METEO FRANCE
Toujours un temps d'avance

GLOBAL CLIMATE BULLETIN
n°152 - FEBRUARY 2012

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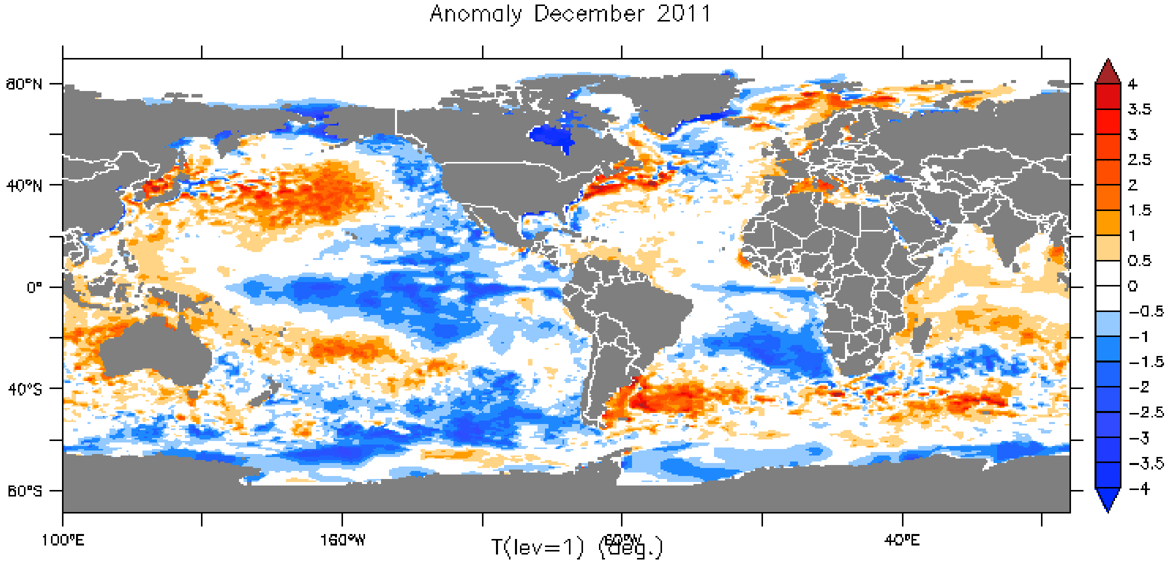
I. DESCRIPTION OF THE CLIMATE SYSTEM (DECEMBER 2011)

I.1. OCEANIC ANALYSIS

I.1.a Global Analysis

In the Tropical Pacific the situation shows only little evolutions in the tropical band (fig.1). East to the date line, the temperature is Below Normal and La Niña signature is clearly visible in the equatorial waveguide. In the most western part there is some warmer than normal temperature. Still in the Pacific at the highest latitude of the Northern Hemisphere, the positive anomaly seems to decrease and the negative anomaly on the North Eastern part as well.



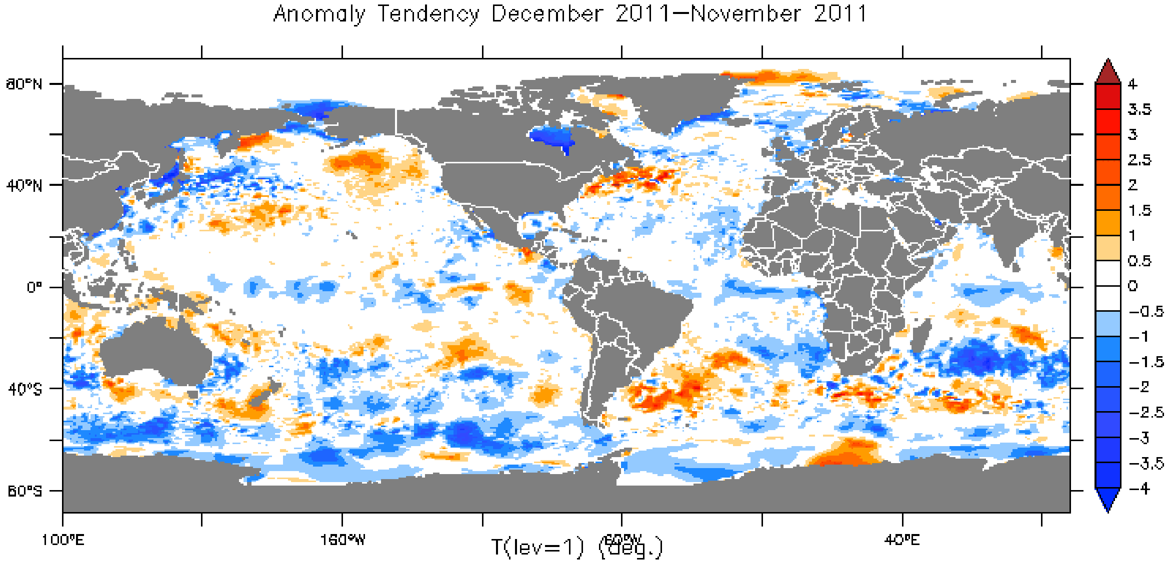


fig.1: top : SSTs Anomalies in December 2011 (°C) (reference Levitus 1950-2008)
bottom : time tendency (December-November) http://bcg.mercator-ocean.fr/

The tropical Atlantic ocean is now close to normal excepted along the North Eastern coast of South America. A negative anomaly developed in the equatorial waveguide. Even if La Niña could be partly related to this cooling, the main reason for is still unclear. In the extra tropics of the Southern Hemisphere, on can notice Below normal conditions. The Northern Atlantic shows little evolution in the mid-latitudes excepted along the Eastern coast of North America where a warming is observed likely related to the atmosphere (see T2m anomaly) and potentially to the Labrador current..
On the Indian Ocean, its Tropical part remains mostly warmer than normal. In the sub topics of the Southern hemisphere, there is a strong cooling which leads to evolution in the SST field creating a dipole like structure between subtropical and tropical regions.
In subsurface (fig.2), in the equatorial Pacific waveguide, the heat content anomalies show some similarity with the SSTs and thermocline depth anomalies (see fig. 5) showing negative anomalies, strengthened in the Central and Eastern part. In the Western part there are strengthened positive anomalies. In the extra tropics, West to 180°W, there is a strong positive anomaly which persist sine a quite long time. This can lead to delayed (5-6 month later) warming in the Philippines sea.
In Tropical Atlantic, one can remarks some opposite patterns between the North (positive anomaly) and South (negative anomaly) part of the basins despite the patterns are quite fragmented (likely related to the resolution effect). However, the tendency is mostly negative over the whole Tropical Atlantic.
In the equatorial wave guide of the Indian Ocean, the main tendency is a cooling (already pointed out for the SSTs) in the equatorial part. The heat content is quite consistent with the SST signal.

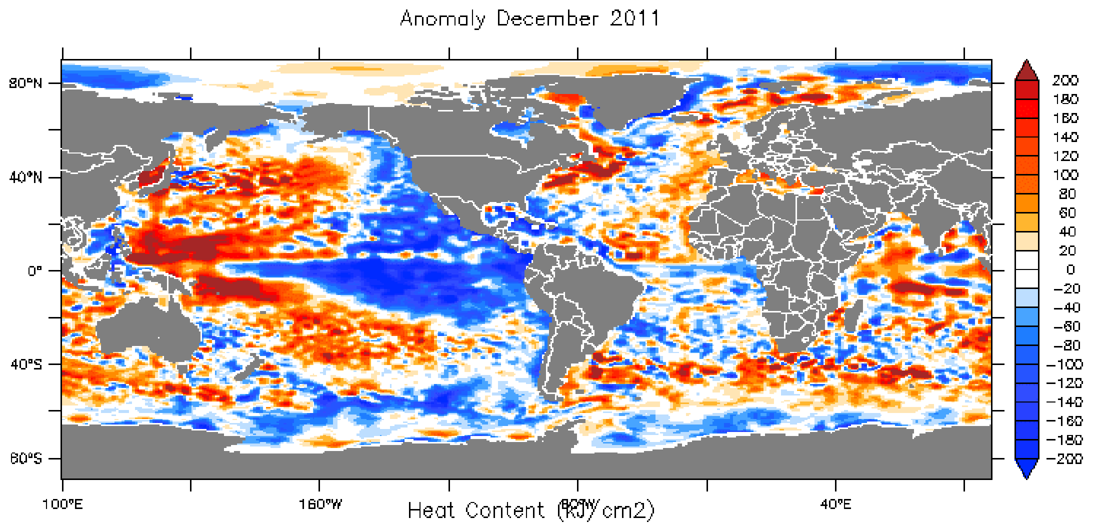


fig.2: map of Heat Content Anomalies (first 300m) in December 2011 (kJ/cm²). (reference Levitus 1950-2008) http://bcg.mercator-ocean.fr/

I.1.b Pacific Basin

In December, the negative anomaly in the equatorial Pacific has strengthened (fig.3) close to the date line while –0°5 isoline expanded over most of the central and eastern Pacific. In the Western part of the basin the zonal Trade Wind anomaly has strengthened consistently with an above normal zonal circulation (Walker cell strengthened).

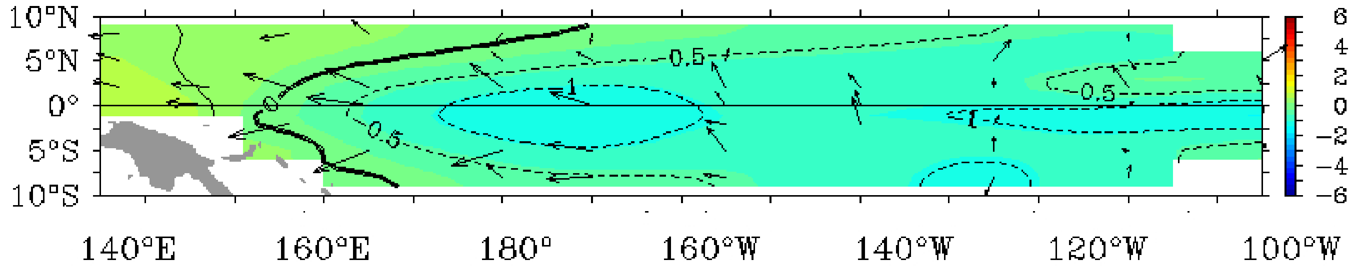


fig.3: SST Anomalies and Wind anomalies in December 2011 over the Equatorial Pacific from TAO/TRITON. http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/monthly-summary.html

In the Niño boxes (4, 3.4, 3 et 1+2 ; see definition in Annex) the SST anomalies are negative everywhere and have slightly increased. The monthly averages in December are respectively -1,1°C, -1,0°C, -1,0°C and -1,1°C from West to East (weak to moderate La Niña).

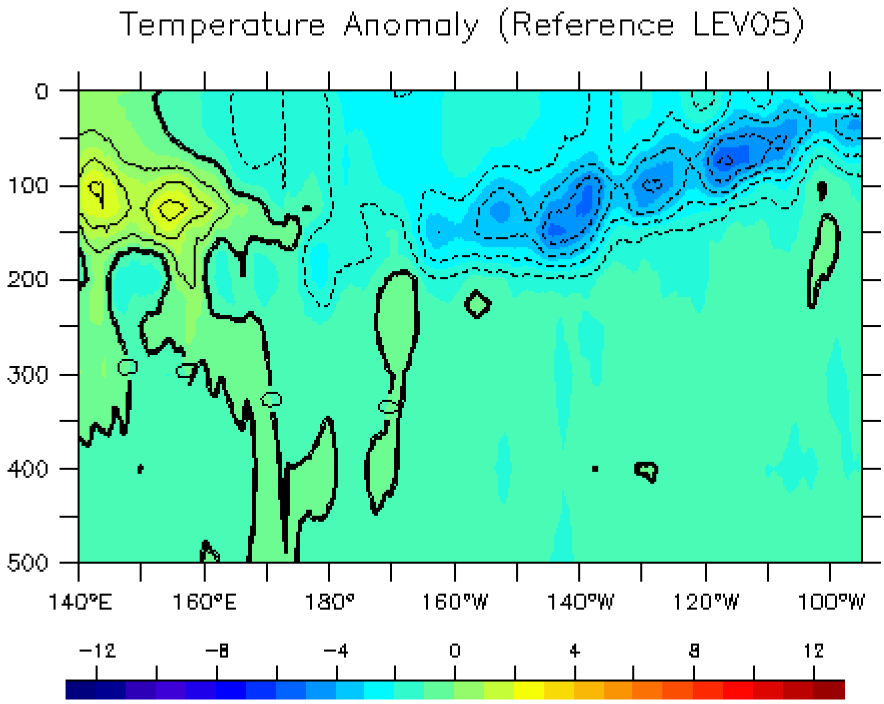


fig.4: Oceanic temperature anomaly in the first 500 metres in the Equatorial Pacific, in December 2011 (http://bcg.mercator-ocean.fr/)

In the equatorial waveguide (fig. 4) under the surface the negative cold anomalies propagated eastward. It reached the surface close to South American coast. On the West side the warm reservoir around 150 m continue to strengthen and start an eastward propagation.

Over the Equatorial Pacific, the La Niña like dipole structure is conspicuous (fig. 5) in the thermocline structure (deeper than normal on western part and thinner than normal on Eastern part) ; the negative anomaly extended westward. During December there is not too much traces of Kelvin wave propagation in the equatorial waveguide.

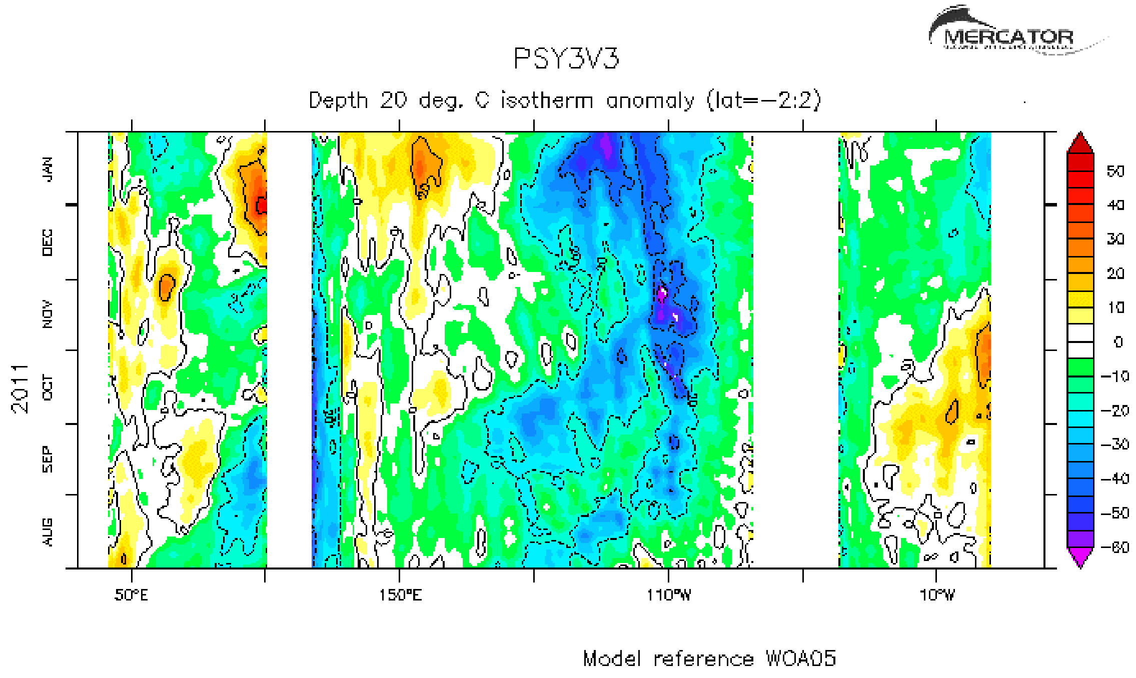


fig.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 6 month period. http://www.ecmwf.int/

I.1.c Atlantic Basin

In the equatorial waveguide (fig. 5) the Atlantic thermocline depth is thinner than normal everywhere and in the Eastern part this negative anomaly seems to strengthen at the end of the period. This evolution is very consistent with the surface signal (see SST comments).
The tropical Atlantic ocean is now close to normal excepted along the North Eastern coast of South America. In the extra tropics of the Southern Hemisphere, on can notice below normal conditions. The Northern Atlantic shows little evolution in the mid-latitudes excepted along the Eastern coast of North America where a warming is observed.

I.1.d Indian Basin

On the Indian Ocean, even if it remains mostly warmer than normal in the Tropics, on can point out the cooling in the equatorial part. In the sub topics of the Southern hemisphere, there is a strong cooling which leads to evolution in the SST field ; the warmer than normal band between Madagascar and Australia having a more tropical location (with respect of the previous month).

I.2. ATMOSPHERE

I.2.a Atmosphere : General Circulation

Looking to the Velocity Potential Anomaly field in the high troposphere (fig. 6), the patterns of General Circulation (especially Hadley-Walker circulations) are not yet fully similar to La Niña like patterns. Over the Western Tropical Pacific there is a strong negative anomaly (Divergent circulation anomaly ; upward anomaly motion). This Divergent Circulation anomaly widely extends from Australia to Korea and over the maritime continent. Associated to this anomaly, the SOI is strongly positive (+ 2.5). However, there is still little anomalies over the Equatorial and Southern Pacific (and even some traces of Divergent Circulation anomalies East to the date line indicating some fragmentation in the Niña influence). Over the South Atlantic a convergent Circulation anomaly (positive anomaly – downward motion) developed along the Greenwich Meridian up to West Africa. The pattern over North Atlantic is quite complex and fragmented.

