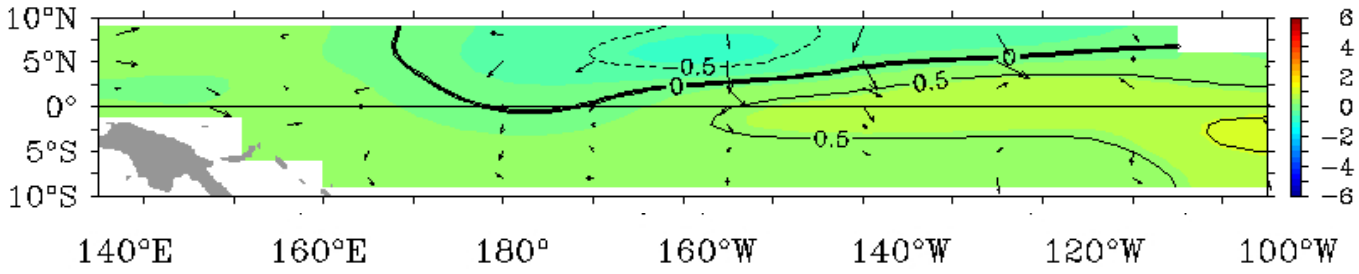


fig.3: SST Anomalies and Wind anomalies in June 2012 over the Equatorial Pacific from TAO/TRITON.
http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/monthly-summary.html

In the Niño boxes (4, 3.4, 3 et 1+2 ; see definition in Annex) the SST anomalies illustrate the warming which develops from the Eastern part of the basin. The monthly averages in July are respectively -0,1°C, +0,3°C, +0,7°C and +1,6°C from West to East (in relationship with the coastal event).

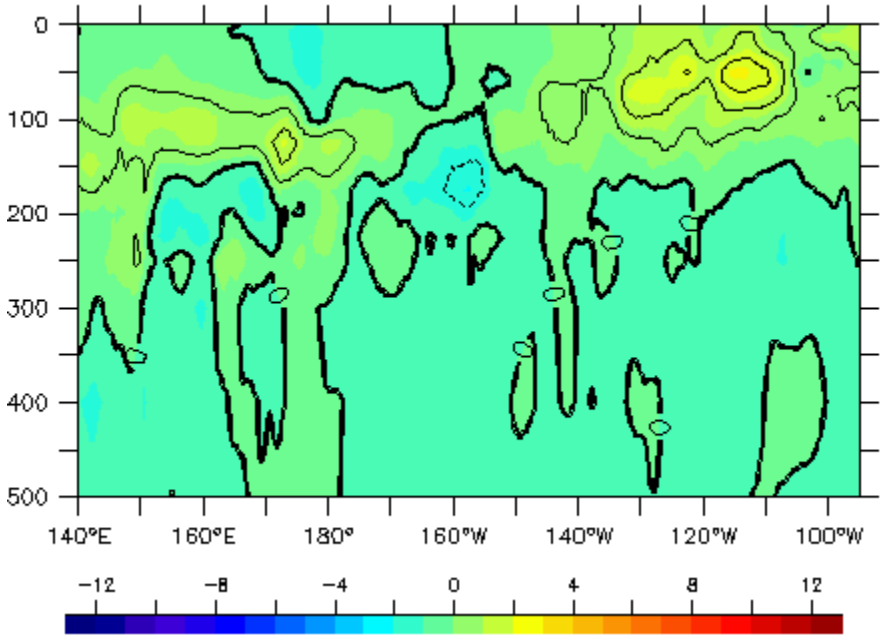


fig.4: Oceanic temperature anomaly in the first *500 metres* in the Equatorial Pacific, in June 2012 http://bcg.mercator-ocean.fr/

In the equatorial waveguide (fig. 4) : warming under the surface on the Eastern part. Cooling on the most western part but still a warm reservoir close to 150m depth and the dateline. The last MJO forecast show little MJO activity for the next month.
The thermocline structure (fig. 5) : Deeper than normal everywhere with some relative maximum in both West and East. Situation close to normal in the central part of the basin.

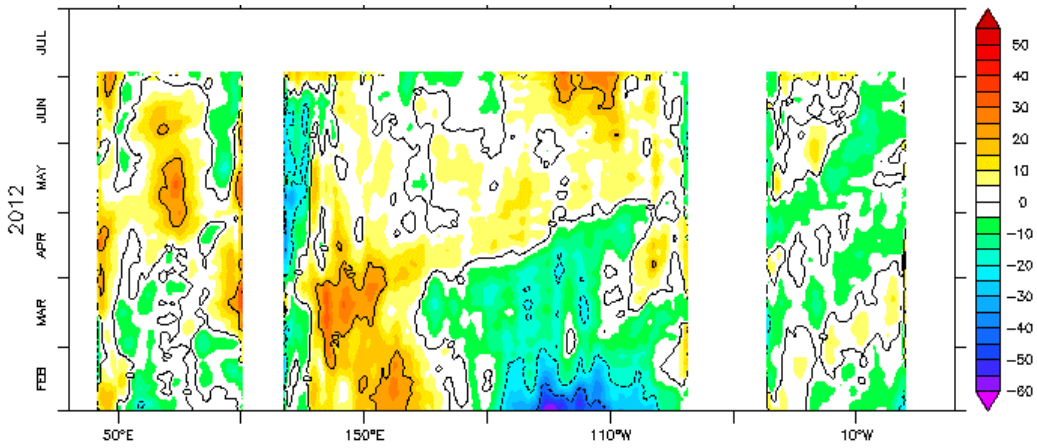


fig.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 12 month period. http://bcg.mercator-ocean.fr/

I.1.c Atlantic Basin

Northern Tropical Atlantic : little anomalies (some positive in the western part).
Equatorial waveguide : A dipole pattern (negative/positive respectively East/West) is still visible but the situation evolves in the Eastern part (Guinean Gulf warming) and the Western part (negative anomaly disappearing).
The Southern Tropical Atlantic : still negative anomaly but decreasing. Still a dipole pattern between Tropics and sub-tropics. To be quoted the warming along the western coast.

I.1.d Indian Basin

Southern Tropical Indian Ocean : warmer than normal (warming especially North-West to 20°S)
Equatorial waveguide : some warmer than normal conditions in Western and close to normal in Eastern parts. The IOD is still close to normal (slightly positive).
Northern Tropical Indian Ocean : little changes since the last month. 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) and less intense over the Eastern (both equatorial and Northen). Sub-regional Convergent circulation anomalies (downward anomaly motion) on the South-Eastern (close to Easter Island) and North Central parts (close to Hawaï). Consistently with these patterns the SOI is slightly positive (+0,4).
On the Atlantic : Strong divergent circulation anomaly over West Africa (Close to Nigeria and Cameroon). Still a convergent circulation anomaly (downward anomaly motion) on Southern Atlantic which extends up to North-Eastern coast of South America. To be noticed the divergent circulation anomaly (upward anomaly motion) which has developed close to the coast of Argentina.
On the Indian Ocean : quite strong positive anomaly (convergent circulation anomaly - downward anomaly motion) just South to the Indian continent ; indication of unfavourable monsoon development..

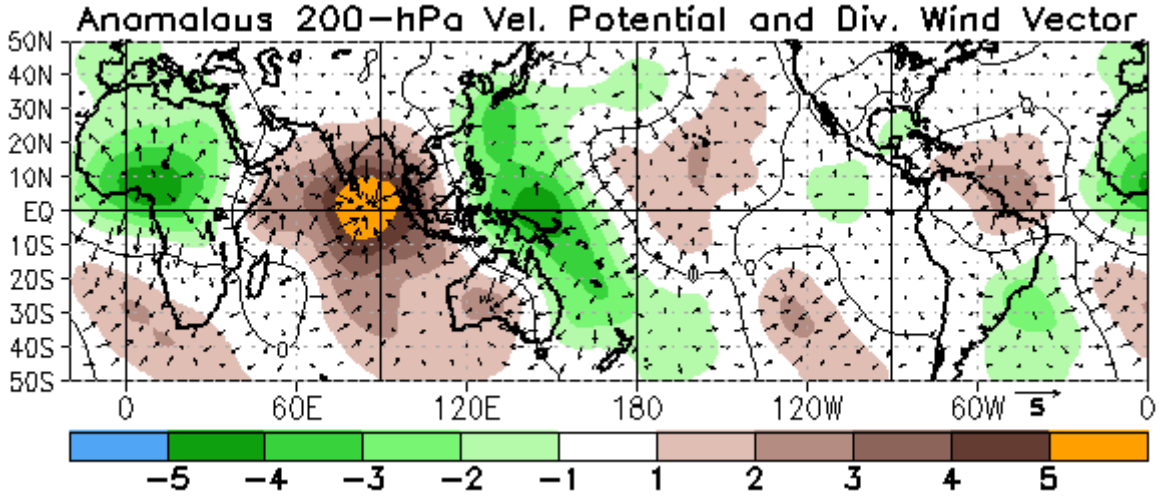


fig.6: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly in June 2012. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

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

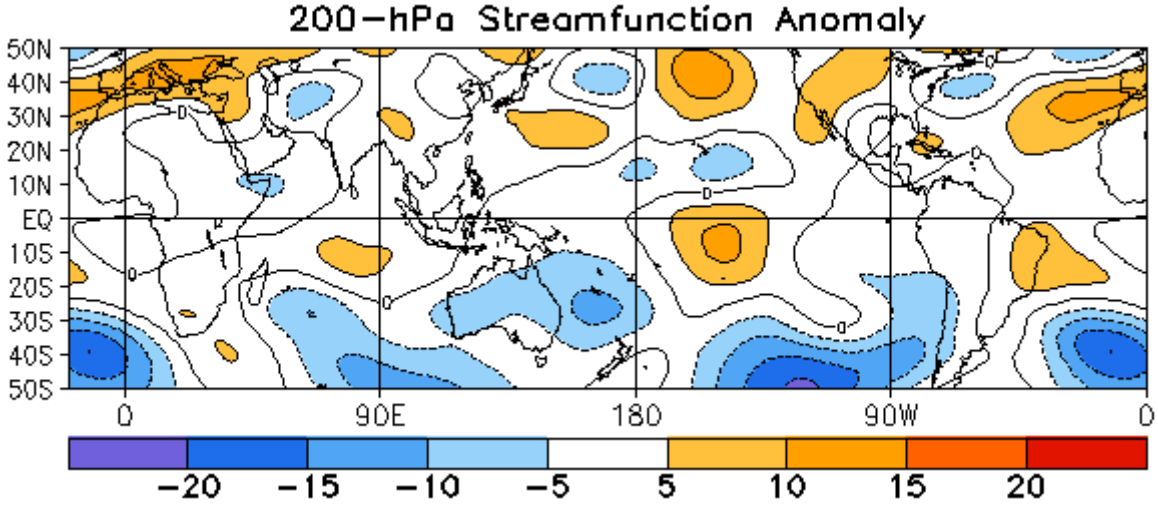


fig.7: Stream Function Anomalies at 200 hPa in June 2012.
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

Geopotential height at 500 hPa (fig. 8 – insight into mid-latitude general circulation) : In relationship with previous discussion, the main anomalies are mostly related to mid-latitude dynamic with sub-regional structure. Consequently the main active atmospheric modes in the Northern hemisphere (see next table) seems to be mostly related to mid-latitude dynamic. For Europe, note the NAO mode (-2,2 – summer mode) with some positive geopotential height anomalies over the Mediterranean basin.

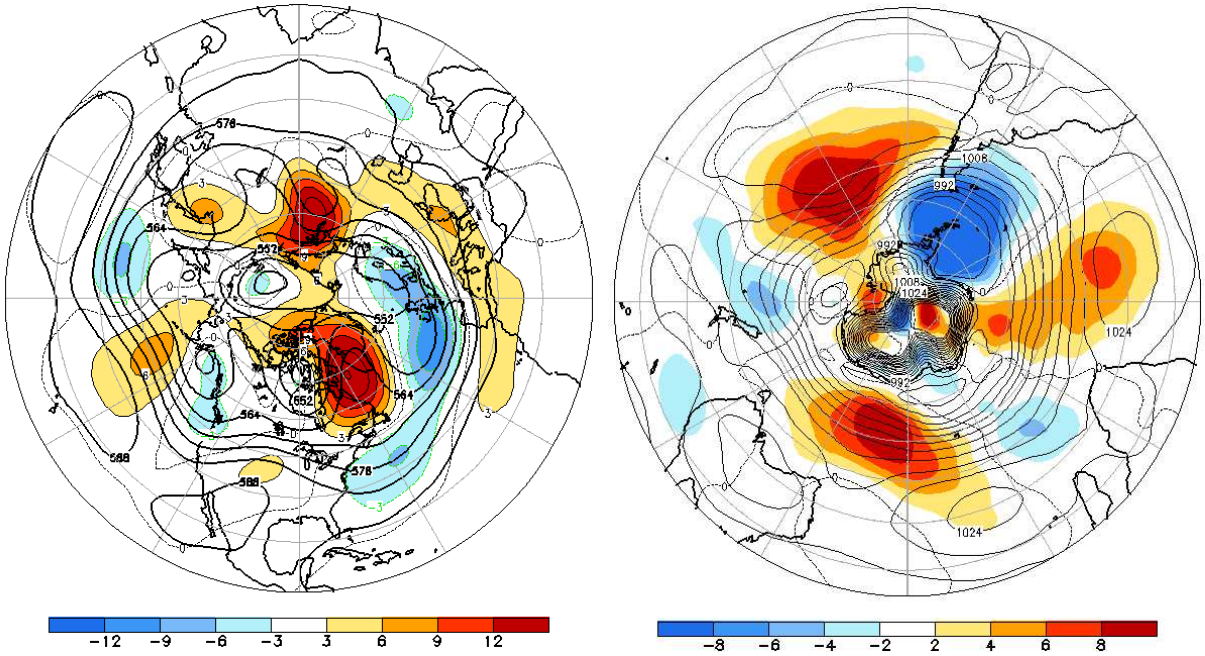


fig.8: Anomalies of Geopotential height at 500hPa in June 2012 (left North Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige9.shtml, and right South Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige15.shtml)

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
JUN 12	-2.2	-0.1	-1.4	-0.9	-0.4	---	0.0	-1.4	-1.8
MAY 12	-0.8	0.5	-1.7	-1.5	-0.3	---	-0.5	-0.6	-0.1
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

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

I.2.b Precipitation

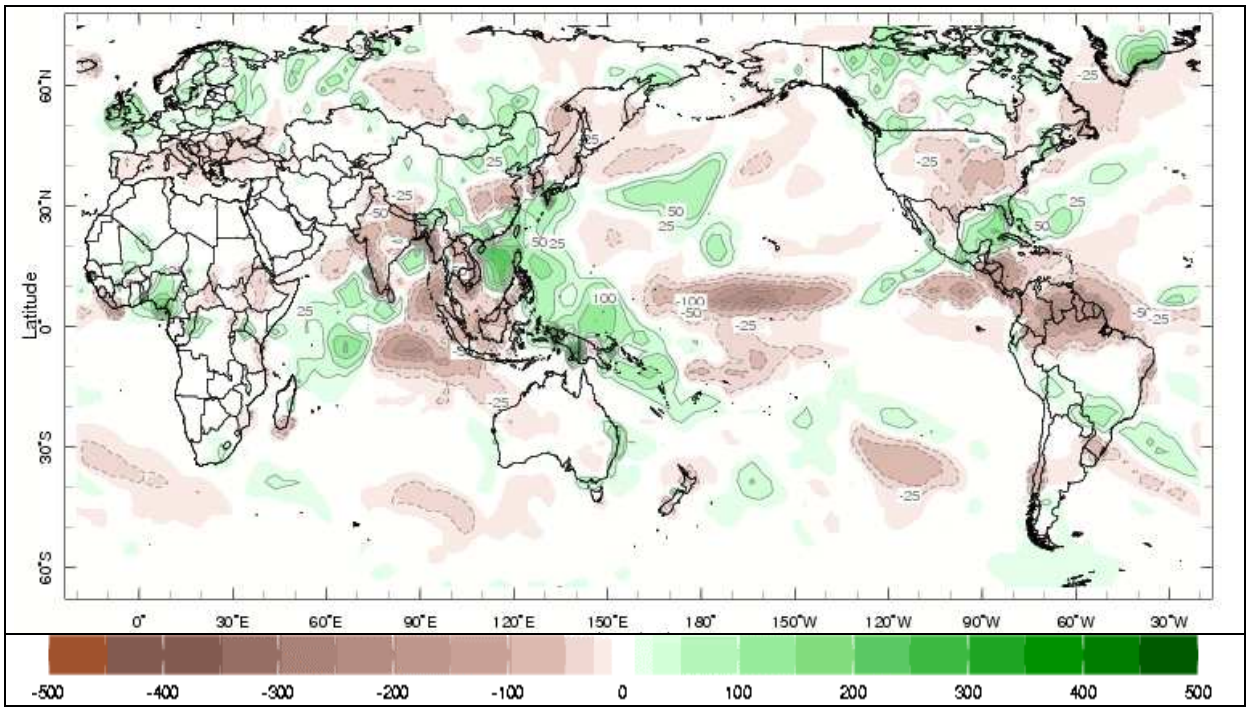


fig.9: Rainfall Anomalies (mm) in June 2012 (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.
http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/

Pacific : Good consistency with the Divergent/Convergent Circulation anomalies over the Western (strong positive anomaly) and Central (negative anomaly).
Atlantic : strong negative anomaly over the North of South (and Central) America. and positive anomalies close to Nigeria.
Indian Ocean : strong negative anomaly over most of the Indian sub-continent. The positive anomalies over the Western Indian Ocean seem to be out of phase with the Velocity Potential anomalies.
In Europe : negative anomalies over Spain, the Mediterranean basin and part of Central Europe (related the Geopotential anomalies) and positive anomalies over the Northern regions (also consistent with Z500 pattern).

