WMO RA VI Pilot RCC-Network

METEO FRANCE Toujours un temps d'avance

GLOBAL CLIMATE BULLETIN n°160 - OCTOBER 2012

Table of Contents

I. DESCRIPTION OF THE CLIMATE SYSTEM (AOUT 2012) 3
I.1. OCEANIC ANALYSIS 3
I.1.a Global Analysis 3
I.1.b Pacific Basin (fig. 3, 4 and 5) 4
I.1.c Atlantic Basin 6
I.1.d Indian Basin 6
I.2. ATMOSPHERE 6
I.2.a Atmosphere : General Circulation 6
I.2.b Precipitation 8
I.2.c Temperature 8
I.2.d Sea Ice 9
II. SEASONAL FORECASTS FOR OND FROM DYNAMICAL MODELS 10
II.1. OCEANIC FORECASTS 10
II.1.a Sea Surface Température (SST) 10
II.1.b ENSO Forecast : 13
II.1.c Atlantic Ocean forecasts : 15
II.1.d Indian Ocean forecasts : 16
II.2. GENERAL CIRCULATION FORECAST 17
II.2.a Global Forecast 17
II.2.b North hemisphere forecast and Europe 18
II.3. IMPACT : TEMPERATURE FORECASTS 19
II.3.a ECMWF 19
II.3.b Météo-France 20
II.3.c Met Office (UKMO) 20
II.3.d Japan Meteorological Agency (JMA) 21
II.3.e National Centers for Environmental Prediction (NCEP) 22
II.3.f Euro-SIP 23
II.3.g International Research Institute (IRI) 24
II.4. IMPACT : PRECIPITATION FORECAST 25
II.4.a ECMWF 25
II.4.b Météo-France 25
II.4.c Met office (UKMO) 26
II.4.d Japan Meteorological Agency (JMA) 26
II.4.e Euro-SIP 27
II.4.f National Centers for Environmental Prediction (NCEP) 28
II.4.g International Research Institute (IRI) 29
II.5. REGIONAL TEMPERATURES 30
REGIONAL PRECIPITATIONS 31
II.6. MODEL'S CONSISTENCY 32
II.6.a GPCs consistency maps 32
II.7. "Extreme" Scenarios 33
II.8. DISCUSSION AND SUMMARY 35
Forecast over Europe 35

Tropical Cyclone activity 35
III. ANNEX 38
III.1. Seasonal Forecasts 38
III.2. « NINO » and SOI indices 38
III.3. Land Boxes 39

I. DESCRIPTION OF THE CLIMATE SYSTEM (AOUT 2012)

I.1. OCEANIC ANALYSIS

I.1.a Global Analysis

At the Surface (fig. 1) :

- Pacific Ocean :
  - In the Tropical Pacific : in the equatorial waveguide, the SST warming in the Eastern part stopped during August, even a cooling is observed. Anomalies are now negative n the far East of the equatorial waveguide. Slight warming in the western part of the basin
  - mid/high latitudes of the Northern hemisphere : important warning near off the US coast.

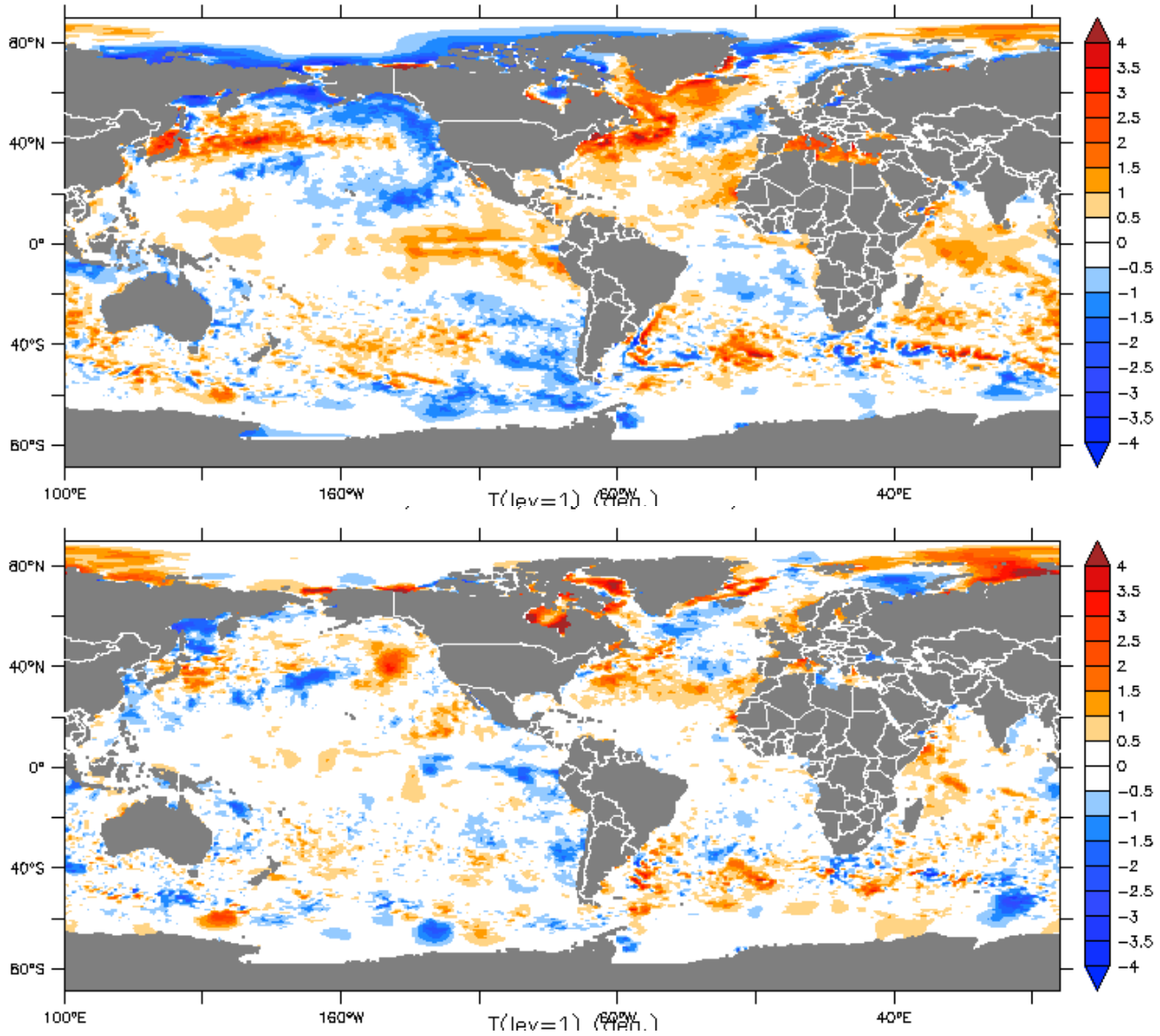


fig.1: **top : SSTs Anomalies in August 2012 (°C) (reference 1950-2008)**
bottom : SST tendency (current – previous month) http://bcg.mercator-ocean.fr/

- Atlantic ocean :
  - In the Tropics : little evolution with still a positive anomaly in the Guinean Gulf.
  - In the Southern hemisphere : still a dipole pattern (Colder / Warmer than normal) between the Tropics and the mid-latitudes.
  - In the northern hemisphere : warming along 30°N and cooling from Azores up to South of Greenland. The strong positive anomaly in the North-West Atlantic has strengthened.

- Indian Ocean : Mostly warmer than normal from West Australia up to the Great Horn of Africa. Cold anomaly near maritime continent. Warming tendency in the North-East part of the basin.

In subsurface (fig.2) :

- Pacific ocean : in the tropical waveguide, heat content anomalies have migrated westerly (cf I.1.b consistent with Nino boxes), negative tendency in the Eastern part.. Note still positive anomalies in the most Western part. In the high latitudes of the Northern hemisphere, great consistency with the surface signal.
- Atlantic ocean : important warming near 10°N. Still a strong anomaly near the Gulf Stream. Still positive anomalies from the Northern basin centre up to European coast. South Atlantic dipole is consistent with SST.
- Indian Ocean : good consistency with SST near equatorial waveguide and Australia. Important cooling west to Java and Sumatra.

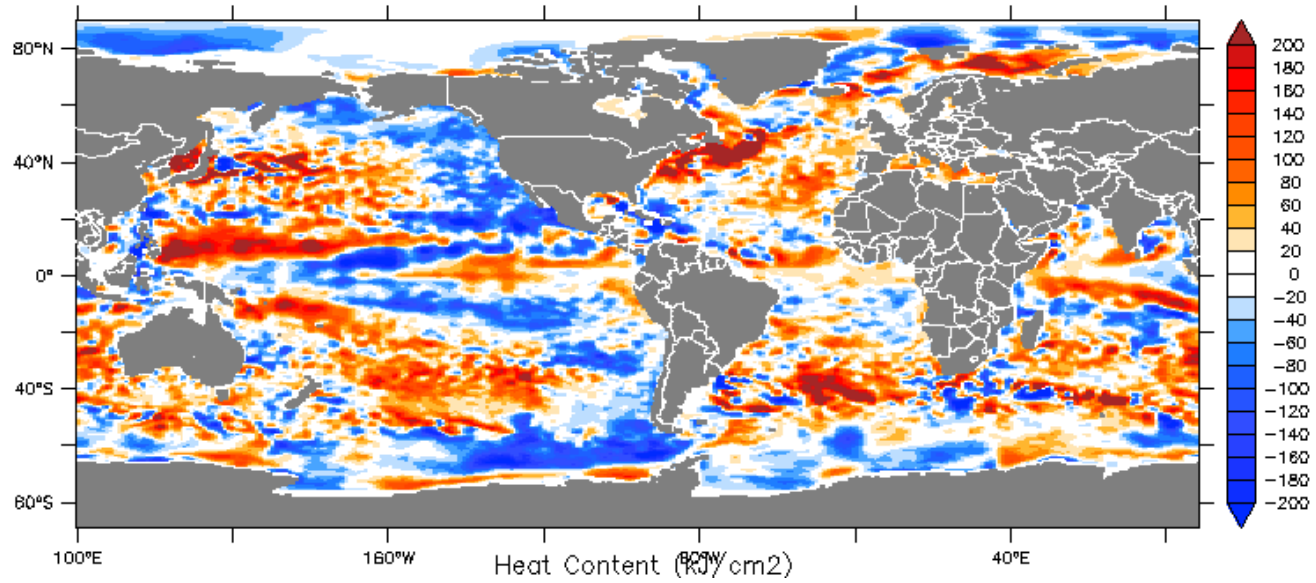


fig.2: map of Heat Content Anomalies (first 300m) in August 2012 (kJ/cm²). (reference 1950-2008)
http://bcg.mercator-ocean.fr/

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

The positive anomaly have moved westerly during August. In the far West of the basin, trade wind anomalies weaken.

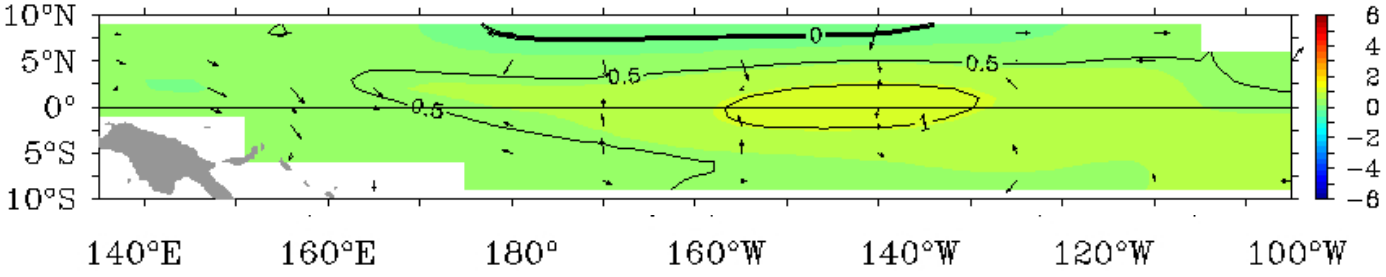


fig.3: SST Anomalies and Wind anomalies in August 2012 over the Equatorial Pacific from TAO/TRITON. http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/monthly-summary.html

In the Niño boxes (4, 3.4, 3 et 1+2 ; see definition in Annex) the SST anomalies illustrate the warming continuation in the west part and the cooling in tre East part. The monthly averages in August *(and their evolution during last month)* are respectively +0,4°C *(+0,4°C)*, +0,7°C *(+0,1°C)*, +0,7°C *(-0,3°C)* et +0,4°C *(-0,8°C)* from West to East.

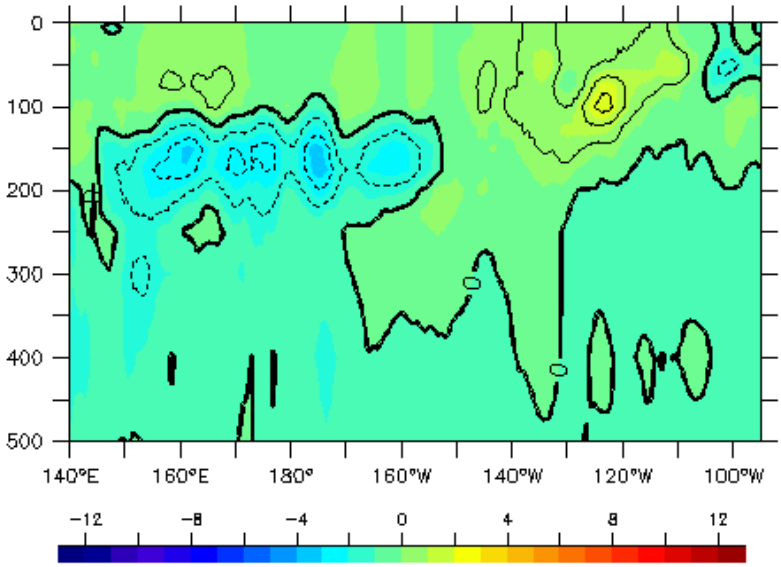


fig.4: Oceanic temperature anomaly in the first *500 metres* in the Equatorial Pacific, in August 2012 http://bcg.mercator-ocean.fr/

In the equatorial waveguide (fig. 4) : except close to the Eastern coast, persistence of warmer than normal conditions under the surface on the Eastern part, but the anomaly is weakening. Cooling on the most western part, but still a warm reservoir above 100m depth. In the Central part (close to the 150m depth) the negative anomaly is still developing.

The thermocline structure (fig. 5) : still deeper than normal over the eastern part and evolution to more shallow than normal in the central part.

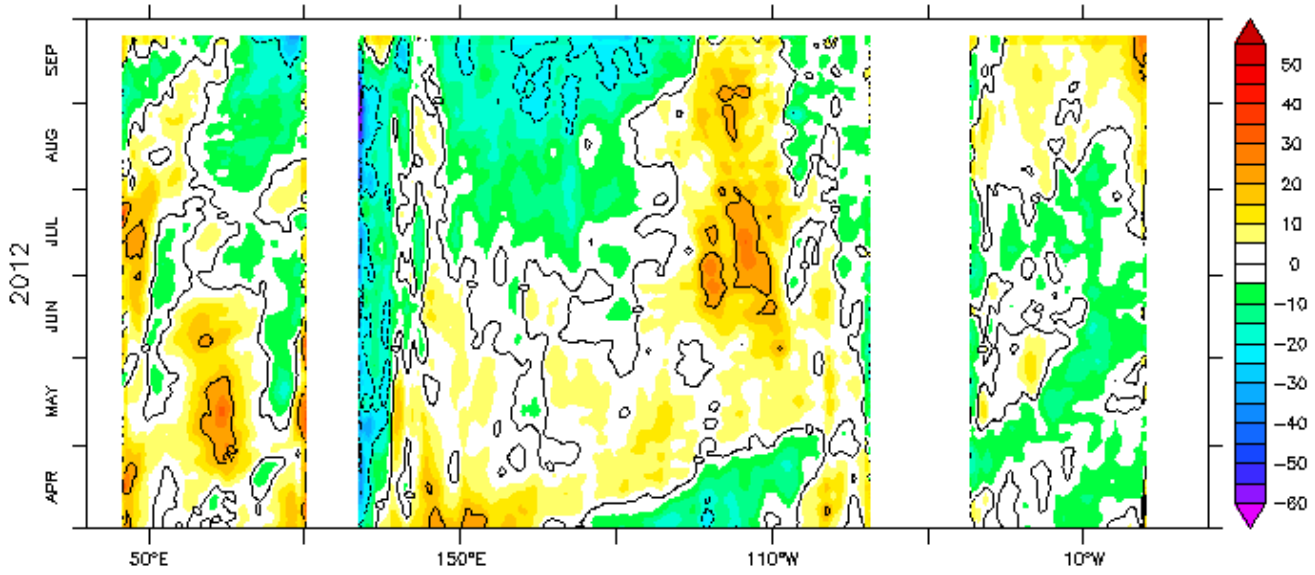


fig.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 12 month period. http://bcg.mercator-ocean.fr/

I.1.c Atlantic Basin

Cf. I.1.a.

I.1.dIndian Basin

Cf. I.1.a.

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) :

Weak wave structure, but it seems that the field can be analysed as a 3 wave number pattern.

- On the Pacific : weak anomalies, almost every divergent (upward anomaly motion). Still (but weakening) divergent circulation anomaly on the Western side (which extends northward, southward and interestingly toward the dateline). In the Eastern part, the anomaly is now negative (upward anomaly) west to Mexico.
- On the Atlantic : convergent circulation anomaly (downward anomaly motion) on Southern Atlantic which extends up to North-Eastern coast of South America (cold SST?). Divergent circulation anomaly over Central Africa.
- On the Indian Ocean : strong positive anomaly (convergent circulation anomaly - downward anomaly motion) north west of Sumatra, more intense than the previous month. MJO activity on the end of August could probably explain this anomaly.

