WMO RA VI Pilot RCC-Network

METEO FRANCE Toujours un temps d'avance

GLOBAL CLIMATE BULLETIN n°162 - DECEMBER 2012

Table of Contents

I. DESCRIPTION OF THE CLIMATE SYSTEM (OCTOBER 2012)

I.1. OCEANIC ANALYSIS

I.1.a Global Analysis

At the Surface (fig. 1) :
For the Pacific : In the equatorial wave guide SSTs are close to normal excepted a positive anomaly close to the date line and a negative anomaly on the most Eastern part (in relationship with a wave propagation under the surface). Little evolutions elsewhere to the exception of the mid/high-latitudes in the North Pacific (cooling close to Japan and warming over the Bering sea).

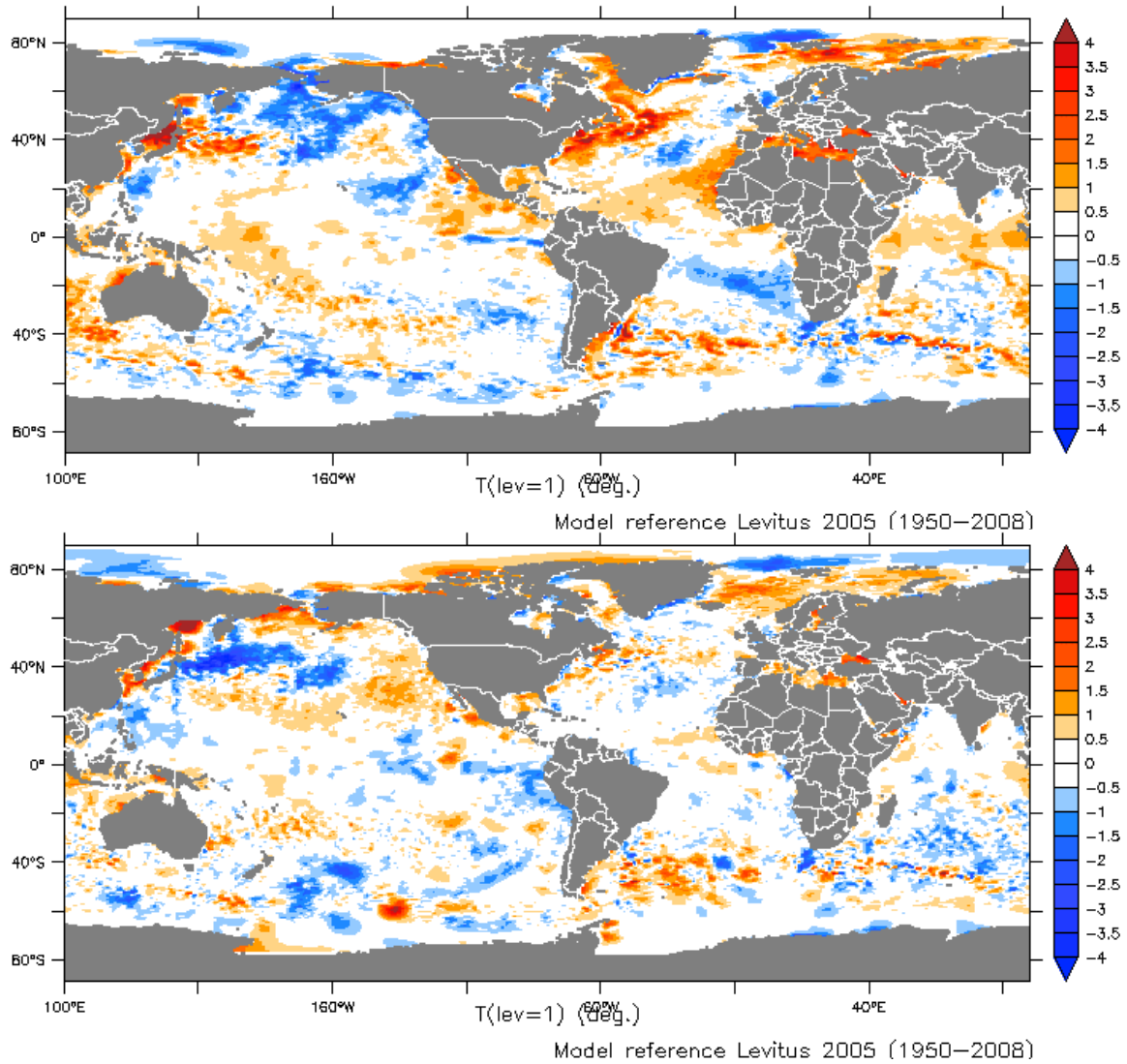

fig.1: top : SSTs Anomalies in October 2012 (°C) (reference 1950-2008)
bottom : SST tendency (current – previous month) http://bcg.mercator-ocean.fr/

For the Tropical Atlantic : little evolution in the equatorial band with still some positive anomaly in the Guinean Gulf and close to normal close to South America. In the Southern Tropics, still a negative

anomaly. Over the North Atlantic : Tropical part warmer than normal, warming along the Eastern coast of North America. A negative anomaly appears in the sub-tropical and the central part of the basin.
In the Indian Ocean : still mostly warmer than normal from West Australia up to the Great Horn of Africa. The southern part is slightly cooling.
In subsurface (fig.2) :
In the Pacific : in the equatorial waveguide, heat content anomalies mostly negative over Western and Eastern regions and consistent with the temperature in subsurface and the thermocline depth anomalies (see fig. 4 & 5). Note the positive anomalies in the most Western part off equator (especially in the Northern hemisphere between 10°N and 20°N) while the signal is weaker at the surface. In the mid/high latitudes of the Northern hemisphere, great consistency with the surface signal.
In Tropical Atlantic : Little evolution. Positive anomaly developed in the Guinean Gulf. Persistence of the positive anomaly in the North-Western part of the basin (close to the mid-latitudes). The Northern Atlantic is mostly above normal conditions. Over South Atlantic anomalies are consistent with SST.
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 to the exception the southern hemisphere (cooling).

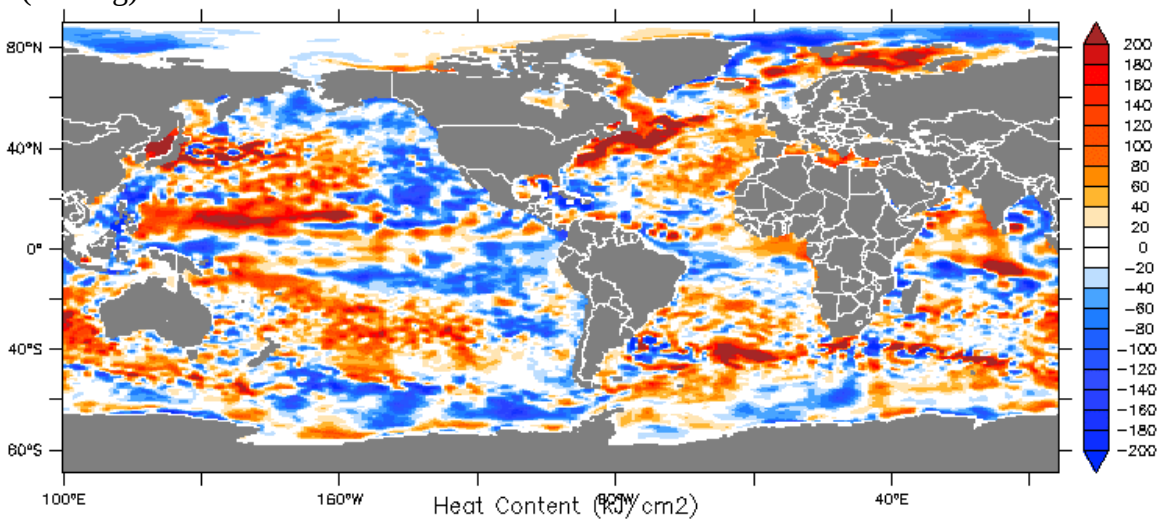

fig.2: map of Heat Content Anomalies (first 300m) in October 2012 (kJ/cm²). (reference 1950-2008)
http://bcg.mercator-ocean.fr/

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

A positive anomaly developed close to the dateline while it is vanishing on the eastern part. Little anomalies of the Trade Wind over most of the basin. The SOI is still slightly positive (0,3).

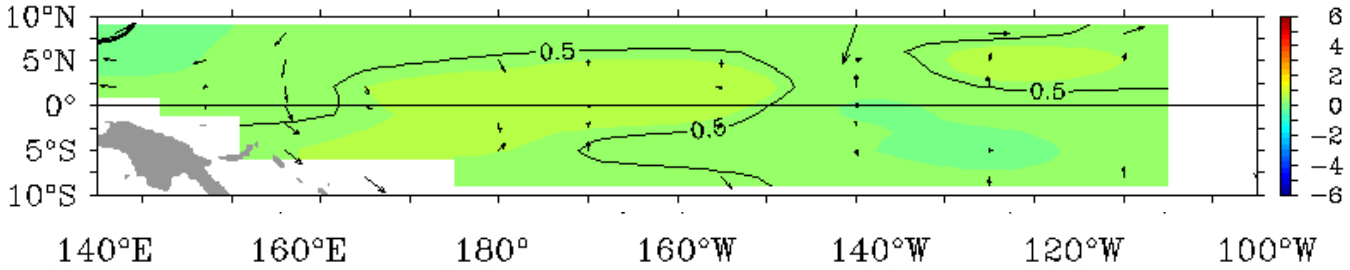

fig.3: SST Anomalies and Wind anomalies in October 2012 over the Equatorial Pacific from TAO/TRITON.
http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/monthly-summary.html

In the Niño boxes (4, 3.4, 3 et 1+2 ; see definition in Annex) the SST anomalies illustrate the SST decease (excepted in Niño 1+2 box). The monthly averages in October are respectively
0,5°C, +0,3°C, +0,0°C and -0,1°C from West to East.

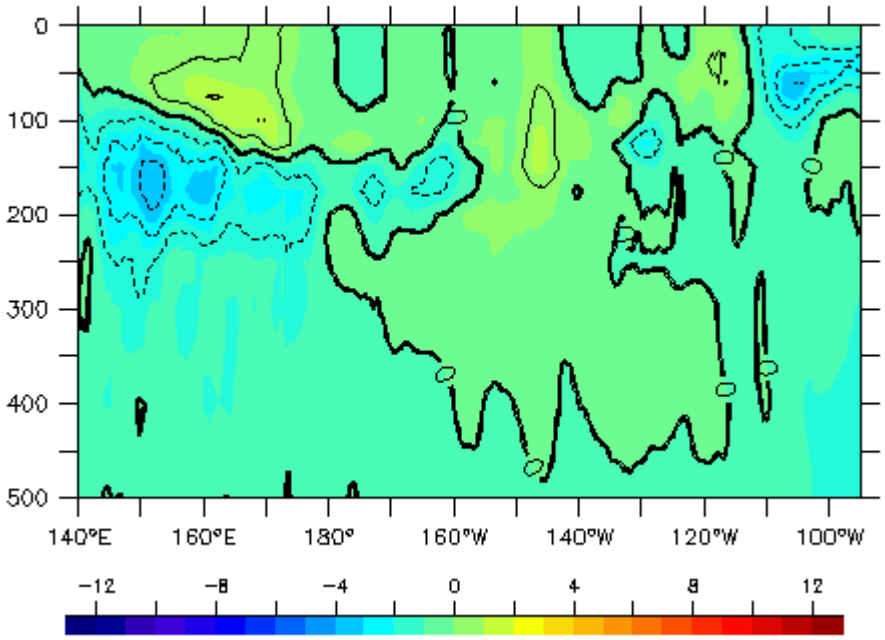

fig.4: Oceanic temperature anomaly in the first *500 metres* in the Equatorial Pacific, in October 2012 http://bcg.mercator-ocean.fr/

In the equatorial waveguide (fig. 4) : clear traces of warmer than normal conditions under the surface close to the date line and in the central part. On the Eastern part negative anomaly (close to 50m depth) consistent with SST and the Kelvin wave propagation already pointed out last month.
The thermocline structure (fig. 5) : Thinner than normal over the eastern and western part. Some wave propagation signal of the negative and positive anomalies is visible across the basin.

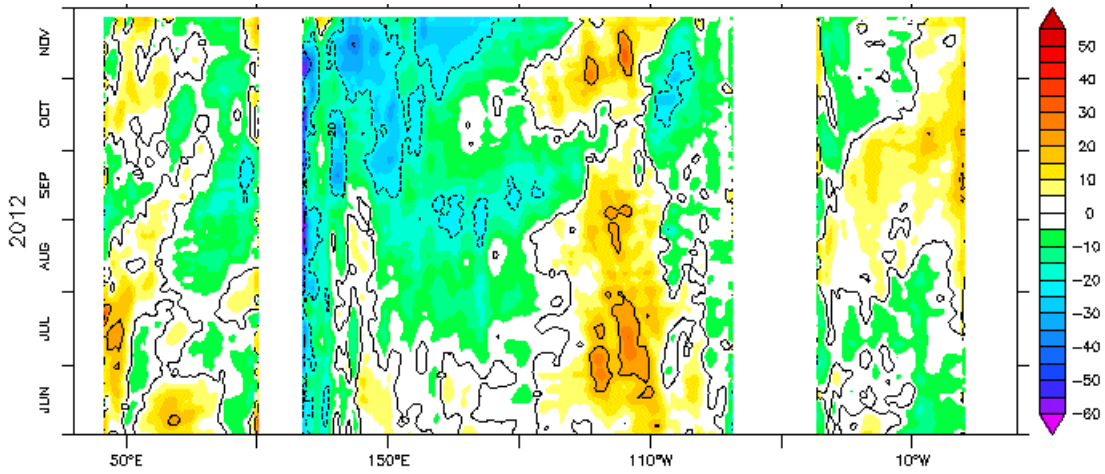

fig.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 6 month period. http://bcg.mercator-ocean.fr/

I.1.c Atlantic Basin

Northern Tropical Atlantic : mostly warmer than normal, with little evolution since the last month.
Equatorial waveguide : a dipole like pattern with deeper/warmer than normal conditions for the thermocline/SST on the Eastern part (Guinean Gulf) while in the Western part there is a weak thinner/cooler than normal signal.
The Southern Tropical Atlantic : Still cooler than normal. Some traces of warmer than normal conditions in the mid-latitudes.

I.1.d Indian Basin

Southern Tropical Indian Ocean : warmer than normal close to West Australia.
Equatorial waveguide : warmer than normal conditions in Western part and Normal/colder than normal in Eastern part (close to the maritime continent). The IOD is still positive. Here also, some trace of ocean dynamic.
Northern Tropical Indian Ocean : Slightly warmer than normal to the exception of the Bay of Bengal.

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) : a 2 wave number pattern could be suspected along the equator. However, quite a lot of sub-regional patterns are visible.
On the Pacific : Clear Convergent circulation anomaly (downward anomaly motion) on the Western side (which extends southward and Northward). Quite a lot of additional sub-regional Convergent circulation anomaly in the Southern hemisphere across the Pacific. Some weak but discernable Divergent circulation anomalies on the West Southern Pacific, North to Hawai and over the equatorial central Pacific.
On the African continent : Strong and large divergent circulation anomaly (upward anomaly motion) over West Africa and Egyptia. Two positive anomalies (downward anomaly motion) over regions of the Gulf of Mexico and Nordeste Brasil.
On the Indian Ocean : positive anomaly (convergent circulation anomaly - downward anomaly motion) on the Eastern part and negative anomaly (divergent circulation anomaly - upward anomaly motion) on the equatorial western side (with extension on North over the Arabic Peninsula and on South up to the South West Indian Oceanic regions.

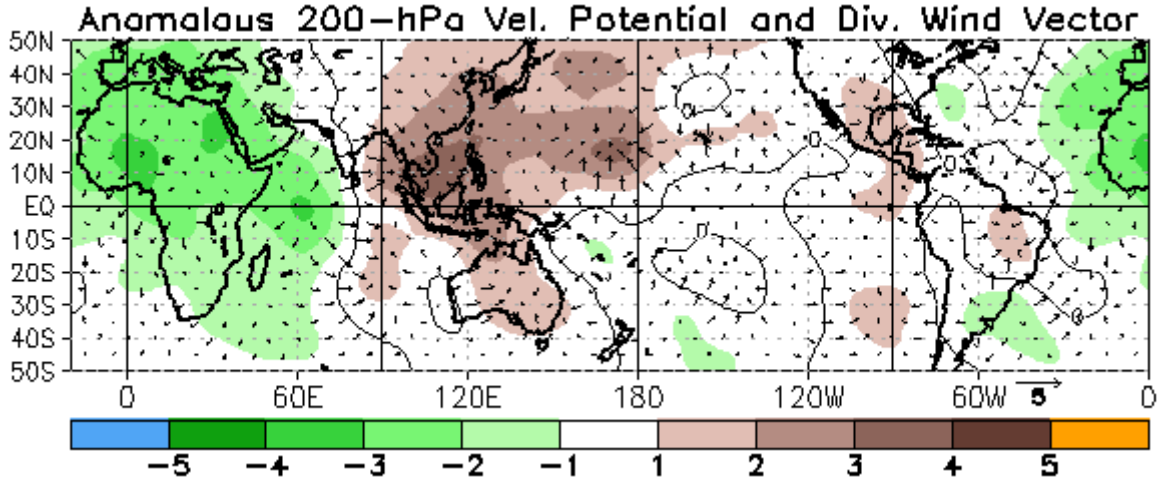

fig.6: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly in October 2012. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

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. Some traces of possible teleconnection over the Western side of the Pacific. Over the Atlantic and Europe, some signal could be related the large scale convection over Africa even if the relationship with the ST forcing is a bit unclear.

