WMO RA VI Pilot RCC-Network

METEO FRANCE Toujours un temps d'avance

GLOBAL CLIMATE BULLETIN n°164 - FEBRUARY 2013

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I. DESCRIPTION OF THE CLIMATE SYSTEM (DECEMBER 2012)

I.1. OCEANIC ANALYSIS

I.1.a Global Analysis

At the Surface (fig. 1) :
For the Pacific : In the equatorial wave guide cooling of SSTs (excepted the most western part). Weak anomalies positive over the Western part and slightly negative anomaly on the Eastern part (in relationship with a wave propagation under the surface). Strengthening of the upwelling in the most South-Eastern part of the basin. In the mid/high-latitudes in the North Pacific tripole structure strengthened (cooling close to Japan, warming over the Bering sea and cooling over Eastern basin).

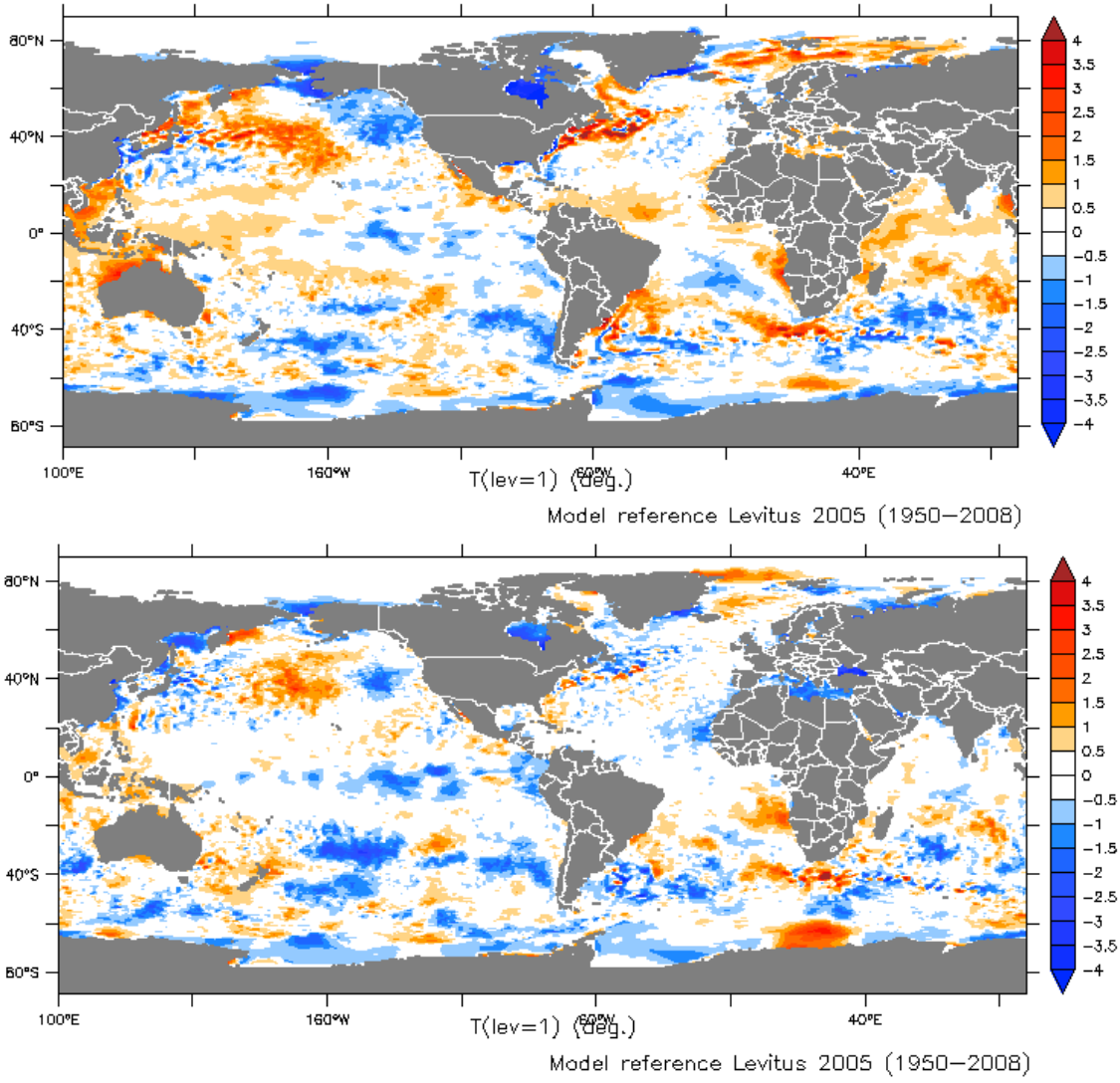


fig.1: **top : SSTs Anomalies in December 2012 (°C) (reference 1950-2008)**
bottom : SST tendency (current – previous month) http://bcg.mercator-ocean.fr/

For the Atlantic : little evolution in the equatorial band with still some positive anomaly in the Guinean Gulf. To be quoted the positive anomaly developed along the Benguela current (South-Eastern Tropics). Over the Northern Atlantic, positive anomaly on the Western Tropics and over the NW basin in the mid-latitudes. In the Southern Tropics, still a negative anomaly (weakening).
In the Indian Ocean : still mostly warmer than normal from West Australia up to the Great Horn of Africa. In the mid-latitudes, the southern part is slightly cooling. The DMI is close to neutral.
In subsurface (fig.2) :
In the Pacific : in the equatorial waveguide, heat content anomalies mostly negative and consistent with the temperature in subsurface and the thermocline depth anomalies (see fig. 4 & 5). Note the positive anomalies in the most Western part off equator (in the Northern hemisphere between 10°N and 20°N and in the SPCZ region) while the signal is weaker at the surface. In the mid/high latitudes of the Northern hemisphere, great consistency with the surface signal.
In the Atlantic : weakening of the dipole structure in the equatorial waveguide (positive/negative anomaly in the Eastern/Western sides). Persistence of the positive anomaly in the North-Western part of the basin (close to the mid-latitudes). NW Atlantic is mostly facing above normal conditions. Over South Tropics 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.

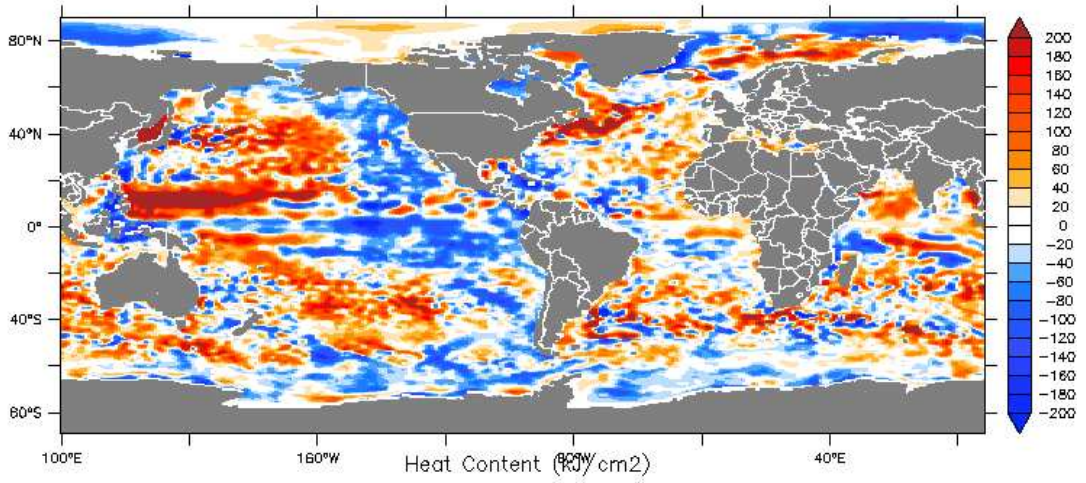


fig.2: map of Heat Content Anomalies (first 300m) in December 2012 (kJ/cm²). (reference 1950-2008) http://bcg.mercator-ocean.fr/

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

Weak anomalies. The largest anomalies are on the Western side of the basin. Little anomalies of the Trade Wind over most of the basin. The SOI is now negative (-0,6) and inconsistent with the SSTs (weak Ocean/Atmosphere coupling).

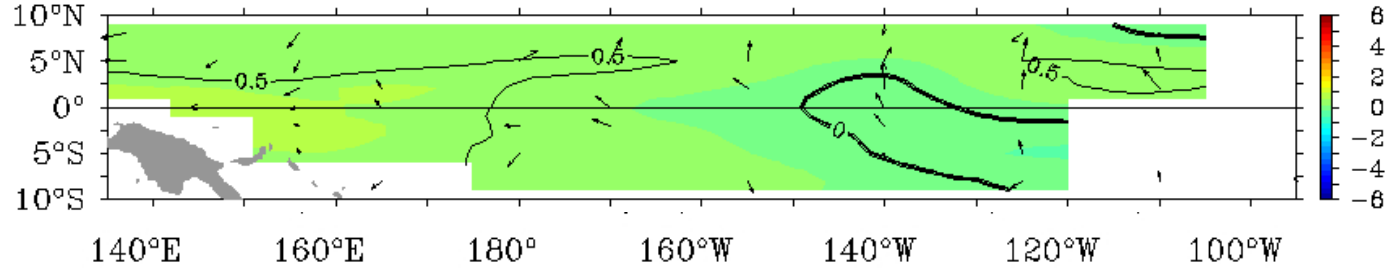


fig.3: SST Anomalies and Wind anomalies in December 2012 over the Equatorial Pacific from TAO/TRITON. http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/monthly-summary.html

In the Niño boxes (4, 3.4, 3 et 1+2 ; see definition in Annex) the SST anomalies illustrate the SST decrease (excepted in Niño 1+2 box). The monthly averages in November are respectively 0,3°C, -0,1°C, -0,2°C and -0,9°C from West to East.