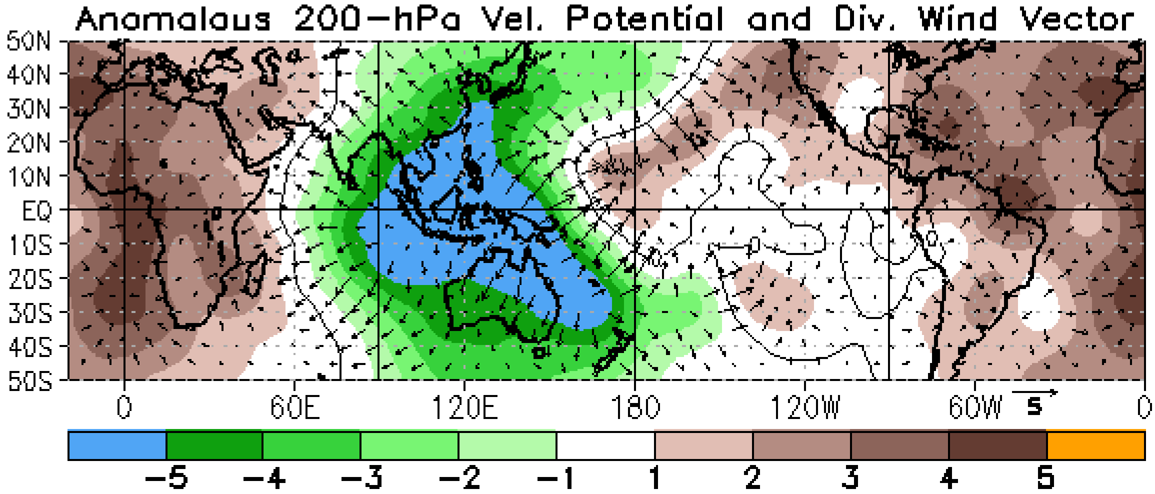


fig.6: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly for December 2011. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

Looking to the Stream Function anomalies in the high troposphere (fig. 7), with respect of the previous month one can remark that the anomalies have strengthened on the Pacific Basin East to the date line. However, the identification of the teleconnection patterns is not very easy over Pacific and the Atlantic as well (especially the positive anomaly over the mid latitudes of the North Atlantic sector).

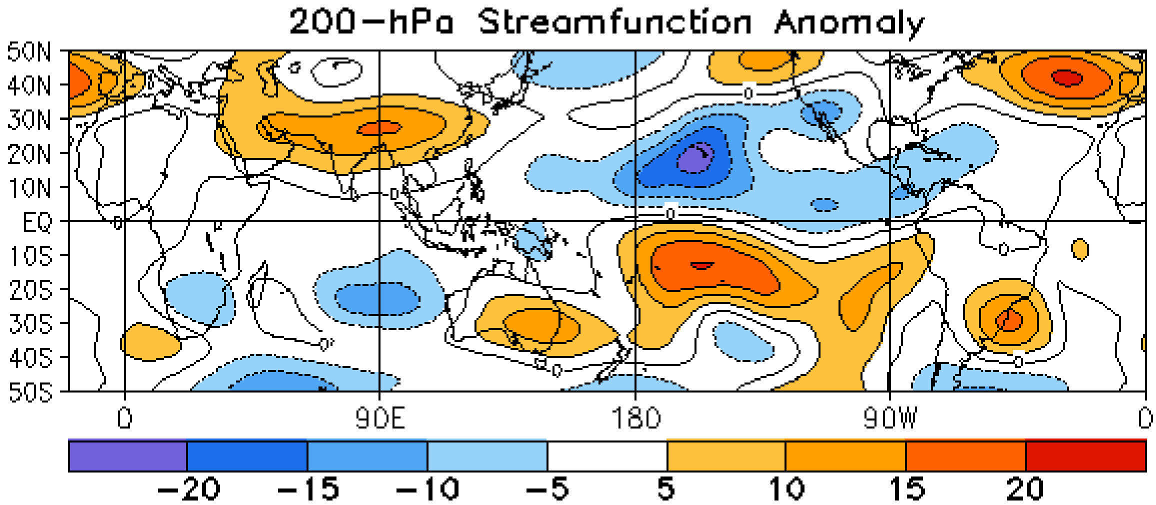


fig.7: Stream Function Anomalies at 200 hPa in December 2011.
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

Over the Northern Hemisphere the Geopotential height at 500 hPa (fig. 6) shows a positive anomalies over the mid latitudes of the North Atlantic (up to the spain). Associated to the negative anomaly from Greenland to Scandinavia, one can observe a strong positive NAO index (+2.2 – see next table). This is related to an increased zonal circulation over the mid /high latitudes of the North Atlantic sector and consequently to more winter storm situations over North West Europe.
Over the Pacific regions consistently with the Stream Function, there is no major anomalies which lead to a non active PNA mode.

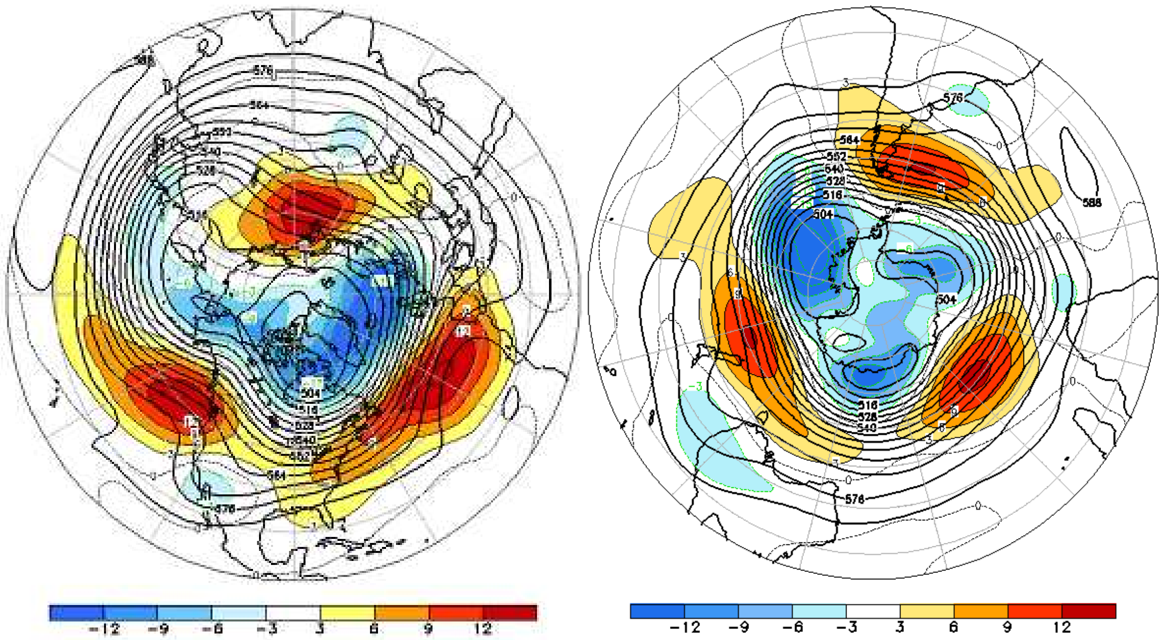


fig.8: Anomalies of Geopotential height at 500hPa in December 2011 (left North Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige9.shtml, and right South Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige15.shtml)

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
DEC 11	2.2	0.1	-0.4	---	0.1	0.7	-0.5	0.5	0.7
NOV 11	1.3	-0.1	0.4	-1.3	-0.8	---	2.1	0.6	-0.4
OCT 11	0.9	-0.3	1.1	-0.8	0.9	---	0.1	-0.3	0.3
SEP 11	0.7	1.8	0.5	-0.5	-0.4	---	-0.3	-0.6	-1.1
AUG 11	-1.9	1.0	-0.5	-0.7	1.4	---	1.0	0.2	-0.3
JUL 11	-1.5	0.4	-0.3	-2.2	-0.8	---	-0.8	2.5	-0.3

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

I.2.b Precipitation

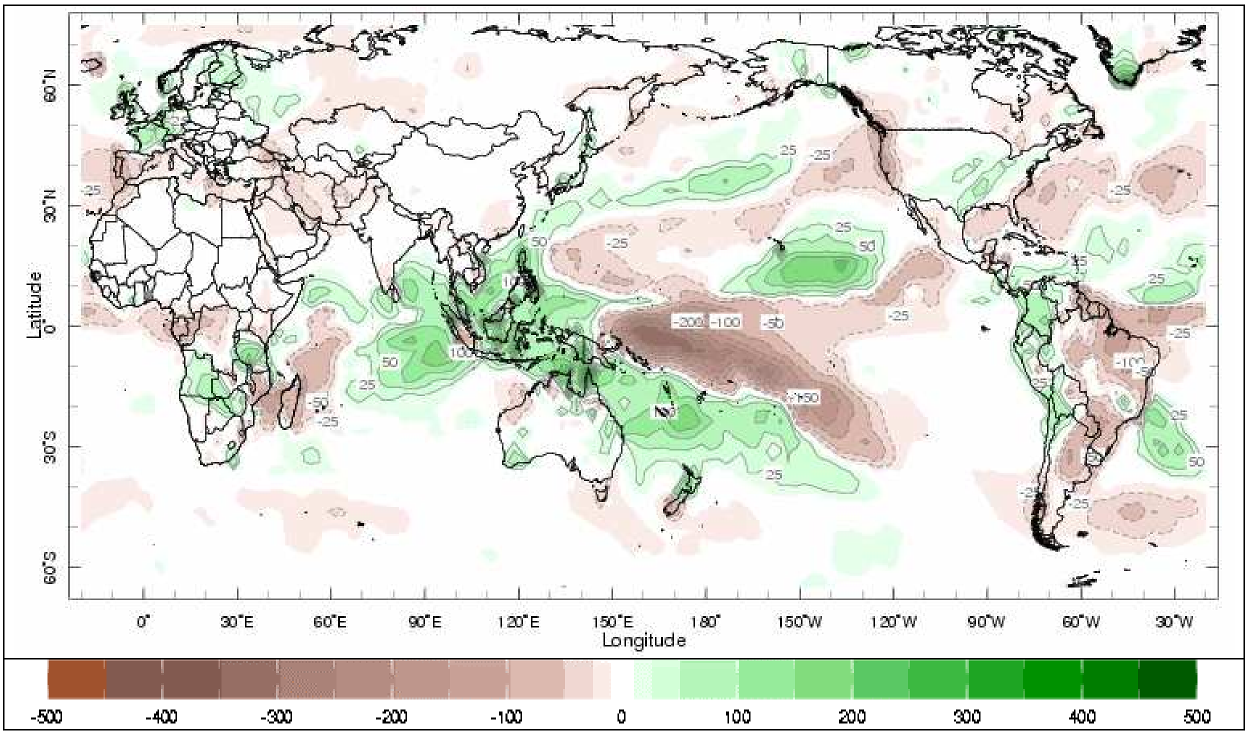


fig.9: Rainfall Anomalies (mm) in December 2011 (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.
http://iridl.ldeo.columbia.edu/maprom/.Global/.Precipitation/

Accordingly to the strong Divergent Circulation over the West Pacific, the rainfall situation (fig. 9) is Above Normal over the entire maritime continent. The Western coast of South America face mostly above normal situation while it's the opposite on the Eastern side. Negative anomalies are also visible across the Mediterranean basin and especially over the Iberic peninsula. Conversely (and consistently with the general circulation), Positive anomalies are visible over France and North West Europe.

I.2.cTemperature

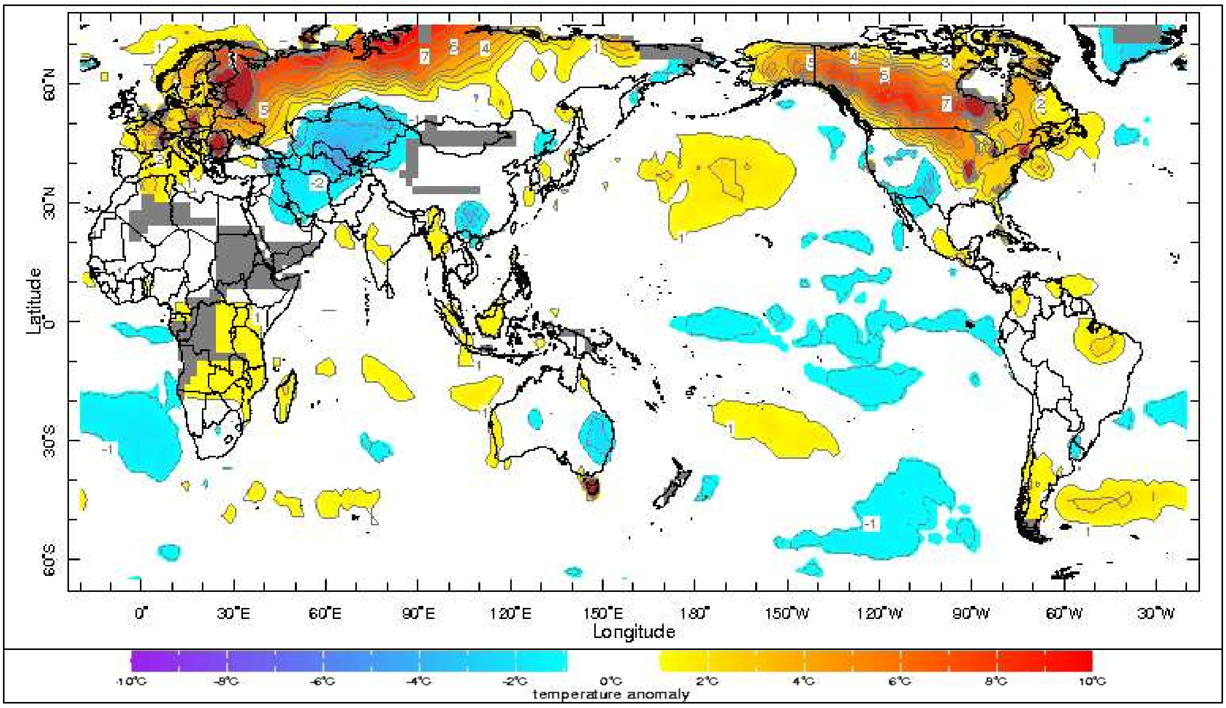


fig.10: Temperature Anomalies (°C) in November 2011 (departure to the 1979-2000 normal) **http://iridl.ldeo.columbia.edu/maproom/.Global/.Atm_Temp/Anomaly.html**

In December, temperatures (fig. 10) have been far above normal over most of the high latitudes of the Northern hemisphere. Most of European countries faced also Above normal conditions excepted for some regions surrounding the Eastern part of the Mediterranean sea. Regions close to Ukraine are facing quite strong Below Normal conditions.

I.2.d Sea Ice

In Arctic in October, the sea-ice extension (fig.9) is still far below normal, excepted over the Greenland sea and on the Pacific side. It is very close to the observed 2007 sea-ice extension – record year for the minimum reached at the end of the boreal summer (fig. 9bis – left).
In Antarctic, the sea-ice extension (fig. 9bis – right) is very above normal with some regional strong positive anomalies.

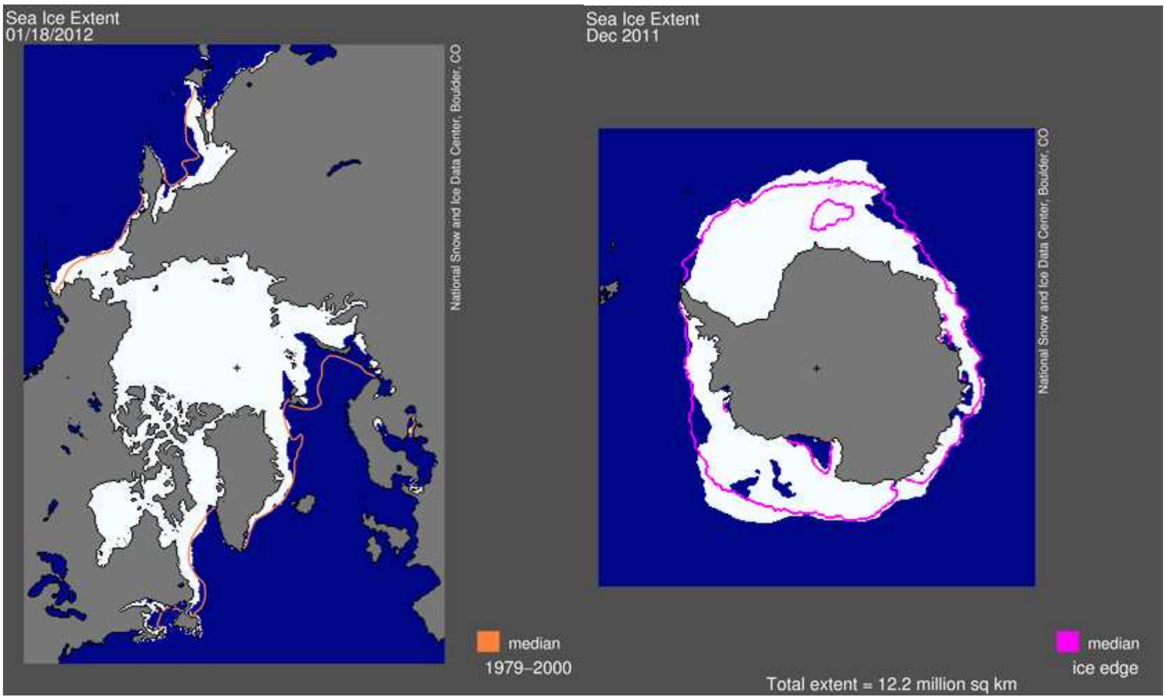


fig.11: Sea-Ice extension in Arctic (left), and in Antarctic (right) in December 2011. The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

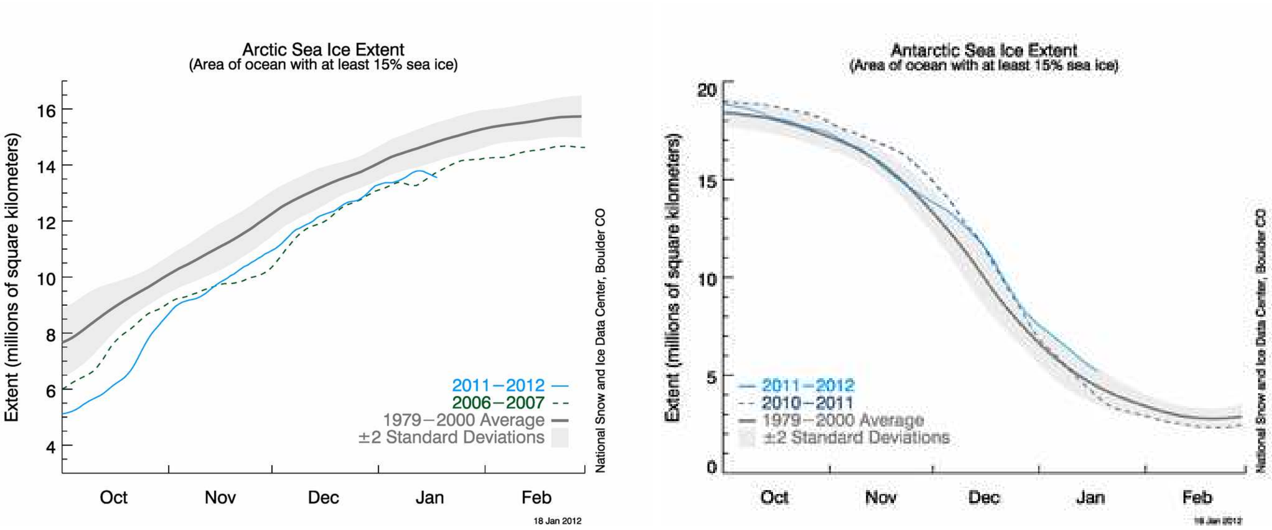


fig. 9bis : Sea-Ice extension evolution from NSIDC
http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png