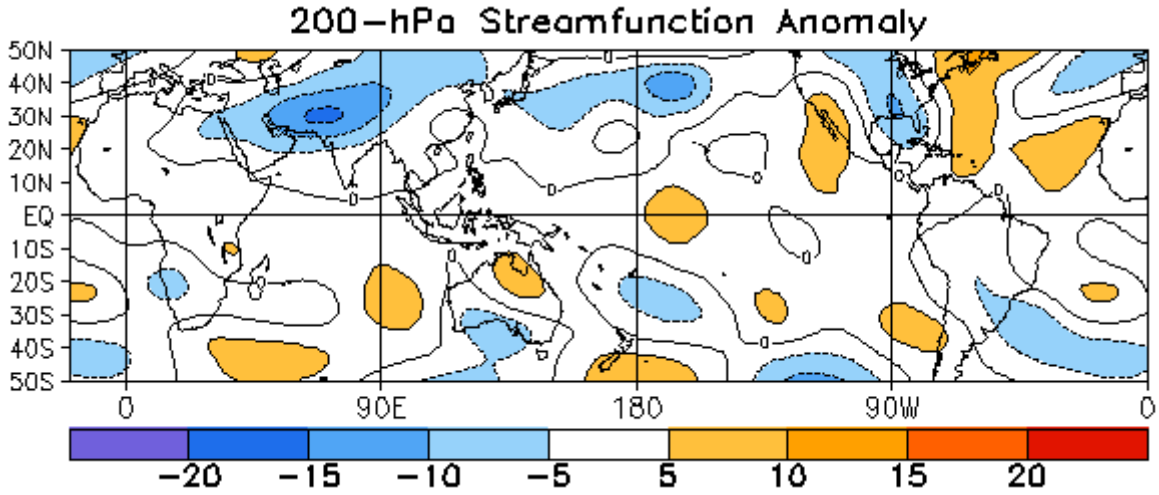

fig.7: Stream Function Anomalies at 200 hPa in October 2012.
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

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. However, as already pointed out (see stream function discussion) the West Pacific mode is active (-2.5) leading to a positive anomaly close to Japan (consistently with SST) and the PNA is negative (-1.1). For Europe, the most active mode are the NAO mode (-1.7) and the East-Atlantic/West Russia mode (-1.0).

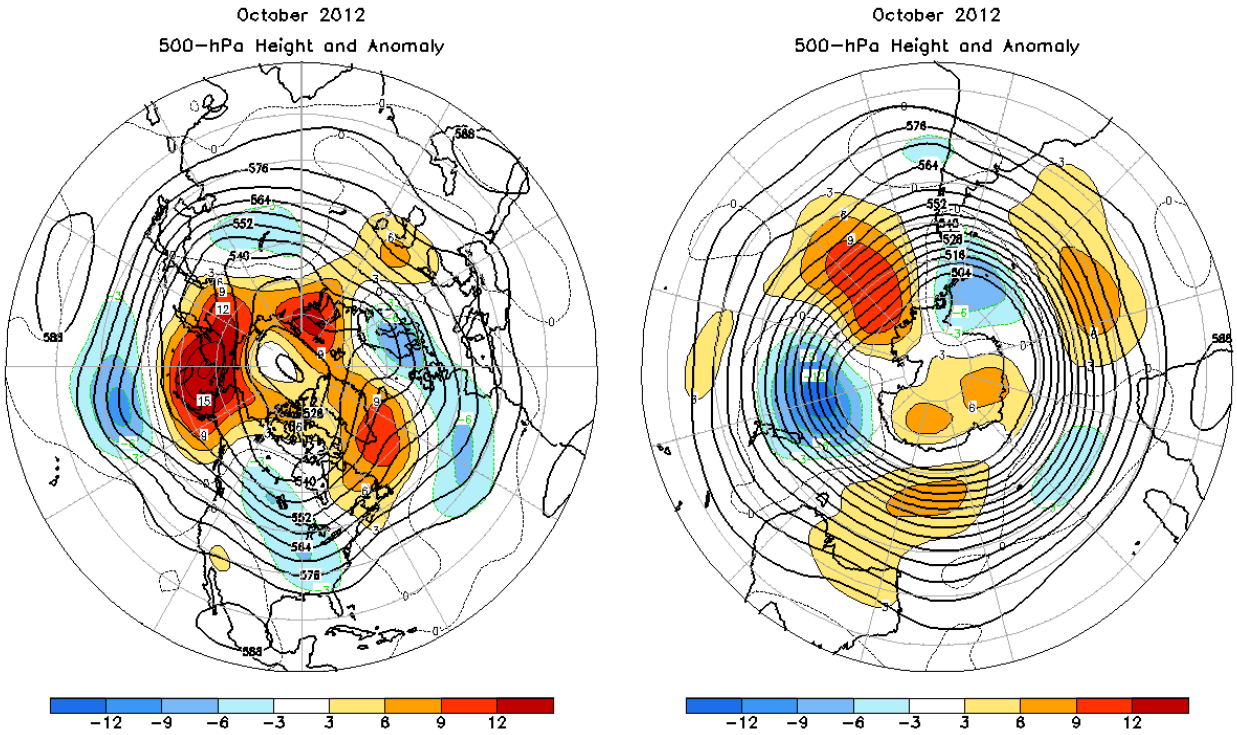

fig.8: Anomalies of Geopotential height at 500hPa in October 2012 (left North Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige9.shtml, and right South Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige15.shtml)

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
OCT 12	**-1.7**	**-0.3**	**-2.5**	**0.6**	**-1.1**	**---**	**-1.0**	**-0.3**	**-0.2**
SEP 12	-0.4	0.4	0.7	0.2	-0.4	---	-0.5	-0.9	-0.7
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

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

I.2.b Precipitation

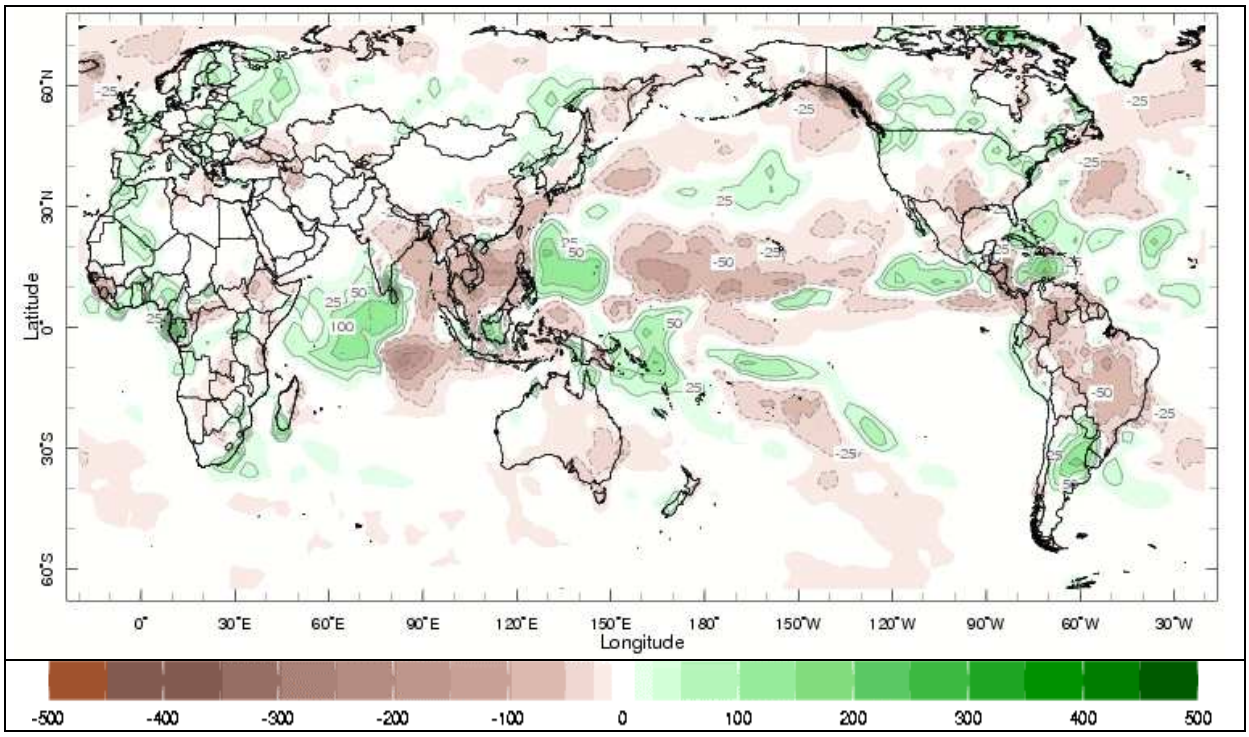

fig.9: Rainfall Anomalies (mm) in October 2012 (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.

http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/

In relationship with quite a lot of sub-regional patterns in the Velocity Potential anomaly field, the patterns are quite fragmented.

Pacific : quite good consistency with the Divergent/Convergent Circulation anomalies ; especially over the Western and Central Pacific and the SCPZ region.

Atlantic/Africa : Clear relationship with the velocity potential field anomaly. Strong negative anomaly centred over Brazil which extends over the north of South-America and positive anomaly over Argentina. To be quoted the positive anomalies over West Africa.

Indian Ocean : strong negative anomaly over most of the Eastern part counterbalanced by a positive anomaly westward (see velocity potential field).

Australia : some traces of negative anomalies, especially over South-Eastern regions.

North America : mostly dry over coastal area of West Canada and US regions close to the Gulf of Mexico.

Over Europe : to be quoted the positive anomalies (wet) on the Eastern part (also some on the western façade).

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I.2.cTemperature

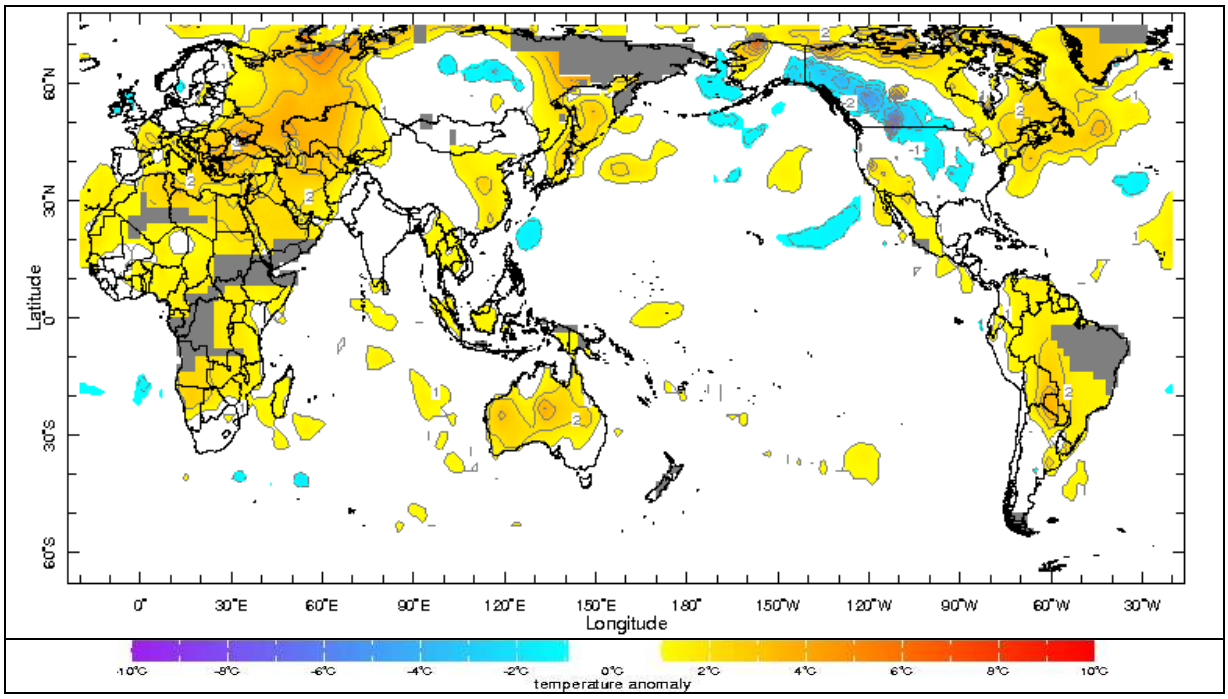


fig.10: Temperature Anomalies (°C) in October 2012 (departure to the 1979-2000 normal) http://iridl.ldeo.columbia.edu/maproom/.Global/.Atm_Temp/Anomaly.html

North-America : Warmer than normal conditions over Canada (extreme Northern and most of the eastern part) and Greenland. To be quoted the negative anomaly band over Western Canada (and North US). Aslo warmer than normal conditions over Mexico and South East US.
South-America : Warmer than normal conditions North to 30°S.
Australia : Warmer than normal conditions more or less everywhere.
Asia : Close to normal conditions excepted over Eastern Siberia and China (strong positive anomaly).
Africa : Warmer than normal conditions over most of the continent (including the Arabic Peninsula).
Europe : Above normal conditions over Central and Eastern regions and the Mediterranean regions. Close to normal conditions over North West regions.
This signal is likely at least partly related to the climate change (see Greenland, Canada, Siberia, …).

I.2.d Sea Ice

In Arctic (fig. 11 - left) : still the sea-ice extension reached its minimum value and new record (negative anomaly below 2007 value). But the growing rate is very fast.
In Antarctic (fig. 11 - right) : above normal sea-ice extension anomaly (above + 2 std) with some regional modulation.

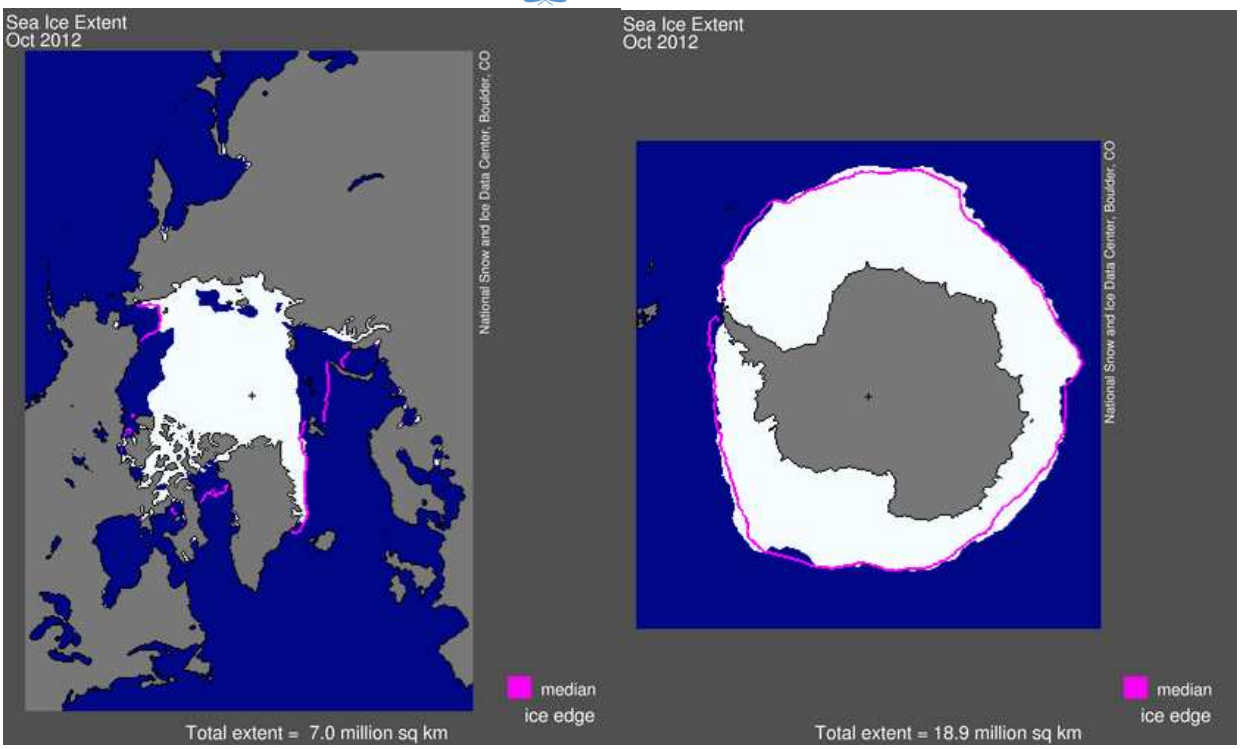


fig.11: Sea-Ice extension in Arctic (left), and in Antarctic (right) in October 2012. The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

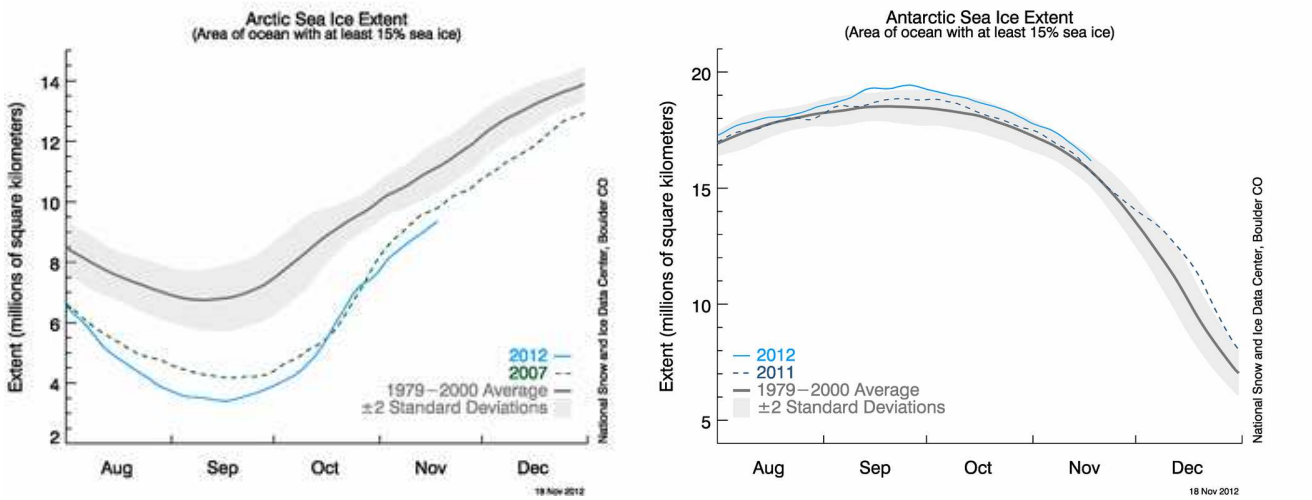


fig. 9bis : Sea-Ice extension evolution from NSIDC
http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png

II.SEASONAL FORECASTS FOR DJF FROM DYNAMICAL MODELS

II.1. OCEANIC FORECASTS

II.1.a Sea Surface Température (SST)