I.2.cTemperature

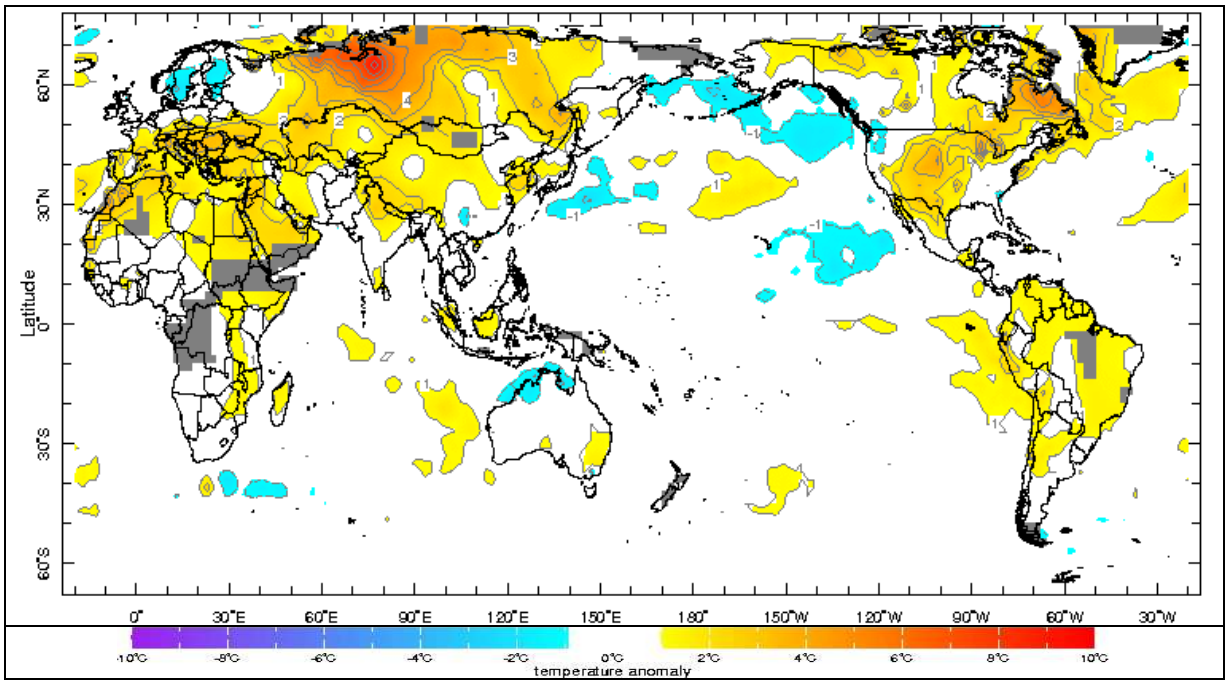


fig.10: Temperature Anomalies (°C) in June 2012 (departure to the 1979-2000 normal) http://iridl.ldeo.columbia.edu/maproom/.Global/.Atm_Temp/Anomaly.html

North-America : Warmer than normal conditions over a large portion of the continent which extends southward over the Great Plain up to Mexico borders.
South-America : Warmer than normal conditions over most of the continent.
Australia : Close to normal conditions
Asia : Warmer than normal conditions excepted over India and South-East Asia (close to normal).
Africa : Warmer than normal conditions over Northern Africa. Close to Normal over West Africa.
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) : continuation of the dramatic decrease of the sea-ice extension anomaly (now below 2007 value) with some regional modulation in the Barents Sea (very large deficit) and close to Greenland (close to Normal).
In Antarctic (fig. 11 - right) : slightly above normal sea-ice extension anomaly with some regional modulation.

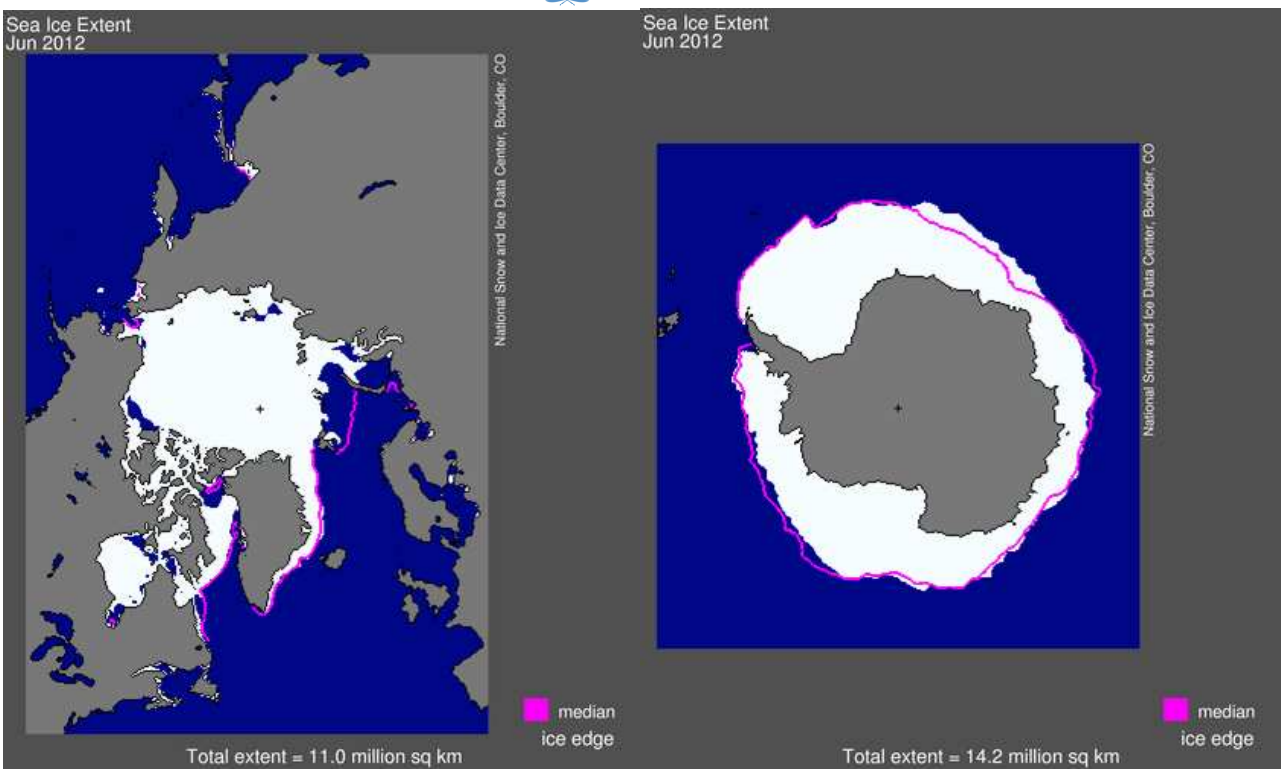


fig.11: Sea-Ice extension in Arctic (left), and in Antarctic (right) in June 2012. The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

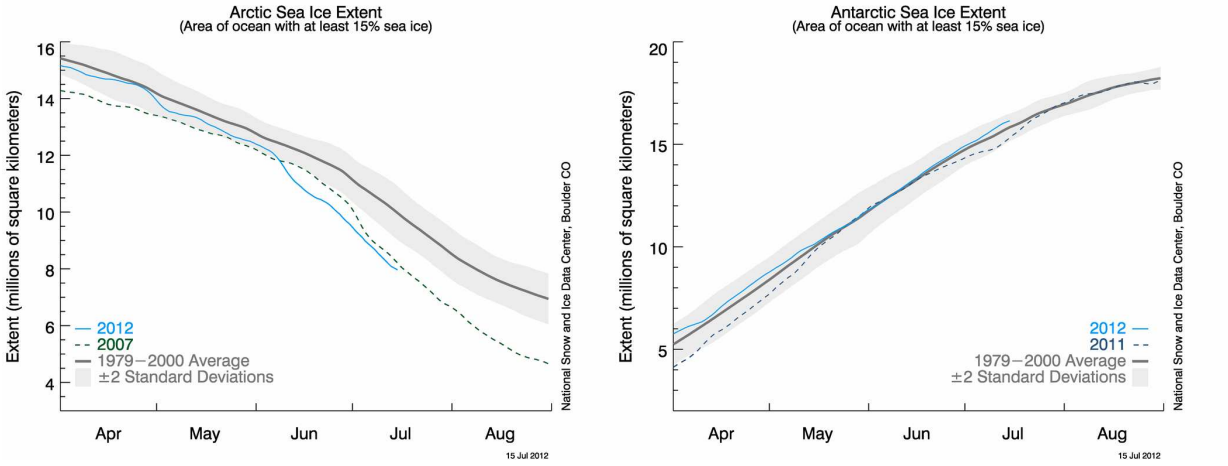


fig. 9bis : Sea-Ice extension evolution from NSIDC
http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png

II.SEASONAL FORECASTS FOR ASO FROM DYNAMICAL MODELS

II.1. OCEANIC FORECASTS

II.1.a Sea Surface Température (SST)

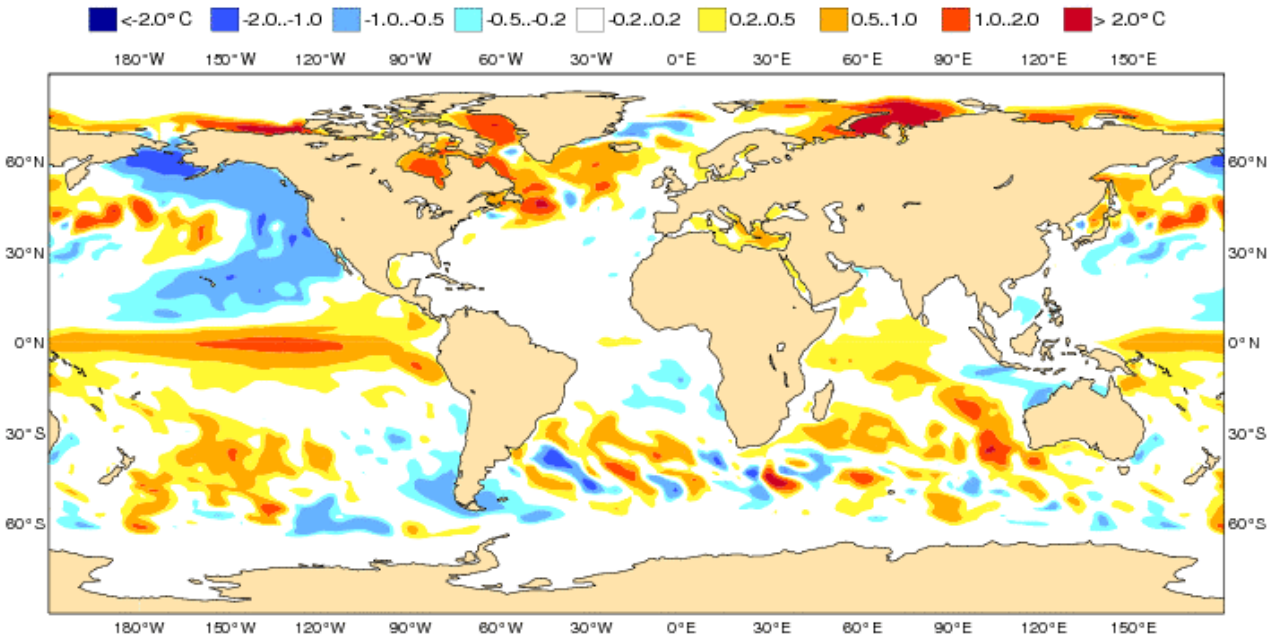


fig.12: SST anomaly forecast (in °C) from ECMWF for ASO, issued in July.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

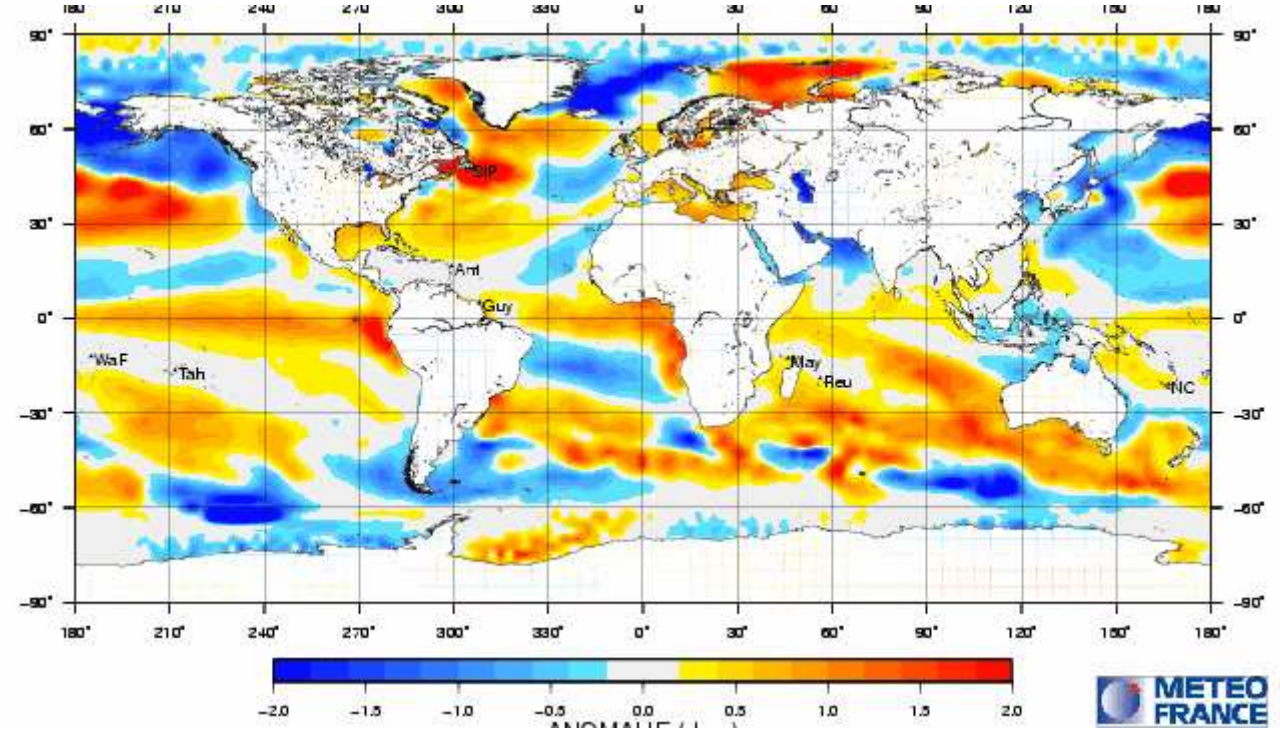


fig.13: SST Anomaly forecast (recalibrated with respect of observation) from Météo-France for ASO, issued in July. http://elaboration.seasonal.meteo.fr/

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.