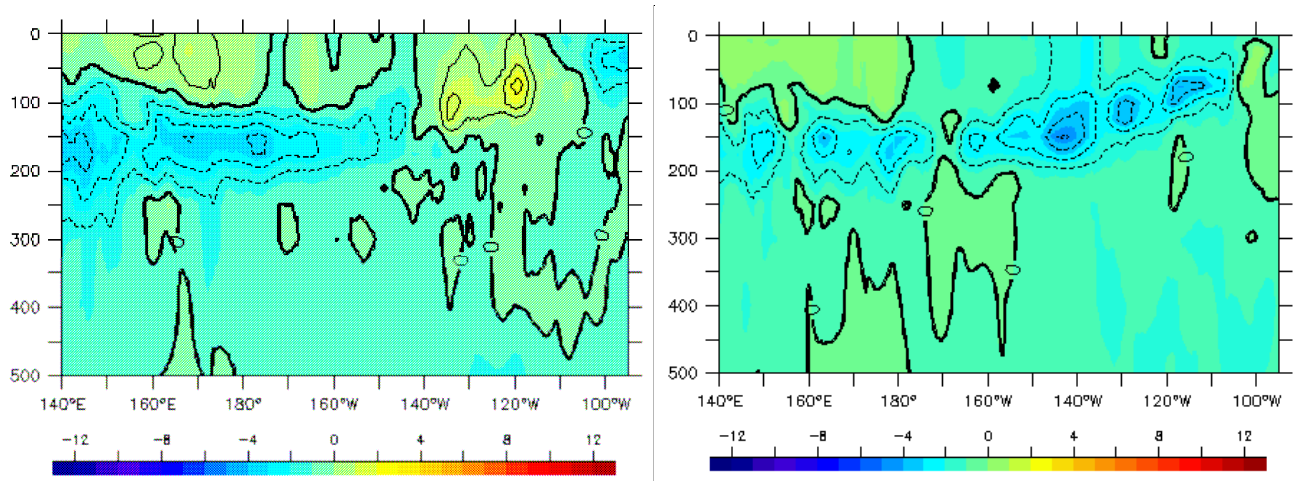


fig.4: Oceanic temperature anomaly in the first *500 metres* in the Equatorial Pacific, in November (left) and December 2012 (right) http://bcg.mercator-ocean.fr/

In the equatorial waveguide (fig. 4) : the traces of warmer than normal conditions in November under the surface in the Eastern part has been swept by the Kelvin wave propagation (colder than normal).
The thermocline structure (fig. 5) : Thinner than normal over most of the basin cionsistently with the temperature signal at the thermocline level. Wave propagation signal of the negative anomalies is visible across the basin.

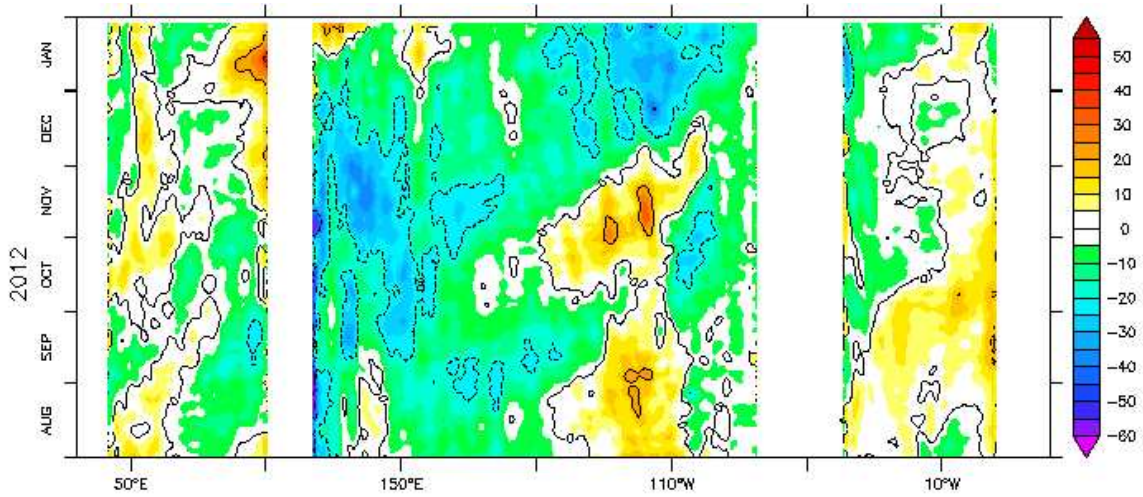


fig.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 6 month period. http://bcg.mercator-ocean.fr/

I.1.c Atlantic Basin

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

I.1.d Indian Basin

Southern Tropical Indian Ocean : warmer than normal close to West Australia.

Equatorial waveguide : warmer than normal conditions in Western part and warmer than normal in Eastern part (close to the maritime continent). The IOD is close to normal. Not too much trace of ocean dynamic.
Northern Tropical Indian Ocean : mostly warmer than normal.

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) : 2 major anomalies in the Tropics (East Indian Ocean and Caribbean) and quite a lot of sub-regional patterns.
On the Pacific : Convergent circulation anomaly (downward anomaly motion) on the North-Western Tropics and in the North-Eastern subtropics (consistent with SSTs) and Divergent circulation anomaly (upward anomaly motion) on the Northern part of the SPCZ. Additional sub-regional circulation anomaly in the Southern hemisphere across the Pacific. Weak but discernable Divergent circulation anomalies South-West to Hawai.
On the Atlantic : Strong Convergent circulation anomaly (downward anomaly motion) over the Caribbean and East to Brazil. In the Northern hemisphere, to be quoted the positive anomalies (downward anomaly motion) over coastal regions of North-West Africa. Divergent circulation anomaly over Africa South to the equator.
On the Indian Ocean : Strong negative anomaly (divergent circulation anomaly - upward anomaly motion) on the equatorial eastern side (with southward extension up to western side of Australia). The equatorial pattern seems to be partly related to the MJO activity.

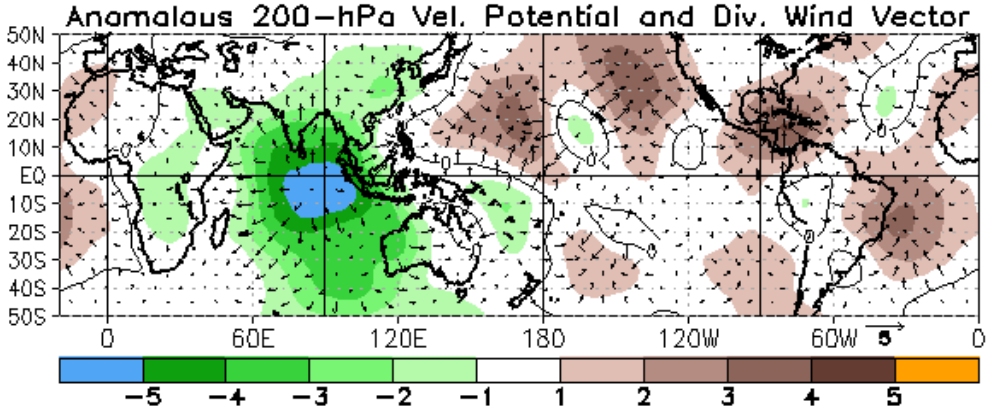


fig.6: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly in December 2012. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly). http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

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 in relationship with the convergent anomaly already pointed over the Pacific Western Tropics. Over the Atlantic and Europe, difficult to found a clear relationship with the SST forcing.

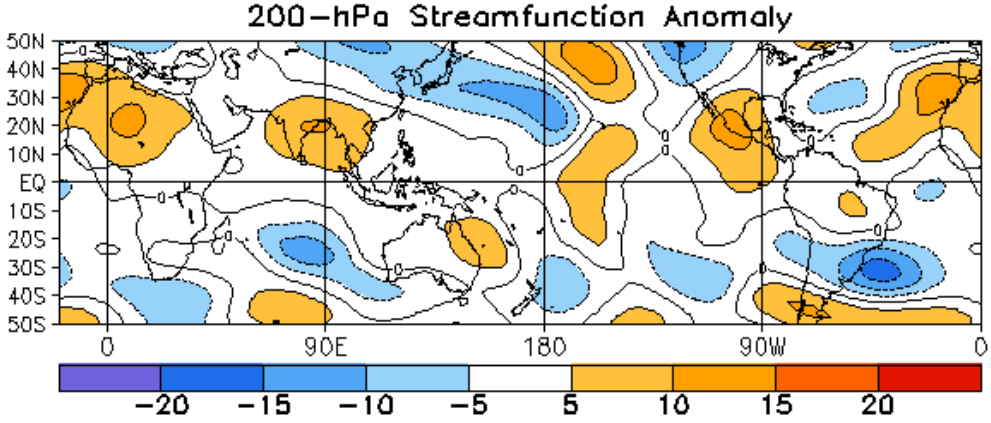


fig.7: Stream Function Anomalies at 200 hPa in December 2012.
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

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. In the Northern hemisphere, anomalies are mostly meridionnal (inferring a weakening of the zonal circulation). Consequently the main active atmospheric modes in the Northern hemisphere (see next table) seems to be mostly related to mid-latitude dynamic. The active modes are the Scandinavian (+2.0), the TNH (-1.3) and a PNA-like mode (-1.3 – partly related to mid-latitude circulation). Also for Europe, the East-Atlantic/West Russia mode (-0.9) and the EA (+0.7 related to Z500 anomaly over North-West Africa).