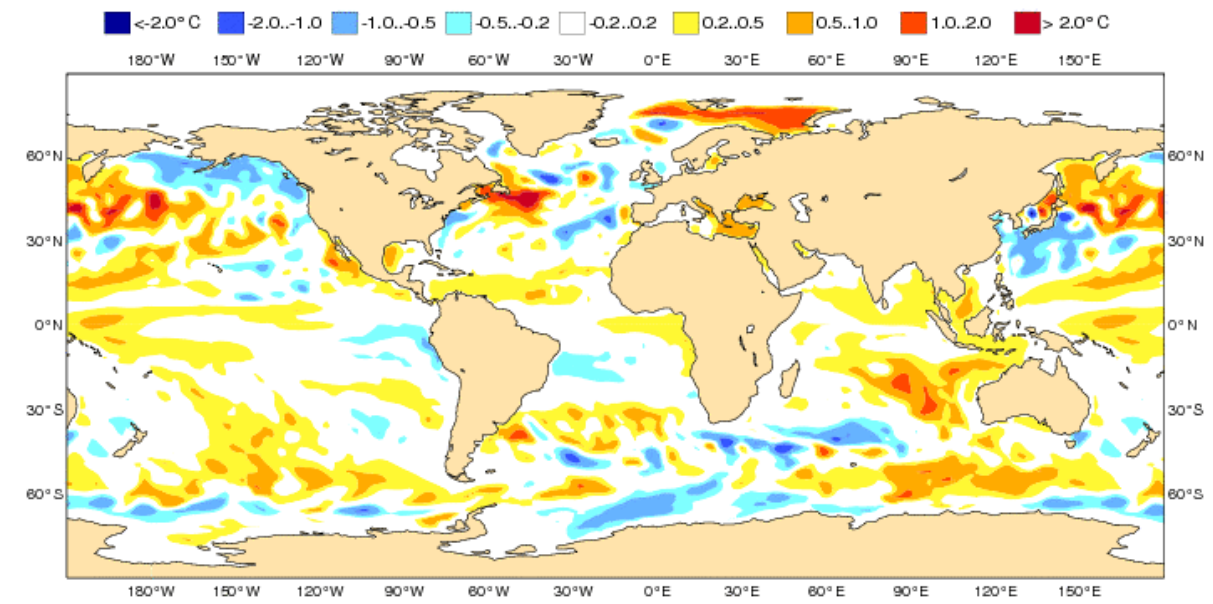


fig.12: SST anomaly forecast (in °C) from ECMWF for DJF, issued in November.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

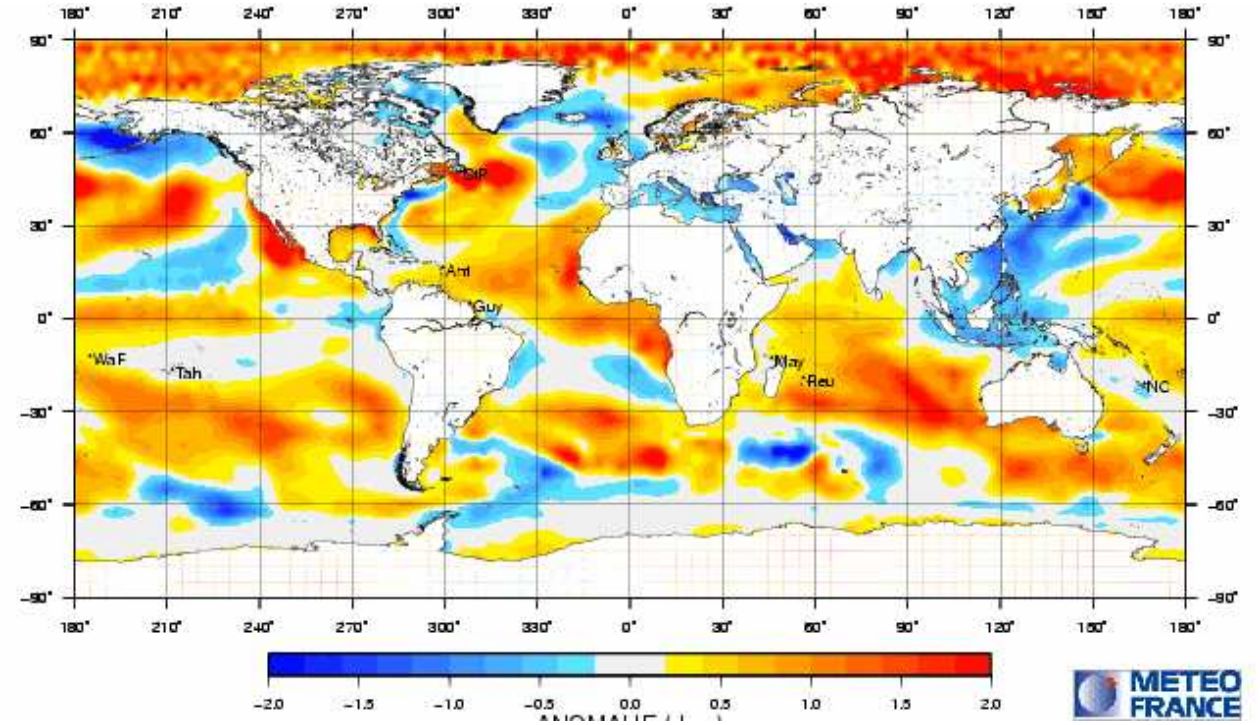


fig.13: SST Anomaly forecast (recalibrated with respect of observation) from Météo-France for DJF, issued in November. http://elaboration.seasonal.meteo.fr/

For the 2 individual models :

At large scale consistent over most of the Tropics despite some sub-regional differences. The main difference comes from the Pacific.
Pacific : along the equator warmer than normal conditions ; warmer than normal conditions at the sub-tropical latitudes (both South and North). However, the Meteo-France model maintain a consistent signal over the Central Pacific while in ECMWF it is mostly located close to the date line. To be highlight the tendency in both models to develop a negative anomaly in the most eastern equatorial Pacific. Over the SPCZ region warmer than normal conditions in both MF and ECMWF. Warmer than normal conditions close to California.
Atlantic : both models consistent over the South Atlantic (slightly colder than normal in the Tropics/sub-Tropics), the Tropical North Atlantic (warmer than normal) and the mid-latitudes of the Northern hemisphere. Close to the Equator warmer than normal signal in both models including the Guinean Gulf.
Indian Ocean : Very consistent patterns in both models. Warmer than normal more or less everywhere to the exception of the region between Australia and the maritime continent. The main difference to highlight is the colder than normal conditions close to the maritime continent in MF which are not present in ECMWF ; likely in relationship with the differences in the Pacific evolution in the 2 models (early return to normal in ECMWF). To be quoted that there is only little differences in the mid-latitudes.

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 close to the date line and close to normal elsewhere (note the little but present negative anomaly in the most eastern part).
Atlantic : mostly warmer than Normal conditions in the Northern Tropics and equatorial regions. Still warmer than normal conditions on the Guinean Gulf.
Indian Ocean : mostly warmer than normal conditions to the exception of regions close to Australia and the maritime continent (close to normal).

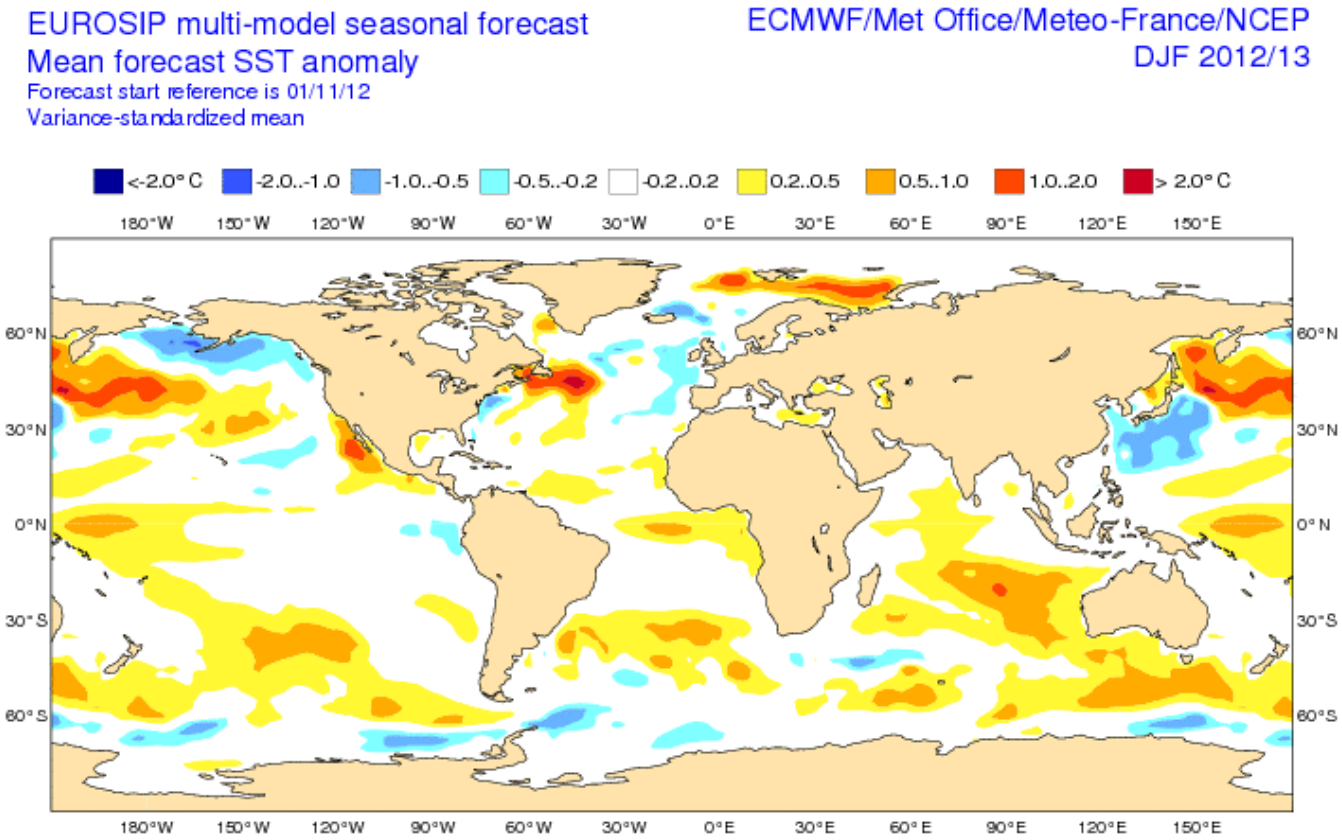


fig.14: SST Forecasted anomaly (in °C) from Euro-SIP valid for DJF, issued in November.

II.1.b ENSO Forecast :

Forecasted Phase for NDJ : neutral (but positive anomaly)

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 DJF : a large set of dynamical models give close to normal conditions (despite a few are well above El Niño threshold) and continuation a progressively decreasing temperatures over the period. For the statistical models, they are mostly forecasting still warmer than normal conditions but below the Niño threshold. So a neutral but positive situation is expected in winter up to the beginning of Spring.

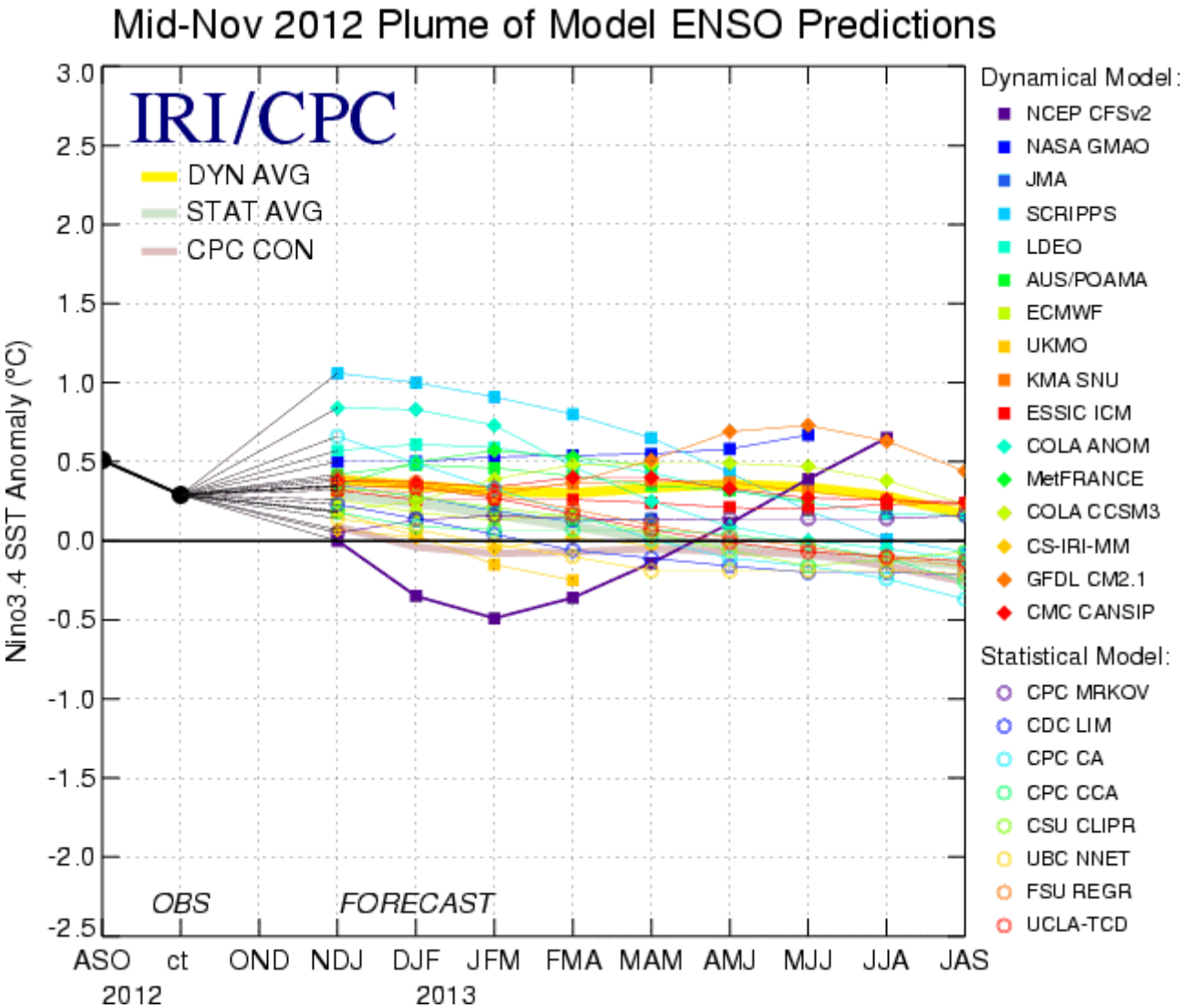


fig.15: Synthesis of Niño 3.4 forecasts (120° to 165°W) issued in November by IRI : http://iri.columbia.edu/climate/ENSO/currentinfo/SST_table.html

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 progressive return to neutral conditions while the statistical model average always stayed within neutral category.

SEASON	NDJ	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS
Value « La Niña » **Value « El Niño »**	***-0,70*** ***0,70***	***-0,65*** ***0,65***	***-0,55*** ***0,50***	***-0,45*** ***0,40***	***-0,40*** ***0,40***	***-0,45*** ***0,45***	***-0,50*** ***0,45***	***-0,50*** ***0,45***	***-0,50*** ***0,45***
Average, statistical models	0.3	0.2	0.2	0.1	0	0	-0.1	-0.1	-0.2
Average, dynamical models	0.4	0.4	0.3	0.3	0.3	0.4	0.3	0.3	0.2
Average, all models	**0.4**	**0.3**	**0.3**	**0.2**	**0.2**	**0.2**	**0.2**	**0.1**	**0**

Plumes from Météo-France and ECMWF for the 3 Niño boxes (see definition in Annex – fig. 16) :
In both models the Niño threshold is not reached on average for the NDJ period. One can only notice that some warming still could occur beginning of spring. Last, the spread of both models has increased in relationship with the uncertainty on the end of the Niño event.

NIÑO 4 NIÑO 3.4 NIÑO 3

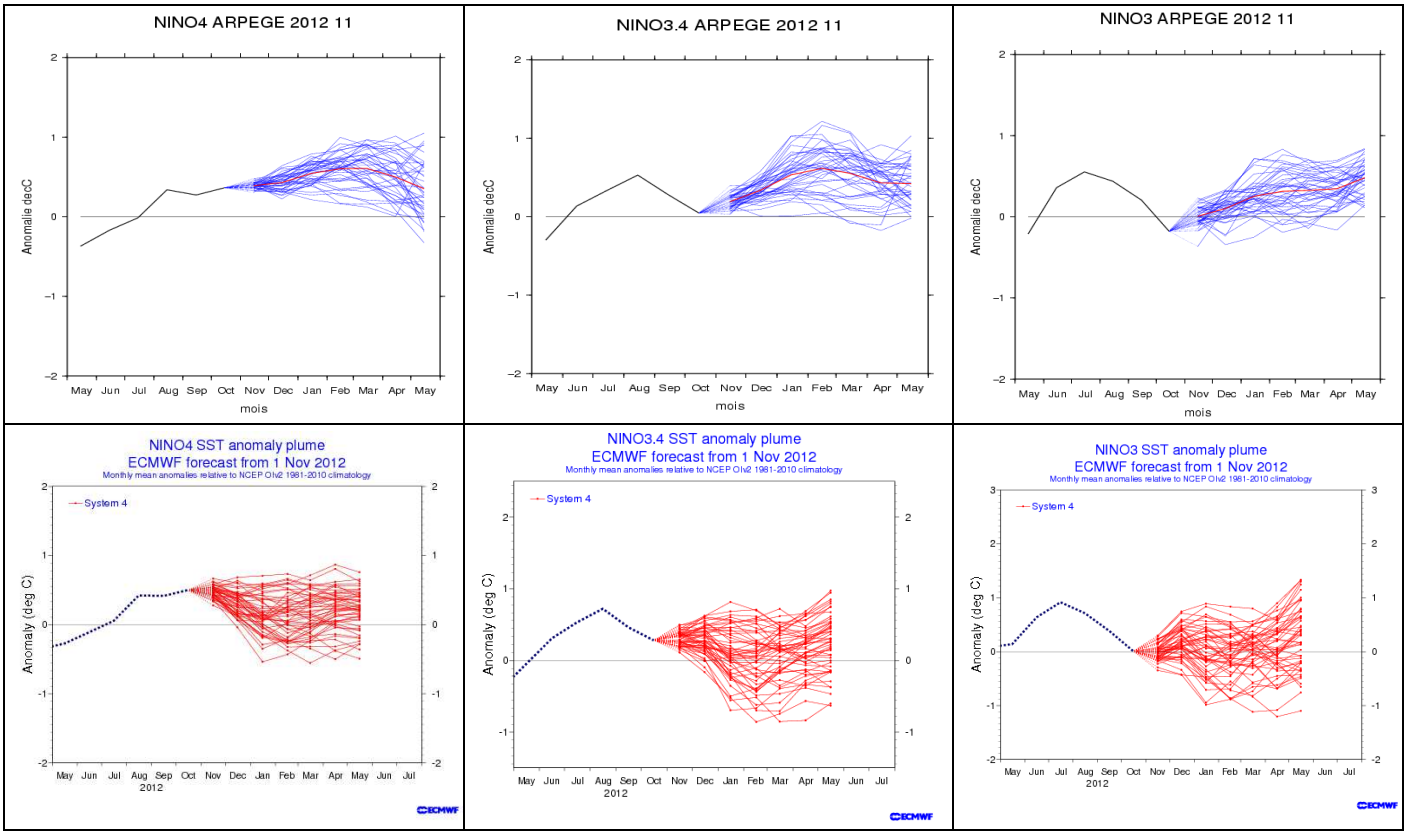


fig.16: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (bottom) issued in November, monthly mean for individual membres. (http://www.ecmwf.int/ **)**