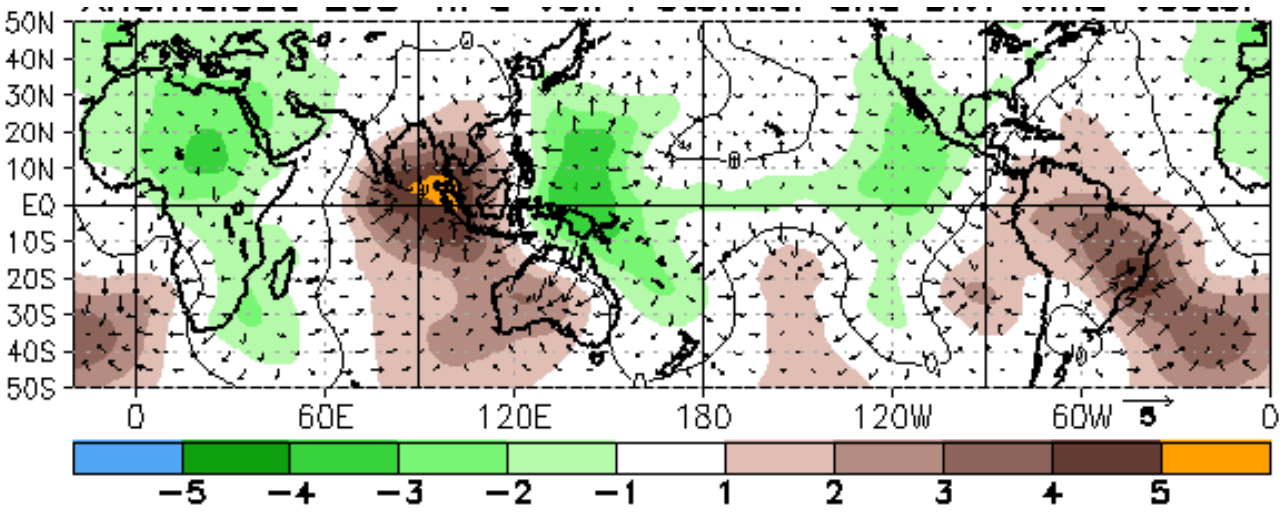


fig.6: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly in August 2012. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

Stream Function anomalies in the high troposphere (fig. 7 – insight into teleconnection patterns tropically forced) :

Almost no signal in the Northern Tropics likely related to a weak ocean/atmosphere coupling. A large part of the signal seems to be related to the mid-latitudes (especially over Europe and Mediterranean regions).

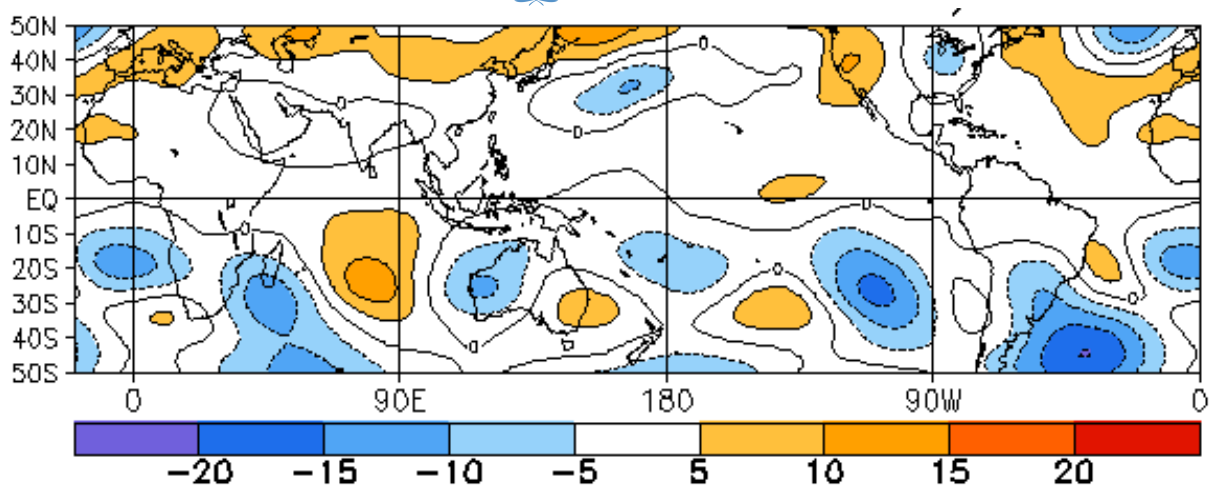


fig.7: Stream Function Anomalies at 200 hPa in August 2012.
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

Geopotential height at 500 hPa (fig. 8 – insight into mid-latitude general circulation) :
In relationship with previous discussion, the main anomalies are mostly related to mid-latitude dynamic with sub-regional structure. Consequently the main active atmospheric modes in the Northern hemisphere (see next table) seems to be mostly related to mid-latitude dynamic. For Europe, note the NAO mode (-1,4 – summer mode) and the East-Atlantic mode (+1,4) with positive anomalies of Z500 from Northern Maroco to Adriatic Sea, which usually conducts to heat waves over South-East Europe (what happened indeed).

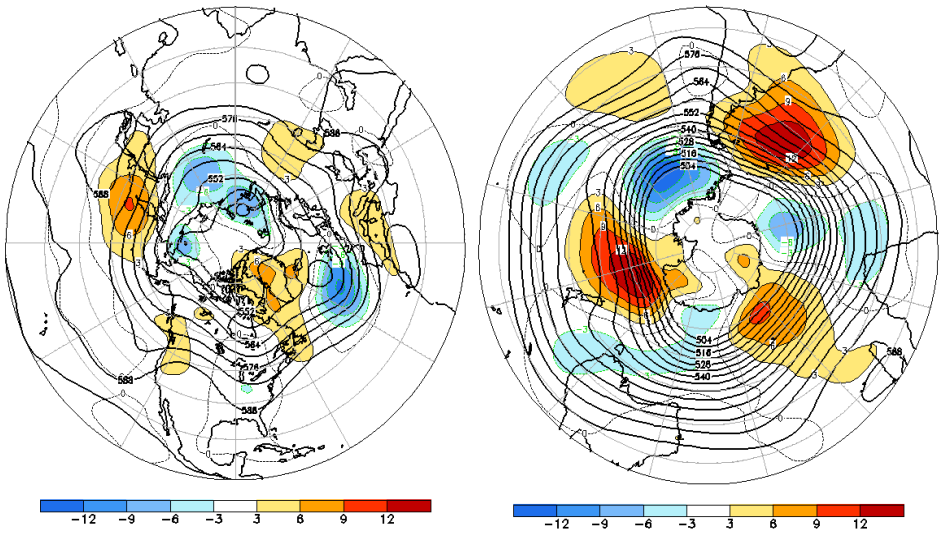


fig.8: Anomalies of Geopotential height at 500hPa in August 2012 (left North Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige9.shtml, and right South Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige15.shtml)

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
AUG 12	**-1.4**	**1.4**	**-0.1**	**0.6**	**-0.2**	---	**1.1**	**0.8**	**1.0**
JUL 12	-1.3	1.0	0.6	-1.0	-0.6	---	-1.4	-0.6	1.0
JUN 12	-2.2	-0.1	-1.4	-0.9	-0.4	---	0.0	-1.4	-1.8
MAY 12	-0.8	0.5	-1.7	-1.5	-0.3	---	-0.5	-0.6	-0.1
APR 12	0.4	-0.3	-0.3	0.3	-0.1	---	-1.6	-0.9	-1.0
MAR 12	0.9	-0.6	0.8	-2.6	-0.2	---	1.3	-0.5	-1.4

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

I.2.b Precipitation

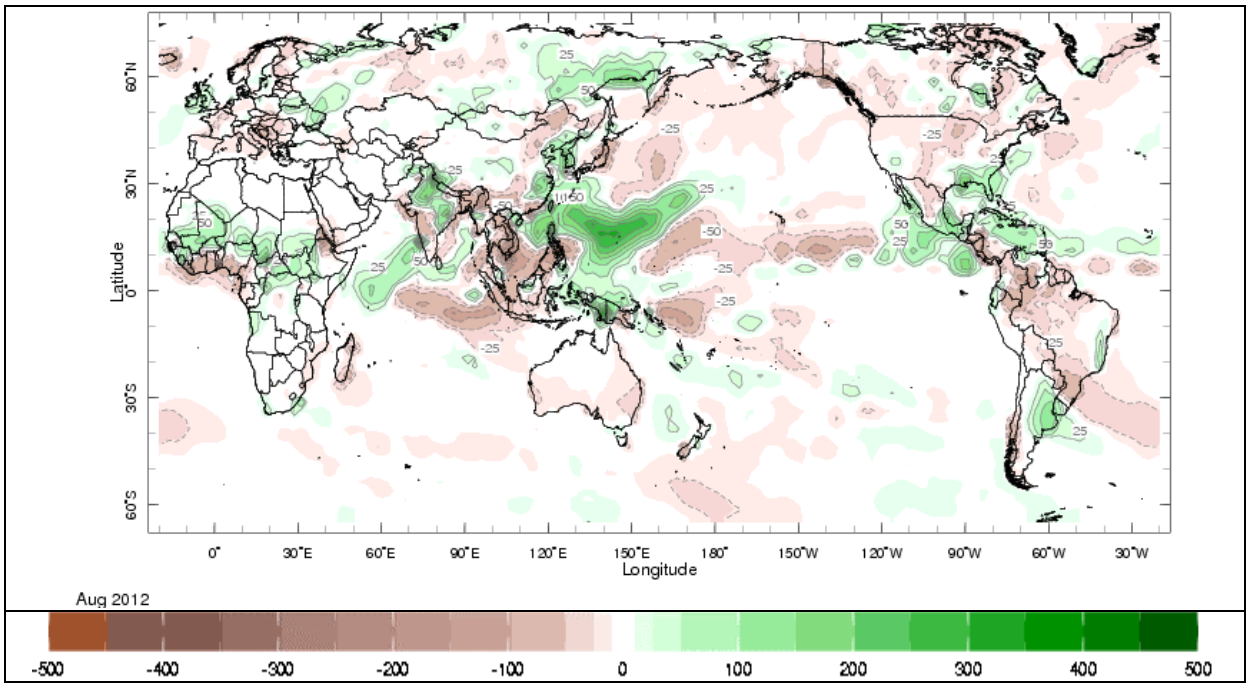


fig.9: Rainfall Anomalies (mm) in August 2012 (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.
http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/

Quite good consistency with the Divergent/Convergent Circulation anomalies:

- over the Western Pacific (strong positive anomaly)
- over north of South America (globally a negative anomaly)
- over Malasia (negative anomaly)
- over Sahelian regions (positive anomly)

I.2.cTemperature

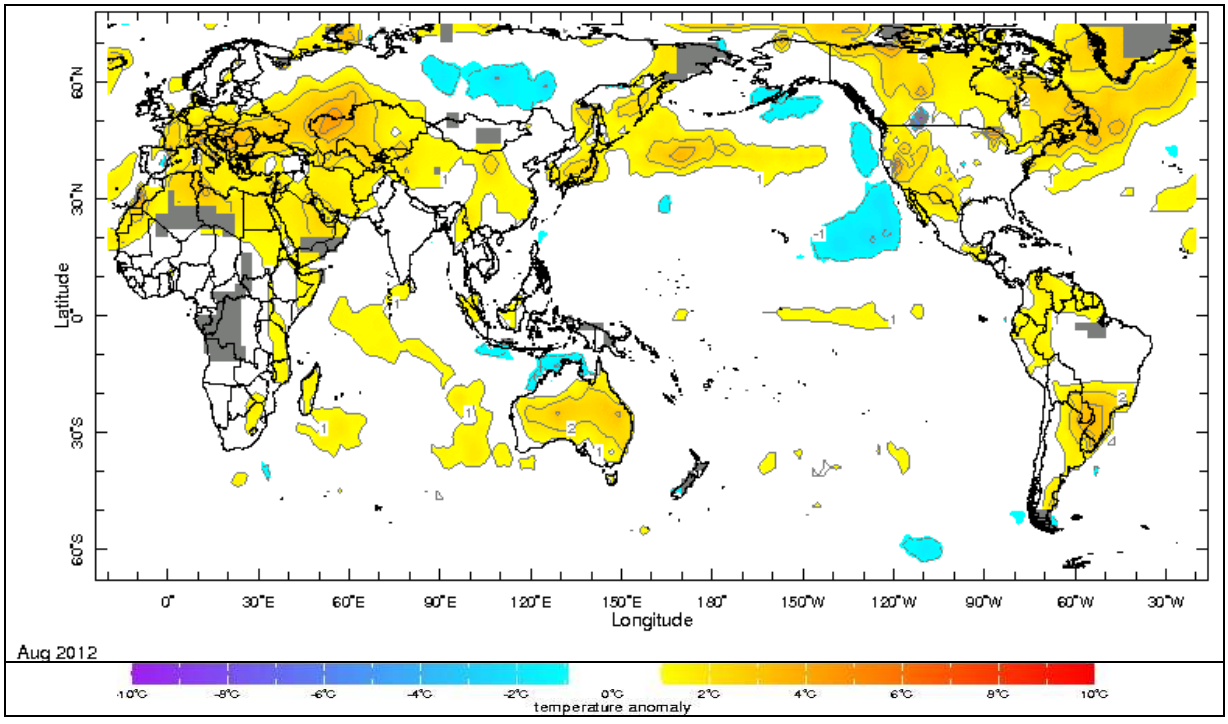


fig.10: Temperature Anomalies (°C) in August 2012 (departure to the 1979-2000 normal) http://iridl.ldeo.columbia.edu/maproom/.Global/.Atm_Temp/Anomaly.html

- North-America : Warmer than normal conditions over a large portion of the continent
- South-America : Warmer than normal conditions over the Northern part of the continent and South of Brazil.
- Australia : Warmer than normal conditions
- Asia : quite normal conditions excepted over China
- Africa : Warmer than normal conditions over North and Eastern Africa (including the Arabic Peninsula). Close to Normal over West and South Africa.
- Europe : Above normal conditions except over Siberia

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 (below 2007 value).
In Antarctic (fig. 11 - right) : slightly above normal sea-ice extension anomaly with some regional modulation.

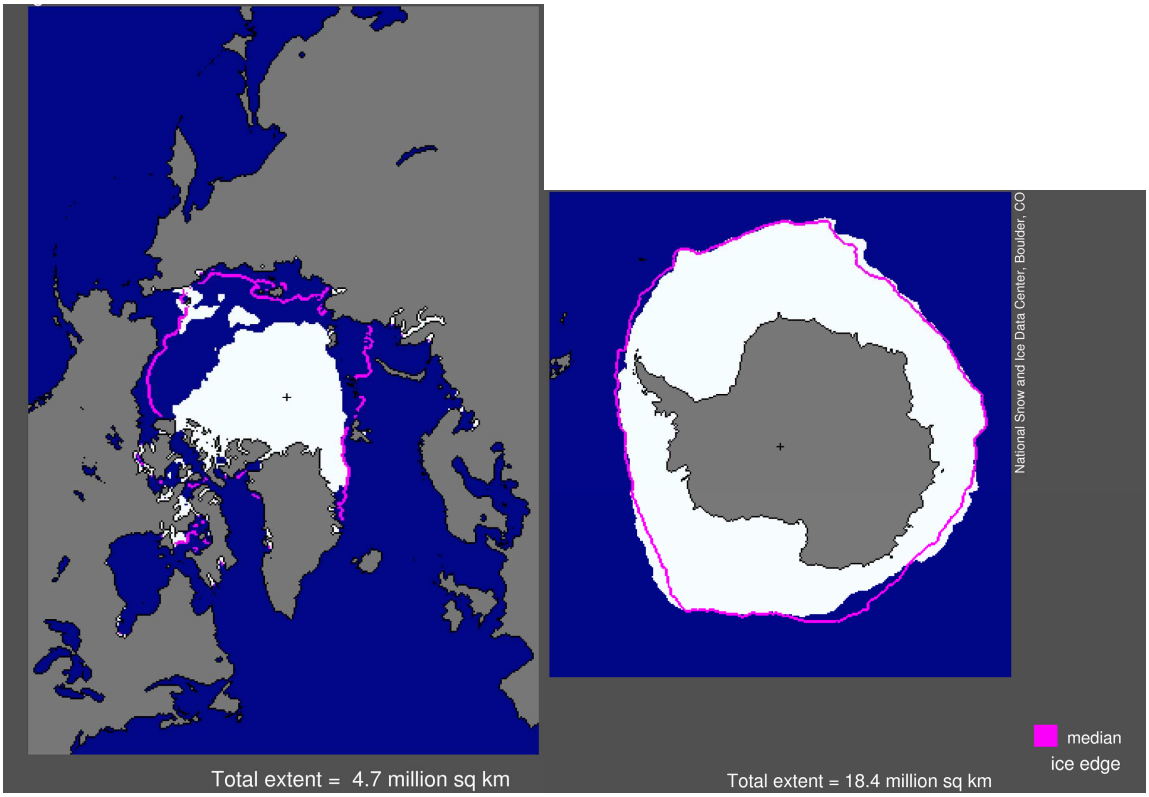


fig.11: Sea-Ice extension in Arctic (left), and in Antarctic (right) in August 2012. The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

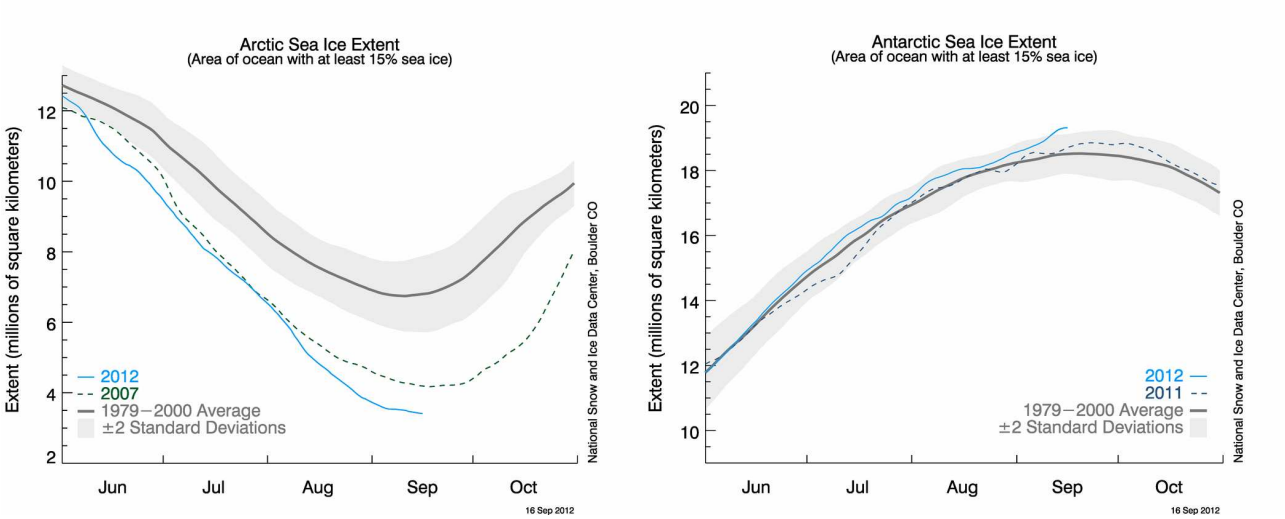


fig. 9bis : Sea-Ice extension evolution from NSIDC
http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png

II.SEASONAL FORECASTS FOR OND FROM DYNAMICAL MODELS

II.1. OCEANIC FORECASTS

II.1.a Sea Surface Température (SST)