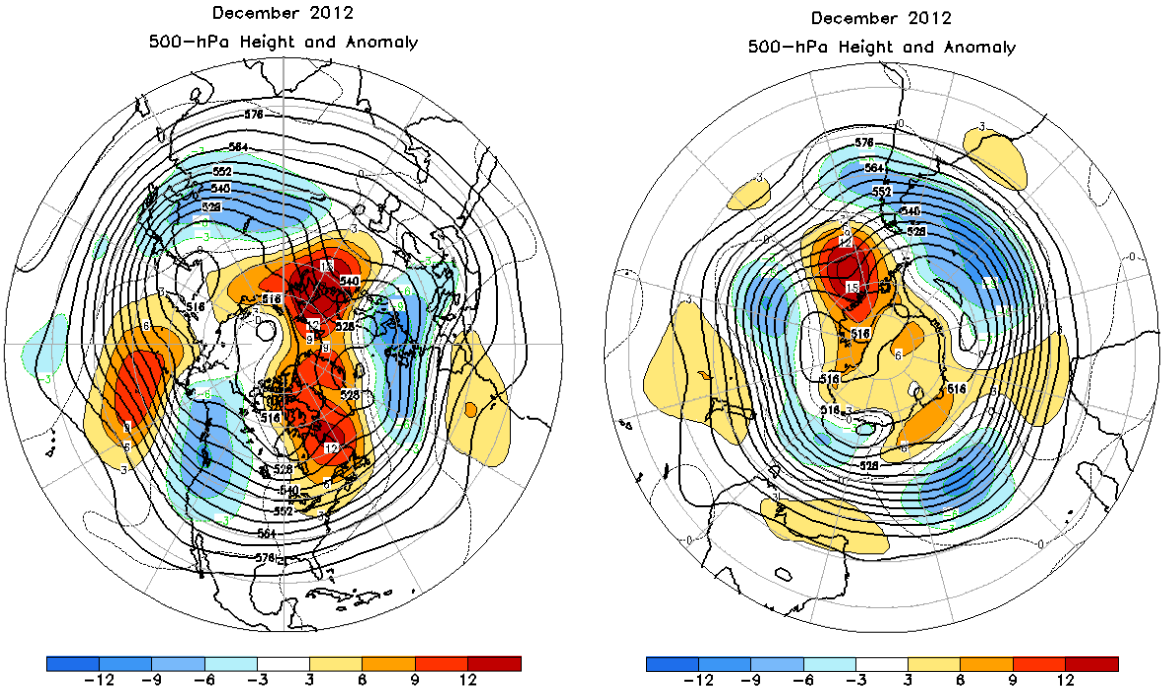


fig.8: Anomalies of Geopotential height at 500hPa in December 2012 (left North Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige9.shtml, and right South Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige15.shtml)

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
DEC 12	**0.1**	**0.7**	**-0.6**	**---**	**-1.3**	**-1.3**	**-0.9**	**2.0**	**0.4**
NOV 12	-0.7	1.1	-2.0	0.1	-1.1	---	-0.6	0.7	-0.2
OCT 12	-1.7	-0.3	-2.5	0.6	-1.1	---	-1.0	-0.3	-0.2
SEP 12	-0.4	0.4	0.7	0.2	-0.4	---	-0.5	-0.9	-0.7
AUG 12	-1.4	1.4	-0.1	0.6	-0.2	---	1.1	0.8	1.0
JUL 12	-1.3	1.0	0.6	-1.0	-0.6	---	-1.4	-0.6	1.0

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

I.2.b Precipitation

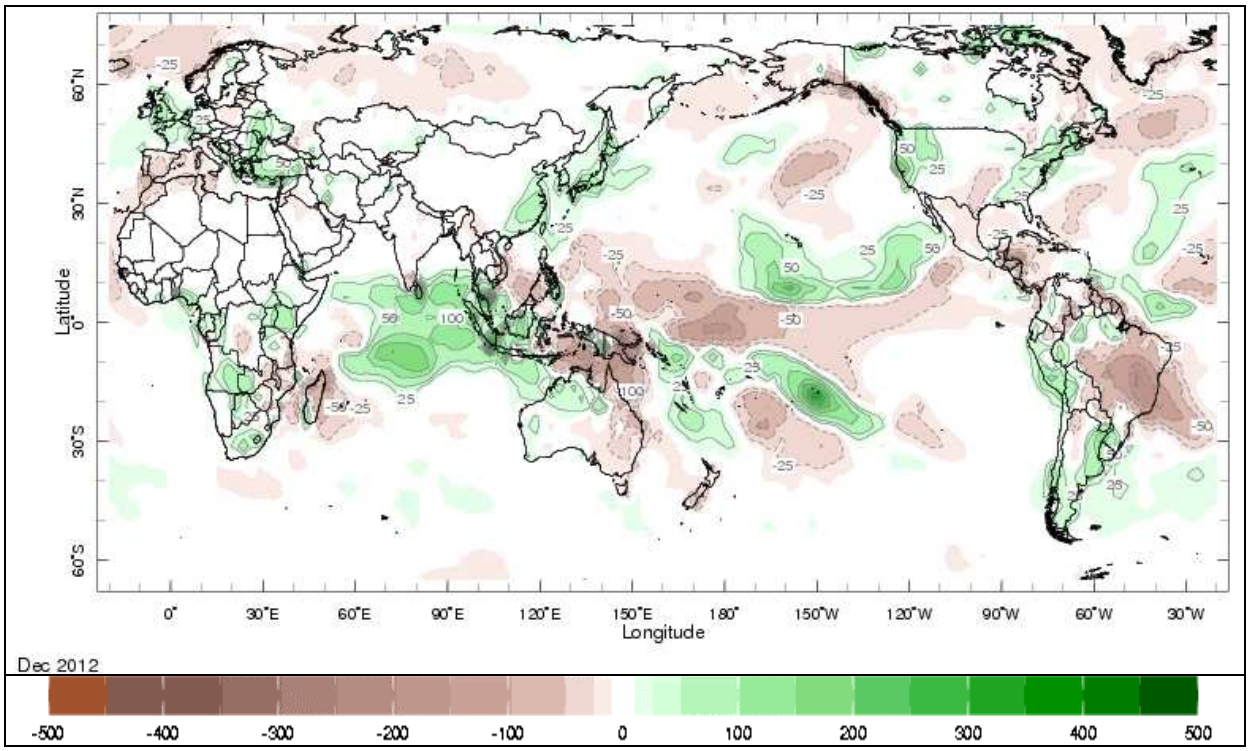


fig.9: Rainfall Anomalies (mm) in December 2012 (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.
http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/

In relationship with the Velocity Potential anomaly field, the patterns are :
Pacific : quite good consistency with the Divergent/Convergent Circulation anomalies ; especially over the Western Tropics and the SCPZ region.
Atlantic/Africa : Clear relationship with the velocity potential field anomaly. Strong negative anomaly centred over Brazil and positive anomaly over Argentina. To be quoted the positive anomalies over Southern Africa.
Indian Ocean : strong positive anomaly over most of the Eastern (and central) part.
Australia : some traces of negative anomalies, especially over Eastern regions.
North America : mostly dry over coastal area of West Canada and Alaska and wet over the Rocky mountain and Western coast of US (PNA-like pattern). Wet over the Eastern coast.
Over Europe : to be quoted the positive anomalies (wet) on the Eastern part (also some on the western façade). Also dry conditions over the South-West Mediterranean.

I.2.cTemperature

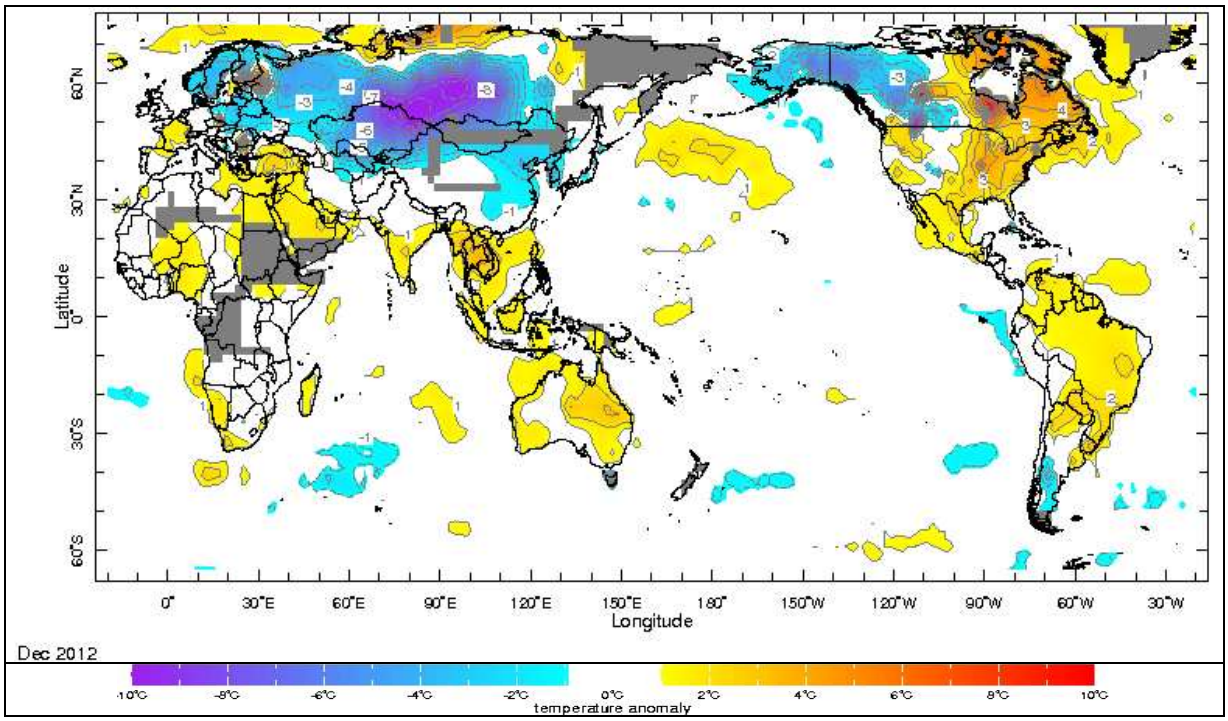


fig.10: Temperature Anomalies (°C) in December 2012 (departure to the 1979-2000 normal) http://iridl.ldeo.columbia.edu/maproom/.Global/.Atm_Temp/Anomaly.html

North-America : Strong anomalies. Warmer than normal conditions over half of the Eastern continent counterbalanced by colder than normal conditions over Alaska and West Canada.
South-America : mostly Warmer than normal conditions North to 40°S.
Australia : Warmer than normal conditions more or less everywhere.
Asia : Close to normal conditions excepted over Eastern Siberia and China (strong positive anomaly).
Africa : Warmer than normal conditions over the North Eastern part of the continent (including the Arabic Peninsula).
Europe : Above normal conditions over Eastern Mediterranean regions. Colder than normal conditions over the Northern areas.

