WMO RA VI Pilot RCC-Network

METEO FRANCE Toujours un temps d'avance

GLOBAL CLIMATE BULLETIN n°161 - NOVEMBER 2012

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I.1. OCEANIC ANALYSIS

I.1.a Global Analysis

At the Surface (fig. 1) :
For the Pacific : In the equatorial wave guide weakening of the positive anomaly. Little evolutions elsewhere to the exception of the mid/high-latitudes in the North Pacific (warming close to Japan and cooling over the Bering sea). The horse shoes pattern in the North Hemisphere is very conspicuous.

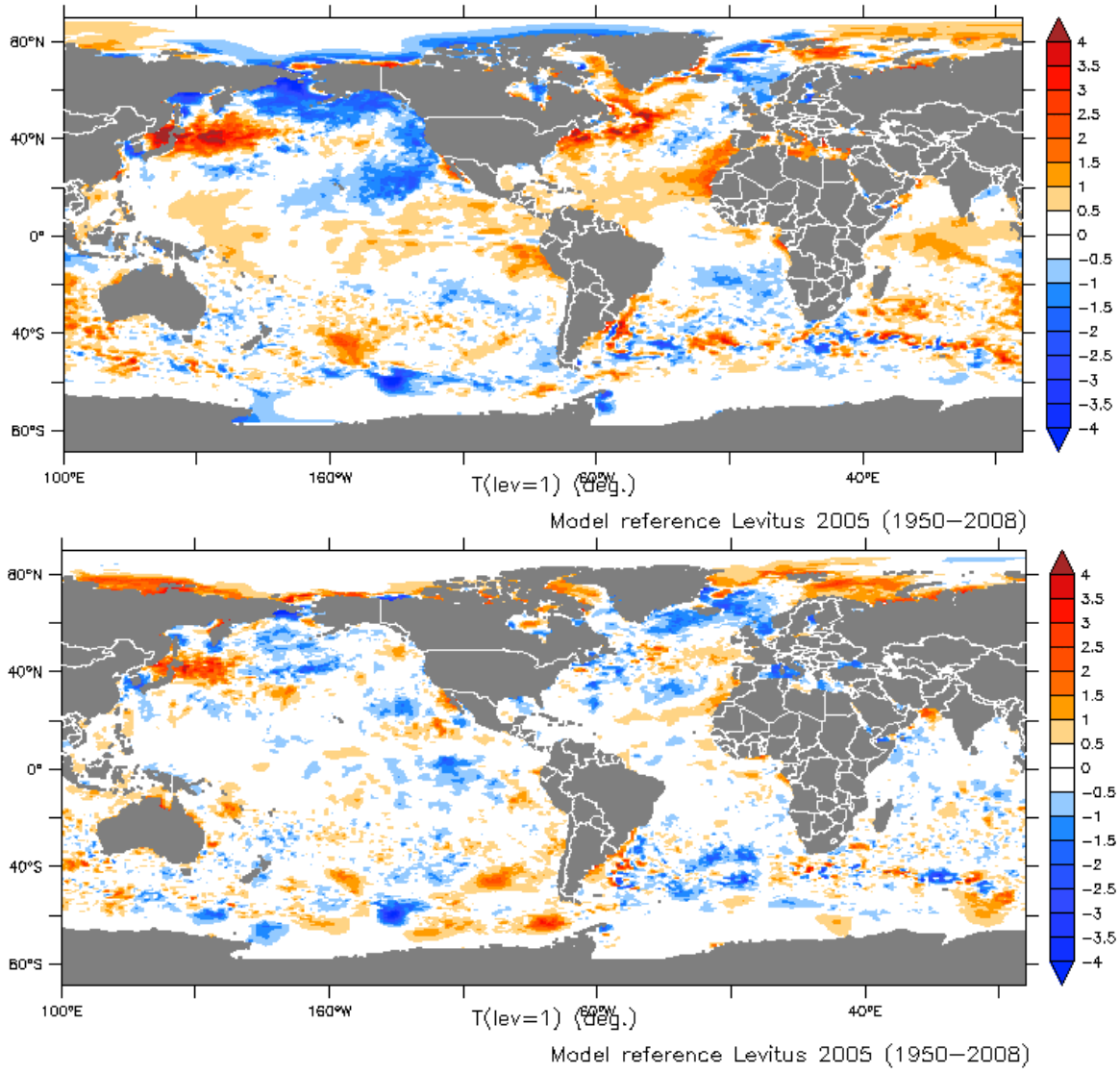

fig.1: **top : SSTs Anomalies in September 2012 (°C) (reference 1950-2008)**
bottom : SST tendency (current – previous month) http://bcg.mercator-ocean.fr/

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 (and dipole like pattern with the mid-latitudes). Over the North Atlantic warming from the Eastern Sub-Tropics to the Western Tropics and cooling between Greenland and Norway. There is a strong positive anomaly on the Western part of the basin (from the mid-latitudes up to Labrador sea)
In the Indian Ocean : still mostly warmer than normal from West Australia up to the Great Horn of Africa.
In subsurface (fig.2) :
In the Pacific : in the equatorial waveguide, heat content anomalies mostly negative over Western and Central regions (could be consistent with the delayed oscillator theory) and consistent with thermocline depth anomalies (see fig. 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. However, a positive anomaly has 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 of area close to the Great Horn of Africa (cooling).

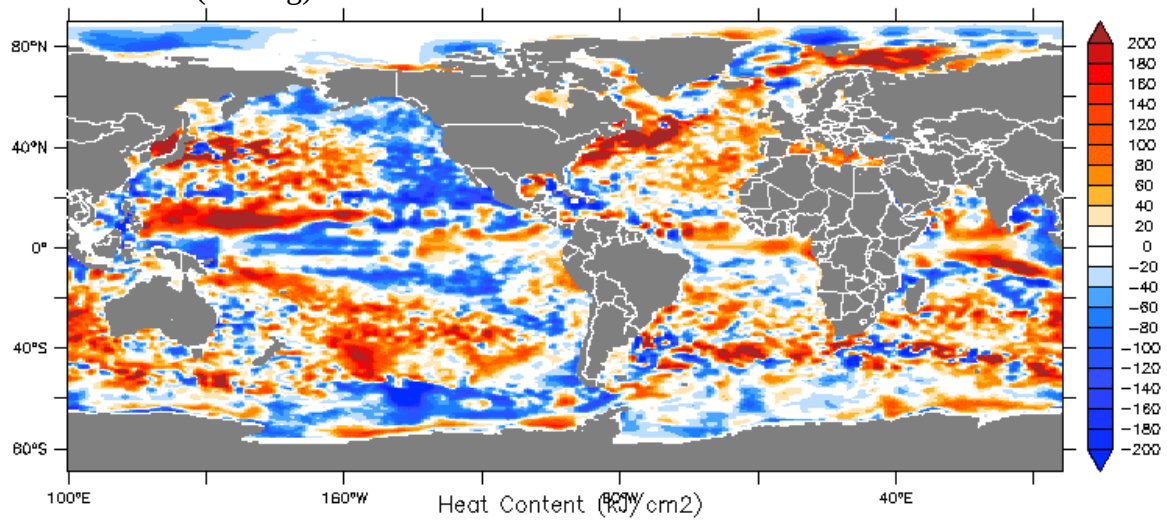

fig.2: map of Heat Content Anomalies (first 300m) in August 2012 (kJ/cm²). (reference 1950-2008)
http://bcg.mercator-ocean.fr/

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

The positive anomaly starting from the Eastern part is now decreasing over the Central and Eastern Pacific. Little Some strengthening of the Trade Wind over most of the basin East to the dateline. To be quoted the positive wind anomaly west to the dateline, possibly related to MJO activity and location of the convection anomaly over these regions. Consistently, the SOI becomes slightly positive (0,2).

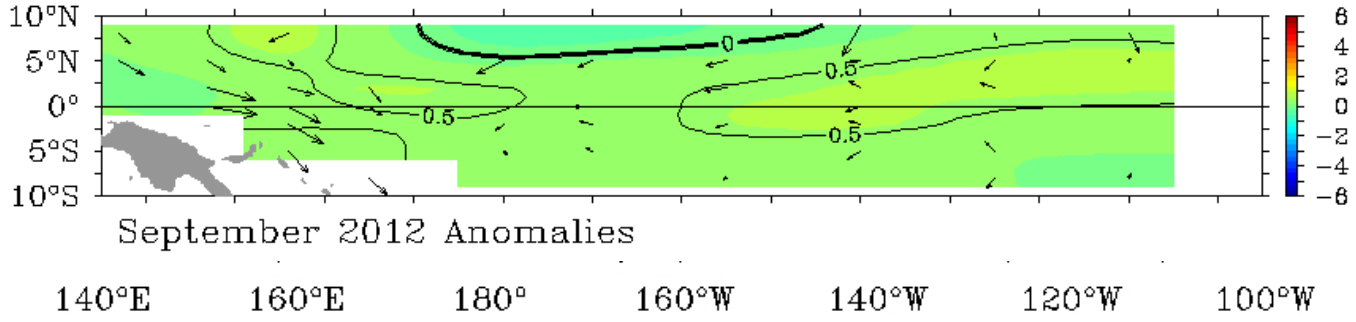

fig.3: SST Anomalies and Wind anomalies in July 2012 over the Equatorial Pacific from TAO/TRITON.
http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/monthly-summary.html

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 September are respectively 0,4°C, +0,5°C, +0,4°C and +0,5°C from West to East.

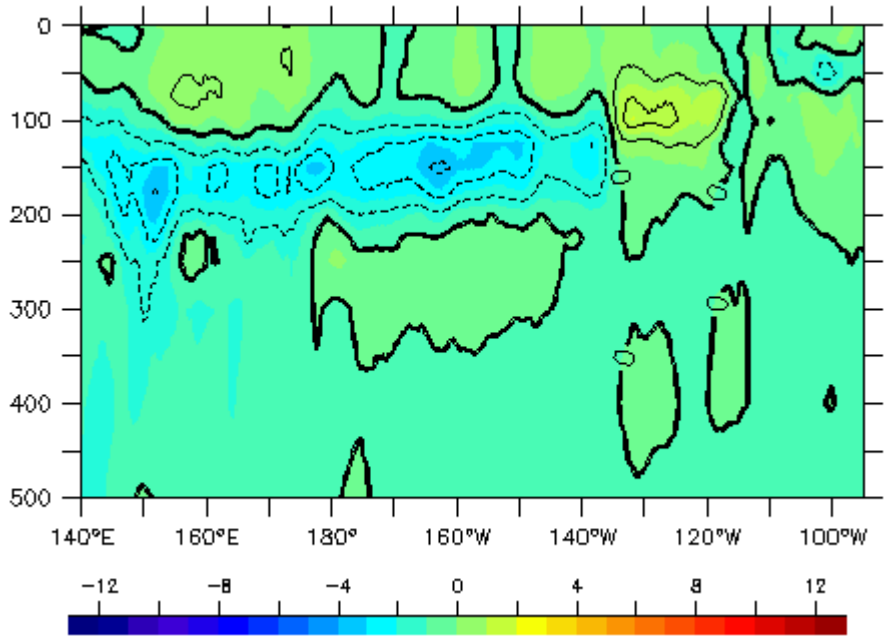

fig.4: Oceanic temperature anomaly in the first *500 metres* in the Equatorial Pacific, in September 2012 http://bcg.mercator-ocean.fr/

In the equatorial waveguide (fig. 4) : persistence of warmer than normal conditions under the surface on the Eastern part (excepted close to the Eastern coast). The negative anomaly (close to 150m depth) is covering from Western to the Central Pacific and propagate Eastward (consistently with the delayed oscillator theory).

The thermocline structure (fig. 5) : Deeper than normal over the eastern part and thinner to normal in the western part. Some wave propagation signal of the negative anomaly is visible from the most western up to the central part of the basin.

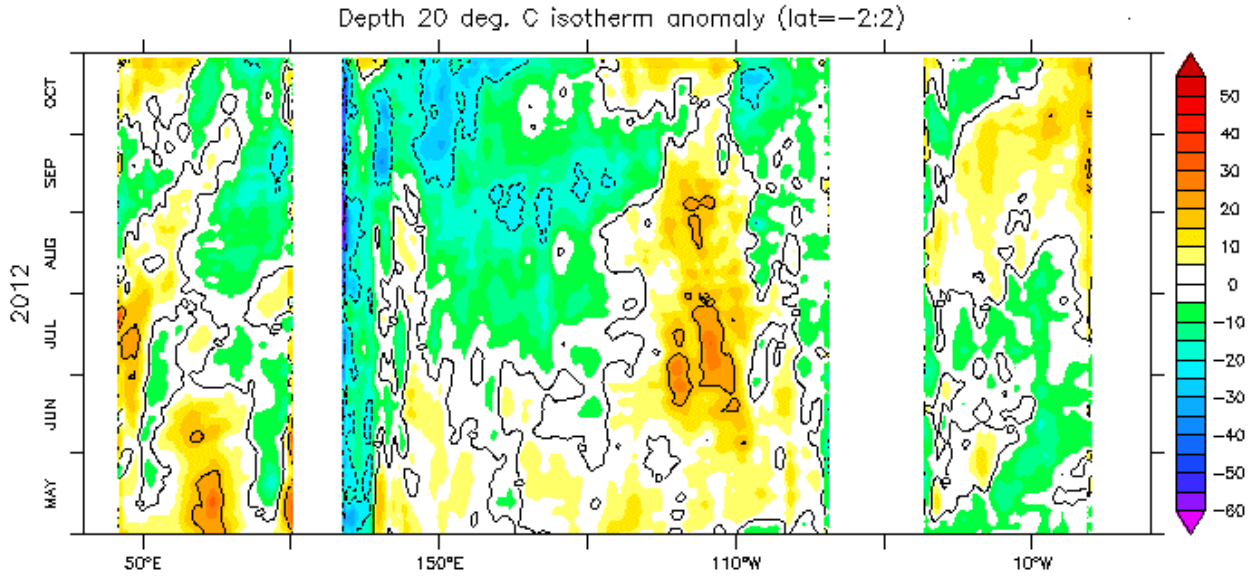

fig.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 6 month period. http://bcg.mercator-ocean.fr/

I.1.c Atlantic Basin

Northern Tropical Atlantic : mostly warmer than normal, with a warming from the eastern sub-tropics up to the Tropics.
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. Traces of wave propagation of the positive anomaly.
The Southern Tropical Atlantic : Still a dipole pattern between Tropics and sub-tropics (colder/warmer than normal). However, the warmer than normal conditions seem to decrease in the mid-latitudes.

I.1.d Indian Basin

Southern Tropical Indian Ocean : mostly warmer than normal especially in the sub-tropics from West Australia up to Madagascar.
Equatorial waveguide : warmer than normal conditions in Western part and 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 : mostly warmer than normal to the exception of the Bay of Bengal (colder than normal condition).

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 is conspicuous along the equator. Interestingly, some patterns can be interpreted as an atmospheric response to an El Niño event but some others not.
On the Pacific : Strong and strengthening Divergent circulation anomaly (upward anomaly motion) on the Western side (which extends southward and interestingly eastward along the equator consistently with an El Niño). Sub-regional Divergent circulation anomaly in the Southern hemisphere close to Easter Island.
As a conclusion, the ocean/atmosphere coupling is weak on the western part of the basin.
On the Atlantic : Strong and large convergent circulation anomaly (downward anomaly motion) over Gulf of Mexico which extends up on one hand to South Africa and on the other hand along the Eastern coast of North America.
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 western side which extends on North over the Arabic Peninsula and Iran and on South up to the South West Indian Oceanic regions.

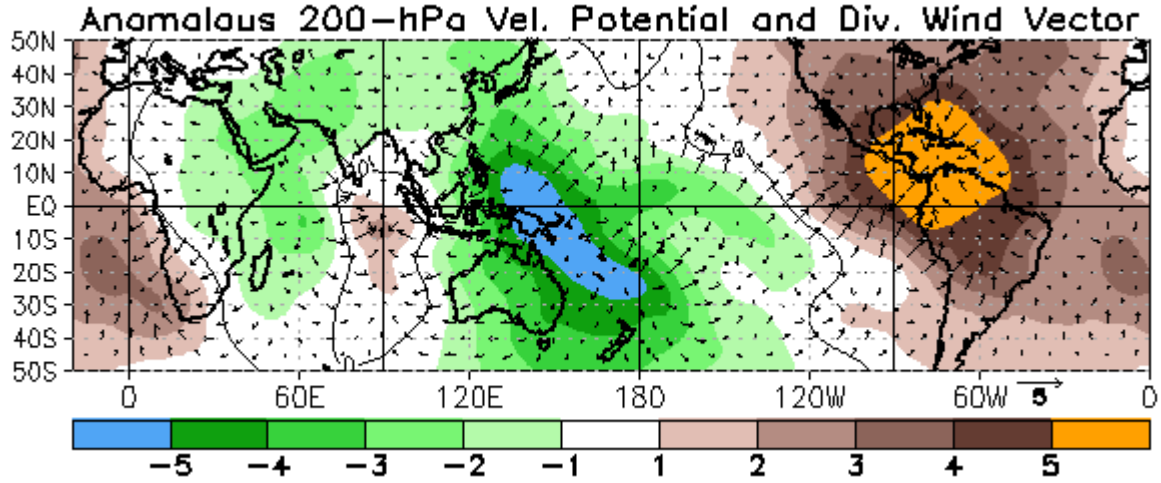

fig.6: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly in September 2012. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly). http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

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 possibly inferring some disturbances with respect of the expected impacts of an El Niño event. Elsewhere, most of the signal seems to be related to the mid-latitudes (especially over Eastern Mediterranean regions) even over the Atlantic the tropical forcing could (slightly) enhance the atmospheric response.