II.1.c Atlantic Ocean forecasts :

Forecasted Phase: ***warmer than normal/close to normal in the Northern/Southern Tropics***

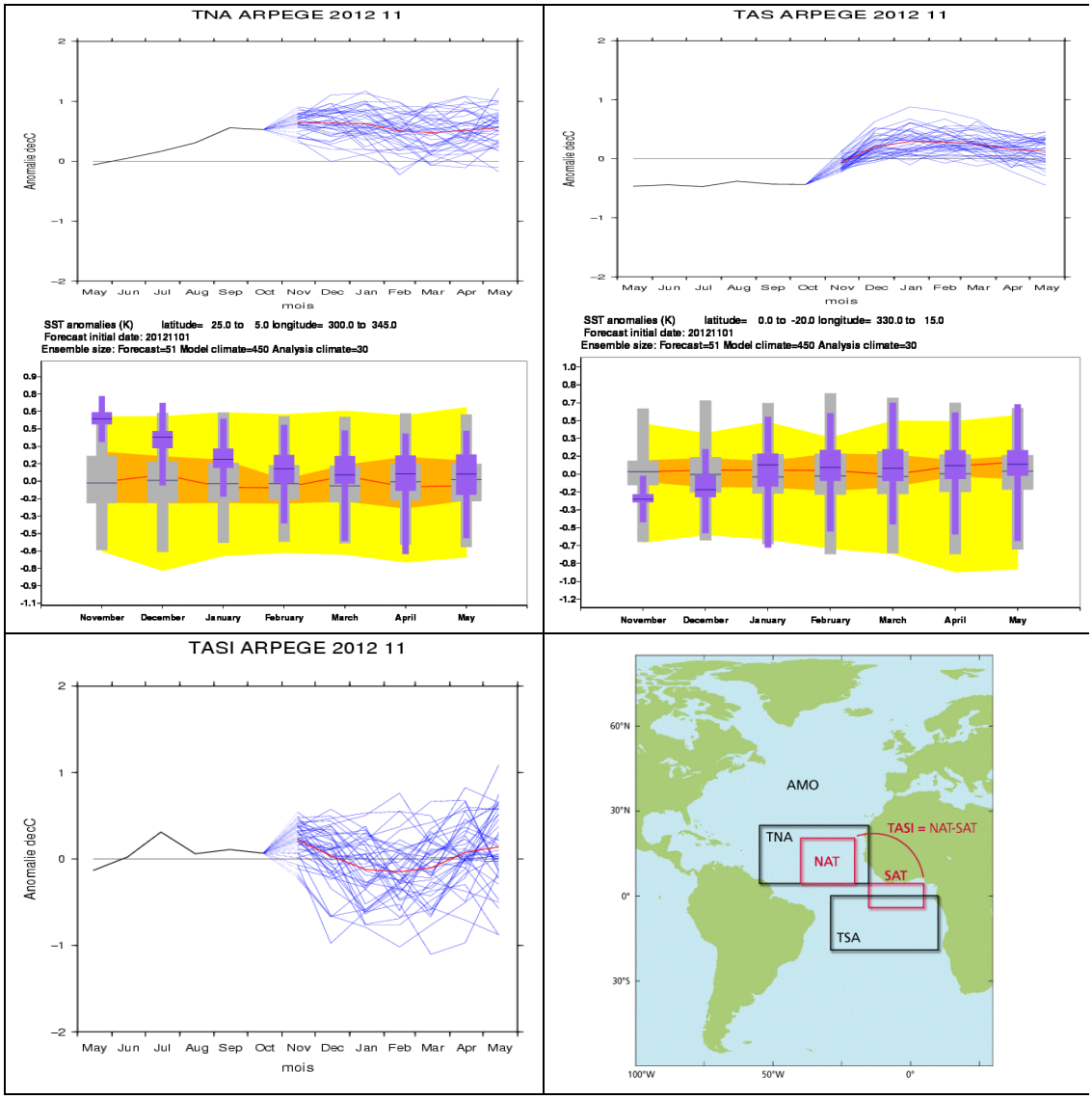


fig.17: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, issued in November, plumes / climagrams correspond to 41 / 51 members and monthly means.

North Tropical Atlantic : warmer than normal conditions with a continuous decrease in ECMWF.
South Tropical Atlantic : in both models same time tendency starting with slightly cold conditions and a continuous warming leading to warmer than normal conditions beginning of winter (in MF) or close to normal (ECMWF).
The inter-hemispheric SST gradient should remains positive.
TASI : the TASI index is close to normal (despite the MF warm bias, warmer than normal conditions developed in the Guinean Gulf in both models). However, the spread is very large which lead to be cautious on this interpretation.

II.1.d Indian Ocean forecasts :

Forecasted Phase: *IOD slightly positive with uncertainty*

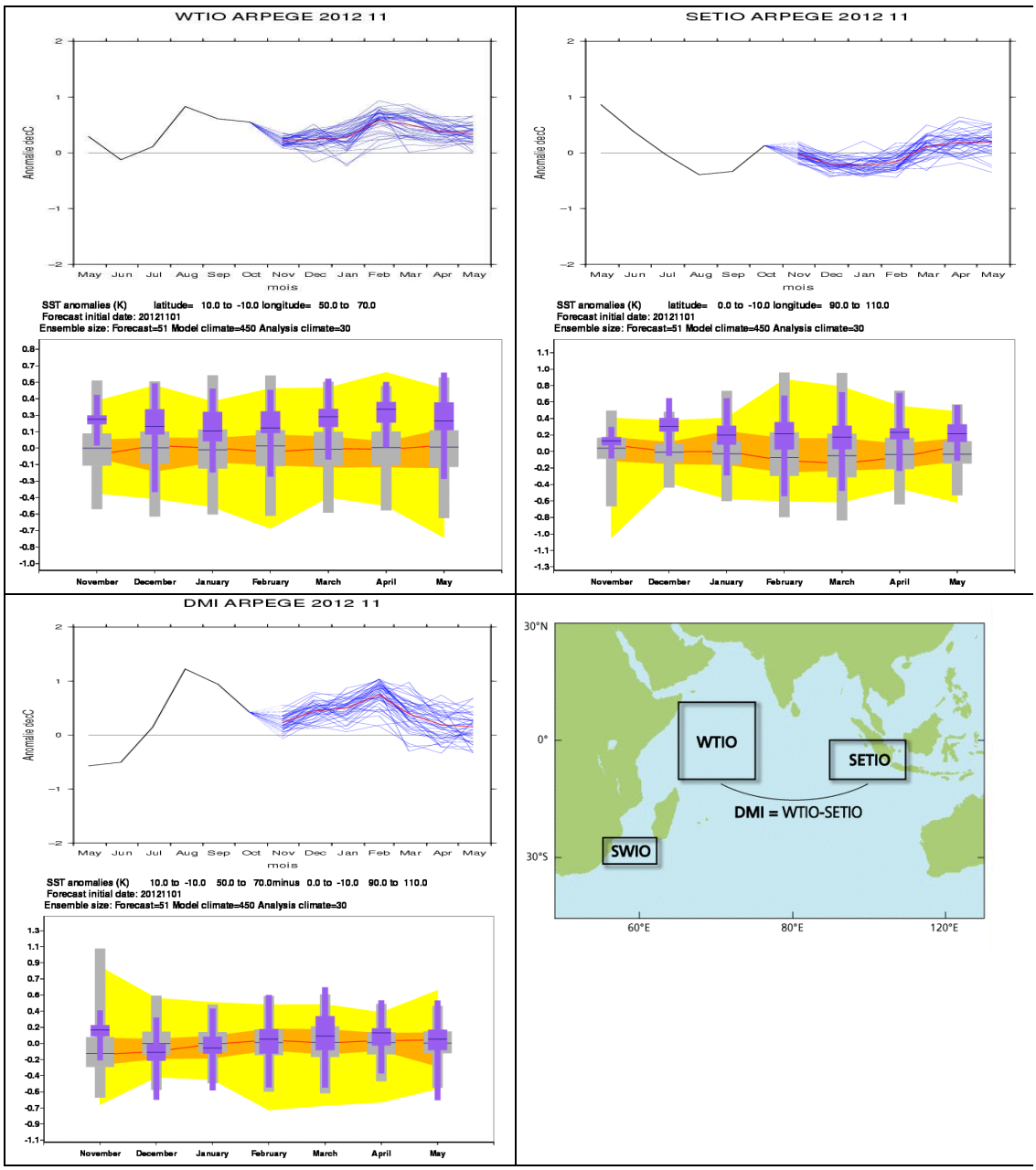


fig.18: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, issued in November, plumes / climagrams correspond to 41 / 51 members and monthly means.

In WTIO : Warmer than normal conditions in both models with little spread.
In SETIO : Slightly Colder than normal in MF along the DJF period. In ECMWF, warmer than normal conditions, in relationship with differences (with MF) in the Equatorial Pacific evolution. To be quoted the relative little spread in both models.
DMI (IOD) : the difference between the 2 models is clearly related to the SETIO behaviour. Positive phase quite stable in MF and close to normal conditions in ECMWF. The uncertainty is likely related to model uncertainty and the current weak Ocean/Atmosphere coupling.

II.2. GENERAL CIRCULATION FORECAST

II.2.a Global Forecast

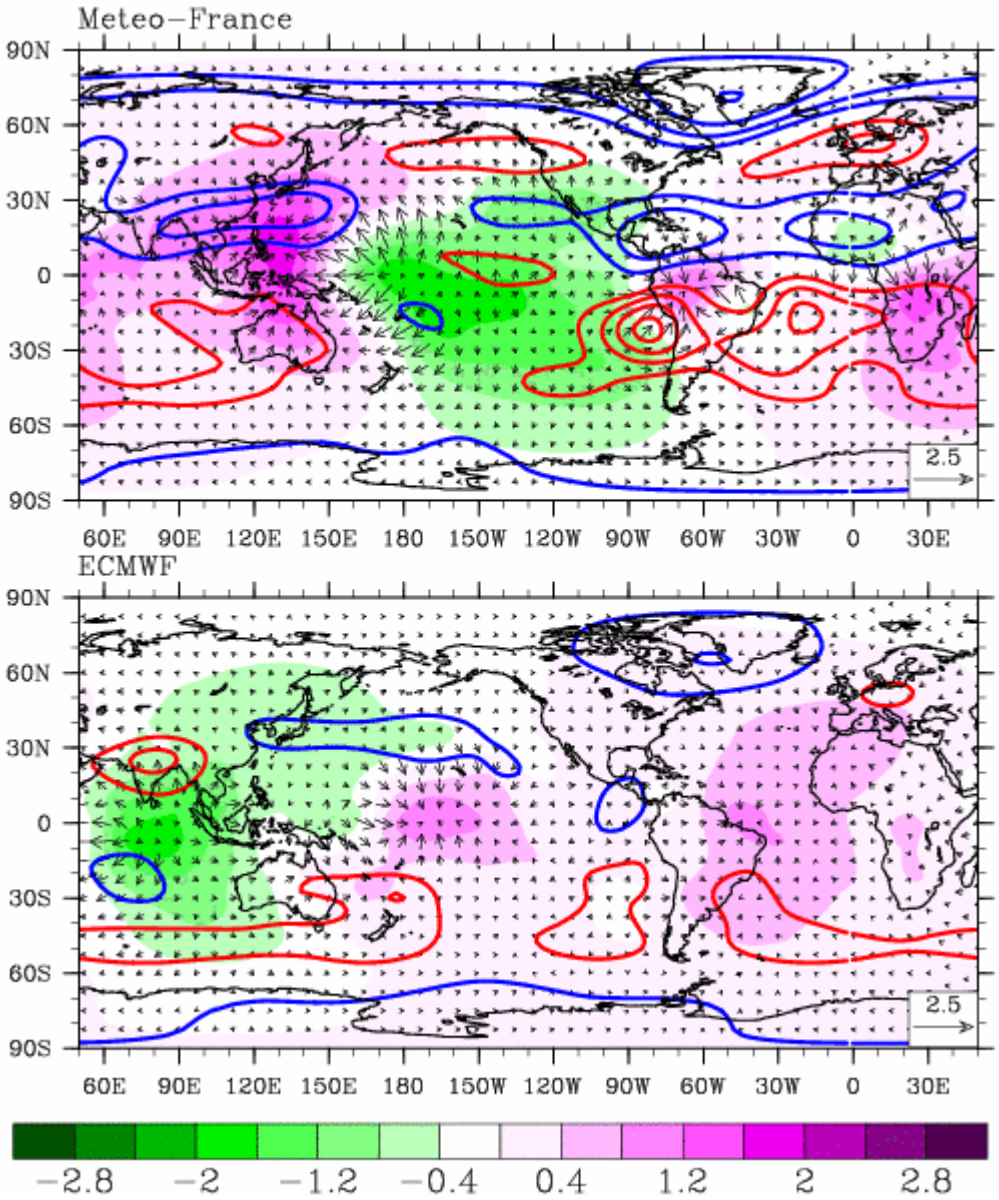


fig.19: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), asociated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa for NDJ, issued in October by Météo-France (top) and ECMWF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

Velocity potential anomaly field (cf. fig. 19 – insight into Hadley-Walker circulation anomalies) :
in the Tropics : different atmospheric response in the 2 models in relationship with the differences in the Pacific evolution.
Over the Central Pacific : In MF still some traces of the positive SST anomaly close to the date line. Consequently Divergent circulation anomaly (upward motion) just West to the dateline. ECMWF shows an opposite response (Convergent circulation anomaly – downward motion).
Over Indian Ocean/West Pacific : In MF strong convergent circulation anomaly (downward motion) close to the Maritime continent which extends up to the African continent (East Africa, South Africa) while there is a strong divergent circulation anomaly in ECMWF in the centre of the Indian Ocean Basin. However, in ECMWF, a weak trace of the convergent circulation anomaly over the African continent.

Over Atlantic : convergent circulation anomaly (downward motion) close to the North Eastern coast of South America in ECMWF ; stronger and westward shifted in MF. To be quoted the weak Divergent circulation anomaly over West Africa (enhanced convection) which could be related to the Stream function anomalies across the Eastern Atlantic.

Stream Function anomaly field (cf. fig. 19 – insight into teleconnection patterns tropically forced) :

In both models, over the Pacific very weak signal toward the mid-latitudes. Some possible teleconnection patterns propagating from West Africa / Atlantic up to Europe and more especially the Western façade but only in MF (signal close to zero in ECMWF).

Likely a large part of the signal should come from the Polar Vortex and the Stratosphere. It's difficult to infer a clear diagnosis on the predictability as it seems that the difference between ECMWF and MF are in the range of model uncertainties and initial conditions uncertainties.

II.2.b North hemisphere forecast and Europe

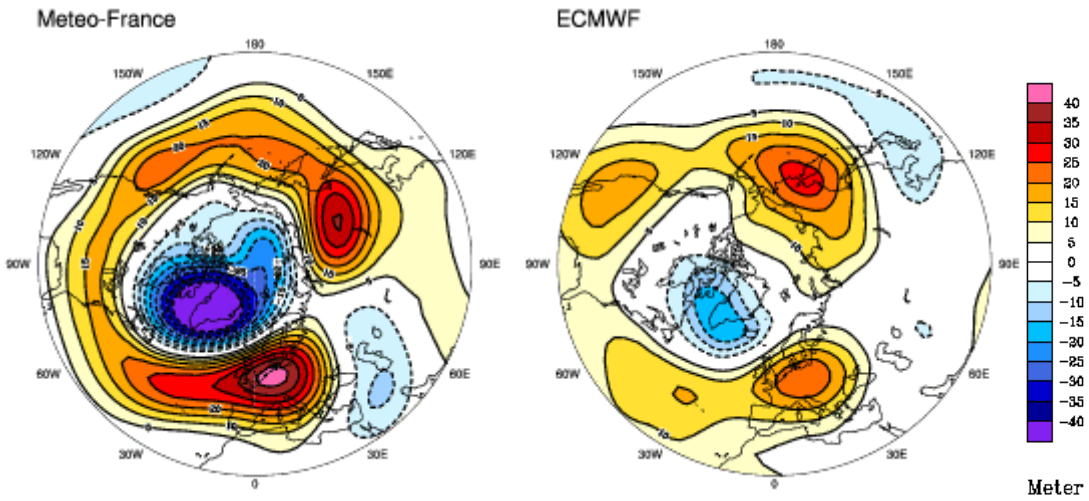


fig.20: Anomalies of Geopotential Height at 500 hPa for DJF, issued in November from Météo-France (left) and ECMWF (right).

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

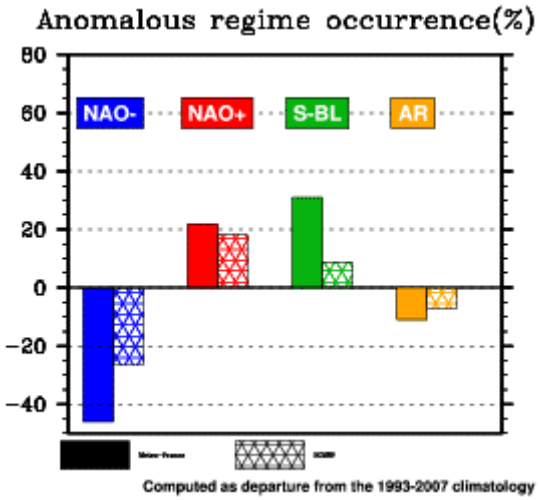


fig.21: North Atlantic Regime occurrence anomalies from Météo-France and ECMWF : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.

Geopotential height anomalies (fig. 20 – insight into mid-latitude general circulation anomalies) :

Despite the difficulty to infer a clear information on the predictability, the 2 models are very consistent in

terms of Geopotential Heigh anomalies and consequently of Circulation Regime response. Consistently with the SSTs, ECMWF indicates a West Pacific mode response while the response is more coming from central Pacific in MF (but with the same consequences on mid/high latitudes). The Negative anomaly over Greenland region and positive anomaly over Scandinavia are consistent with a NAO (+) and Scandinavian modes active.

North Atlantic Circulation Regimes (fig. 21) : in both models increased occurrence of NAO+ and Blocking regimes (counterbalanced by a deficit of NAO- regimes and AR regimes - slightly) consistent with Z500 anomalies.

General atmospheric circulation in MF in the low troposphere (see fig. 22) : signal over Europe consistent with the large Geopotential Heigh anomaly over North-West Europe and an increased zonal circulation.