I.2.d Sea Ice

In Arctic (fig. 11 - left) : still the sea-ice extension reached its minimum value and new record (negative anomaly close to 2011-2012 value).
In Antarctic (fig. 11 - right) : above normal sea-ice extension anomaly with some regional modulation. The growing rate seems to be above normal.

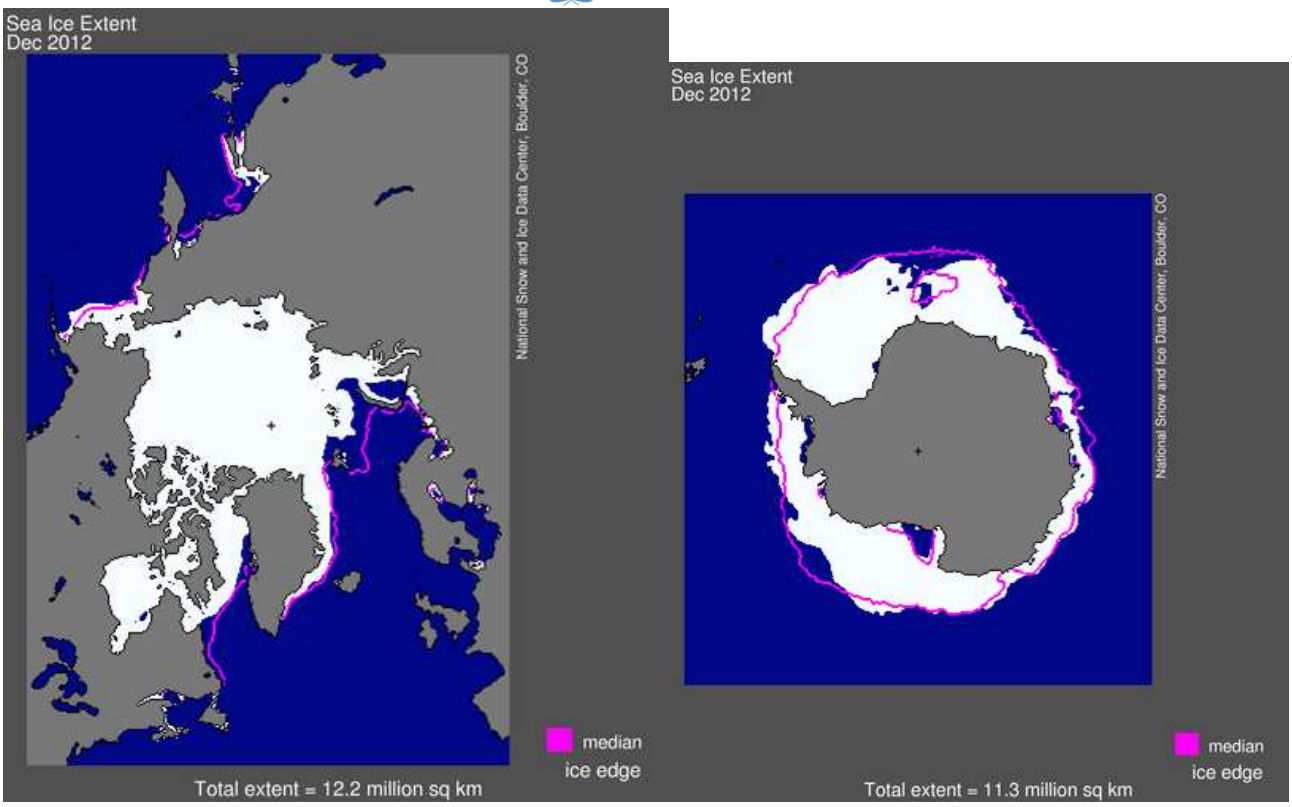


fig.11: Sea-Ice extension in Arctic (left), and in Antarctic (right) in December 2012. The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

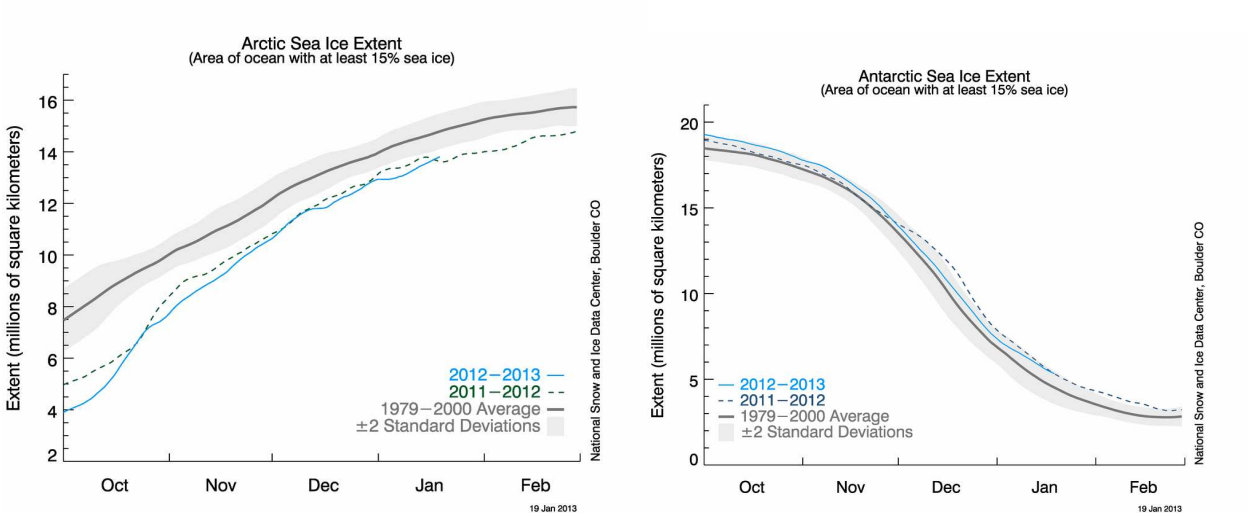


fig. 9bis : Sea-Ice extension evolution from NSIDC
http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png

II.SEASONAL FORECASTS FOR FMA FROM DYNAMICAL MODELS

II.1. OCEANIC FORECASTS

II.1.a Sea Surface Température (SST)

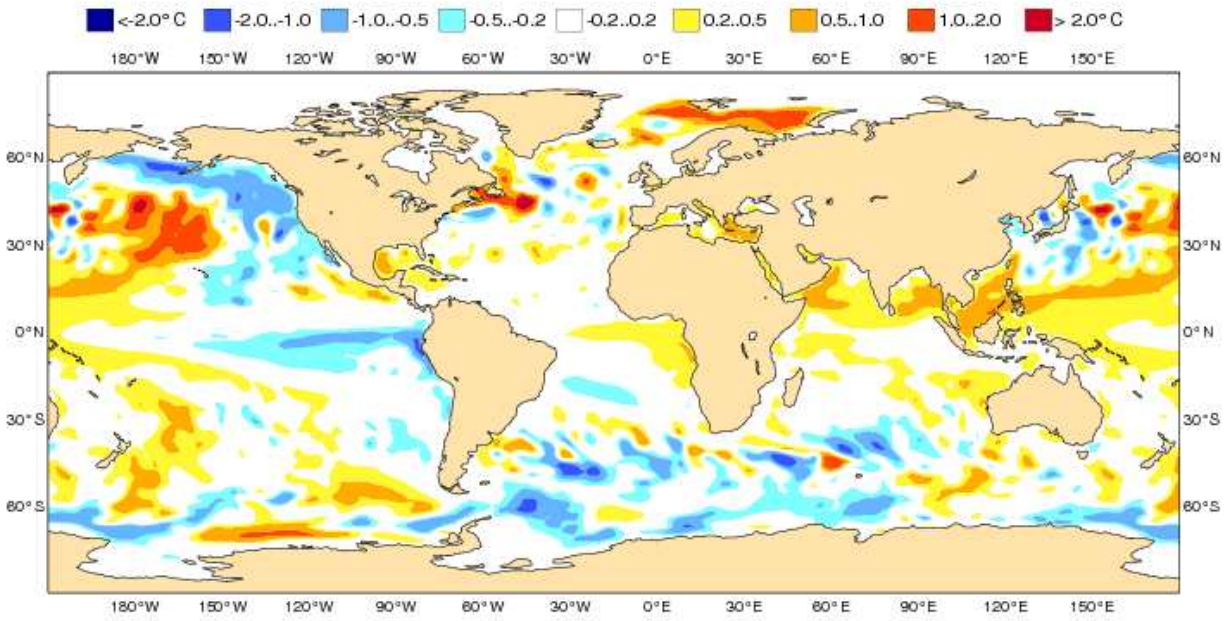


fig.12: SST anomaly forecast (in °C) from ECMWF for FMA, issued in January.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

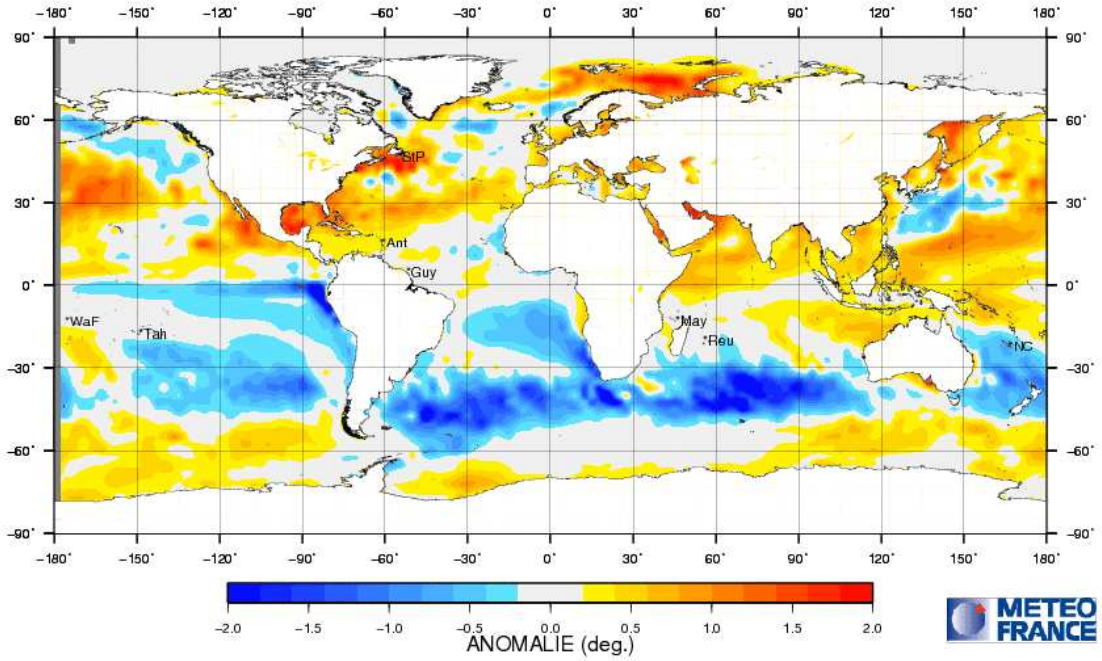


fig.13: SST Anomaly forecast (recalibrated with respect of observation) from Météo-France for FMA, issued in January. http://elaboration.seasonal.meteo.fr/