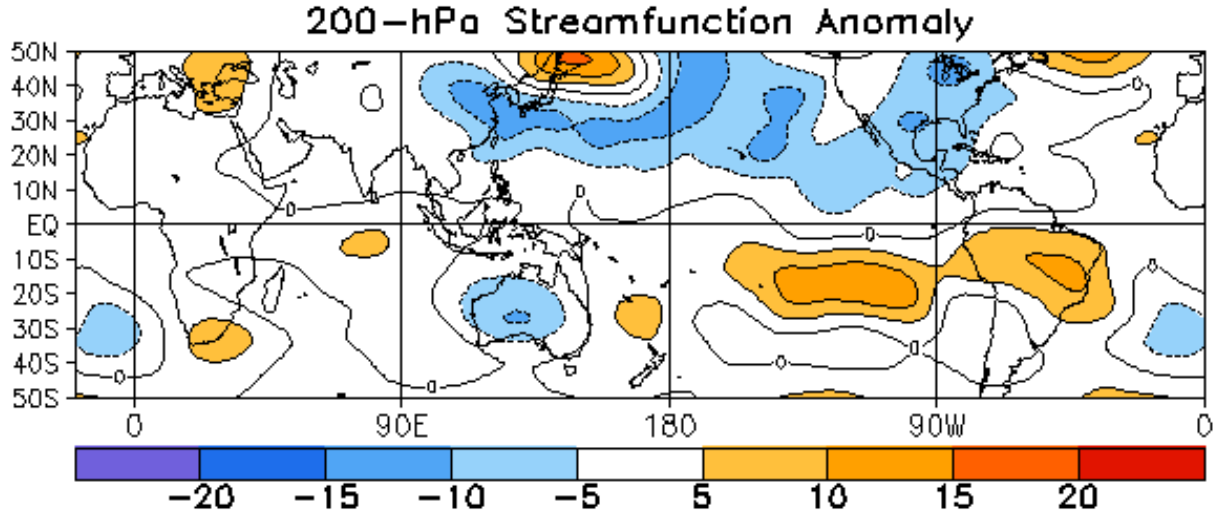

fig.7: Stream Function Anomalies at 200 hPa in September 2012.
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

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 leading to a positive anomaly close to Japan (consistently with SST) and the PNA is slightly negative (conversely to expected Niño impact). For Europe, note the most active mode is the Scandinavian (-0,9) and some positive geopotential height anomalies over central North Atlantic and also over the regions close to the Black sea.

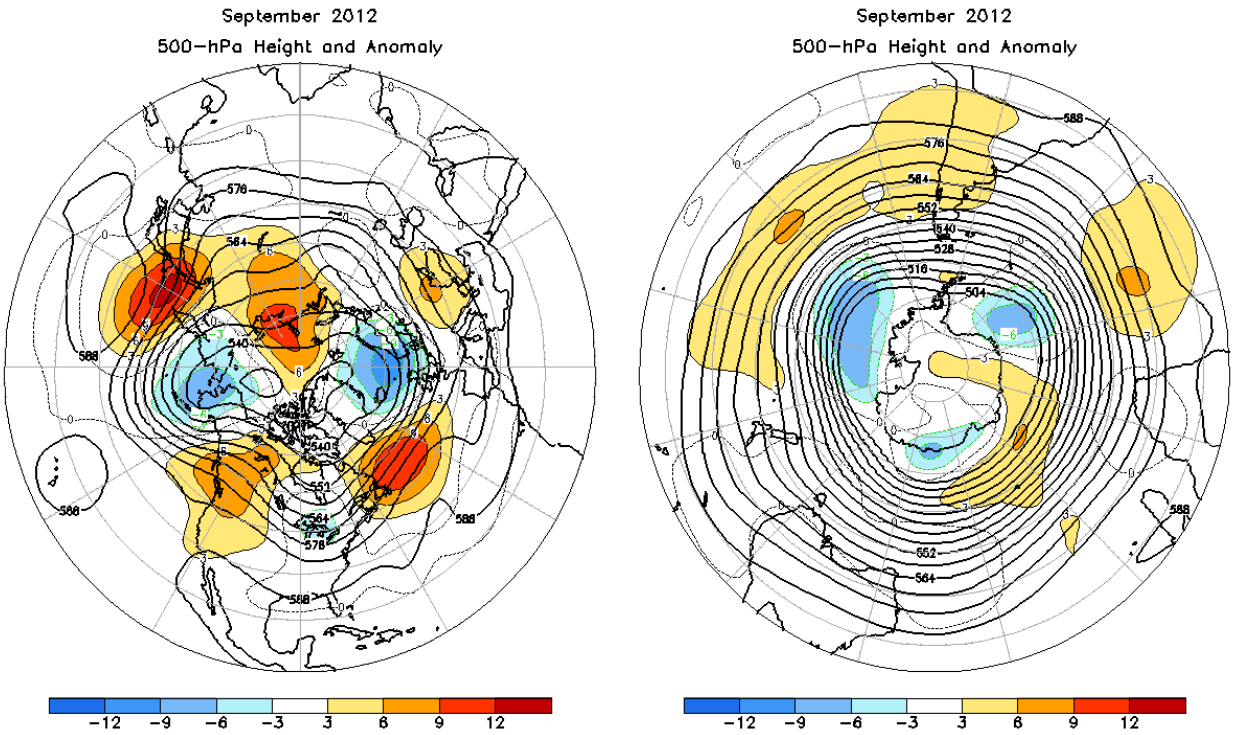

fig.8: Anomalies of Geopotential height at 500hPa in September 2012 (left North Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige9.shtml, and right South Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige15.shtml)

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
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
APR 12	0.4	-0.3	-0.3	0.3	-0.1	---	-1.6	-0.9	-1.0

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

I.2.b Precipitation

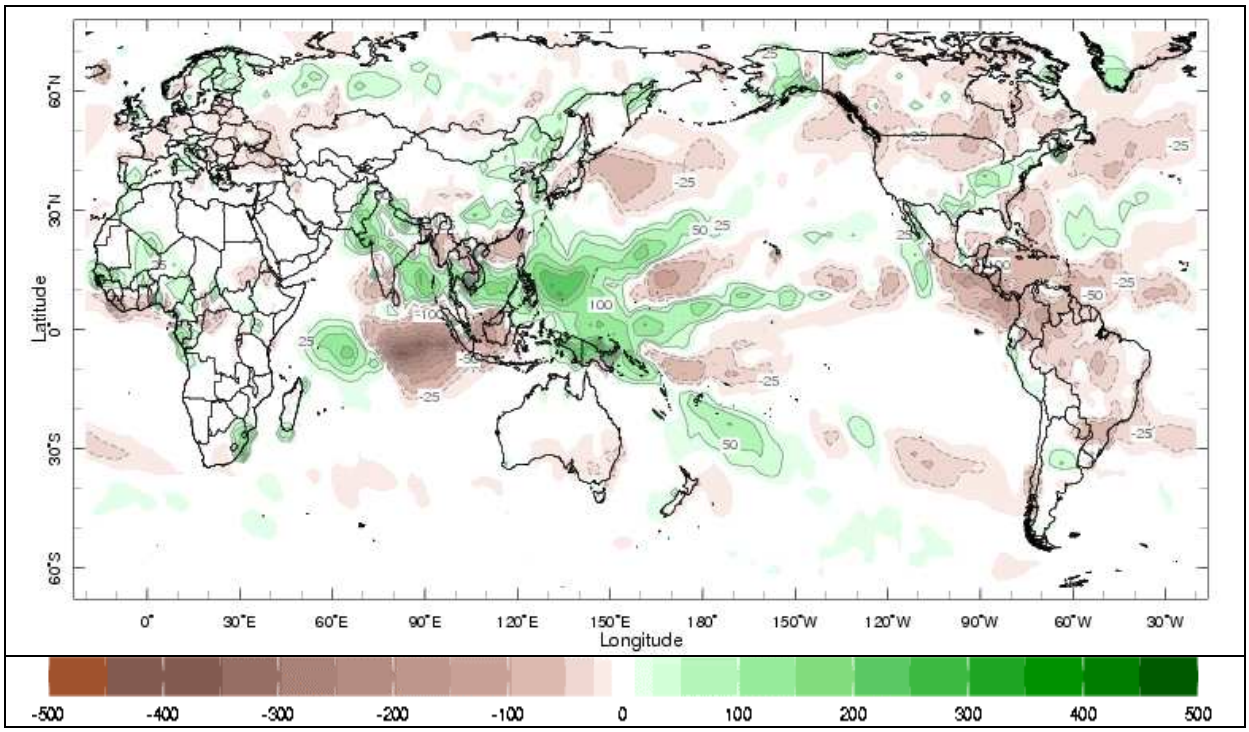

fig.9: Rainfall Anomalies (mm) in September 2012 (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.
http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/

Pacific : Good consistency with the Divergent/Convergent Circulation anomalies over the Western and Central Pacific (positive anomaly strong on the western side) and over Easter Island region (negative anomaly).
Atlantic : Clear relationship with the velocity potential field anomaly. Very strong negative anomaly centred over Central America which extends over the north of South-America and Brazil. To be quoted the positive phase of the Sahelian dipole likely related to an more than normal active monsoon.
Indian Ocean : strong negative anomaly over most of the Eastern equatorial area counterbalanced by a positive anomaly westward (see velocity potential field). Still some positive anomalies over India and Pakistan while a negative anomaly is observed in the southern part of India. South and Western coast of India. Positive anomalies on the North Eastern side possibly in relationship with the strong Divergent Circulation anomaly (see fig. 6) on the western Pacific.
Australia, some traces of negative anomalies, especially over Southern regions (mostly East).
North America : mostly dry over Canada and North US.
Over Europe : to be quoted the contrast between the highest northern latitudes (wet) and latitudes southward (especially Central and South-East Europe) where dry conditions occurred (weak anomalies).
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I.2.cTemperature

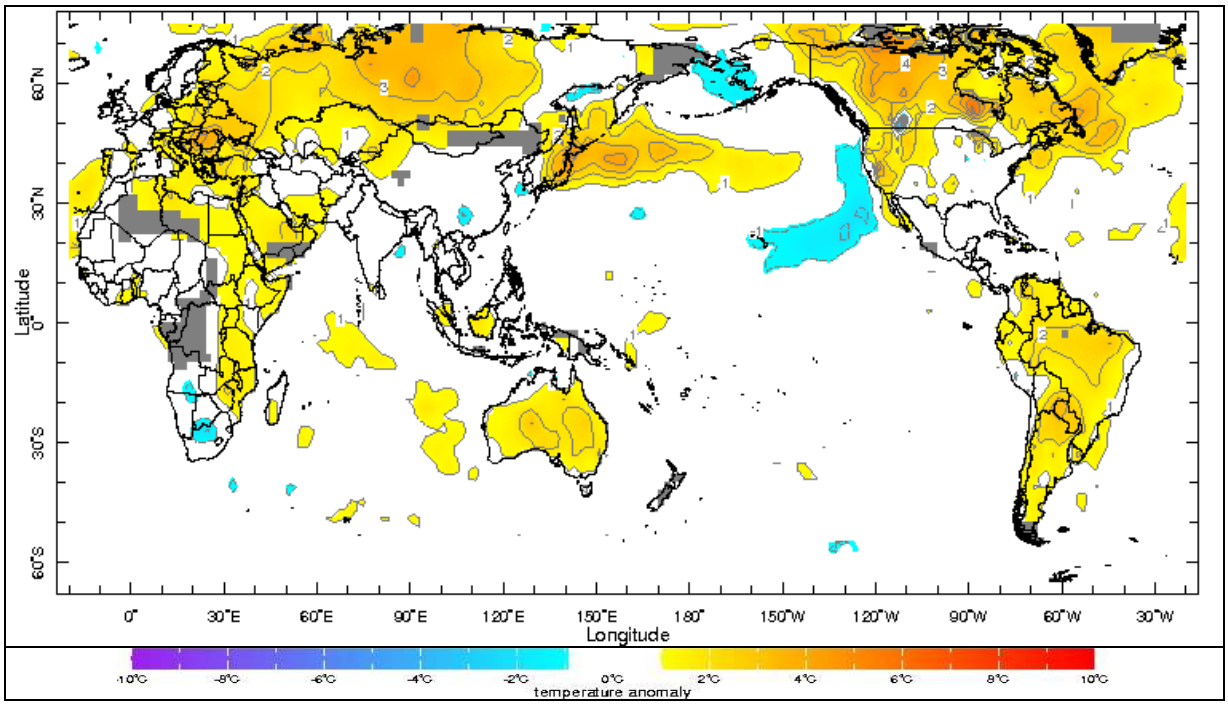


fig.10: Temperature Anomalies (°C) in September 2012 (departure to the 1979-2000 normal) http://iridl.ldeo.columbia.edu/maproom/.Global/.Atm_Temp/Anomaly.html

North-America : Warmer than normal conditions over a large portion of Canada which extend southward over the western US regions and Eastward to Greenland.
South-America : Warmer than normal conditions everywhere.
Australia : Warmer than normal conditions everywhere.
Asia : Close to normal conditions excepted over Siberia (strong positive anomaly).
Africa : Warmer than normal conditions over most of Northern and Eastern Africa (including the Arabic Peninsula). Close to Normal over West and South Africa.
Europe : Above normal conditions over Central and Eastern regions (including the eastern side of the Mediterranean basin). Close to normal conditions on the Western façade.
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) : continuation of the sea-ice extension reached its minimum value and new record (negative anomaly far below 2007 value).
In Antarctic (fig. 11 - right) : above normal sea-ice extension anomaly (above + 2 std) with some regional modulation.

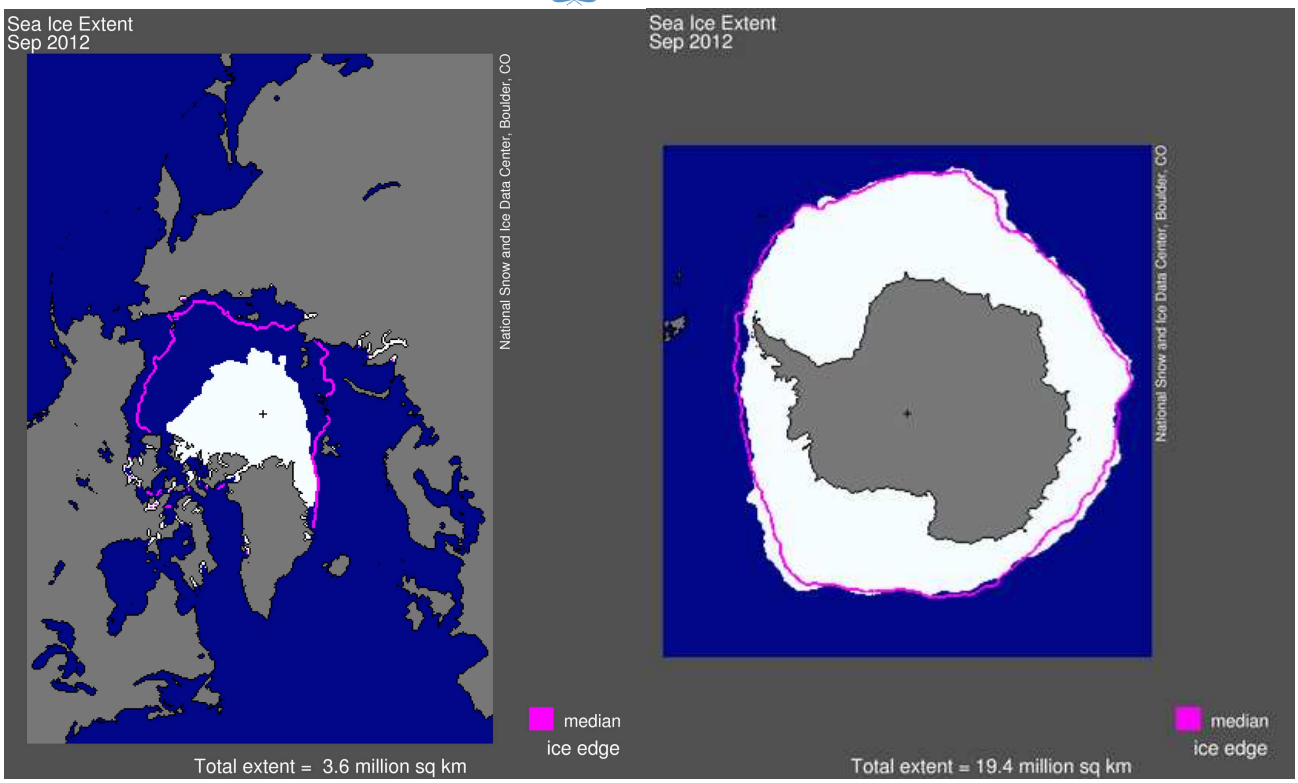


fig.11: Sea-Ice extension in Arctic (left), and in Antarctic (right) in September 2012. The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

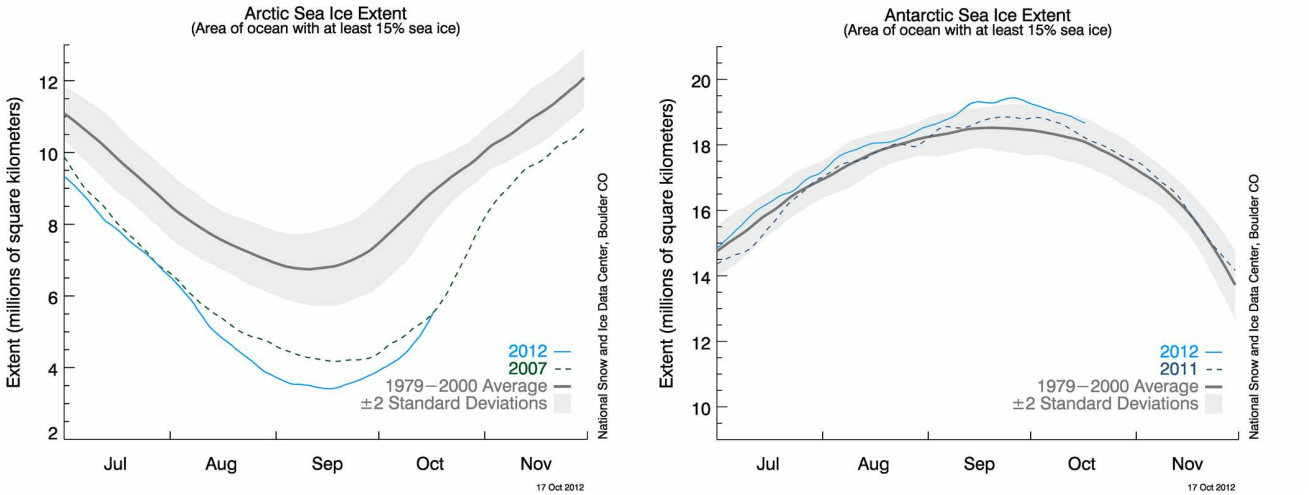


fig. 9bis : Sea-Ice extension evolution from NSIDC
http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png