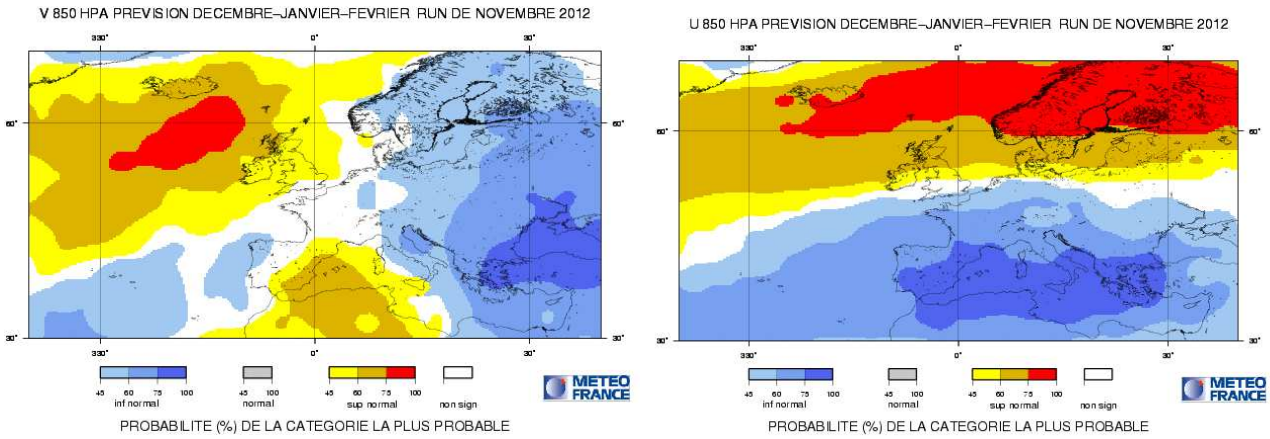


fig.22: Most likely category for the meridional (left) and zonal (right) wind at 850 hPa for DJF, issued in November from Météo-France.

II.3. IMPACT : TEMPERATURE FORECASTS

II.3.a ECMWF

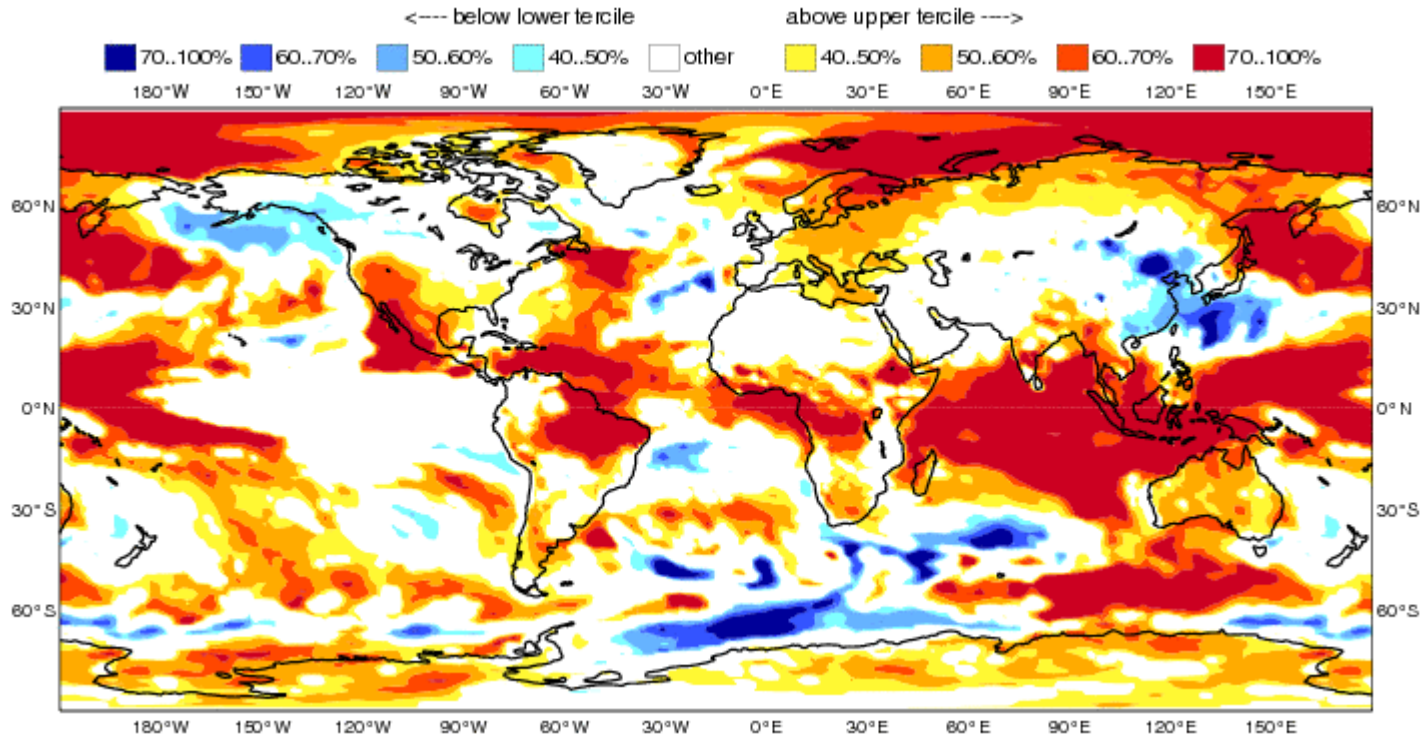


fig.23: Most likely category probability of T2m from ECMWF for DJF, issued in November. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

II.3.b Météo-France

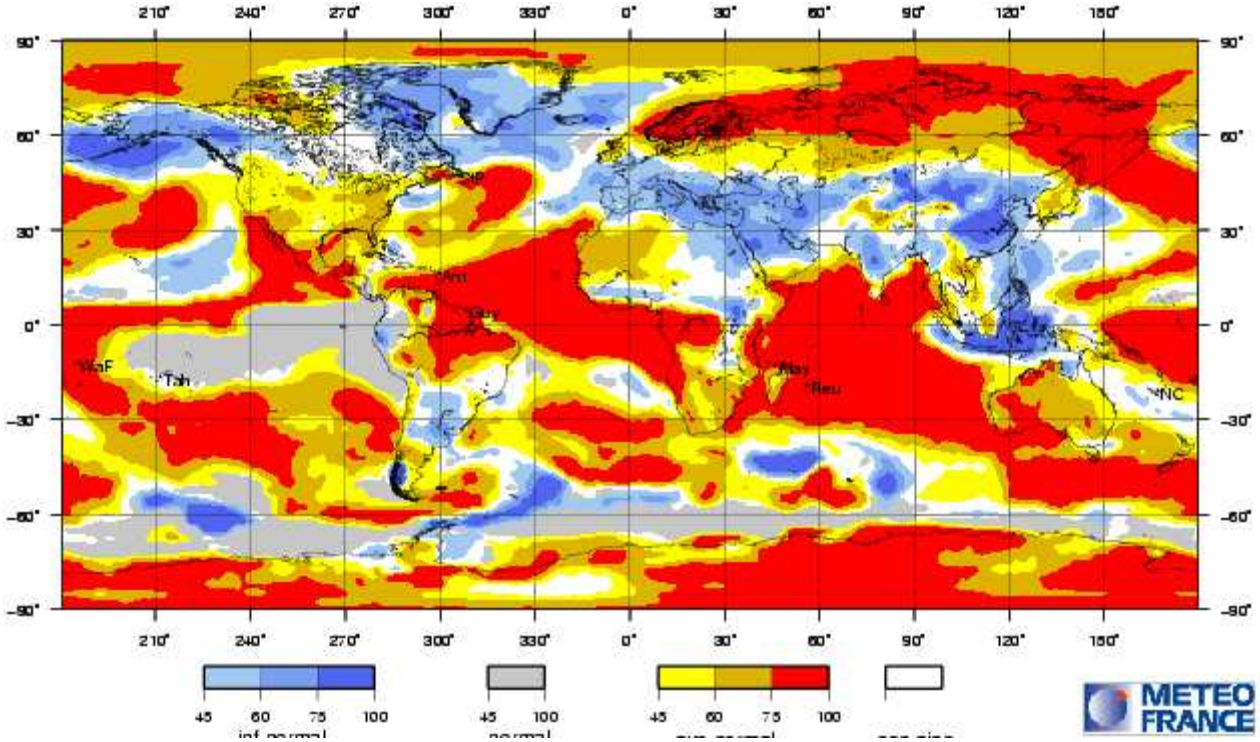


fig.24: Most likely category of T2m for DJF, issued in November. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.3.c Met Office (UKMO)

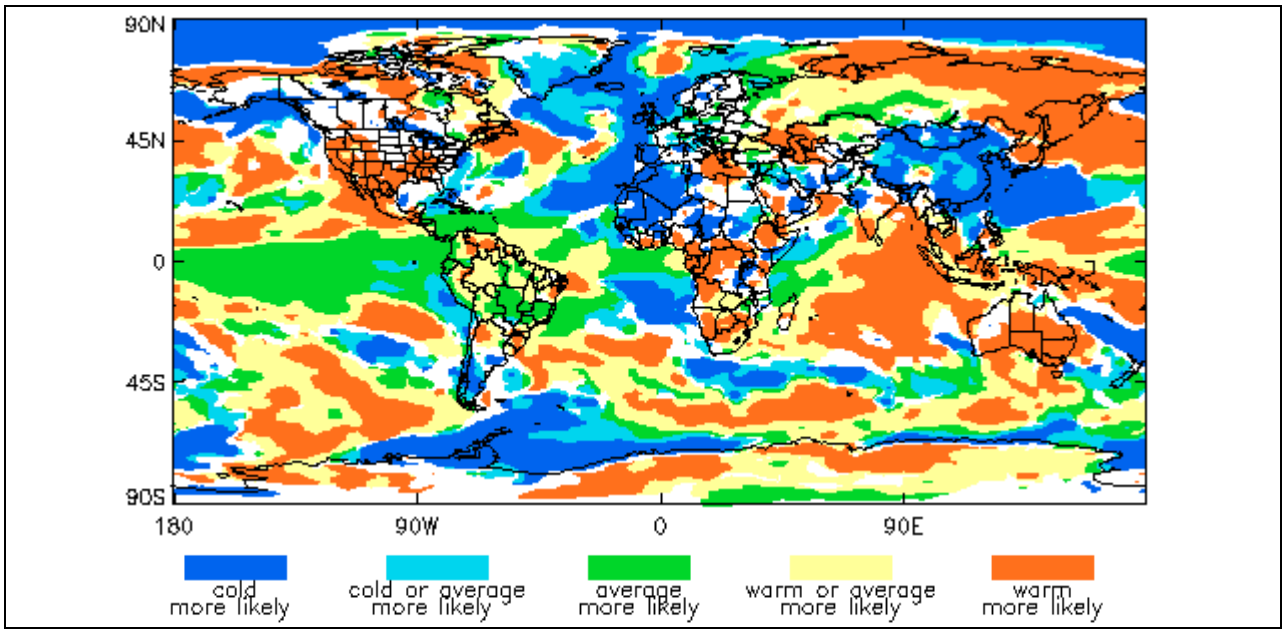


fig.25: Most likely category of T2m for DJF, issued in November from UK Met Office. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://www.metoffice.gov.uk/

II.3.d Japan Meteorological Agency (JMA)

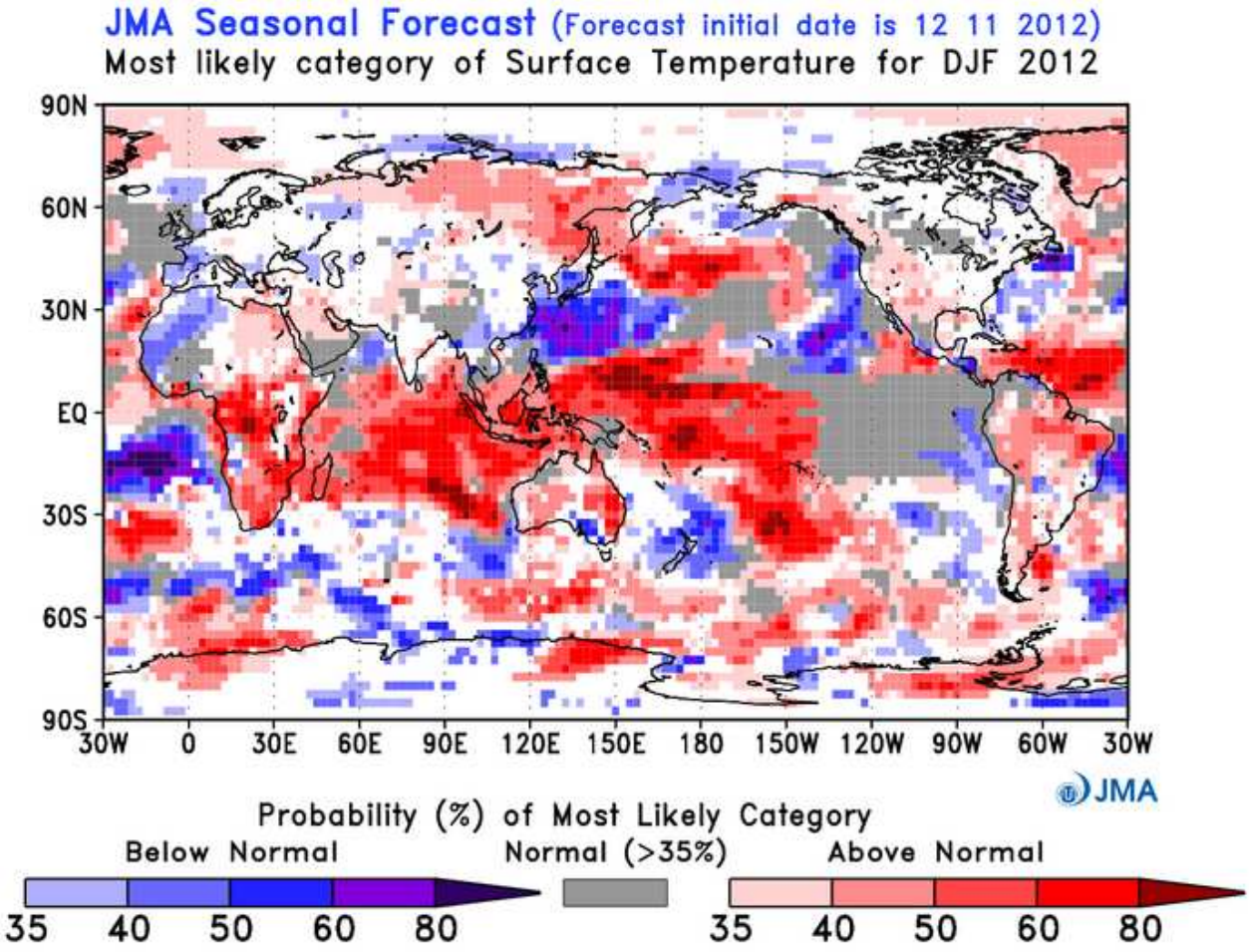


fig.26: Most likely category of T2m for DJF, issued in November from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.html

II.3.e Euro-SIP

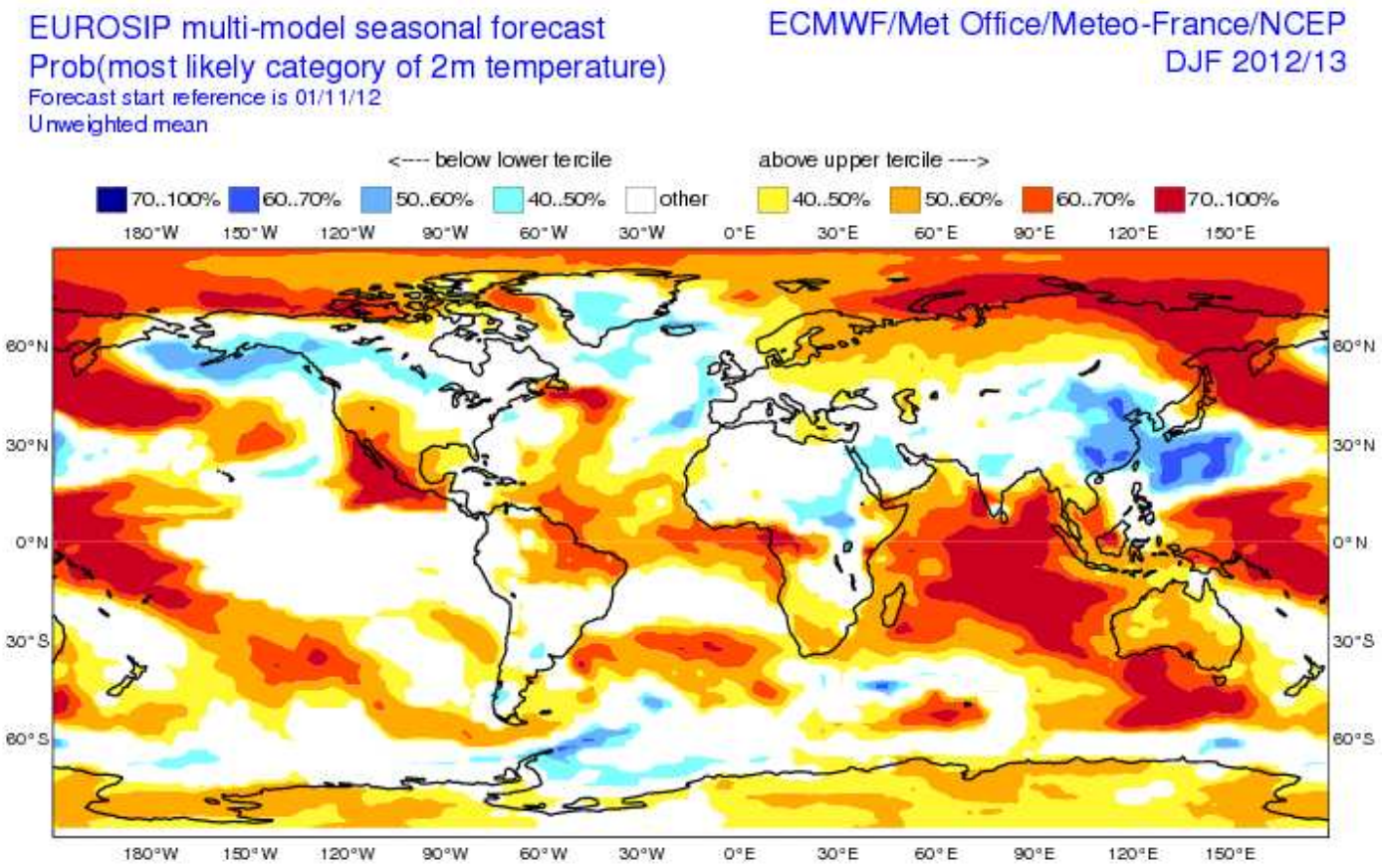


fig.27: Multi-Model Probabilistic forecasts for T2m from EuroSip for DJF, issued in November. (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).