II. SEASONAL FORECASTS FOR FEBRUARY-MARCH-APRIL FROM DYNAMICAL MODELS

II.1. OCEANIC FORECASTS

II.1.a Sea Surface Température (SST)

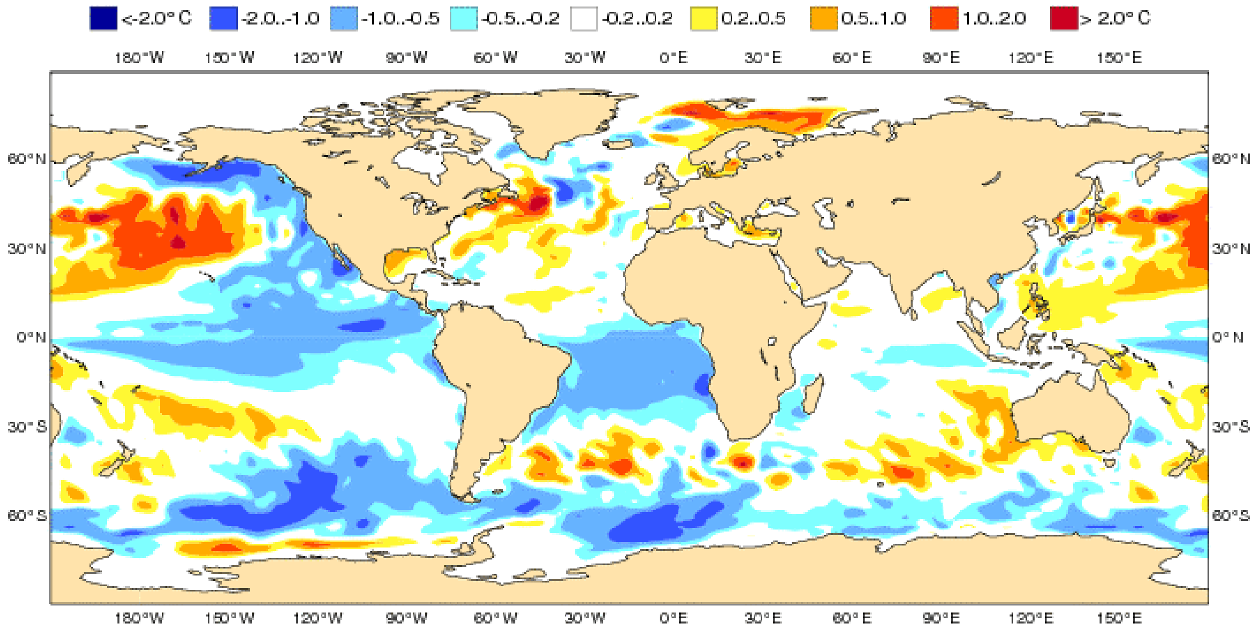


fig.12: SST anomaly forecast (in °C) from ECMWF for February-March-April, issued in January.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

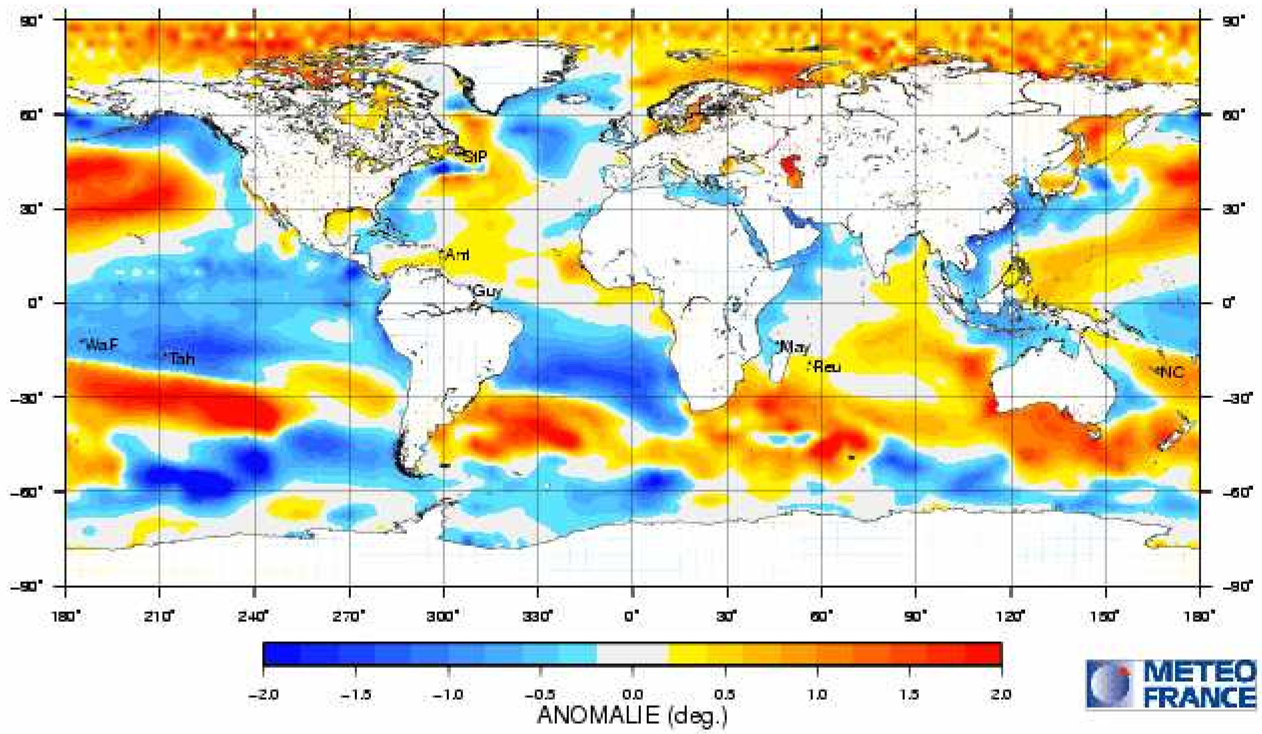


fig.13: SST Anomaly forecast (recalibrated with respect of observation) from Météo-France for February-March-April, issued in January. http://elaboration.seasonal.meteo.fr/

The 2 models are very consistent over the Pacific. Some differences appear on the Indian Ocean close to the Eastern coast of Africa. Last over the Atlantic the scenarios proposed by the two models are quite similar at the exception of the Guinean Gulf where Meteo-France is likely penalized by its warm bias in this region.
Because of the consistency between the individual models, in the Euro-Sip forecast the patterns are quite similar to the one already discussed just above. The persistence of La Niña is clearly visible and the cold condition over the South Atlantic as well. The opposite sign between North (warm) and South (cold) Tropical Atlantic is also noticeable.
Last, in the Indian Ocean, one can see the warmer than normal conditions over the Southern part of the basin ; especially in regions close to Australia.

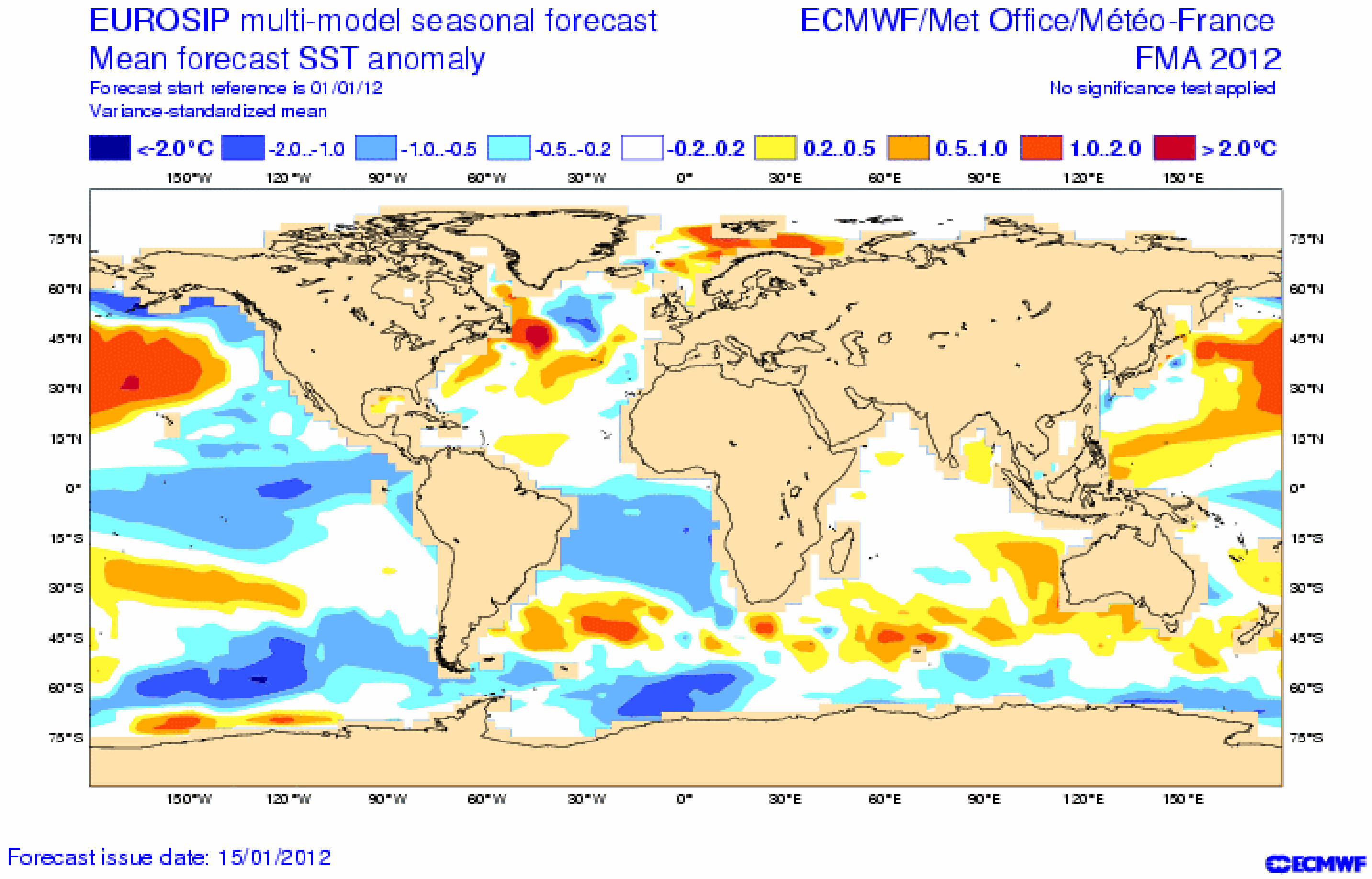


fig.14: SST Forecasted anomaly (in °C) from Euro-SIP valid February-March-April, issued in January.

II.1.b ENSO Forecast :

Forecasted Phase : weak La Niña ending at Spring

IRI provide a synthesis of several model forecast for the Niño 3.4 box (see definition in Annex) including models from Euro-Sip and statistical models. The figure 15 shows the ensemble mean of these models (circle for statistical models and squares for dynamical coupled models). The yellow thick line indicate the average of all dynamical models.

For February-March-April on average, both statistical and dynamical models forecast conditions below La Niña threshold. The event seems to likely end during the spring period.

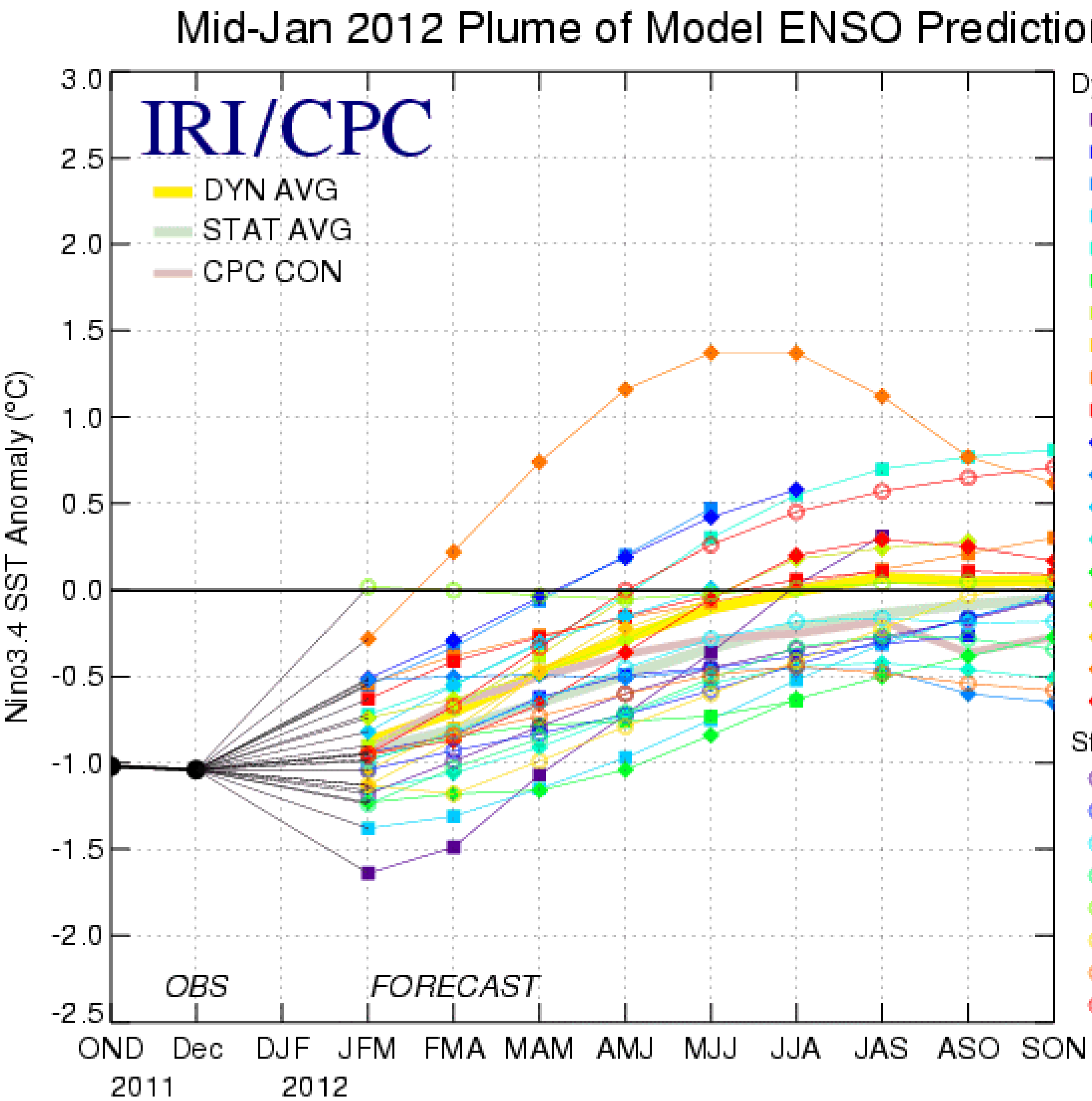


fig.15: Synthesis of Niño 3.4 forecasts (120° to 165°W) issued in January by IRI :
http://iri.columbia.edu/climate/ENSO/currentinfo/SST_table.html

The following table (from IRI) give the SST values currently used 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. This clearly reflect the "weak to moderate La Niña" condition which prevails for FMA.

SEASON	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON
Value « La Niña » Value « El Niño »	*-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*	*-0,55* *0,50*	*-0,75* *0,70*
Average, statistical models	-0.9	-0.8	-0.7	-0.5	-0.3	-0.2	-0.1	-0.1	-0.1
Average, dynamical models	-0.9	-0.7	-0.5	-0.3	-0.1	-0	0.1	0	
Average, all models	-0.9	-0.7	-0.5	-0.3	-0.2	-0.1	-0	-0	0

The figure 16 shows plumes from Météo-France and ECMWF for the 3 Niño boxes (see definition in Annex). Both models forecast colder than normal conditions below the Niña threshold and they forecast a quite rapid return to normal conditions during the Spring period. The spread of the forecasts is not to much in both Météo-France and may be more dispersed in ECMWF.