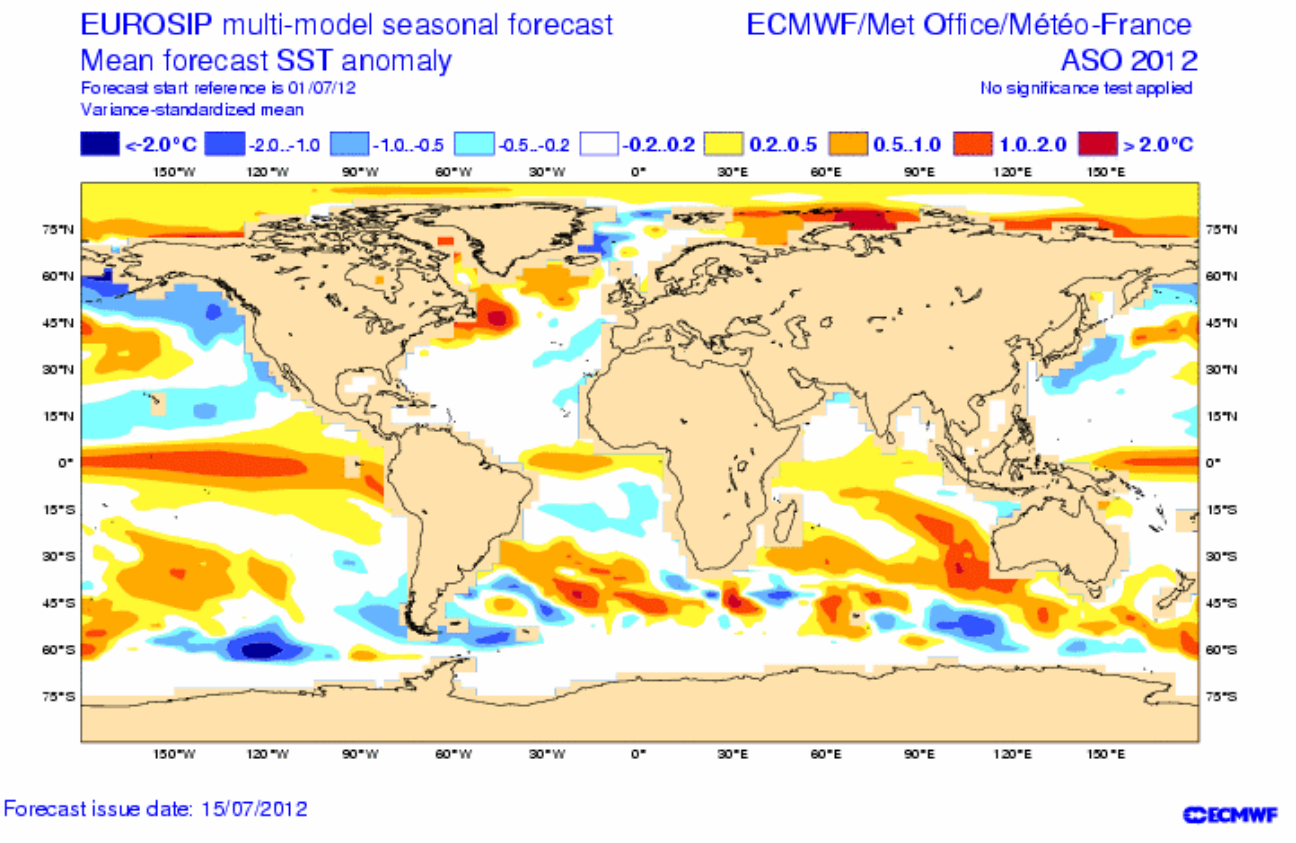


fig.14: SST Forecasted anomaly (in °C) from Euro-SIP valid for ASO, issued in July.

II.1.b ENSO Forecast :

Forecasted Phase for ASO : weak to moderate El Niño

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

For ASO : a large set of dynamical models give above normal conditions (sometime far above El Niño threshold) and continuation of the warming along fall period. For the statistical models, they are forecasting close to neutral conditions. So an El Niño event is likely expected for the end of this year.

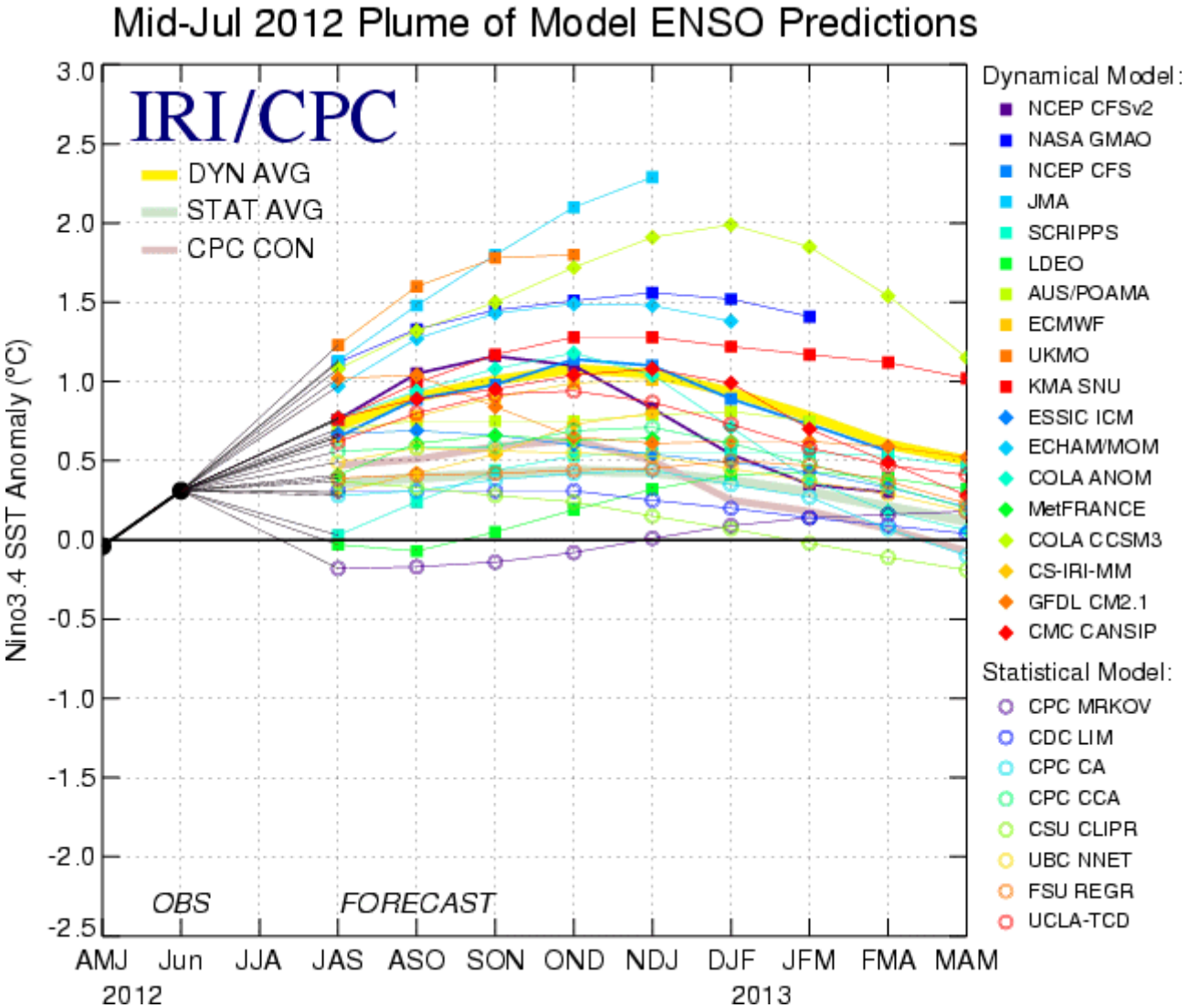


fig.15: Synthesis of Niño 3.4 forecasts (120° to 165°W) issued in June by IRI :
http://iri.columbia.edu/climate/ENSO/currentinfo/SST_table.html

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	JAS	ASO	SON	OND	NDJ	DJF	JFM	FMA	MAM
Value « La Niña » Value « El Niño »	*-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*	*-0,40* *0,40*
Average, statistical models	*0.4*	*0.4*	*0.4*	*0.4*	*0.4*	*0.4*	*0.3*	*0.2*	*0.1*
Average, dynamical models	*0.7*	*0.9*	*1*	*1.1*	*1*	*0.9*	*0.8*		
Average, all models	**0.6**	**0.7**	**0.8**	**0.9**	**0.8**	**0.7**	**0.6**	**0.4**	**0.3**

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.

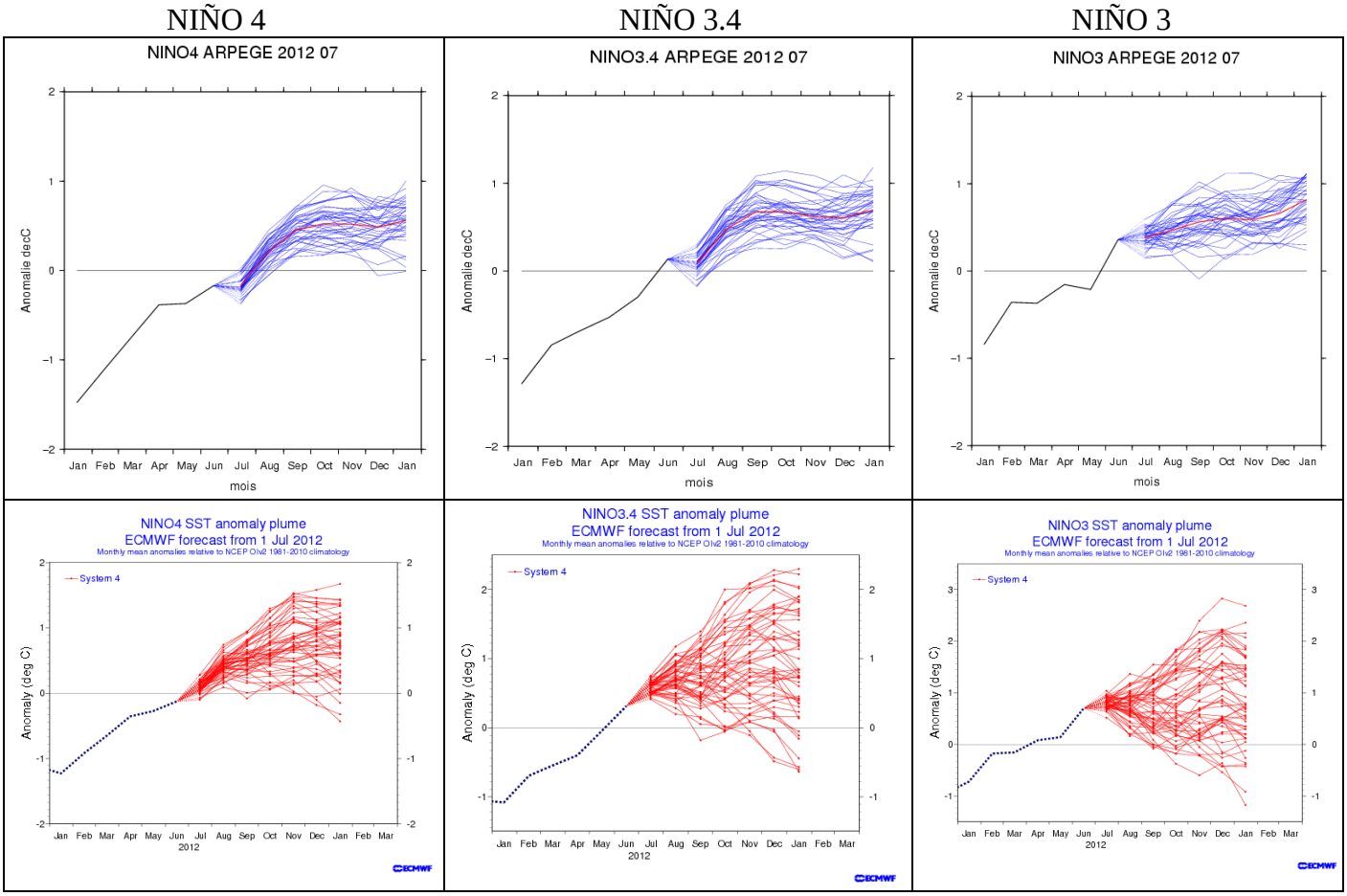


fig.16: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (bottom) issued in July, monthly mean for individual membres. (http://www.ecmwf.int/)

II.1.c Atlantic Ocean forecasts :

Forecasted Phase: *Close to normal in the Northern/Southern Tropics*

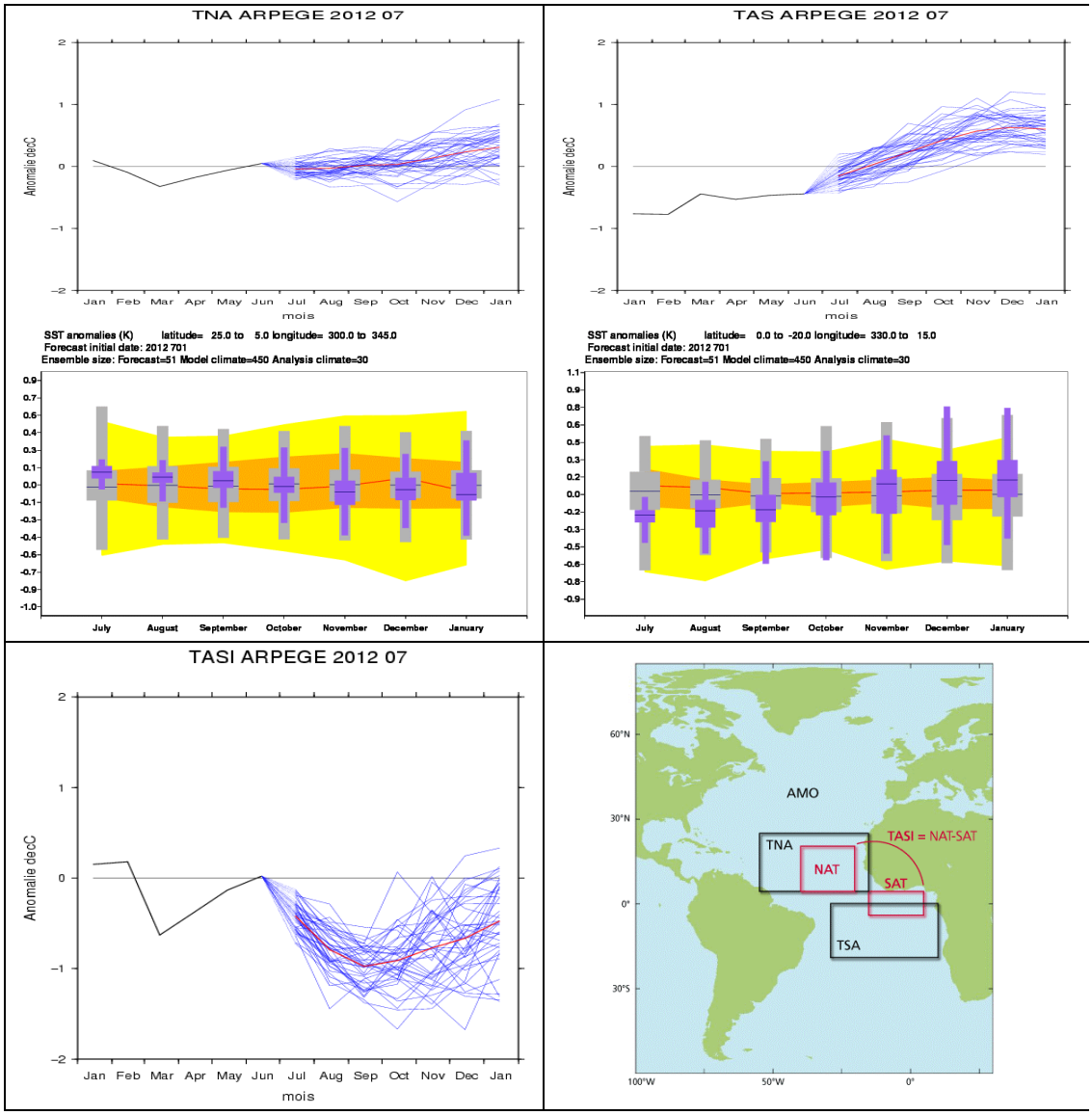


fig.17: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, issued in July, plumes / climagrams correspond to 41 / 51 members and monthly means.

North Tropical Atlantic : in both models close to normal conditions with a slight but continuous warming in MF.
South Tropical Atlantic : in both models same time tendency starting with slightly cold conditions and a continuous warming leading to warmer than normal conditions at fall (in MF) or winter (ECMWF).
TASI : the TASI index is negative (likely related to the MF warm bias). But, looking to ECMWF, remark very similar behaviour of TNA and TSA (with a more rapid warming in TSA). So TASI should change from positive to negative phase for the end of the year.