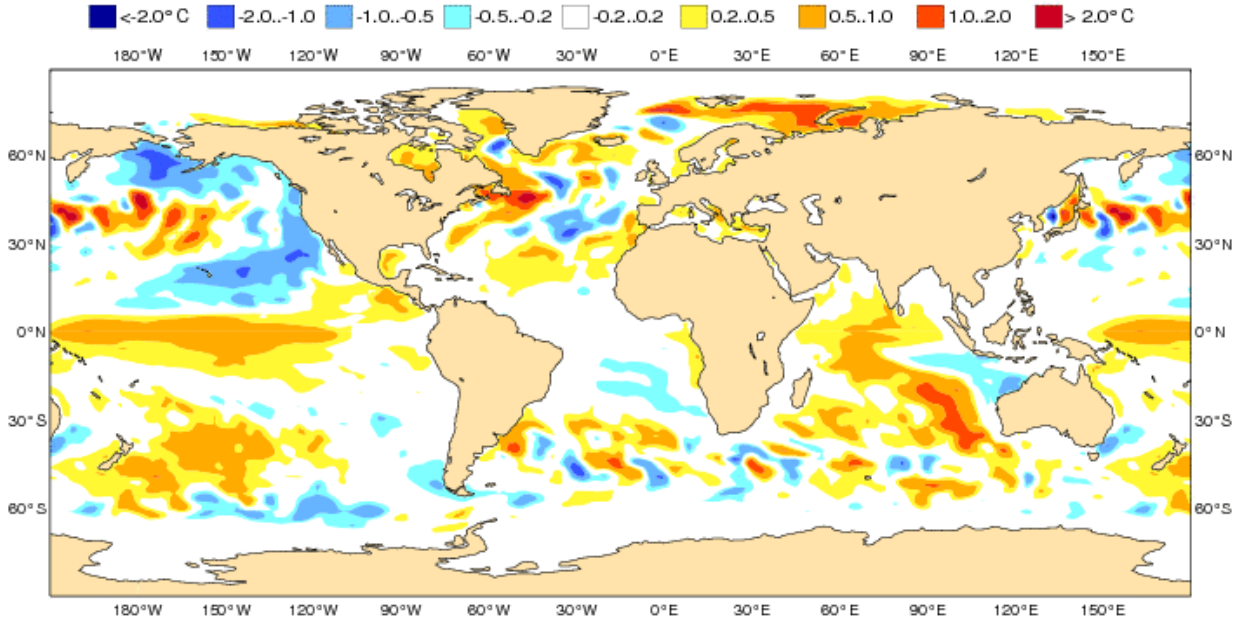


fig.12: SST anomaly forecast (in °C) from ECMWF for OND, issued in September.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

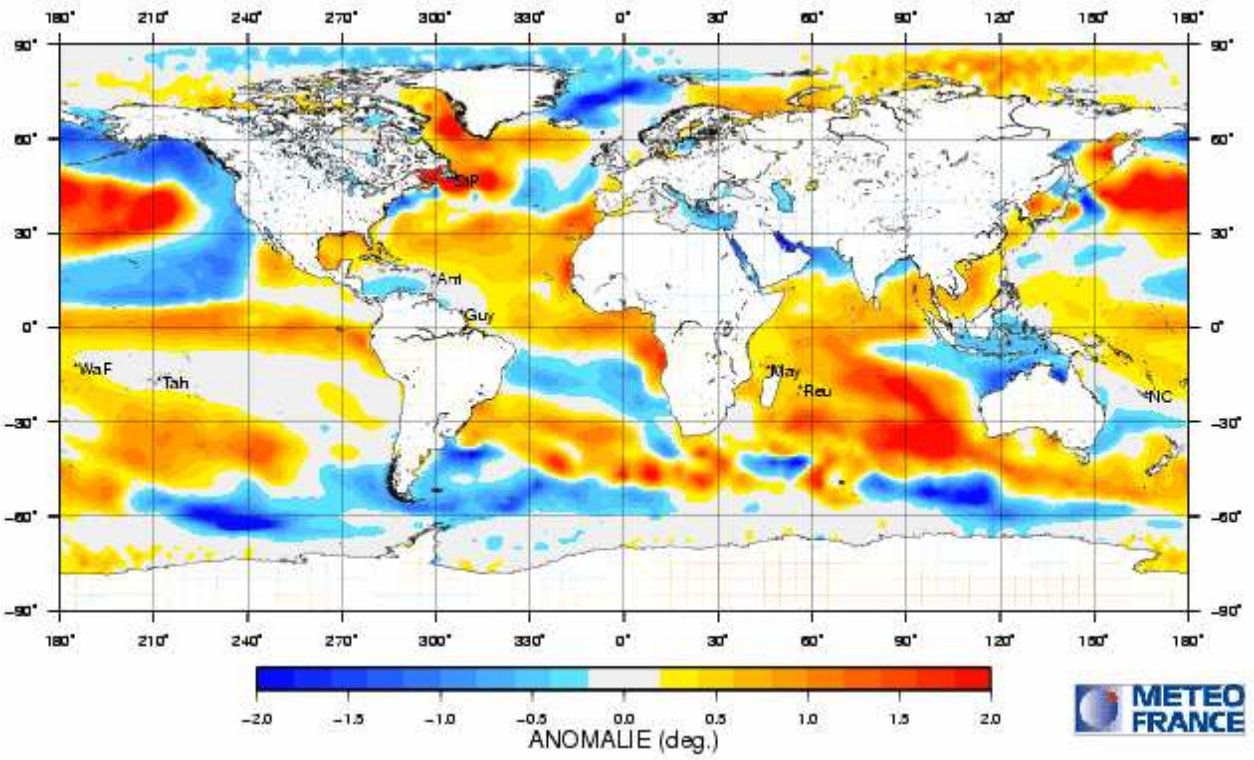


fig.13: SST Anomaly forecast (recalibrated with respect of observation) from Météo-France for OND, issued in September. http://elaboration.seasonal.meteo.fr/

For the 2 individual models :
At large scale very consistent over most of the Tropics despite a significative difference over Pacific equatorial waveguide :

- Pacific : along the equator warmer than normal conditions with MF, while with ECMWF the eastern part is close to normal (close to Modoki Nino) ; warmer than normal conditions at the sub-tropical latitudes (both South and North). In the North Tropical area, colder than normal conditions.
- 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. The two models agree about strong warm anomaly in Labrador sea : to keep a watch on for next winter.
- Indian Ocean : warmer than normal in the South sub-tropics and close the equatorial waveguide. Colder than normal in the Arabian Sea for MF

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.
Pacific equatorial waveguide : warmer than normal conditions
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.

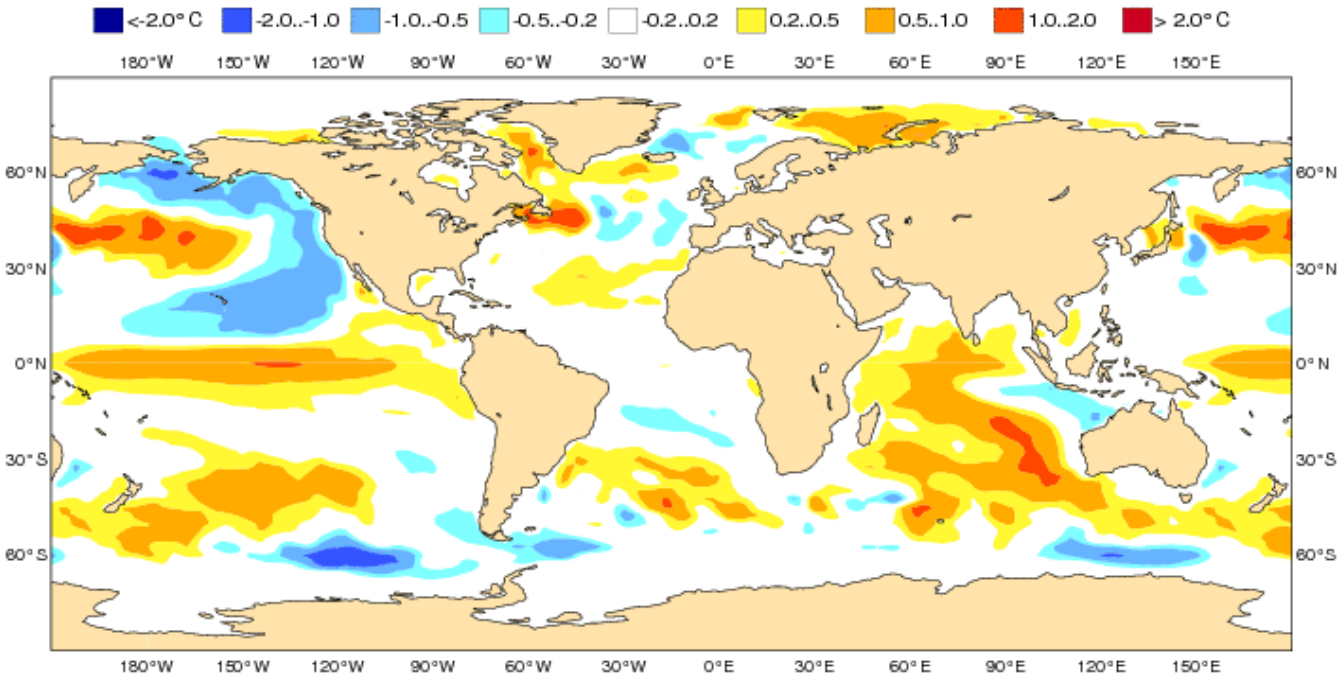


fig.14: SST Forecasted anomaly (in °C) from Euro-SIP valid for SON, issued in September.

II.1.b ENSO Forecast :

Forecasted Phase for OND : 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 OND : all dynamical models give above normal conditions, mostly above El Nino threshold. For the statistical models, most of them are forecasting close to neutral conditions. The warmer than normal conditions should continue up to end of winter. So a weak El Niño event should occur this autumn and persist during winter.

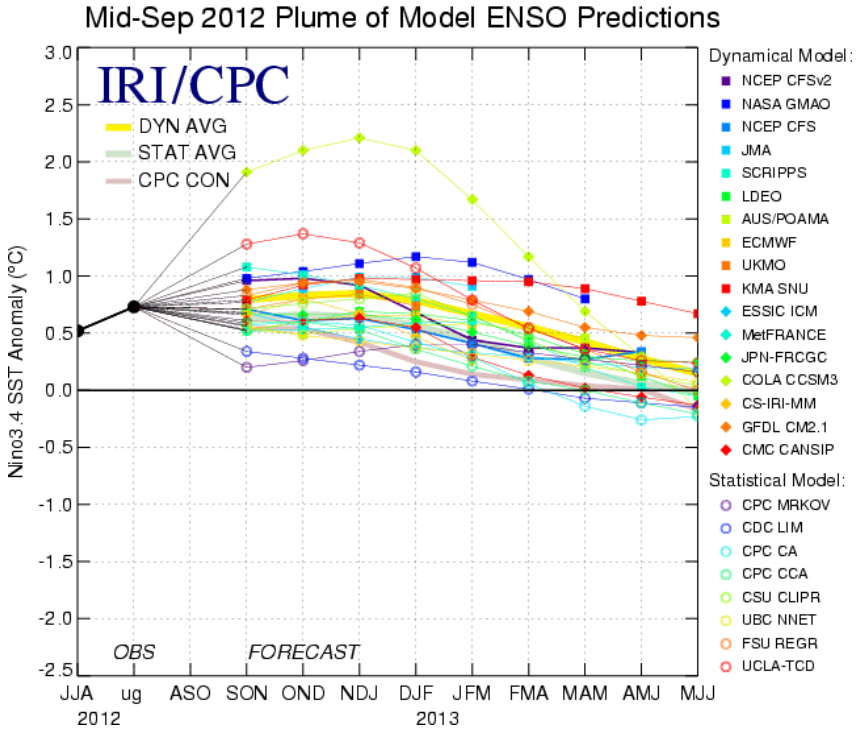


fig.15: Synthesis of Niño 3.4 forecasts (120° to 165°W) issued in September by IRI : http://iri.columbia.edu/climate/ENSO/currentinfo/SST_table.html

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	SON	OND	NDJ	DJF	JFM	FMA	MAM	AMJ	MJJ
Value « La Niña » Value « El Niño »	*-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*	*-0,45* *0,45*	
Average, statistical models	**0.6**	**0.7**	**0.6**	**0.6**	**0.4**	**0.3**	**0.2**	**0.1**	**0**
Average, dynamical models	**0.8**	**0.8**	**0.8**	**0.8**	**0.7**	**0.6**	**0.4**	**0.3**	
Average, all models	**0.7**	**0.8**	**0.8**	**0.7**	**0.6**	**0.4**	**0.3**	**0.2**	**0.1**

Plumes from Météo-France and ECMWF for the 3 Niño boxes (see definition in Annex – fig. 16) :
In both models an El Niño event is forecasted for autumn and winter. Spread very large in ECMWF and quite normal in MF.

NIÑO 4	NIÑO 3.4	NIÑO 3

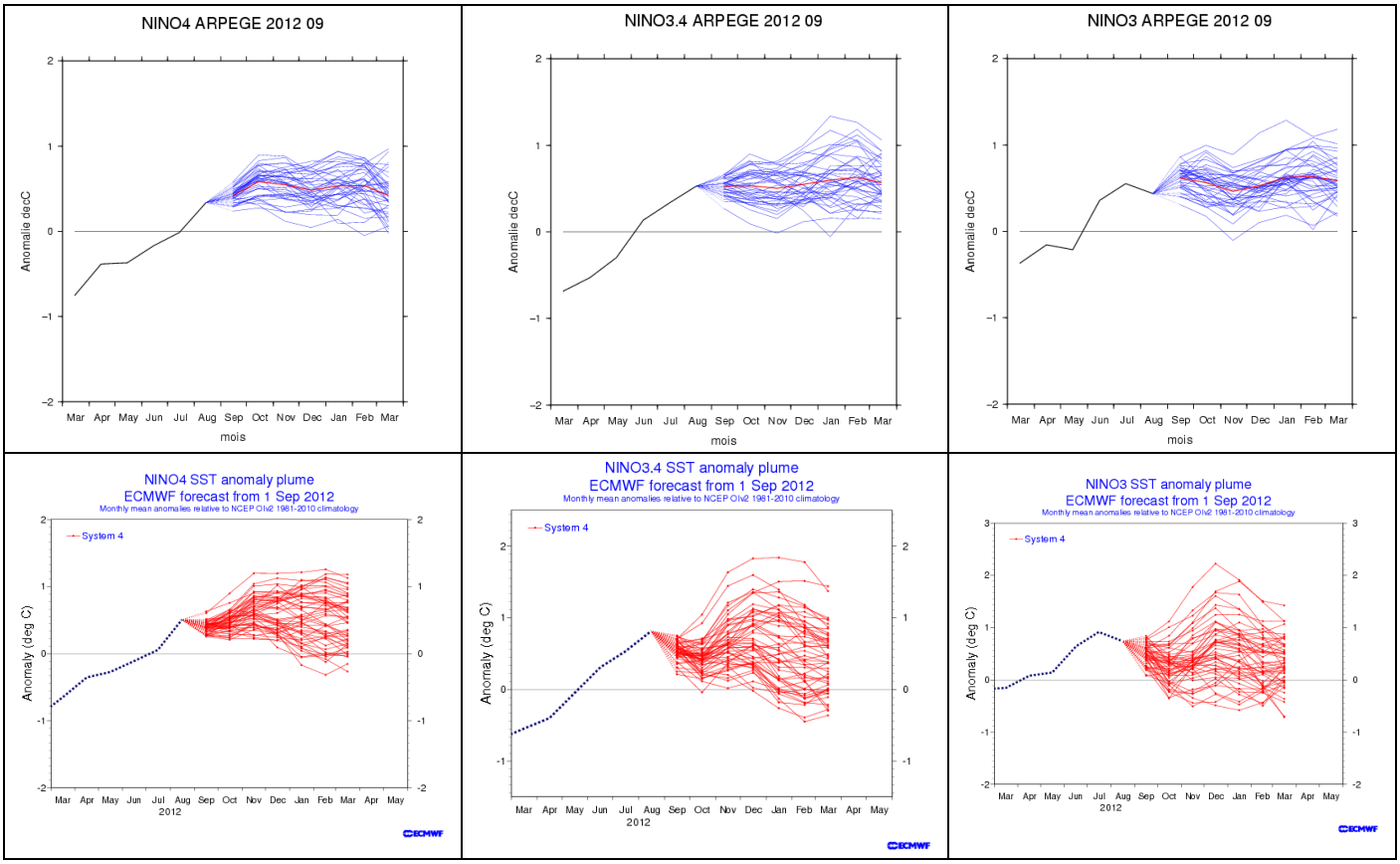


fig.16: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (bottom) issued in September, monthly mean for individual membres. (http://www.ecmwf.int/)

II.1.c Atlantic Ocean forecasts :

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

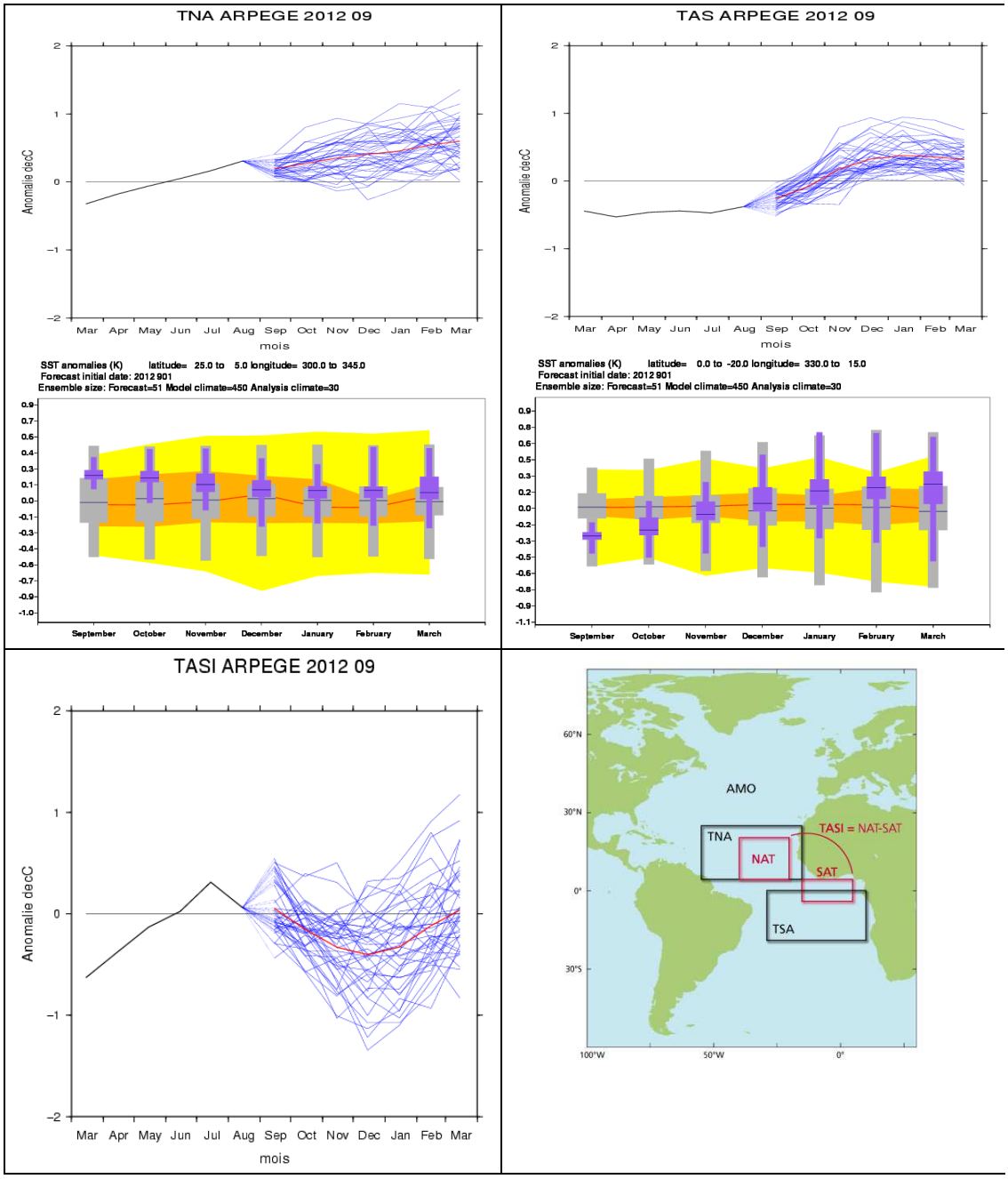


fig.17: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, issued in September, plumes / climagrams correspond to 41 / 51 members and monthly means.