For the 2 individual models :

At large scale consistent over most of the Tropics despite some sub-regional differences and a different reference period for the hindcast (81-2010 for ECMWF and 93-2010 for MF system 4). The main difference comes from the Southern Pacific and Southern Atlantic.
Pacific : along the equator colder than normal conditions on the Eastern and Central part of the basin and warmer than normal conditions West to the date line. Off equator, warmer than normal conditions in the Tropical latitudes (in the North Tropics consistently with the warm reservoir under the surface and over the SPCZ in the South). Warmer than normal conditions close to California. Some differences in the sub-topics of the Southern hemisphere with colder than normal conditions in MF (Central and Eastern part) while the signal is weak (even slightly warmer than normal in the Central part) in ECMWF.
Atlantic : both models quite consistent over the Tropical South Atlantic (slightly colder than normal in the Tropics/sub-Tropics), the Tropical North Atlantic (warmer than normal in the Western side extending toward North Africa and Spain) and the mid-latitudes of the Northern hemisphere. Close to the Equator warmer than normal signal along the Western coast of Southern Africa which extends toward the Guinean Gulf more marked in ECMWF).
Indian Ocean : Very consistent patterns in both models. Warmer than normal more or less everywhere. The main difference to highlight is the colder than normal conditions in MF close to Southern mid-latitudes which are not really present in ECMWF.

In Euro-SIP :
Main patterns very similar to the 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 west to the date line and colder than normal in the Central and Eastern part of the basin. Note the positive anomalies in the North-Western Tropics and in the North-Western region of the SCPZ. To be quoted the very consistent behaviour in the mid/high latitudes of the Northern Hemisphere.
Atlantic : Weak signal over the Tropics (both South and North). Some consistency over the mid-latitudes of the Northern Hemisphere.
Indian Ocean : mostly warmer than normal conditions North to the Equator and close to Australia and the maritime continent.

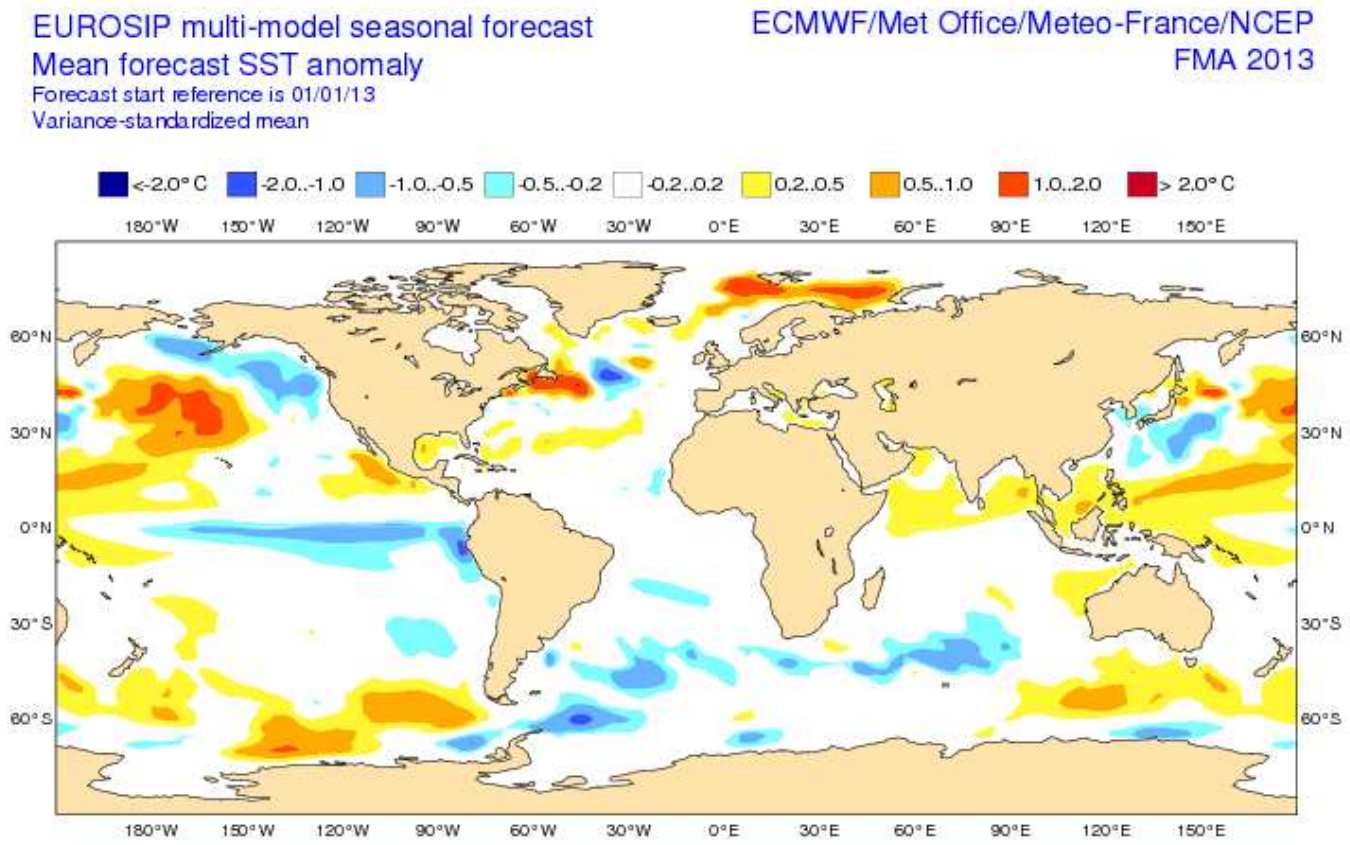


fig.14: SST Forecasted anomaly (in °C) from Euro-SIP valid for FMA, issued in January.

II.1.b ENSO Forecast :

Forecasted Phase for FMA : neutral

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 FMA : a large set of dynamical models give close to normal conditions (despite one is indicating a weak La Niña event) and the evolutions are very weak along the whole the period. For the statistical models, they are mostly forecasting close to normal conditions. So a neutral situation is expected in winter up to the beginning of Spring.

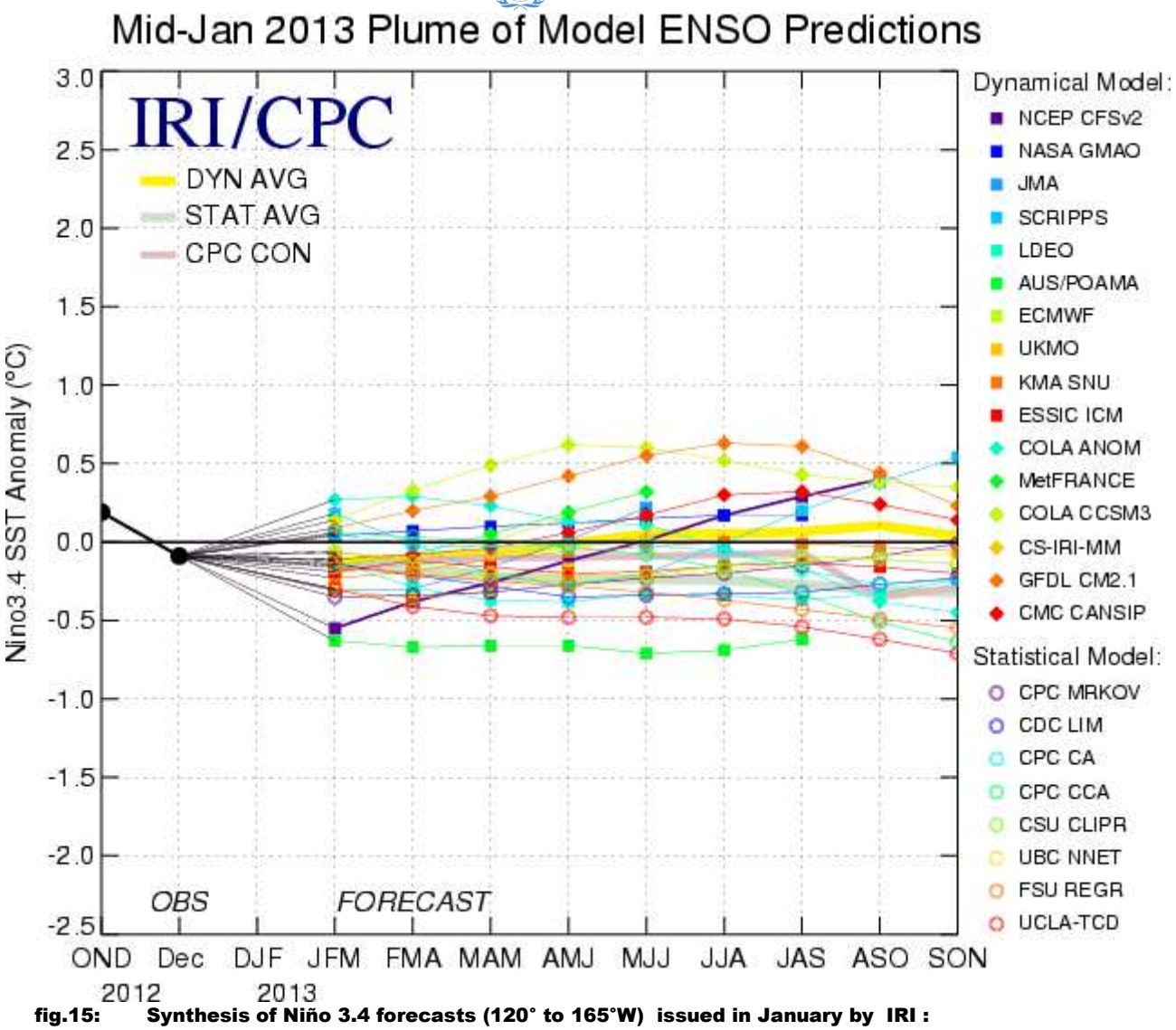


fig.15: Synthesis of Niño 3.4 forecasts (120° to 165°W) issued in January by IRI :
http://iri.columbia.edu/climate/ENSO/currentinfo/SST_table.html