NIÑO 4 NIÑO 3.4 NIÑO 3

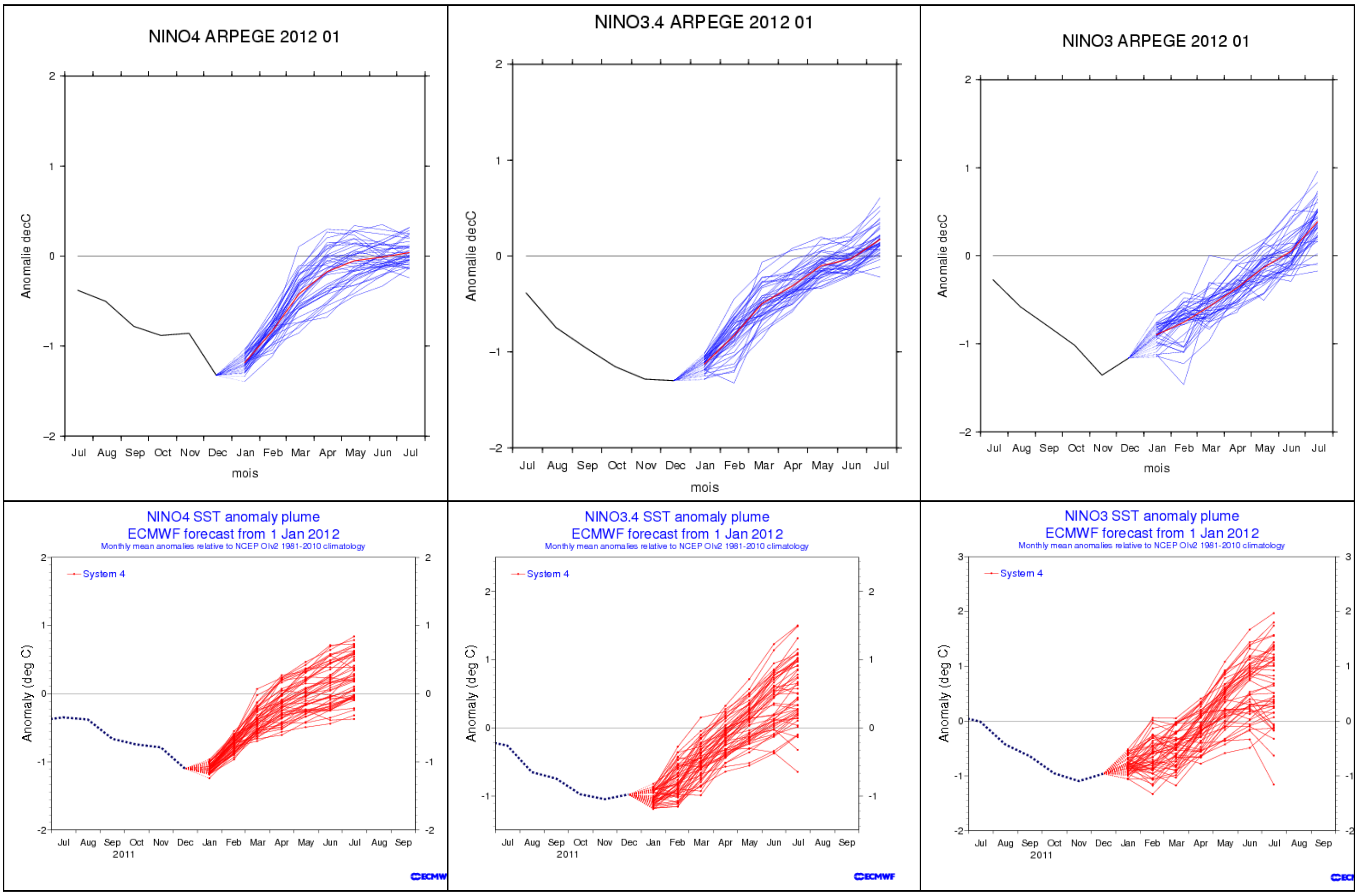


fig.16: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (bottom) issued in January, monthly mean for individual membres. (http://www.ecmwf.int/ **)**

II.1.c Tropical Atlantic forecasts :

Forecasted Phase: Warmer/Colder to normal conditions in the North/South Tropical Atlantic

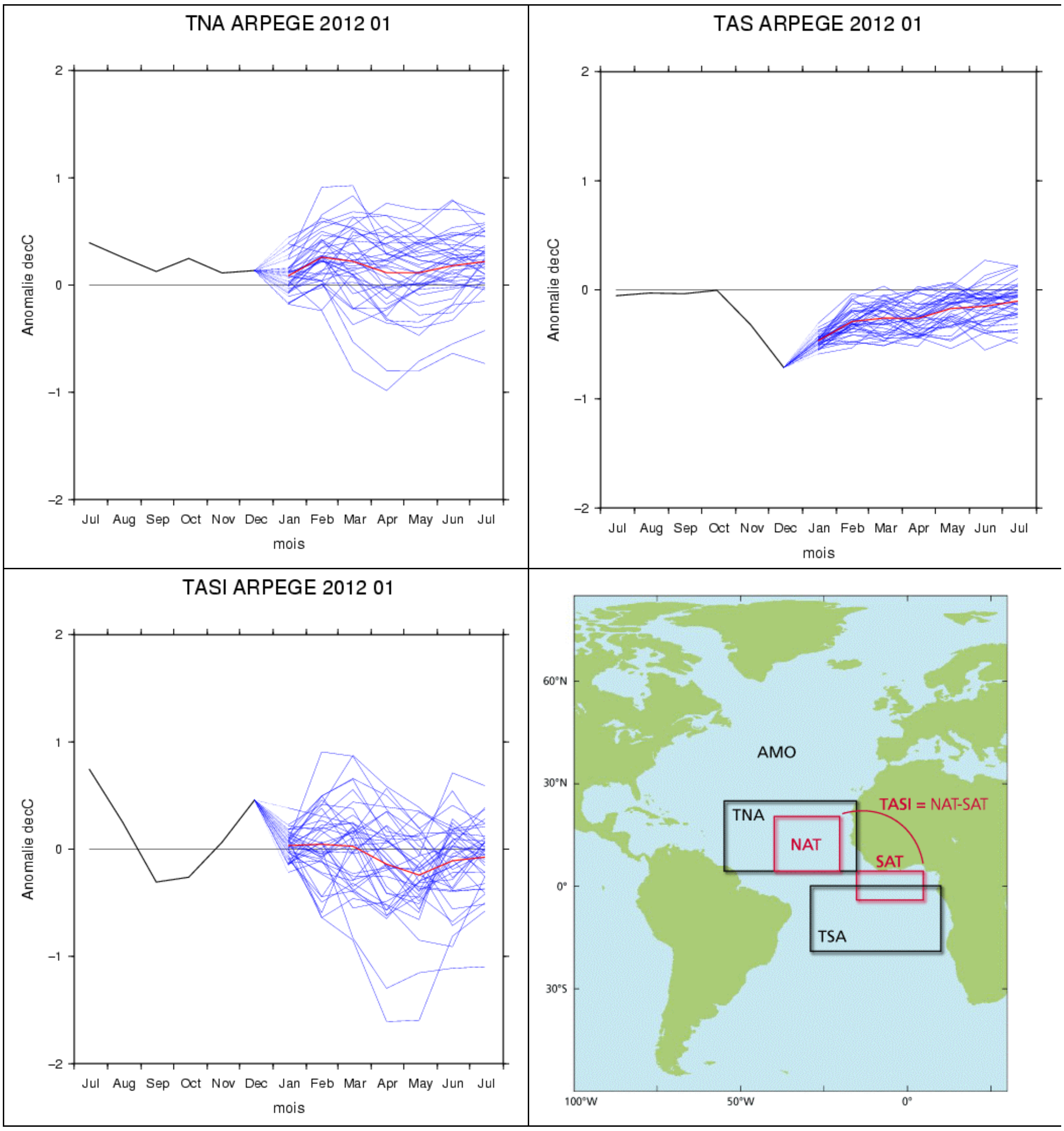


fig.17: SSTs anomaly forecasts in the Tropical Atlantic boxes from Météo-France, issued in January, plumes correspond to 41 membres and monthly means.

The Plumes confirm that on average the forecast corresponds to warmer (respectively colder) to normal conditions in the North (respectively South) Tropical Atlantic. However, one can notice the quite great dispersion of the ensemble for the TNA box. A close to Normal condition of TASI is forecasted all over the period, corresponding to a warmer temperature in the Guinean Gulf with respect of the temperature in the Southern Atlantic. However, the TASI index is potentially biased because of the likely positive bias of Météo-France forecast in the Guinean Gulf and the very large spread of the ensemble.

II.1.d Indian Ocean forecasts :

Forecasted Phase: Close to Neutral conditions

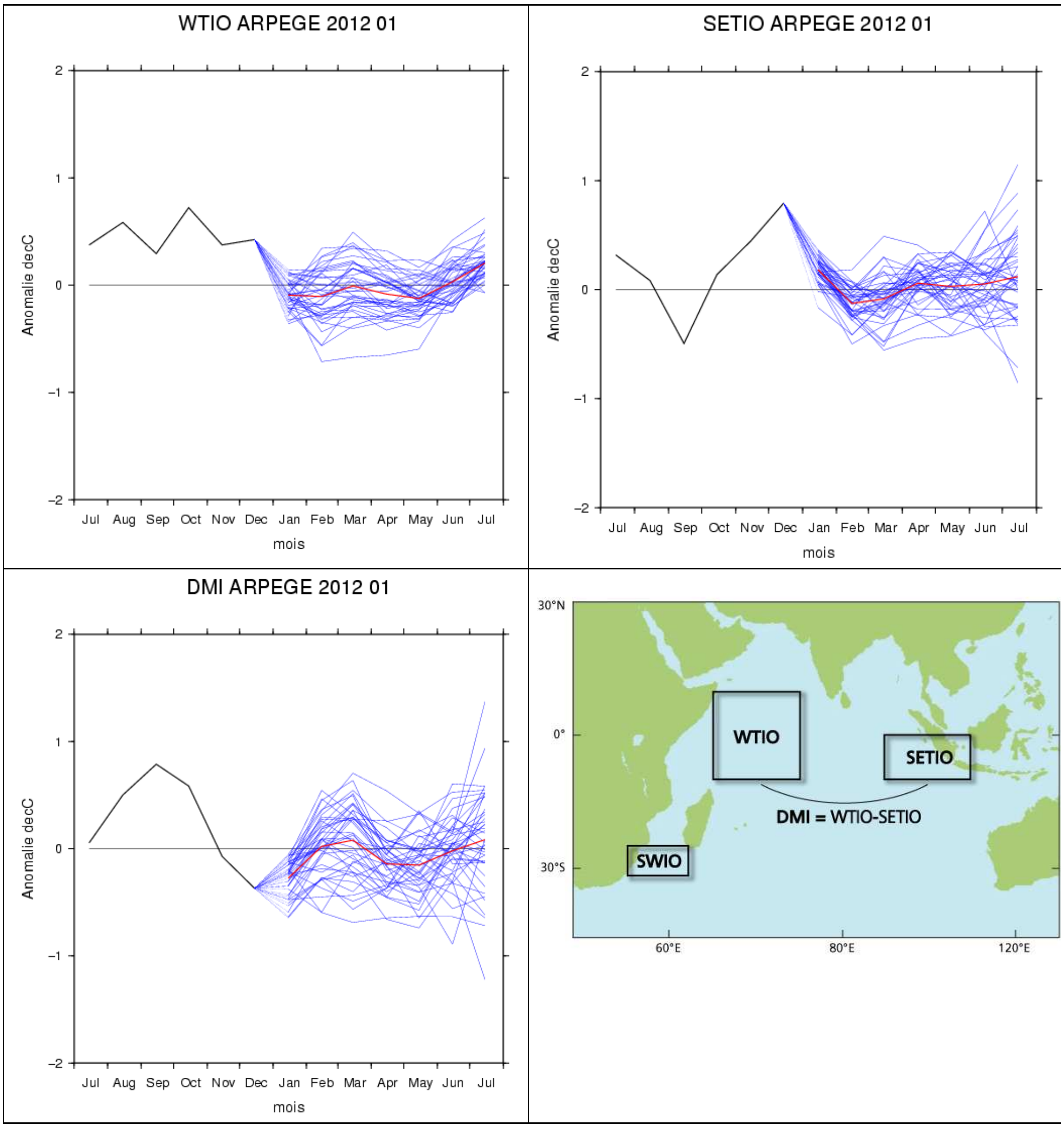


fig.18: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France, issued in January, plumes correspond to 41 membres and monthly means.

The Plumes show that most of the members are forecasting close to normal conditions in both the Western and Eastern Equatorial Indian Ocean. Both indices show some spread among all members of the ensemble during all the period. As a consequence, the DMI is also close to normal conditions over all the period but one can notice the large spread which led to be cautious in using this forecast.

II.2. GENERAL CIRCULATION FORECAST

II.2.a Global Forecast

First, looking to the Tropics one remark the great consistency between both the divergent and rotational circulation anomalies. As a first glance, the velocity potential anomaly field (cf. fig. 19) show in the Tropics a 2 wave number pattern in both models (ECMWF and Meteo-France). In details, over the Central Pacific both models show an atmospheric response with a divergence anomaly (upward motion) over the maritime continent. Interestingly, the Tropical Divergent circulation anomaly extends far to the North (and South) over the Western Pacific. In the Central Pacific? The atmospheric response is more complex with some damping of the response in ECMWF and a convergence (downward motion)/ Divergence/convergence response on the Central and Eastern part of the basin.

The Météo-France model shows a stronger response (Divergent circulation anomaly) on the North-East of South America (compared to ECMWF) but the general pattern of the responses are very similar in both models.

On the Stream function the main anomalies visible on both models are developing first across the latitudes of the Pacific basin in a quite consistent way. A large anomaly is present in the highest latitudes over Canada while it is not present in Meteo-France. This difference could be related to model uncertainty (especially to stratosphere ?). Over the Atlantic, there is also some trace of consistence despite some geographical differences. In conclusion, it is difficult to assess a clear indication of tropical forced teleconnection for Europe ; so one should be cautious as the predictability seems to be limited for FMA.

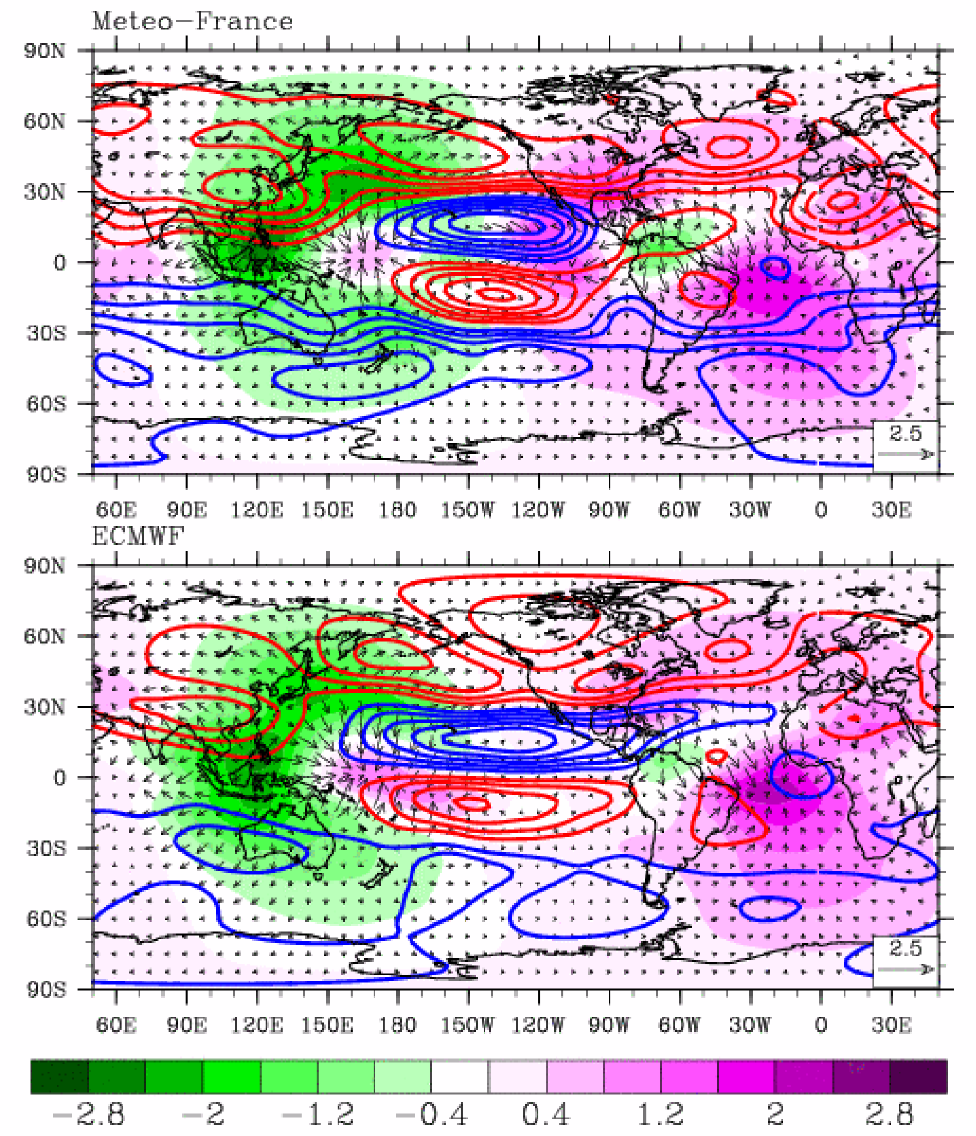


fig.19: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), associated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa for February-March-April, issued in January by Météo-France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

II.2.b North hemisphere forecast and Europe

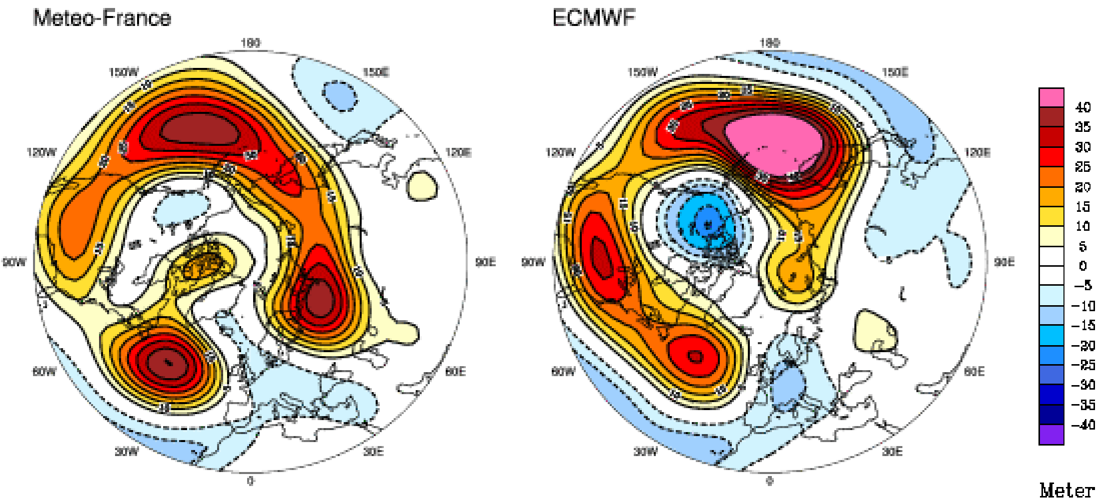


fig.20: Anomalies of Geopotential Height at 500 hPa for February-March-April, issued in January from Météo-France (left) and ECMWF (right).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip

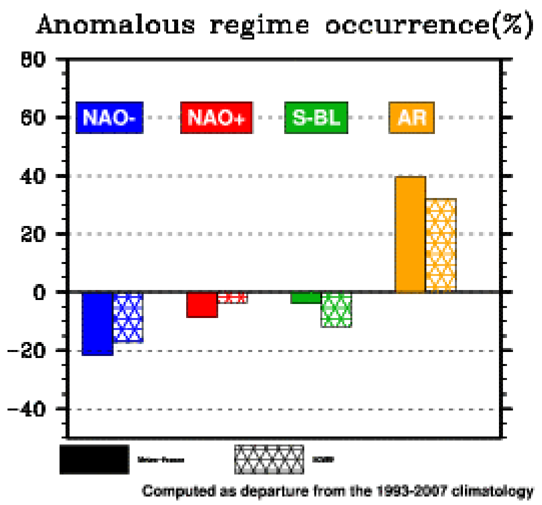


fig.21: North Atlantic Regime occurrence anomalies from Météo-France and ECMWF : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.