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. So TASI should change from positive to negative phase during autumn.

II.1.d Indian Ocean forecasts :

Forecasted Phase: *Positive phase of the IOD*

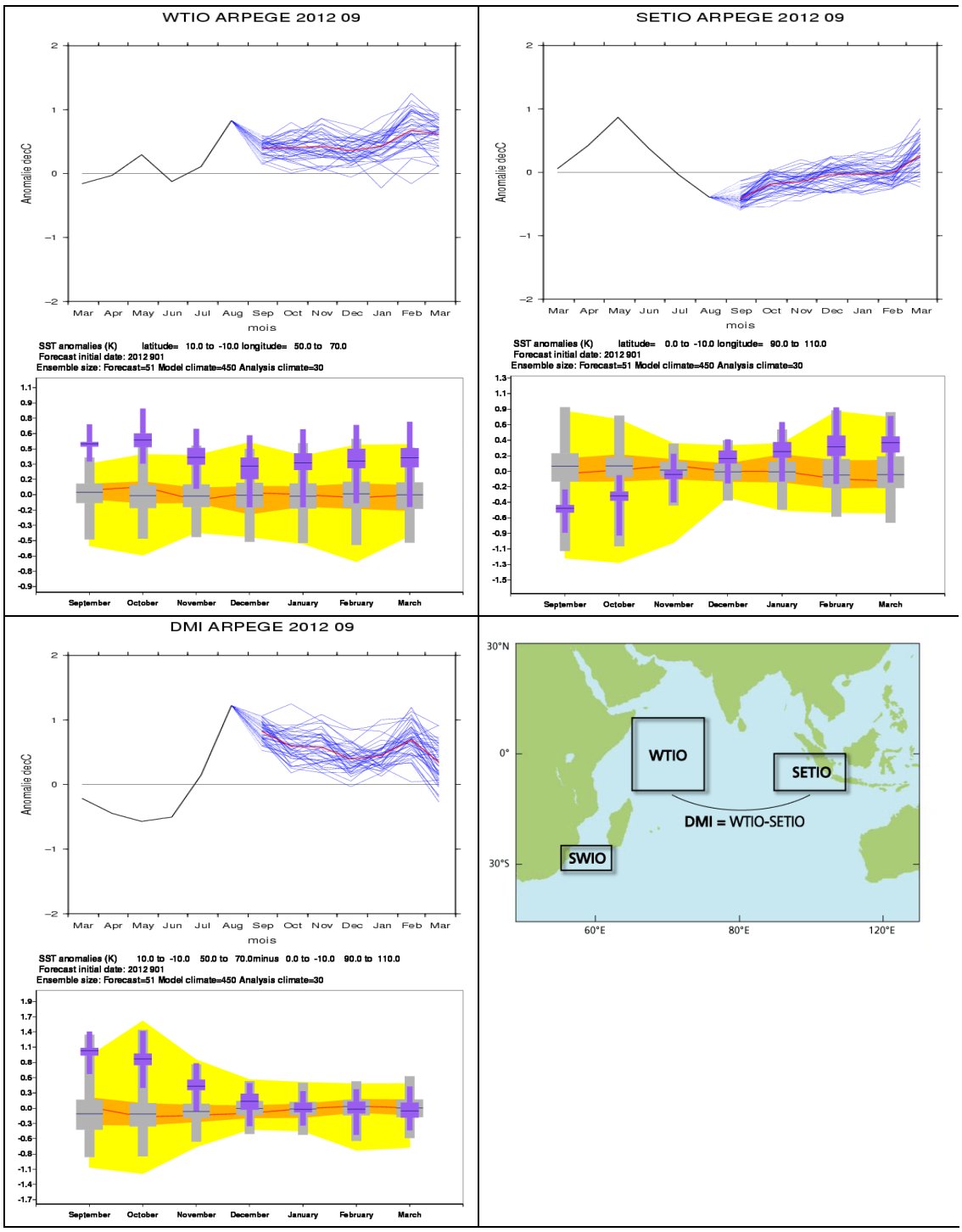


fig.18: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, issued in September, plumes / climagrams correspond to 41 / 51 members and monthly means.

In WTIO : the 2 models show the same evolution, with a positive anomaly decreasing from autumn up to winter.
In SETIO : good consistency, anomaly will change from negative to positive during next months
DMI : good consistency between the 2 models. Positive phase then close to normal

II.2. GENERAL CIRCULATION FORECAST

II.2.a Global Forecast

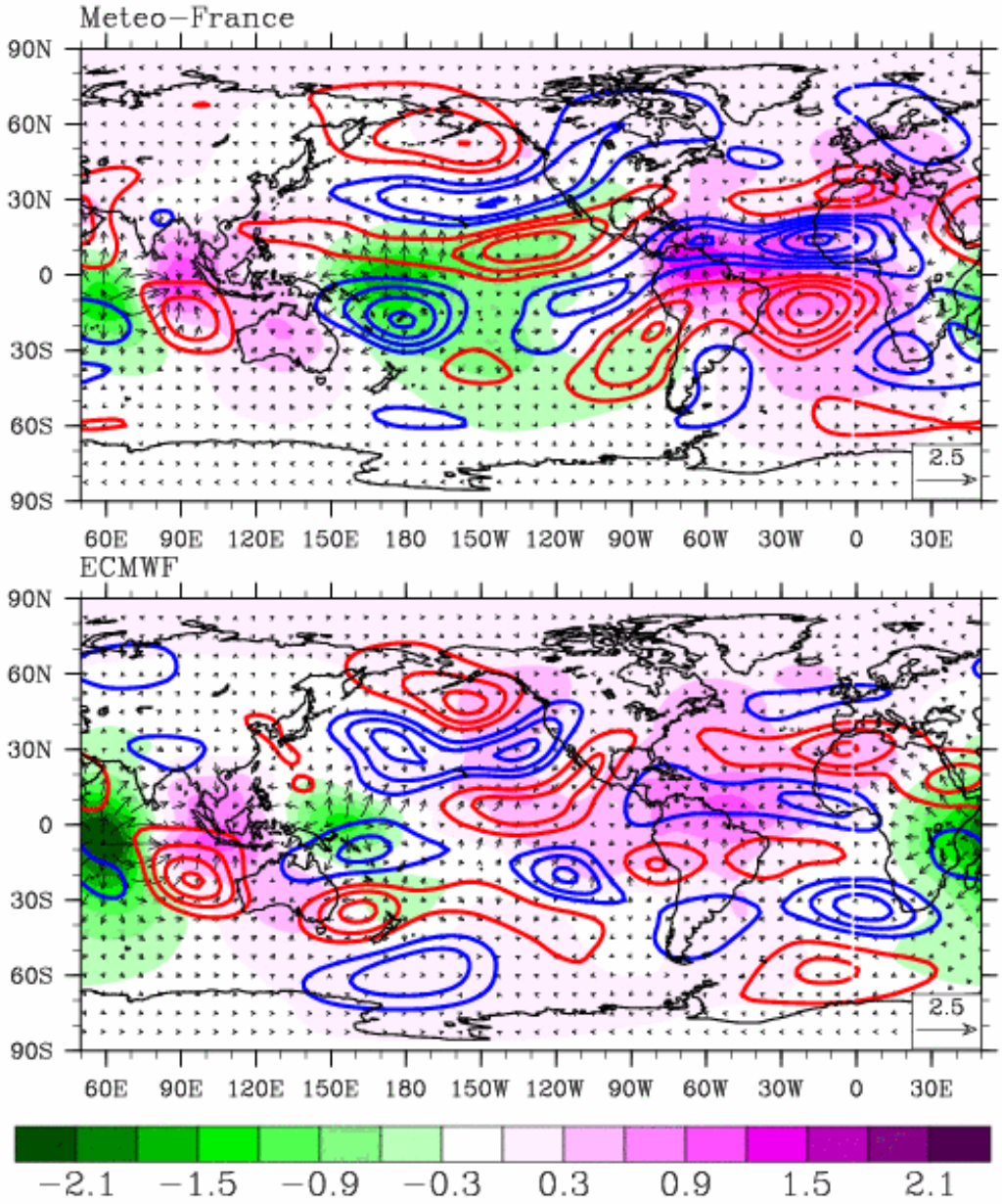


fig.19: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), asociated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa for OND, issued in September by Météo-France (top) and ECMWF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

Velocity potential anomaly field (cf. fig. 19 – insight into Hadley-Walker circulation anomalies) :
Quite good consistency between ARP and ECMWF.

- Over Pacific : a divergence anomaly (upward motion) over the West Pacific less intense and less expanded in ECMWF, and situated more Eastward. Convergent circulation anomaly (downward motion) in the East Pacific with ECMWF. The MF pattern in more typical of an El Nino event.
- Over Indian Ocean: the 2 models show a dipole with divergent circulation (upward motion) near Africa coast and convergent circulation near Sumatra. This pattern is consistent with SST anomalies.
- Over Atlantic : convergent circulation anomaly (downward motion) over the basin, with a maximum near South America

Stream Function anomaly field (cf. fig. 19 – insight into teleconnection patterns tropically forced) :
There is a weak (but consistent) atmospheric response for the 2 models. The Pacific tropical forcing seems to propagate to mid-latitude up to North America. Anomalies in the Pacific basin are likely perturbing the planetary Rossby-waves so that there is some trace over the Atlantic. In addition, some possible weak teleconnection patterns seem to propagate from Africa toward Europe and more especially the Mediterranean basin.
As a conclusion, teleconnection patterns highlighted last month seem to be confirmed by these forecasts. One can expect some improvement in the predictability (nevertheless still not too much) for fall and beginning of winter over Europe.

II.2.b North hemisphere forecast and Europe

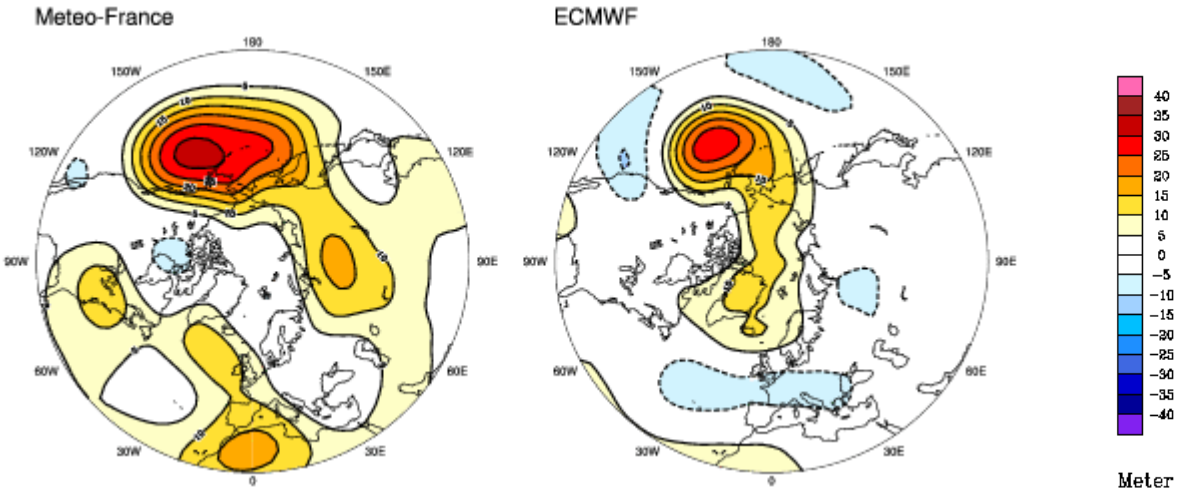


fig.20: Anomalies of Geopotential Height at 500 hPa for OND, issued in September from Météo-France (left) and ECMWF (right).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip

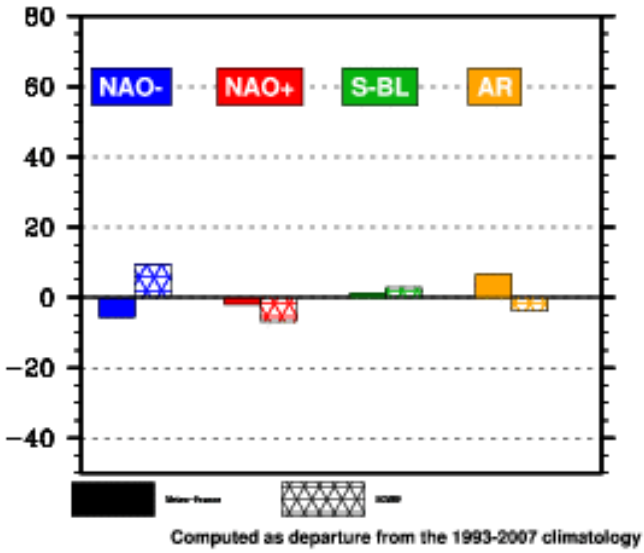


fig.21: North Atlantic Regime occurrence anomalies from Météo-France and ECMWF : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.

Geopotential height anomalies (fig. 20 – insight into mid-latitude general circulation anomalies) :
There is quite a good consistency around Pacific regions with a negative PNA pattern (also consistent with stream function anomalies). But around Europe, the 2 models show substantial differences: the agreement

point is positive anomaly over Maghreb region.

North Atlantic Circulation Regimes (fig. 21) :
Weak signal for both models, it's not surprising, considering the weak signal in Z500 anomalies.

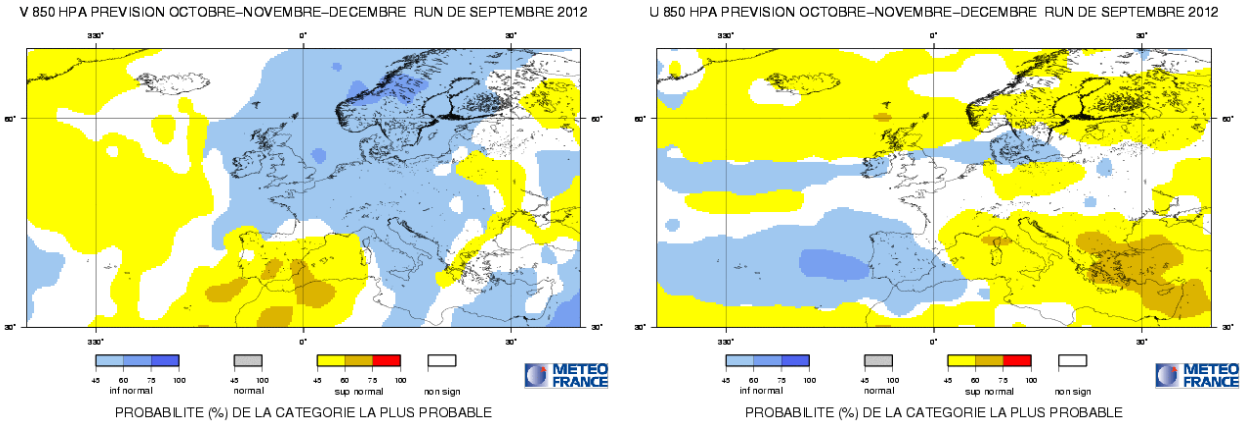


fig.22: Most likely category for the meridional (left) and zonal (right) wind at 850 hPa for October-November-December, issued in September from Météo-France.

General atmospheric circulation in MF in the low troposphere (see fig. 22) :
weak signal over Europe with respect of the previous months. Over the Mediterranean, anomalies seem to show blocking conditions over Maghreb region, consistent with Z500 anomalies.