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

North-America : Warmer than normal conditions around the Mexico Gulf including Central America and Californian regions. Colder than normal over the coastal areas of Alaska and West Canada.
South-America : Warmer than normal conditions over the North-Eastern part of the continent (especially Brazil).
Australia : Warmer than normal everywhere.
Asia : Warmer than normal conditions over South-East Asia including the Southern part of India and Siberia. Below normal conditions over China / Korea (Eastern part of the continent).
Africa : Warmer than normal conditions on one hand along the Guinean Gulf and on the other hand in South Africa.
Europe : No signal over most of the western part of the continent. Warmer than normal scenario over most of Northern and Eastern regions.

II.3.fInternational Research Institute (IRI)

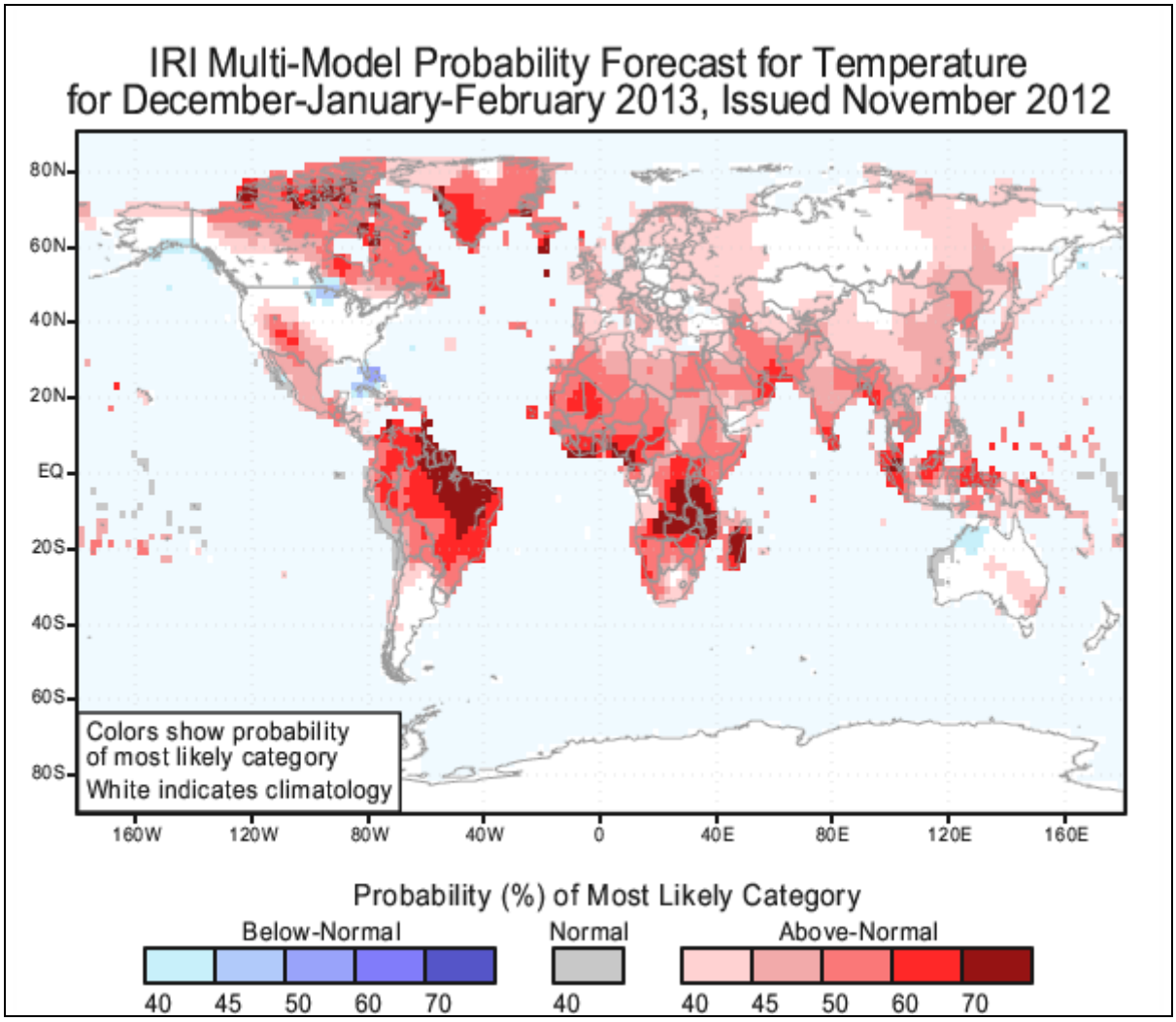


fig.28: Most likely category of T2m for DJF, issued in November from the IRI multi-model ensemble. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://iri.columbia.edu/climate/forecast/net_asmt/

More signal (warmer than normal) with respect of Euro-SIP. So quite a lot of differences over Europe, Asia, Africa and American continents. IRI tends to be warmer than normal in a lot of countries.

II.4. IMPACT : PRECIPITATION FORECAST

II.4.a ECMWF

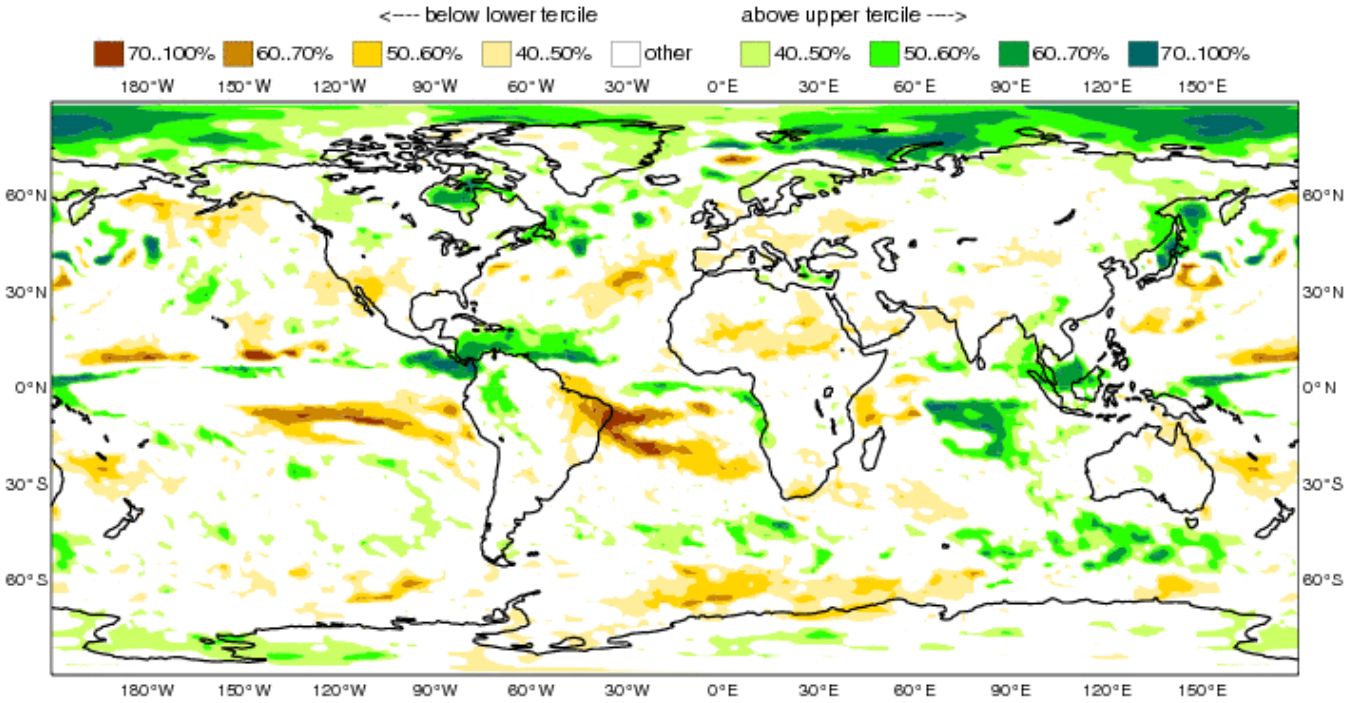


fig.29: Most likely category probability of rainfall from ECMWF for DJF, issued in November. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/charts/seasonal_charts_s2/

II.4.b Météo-France

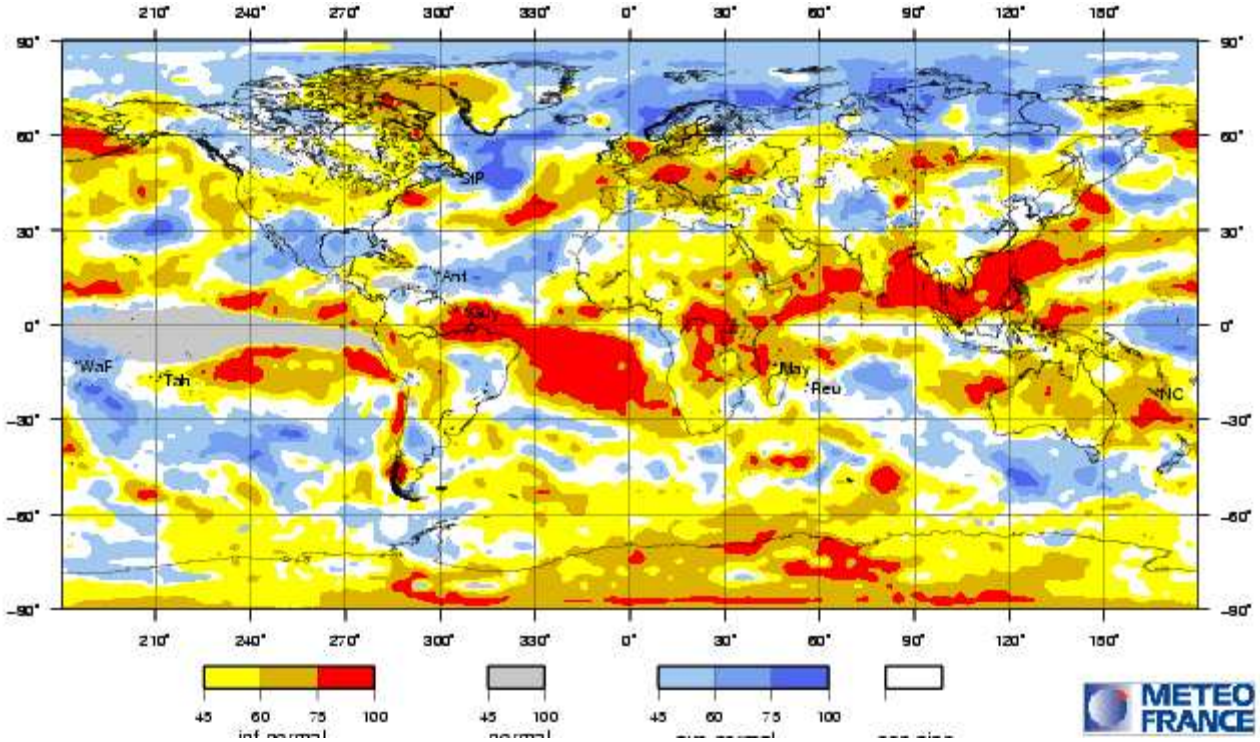


fig.30: Most likely category of Rainfall for DJF, issued in November. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Met office (UKMO)

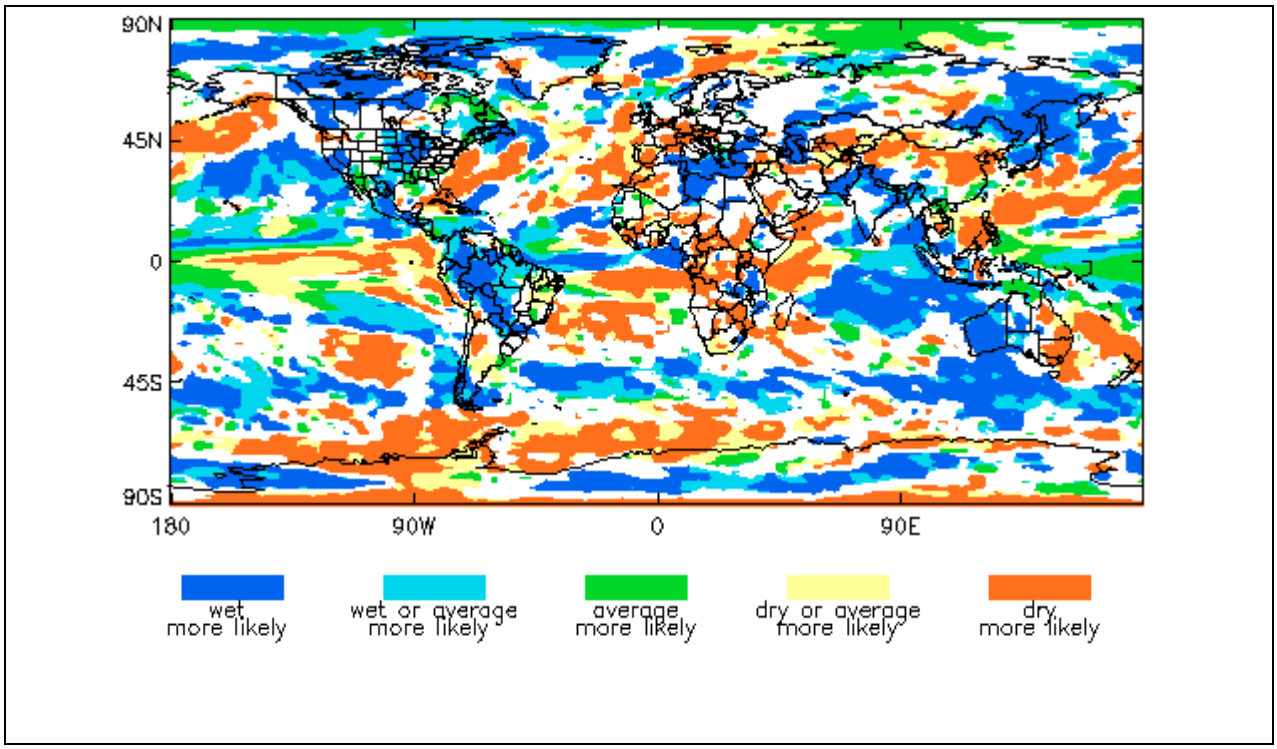


fig.31: Most likely category of Rainfall for DJF, issued in November from UK Met Office. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://www.metoffice.gov.uk/

II.4.d Japan Meteorological Agency (JMA)

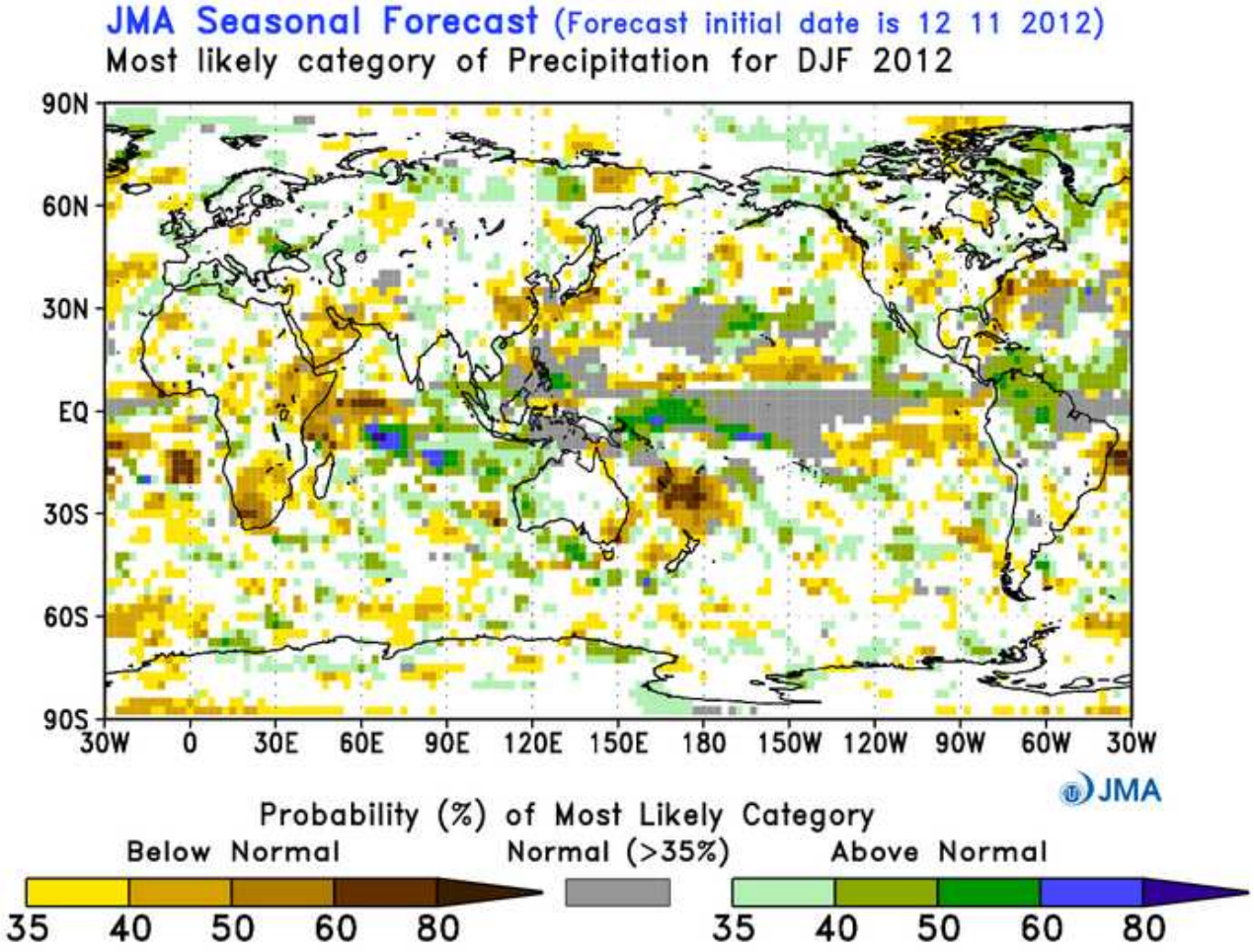


fig.32: Most likely category of Rainfall for DJF, issued in November from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.html