Related to the Stream Function anomaly, the Meteo-France and ECMWF models show a positive Geopotential Height anomaly at 500hPa (fig. 20) in the mid-latitudes all across the North Atlantic sector from the USA up to the Eastern part of the Atlantic basin (with a broad ridge over East Atlantic). The 2 models shows a quite similar response over the Pacific and the North American continent. However, the forecasts in the Polar vortex are quite different. So, not surprisingly, this infer a strong increase of the frequency of AR regimes and strong deficit of NAO - regimes (fig. 21). In association with the AR regimes, one can highlight the probable existence of more trough over the western part of the Mediterranean sea.

The General atmospheric circulation in the low troposphere (see figure 22) is clearly related and consistent with the Geopotential Height. Over most of Europe the meridionnal wind show an clear Southward component on the western façade of Europe (and the related Atlantic sector) fully consistent with the enhanced frequency of AR regimes. The zonal component is also very consistent with the exceedance of AR regimes and the associated increase of the meridionnal circulation.

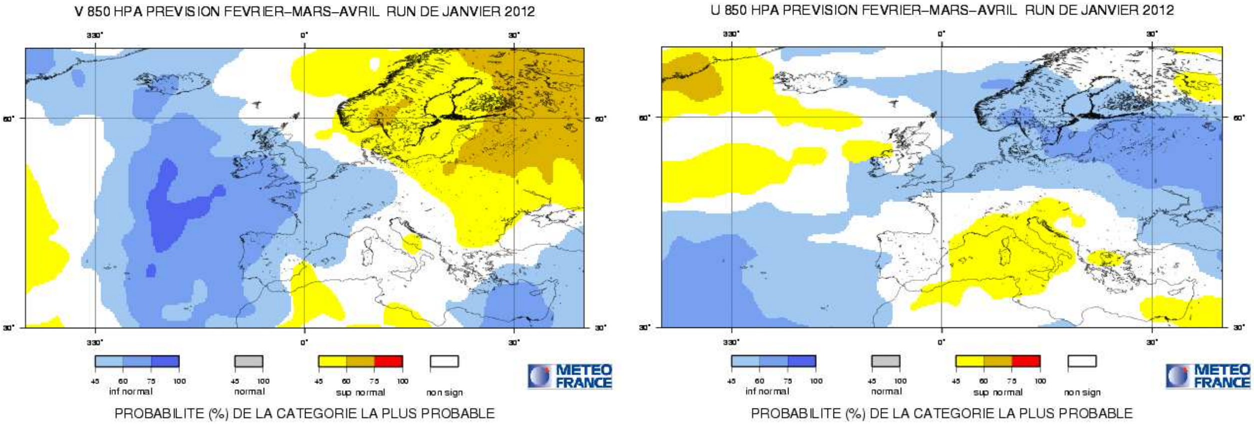


fig.22: Forecasted anomalies of meridional (left) and zonal (right) wind at 850 hPa for FMA from Météo-France issued in December.

II.3. IMPACT : TEMPERATURE FORECASTS

II.3.a ECMWF

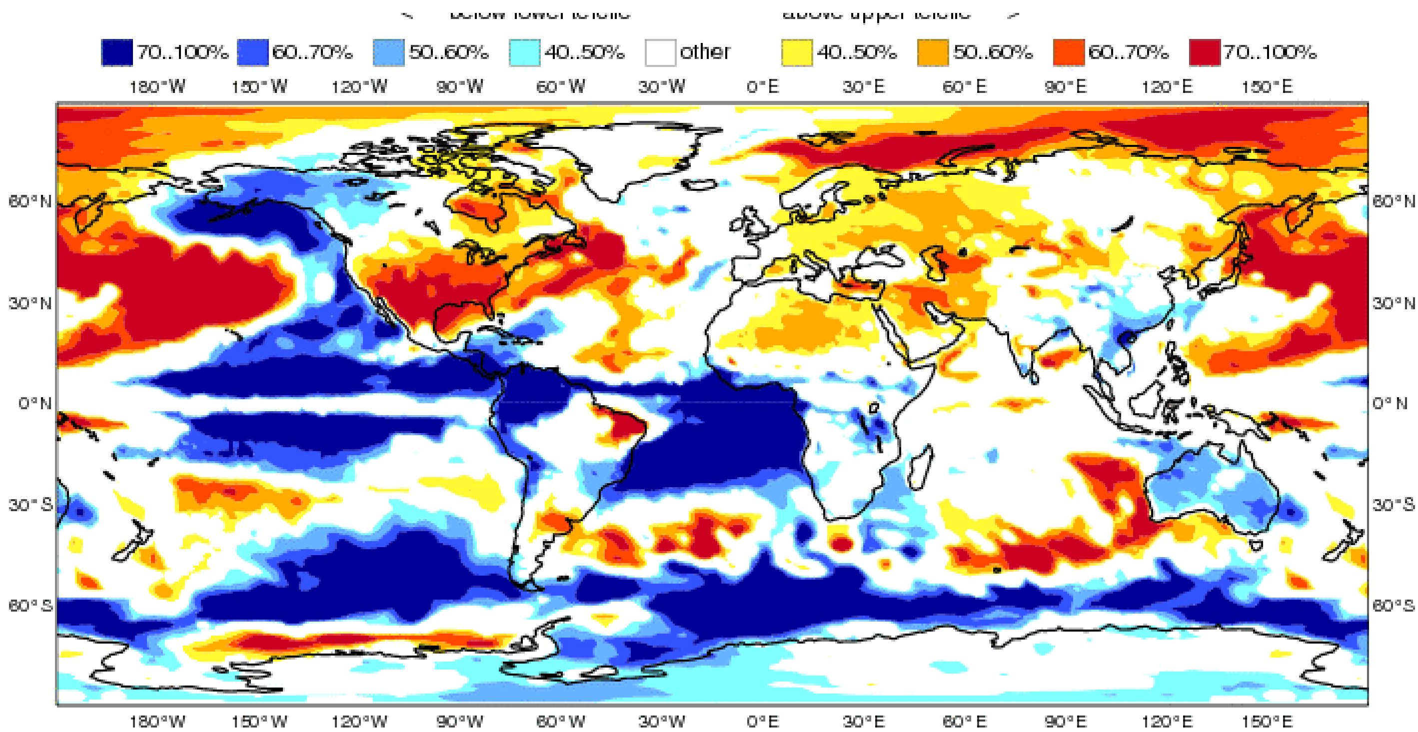


fig.23: Most likely category probability of T2m from ECMWF for February-March-April, issued in January. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

II.3.b Météo-France

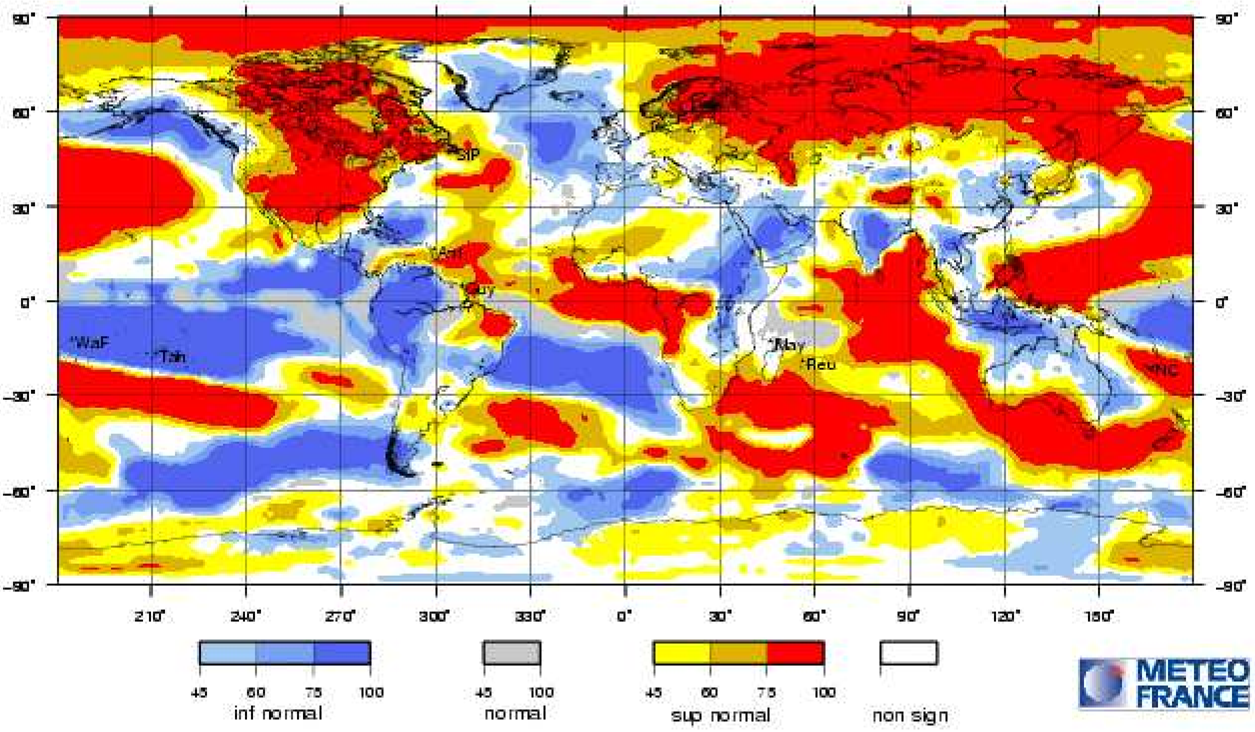


fig.24: Most likely category of T2m for February-March-April, issued in January from Météo-France. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. [**http://elaboration.seasonal.meteo.fr/**](http://elaboration.seasonal.meteo.fr/)

II.3.c Met Office (UKMO)

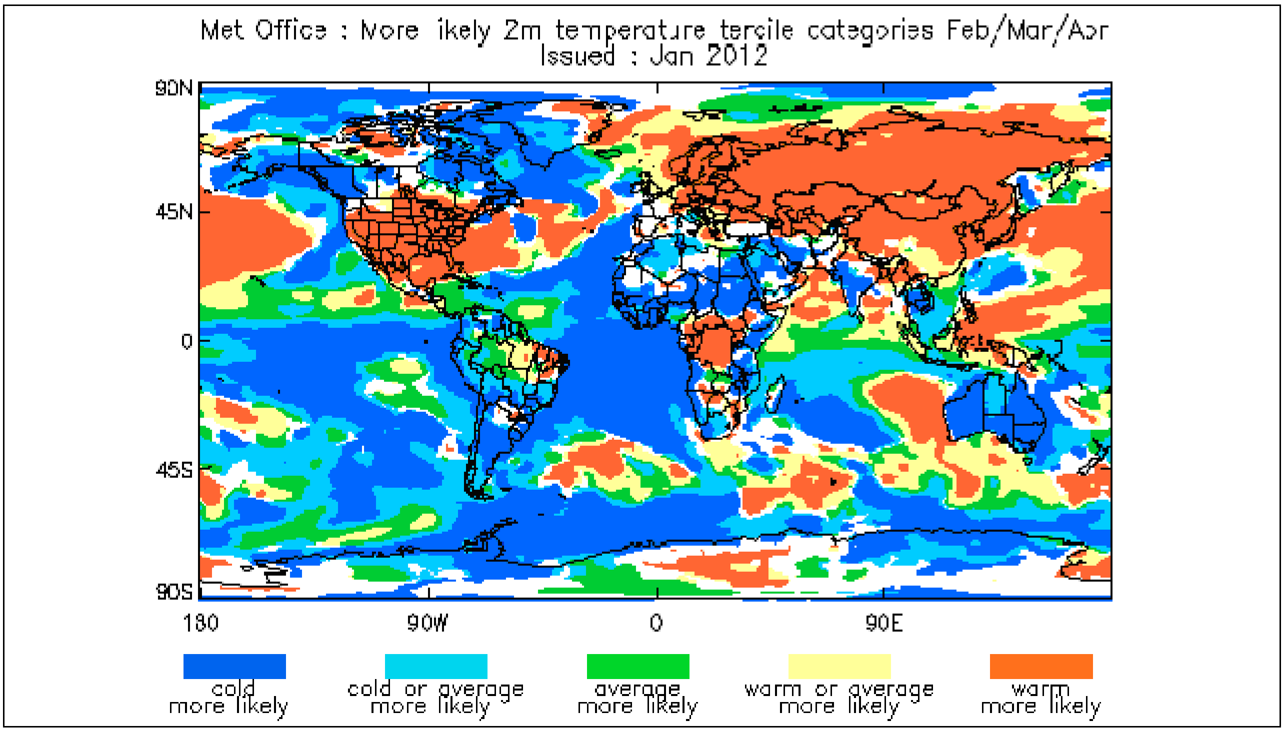


fig.25: Most likely category of T2m for February-March-April, issued in January from UK Met Office. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. [**http://www.metoffice.gov.uk/**](http://www.metoffice.gov.uk/)

II.3.d Japan Meteorological Agency (JMA)

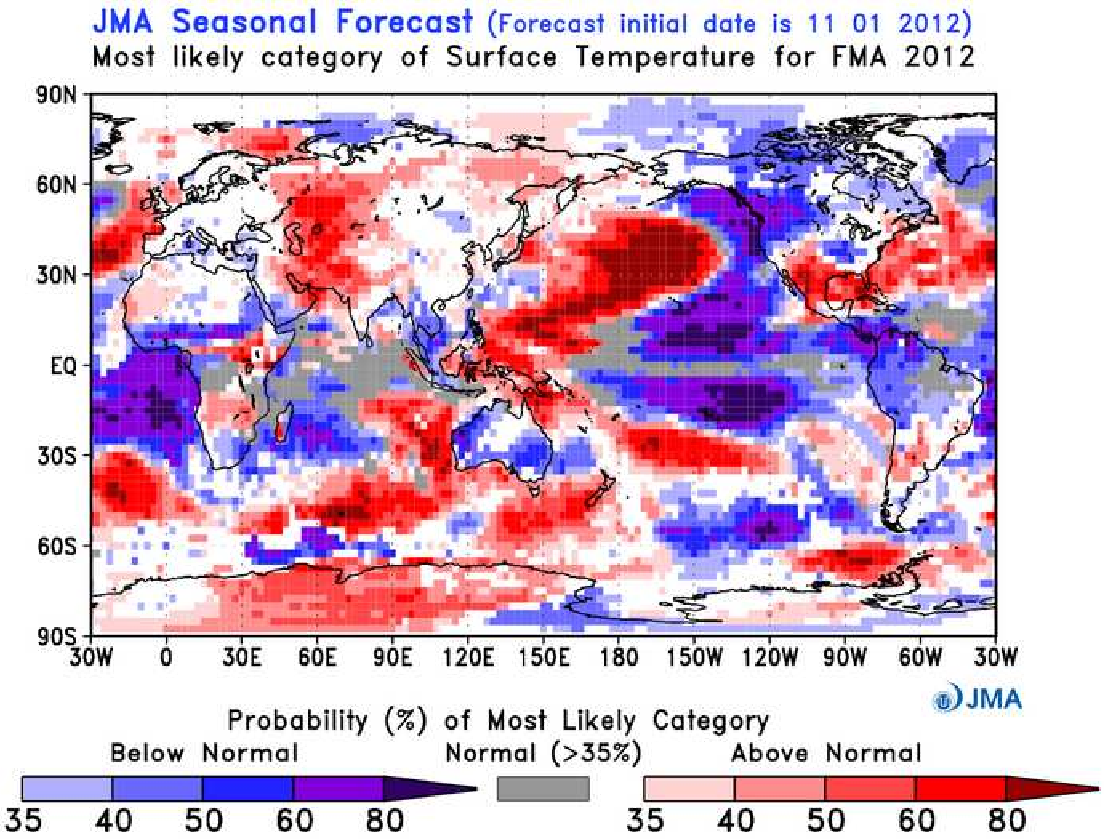


fig.26: Most likely category of T2m for February-March-April, issued in January from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. .
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.html

II.3.e Euro-SIP

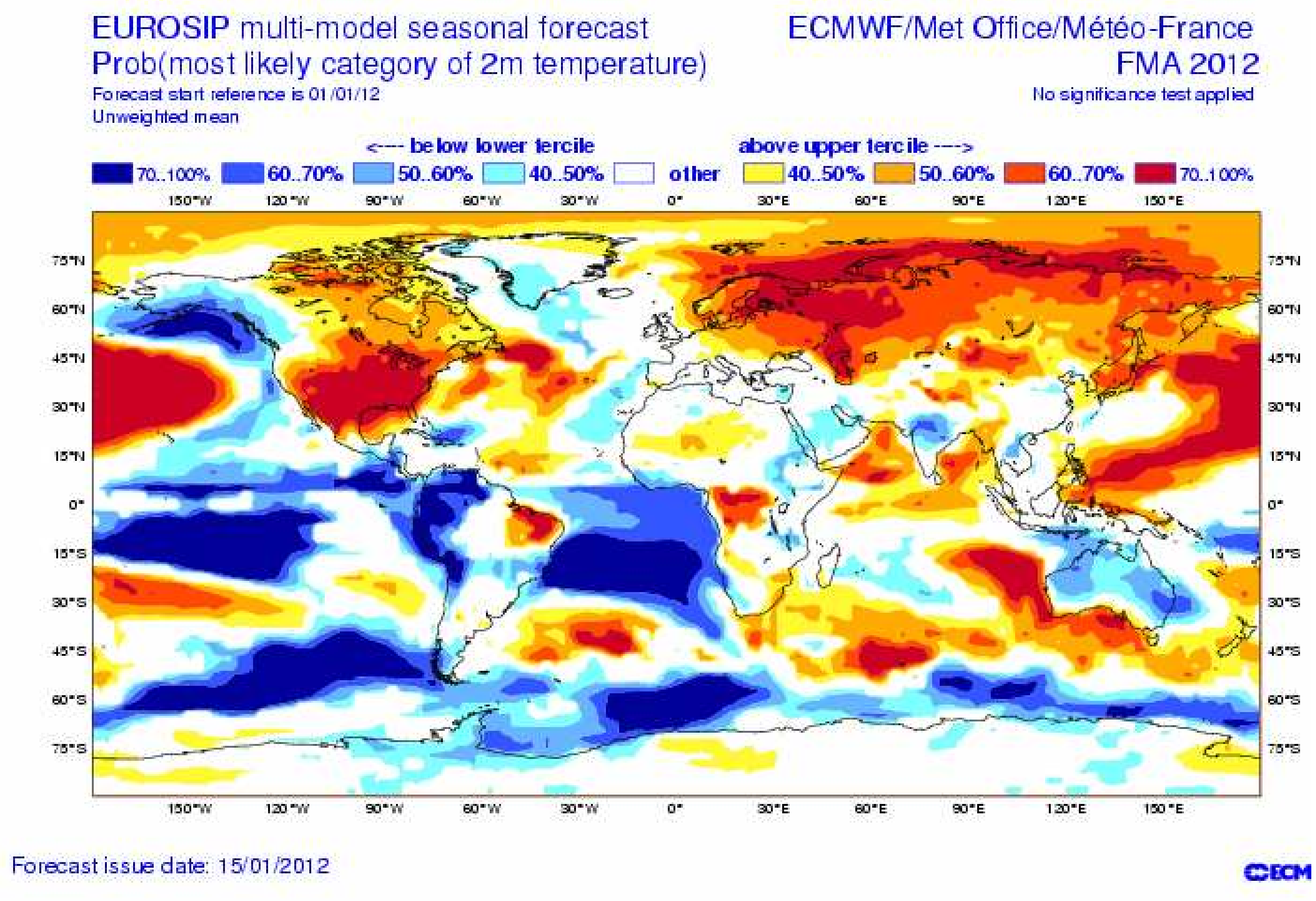


fig.27: Multi-Model Probabilistic forecasts for T2m from EuroSip for February-March-April, issued in January. (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmv2/param_euro/seasonal_charts_2tm/

Still a PNA like pattern over the North American continent is clearly visible on the Euro-SIP forecast. As already discussed in the General Circulation section, some signals exist over Europe ; mostly the North and Eastern regions. The AR regimes have not a clear impact on temperatures as it is during the beginning of the spring period and consequently the impact differ from winter period. When adding consideration on the predictability which is not too much (see difficulties in the general circulation section to interpret the Stream Function anomalies over Europe) the Euro-Sip forecast makes sense in terms of uncertainty on the Western façade of Europe and around the Mediterranean basin while Above Normal situation could occurre in the North and Eastern part of Europe. However, it remains an unclear point which is depending of the strength and exact location of the ridges over Atlantic, the Iberian peninsula and North Western part of the Maghreb could benefit of Above normal situations.