II.1.d Indian Ocean forecasts :

Forecasted Phase: *Positive phase of the IOD ?*

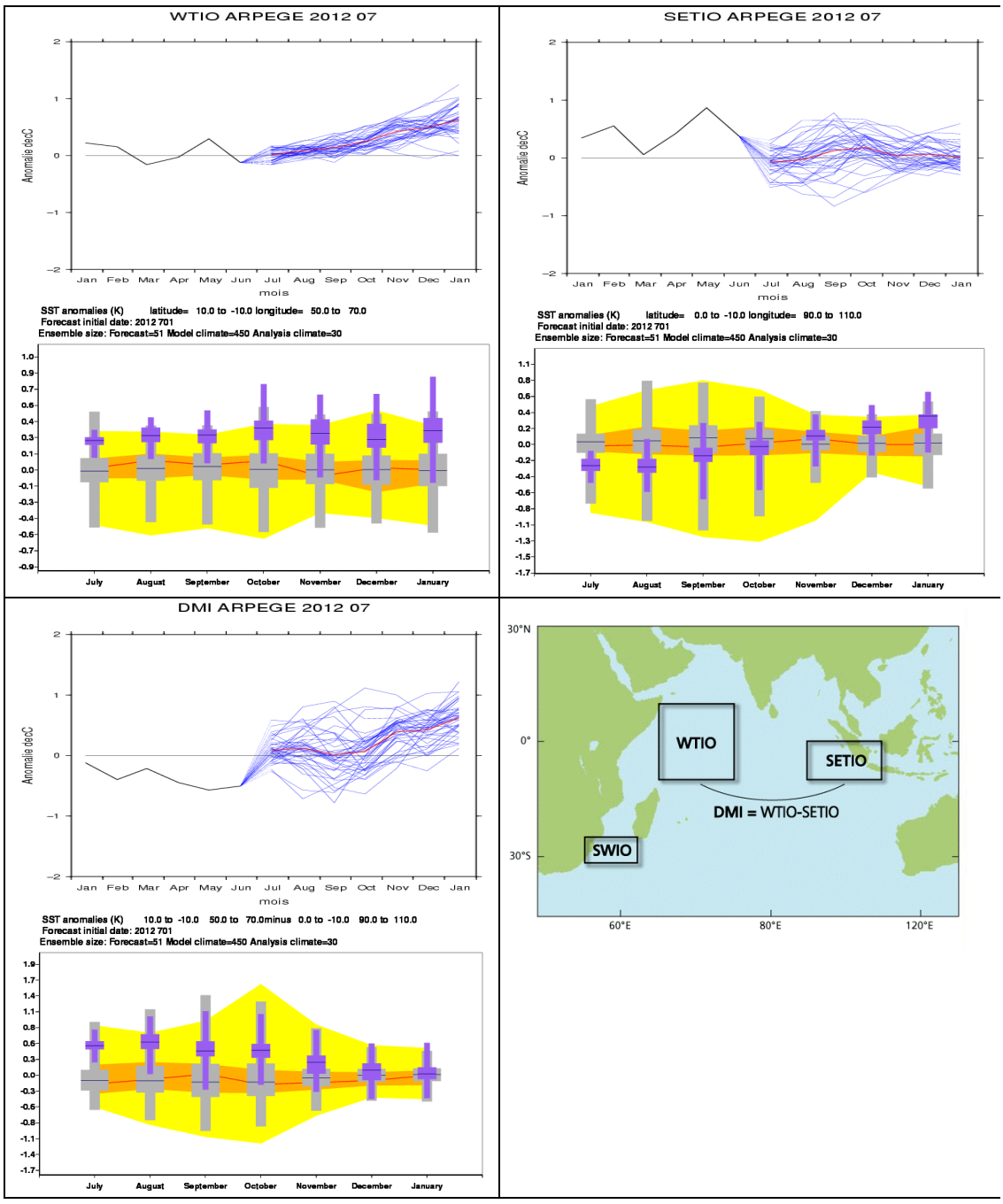


fig.18: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, issued in July, plumes / climagrams correspond to 41 / 51 members and monthly means.

In WTIO : MF start close to normal and indicates a warming along the period. ECMWF is warmer than normal and quite stable along the period.
In SETIO : Colder than normal in ECMWF and close to normal in MF. More spread in SETIO than in WTIO.
DMI : Not so much consistency between the 2 models. Positive phase then close to normal in ECMWF and close to normal then positive phase in MF (large spread in MF and less spread in ECMWF).

II.2. GENERAL CIRCULATION FORECAST

II.2.a Global Forecast

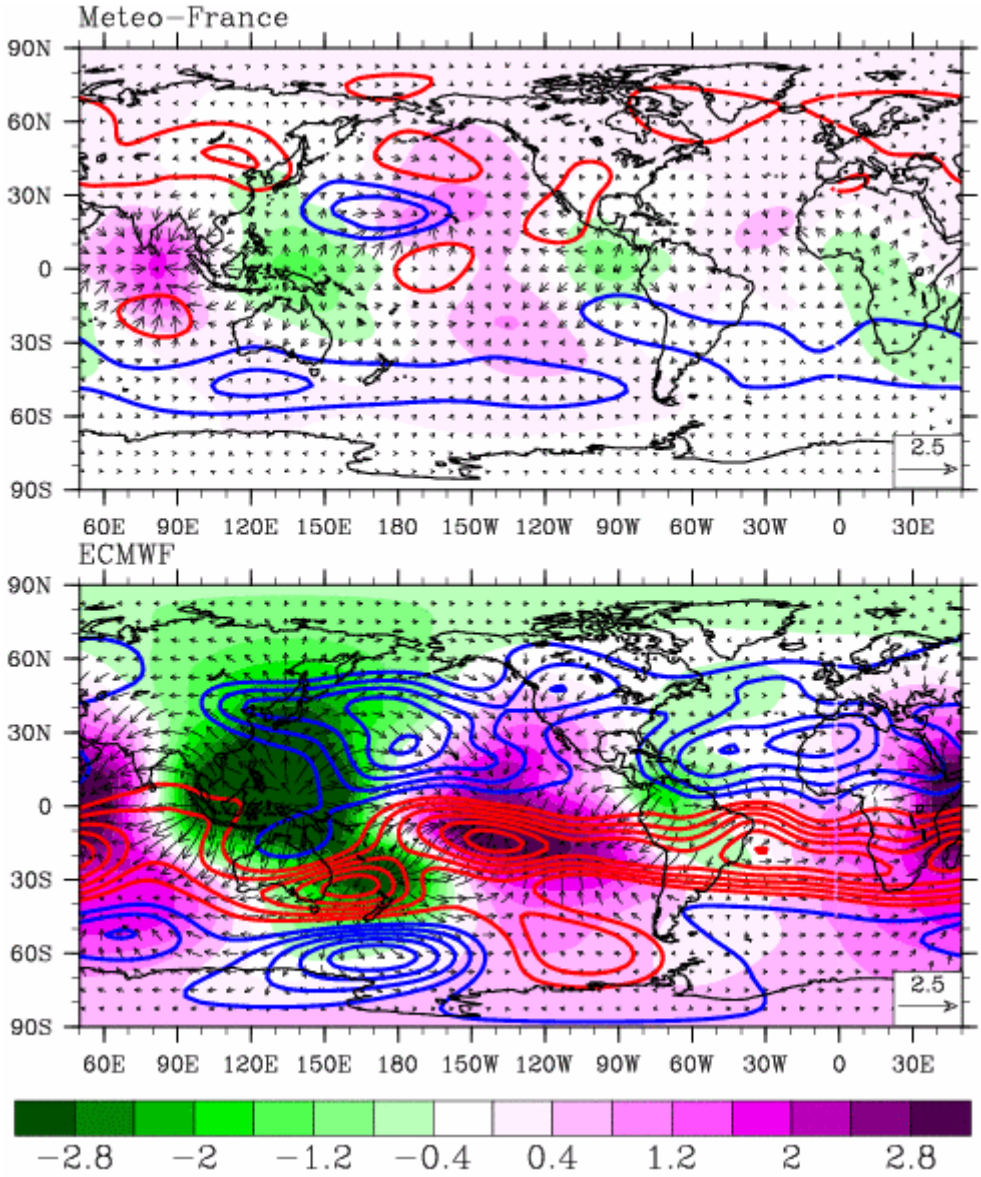


fig.19: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), asociated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa for ASO, issued in July by Météo-France (top) and ECMWF (bottom).

Velocity potential anomaly field (cf. fig. 19 – insight into Hadley-Walker circulation anomalies) :
in the Tropics a 3 wave number pattern in both models (ECMWF and Meteo-France) and a stronger atmospheric response in ECMWF vs. MF. Velocity Potential anomalies not fully consistent with an El Niño development (possibly in relationship with still a weak ocean/atmosphere coupling).
Over the Pacific : over the West Pacific very strong atmospheric response in ECMWF with a divergence anomaly (upward motion) very intense expanded in both hemisphere in ECMWF. In MF basically same response but very weak. In addition a large difference on the Eastern part : weak divergence anomaly in MF while it is stronger and Eastward shifted in ECMWF. Convergent circulation anomaly (downward motion) close Hawaï (both models) and very differently located (in addition to the strength) in ECMWF (closer to equator and widely extended in southern hemisphere) while it is close to Austral Island in MF.

Over Indian Ocean : convergent circulation anomaly (downward motion) just South to India in MF while it is again stronger and westward shifted in ECMWF (western equatorial Indian Ocean).
Over Atlantic : convergent circulation anomaly (downward motion) over the North Tropical Atlantic in ECMWF (from 20° up to 30°N from West to East) and southward shifted (20°N) and located close to West Africa in MF. To be quoted the weak divergence anomaly (upward motion) close to Cameroun in both models.
Stream Function anomaly field (cf. fig. 19 – insight into teleconnection patterns tropically forced) :
In relationship with the large differences in the velocity potential anomalies, ther are large differences in the two models. Weak atmospheric response (to the exception of West Pacific) and signal mostly trapped within the Tropics in MF. Strong atmospheric response in ECMWF but signal also mostly trapped in the tropics and sub-tropics in the Northern hemisphere.
These differences could likely be related to model uncertainty and especially to differences in the sensitivity to oceanic forcing. In conclusion It's still difficult to infer a clear information about predictability in the mid-latitudes of the northern hemisphere.

II.2.b North hemisphere forecast and Europe

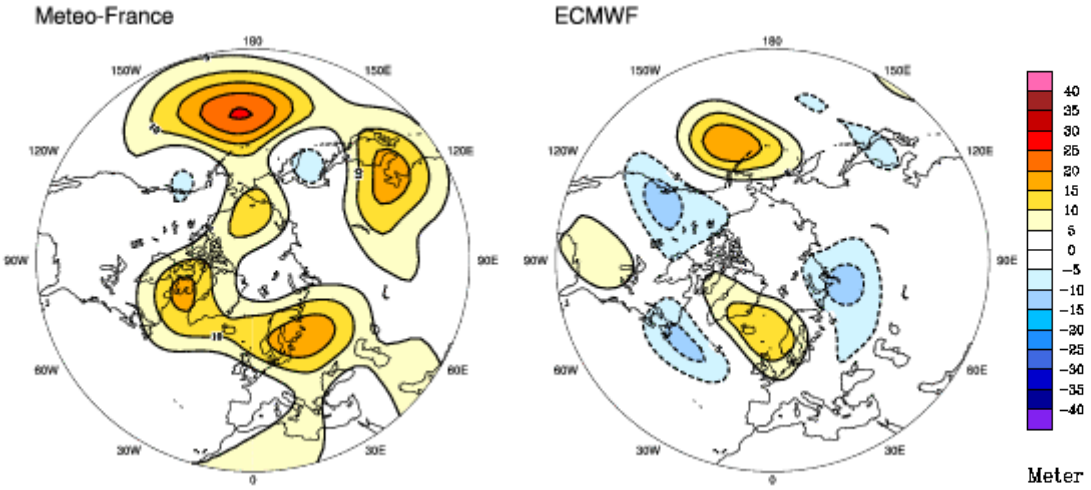


fig.20: Anomalies of Geopotential Height at 500 hPa for ASO, issued in July from Météo-France (left) and ECMWF (right).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip

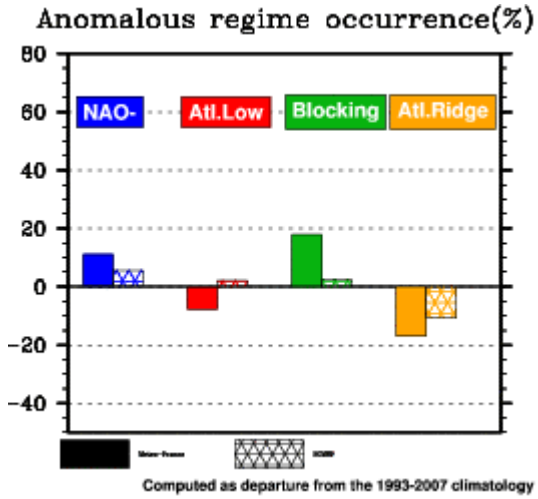


fig.21: North Atlantic Regime occurrence anomalies from Météo-France and ECMWF : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.

Geopotential height anomalies (fig. 20 – insight into mid-latitude general circulation anomalies) : to be quoted the PNA-like pattern in ECMWF and weak signal generally speaking. In MF most of the strong signal is part of the climate trend and weak signal elsewhere.
North Atlantic Circulation Regimes (fig. 21) : Some traces of consistency and some differences. The consistency is about the slight excess of NAO – regimes and deficit of Atlantic Ridge regimes. The difference is about the blocking (excess in MF, No signal in ECMWF) likely related to the unrealistic climate trend in MF.
General atmospheric circulation in MF in the low troposphere (see fig. 22) : consistent with deficit of Atlantic Ridge and also in some way with NAO – circulation regimes.

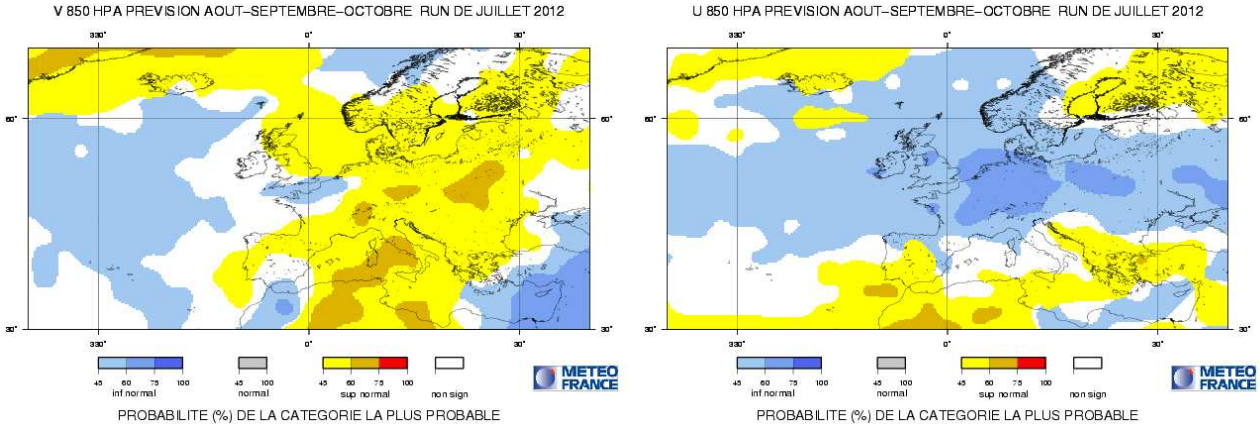


fig.22: Most likely category for the meridional (left) and zonal (right) wind at 850 hPa for ASO, issued in July from Météo-France.