II.4.e Euro-SIP

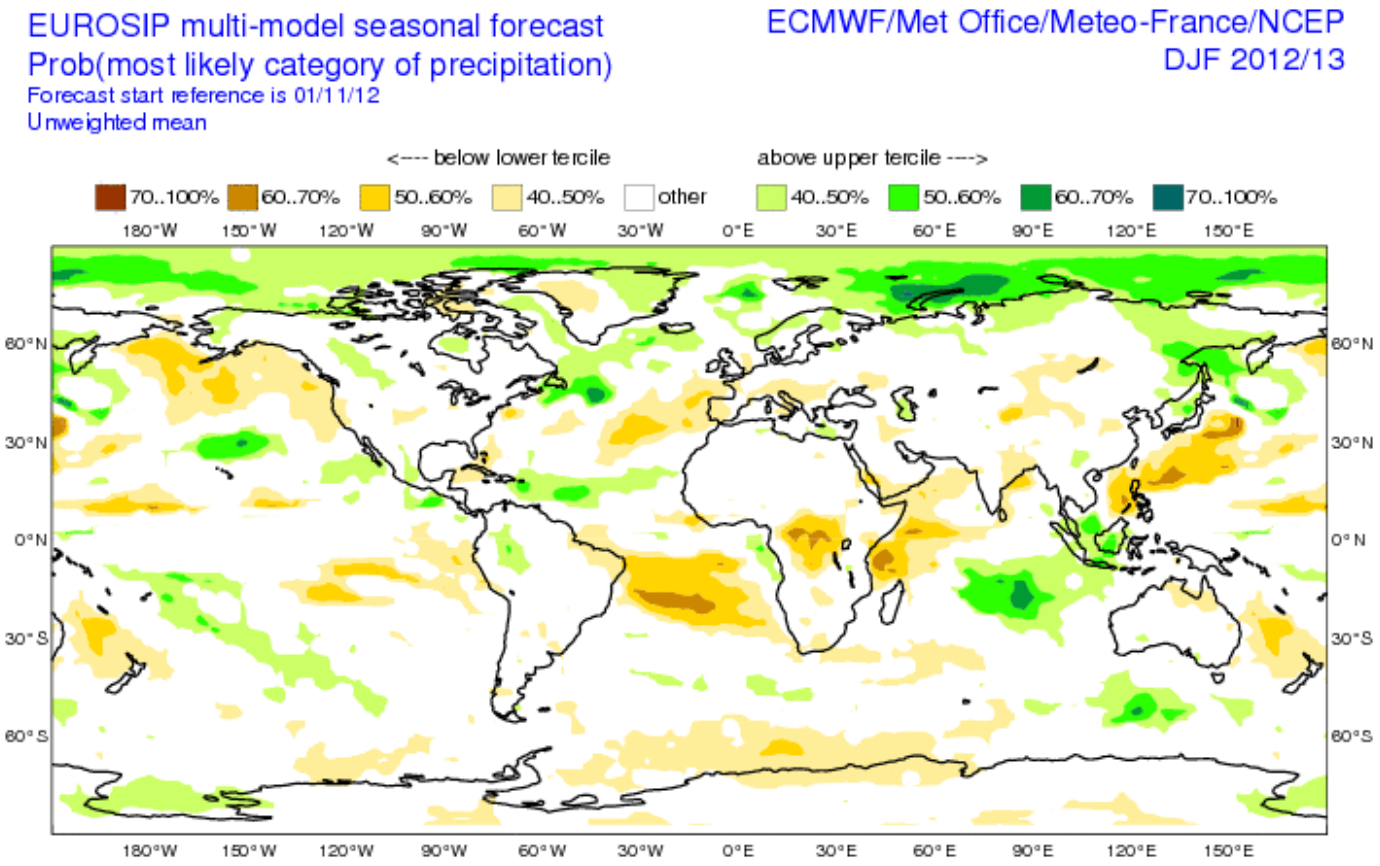


fig.33: Multi-Model Probabilistic forecasts for precipitation from EuroSip for DJF, issued in November. (2 Categories, Below and Above normal – White zones correspond to No signal).

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

Little consistent signal even in the Tropics and little signal in the probabilities over the continent (likely in relationship with a weak ocean/atmosphere coupling) :
Below Normal scenario over Central Africa, Northern coast of South America (Nordeste Brazil),
Above normal scenario over a part of the maritime continent.
For Europe (and more generally for the mid latitude of Northern Hemisphere) Not too much signal excepted around the Mediterranean basin (slight enhanced probabilities for the dry scenario).

II.4.f International Research Institute (IRI)

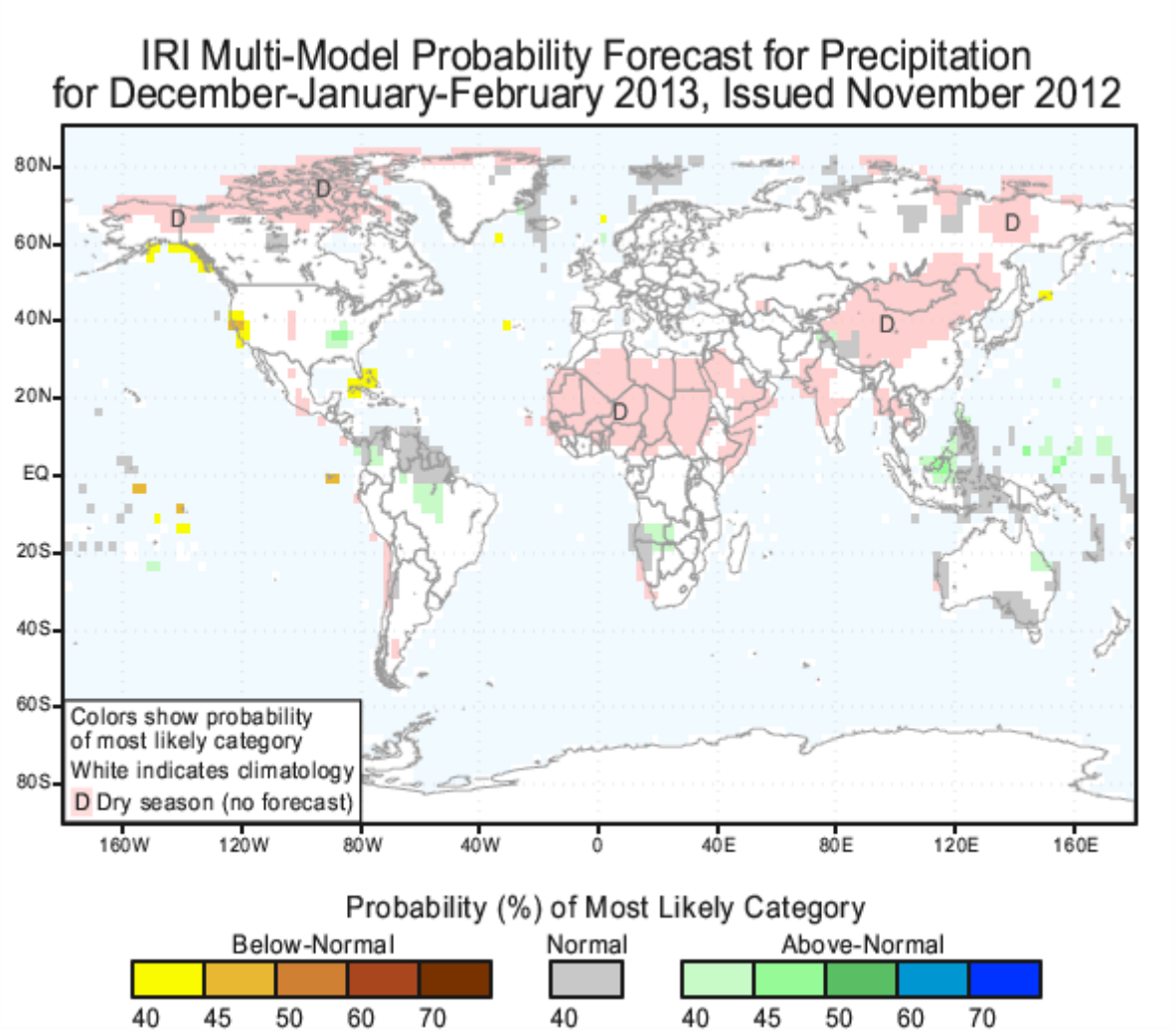


fig.34: Most likely category of Rainfall for DJF, issued in November from the IRI multi-model ensemble. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://iri.columbia.edu/climate/forecast/net_asmt/

The IRI forecast shows No Signal more or less everywhere to the very local areas.
Consequently, over Europe, there is a clear indication for No Privileged Scenario (Climatology forecast).

II.5. REGIONAL TEMPERATURES

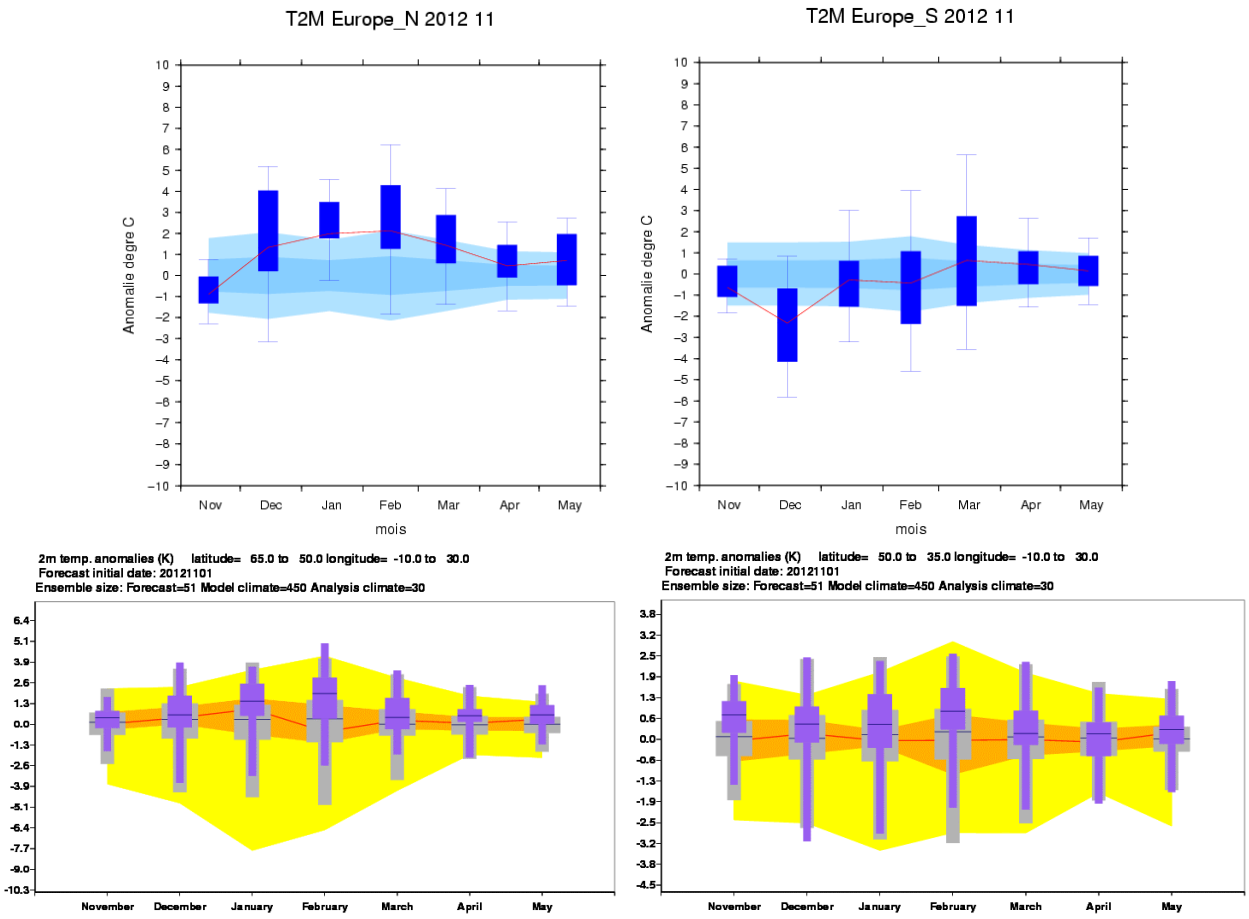


fig.35: Climagrams for T2m in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom) issued in November.

For Northern Europe : some consistency between the 2 models (in relationship with the Z500 anomaly) and large spread (with respect of the climate reference). Above Normal temperature seems to prevail (likely in relationship with the increased occurrence of NAO+ regimes).
For Southern Europe : little consistency between the 2 models. Above normal scenario in ECMWF and oriented toward Below Normal conditions in MF. Again very large spread in both models.
In MF, for Northern Europe ROC skill is above climatology for D, J and F (even greater for J and F only for the upper tercile category) while for Southern Europe it is slightly better than climatology in D and J and worst in F.

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

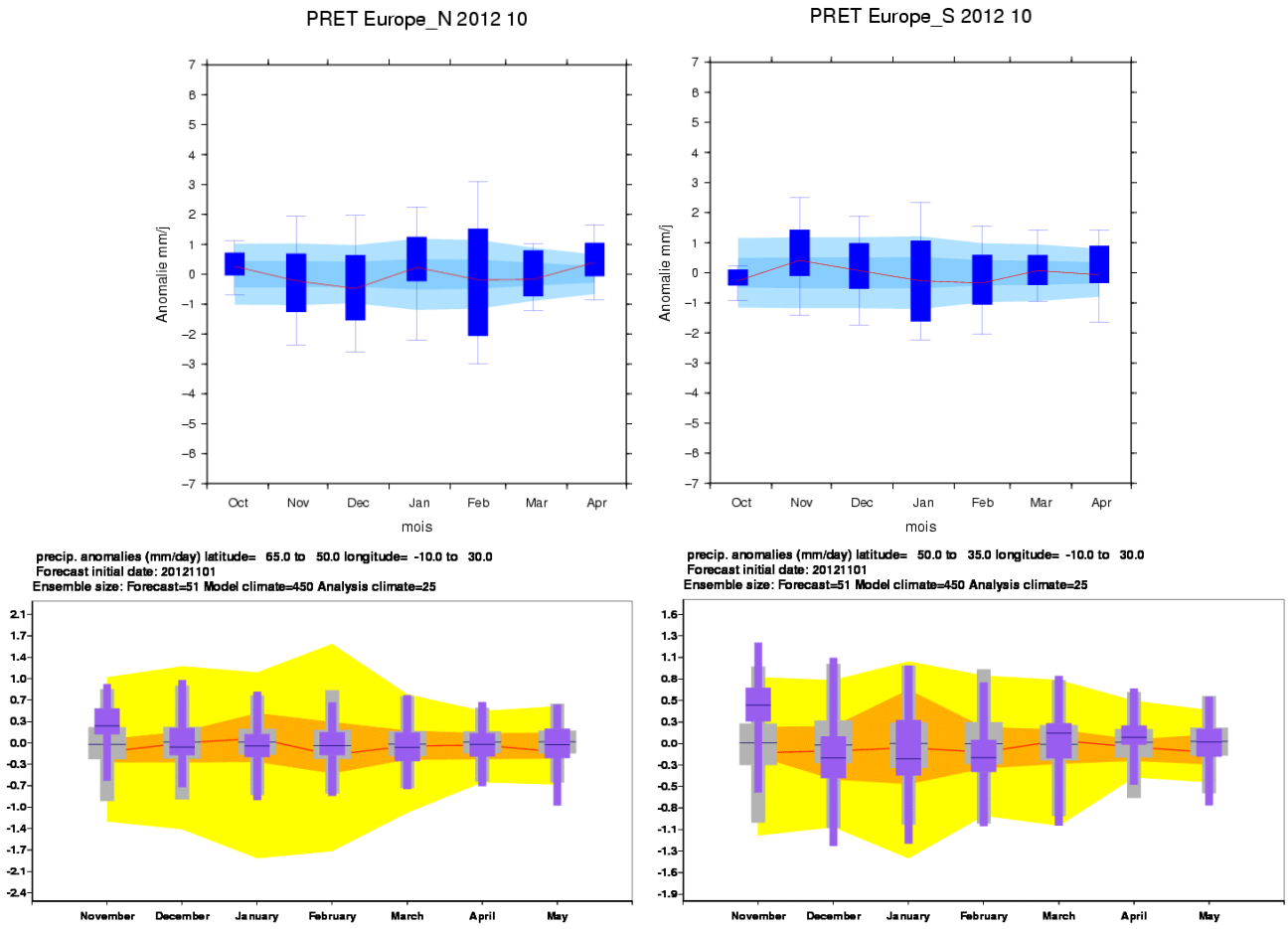


fig.36: Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom), issued in November.

For Northern Europe : Large spread in the evolution of the 2 models and conditions close to Climatology in both models. In MF, there is some skill in ROC scores in D and J.
For Southern Europe : no similarity in the time evolution of the 2 models. The spread is larger than the climate reference. In MF, ROC scores are close or worst than climatology.
So these intraseasonal evolutions should be considered as indicating No Signal.