II.SEASONAL FORECASTS FOR NDJ FROM DYNAMICAL MODELS

II.1. OCEANIC FORECASTS

II.1.a Sea Surface Température (SST)

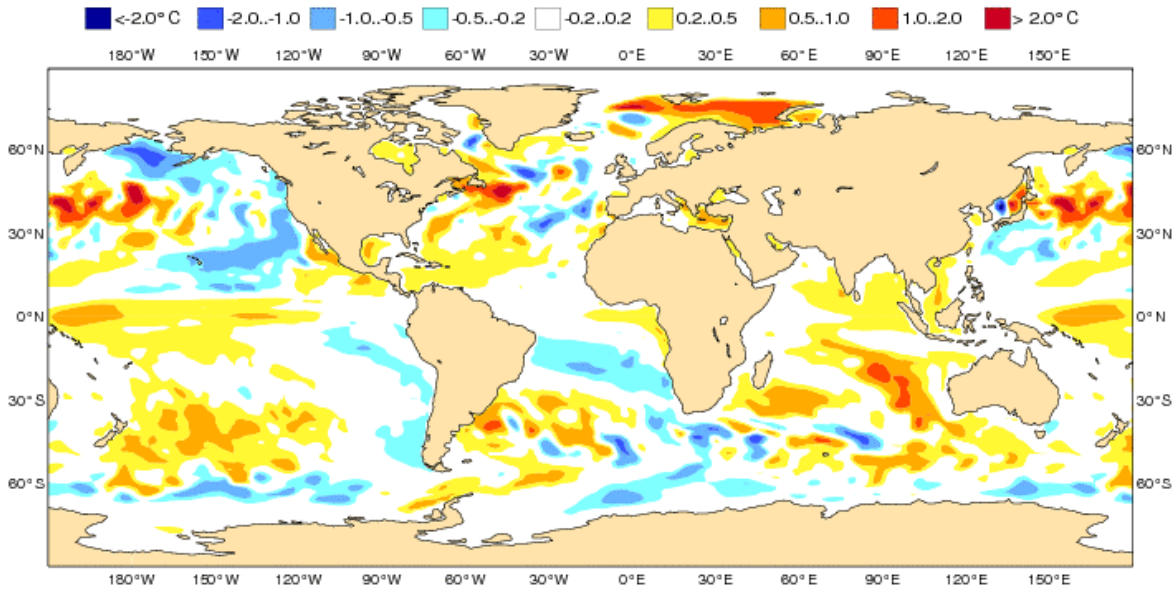


fig.12: SST anomaly forecast (in °C) from ECMWF for NDJ, issued in October.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

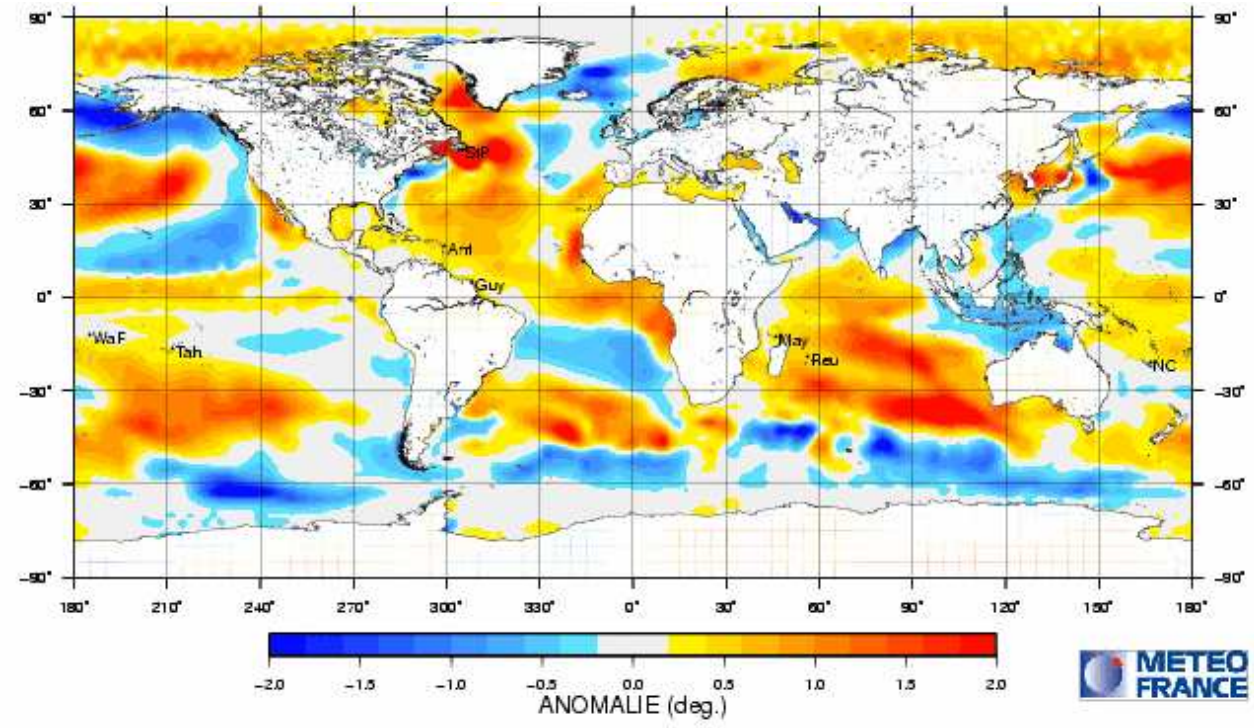


fig.13: SST Anomaly forecast (recalibrated with respect of observation) from Météo-France for NDJ, issued in October. http://elaboration.seasonal.meteo.fr/

For the 2 individual models :
At large scale very consistent over most of the Tropics despite some sub-regional differences.

Pacific : along the equator warmer than normal conditions ; warmer than normal conditions at the sub-tropical latitudes (both South and North). In the North Tropical area, colder than normal conditions extending along the western coast of Canada and US. Over the SPCZ region warmer than normal conditions in both MF and ECMWF.
Atlantic : both models consistent over the South Atlantic (colder /Warmer than normal in the Tropics/sub-Tropics) and the mid-latitudes of the Northern hemisphere. Weak signal (close to normal) in the equatorial waveguide for ECMWF while it is warmer than normal for MF. However a warmer than normal signal in the Guinean Gulf for both models.
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. Some colder than normal conditions in the most Northern part of Arabian Sea and Bay of Bengal for MF which are not present in ECMWF. 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 Niño 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 to the exception of the most eastern part. Horse shoes shape in the Northern Pacific (warmer/colder than normal in the western mid-latitudes/Northern, Eastern and tropical latitudes)
Atlantic : Close to Normal conditions in the Northern Tropics while the colder conditions in the Southern Tropical Atlantic are disappearing. 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).

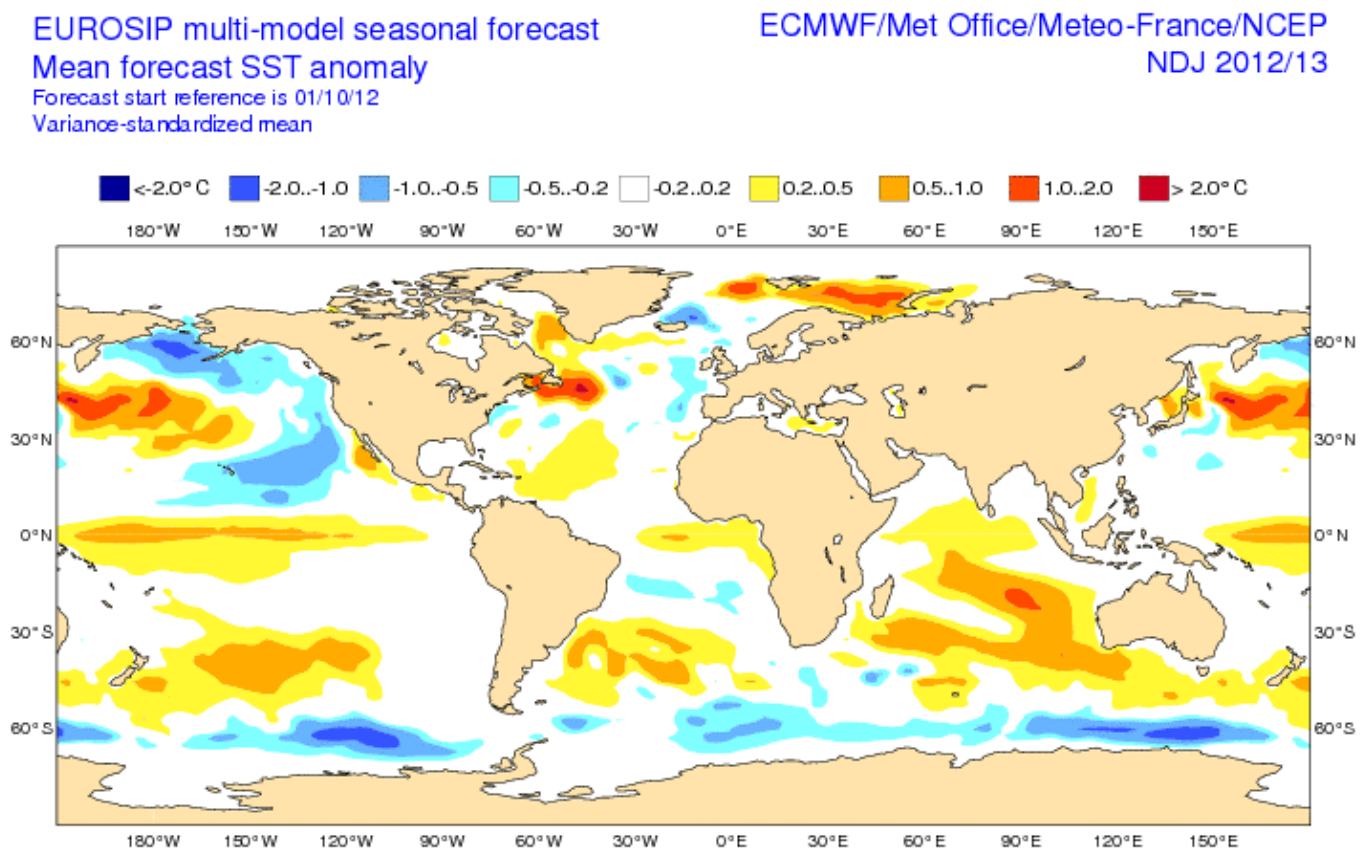


fig.14: SST Forecasted anomaly (in °C) from Euro-SIP valid for NDJ, issued in October.

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 NDJ : a large set of dynamical models give close to normal conditions (despite some 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 from fall up to the end of this year.

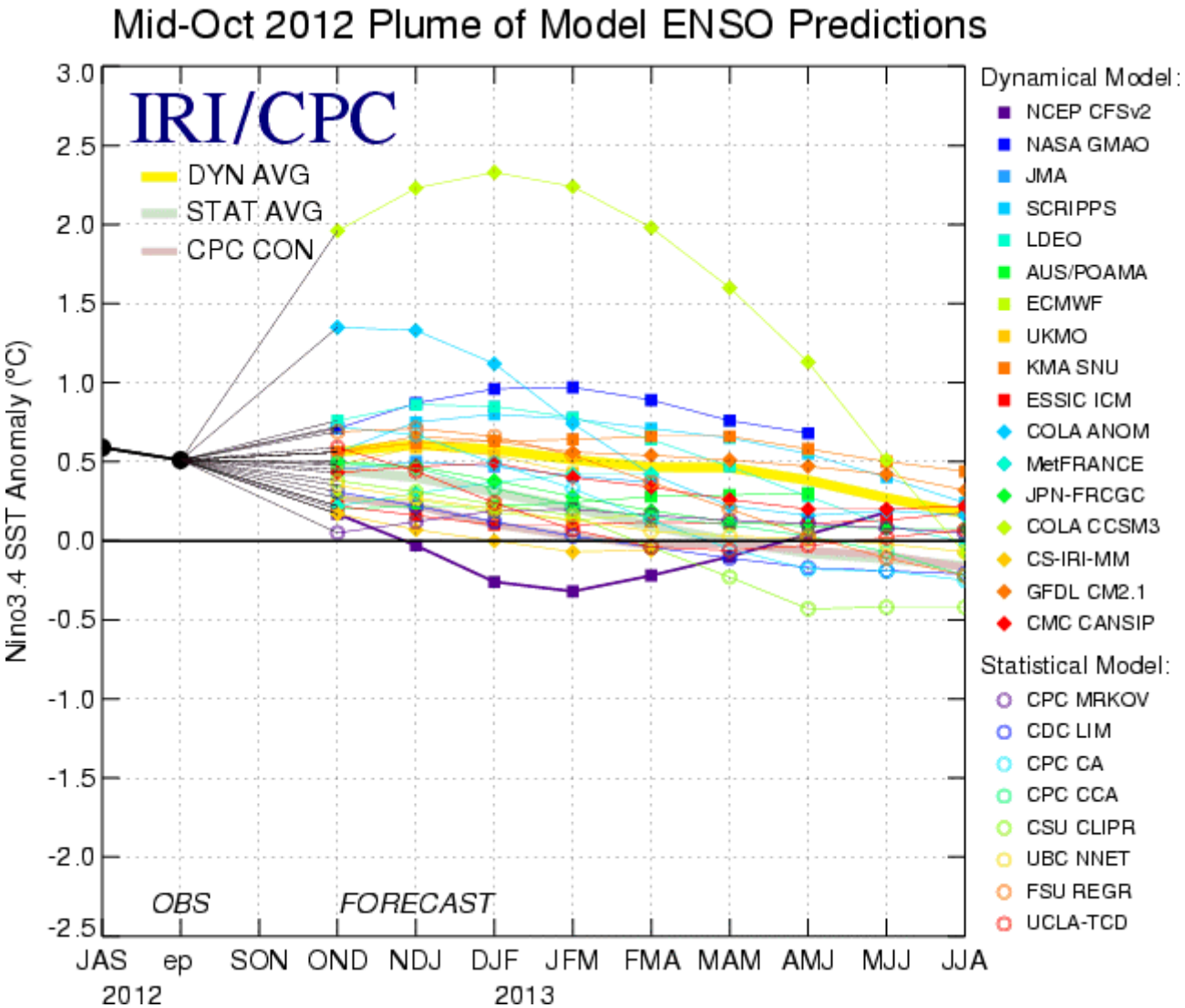


fig.15: Synthesis of Niño 3.4 forecasts (120° to 165°W) issued in October by IRI :
http://iri.columbia.edu/climate/ENSO/currentinfo/SST_table.html

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	OND	NDJ	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA
Value « La Niña » Value « El Niño »	*-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*	*-0,50* *0,45*	*-0,50* *0,45*
Average, statistical models	**0.4**	**0.4**	**0.3**	**0.2**	**0.1**	**0**	**-0.1**	**-0.1**	**-0.2**
Average, dynamical models	**0.6**	**0.6**	**0.6**	**0.5**	**0.5**	**0.5**	**0.4**	**0.3**	**0.2**
Average, all models	**0.5**	**0.5**	**0.5**	**0.4**	**0.3**	**0.3**	**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.

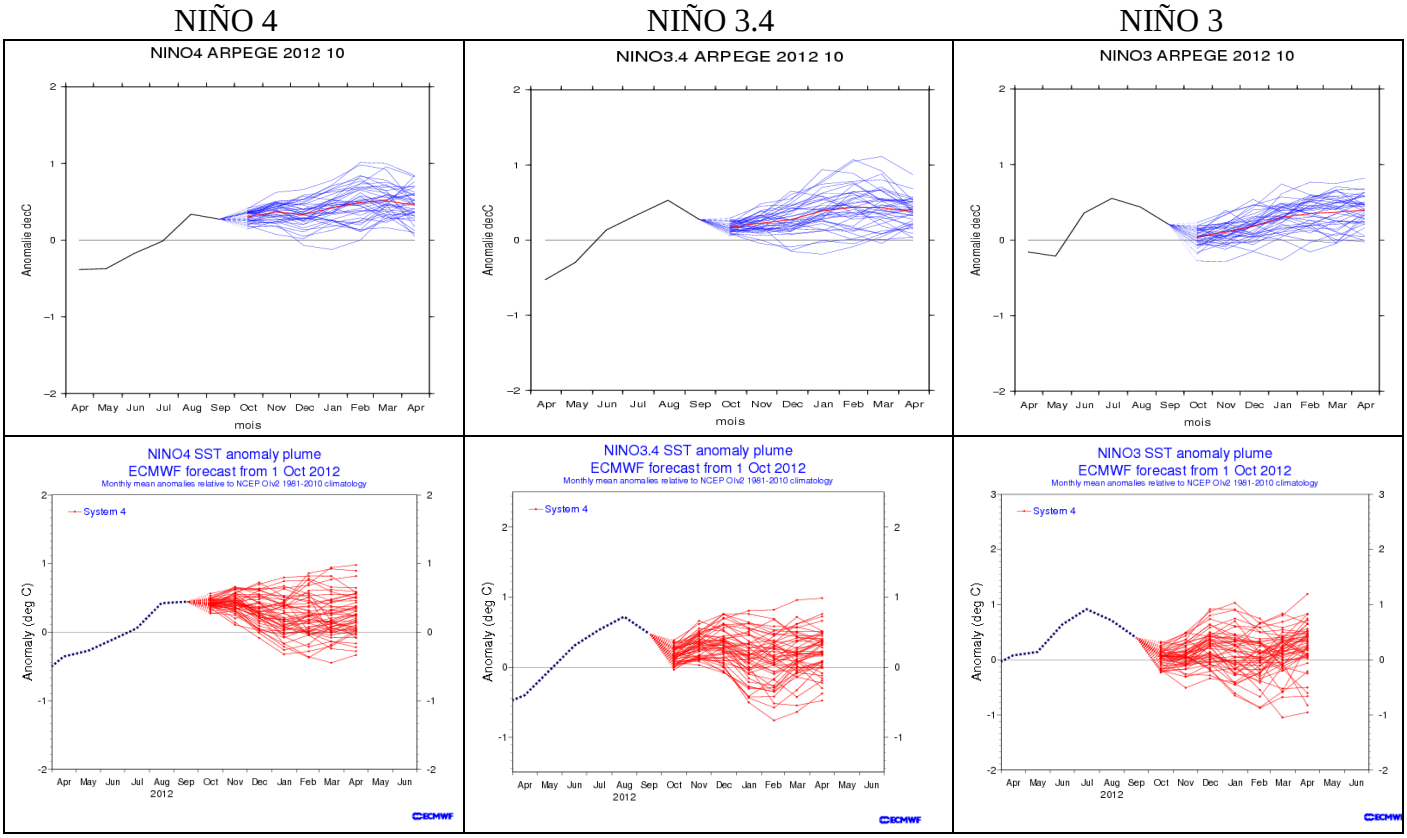


fig.16: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (bottom) issued in October, monthly mean for individual membres. (http://www.ecmwf.int/ **)**