II.3.f International Research Institute (IRI)

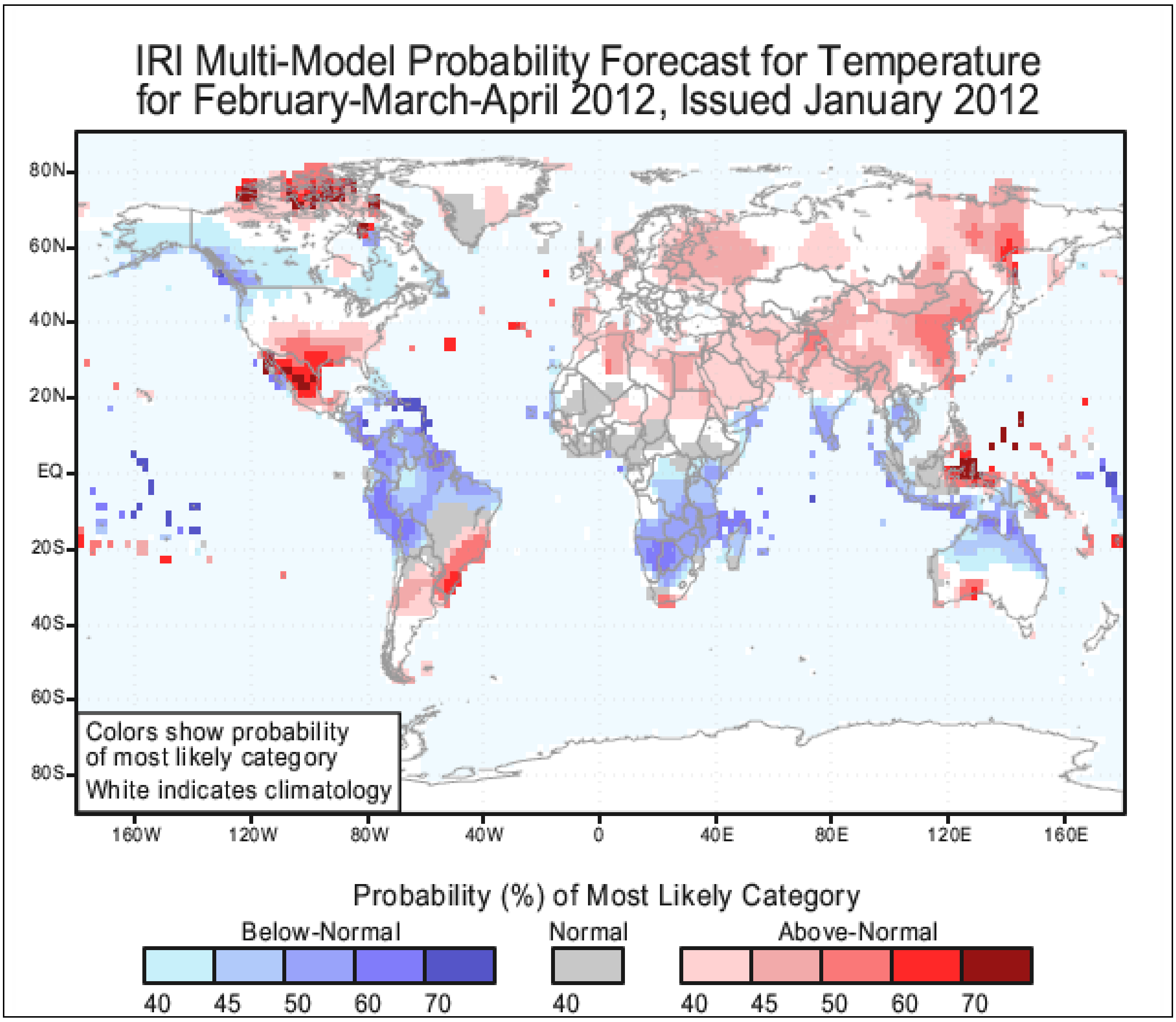


fig.28: Most likely category of T2m for February-March-April, issued in January from the IRI multi-model ensemble. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://iri.columbia.edu/climate/forecast/net_asmt/

One can notice some consistency with the Euro-Sip forecast (e.g. the PNA like pattern, South America,) and also some large differences (East Canada, Southern part of Africa, …). Over Europe, one can see some trace of the previous comments on the Euro-Sip forecasts

II.4. IMPACT : PRECIPITATION FORECAST

II.4.a ECMWF

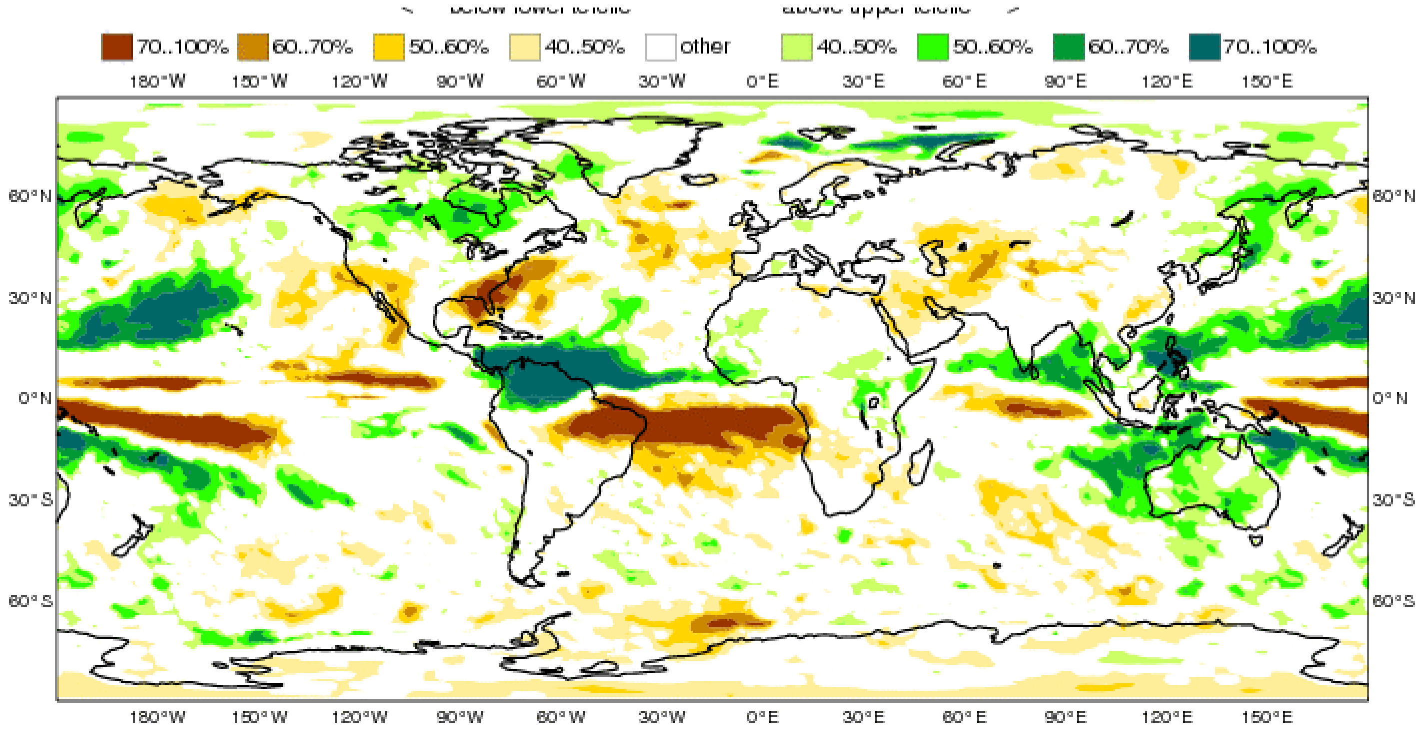


fig.29: Most likely category probability of rainfall from ECMWF for February-March-April, issued in January. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal). **http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/charts/seasonal_charts_s2/**

II.4.b Météo-France

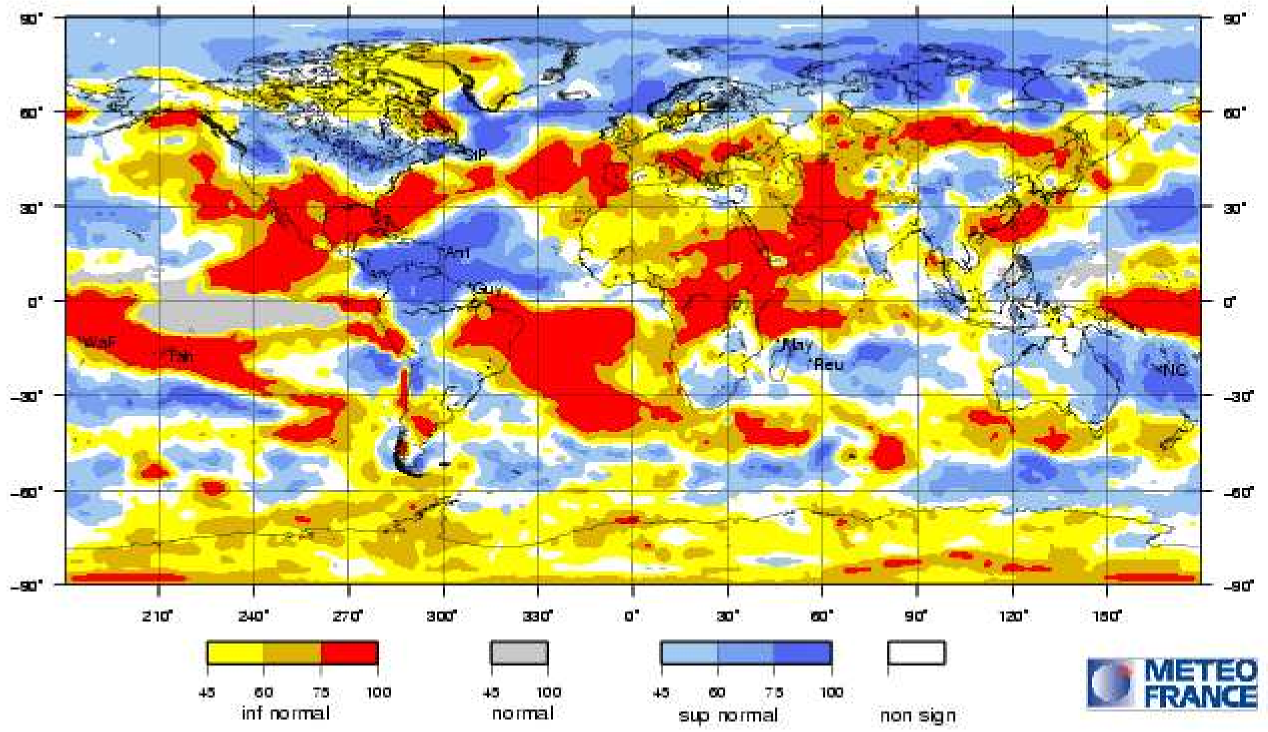


fig.30: Most likely category of Rainfall for February-March-April, issued in January. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Met office (UKMO)

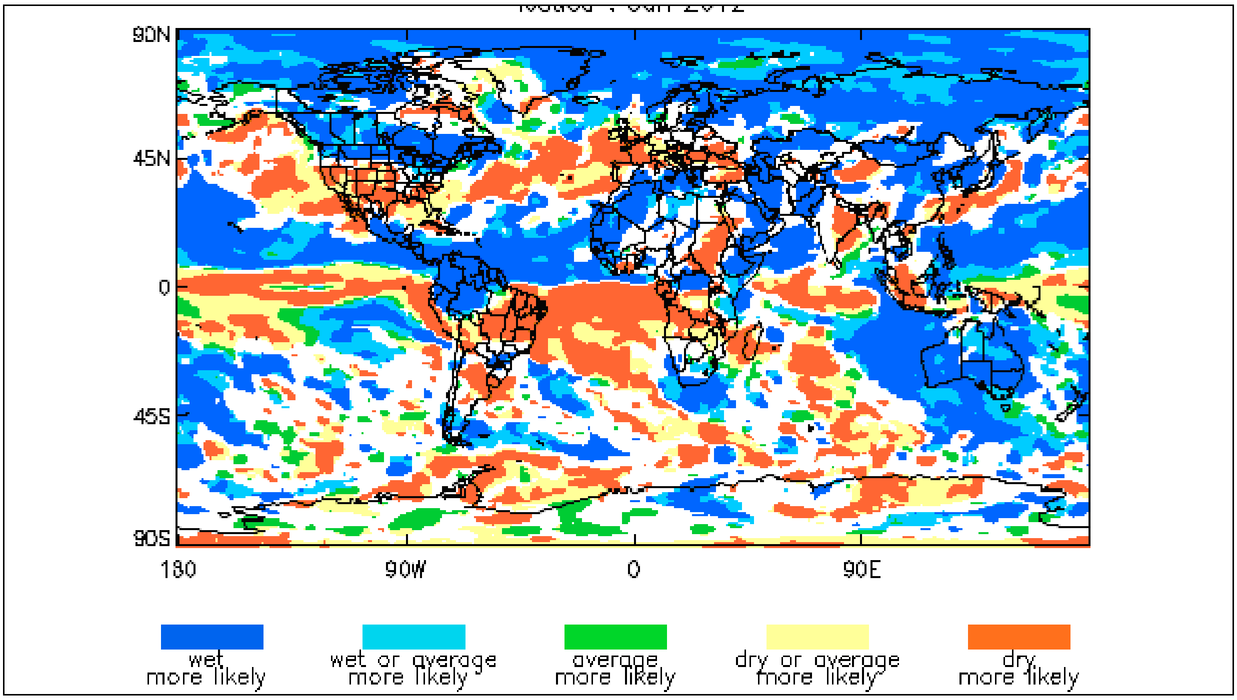


fig.31: Most likely category of Rainfall for February-March-April, issued in January from UK Met Office. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. **http://www.metoffice.gov.uk/**

II.4.d Japan Meteorological Agency (JMA)

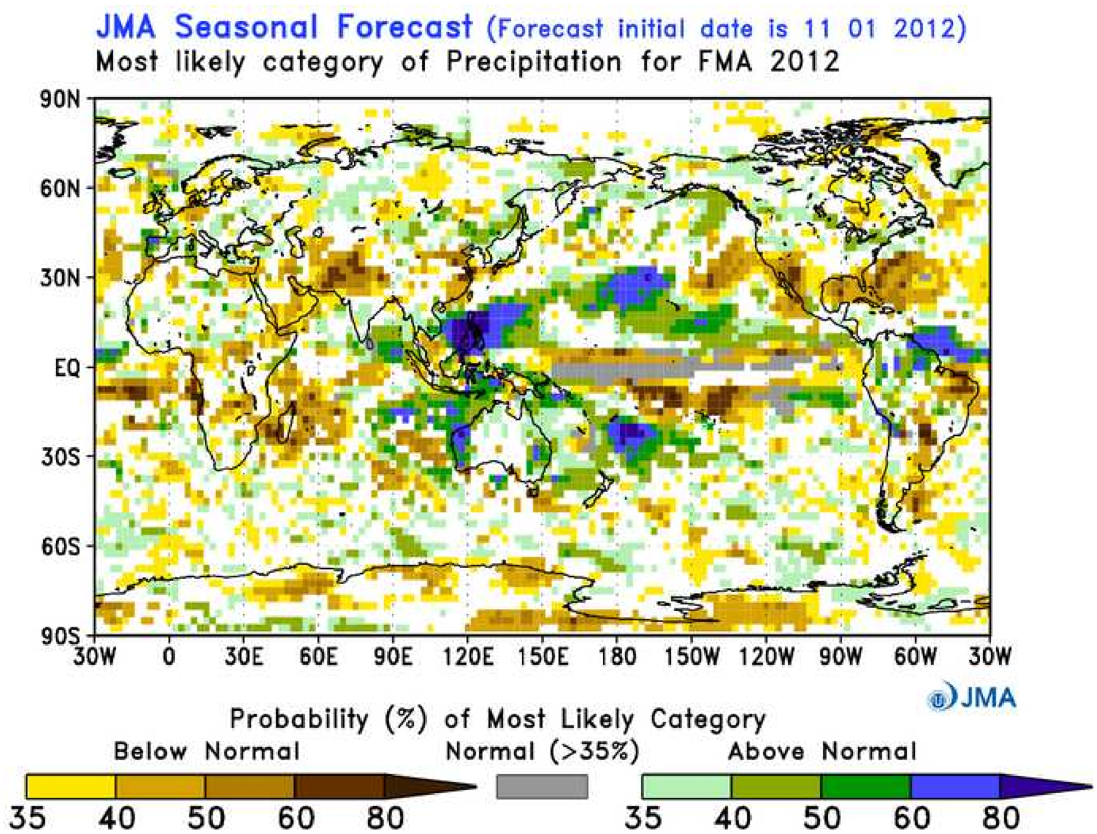


fig.32: **Most likely category of Rainfall for February-March-April, issued in January from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.**
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.html