II.3. IMPACT : TEMPERATURE FORECASTS

II.3.a ECMWF

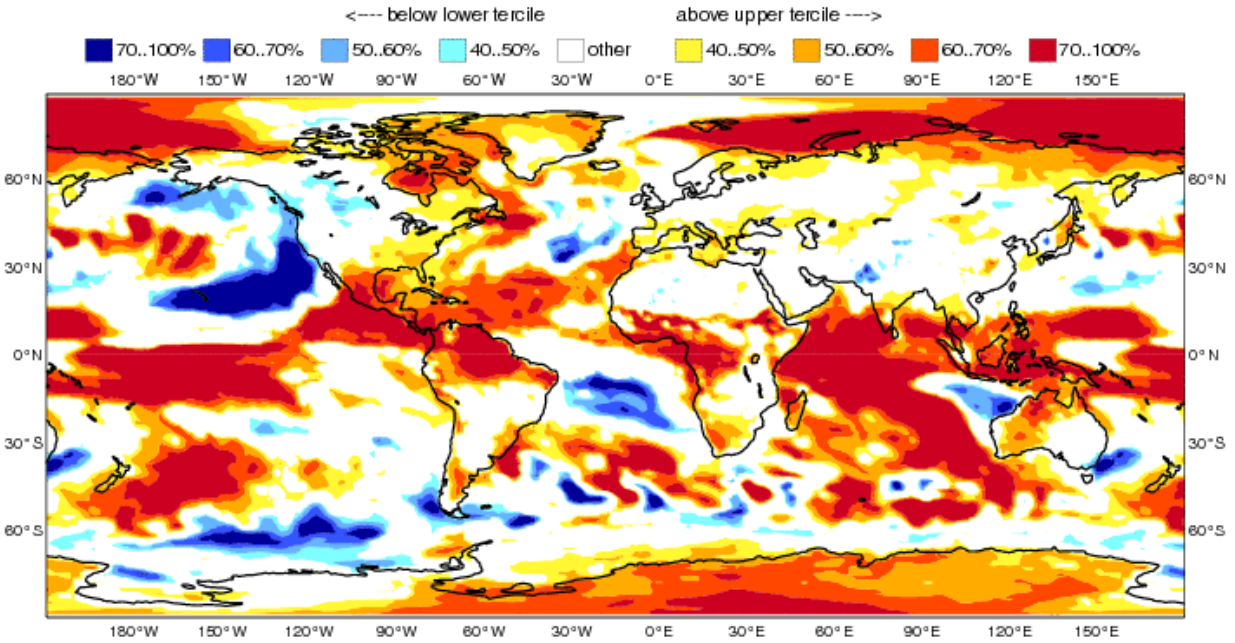


fig.23: Most likely category probability of T2m from ECMWF for OND, issued in September. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

II.3.b Météo-France

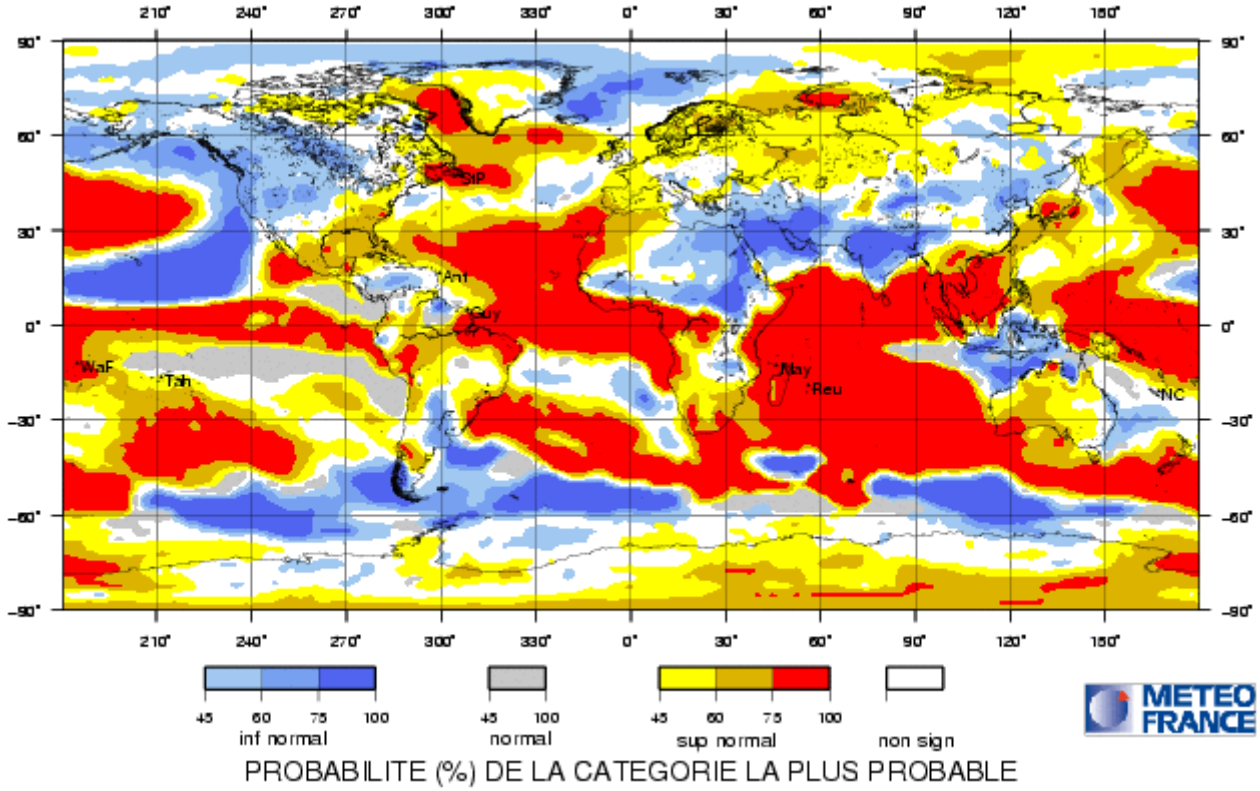


fig.24: Most likely category of T2m for OND, issued in September. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.3.c Met Office (UKMO)

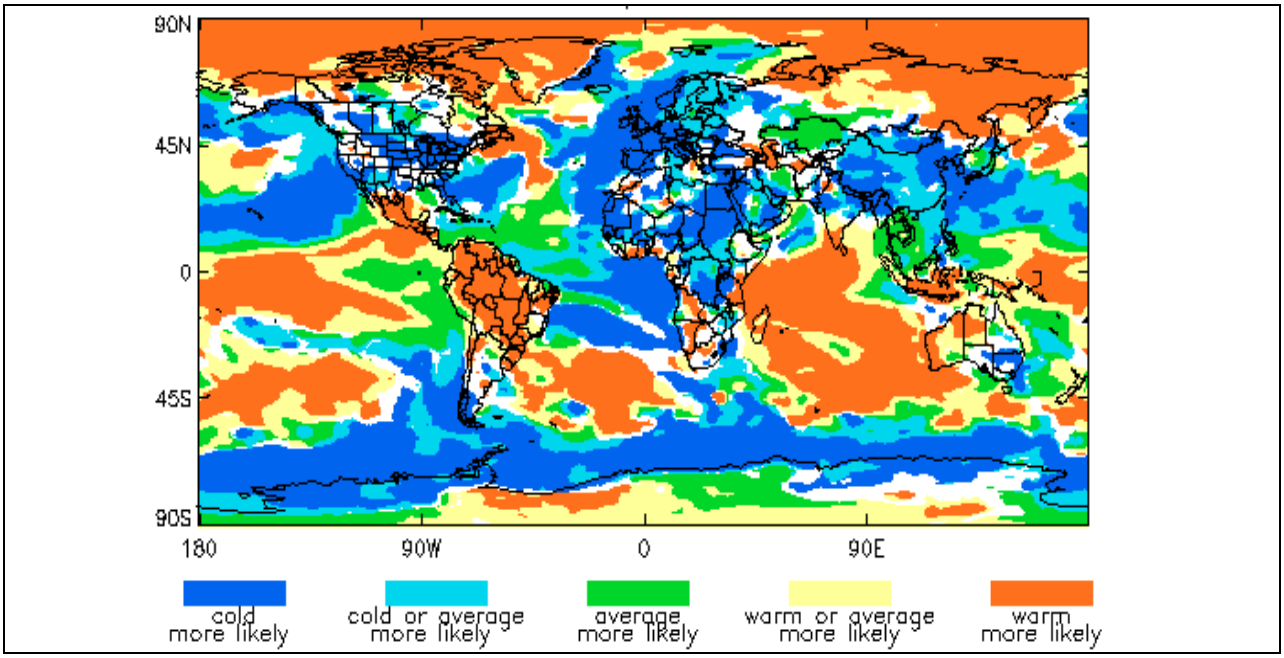


fig.25: Most likely category of T2m for OND, issued in September from UK Met Office. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://www.metoffice.gov.uk/

II.3.d Japan Meteorological Agency (JMA)

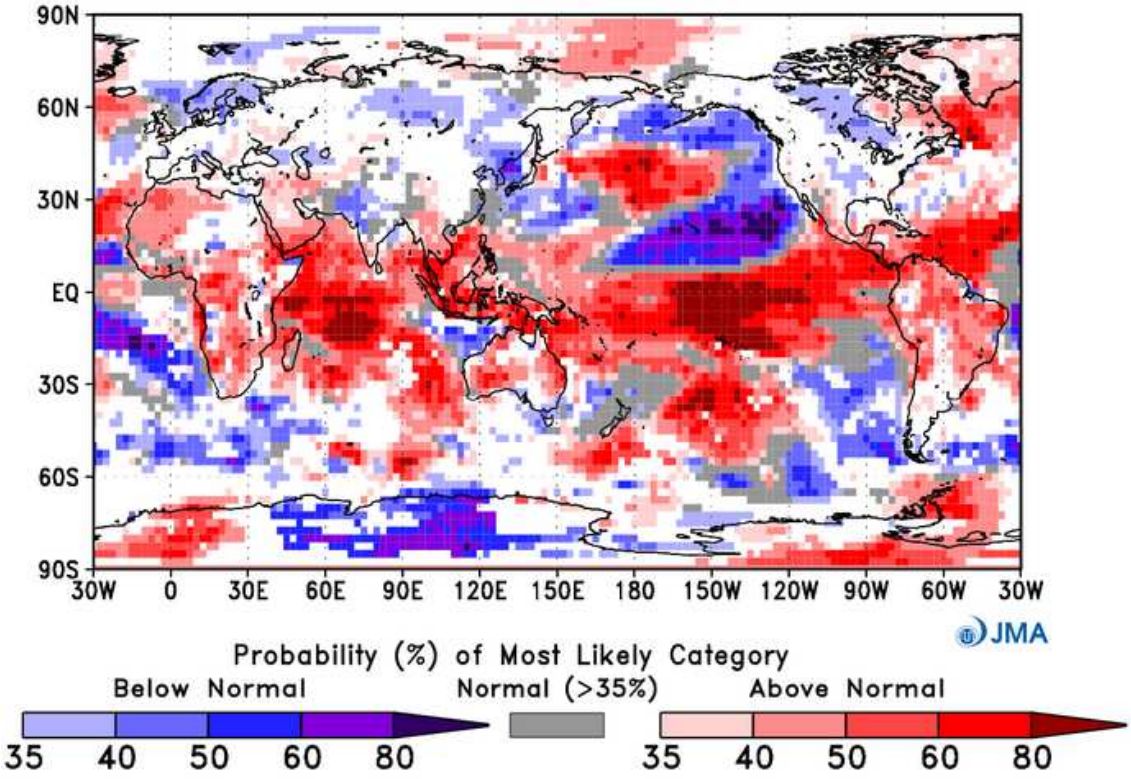


fig.26: Most likely category of T2m for OND, issued in September from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.html

II.3.eNational Centers for Environmental Prediction (NCEP)

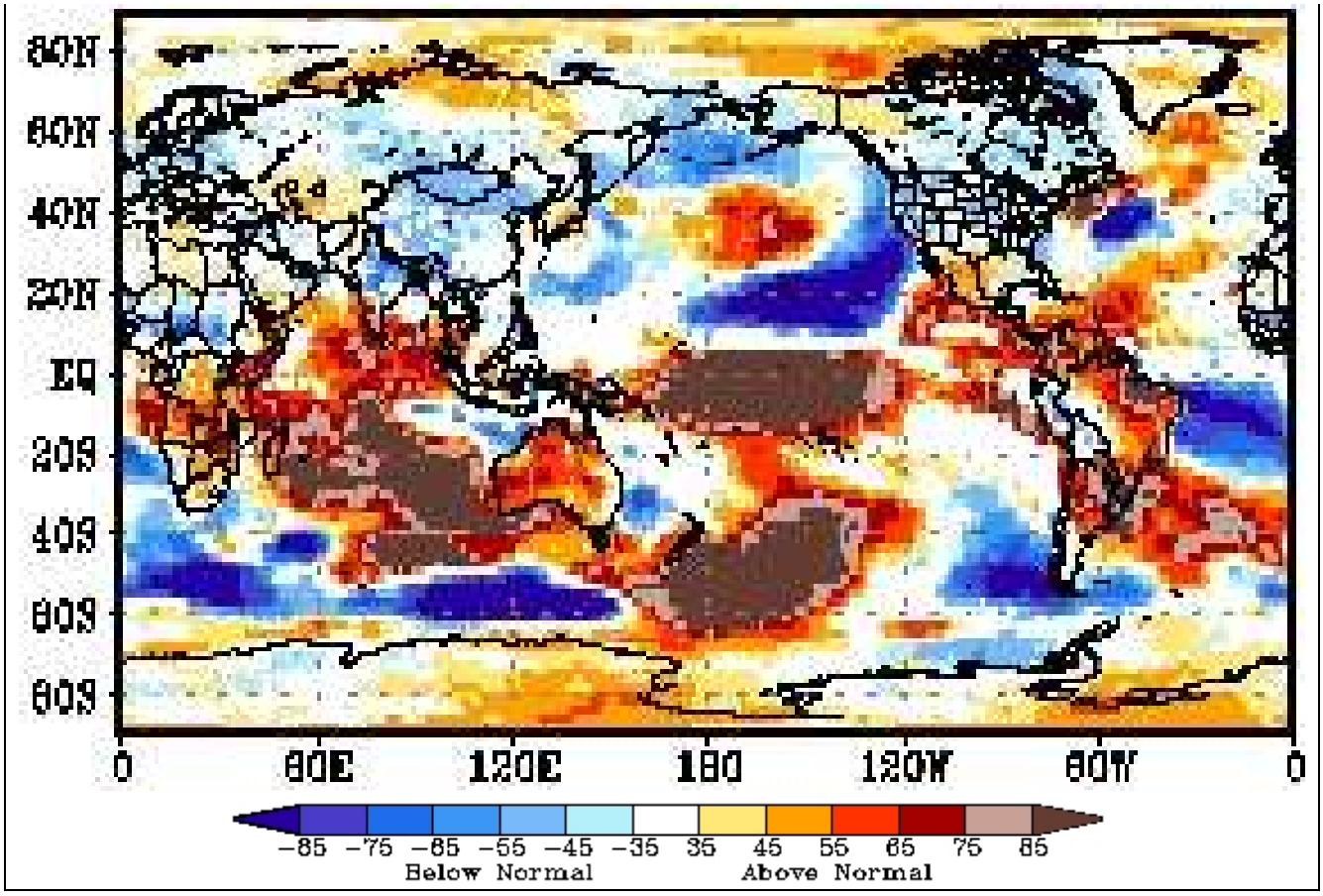


fig.27: Prévision probabiliste d'anomalies de température à 2m (en %) pour la période octobre-novembre-décembre, produite en septembre 2012 par le NCEP. Catégorie le plus probable exprimée selon 3 classes. Les zones en bleu correspondent à la situation où les conditions sont inférieures à la normale, blanc proches de la normale et rouge supérieures à la normale. http://www.cpc.ncep.noaa.gov/products/people/wwang/cfs_fcst/images3/glbT2mProbSea.gif

II.3.f Euro-SIP

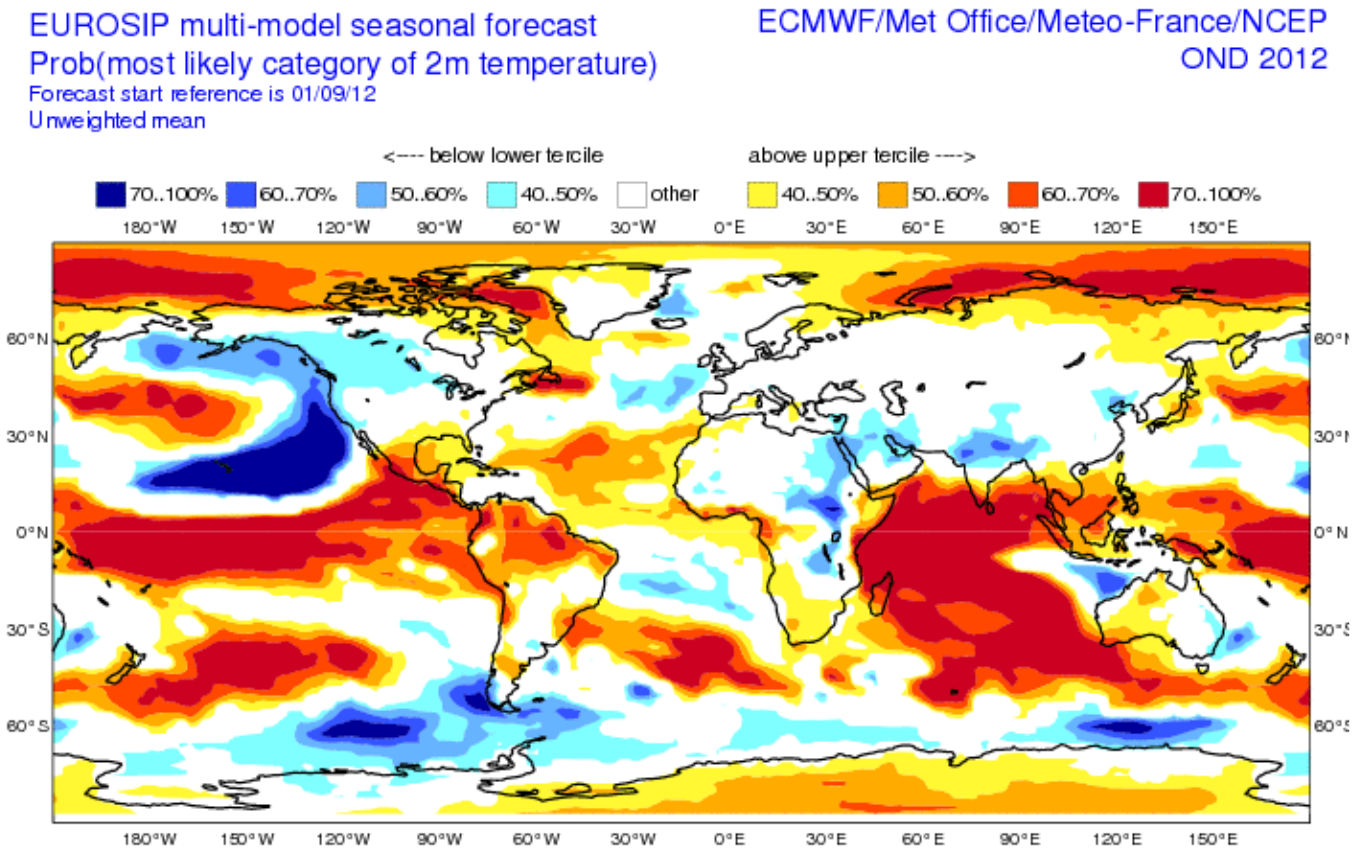


fig.28: Multi-Model Probabilistic forecasts for T2m from EuroSip for OND, issued in September. (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).

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

- North-America : colder than normal conditions over all the most Western Canada and North-Western US. Warmer than normal conditions around the Mexico Gulf including Central America and most of the Caribbean.
- South-America : Warmer than normal conditions over Northern part of the continent and western coastal area.
- Australia : quite normal.
- Asia : Warmer than normal conditions should prevail over South-East Asia including the Southern part of India, consistent with a globally warm Indian basin. Below normal conditions from Northern India up to Middle-East..
- Africa : Warmer than normal conditions on one hand over Atlantic coast and Southern part of the continent., over Horn of Africa on the other hand. Colder than normal in the central-east part.
- Europe : no signal.