II.3. IMPACT : TEMPERATURE FORECASTS

II.3.a ECMWF

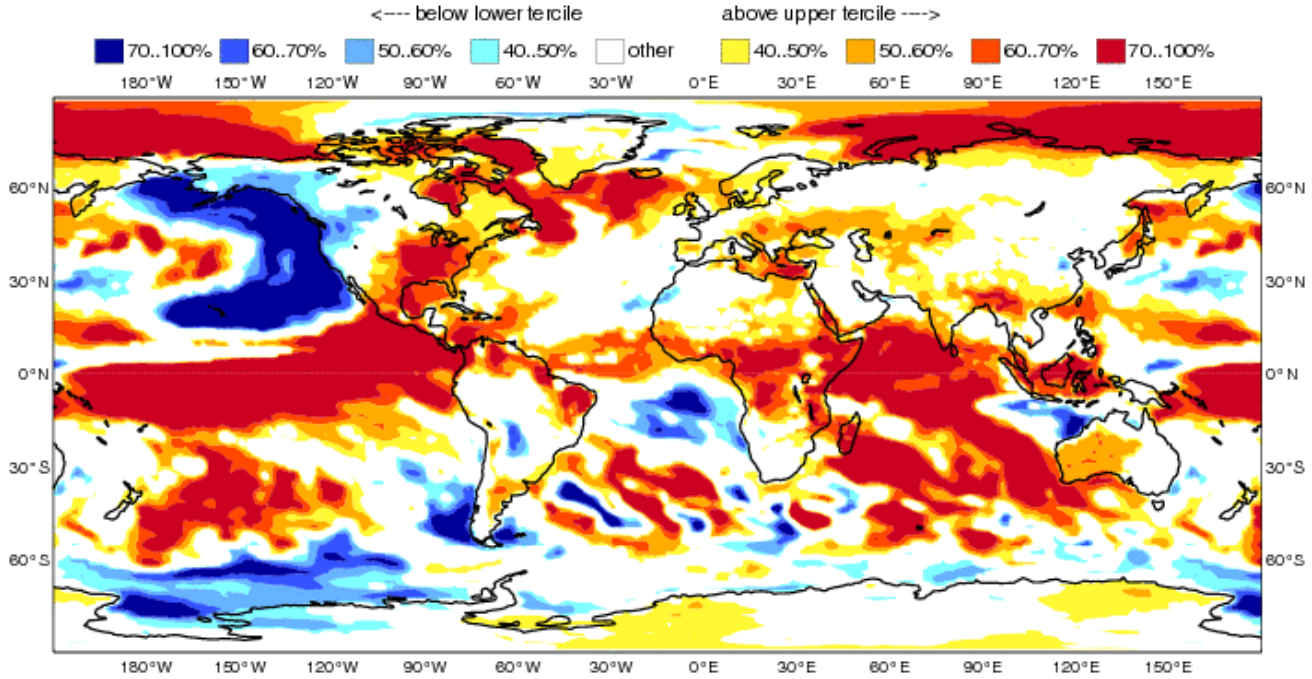


fig.23: Most likely category probability of T2m from ECMWF for ASO, issued in July. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

II.3.b Météo-France

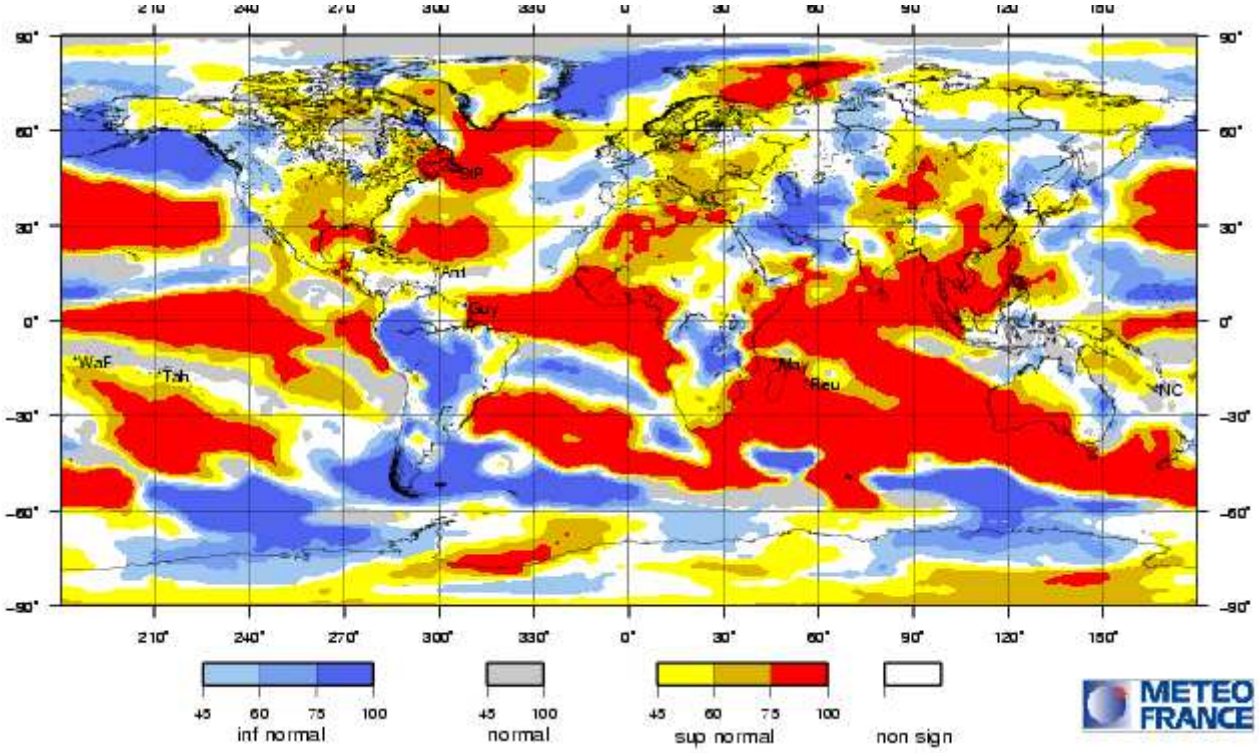


fig.24: **Most likely category of T2m for ASO, issued in July. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.** http://elaboration.seasonal.meteo.fr/

II.3.c Met Office (UKMO)

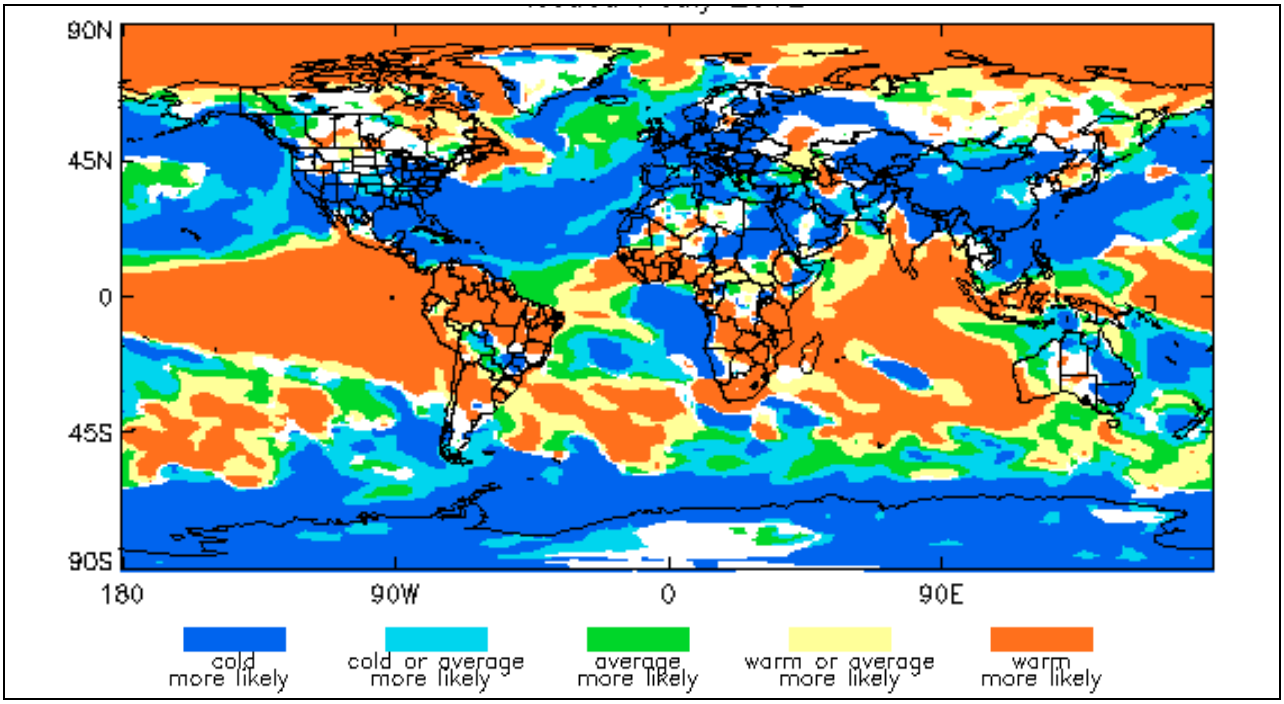


fig.25: **Most likely category of T2m for ASO, issued in July from UK Met Office. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.** http://www.metoffice.gov.uk/

II.3.d Japan Meteorological Agency (JMA)

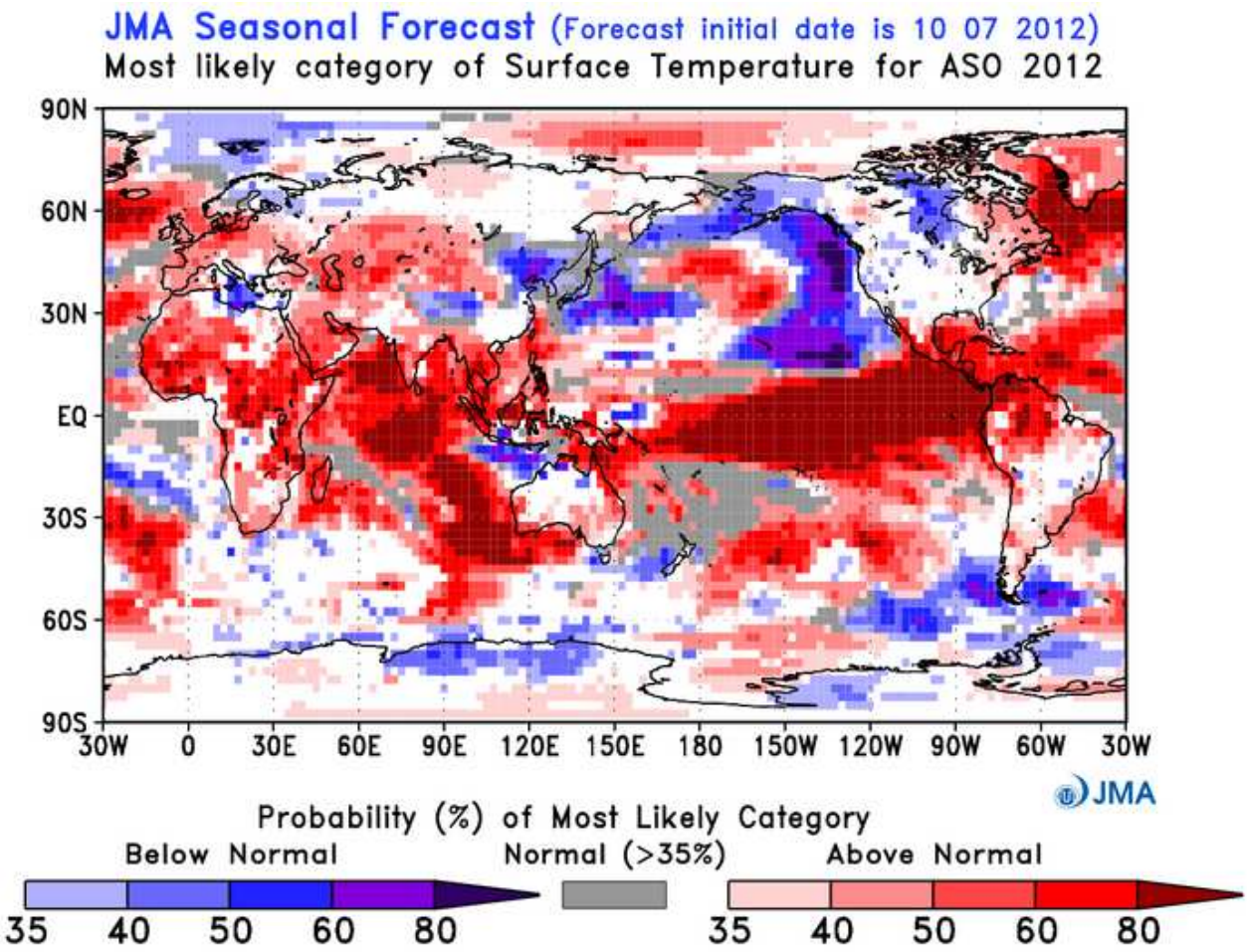


fig.26: Most likely category of T2m for ASO, issued in July from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.

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

II.3.e Euro-SIP

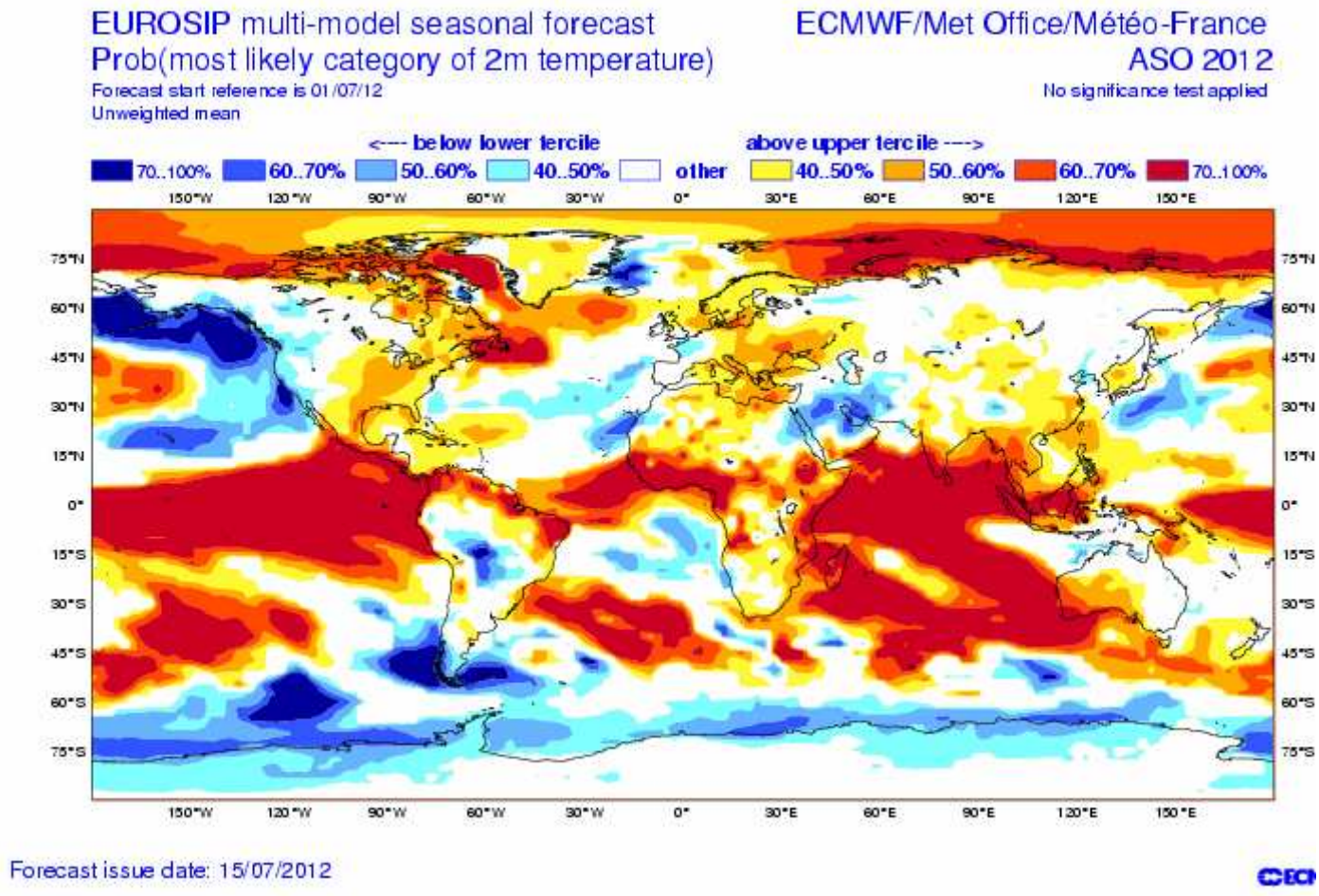


fig.27: Multi-Model Probabilistic forecasts for T2m from EuroSip for ASO, issued in July. (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).

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 Mexico and Central America. Below normal along the western coast.
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 below 30°N and especially over South-East Asia. Above normal conditions over India likely related to forecasted rainfall deficit. Below normal conditions over the Arabic Peninsula and Iran.
Africa : Warmer than normal conditions over most of the continent.
Europe : mostly Above normal conditions everywhere excepted over Spain, France and Benelux. Strong signal over Mediterranean regions and central Europe.
Also to be quoted the above normal conditions over Barents sea and Greenland (see obs. of sea-ice).