II.4.e Euro-SIP

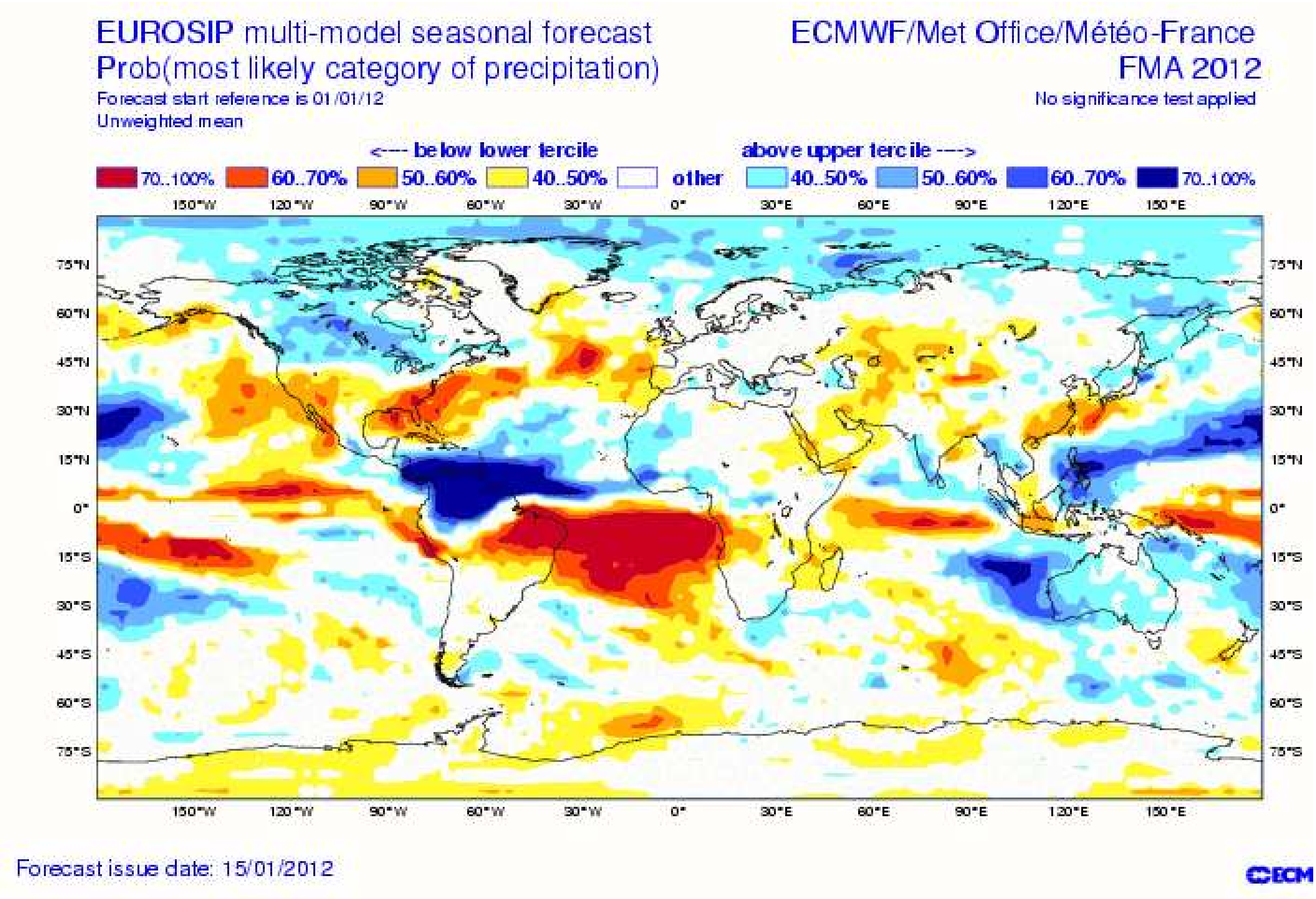


fig.33: **Multi-Model Probabilistic forecasts for precipitation from EuroSip for February-March-April, issued in January. (2 Categories, Below and Above normal – White zones correspond to No signal).**
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmv2/param_euro/seasonal_charts_2tm/

Considering the limited predictability Even if the predictability for rainfall in mid-latitude regions, it is difficult to be confident into a scenario pver the entire European regions. The only signal is over the Iberic peninsula which could face some Below Normal conditions (which is consistent with the AR regimes predominance – see general circulation discussion and Euro-Sip temperature discussion). This scenario could be extended consistently to the North Western part of North Africa despite the Above normal conditions which appear in the tropics over West Africa.
To be notice also the PNA like response in term of precipitation over the North American continent and enhanced rainfall over Australia, the maritime continent and the northern part of South America and the Caribbean. Last, the Below Normal scenario which develops across South Atlantic in relationship with colder than normal SSTs.

II.4.f International Research Institute (IRI)

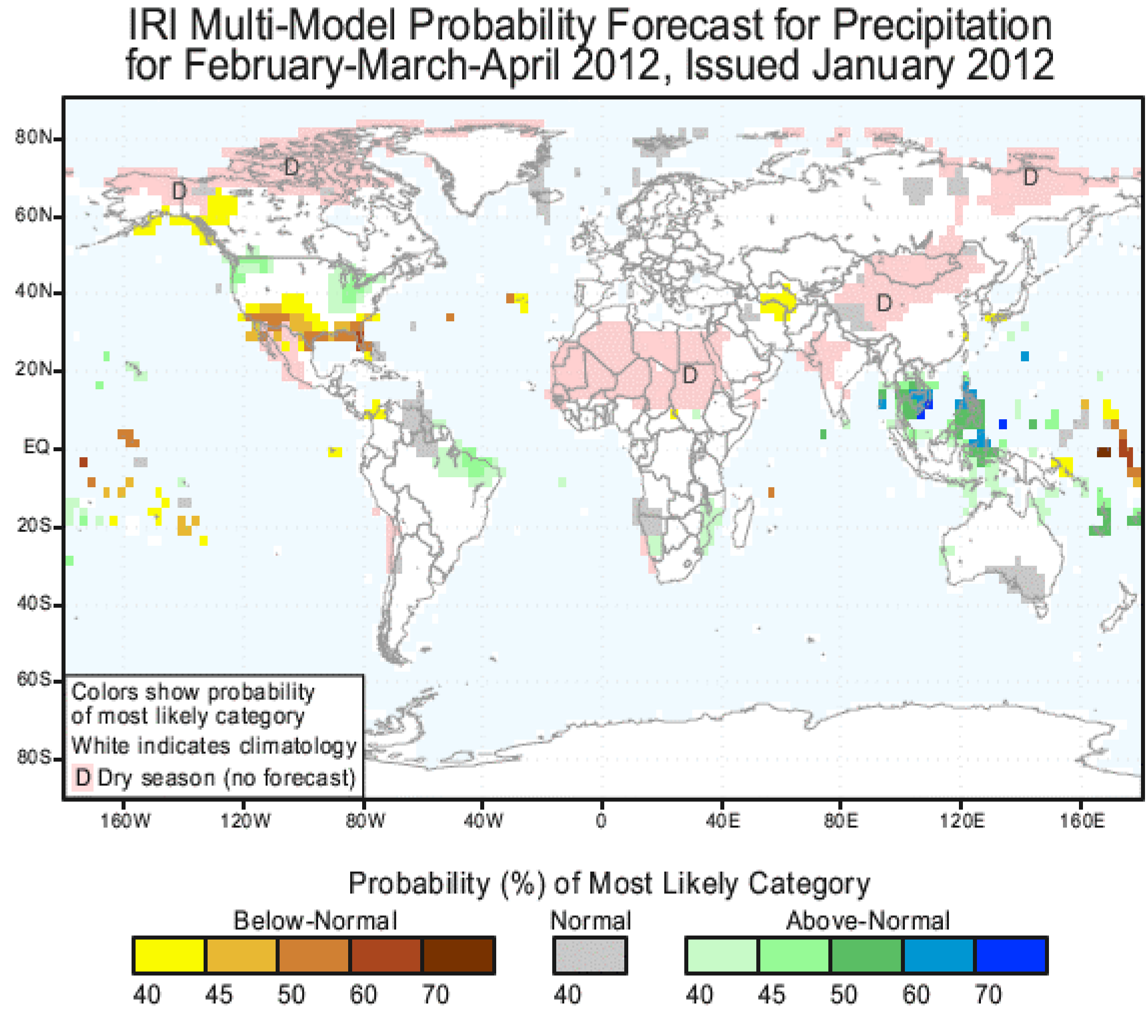


fig.34: Most likely category of Rainfall for February-March-April, issued in January from the IRI multi-model ensemble. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://iri.columbia.edu/climate/forecast/net_asmt/

The IRI forecast shows some consistence with the Euro-SIP over the maritime continent, the North American continent and the Pacific. For the European continent there is no signal like Euro-SIP.

II.5. REGIONAL TEMPERATURES

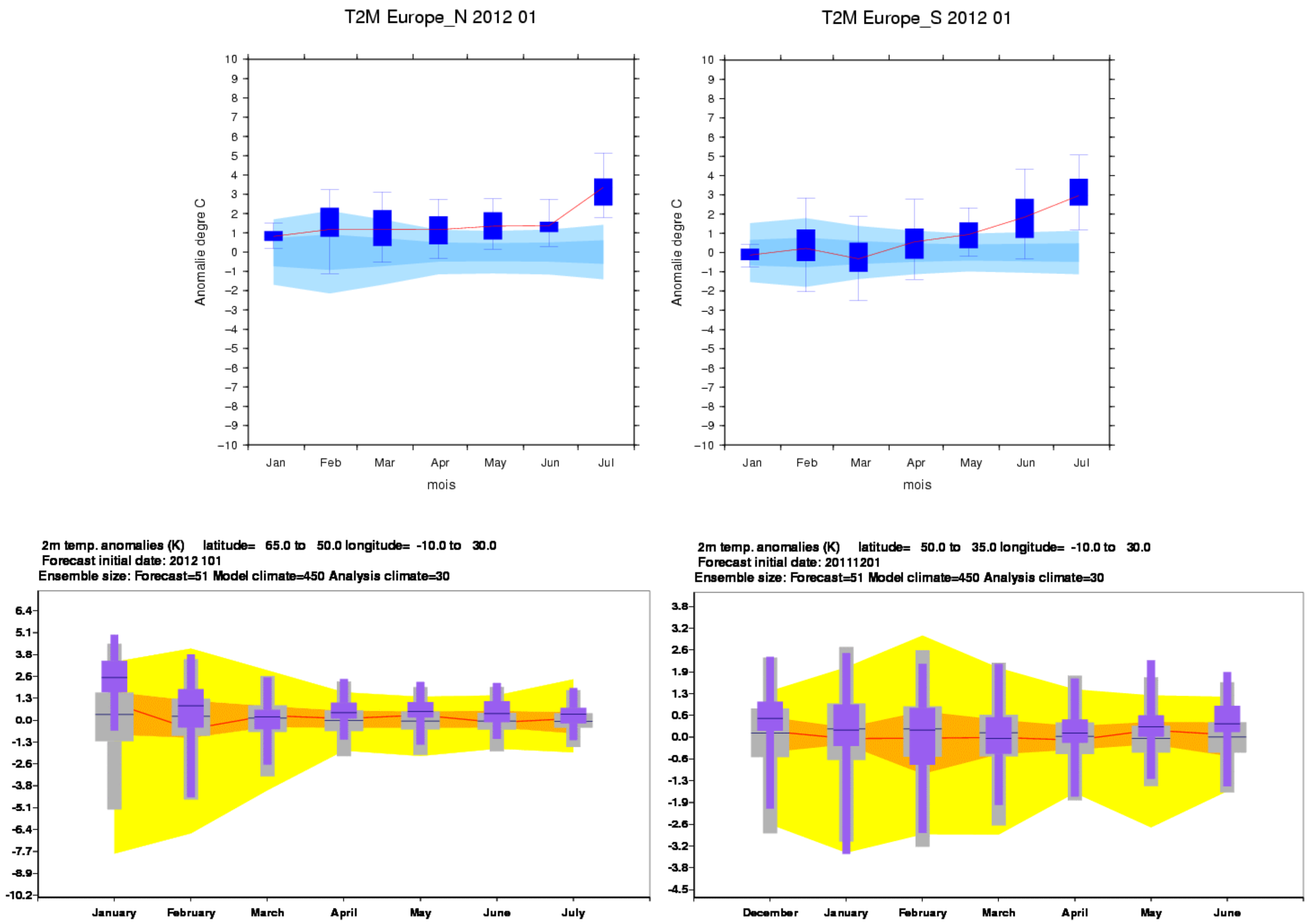


fig.35: Climagrams for T2m in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom) issued in January.

For Northern Europe, the 2 models show a good consistency for Above normal conditions. With respect of the General Circulation discussion, this should be especially relevant for Scandinavian regions and Russian regions. For Southern Europe, there is less consistency. The differences between the two models can be likely related to the model uncertainties and to the low predictability already pointed out. One additional remark is about the size of the boxes which merge regions with different behaviour (with respect of this forecast). In Météo-France, for Northern Europe, there is a noticeable skill in January and February and still some skill from March to May for both Above and Below normal scenarios. For Southern Europe there is no skill in January and February while surpisingly the skill increase in March, April and May (especially for Above normal scenarios).

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

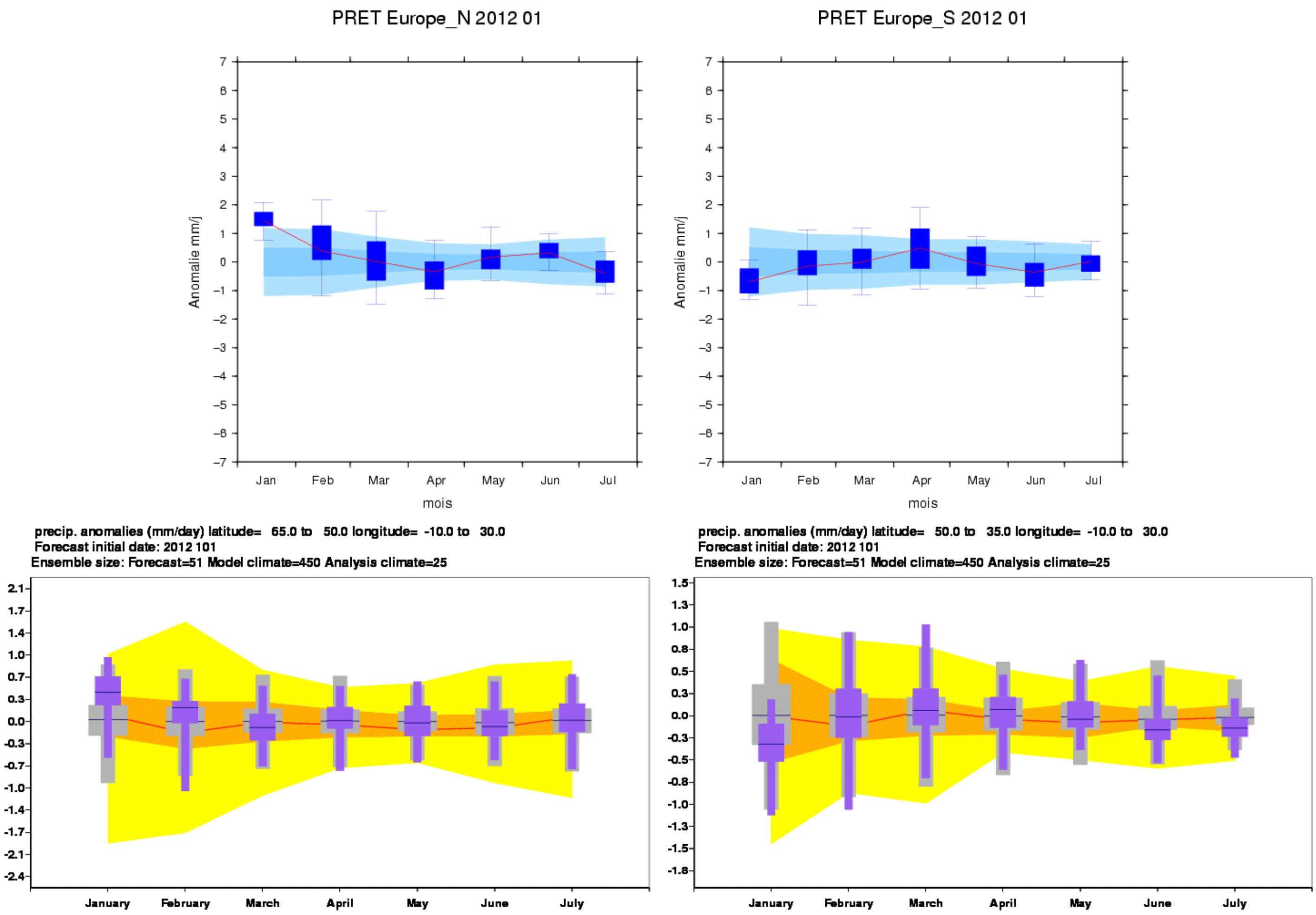


fig.36: Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom), issued in January.

For Northern Europe there is some consistent signal while it's less clear for Southern Europe. For Northern Europe, the intraseasonal evolutions are quite similar in both models. In Météo-France for both Northern and Southern Europe there is little skill in January and no more after. So these intraseasonal evolution should be interpreted with caution however, the Above Normal scenario for Northern Europe and Below Normal scenario close to the Mediterranean basin seems to make sense.