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	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	
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***	
Average, statistical models	*-0.1*	*-0.2*	*-0.2*	*-0.2*	*-0.2*	*-0.2*	*-0.3*	*-0.3*	
Average, dynamical models	-0.1	-0.1	-0.1	0	0.1	0.1	0.1	0.1	
Average, all models	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	

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

NIÑO 4 NIÑO 3.4 NIÑO 3

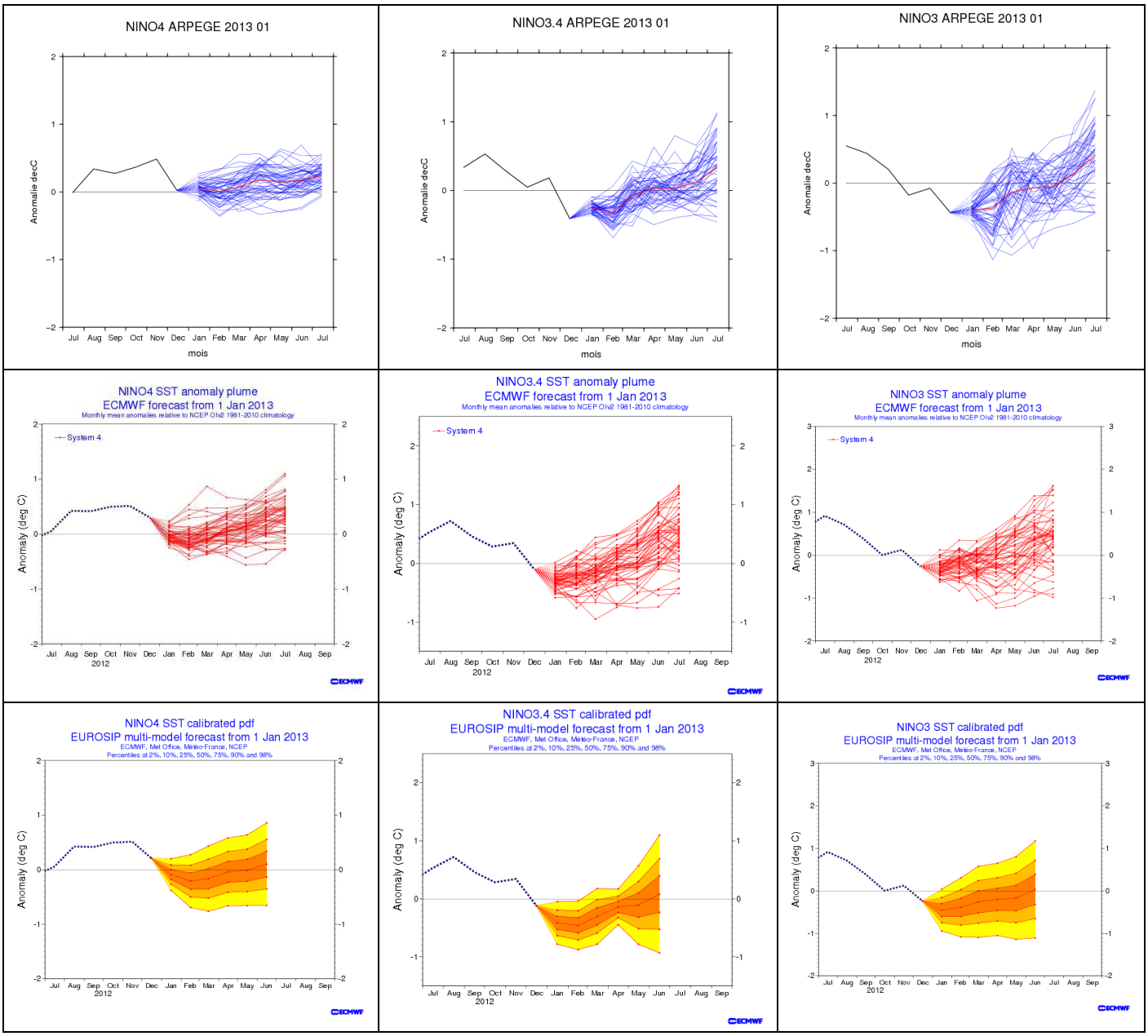


fig.16: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members - and EuroSIP (bottom) – recalibrated distributions - issued in January.
(http://www.ecmwf.int/ **)**

II.1.c Atlantic Ocean forecasts :

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

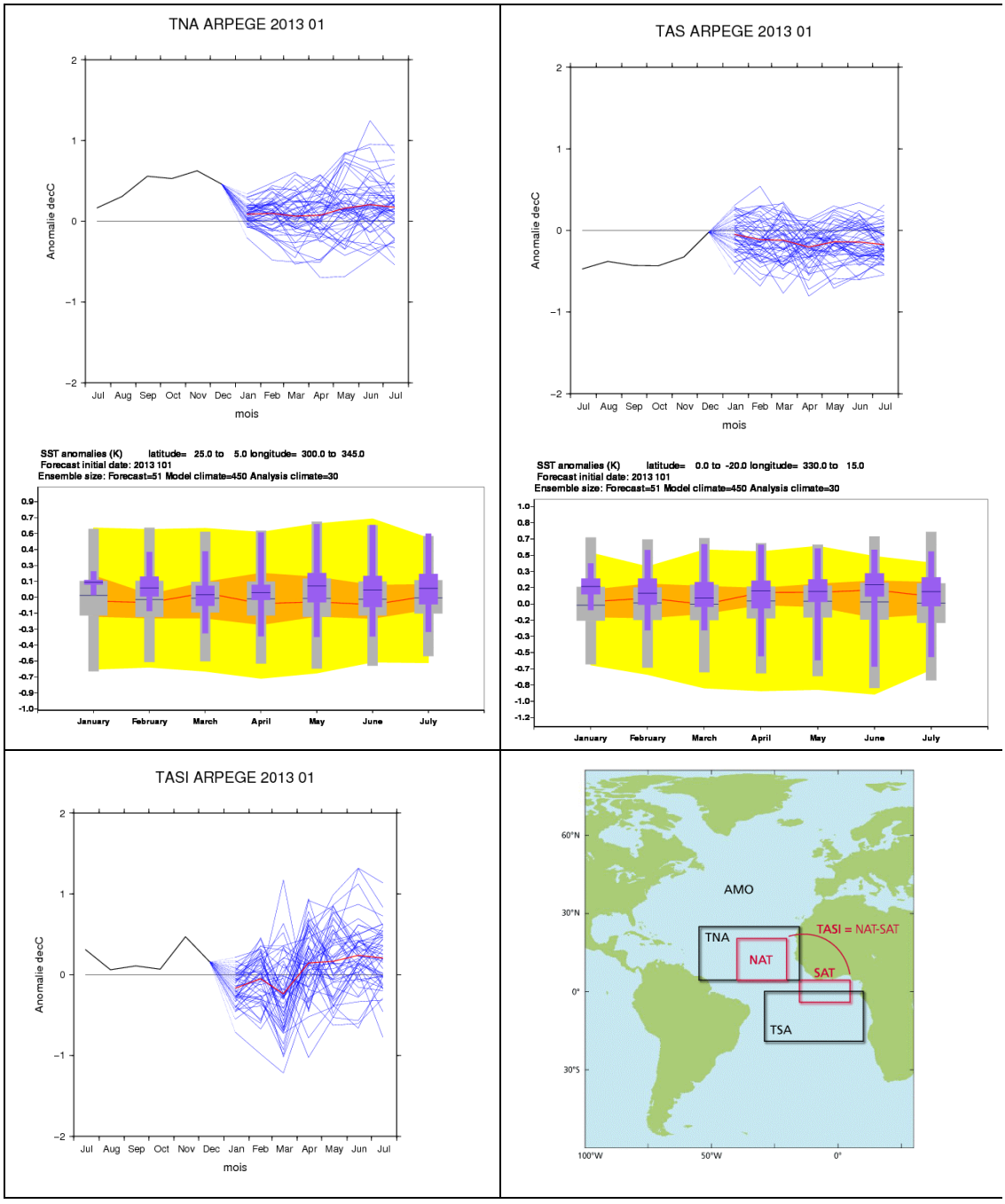


fig.17: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, issued in January, plumes / climagrams correspond to 41 / 51 members and monthly means.

North Tropical Atlantic : slightly warmer than normal conditions in both models with a quite large spread.
South Tropical Atlantic : in both models same time tendency (slight decrease of the temperature) starting with slightly cold conditions in MF and slightly warmer than normal conditions in ECMWF (possibly related to differences in the hindcast periods).
The inter-hemispheric SST gradient should stay slightly positive/close to neutral.
TASI : the TASI index is close to normal. However, the spread is very large which lead to be cautious on this interpretation.