II.3.f International Research Institute (IRI)

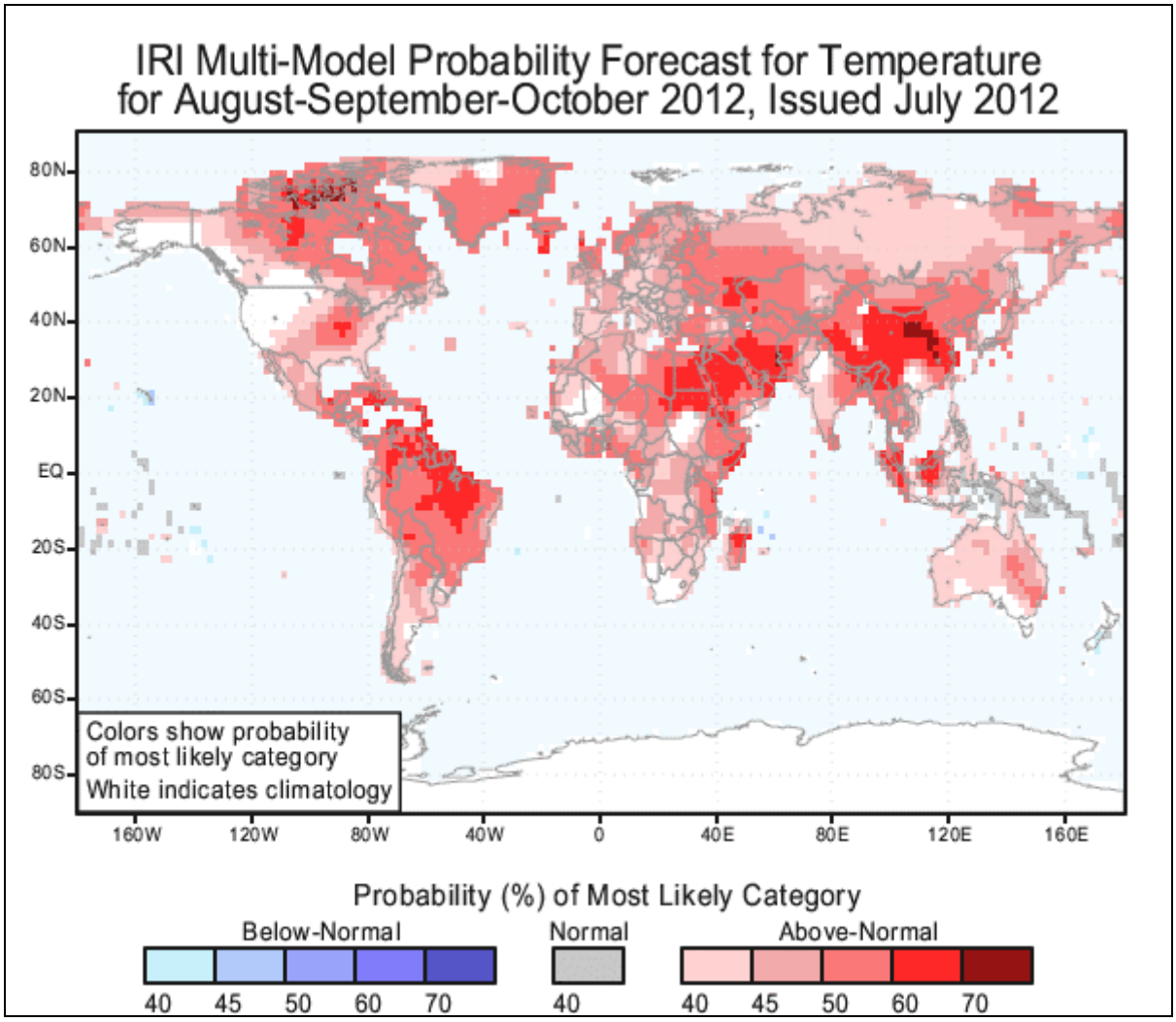


fig.28: Most likely category of T2m for July-August-September, issued in June from the IRI multi-model ensemble. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://iri.columbia.edu/climate/forecast/net_asmt/

The IRI forecast privileges the Above Normal scenario more or less everywhere (trace of the climate change signal ?). So the largest differences with Euro-SIP are over regions where Euro-SIP forecast Below Normal conditions.
For Europe, the tendency for Above normal conditions everywhere (to the exception of Spain, France and Benelux where there is more uncertainty – see Euro-SIP) and especially the strong signal over Eastern Mediterranean regions and central Europe are confirmed.
Still warmer than normal conditions expected over Greenland (see sea-ice section).

II.4. IMPACT : PRECIPITATION FORECAST

II.4.a ECMWF

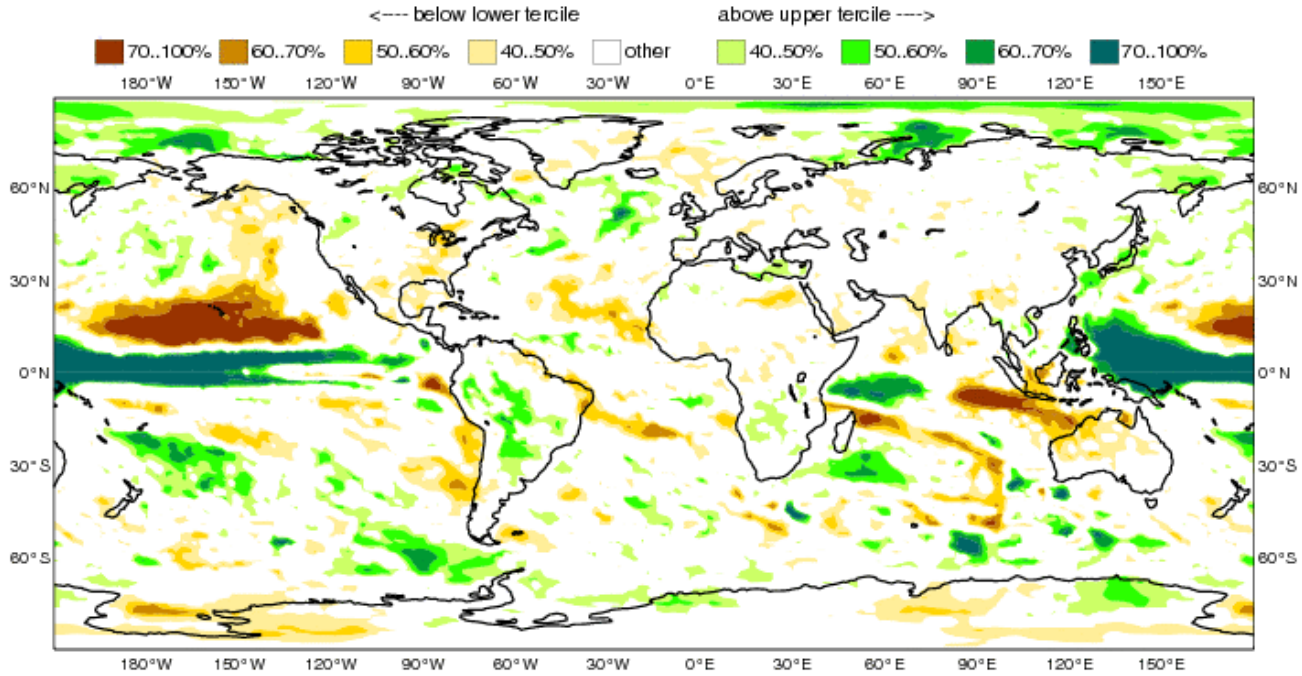


fig.29: Most likely category probability of rainfall from ECMWF for ASO, issued in July. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/charts/seasonal_charts_s2/

II.4.b Météo-France

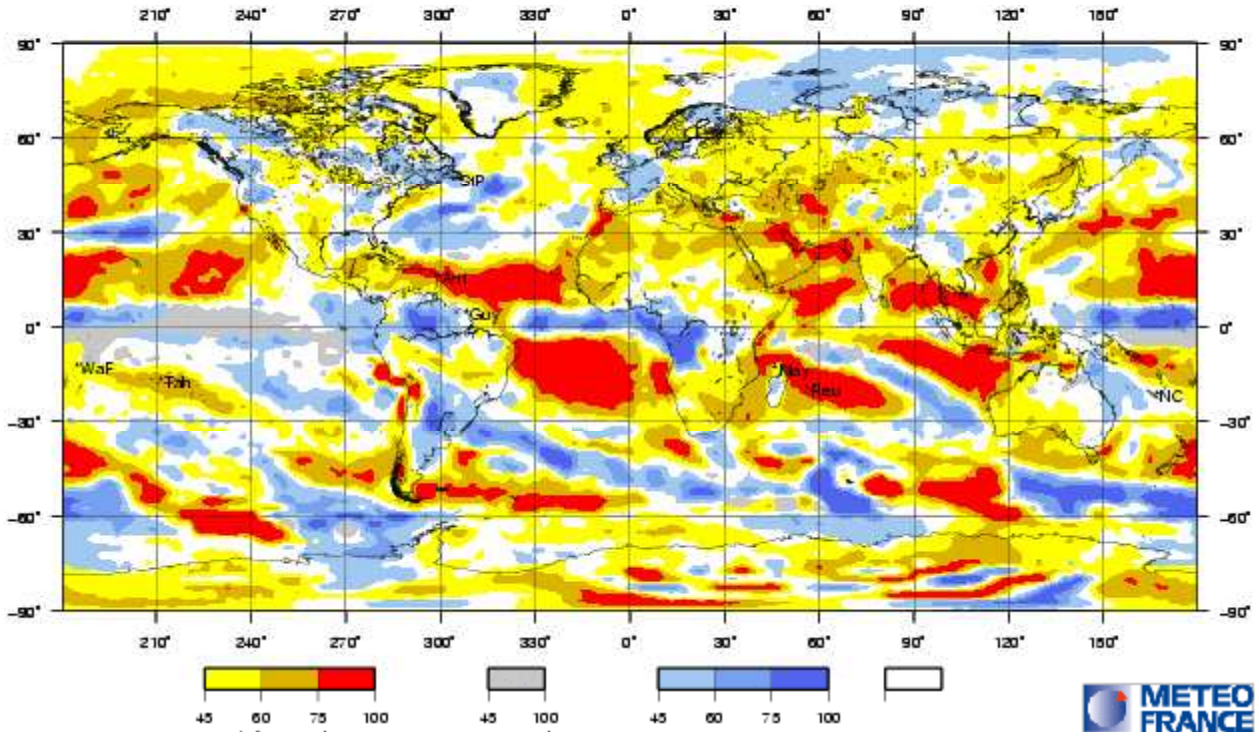


fig.30: Most likely category of Rainfall for ASO, issued in July. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Met office (UKMO)

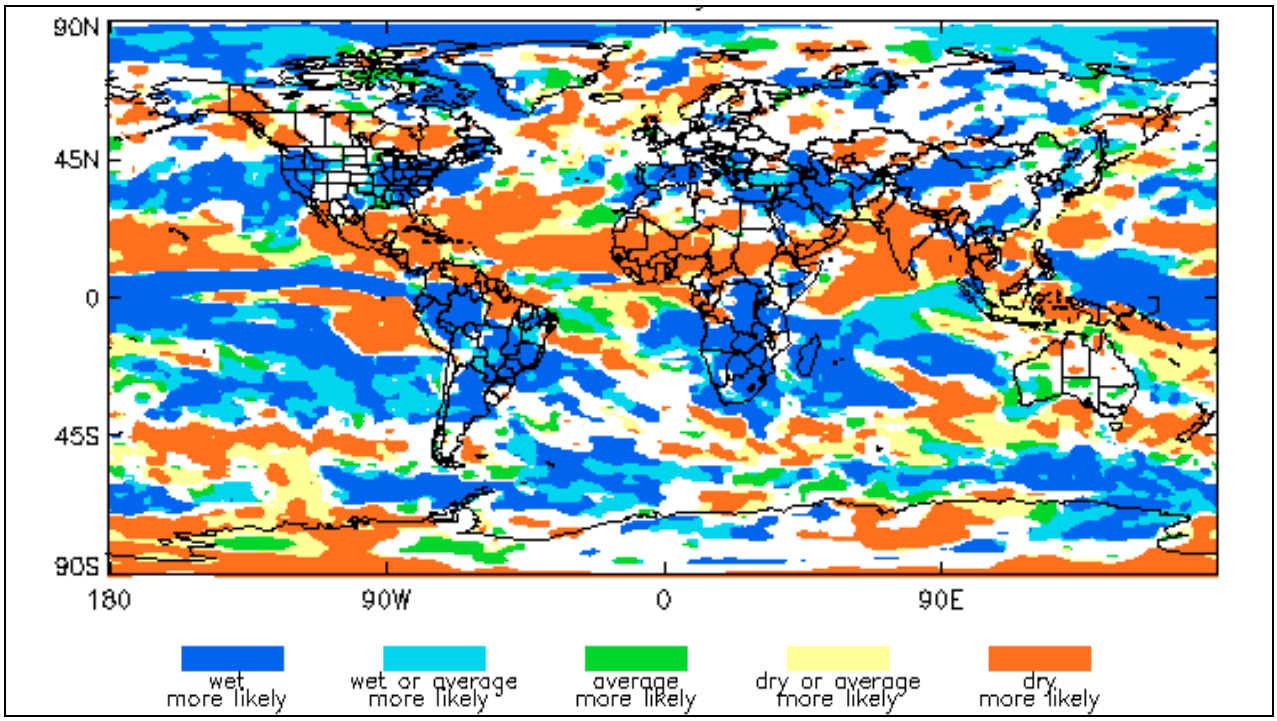


fig.31: Most likely category of Rainfall for ASO, issued in July from UK Met Office. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://www.metoffice.gov.uk/

II.4.d Japan Meteorological Agency (JMA)

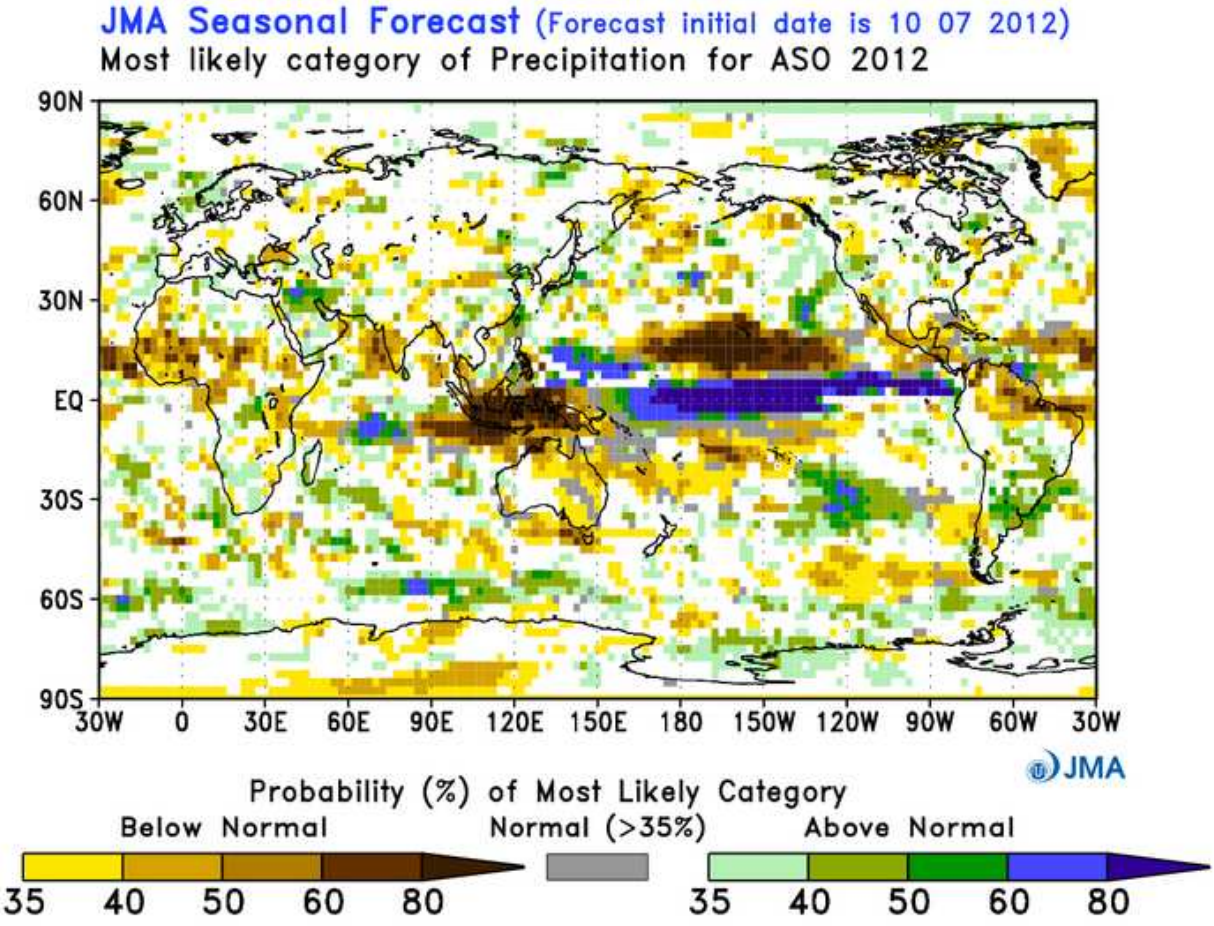


fig.32: Most likely category of Rainfall for ASO, issued in July from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.html