II.1.c Atlantic Ocean forecasts :

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

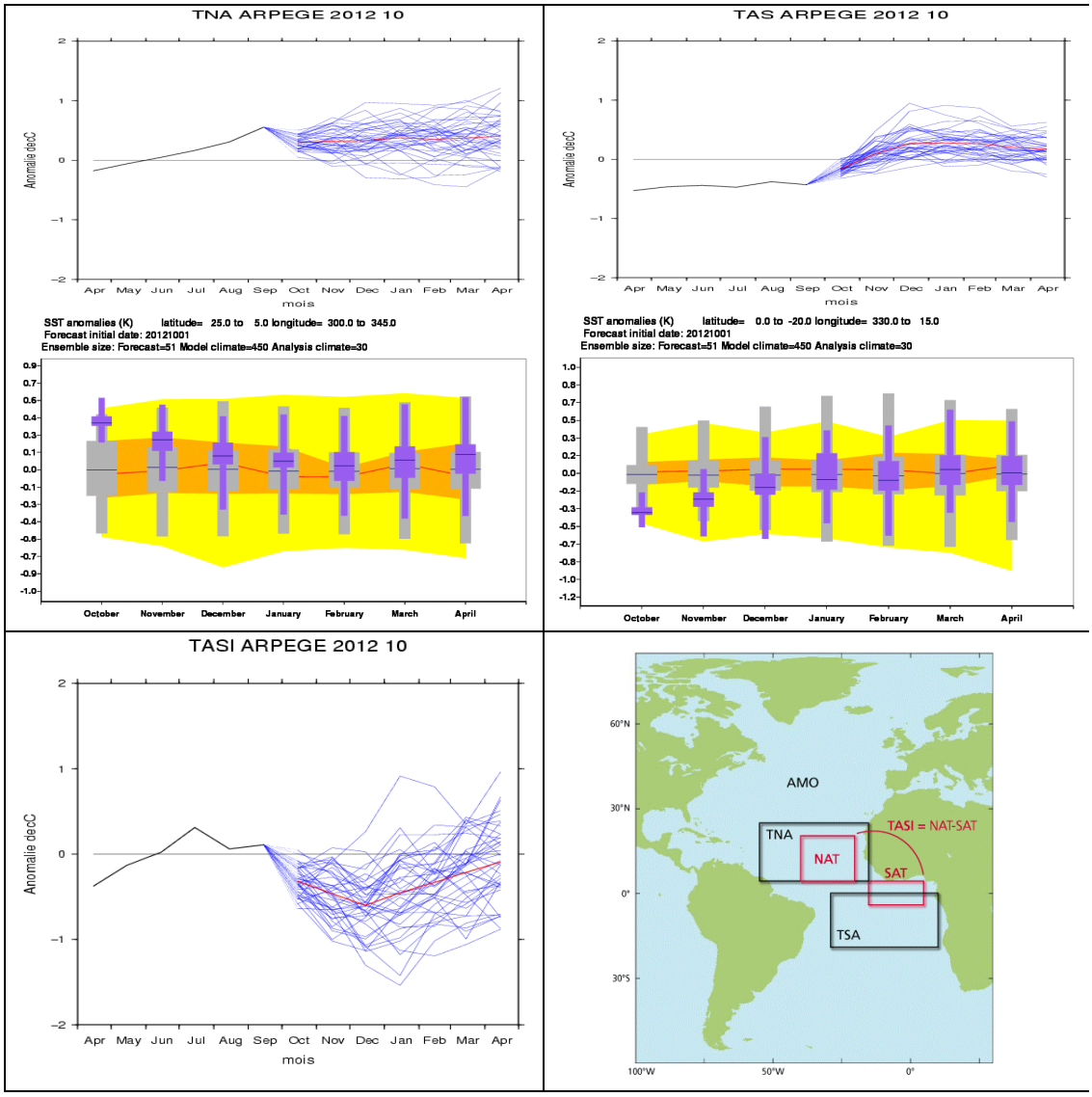


fig.17: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, issued in October, plumes / climagrams correspond to 41 / 51 members and monthly means.

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 mid-winter (ECMWF).
TASI : the TASI index is negative (despite the MF warm bias, warmer than normal conditions developed in the Guinean Gulf). However, the spread is very large which lead to be cautious on this interpretation.

II.1.d Indian Ocean forecasts :

Forecasted Phase: *IOD from Positive to Neutral phase*

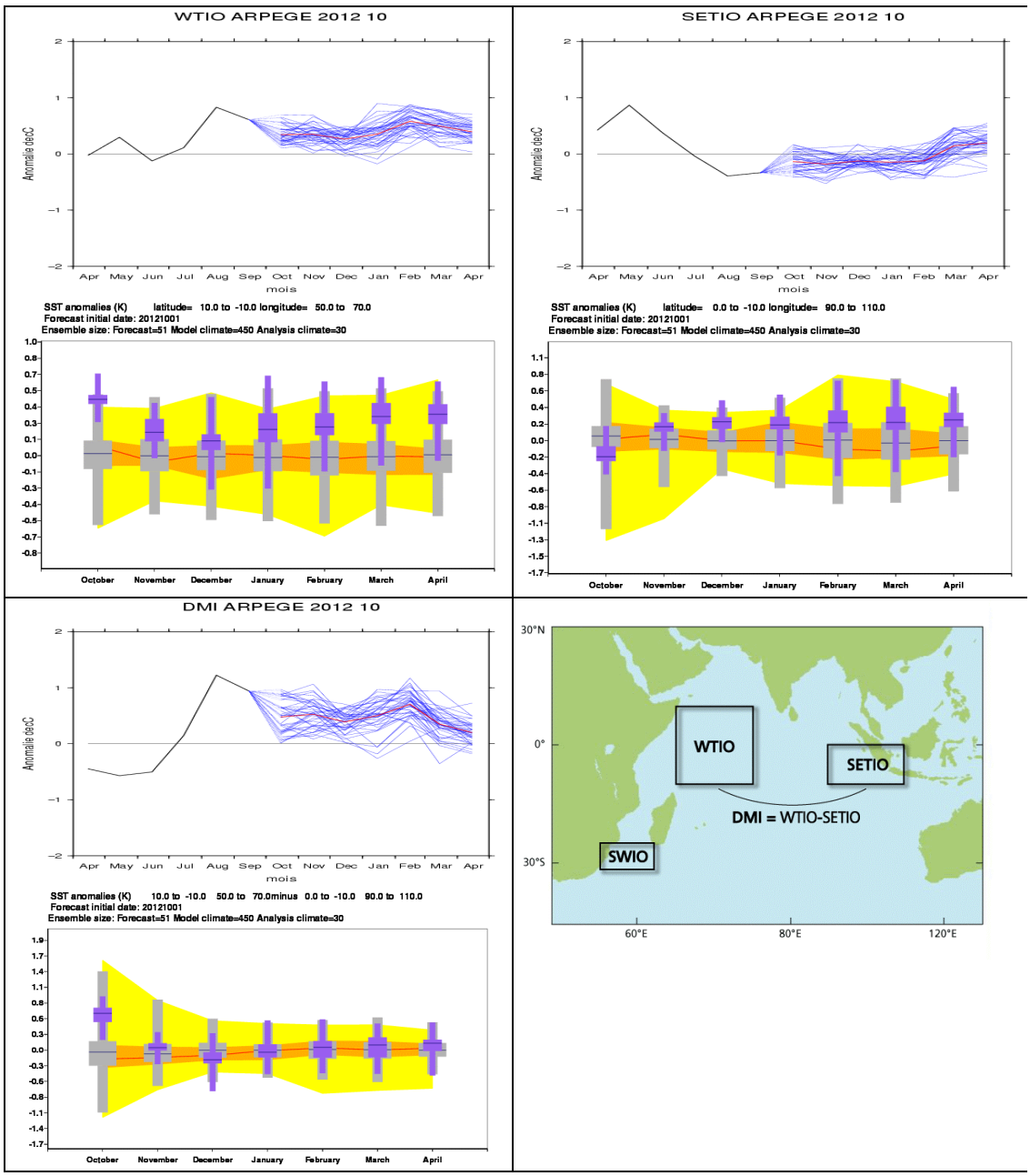


fig.18: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, issued in October, plumes / climagrams correspond to 41 / 51 members and monthly means.

In WTIO : warmer than normal conditions in both models despite the relative drop in ECMWF in December.
In SETIO : Colder than normal in MF along the NDJ period. In ECMWF, warmer than normal conditions, likely in relationship with an early return to neutral conditions in the Pacific. 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. Also, not too much spread in both models.

II.2. GENERAL CIRCULATION FORECAST

II.2.a Global Forecast

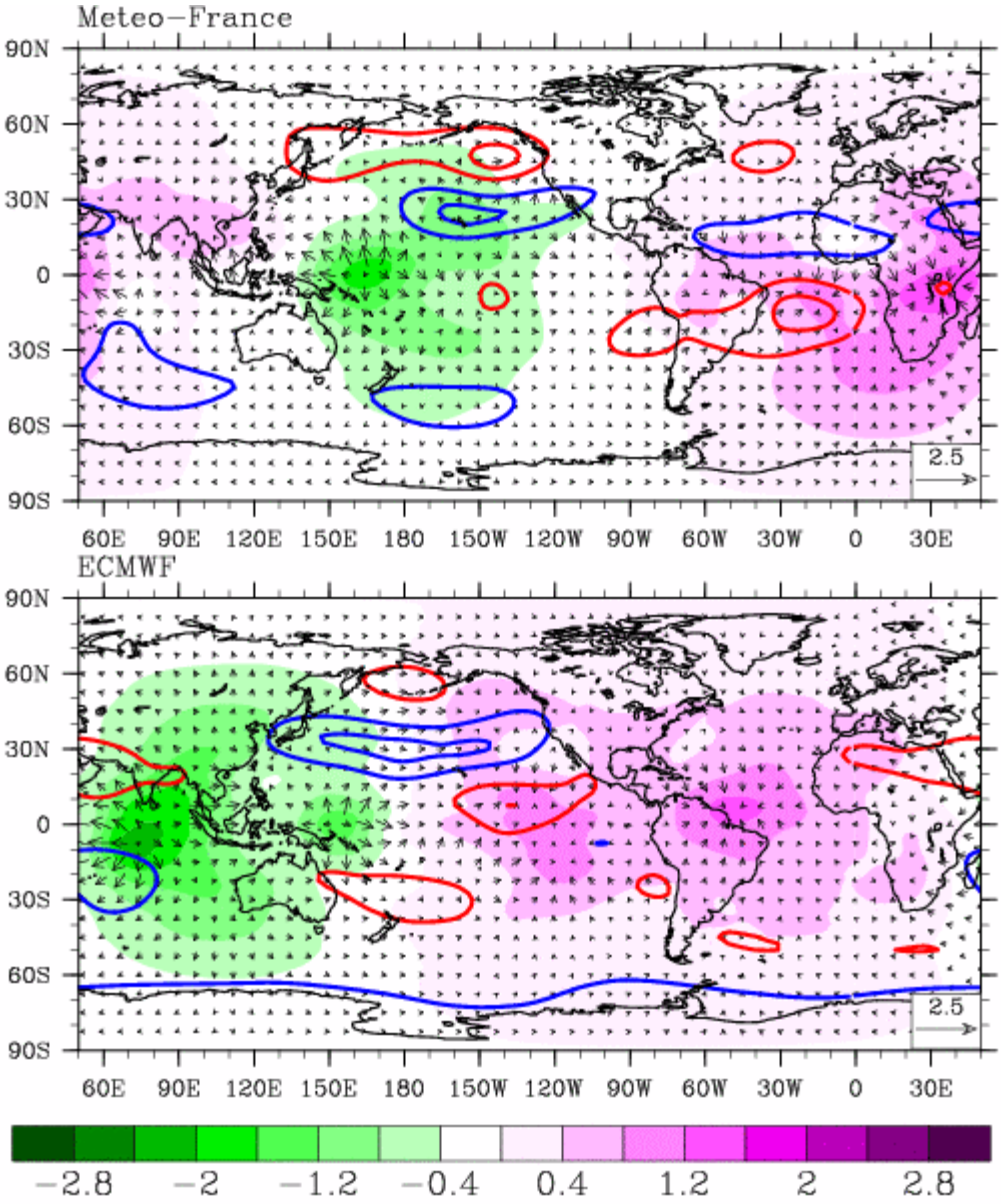


fig.19: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), asociated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa for NDJ, issued in October by Météo-France (top) and ECMWF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

Velocity potential anomaly field (cf. fig. 19 – insight into Hadley-Walker circulation anomalies) :
in the Tropics : different atmospheric response in the 2 models very likely in relationship with the differences in Niño evolution.
Over the Pacific : Over the Pacific, both models are indicating a negative anomaly (divergent circulation anomaly – upward motion) just West to the dateline. However on the Eastern Pacific, ECMWF shows a clear positive anomaly (convergent circulation anomaly – downward motion) which doesn't exist in MF.
Over Indian Ocean : In MF strong convergent circulation anomaly (downward motion) close to the coast of East Africa and a weaker one over Bangladesh. In ECMWF, conversely to MF, strong Divergent circulation anomaly (upward motion) located South to India.
Over Atlantic : convergent circulation anomaly (downward motion) close to the North Eastern coast of South America ; less marked in MF.

Stream Function anomaly field (cf. fig. 19 – insight into teleconnection patterns tropically forced) :
In both models, over the Pacific some wave propagation toward the mid-latitudes up to Bering sea. In addition, some possible weak teleconection patterns propagating from Atlantic and Indian Ocean toward Europe and more especially the Mediterranean basin.
However, the predictability is very likely very limited over Europe (may be some on the Mediterranean basin and North Africa ?).

II.2.b North hemisphere forecast and Europe

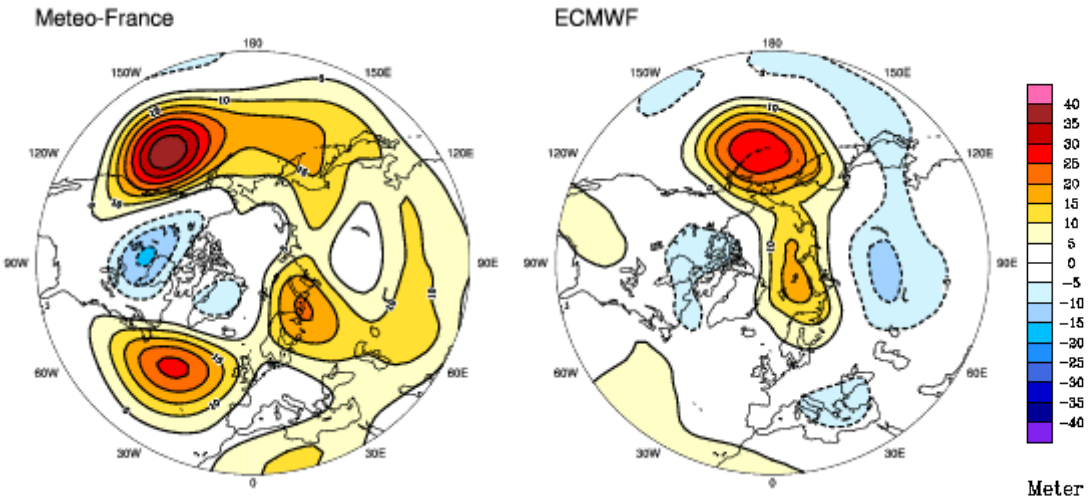


fig.20: Anomalies of Geopotential Height at 500 hPa for NDJ, issued in October from Météo-France (left) and ECMWF (right).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip

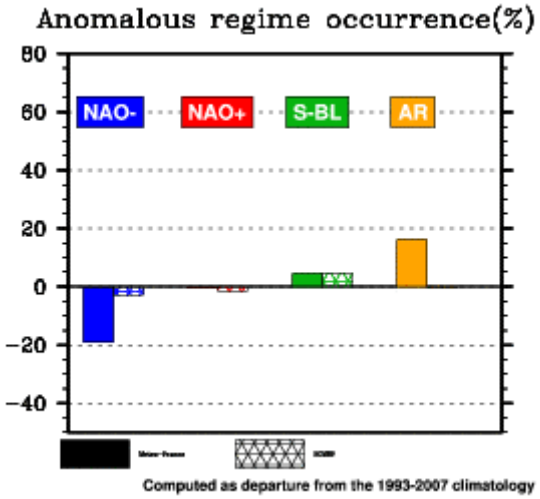


fig.21: North Atlantic Regime occurrence anomalies from Météo-France and ECMWF : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.

Geopotential height anomalies (fig. 20 – insight into mid-latitude general circulation anomalies) :
Large differences between the 2 models. The only convergence is over Canada. These large differences are consistent with the Stream Function anomaly fields. These differences, in relationship with a limited predictability can be related to the model uncertainties.
North Atlantic Circulation Regimes (fig. 21) : No signal in ECMWF and, for MF, an increased occurrence of AR regimes (counterbalanced by a deficit of NAO- regimes) consitent with Z500 anomaly iver the Atlantic.

General atmospheric circulation in MF in the low troposphere (see fig. 22) : weak signal over Europe in MF consistent with a weakening of the zonal circulation.