II.3.g International Research Institute (IRI)

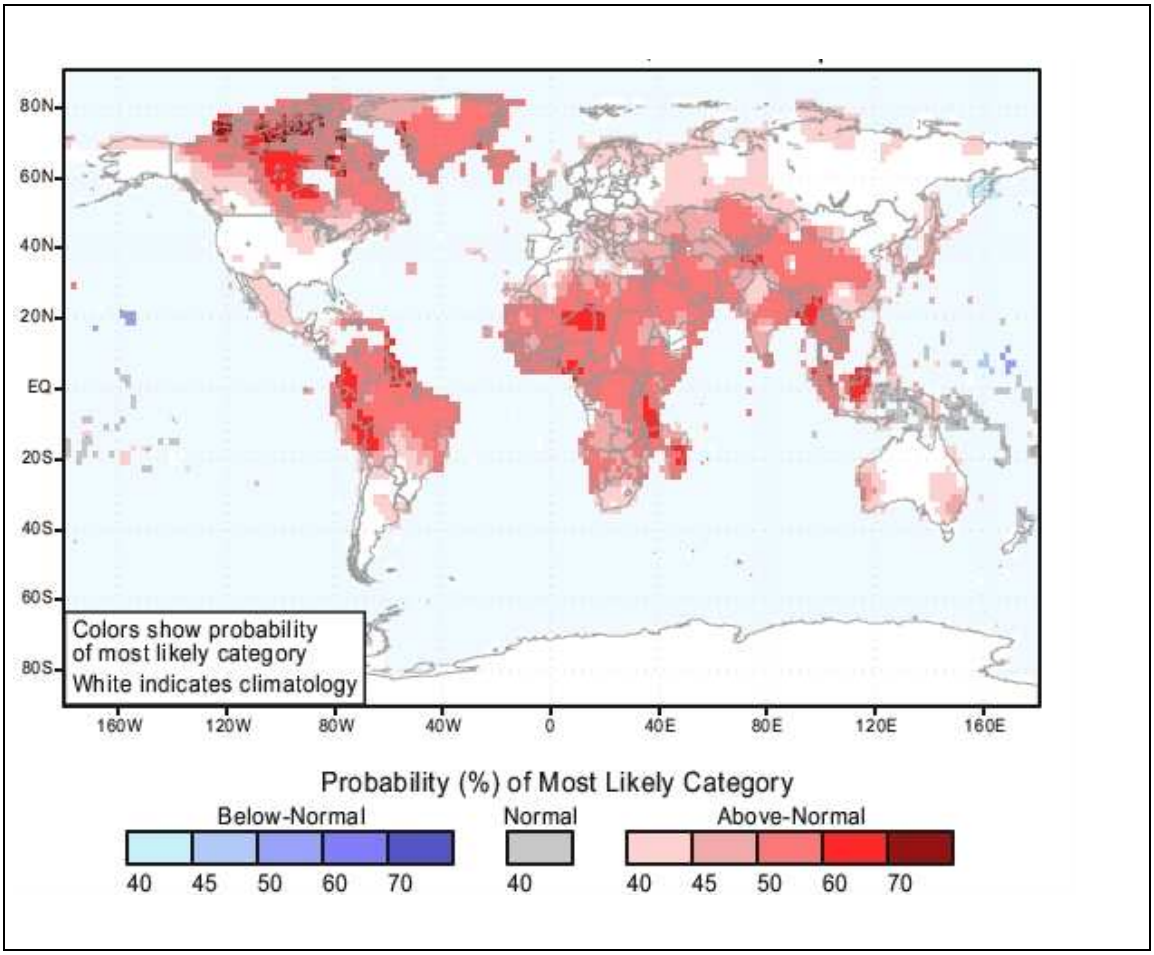


fig.29: Most likely category of T2m for October-November-December, issued in September from the IRI multi-model ensemble. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://iri.columbia.edu/climate/forecast/net_asmt/

Many similarities with Euro-Sip forecast and some differences: the biggest differences are over Asia and Africa where IRI forecasts above normal conditions.

II.4. IMPACT : PRECIPITATION FORECAST

II.4.a ECMWF

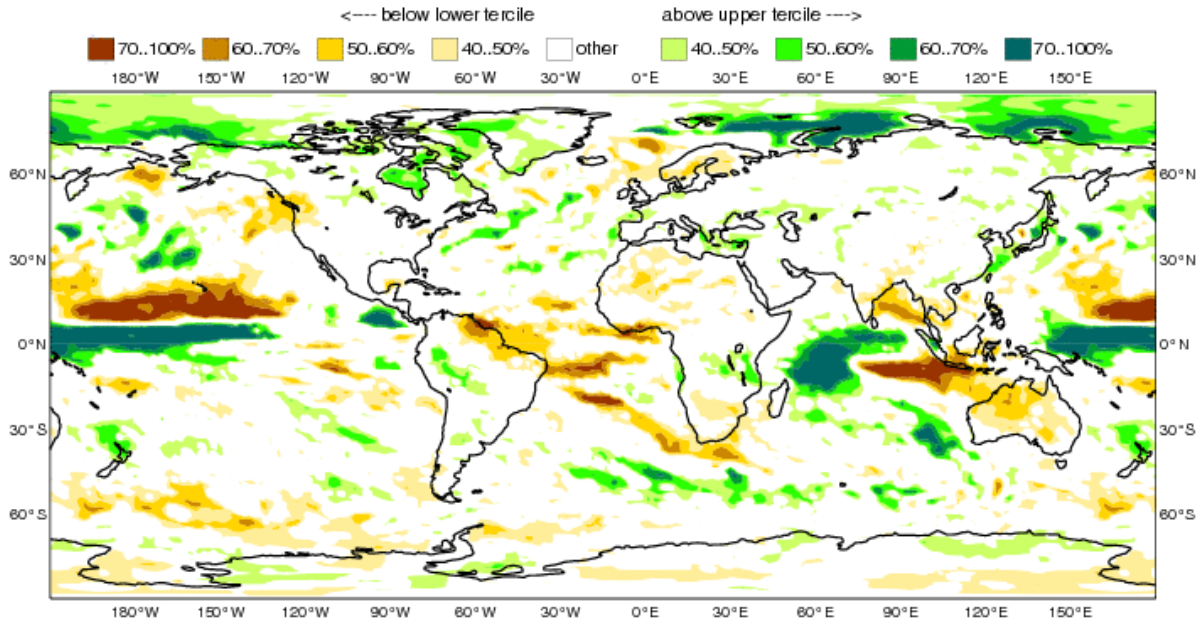


fig.30: Most likely category probability of rainfall from ECMWF for OND, issued in September. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/charts/seasonal_charts_s2/

II.4.b Météo-France

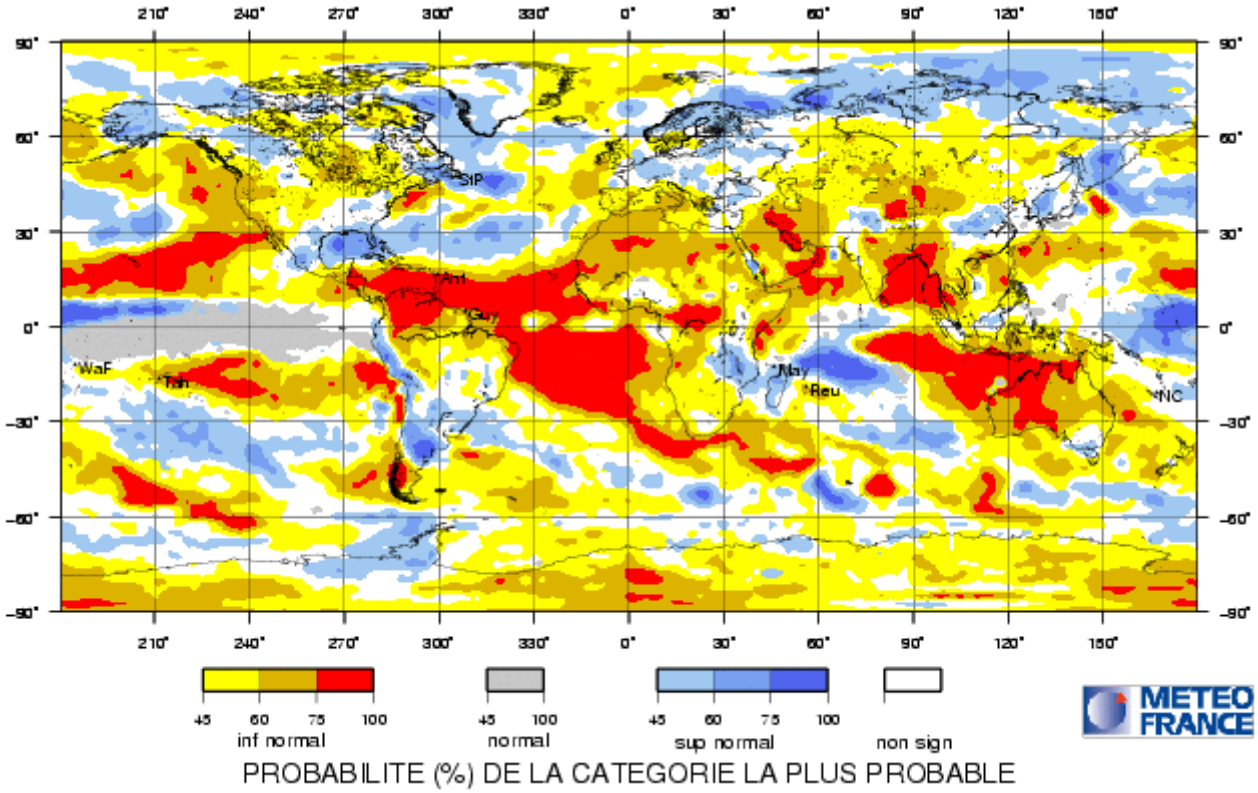


fig.31: Most likely category of Rainfall for OND, issued in September. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Met office (UKMO)

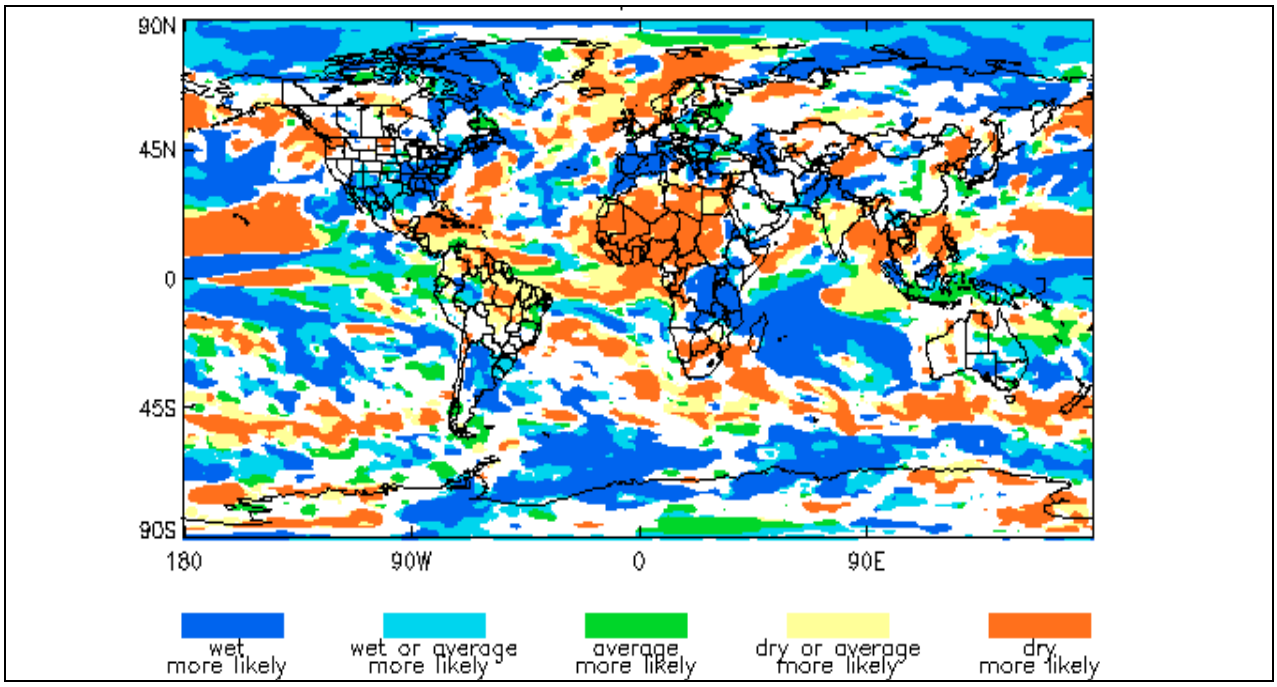


fig.32: Most likely category of Rainfall for OND, issued in September from UK Met Office. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://www.metoffice.gov.uk/

II.4.d Japan Meteorological Agency (JMA)

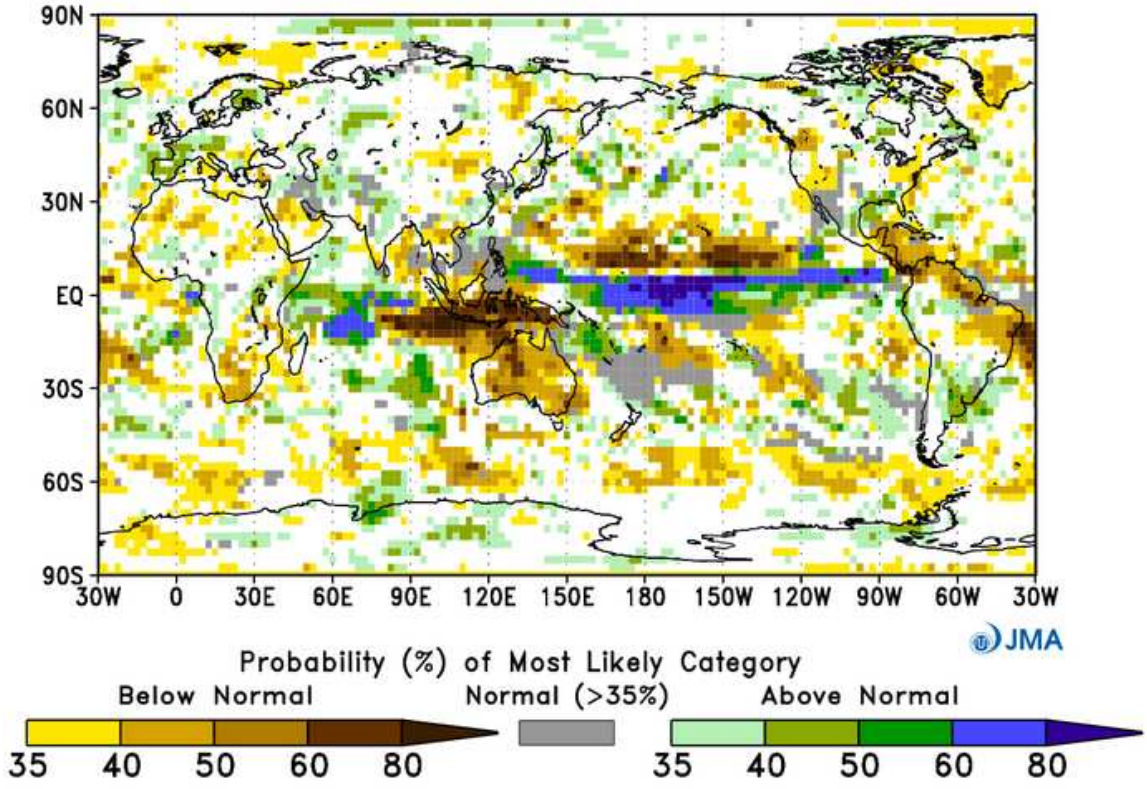


fig.33: Most likely category of Rainfall for OND, issued in September from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.html

II.4.e Euro-SIP

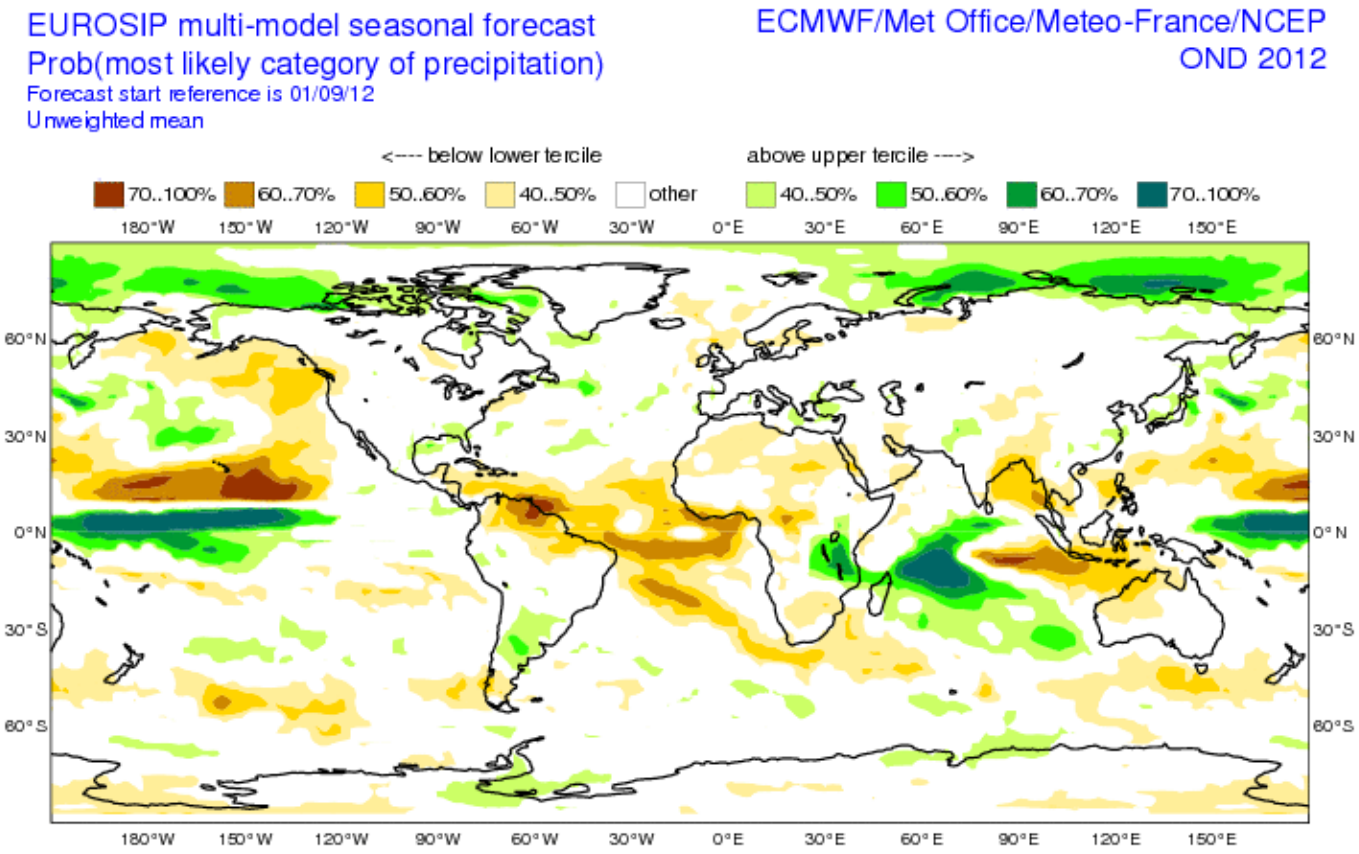


fig.34: Multi-Model Probabilistic forecasts for precipitation from EuroSip for OND, issued in September. (2 Categories, Below and Above normal – White zones correspond to No signal).