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

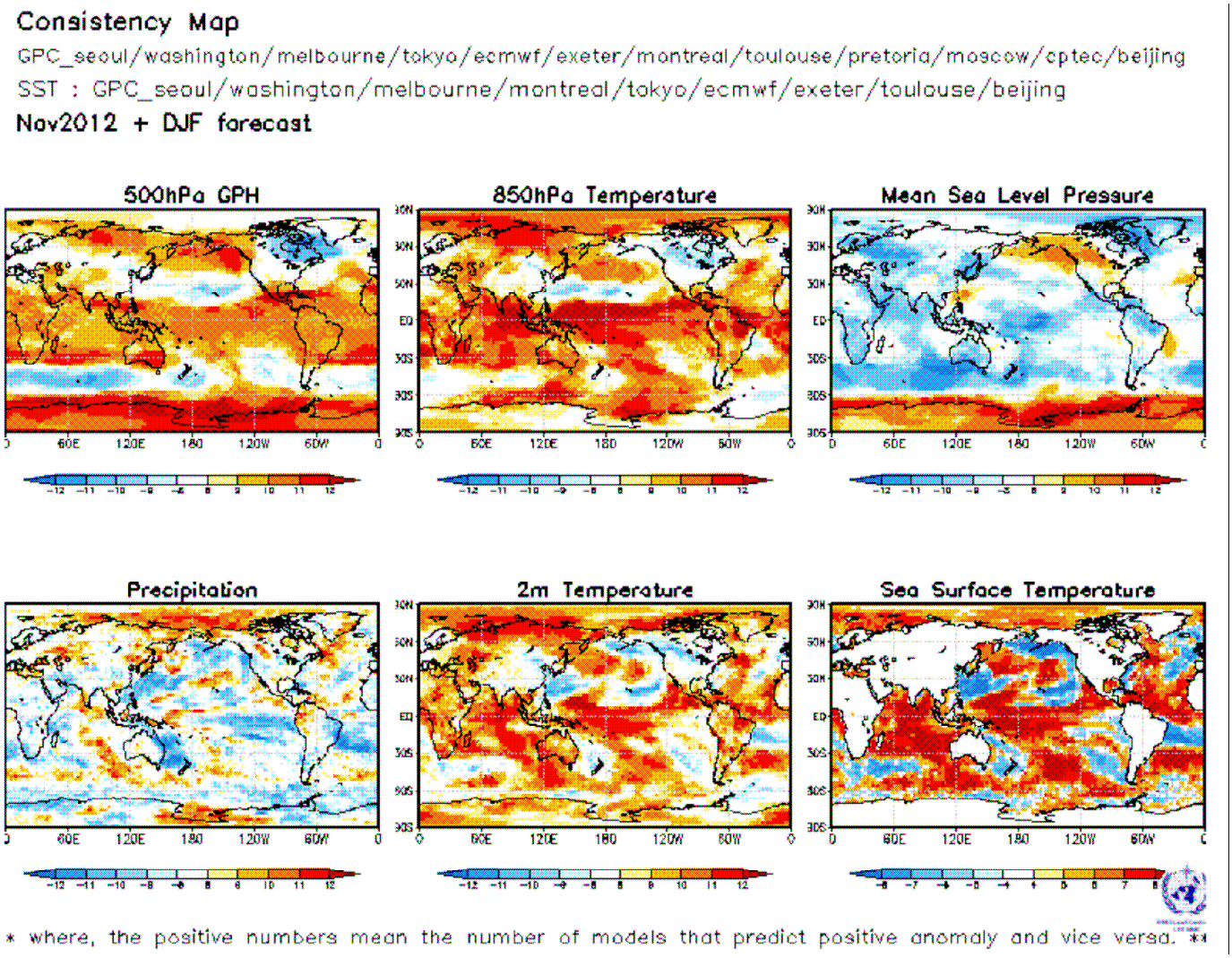


fig.37: ***GPCs Consistency maps from LC-MME*** *http://www.wmolc.org/*

For SST : pretty good consistency for a warmer than normal Indian Ocean, Warm Tropical North Atlantic and Cool Tropical South Atlantic, Equatorial Pacific warmer than normal (despite below the Niño threshold) to the exception of the most eastern part (cooler than normal).
For Z500 : Little consistency over the North Atlantic high latitude and Europe.
For T2m : some consistent signal over the most Northern and Eastern part of the European continent (Above normal scenario). Consistency over the South Africa, Australia and North Eastern part of Southern America. So some similarity with Euro-SIP (Central and Northern South America, Australia, South-East Asia and Southern part of India ; all above normal scenarios).
For precipitation : less consistency over the continents but some trace of Below normal conditions for North-East Brazil and regions close to the Arabic Peninsula.

II.7. "EXTREME" SCENARIOS

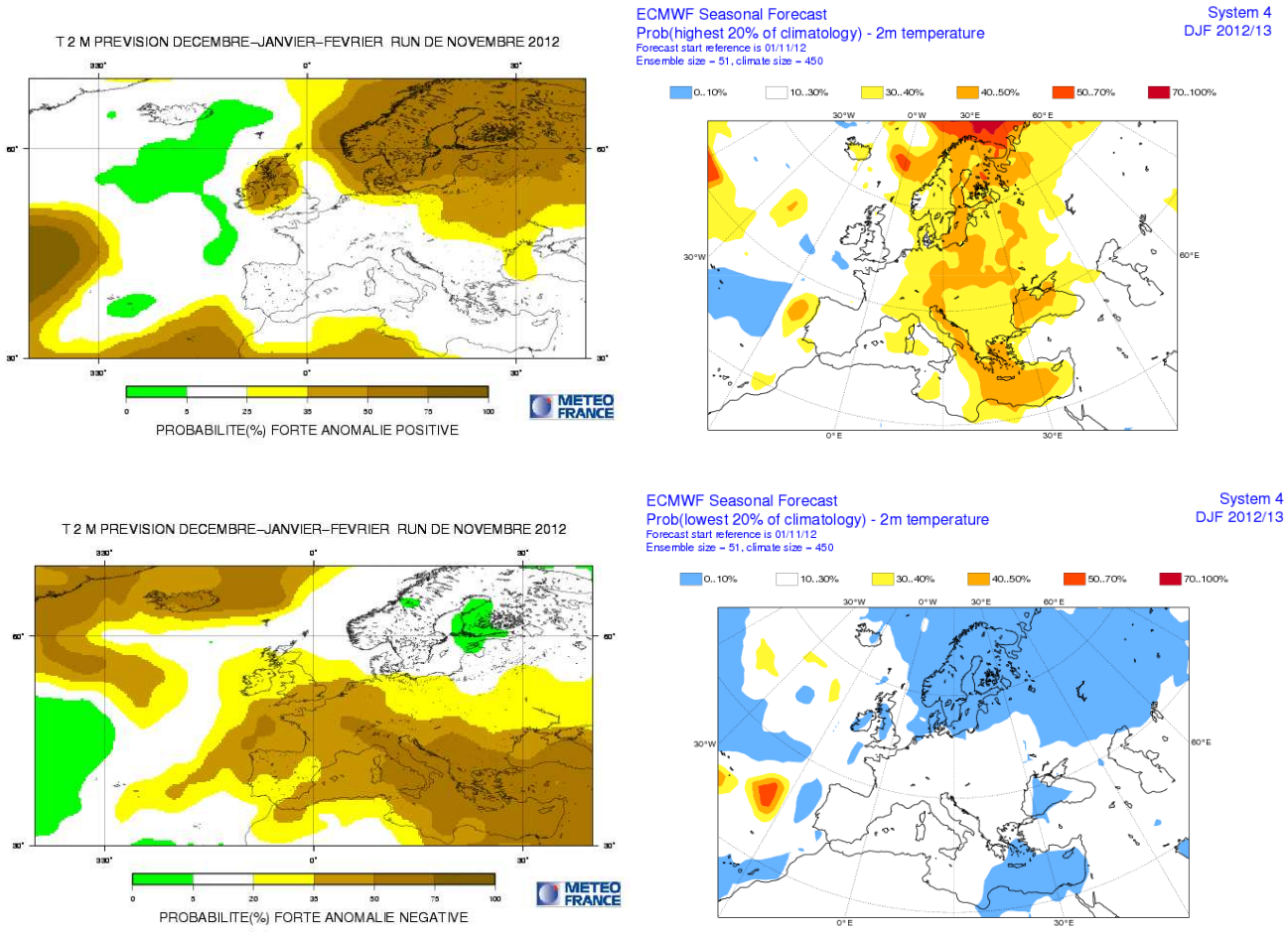


fig.38: Top : Probability of « extreme » above normal conditions for T2m for Meteo-France (left - highest ~15% of the distribution) and ECMWF (right - highest 20% of the distribution).
Bottom : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the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

No consistency between the 2 models for the Very Above Normal scenario (to the exception of the most Northern regions of Western Europe) and for very Below Normal scenario neither .
In Météo-France ROC score for the very Above scenario is above climatology mostly over regions with No Signal.
For the very Below scenario the scores are close or worst than climatology everywhere to the exception of regions around the Baltic sea and some area if Central Europe.
So in relationship with the very limited predictability and the different response of the models, it seems difficult to use these forecast.

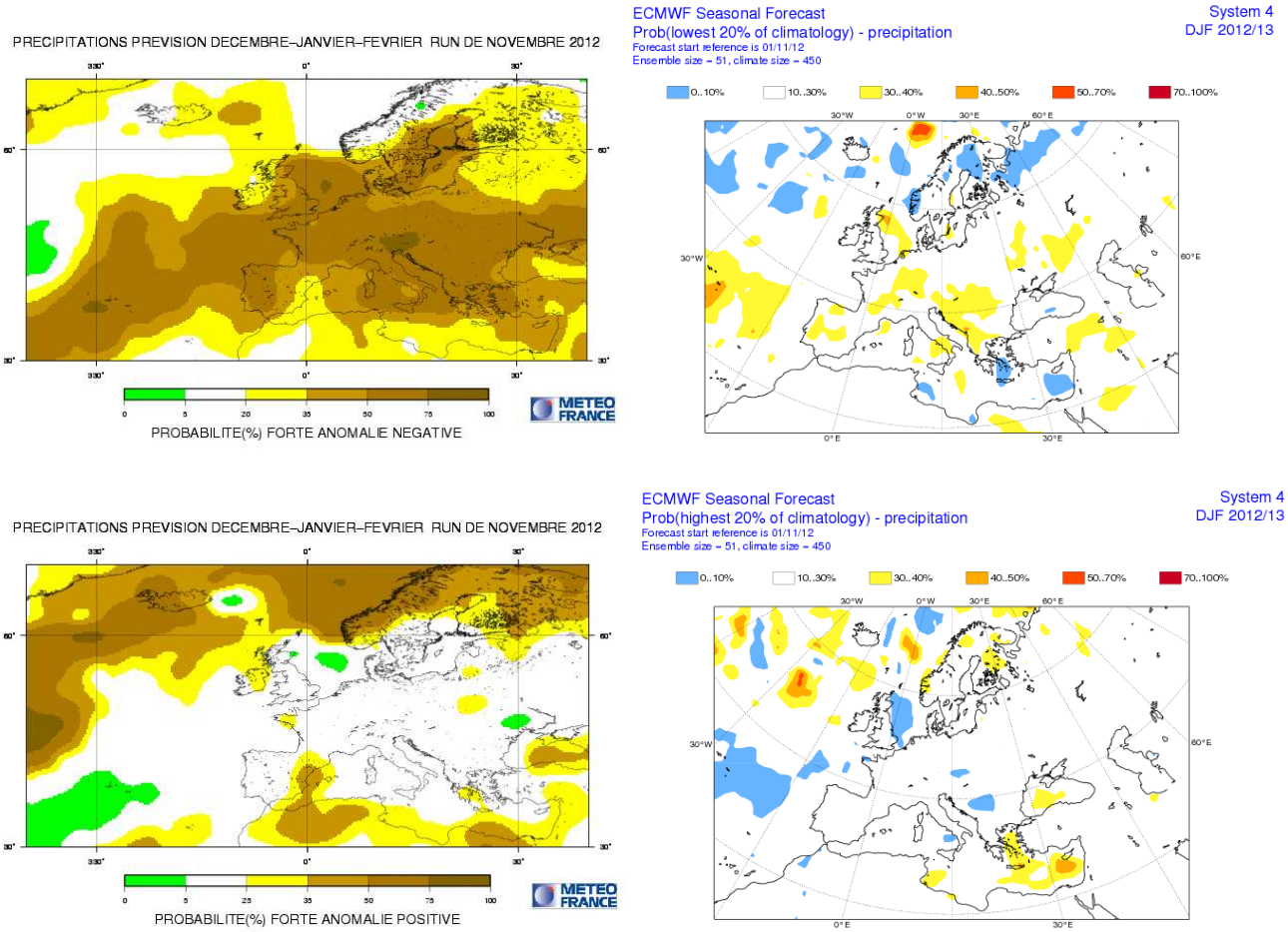


fig.39: Top : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the distribution) and ECMWF (right - lowest 20% of the distribution)
Bottom : Probability of « extreme » Above normal conditions for rainfall for Meteo-France (left - highest ~15% of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

The probability of very Below Normal scenario is enhanced (and sometime very high) everywhere in MF while it is close to climatology in ECMWF but with some fragmented enhanced probabilities (which is reflected in Euro-SIP forecast) which give some consistence over some regions close to the Adriatic sea.
For the very Above scenario, no consistency (excepted may be over coastal area of Norway ?).
In MF, for the extreme Above normal scenario, some skill exists around the Black Sea regions and also around the Baltic Sea. For the Extreme below Normal scenario, some skill exists over Norway and adjacent regions with some extension eastward.

II.8. DISCUSSION AND SUMMARY

Forecast over Europe

For this forecast the first and main comment is about the very limited predictability in the climate system which is reflected by some large differences within the models simulations. This is illustrated by the large differences in the atmospheric response of MF and ECMWF in Tropical regions.
For rainfall, “No Privileged Scenario” covers most of the European continent. There is only a little signal for Mediterranean regions (below Normal scenario).
For temperature : the Above Normal scenario should prevail for Northern Europe and likely on the Eastern part of the continent. There is more uncertainty over the western façade of Europe (No privileged scenario).
However, some downscaled information could details these scenarios for specific countries or sub-regions.

Tropical Cyclone activity

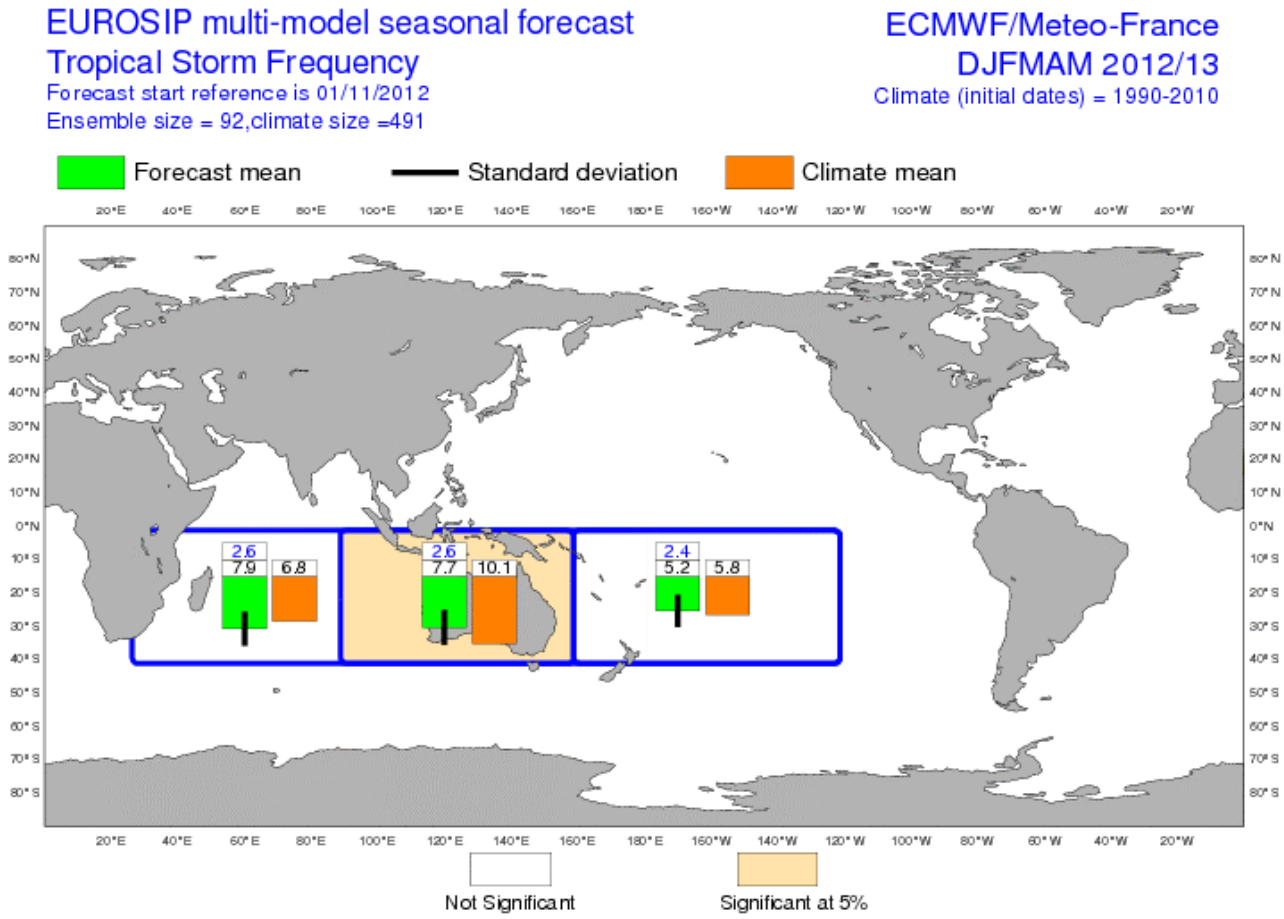


fig.40: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF) for the August 2012 to January 2013 period, issued in November.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtrop/trop_euro/eurosip_tropical_storm_frequency/

For the Tropical Cyclone season in the Southern hemisphere, Euro-Sip forecasts indicate a close to normal condition over the Pacific and South West of Indian Ocean (signal not significant with respect of the climatology) and a Below normal activity Close to Australia.

WMO RA VI
Pilot RCC-Network

Synthesis of Temperature forecasts for December-January-February 2012/2013 for European regions

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

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

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

WMO RA VI
Pilot RCC-Network

Synthesis of Rainfall forecasts for December-January-February 2012/2013 for European regions

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

MODELS	Northern Europe	Southern Europe	Central Europe	Eastern Europe	SEE Region
CEP					
MF					
Met Office					
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).

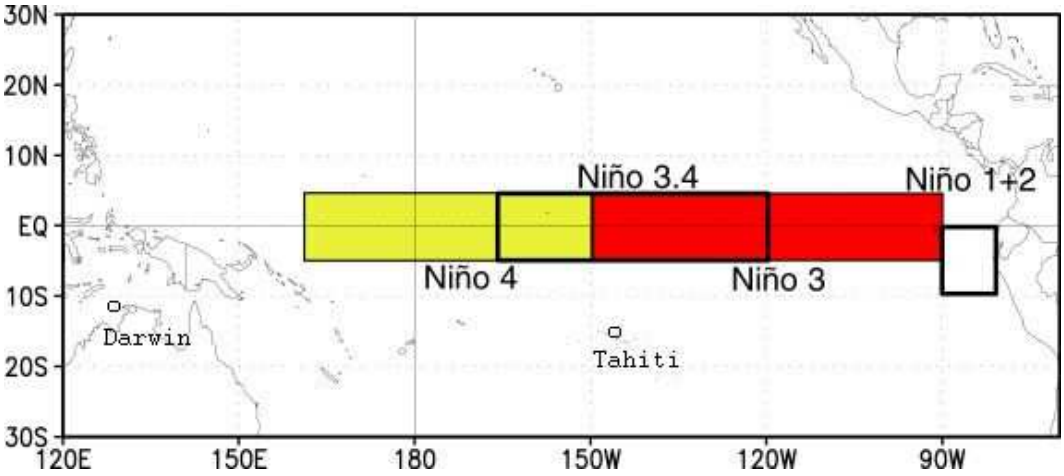
In order to better interpretate the results, it is recommended to look to verification maps and graphs which give some insight into the expected level of skill for a specific parameter, region and period. A set of scores is presented on the web-site of the Lead-Centre for Verification (see http://www.bom.gov.au/wmo/lrfvs/)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