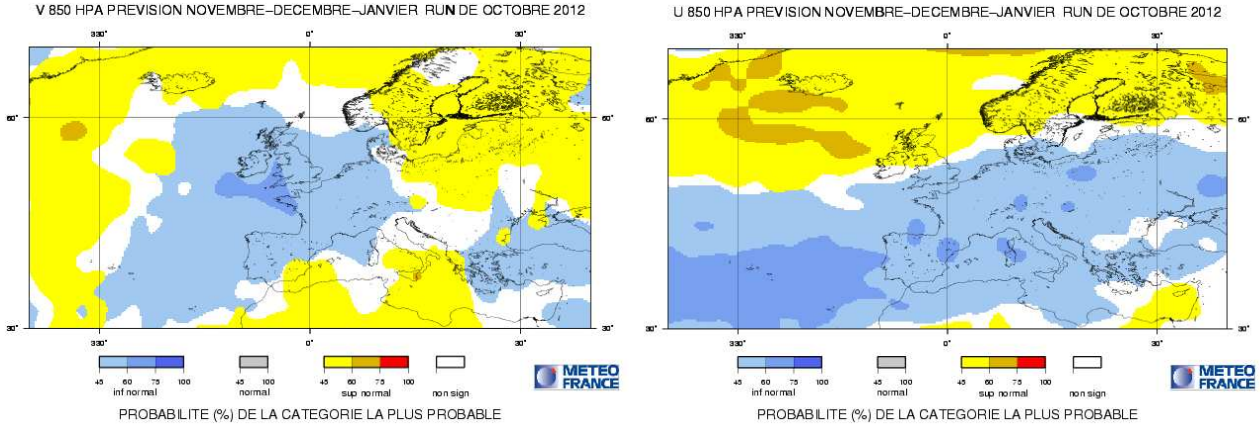


fig.22: Most likely category for the meridional (left) and zonal (right) wind at 850 hPa for NDJ, issued in October from Météo-France.

II.3. IMPACT : TEMPERATURE FORECASTS

II.3.a ECMWF

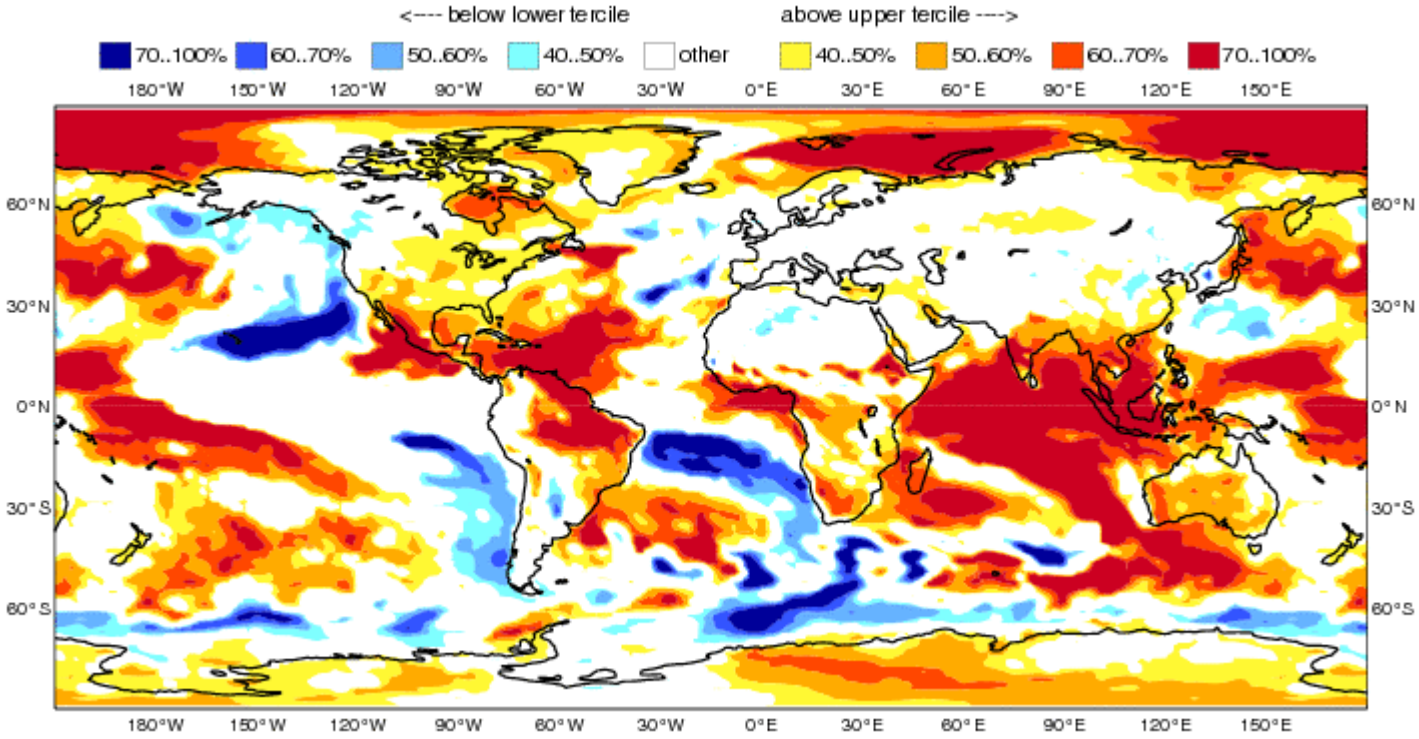


fig.23: Most likely category probability of T2m from ECMWF for NDJ, issued in October. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

II.3.b Météo-France

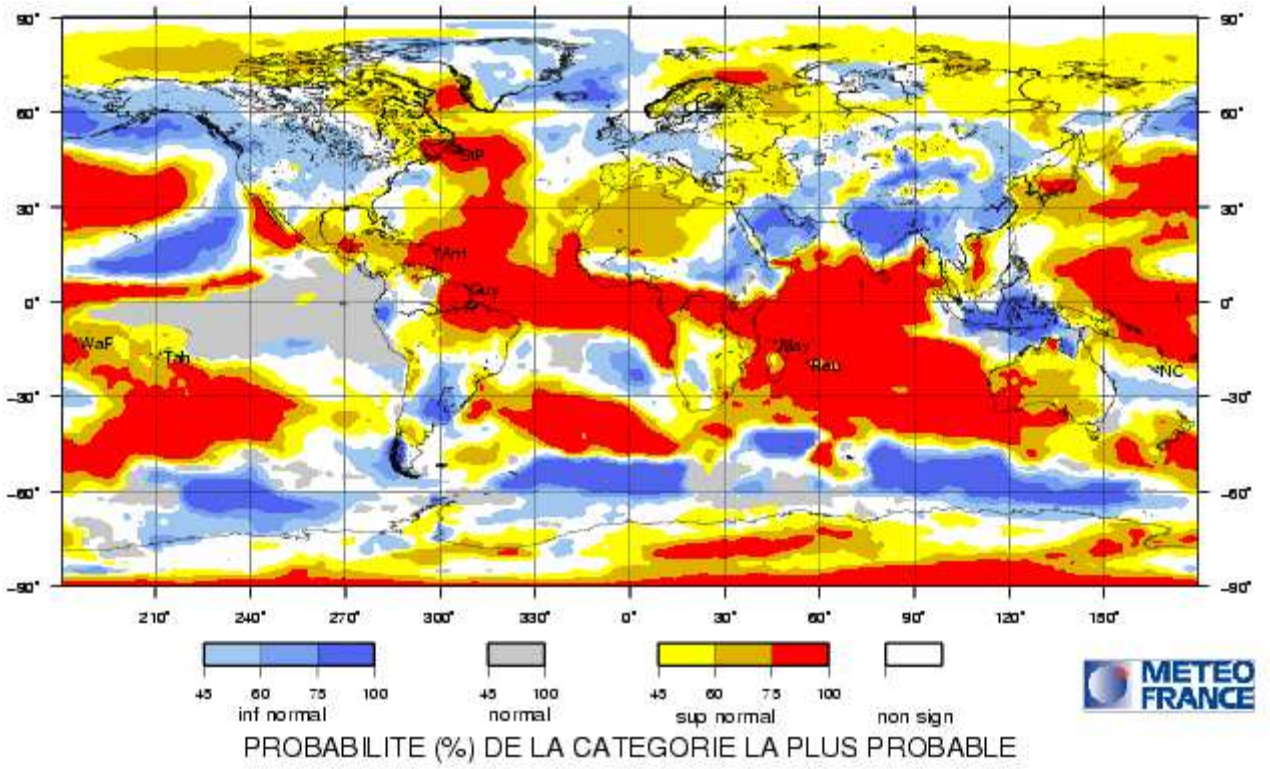


fig.24: Most likely category of T2m for NDJ, issued in October. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.3.c Met Office (UKMO)

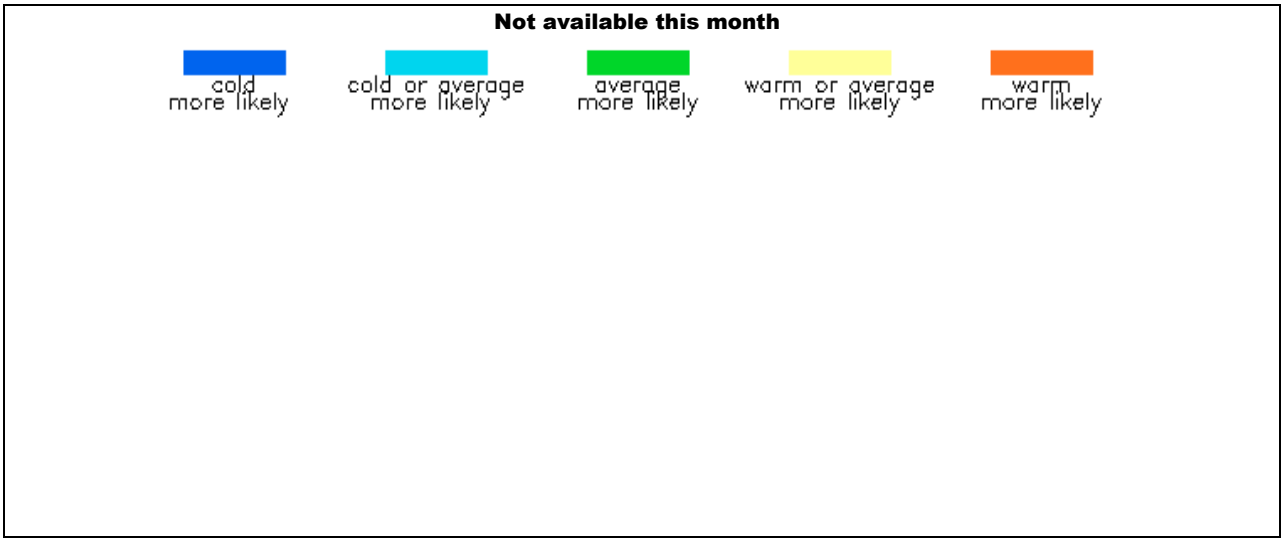


fig.25: Most likely category of T2m for SON, issued in August from UK Met Office. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://www.metoffice.gov.uk/

II.3.d Japan Meteorological Agency (JMA)

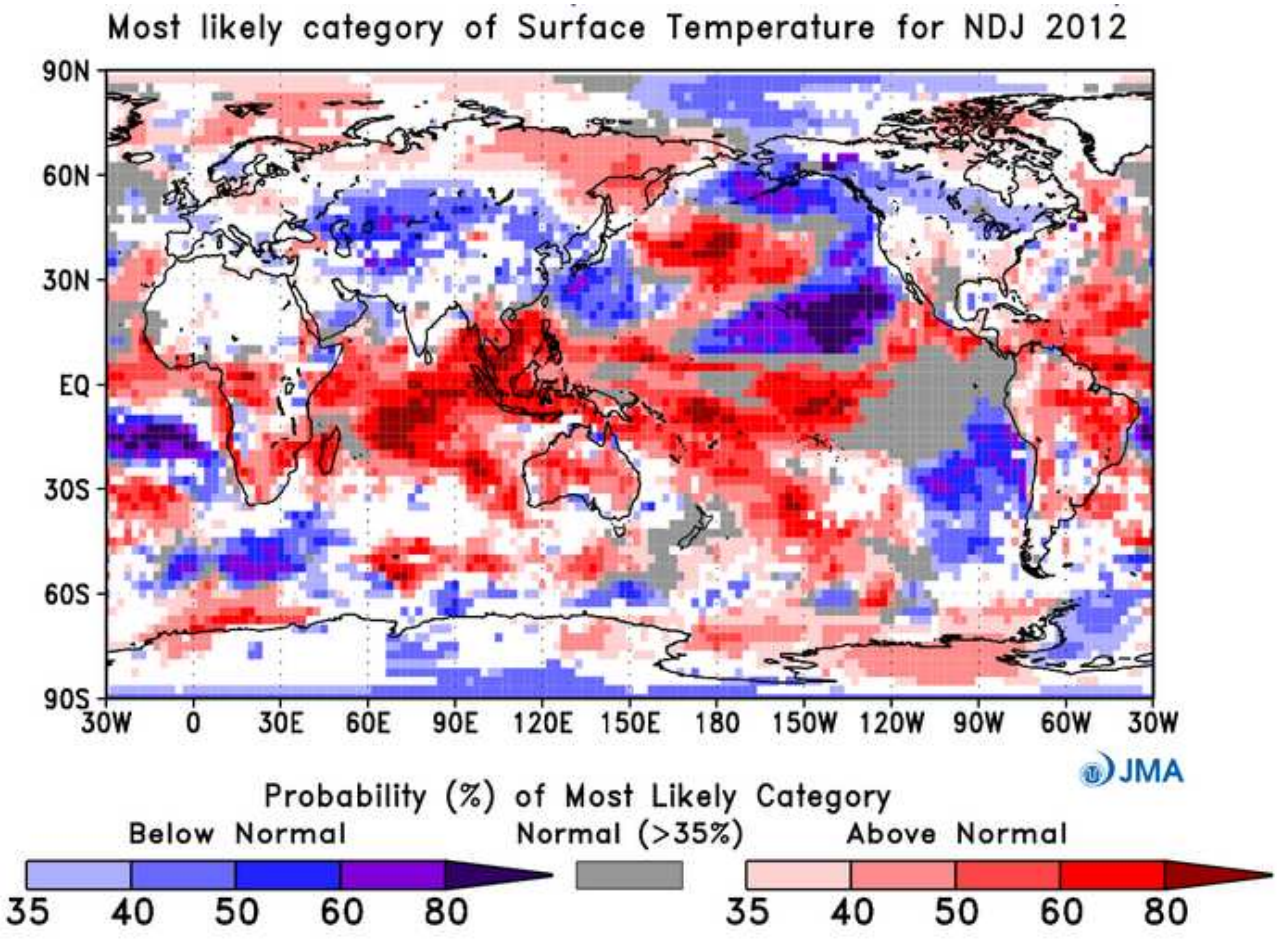


fig.26: Most likely category of T2m for NDJ, issued in October from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.html

II.3.e Euro-SIP

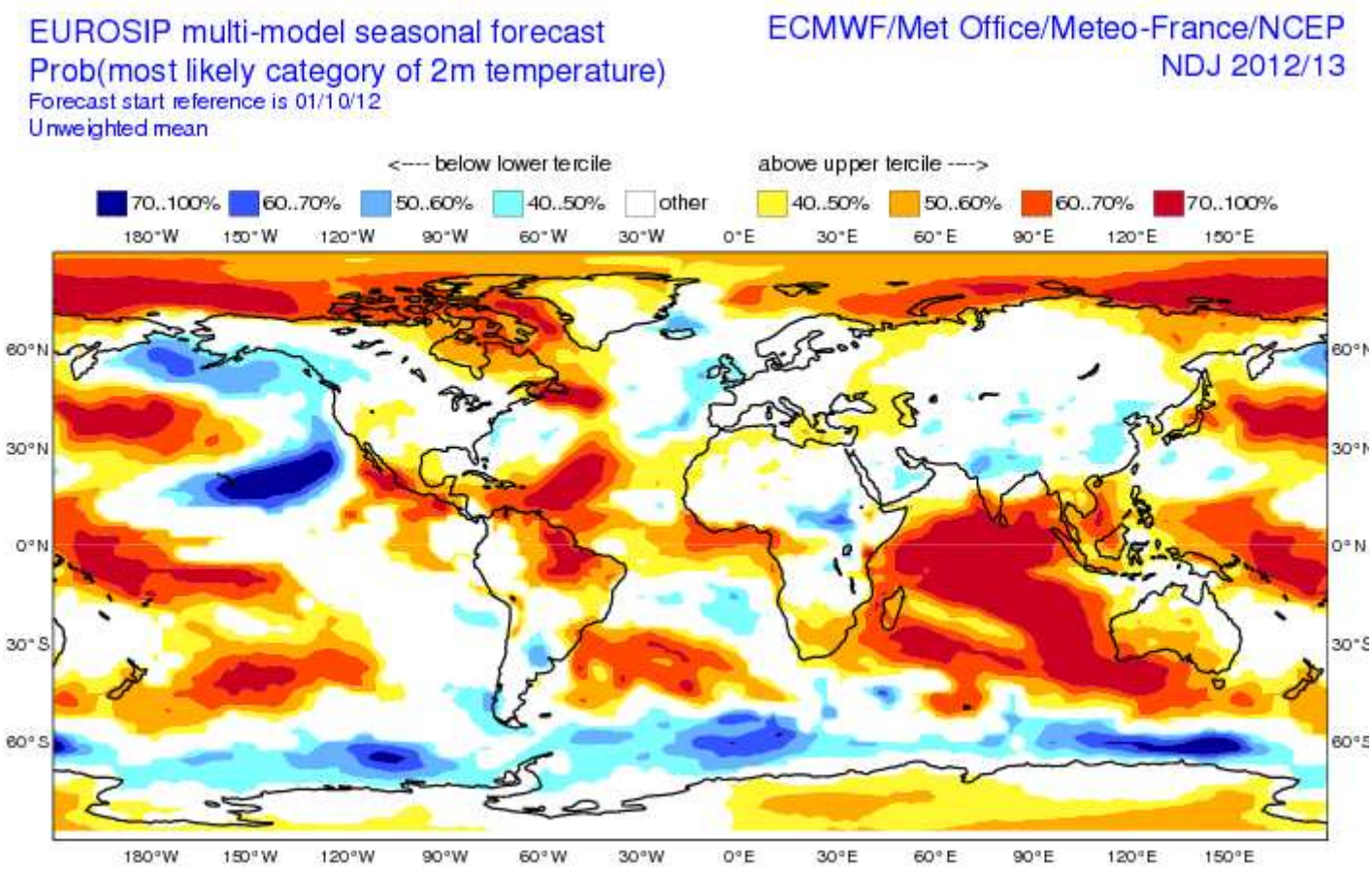


fig.27: Multi-Model Probabilistic forecasts for T2m from EuroSip for NDJ, issued in October. (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).