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

Signal is quite consistent in the Tropics.
No signal for Europe (and more generally for the mid latitude of Northern Hemisphere).

II.4.f National Centers for Environmental Prediction (NCEP)

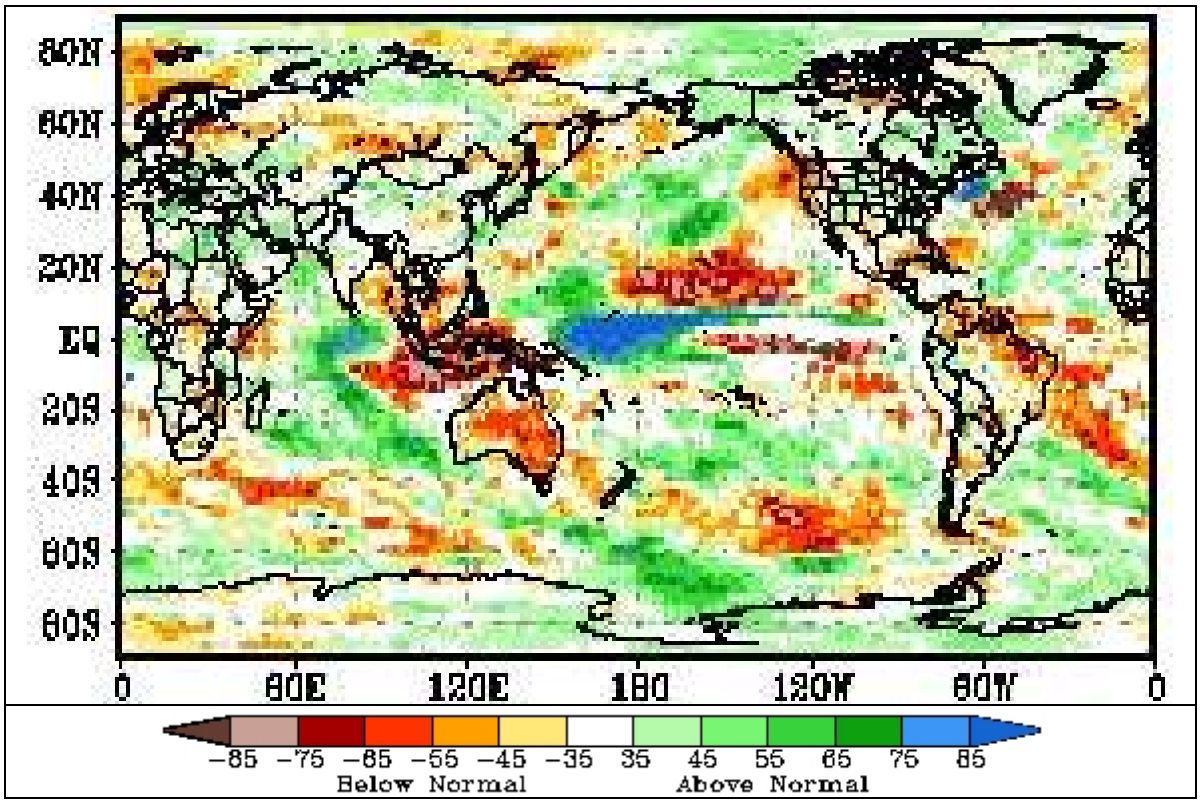


fig.35: Prévision probabiliste d'anomalies de précipitations (en %) pour la période octobre-novembre-décembre, produite en septembre 2012 par le NCEP. Catégorie le plus probable exprimée selon 3 classes. Les zones en bleu correspondent à la situation où les conditions sont inférieures à la normale, blanc proches de la normale et rouge supérieures à la normale.
http://www.cpc.ncep.noaa.gov/products/people/wwang/cfs_fcst/images3/glbPrecProbSea.gif

II.4.g International Research Institute (IRI)

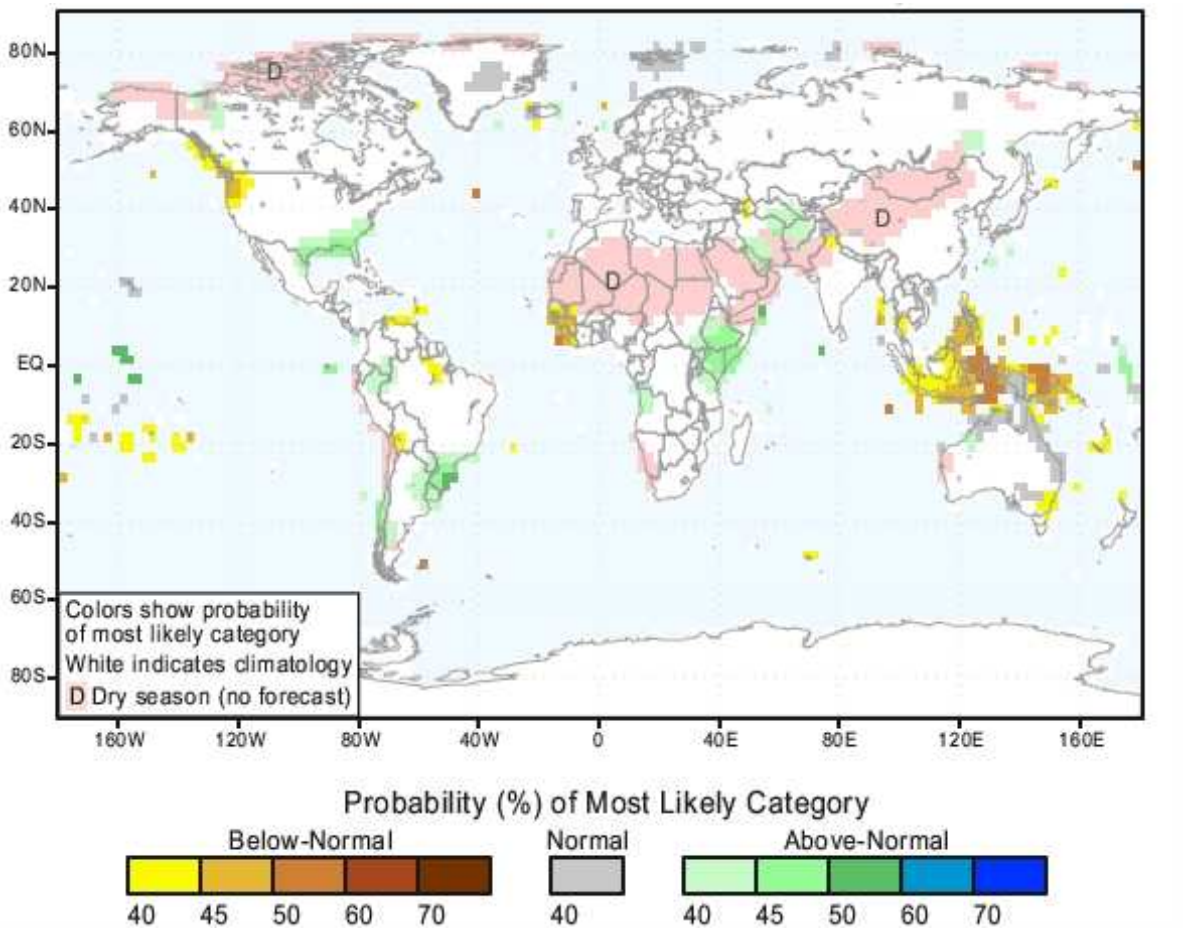


fig.36: Most likely category of Rainfall for October-November-December, issued in September from the IRI multi-model ensemble. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://iri.columbia.edu/climate/forecast/net_asmt/

Good consistency with Euro-Sip.

II.5. REGIONAL TEMPERATURES

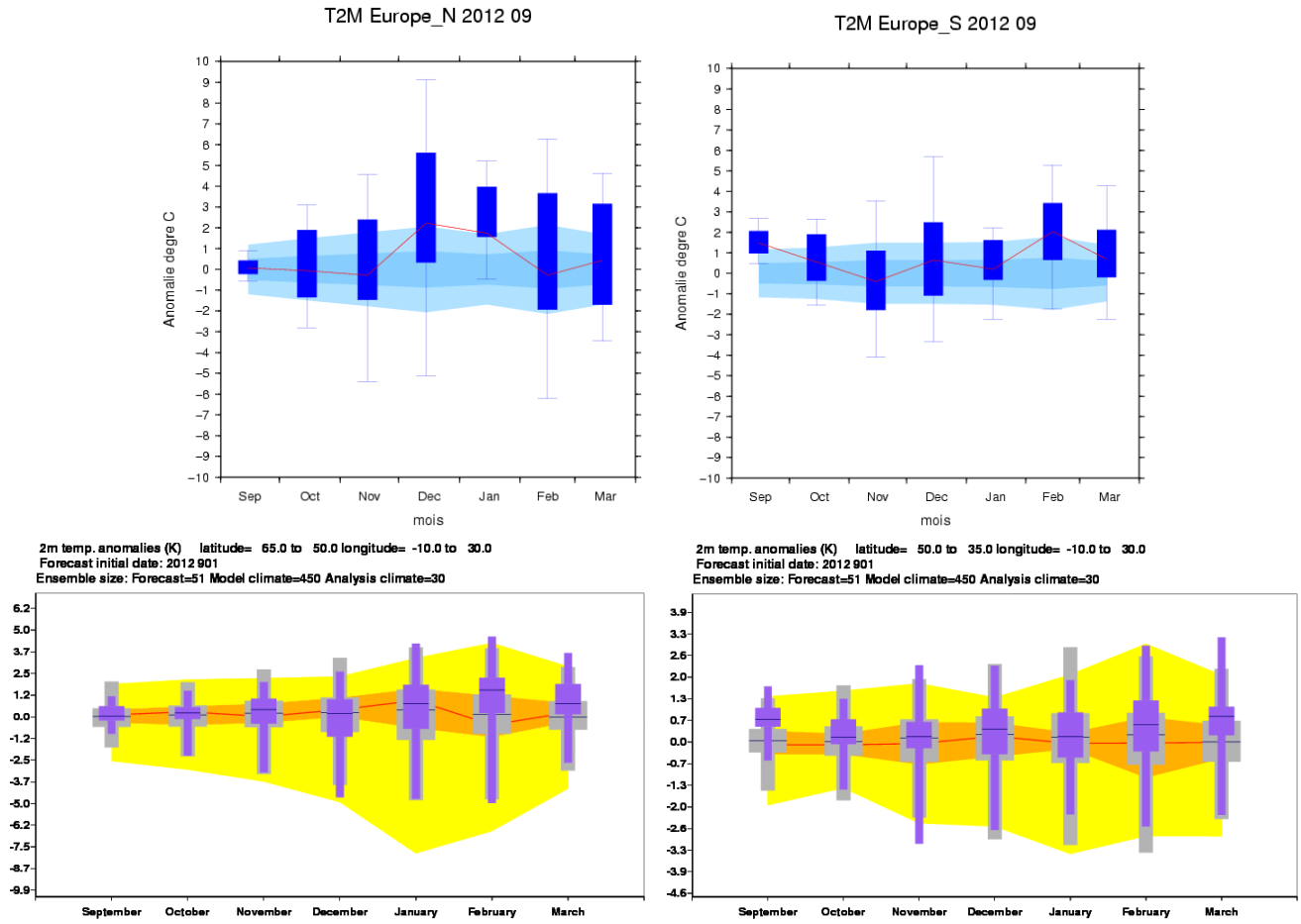


fig.37: Climagrams for T2m in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom) issued in September.

For Northern Europe : no consistency between the 2 models. The differences can be related to the model uncertainties and to the climate trend representation (clearly overestimated in MF).
For Southern Europe : some consistency for close to normal in OND.

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

REGIONAL PRECIPITATIONS

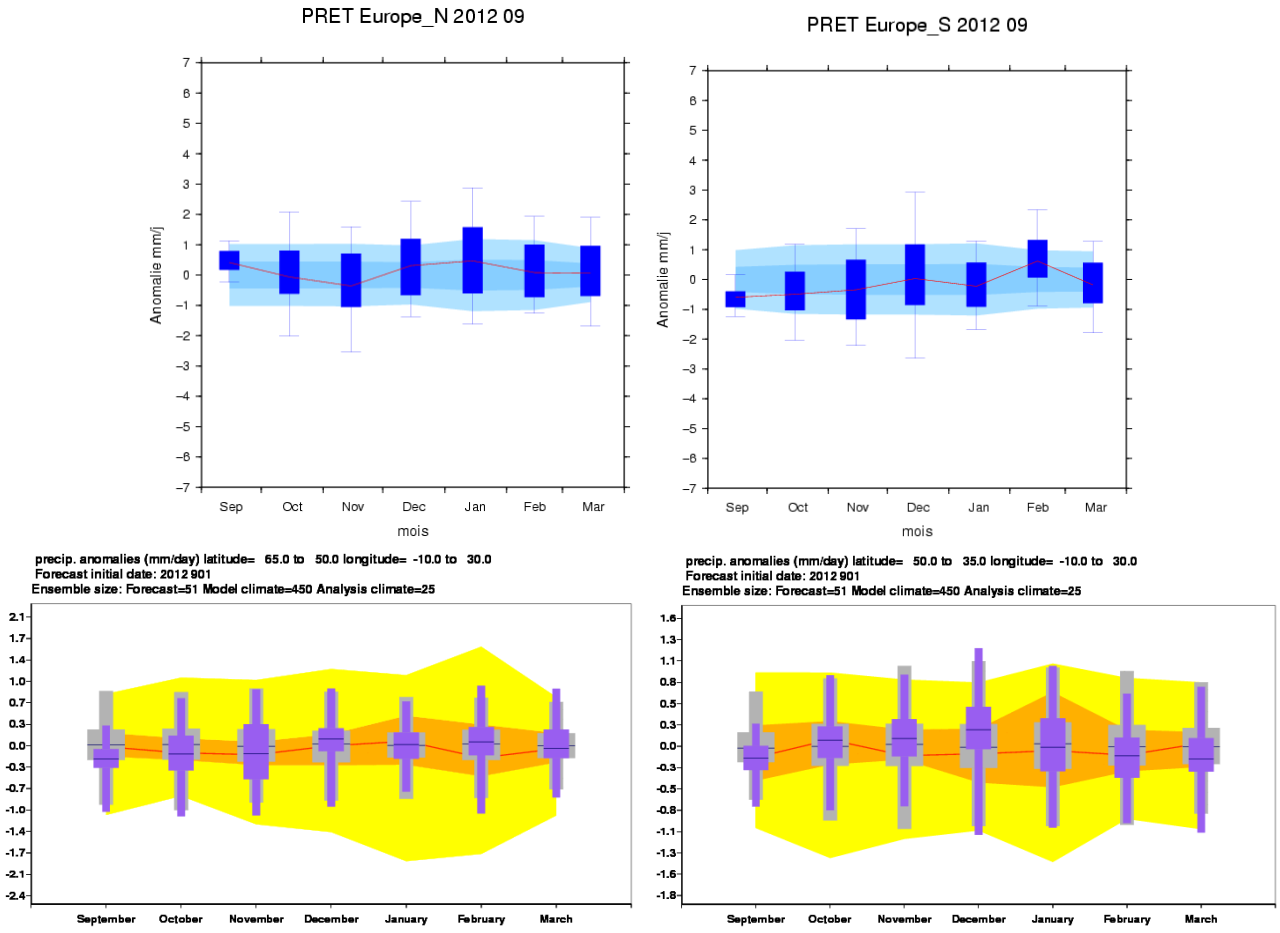


fig.38: Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom), issued in september

For Northern Europe : basically both models give “No Signal” for OND. In MF, ROC are close to 0.6.

For Southern Europe : little consistency between the 2 models, they give about “No Signal”. In MF, ROC scores are close to 0.6

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

II.6. MODEL'S CONSISTENCY

II.6.a GPCs consistency maps

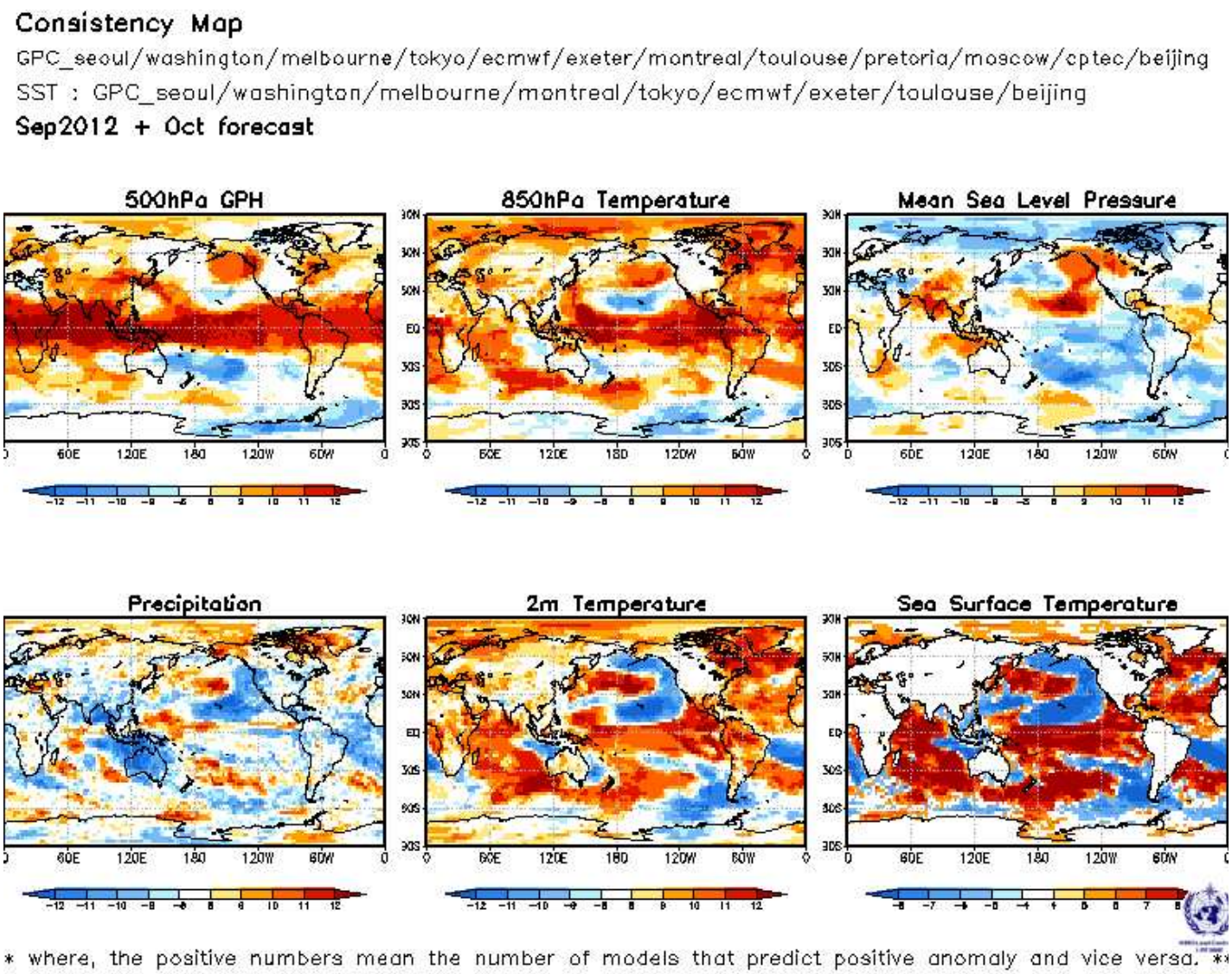


fig.39: GPCs Consistency maps from LC-MME http://www.wmolc.org/

For Z500 : little consistency over Europe and the Mediterranean basin
For T2m : some consistent signal over Europe (Above normal scenario, not confirmed by Eurosip or IRI) and the Mediterranean basin. Good consistency for "above normal" over South America, Central America.
For precipitation : little consistency over mid-latitude regions. Note the good consistency for "below normal" over Australia and Maritime Continent.