II.4.e Euro-SIP

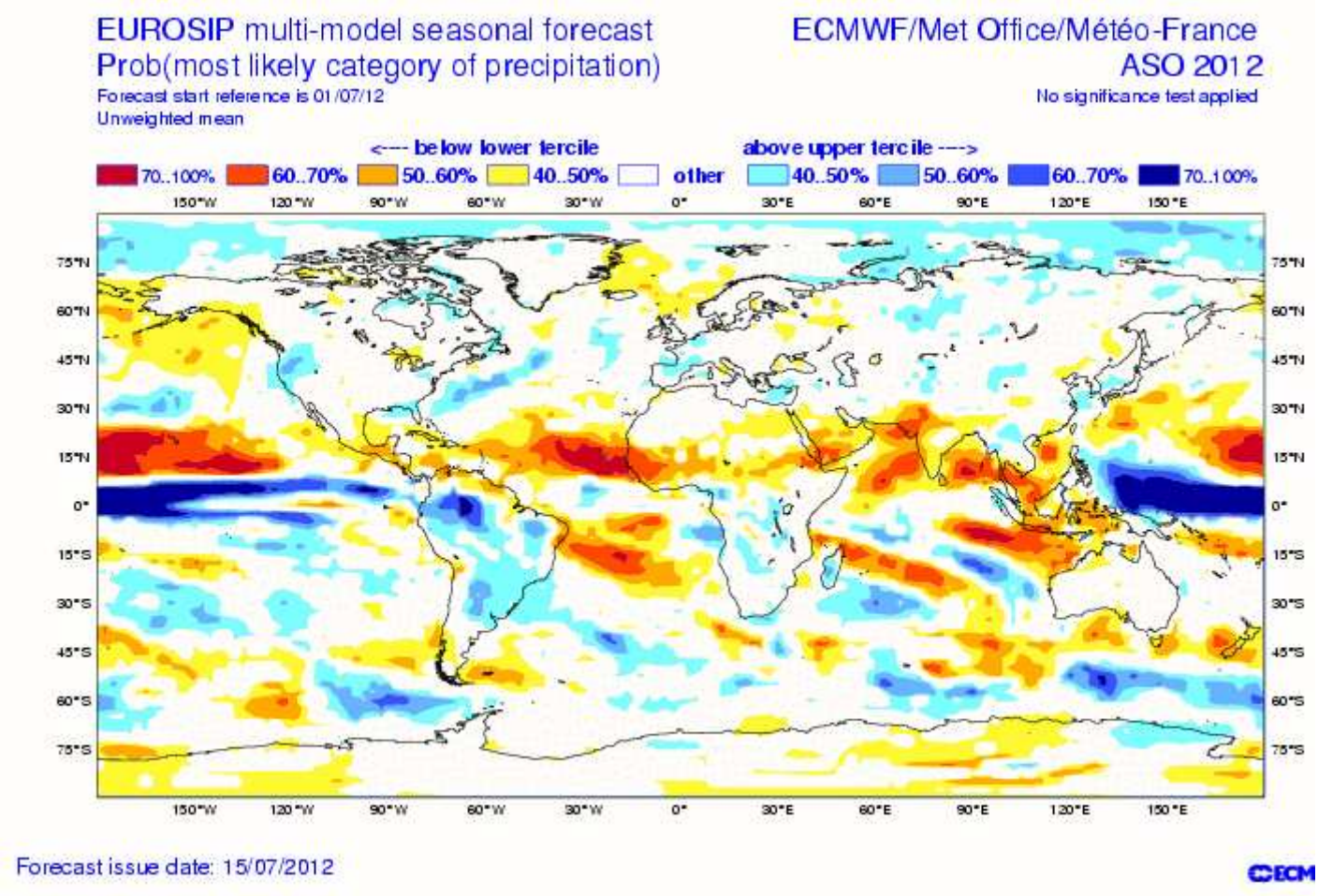


fig.33: Multi-Model Probabilistic forecasts for precipitation from EuroSip for ASO, issued in July. (2 Categories, Below and Above normal – White zones correspond to No signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmv2/param_euro/seasonal_charts_2tm/

Some consistent signal in the Tropics : Central America, West Africa, Arabic Peninsula India and maritime continent (Below normal scenario), most part of South America and Pacific equatorial waveguide (Above normal scenario).
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 most of West Africa and especially over Sahelian regions (likely in relationship with El Niño development).

II.4.f International Research Institute (IRI)

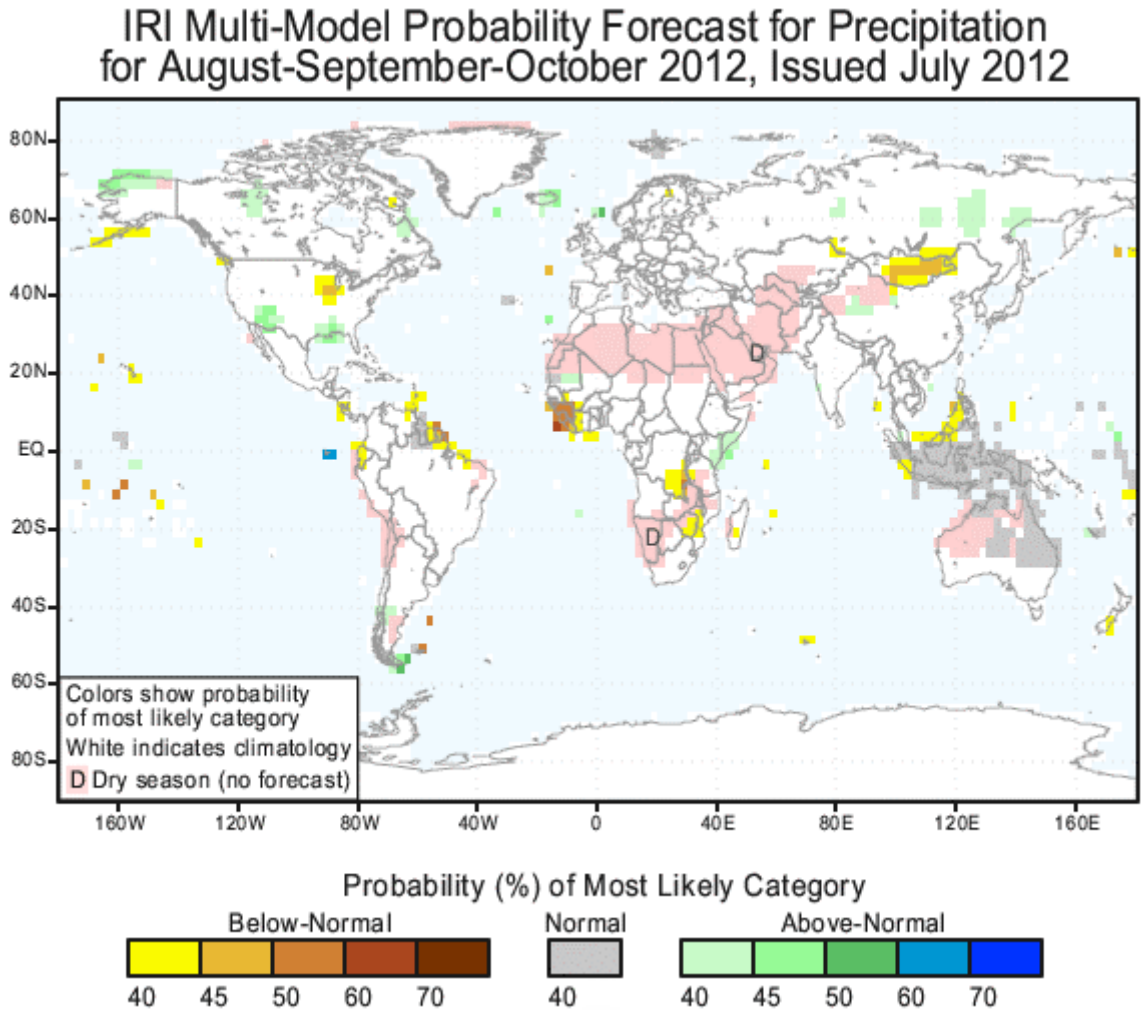


fig.34: Most likely category of Rainfall for July-August-September, issued in June from the IRI multi-model ensemble. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://iri.columbia.edu/climate/forecast/net_asmt/

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

II.5. REGIONAL TEMPERATURES

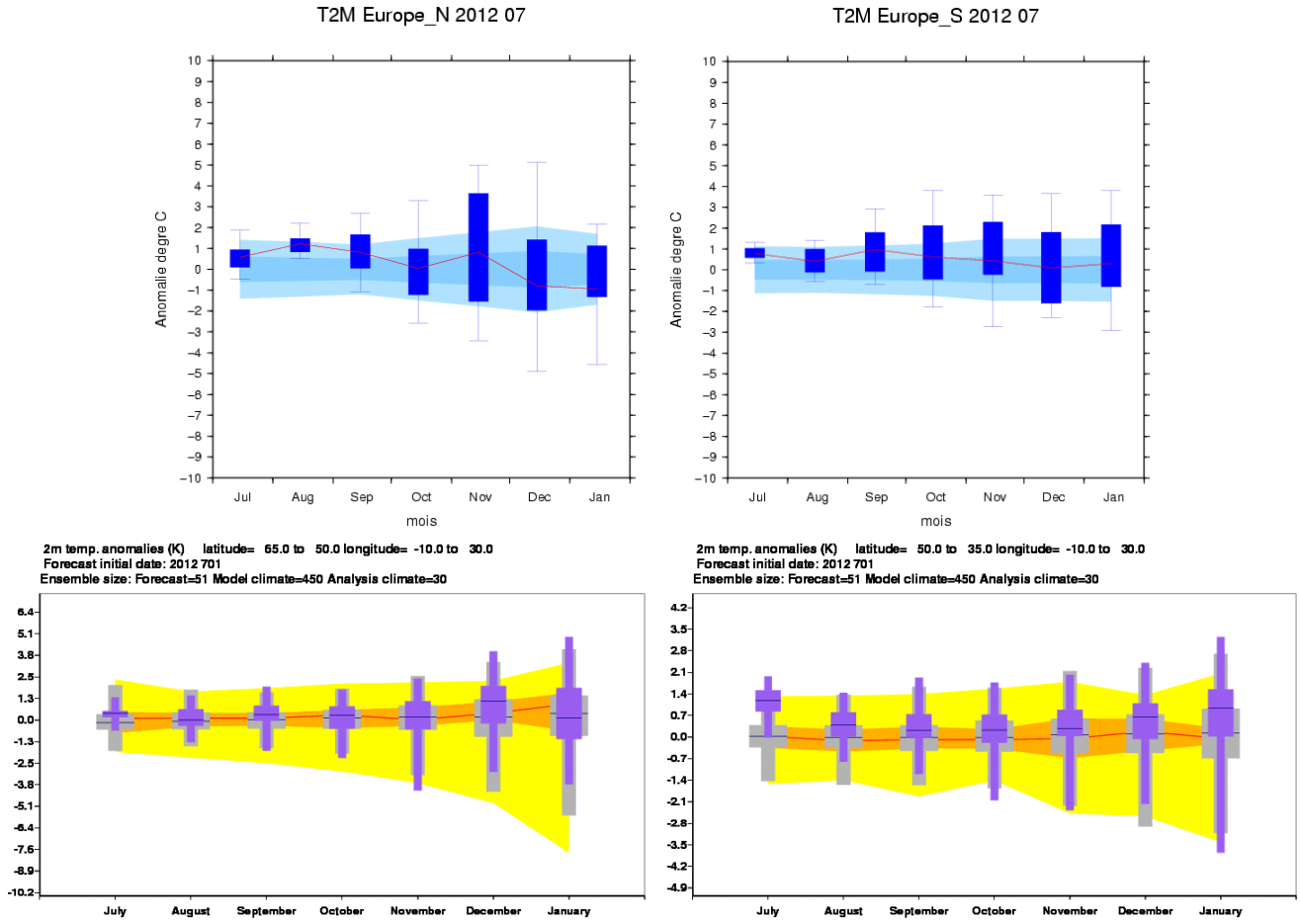


fig.35: Climagrams for T2m in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom) issued in July.

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 real from July to September (close or above 0.6) and then close to or worst than climatology.
For Southern Europe : some consistency for Above Normal for Above normal conditions in ASO. In MF, ROC skill from July 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

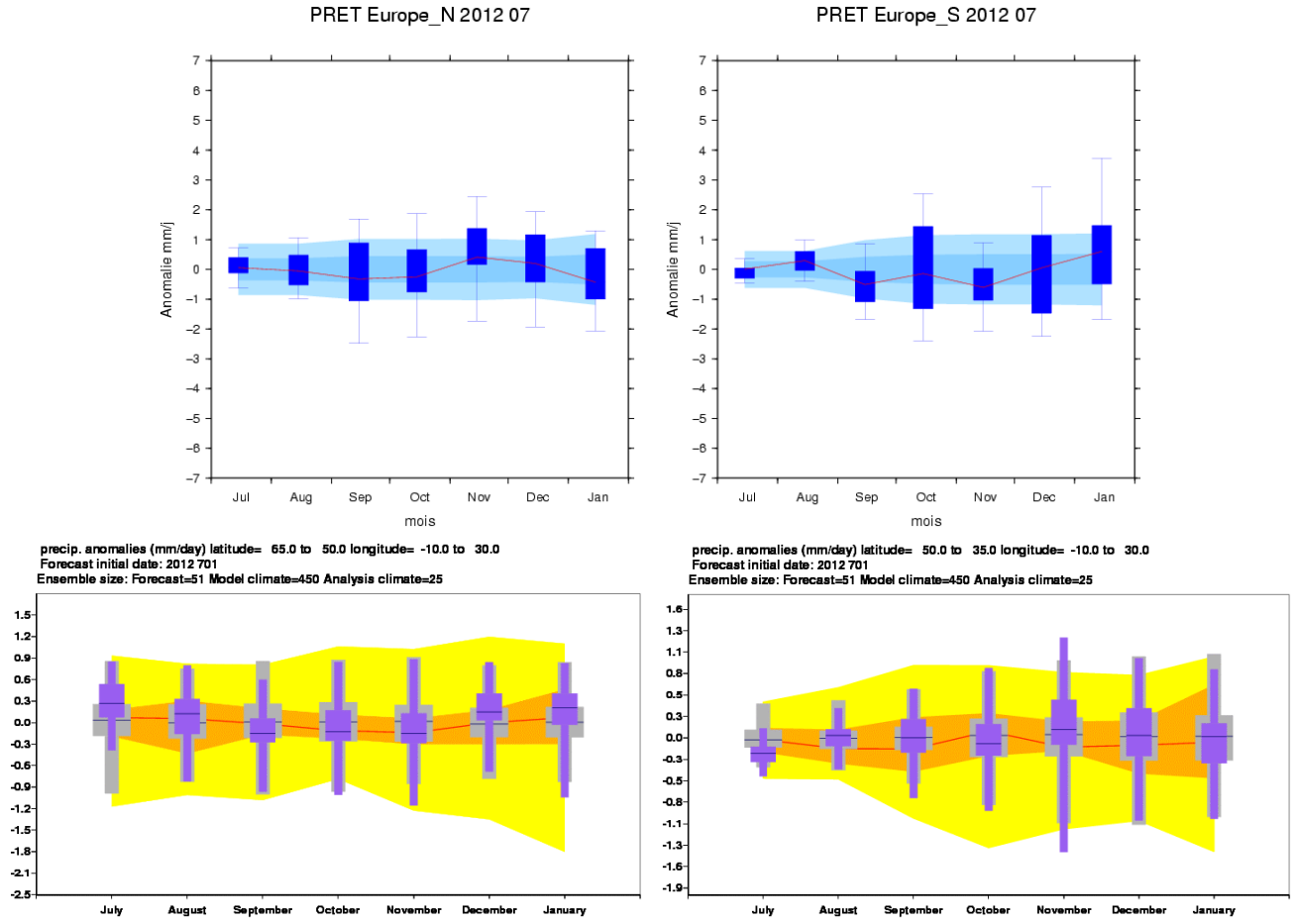


fig.36: Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom), issued in July.