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 most of the Caribbean. Warmer than normal over the regions North to the great lakes.
South-America : Warmer than normal conditions over the Northern part of the continent (especially Brazil).
Australia : Warmer than normal over most of the continent (especially Southern coast).
Asia : Warmer than normal conditions should prevail over South-East Asia including the Southern part of India. Below normal conditions over regions close to Pakistan and North India.
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 continent. Only some little signal (warmer than normal) on the Eastern Mediterranean basin).

II.3.fInternational Research Institute (IRI)

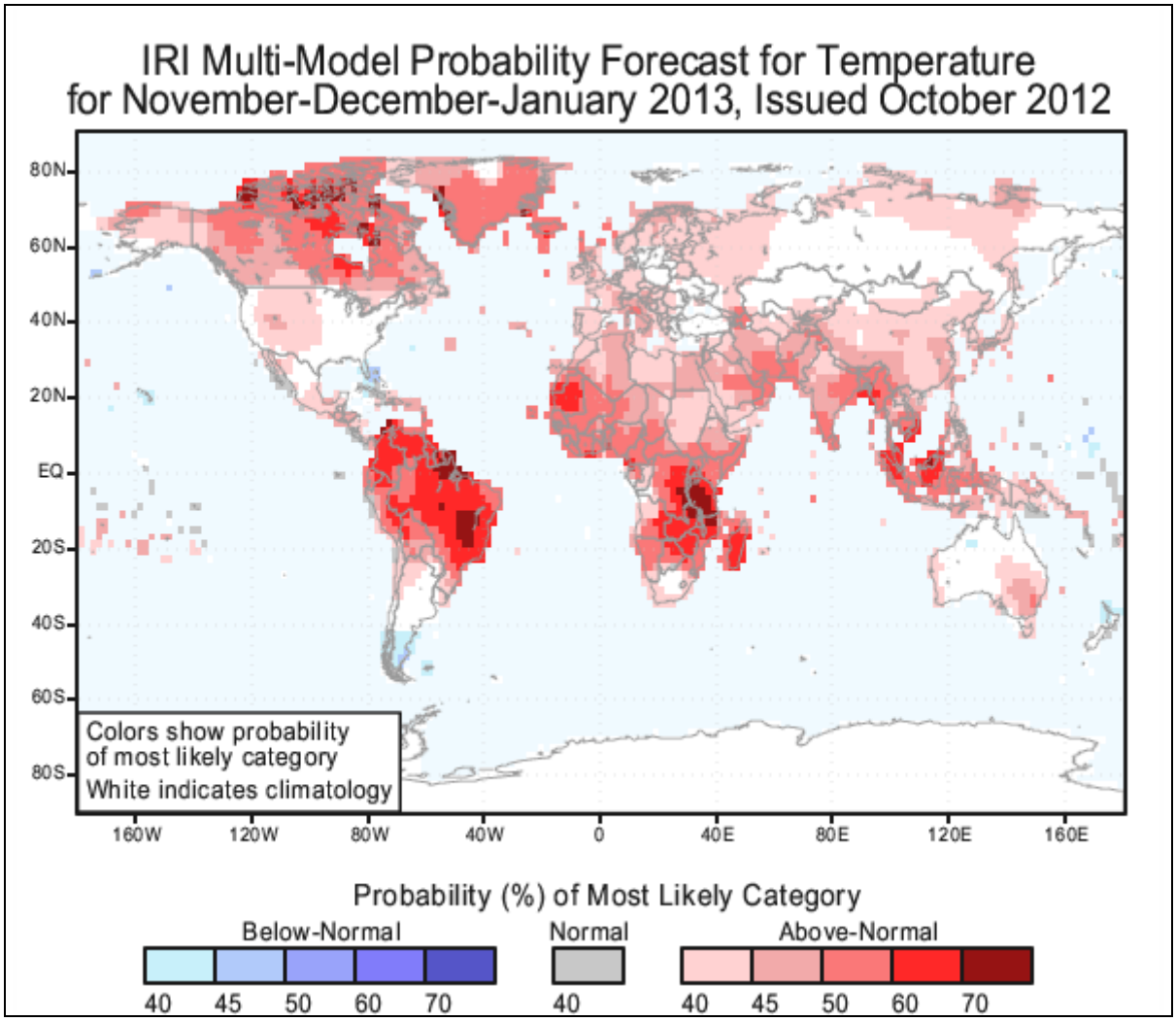


fig.28: Most likely category of T2m for NDJ, issued in October from the IRI multi-model ensemble. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://iri.columbia.edu/climate/forecast/net_asmt/

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

II.4. IMPACT : PRECIPITATION FORECAST

II.4.a ECMWF

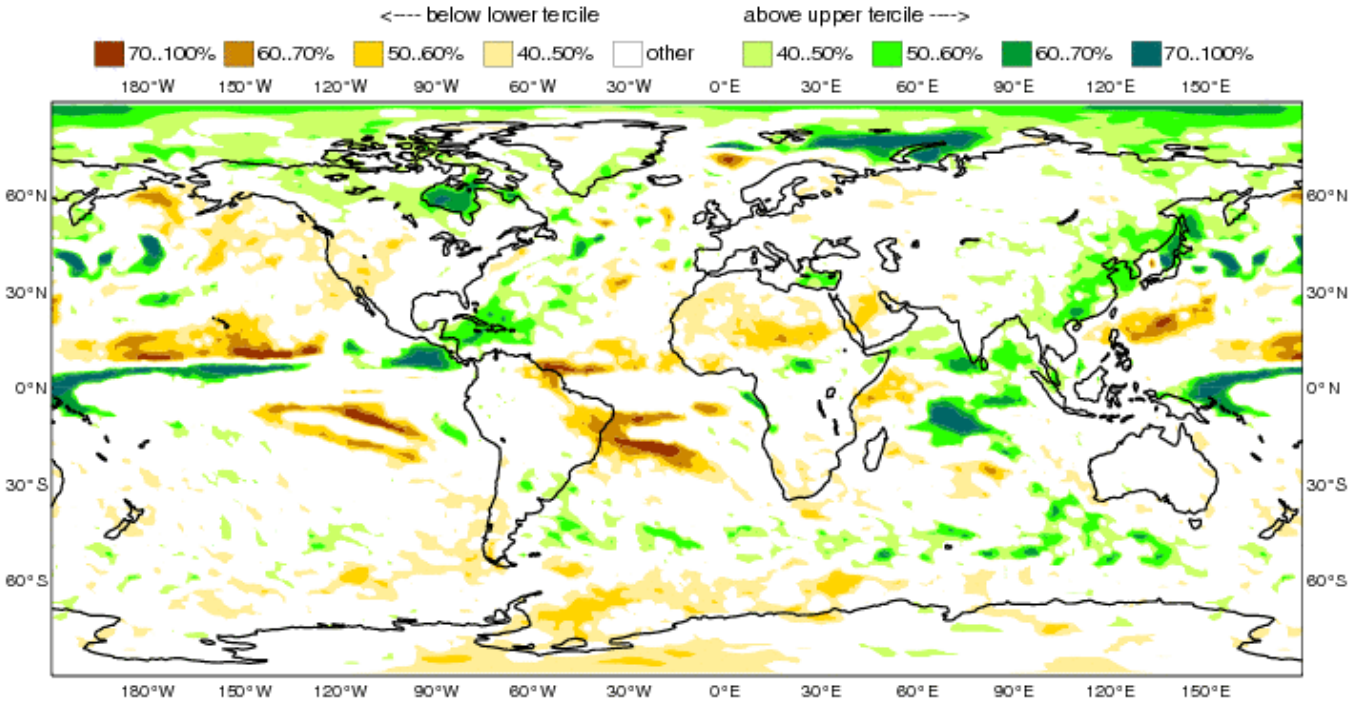


fig.29: Most likely category probability of rainfall from ECMWF for NDJ, issued in October. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/charts/seasonal_charts_s2/

II.4.b Météo-France

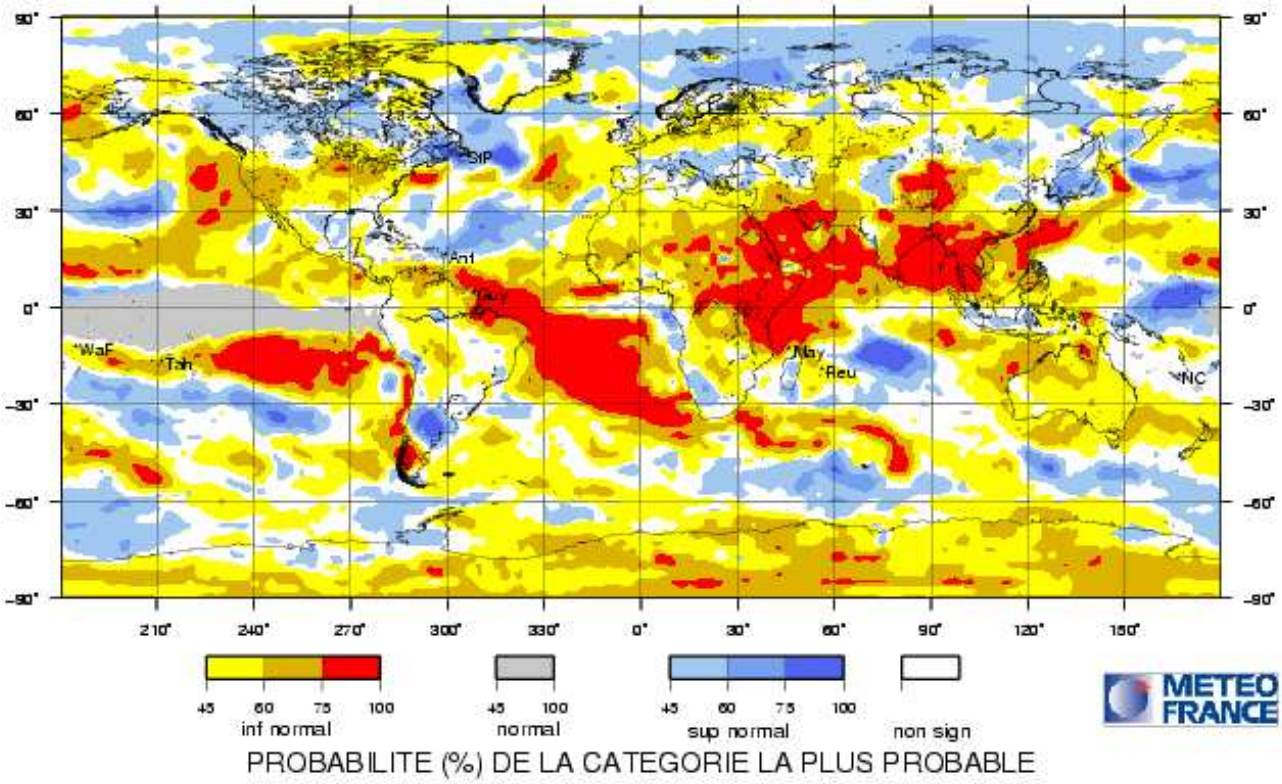


fig.30: Most likely category of Rainfall for NDJ, issued in October. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Met office (UKMO)

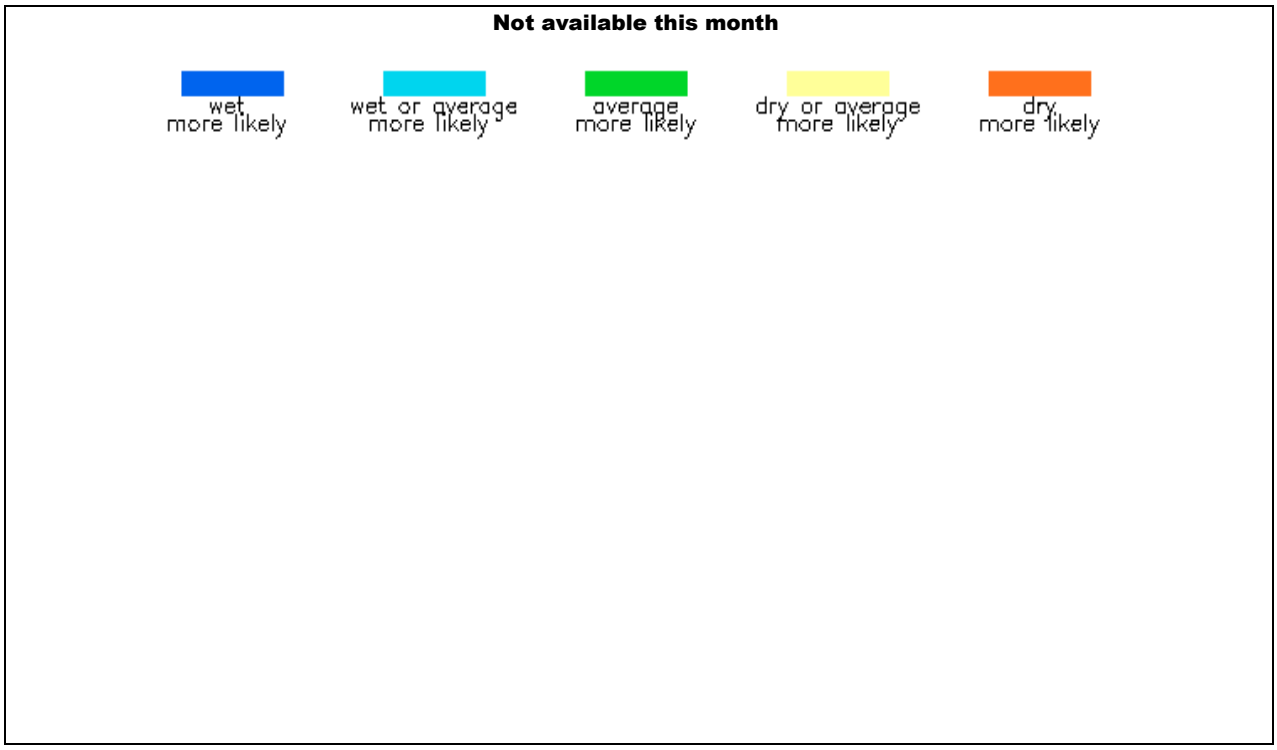


fig.31: Most likely category of Rainfall for SON, issued in August from UK Met Office. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://www.metoffice.gov.uk/

II.4.d Japan Meteorological Agency (JMA)

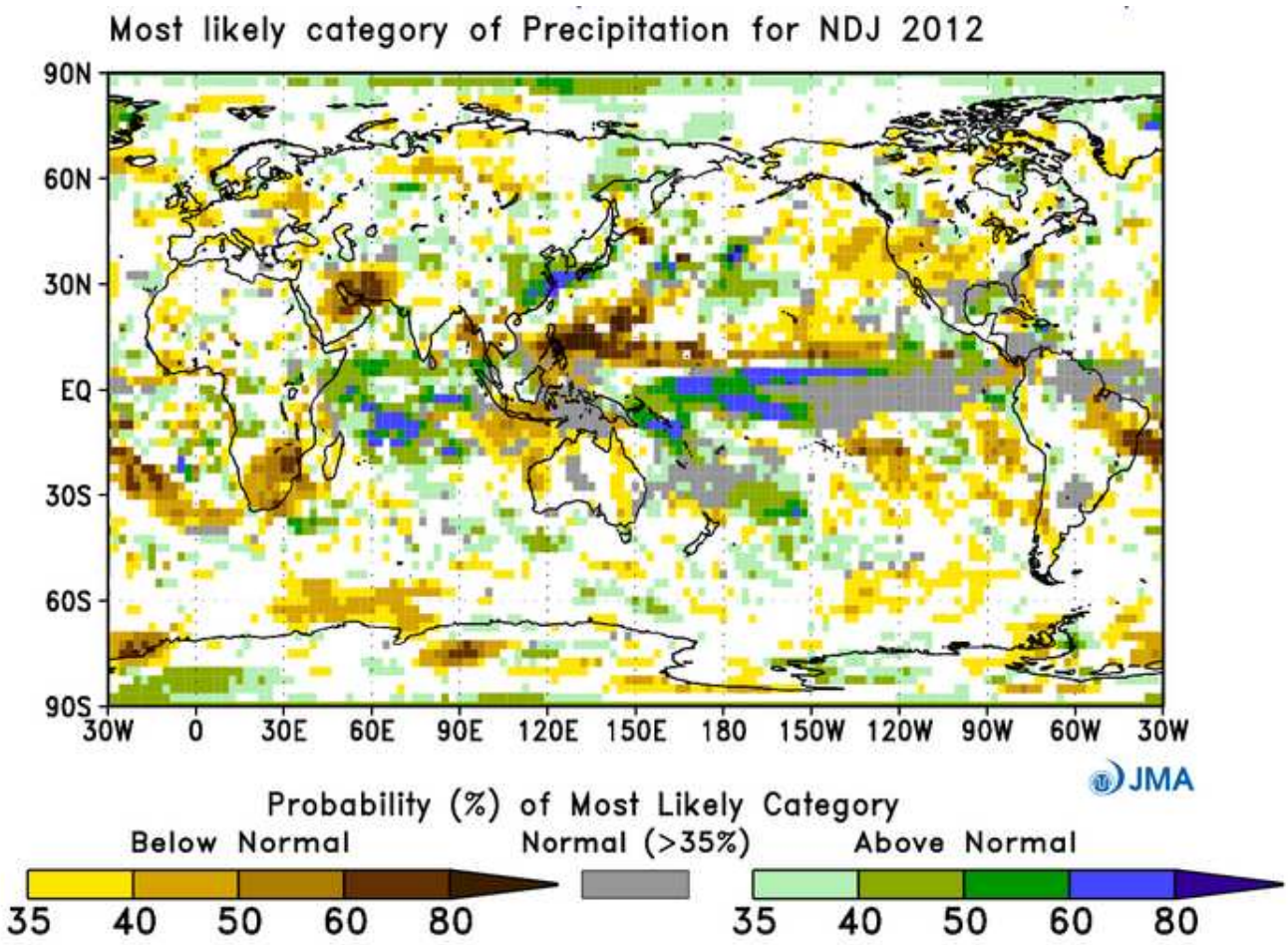


fig.32: Most likely category of Rainfall for NDJ, issued in October from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.html