II.7. "EXTREME" SCENARIOS

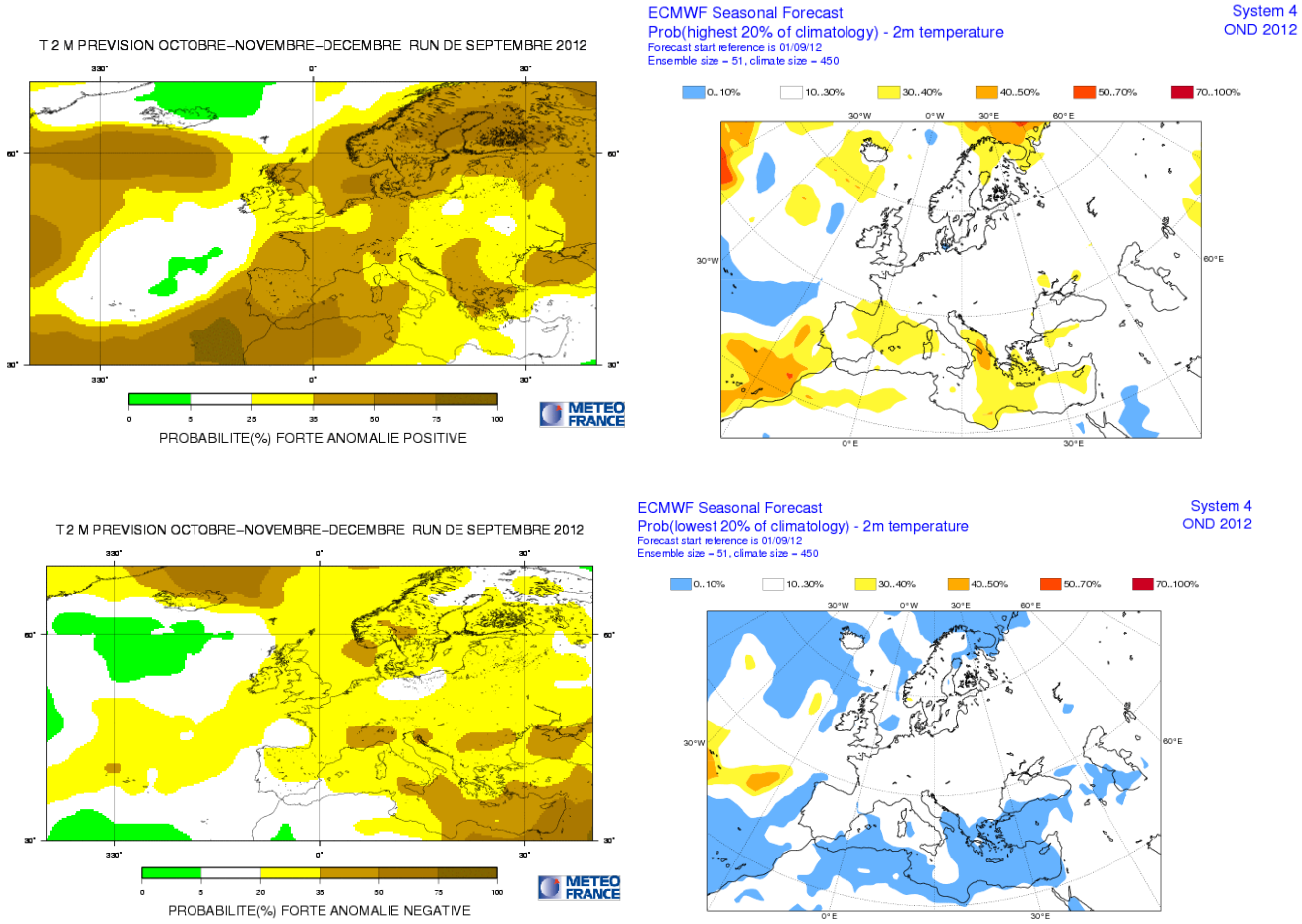
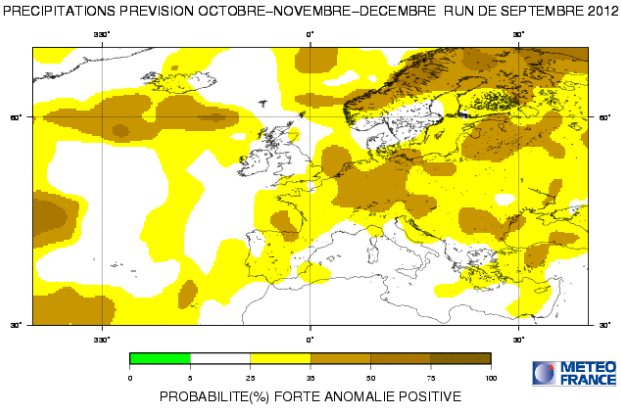
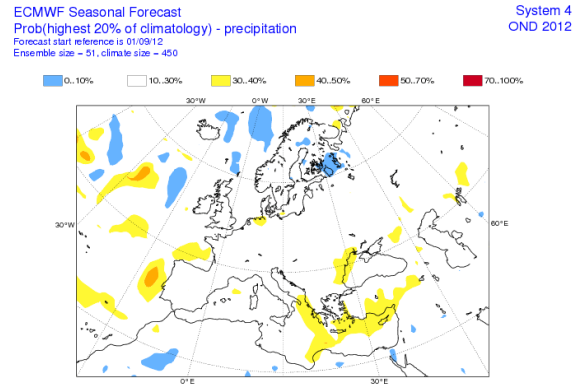
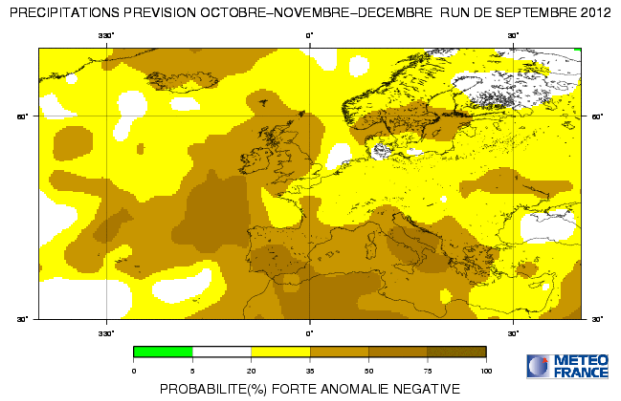


fig.40: Top : Probability of « extreme » above normal conditions for T2m for Meteo-France (left - highest ~15% of the distribution) and ECMWF (right - highest 20% of the distribution).
Bottom : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the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

Little consistent signal over Europe, but over the Mediterranean basin they both give enhanced probabilities of very above normal scenario.
Little consistency for very Below Normal scenario.







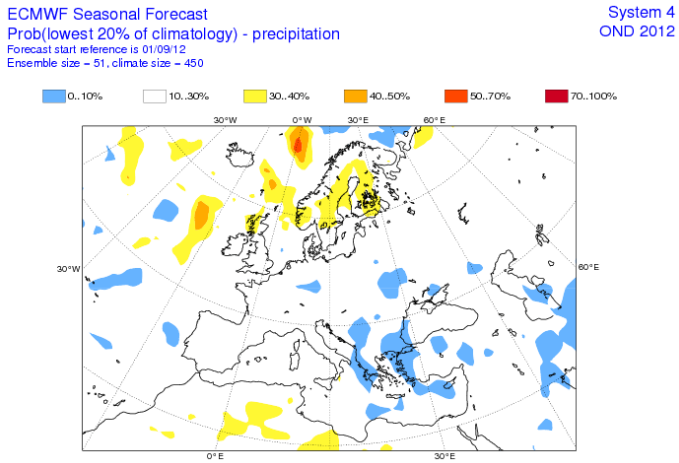


fig.41: Top : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the distribution) and ECMWF (right - lowest 20% of the distribution)
Bottom : Probability of « extreme » Above normal conditions for rainfall for Meteo-France (left - highest ~15% of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

No consistency : ECMWF is much more neutral than MF.

II.8. DISCUSSION AND SUMMARY

Forecast over Europe

Referring to the general Circulation discussion, one can expect some predictability for Europe. However, models are not very consistent, except a positive Z500 anomaly over Southern part. Consequently, no scenario is privileged for OND for Northen Europe, neither in temperature nor precipitation; for Southern Europe, we privilege an “above than normal” scenario in temperature, and “no scenario” in precipitation.

Tropical Cyclone activity

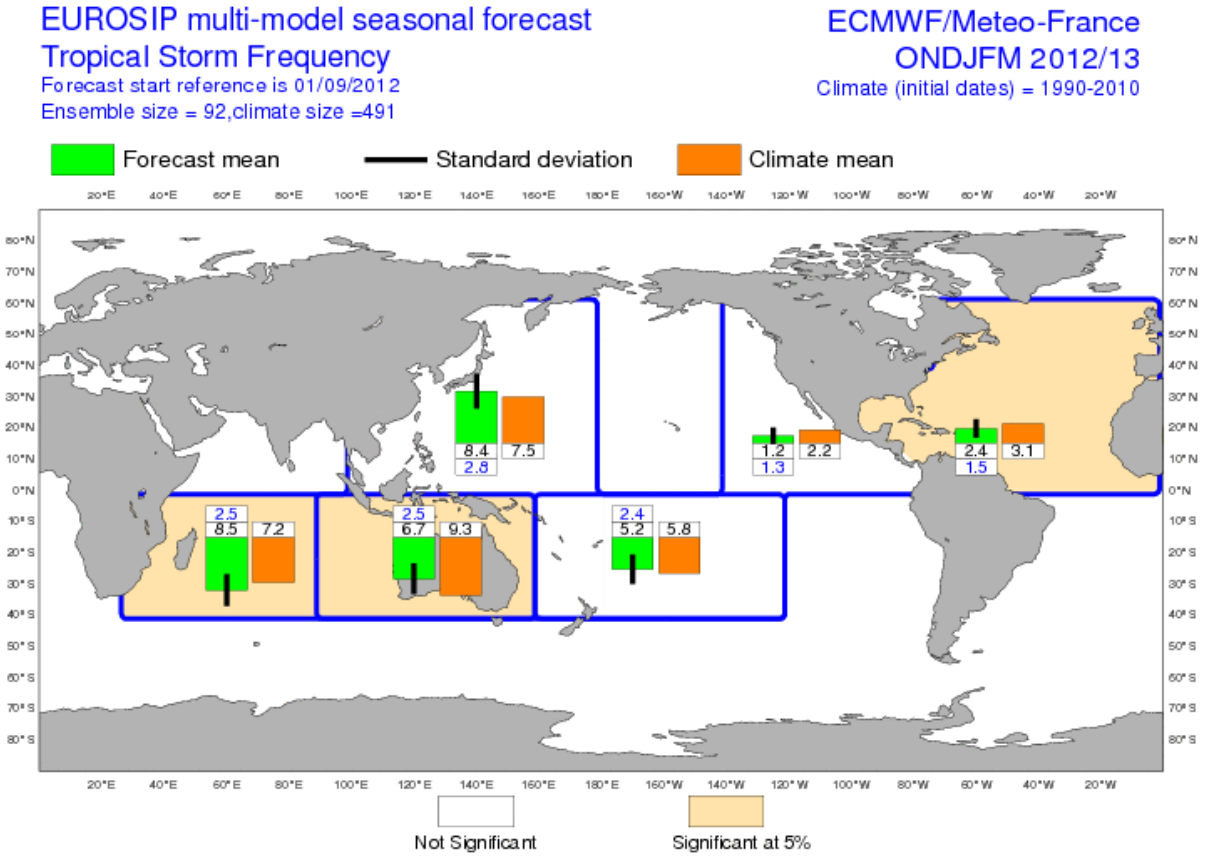


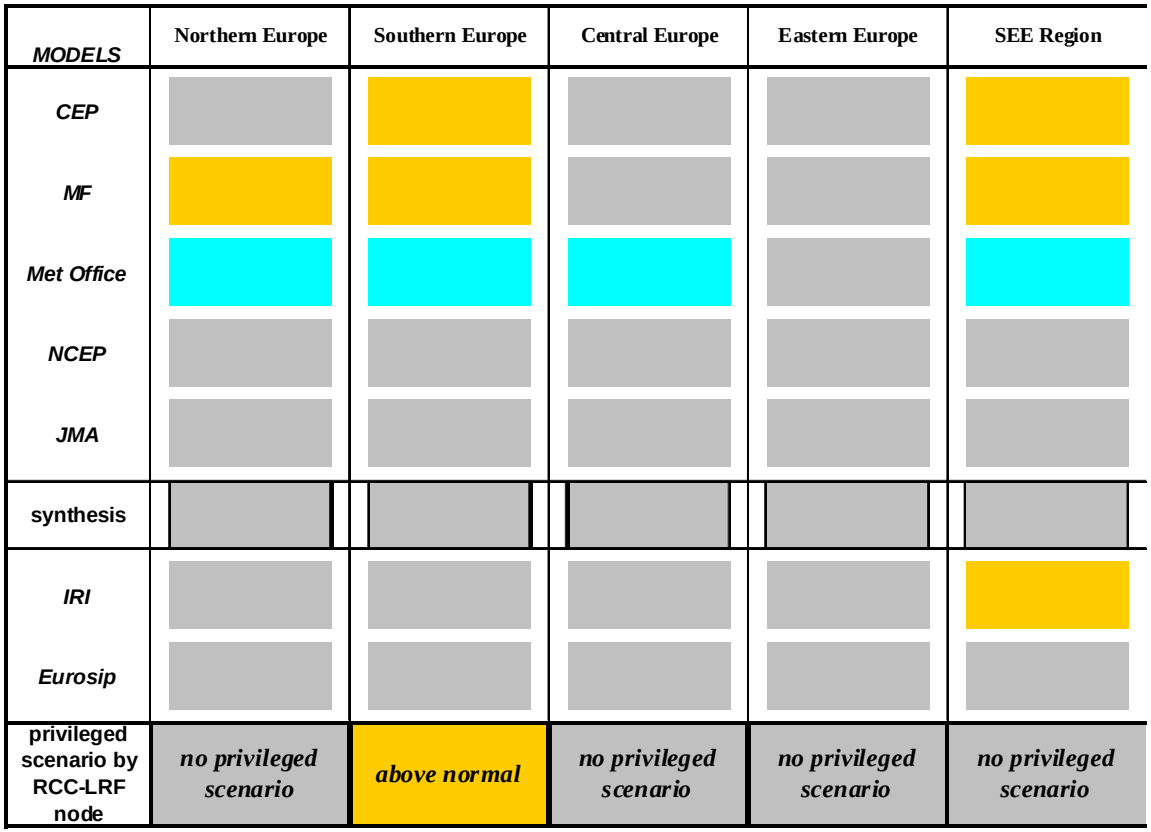
fig.42: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF) for the october 2012 to march 2013 period, issued in September.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtrop/trop_euro/eurosip_tropical_storm_frequency/

For the end of the Tropical Cyclone season in the Northern hemisphere, Euro-Sip forecasts indicate a below than normal condition over Atlantic, signal not significant over Pacific.
For the beginning of the Tropical Cyclone season in the Southern hemisphere, Euro-Sip forecasts indicate a higher than normal condition over South-West Indian ocean, lower than normal over South-Est Indian/Australia region.

WMO RA VI
Pilot RCC-Network

Synthesis of Temperature forecasts for October-November-December 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					
MF					
Met Office					
NCEP					
JMA					
synthesis					
IRI					
Eurosip					
privileged scenario by RCC-LRF node	*no privileged scenario*	*above normal*	*no privileged scenario*	*no privileged scenario*	*no privileged scenario*

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

WMO RA VI
Pilot RCC-Network

Synthesis of Rainfall forecasts for October-November-December 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					
MF					
Met Office					
NCEP					
JMA					
synthesis					
IRI					
Eurosip					
privileged scenario by RCC-LRF node	*no privileged scenario*	*no privileged scenario*	*no privileged scenario*	*no privileged scenario*	*no privileged scenario*

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

III. ANNEX

III.1. SEASONAL FORECASTS

Presently several centres provide seasonal forecasts, especially those designated as Global Producing Centres by WMO (see http://www.wmo.int/pages/prog/wcp/wcasp/clips/producers_forecasts.html).
■ BoM, CMA, 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).

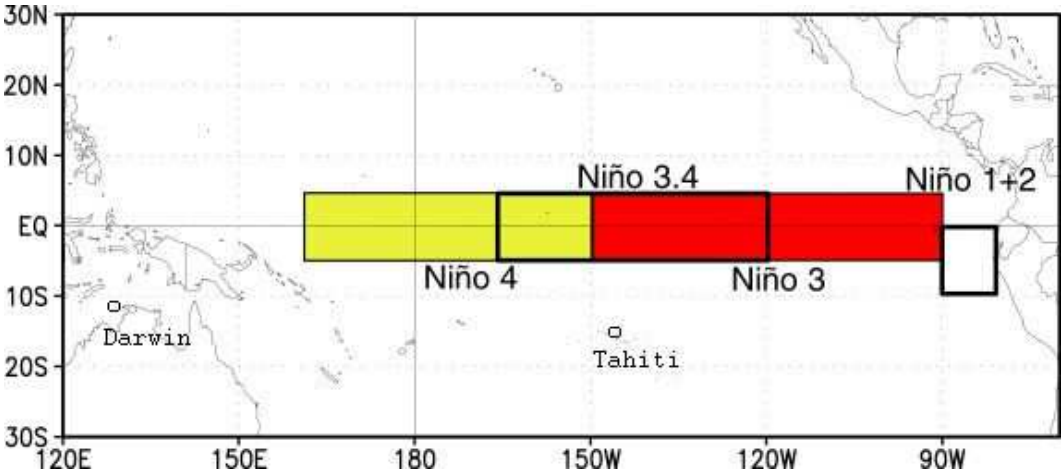
In order to better interpretate the results, it is recommended to look to verification maps and graphs which give some insight into the expected level of skill for a specific parameter, region and period. A set of scores is presented on the web-site of the Lead-Centre for Verification (see http://www.bom.gov.au/wmo/lrfvs/)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