For Northern Europe : basically both models give "No Signal" for ASO. In MF, ROC are close to 0.5 or worst than climatology (excepted in July).
For Southern Europe : little consistency between the 2 models. However both models tend to Above normal conditions in August while there is "No Signal" in October (and different forecast in September). In MF, ROC scores show some skill in July and then scores 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

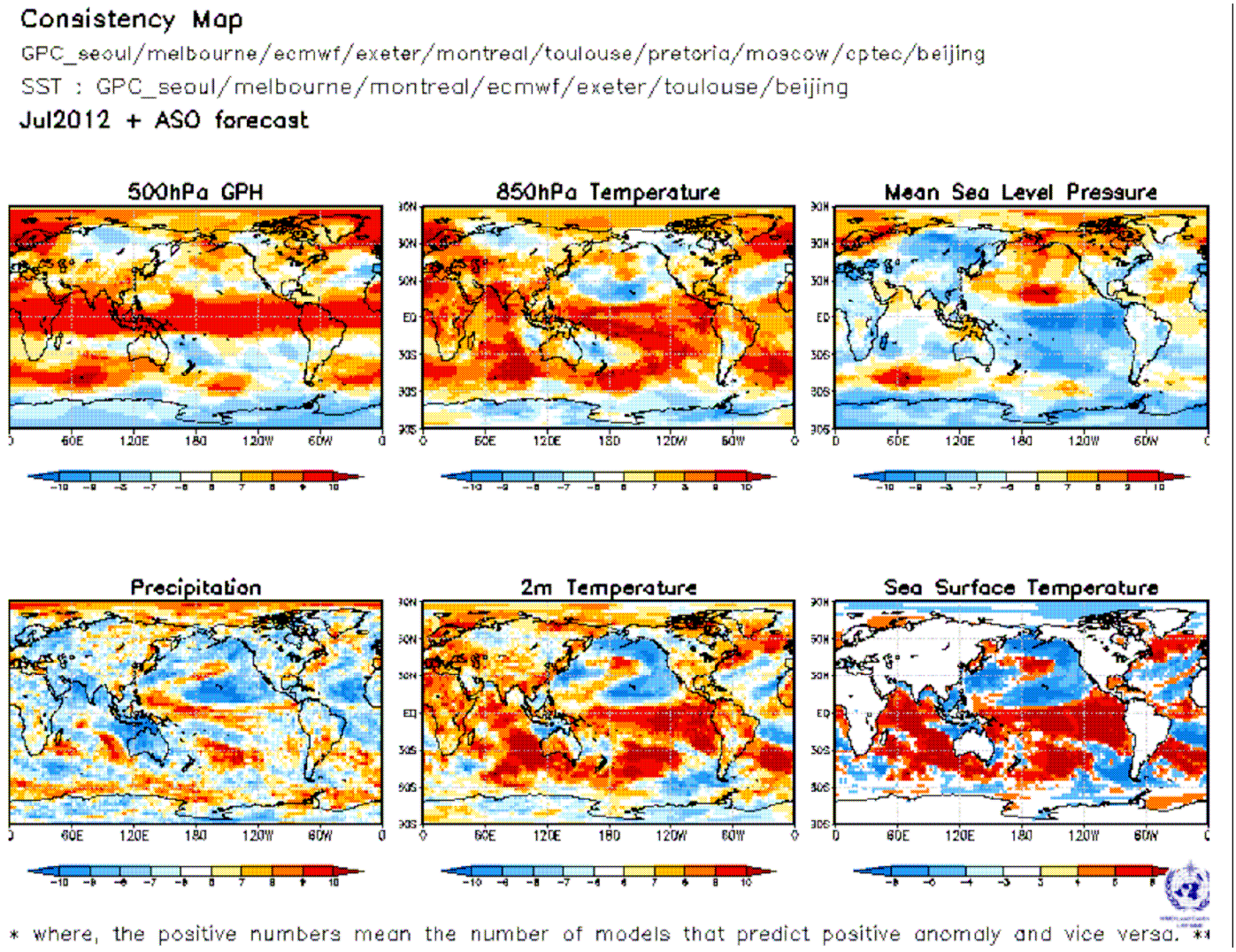


fig.37: GPCs Consistency maps from LC-MME http://www.wmolc.org/

For Z500 : some consistency over the North Atlantic high latitude and Northern Europe (Above normal conditions).
For T2m : some consistent signal over Eastern Europe (Above normal scenario) and the eastern part of the Mediterranean basin. Some similarity with Euro-SIP (South America, US and Central America, Africa, Australia and South-East Asia and India).
For precipitation : less consistency but some trace of Below normal conditions over Central and Eastern Europe and Above normal scenario on the South-Western part of the Mediterranean basin. Some similarity with EuroSIP over Africa, South America, India and Indonesia and Equatorial Pacific.

II.7. "EXTREME" SCENARIOS

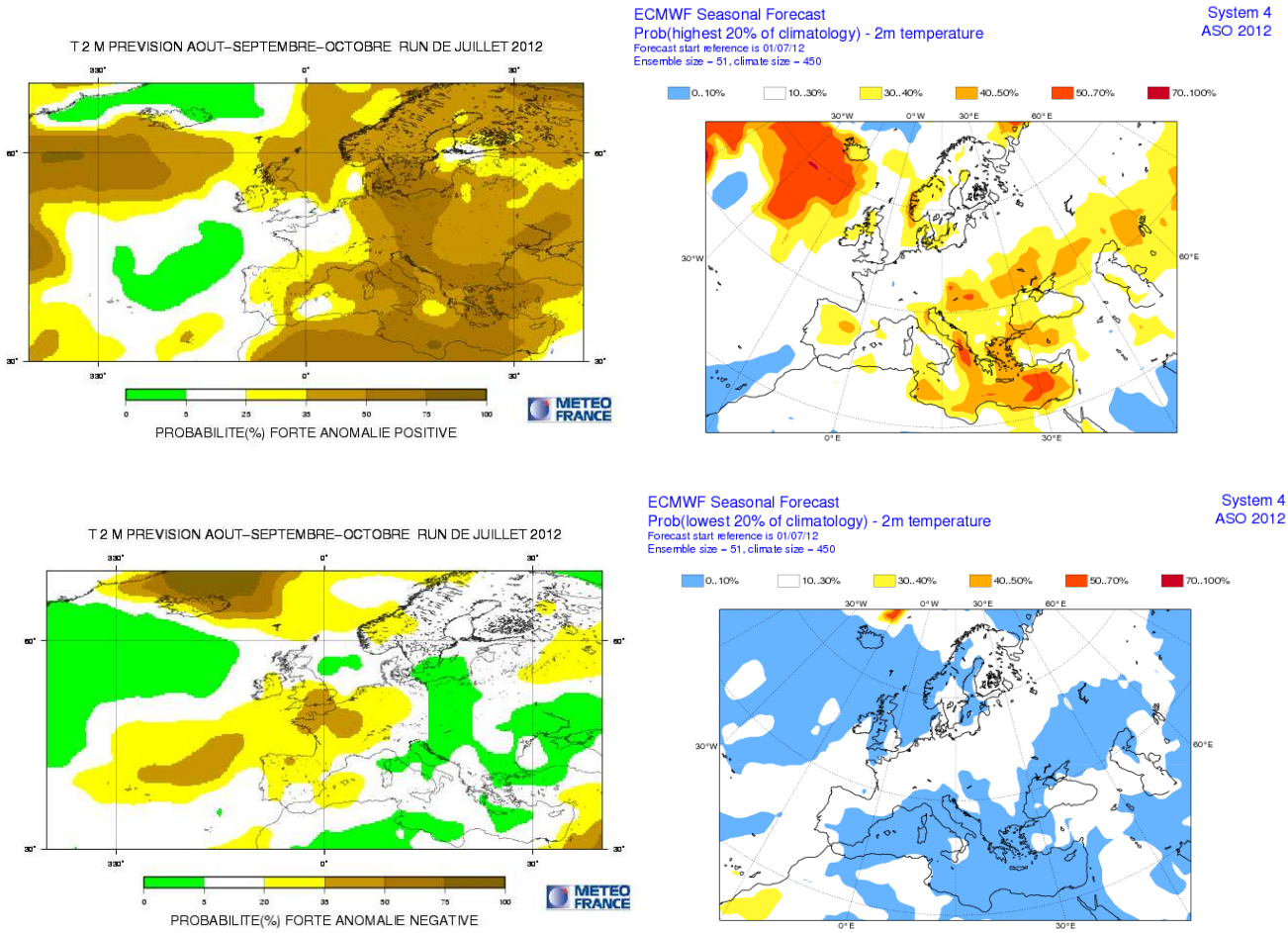


fig.38: Top : Probability of « extreme » above normal conditions for T2m for Meteo-France (left - highest ~15% of the distribution) and ECMWF (right - highest 20% of the distribution).
Bottom : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the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

Very consistent signal over South Eastern Europe (and the Mediterranean basin) 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 for the very Above scenario is clearly above climatology (locally it can reaches 0.8) over South-East Europe. To be notice that there is some lack of skill on the most Northern part of Europe (especially Scandinavia).
For the very Below scenario the scores are better than climatology only on the western Mediterranean sea and UK.

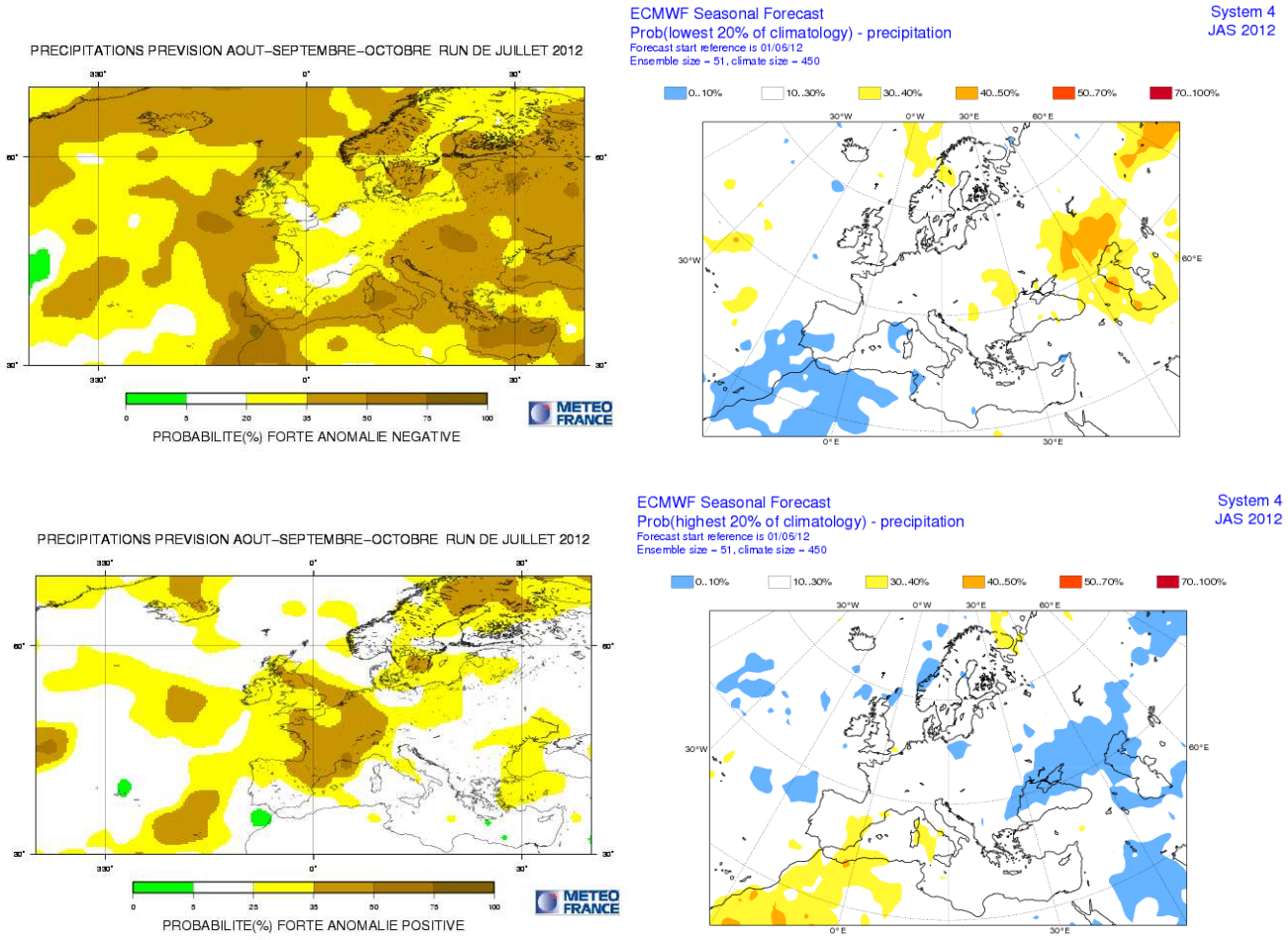


fig.39: Top : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the distribution) and ECMWF (right - lowest 20% of the distribution)
Bottom : Probability of « extreme » Above normal conditions for rainfall for Meteo-France (left - highest ~15% of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

No consistency for very Below Normal scenarios (excepted for regions close to the Caspian Sea).
For the very Above scenario, no more consistency.
ROC scores are close or than climatology for these scenarios (to the exception of limited numbers of grid points). When adding the consideration about the rainfall predictability, it's seems difficult to infer any useful information from these forecast.

II.8. DISCUSSION AND SUMMARY

Forecast over Europe

The first comment is about the predictability. Referring to the general Circulation discussion, it seems difficult to clearly infer a for Europe. This could correspond to the poor consistency between the 2 models in terms of atmospheric response to the oceanic forcing (and Z500 forecasts).
For temperature, whatever the reasons, the Above Normal scenario makes sense for most of Southern European and Central Europe countries. For the North-Eastern Europe and regions close to France ; there is more uncertainty. 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

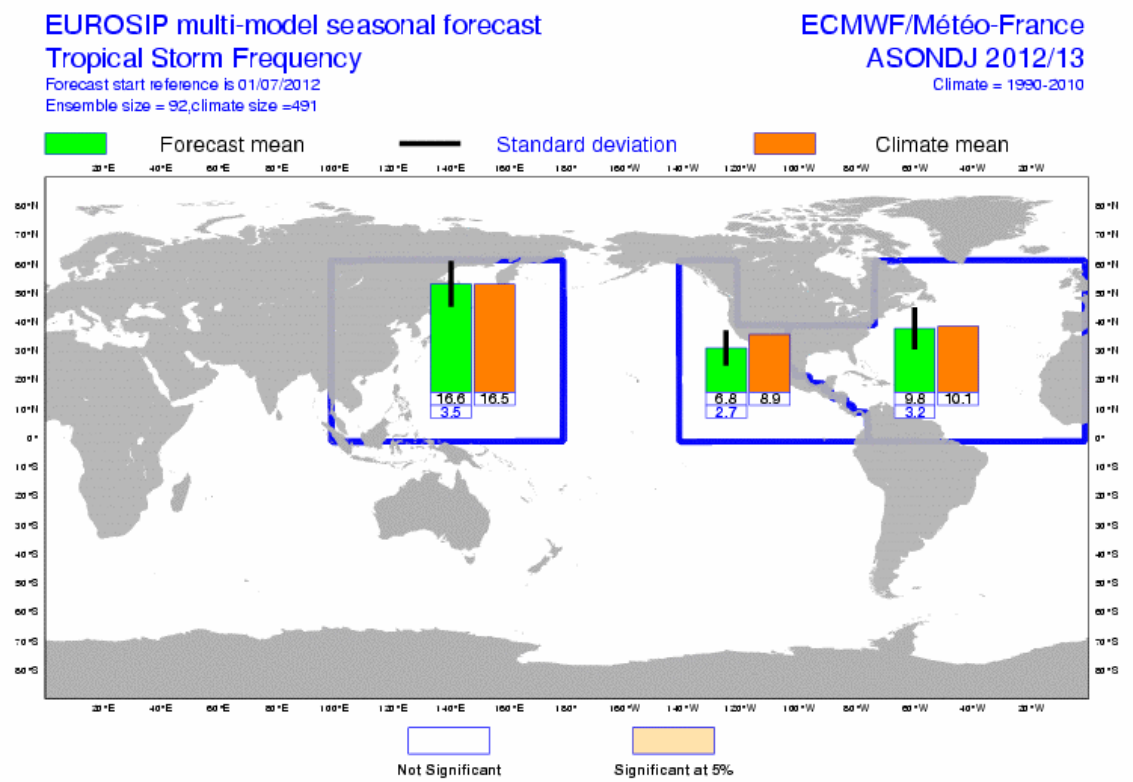


fig.40: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF) for the August 2012 to January 2013 period, issued in July.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtrop/trop_euro/eurosip_tropical_storm_frequency/

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

Synthesis of Temperature forecasts for August-September-October 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	no privileged	above normal
privileged scenario by RCC-LRF node	***no privileged scenario***	***above normal***	***above normal***	***no privileged scenario***	***above normal***

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

WMO RA VI
Pilot RCC-Network

Synthesis of Rainfall forecasts for August-September-October 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	below normal	below normal	below normal
Met Office	no privileged	above normal	no privileged	no privileged	above normal
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).

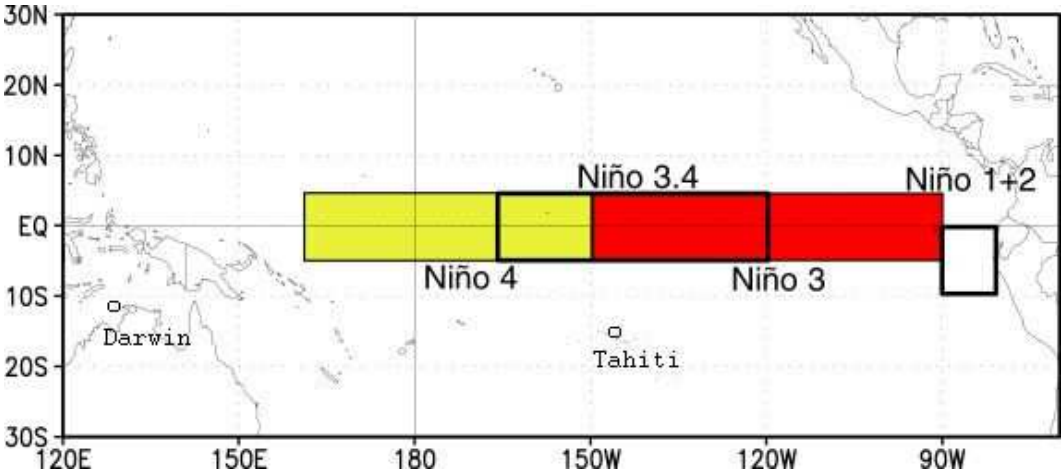
In order to better interpretate the results, it is recommended to look to verification maps and graphs which give some insight into the expected level of skill for a specific parameter, region and period. A set of scores is presented on the web-site of the Lead-Centre for Verification (see http://www.bom.gov.au/wmo/lrfvs/)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