II.4.e Euro-SIP

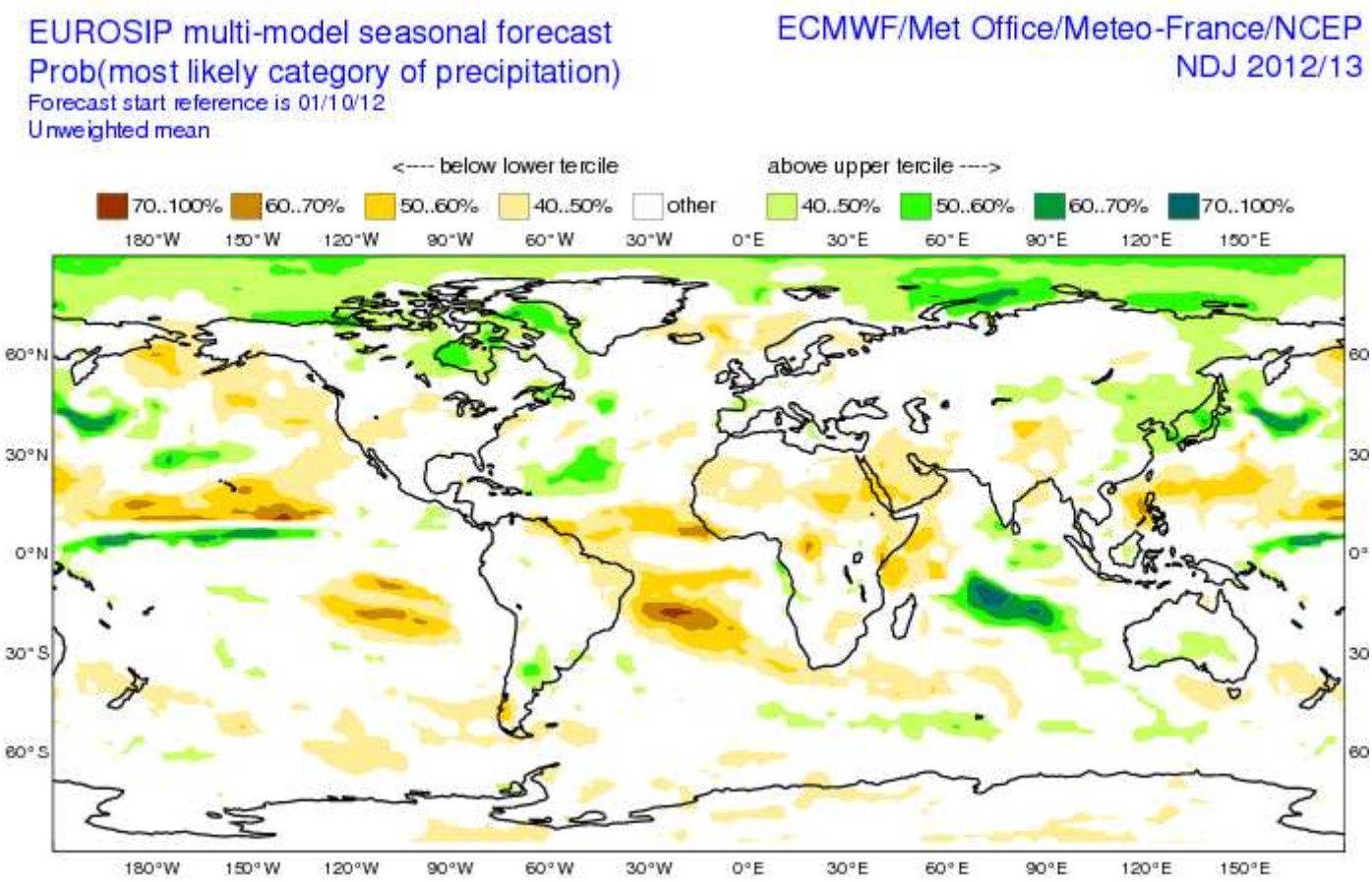


fig.33: Multi-Model Probabilistic forecasts for precipitation from EuroSip for NDJ, issued in October. (2 Categories, Below and Above normal – White zones correspond to No signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmv2/param_euro/seasonal_charts_2tm/

Little consistent signal even in the Tropics and little signal in the probabilities :
Below Normal scenario over the Great Horn of Africa, Northern coast of South America (including Nordeste), Coastal regions of West Africa,
Above normal scenario over the region of North-East Asia (especially close to Japan) and possibly South Australia.
For Europe (and more generally for the mid latitude of Northern Hemisphere) No signal prevails more or less everywhere.

II.4.f International Research Institute (IRI)

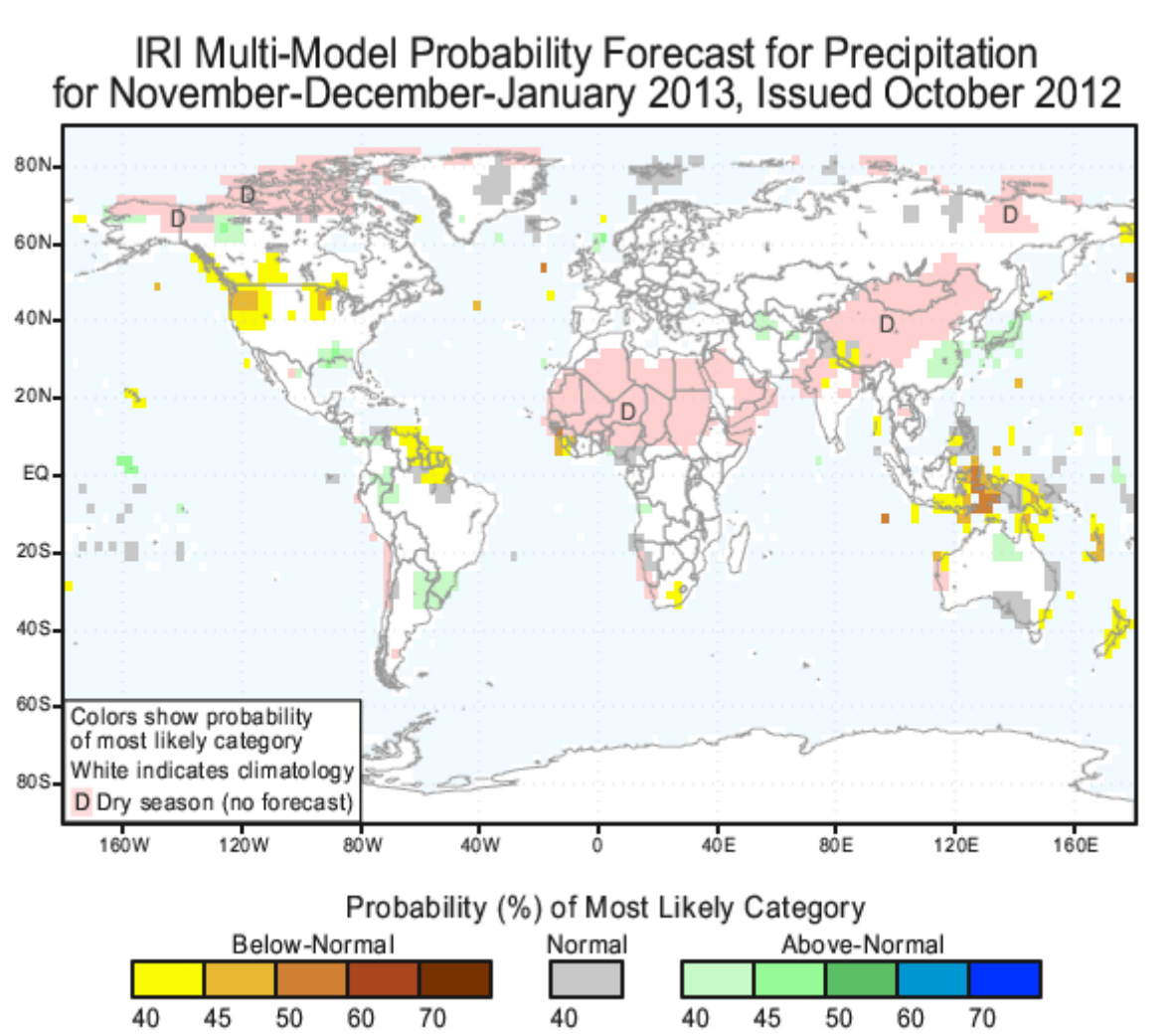


fig.34: Most likely category of Rainfall for NDJ, issued in October from the IRI multi-model ensemble. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://iri.columbia.edu/climate/forecast/net_asmt/

The IRI forecast shows No Signal more or less everywhere to the exception of the maritime continent (drier than normal), North-Eastern coast of South America (drier than normal) and North-West US (wetter than normal) and East Asia (especially close to Japan - wetter than normal).
Consequently, over Europe, there is a clear indication for No Privileged Scenario (Climatology forecast).
Over West Africa, to be highlight the consistency is over the most Western part of the continent with some enhanced probabilities for dry conditions.

II.5. REGIONAL TEMPERATURES

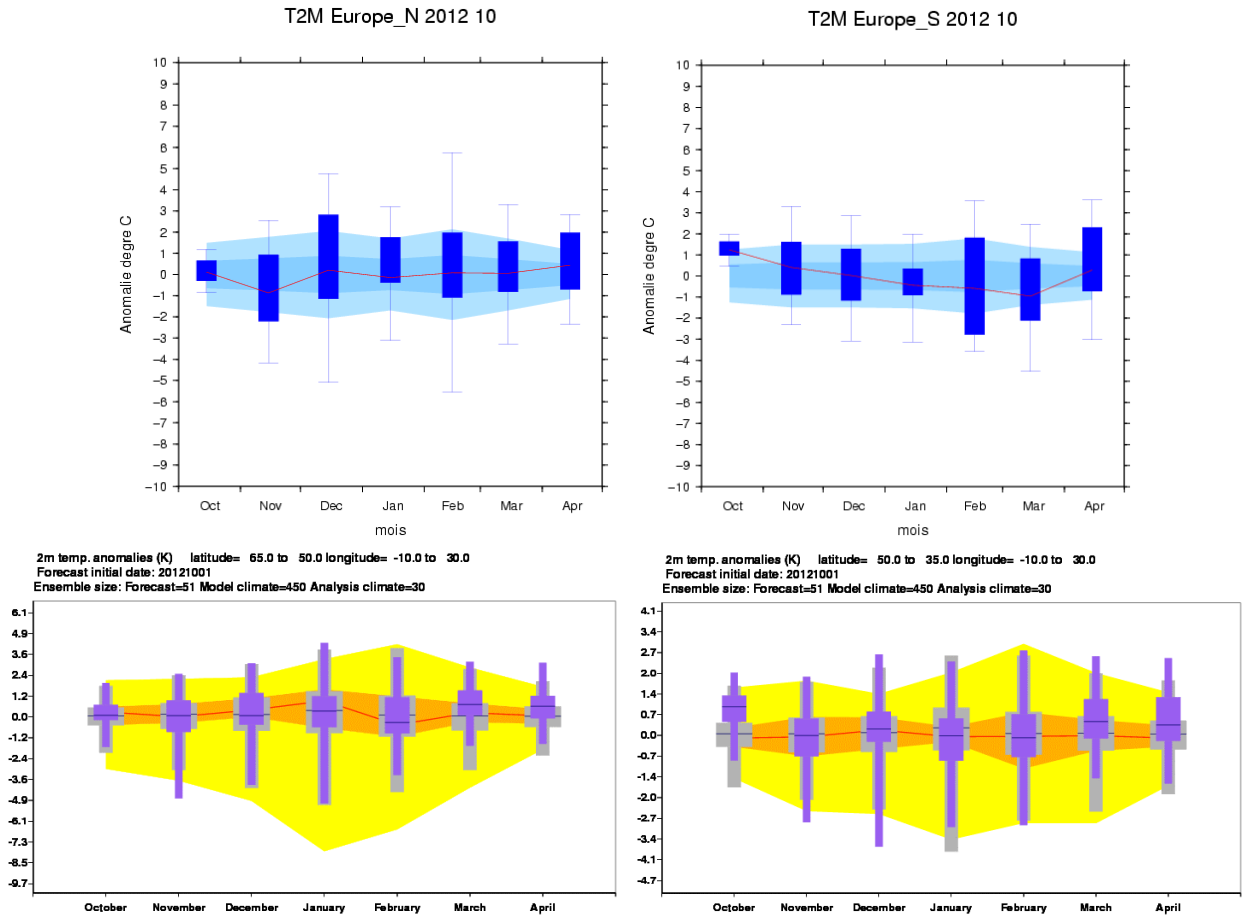


fig.35: Climagrams for T2m in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom) issued in October.

For Northern Europe : little consistency between the 2 models (in relationship with the Z500 anomaly location difference) and large spread (with respect of the climate reference). The differences can likely be related to the model uncertainties.
For Southern Europe : some consistency moving from above normal conditions in October to close to normal conditions then for NDJ. Again large spread in both models.
In MF, ROC skill is close or below climatology for N and D and the score increase in January despite the longer lead-time (around 0.6) for both Southern and Northern Europe.

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

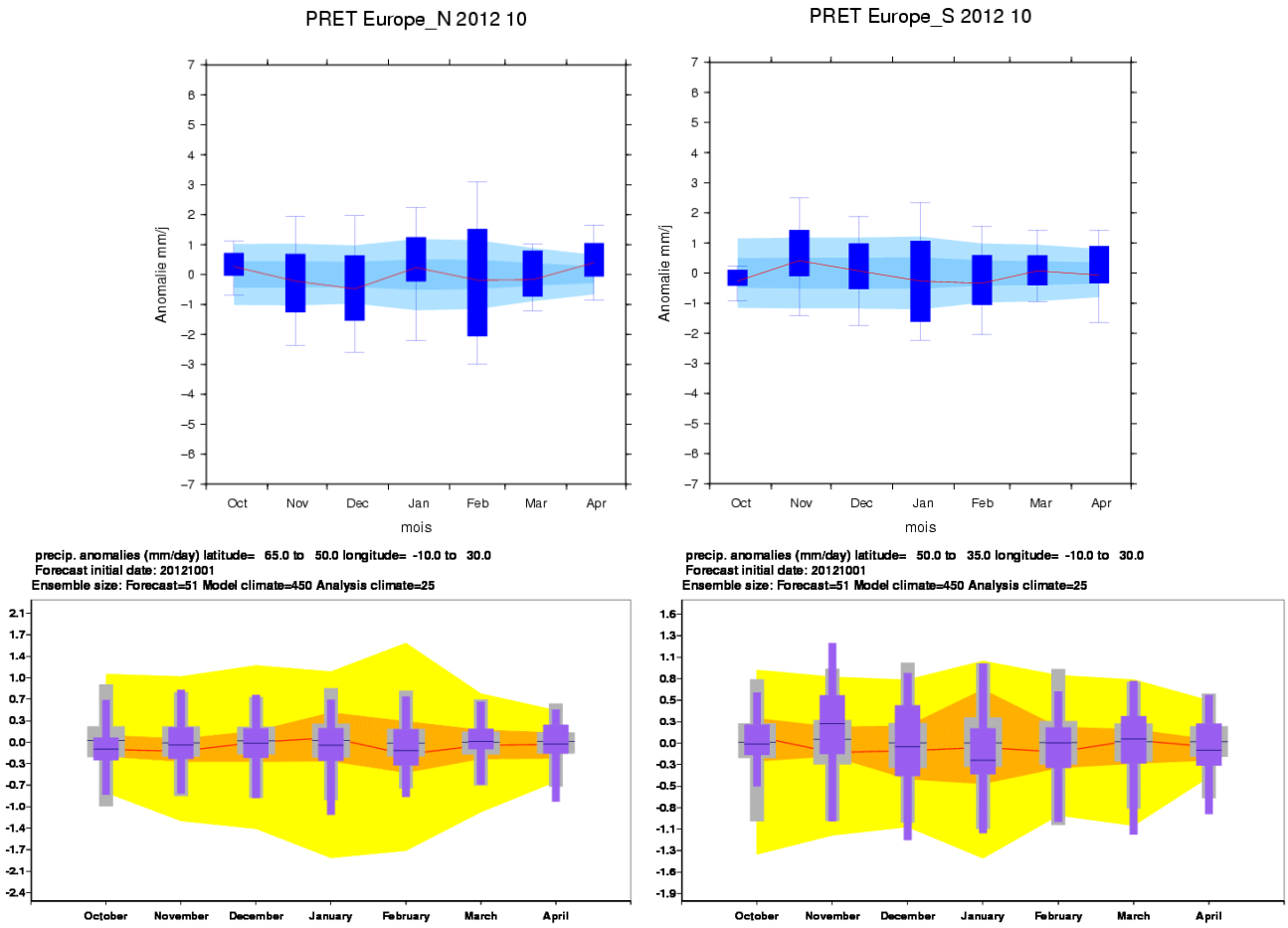


fig.36: Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom), issued in October.