II.1.d Indian Ocean forecasts :

Forecasted Phase: *IOD slightly positive with uncertainty*

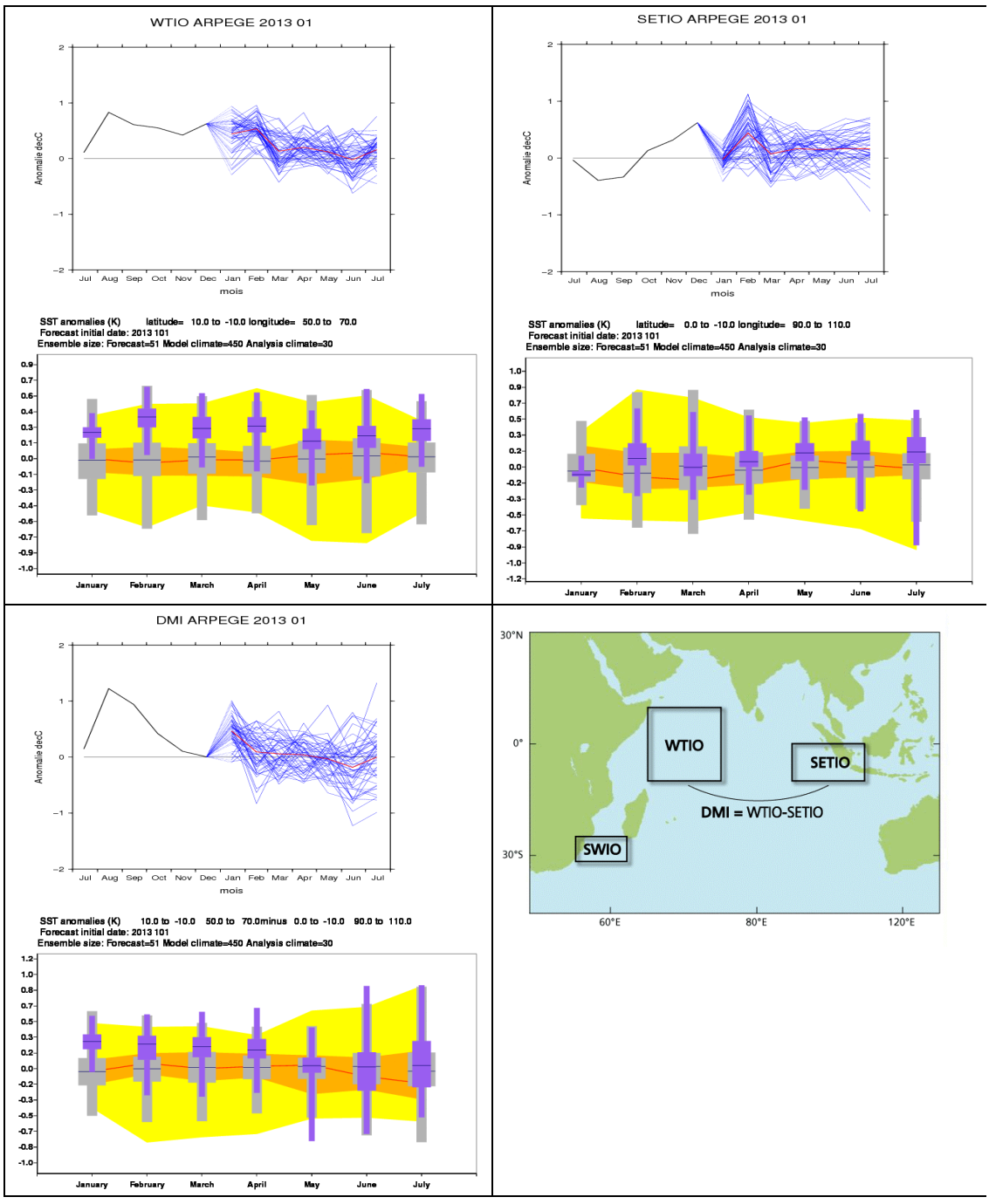


fig.18: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, issued in January, plumes / climagrams correspond to 41 / 51 members and monthly means.

In WTIO : Warmer than normal conditions in both models with little spread. However MF indicates a continuous decrease while ECMWF gives a stable signal. Relative little spread in both models.
In SETIO : Slightly warmer than normal in MF and ECMWF consistently with the Western Pacific SSTs. warmer than normal conditions, in relationship with differences (with MF) in the Equatorial Pacific evolution. Relative little spread in both models.
DMI (IOD) : Close to normal conditions in both models.

II.2. GENERAL CIRCULATION FORECAST

II.2.a Global Forecast

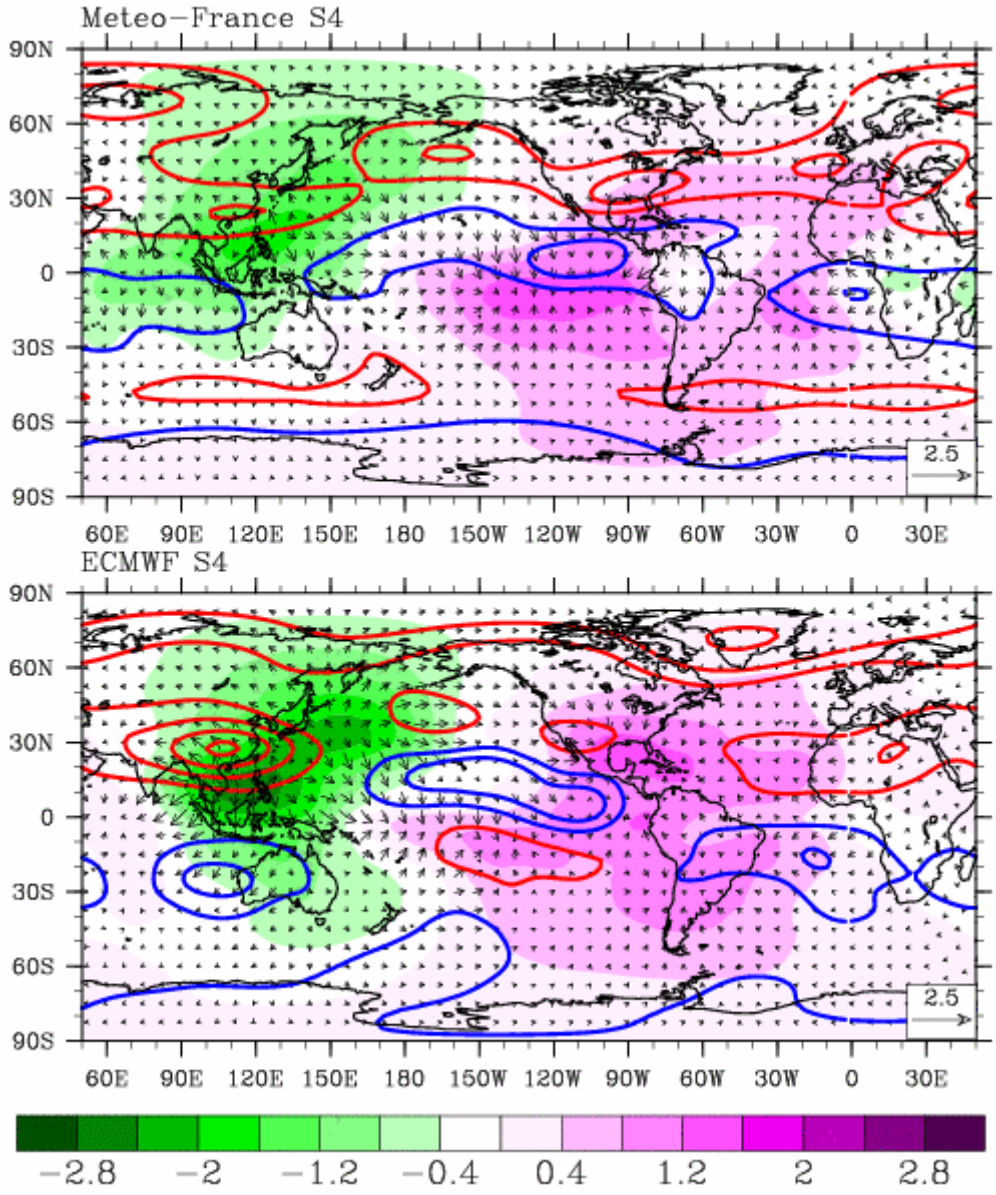


fig.19: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), associated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa for FMA, issued in January by Météo-France (top) and ECMWF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

Velocity potential anomaly field (cf. fig. 19 – insight into Hadley-Walker circulation anomalies) :
in the Tropics : atmospheric response quite consistent over the Pacific ; generally speaking weak anomalies in relationship with the weak SST forcing and weal Ocean/Atmosphere coupling.
Over the Pacific : Good consistency between the models with a contrasted behaviour between the Western and Central/eastern part of the tropical basin. Consequently Divergent circulation anomaly (upward motion) over the North West Tropics extending over the maritime continent (consistently with SSTs) and Convergent circulation anomaly (downward motion) in the Southern Central and Eastern Pacific.
Over Indian Ocean : weak signal in both models but differences in the atmospheric response ; increased divergent circulation anomaly over equatorial regions in MF ; not too much signal in ECMWF.

Over Atlantic : the models show some differences over the South Atlantic. Convergent circulation anomaly (downward motion) East to Brasil and a weak but discernable Divergent circulation anomaly over equatorial Africa in MF. Over the Caribbean both models give a Convergent circulation anomaly.
Stream Function anomaly field (cf. fig. 19 – insight into teleconnection patterns tropically forced) :
In both models, over the Pacific weak signal toward the mid-latitudes. However, the similarity of the cells (in MF and ECMWF) suggest that the Tropics could have an (limited) impact onto the mid-latitudes. The predictability seems to be fairly good around the Pacific basin.
Over the Atlantic the weakness and differences in both models suggest a weak predictability at seasonal scales (like over regions close to the Indian Ocean).