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

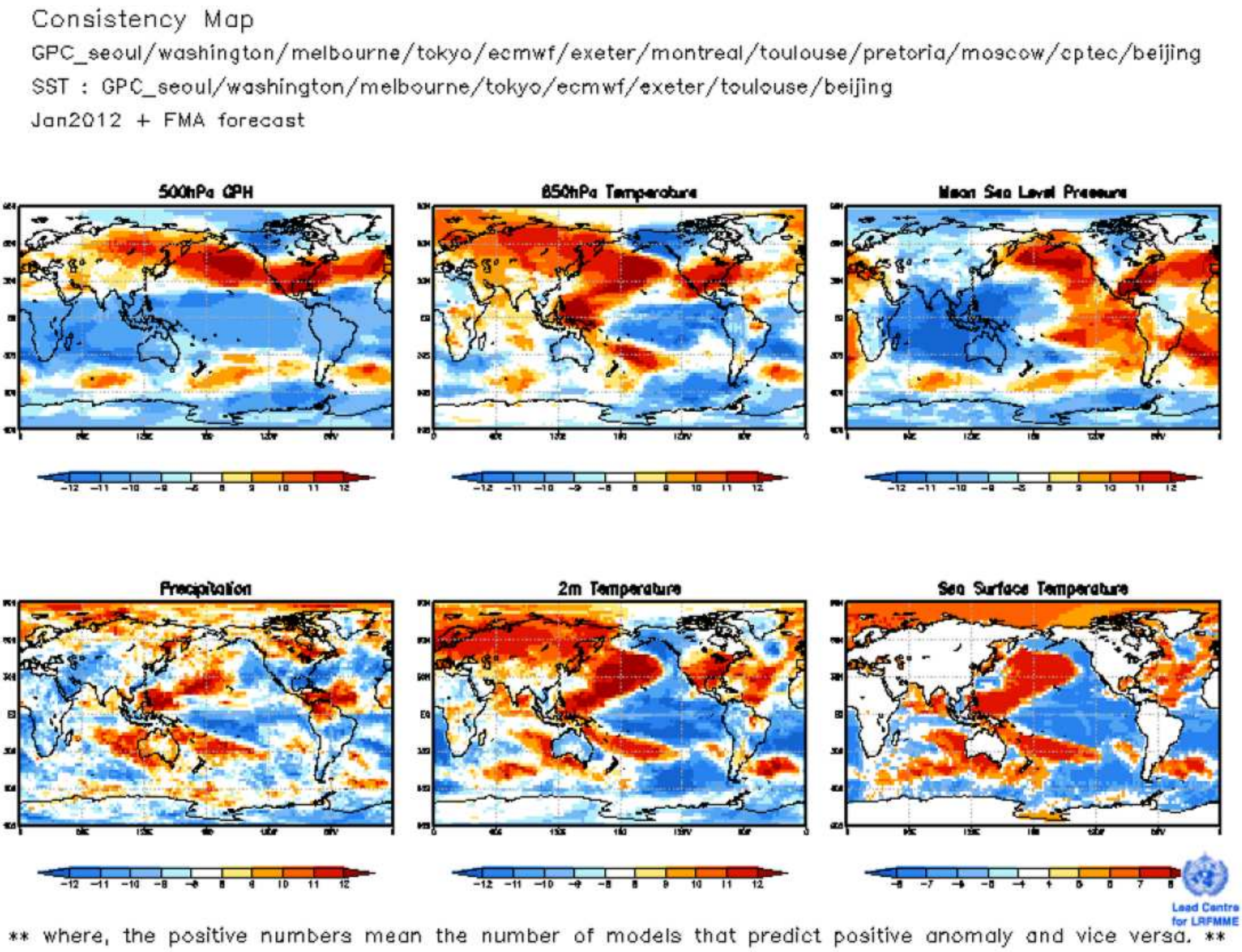


fig.37: GPCs Consistency maps from LC-MME http://www.wmolc.org/

Over the North Atlantic sector, all the models are very consistent with a positive anomaly starting from South US up to Western façade of Europe. It's consistent with the enhanced AR regimes frequency already pointed out in Euro-SIP. The PNA like response is also present in most of the models. So, the Euro-Sip conclusions seems to be applicable to the GPCs forecasts, especially for the temperature over the Northern and Eastern Europe. For precipitation, there is only a little consistency. Consequently No Signal leading to a Climatology Forecast should be the best solution.

II.7. "EXTREME" SCENARIOS

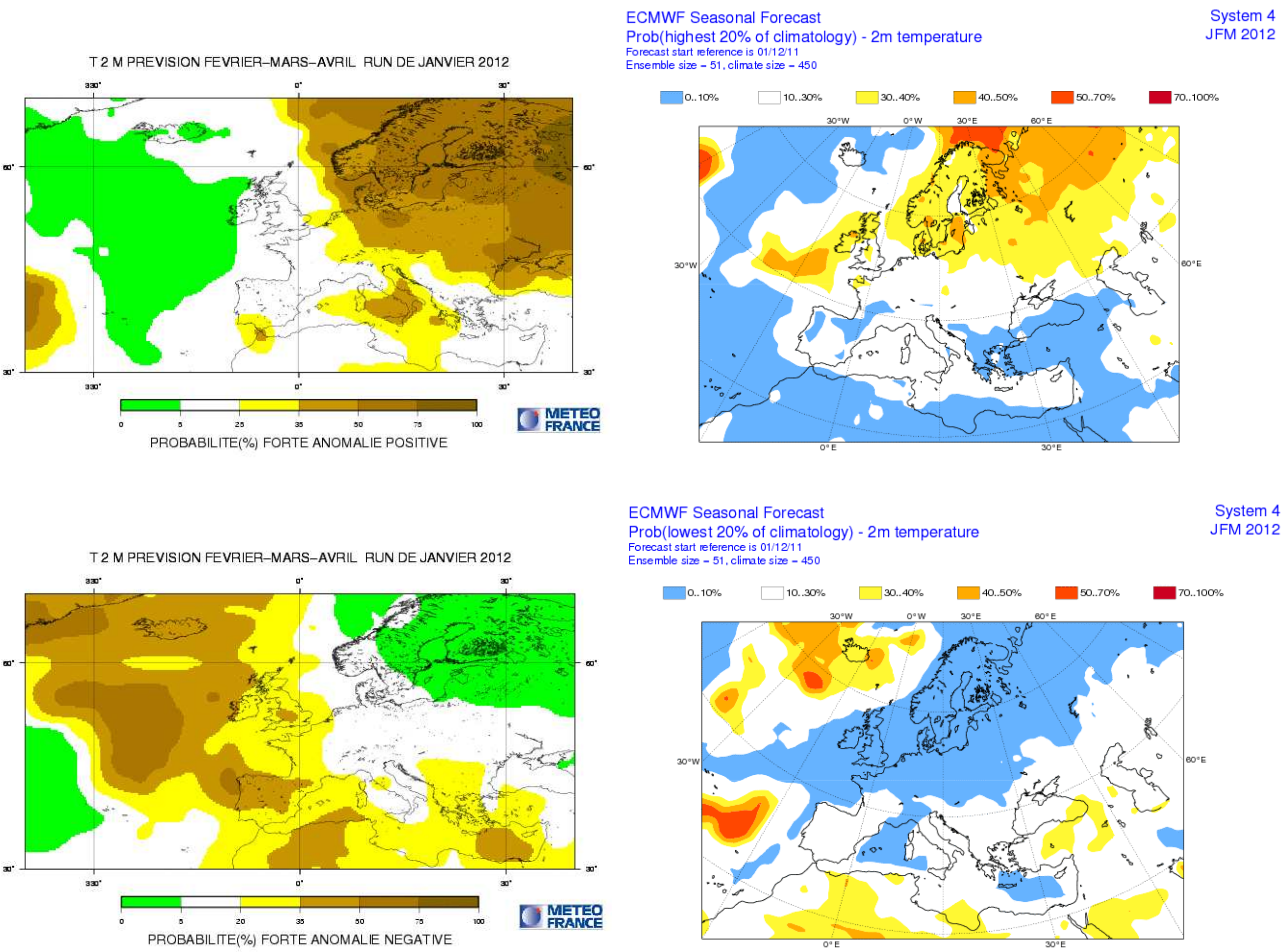


fig.38: Top : Probability of « extreme » above normal conditions for T2m for Meteo-France (left - highest ~15% of the distribution) and ECMWF (right - highest 20% of the distribution).
Bottom : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the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

There is some consistent signal on Northern Europe (enhanced probabilities of very above normal scenario). In Météo-France the ROC score is quite noticeable (above 0.6) indicating some skill for the forecast over these regions (especially for Scandinavia and North East Europe). For the very below normal scenario, for regions close to Mediterranean sea the consistency is poor (excepted over some regions of North Africa – especially Algeria). In addition the ROC score is above 0.55 over most of these regions.

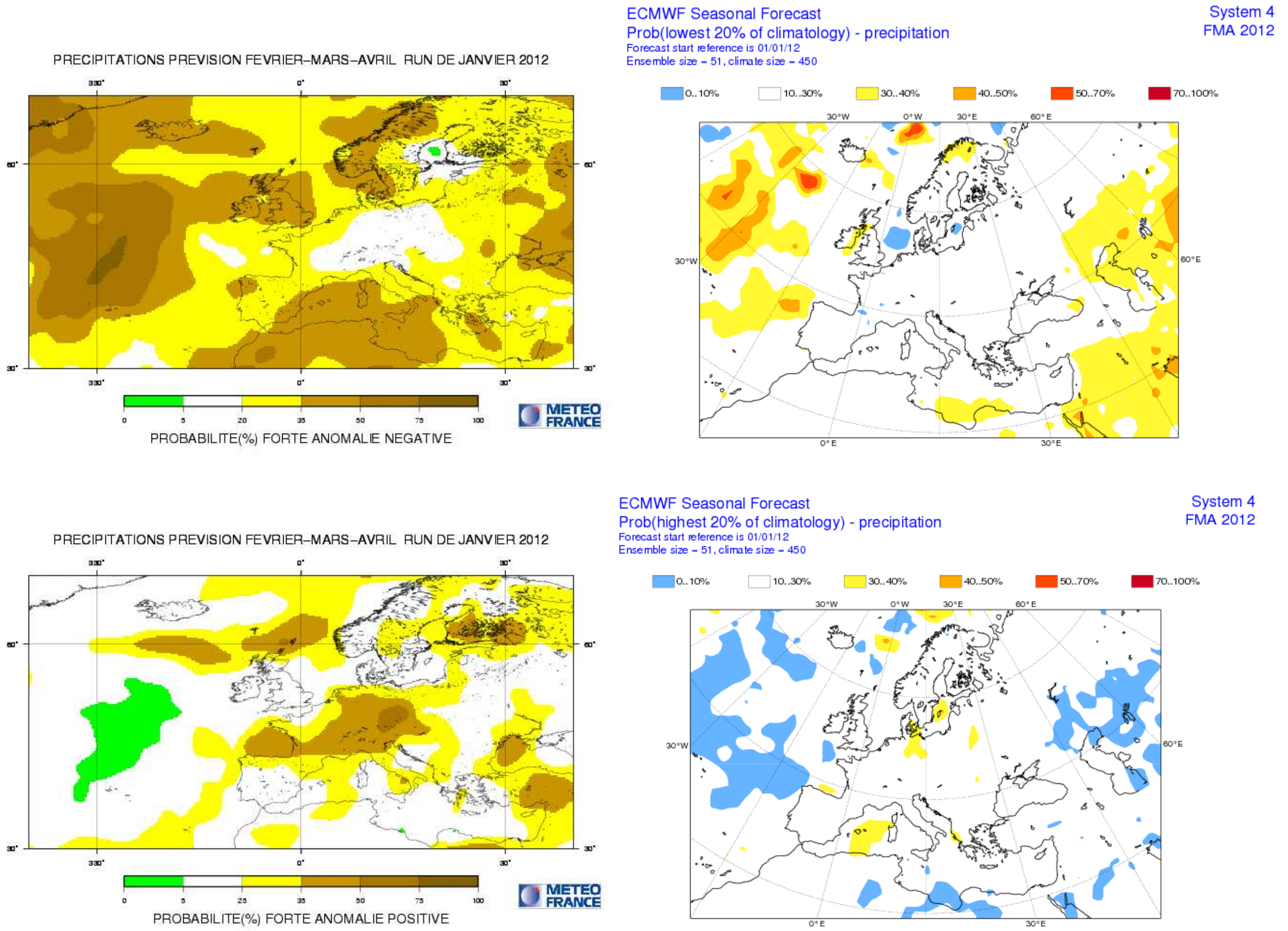


fig.39: Top : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the distribution) and ECMWF (right - lowest 20% of the distribution)

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 February-March-April, issued in January.

For the very Below or Above Normal scenarios, even if the probabilities are high in Meteo-France there is no consistency between the 2 models. When adding the low predictability consideration, it's seems difficult to infer any useful information from these forecast.

II.8. DISCUSSION AND SUMMARY

Forecast over Europe

The first comment is about the predictability which seems to have decreased with respect of the previous forecast so that it become not very high. Related to Geopotential Height forecasts, it seems that the deficit of NAO – regimes and enhancement of AR regimes make sense and are a consistent scenario for most of the models. However, because of the Spring period, it's difficult to infer the impact of such a circulation anomaly in terms of impacts (temperature and precipitation) over the European regions and regions close to the Mediterranean sea.
For temperature, the Above Normal scenario makes sense for North-West and North-East Europe.
The climatology forecast should prevail elsewhere as there is no significant signal.
For rainfall, no consistent signal exists so that the climatology scenario could be acceptable for all European regions and regions close to the Mediterranean sea. Then the size of the boxes lead to "No privileged Scenario". However, some downscaled information could detail these scenarios for specific countries or sub-regions (especially the most South Western part of the Iberian Peninsula and the North West part of North Africa).

Tropical Cyclone activity

For the beginning of the season in the Southern hemisphere, Euro-Sip forecasts indicate a less active than normal cyclonic activity over the South-West Indian Ocean and close to normal activity elsewhere.

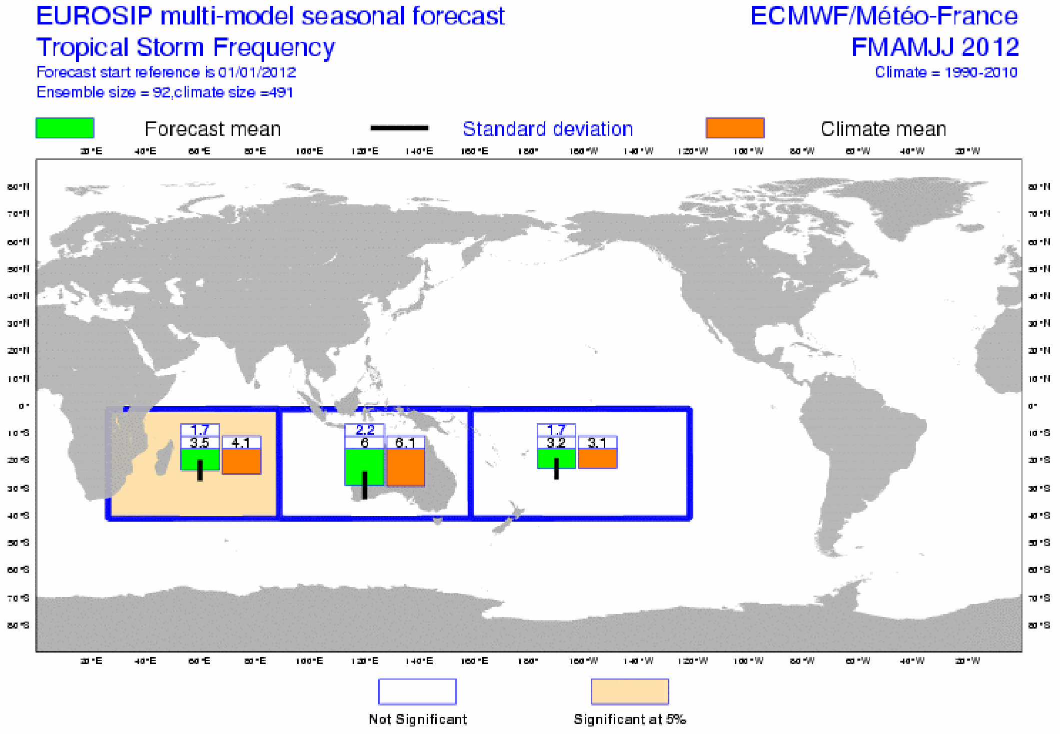


fig.40: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF) for the January to June 2012 period, issued in December.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtrop/trop_euro/eurosip_tropical_storm_frequency/

Synthesis of Temperature forecasts for February-March-April 2012 for European regions

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

MODELS	**Northern Europe**	**Southern Europe**	**Central Europe**	**Eastern Europe**	**SEE region**				
CEP									
MF									
Met Office									
JMA									
Synthesis									
Eurosip									
IRI									
Privileged Scénario by RCC-LRF Node	***Above Normal***	***No privileged scenario***	***Above Normal***	***Above Normal***	***No privileged scenario***				

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

Synthesis of Rainfall forecasts for February-March-April 2012 for European regions

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

MODELS	**Northern Europe**	**Southern Europe**	**Central Europe**	**Eastern Europe**	**SEE region**				
CEP									
MF									
Met Office									
JMA									
Synthesis									
Eurosip									
IRI									
Privileged Scénario 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).

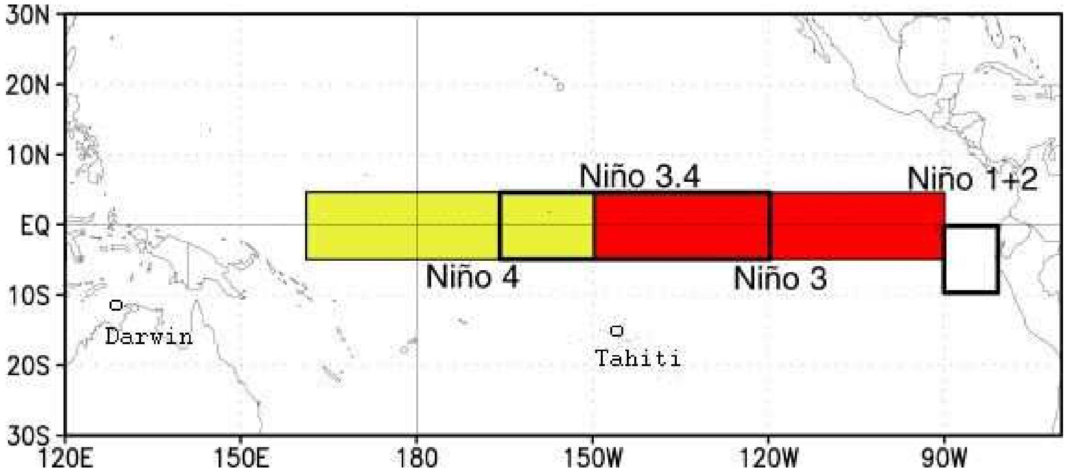
In order to better interpretate the results, it is recommended to look to verification maps and graphs which give some insight into the expected level of skill for a specific parameter, region and period. A set of scores is presented on the web-site of the Lead-Centre for Verification (see http://www.bom.gov.au/wmo/lrfvs/)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