For Northern Europe : no consistency in the evolution of the 2 models and larger spread than the climate reference. In MF, ROC are worst than climatology in N and D and, like for the temperature, become better than climatology for January.
For Southern Europe : some similarity in the time evolution of the 2 models. However, the spread is larger than the climate reference. In MF, ROC scores are close or worst than climatology in N and D and show some skill in January (close to 0.6).
Any way 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

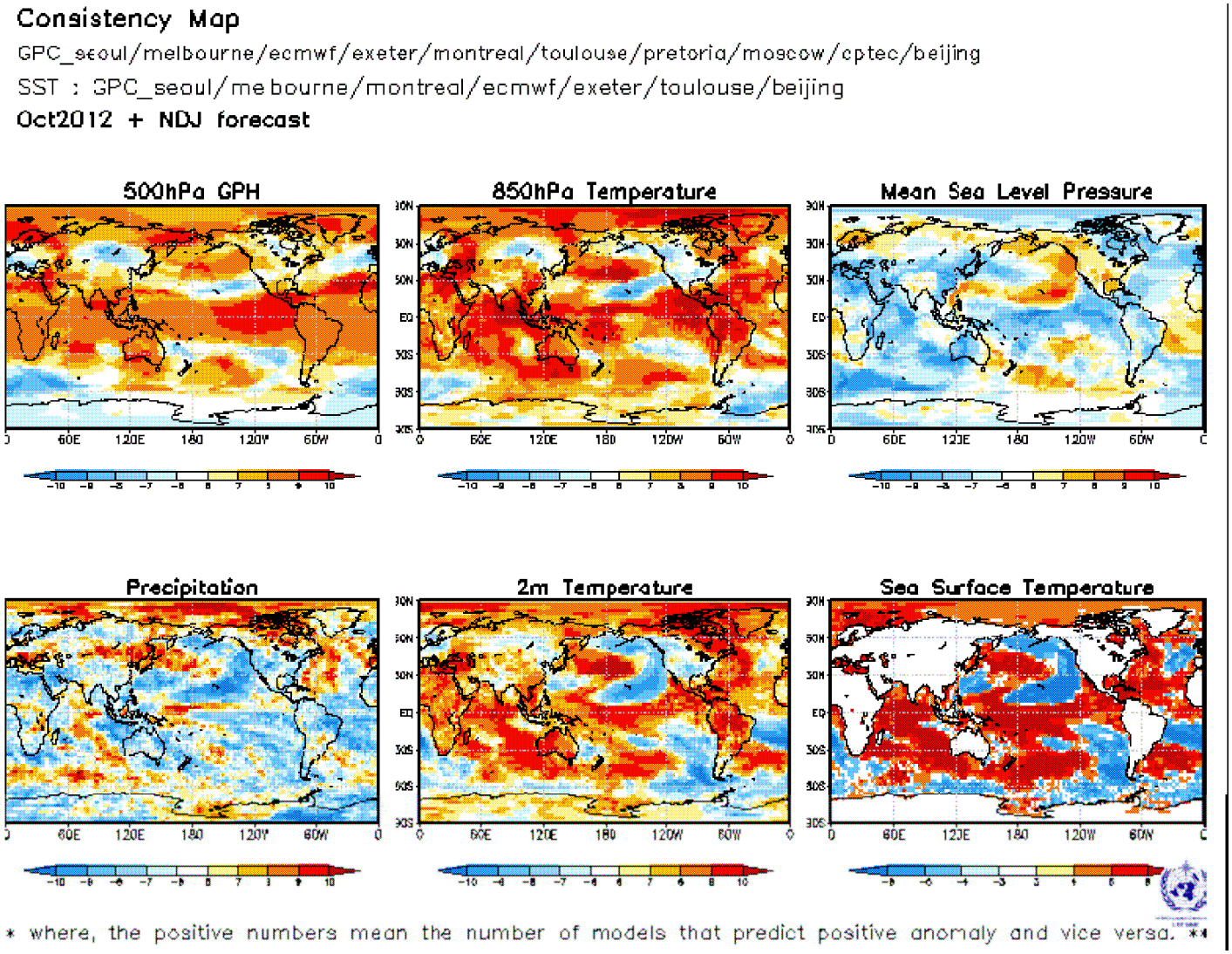


fig.37: ***GPCs Consistency maps from LC-MME*** *http://www.wmolc.org/*

For Z500 : some consistency over the North Atlantic high latitude and Northern Europe (Above normal conditions) with not too much similarity with ECMWF neither MF.
For T2m : some consistent signal over South-East Europe and North Africa (Above normal scenario). 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 but some trace of Below normal conditions for North Africa and Arabic Peninsula, Scandinavia, North-East Brazil and North-West of US. Some similarity with EuroSIP over North-East Africa and Arabic Peninsula, North-Eastern part of South America and North-East Asia.

II.7. "EXTREME" SCENARIOS

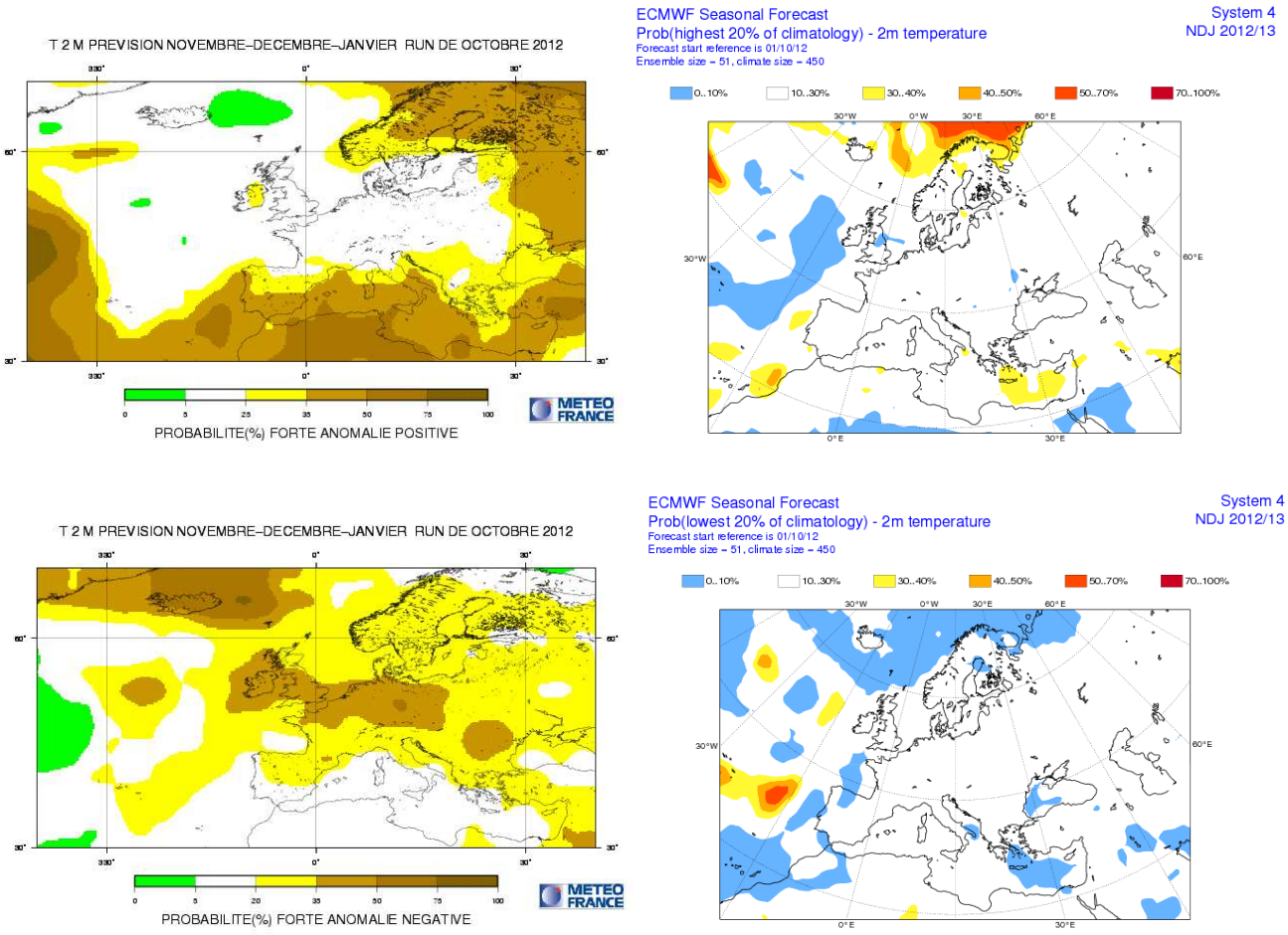


fig.38: Top : Probability of « extreme » above normal conditions for T2m for Meteo-France (left - highest ~15% of the distribution) and ECMWF (right - highest 20% of the distribution).
Bottom : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the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

No consistency between the 2 models for the Very Above Normal scenario and for very Below Normal scenario neither.
In Météo-France ROC score for the very Above scenario is above climatology over Norway and central Europe.
For the very Below scenario the scores are close or worst than climatology everywhere to the exception of Norway and adjacent regions to the Black Sea.
So in relationship with the very limited predictability and the different response of the models, it seems difficult to use these forecast.

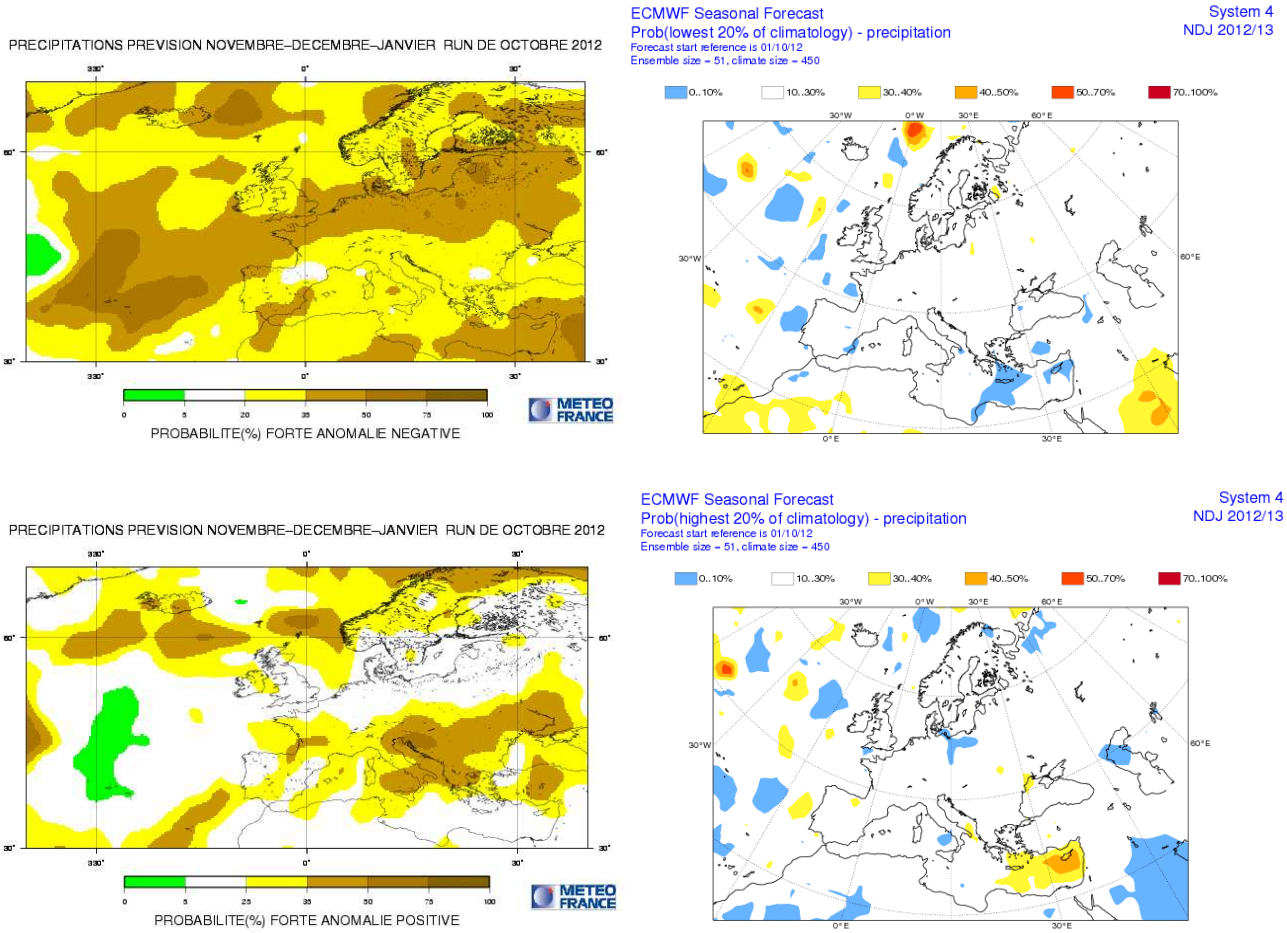


fig.39: Top : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the distribution) and ECMWF (right - lowest 20% of the distribution)
Bottom : Probability of « extreme » Above normal conditions for rainfall for Meteo-France (left - highest ~15% of 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. This is likely directly related to the differences between the Z500 anomaly location in both models ; differences mostly related to model uncertainty.
For the very Above scenario, not too much consistency.
ROC scores are close or worst than climatology for these scenarios (to the exception of limited numbers of grid points over France and Central Europe for the very Below Normal scenario and West France and UK for the very Above Normal scenario). When adding the consideration about the rainfall predictability, it's seems difficult to infer any useful information from these forecast.

II.8. DISCUSSION AND SUMMARY

Forecast over Europe

For this forecast the first and main comment is about the very limited predictability in the climate system for the mid-latitudes. This is illustrated by the large differences in the atmospheric response of MF and ECMWF.
For temperature and rainfall, “No Privileged Scenario” covers most of the European continent.
However, some downscaled information could details these scenarios for specific countries or sub-regions.

Tropical Cyclone activity

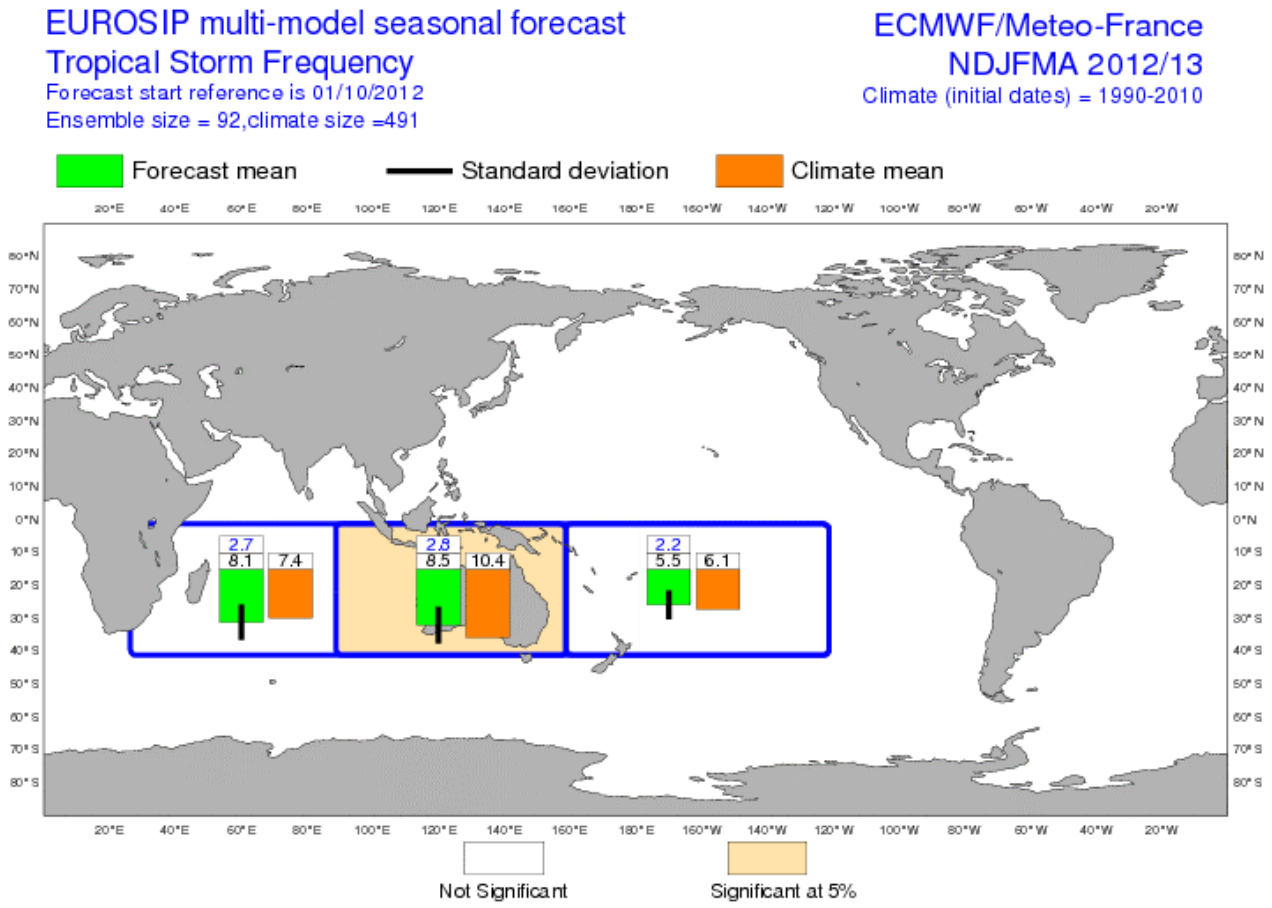


fig.40: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF) for the August 2012 to January 2013 period, issued in August.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtrop/trop_euro/eurosip_tropical_storm_frequency/

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 November-December-January 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	no privileged	no privileged	no privileged	no privileged	no privileged
MF	no privileged	no privileged	no privileged	above normal	no privileged
Met Office					
JMA	no signal	no privileged	no privileged	no privileged	no privileged
synthesis	no privileged	no privileged	no privileged	no privileged	no privileged
IRI	above normal	above normal	no privileged	above normal	no privileged
Eurosip	no privileged	no privileged	no privileged	no privileged	no privileged
privileged scenario by RCC-LRF node	***no privileged scenario***	***no privileged scenario***	***no privileged scenario***	***no privileged scenario***	***no privileged scenario***

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 November-December-January 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).

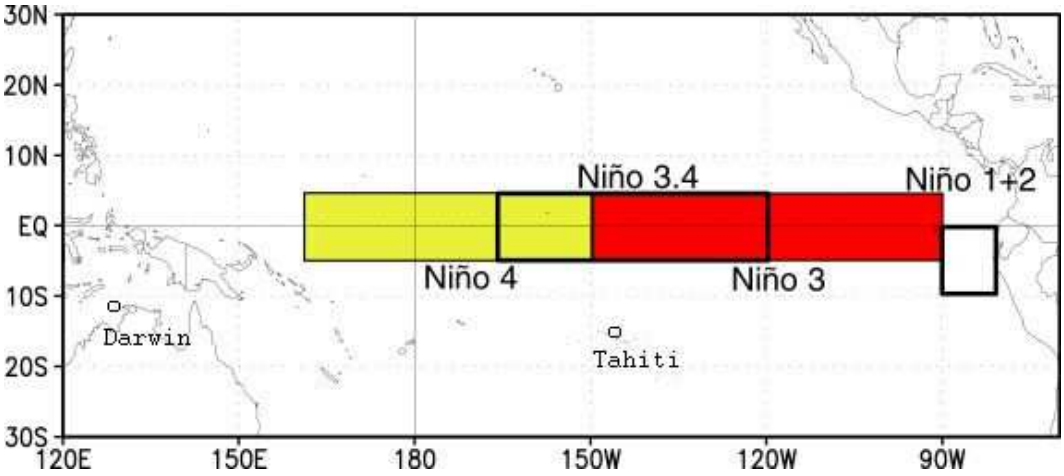
In order to better interpretate the results, it is recommended to look to verification maps and graphs which give some insight into the expected level of skill for a specific parameter, region and period. A set of scores is presented on the web-site of the Lead-Centre for Verification (see http://www.bom.gov.au/wmo/lrfvs/)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