II.2.b North hemisphere forecast and Europe

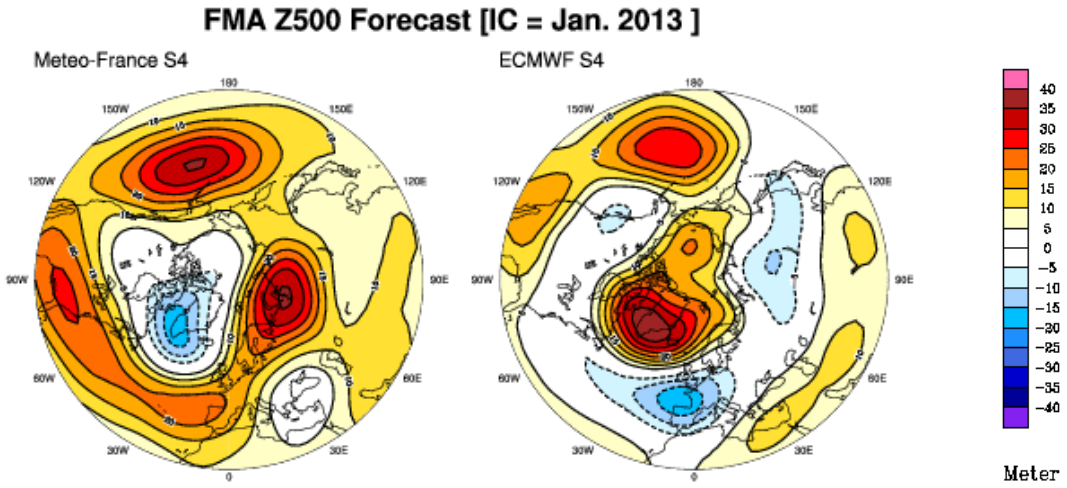


fig.20: Anomalies of Geopotential Height at 500 hPa for JFM, issued in January from Météo-France (left) and ECMWF (right).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip

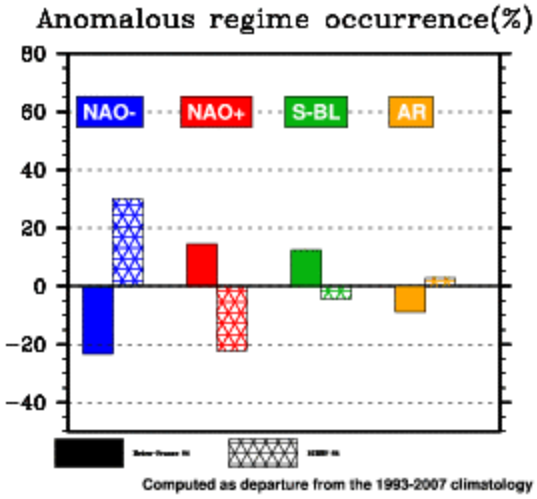


fig.21: North Atlantic Regime occurrence anomalies from Météo-France and ECMWF : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.

Geopotential height anomalies (fig. 20 – insight into mid-latitude general circulation anomalies) :
As seen on the Stream Function anomalies, there is some similarity on the Pacific and then large differences (especially over the North Atlantic sector).
North Atlantic Circulation Regimes (fig. 21) : As a consequence, the circulation regimes forecasts are

opposite between MF and ECMWF. .

General atmospheric circulation in MF in the low troposphere (see fig. 22) : the zonal circulation over Europe is increased and northward shifted. However, the solution proposed by ECMWF should be quite different consistently with the increase of NAO – situations.

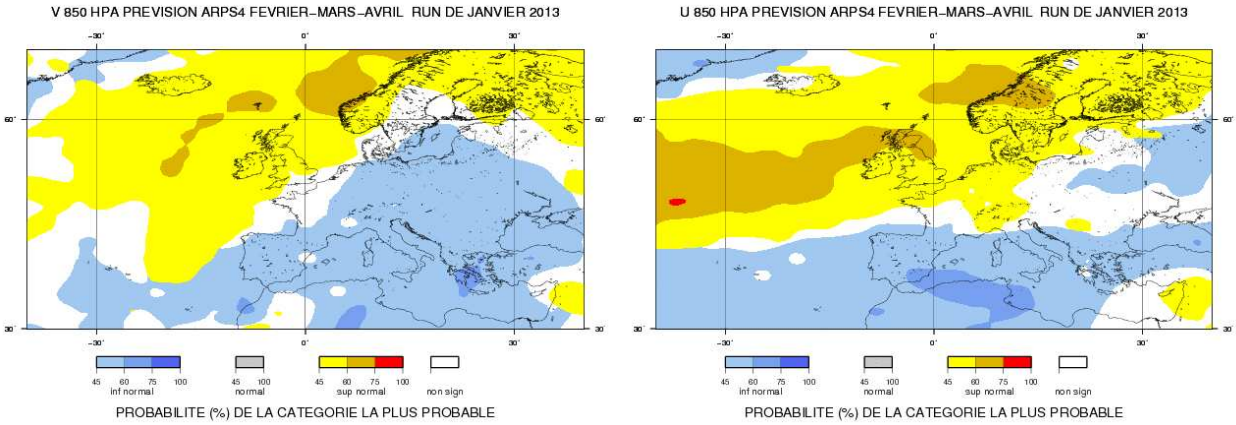


fig.22: Most likely category for the meridional (left) and zonal (right) wind at 850 hPa for FMA, issued in January from Météo-France.

II.3. IMPACT : TEMPERATURE FORECASTS

II.3.a ECMWF

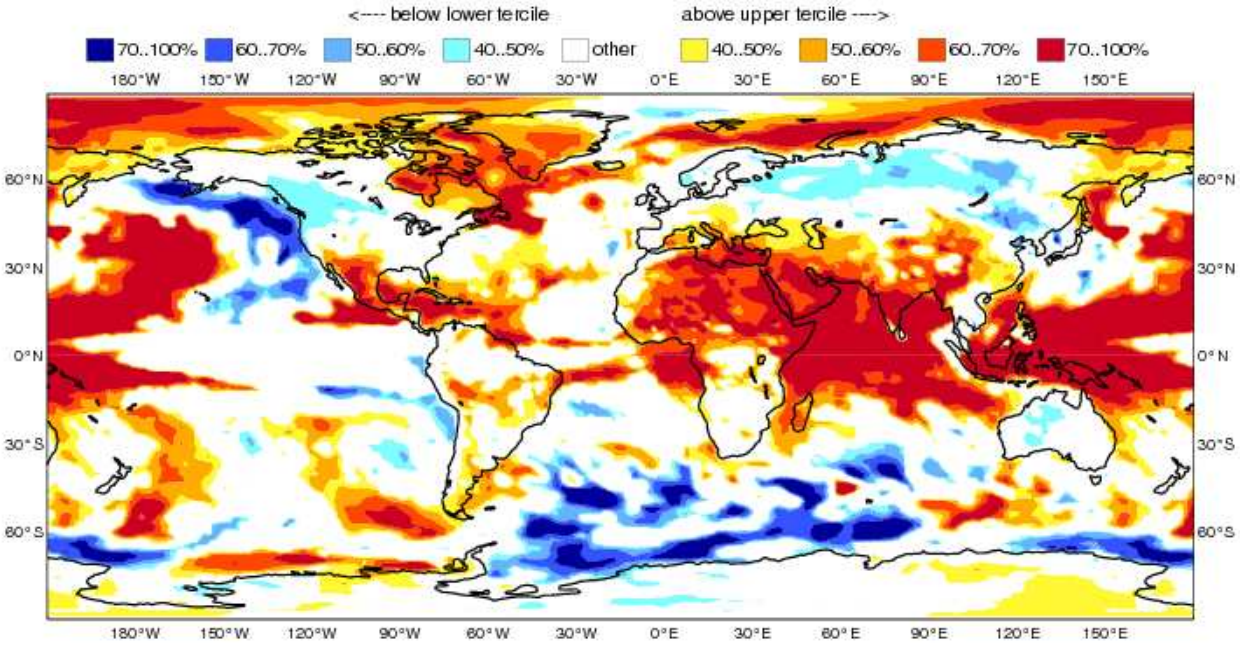


fig.23: Most likely category probability of T2m from ECMWF for FMA, issued in January. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

II.3.b Météo-France

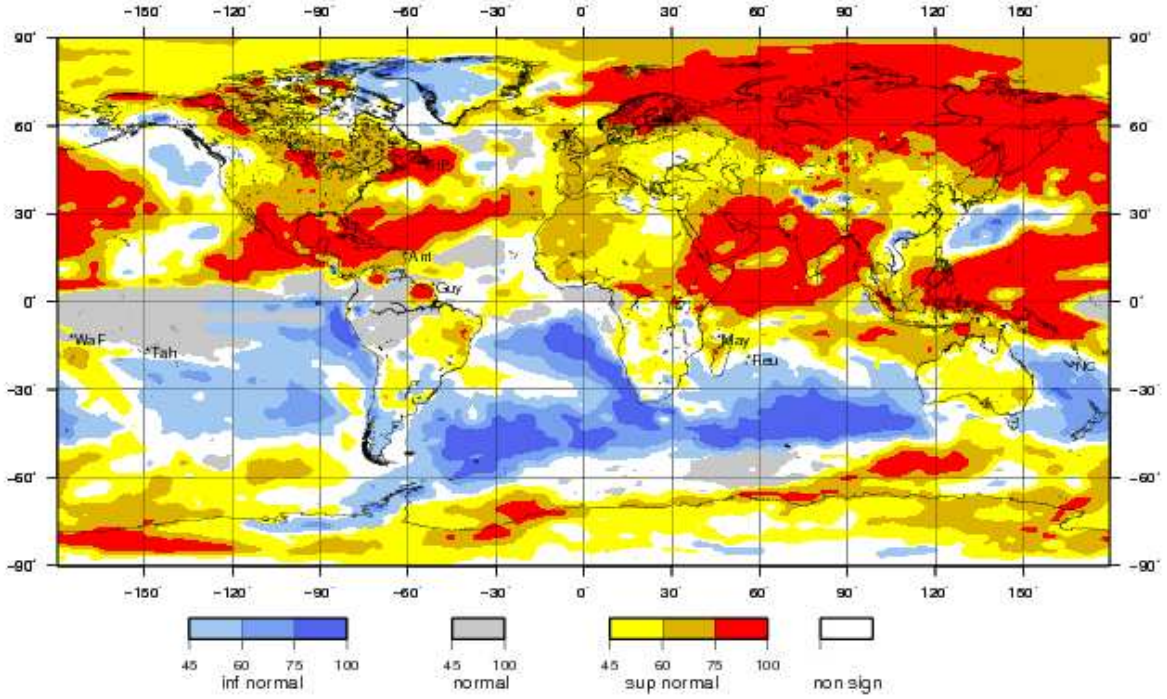


fig.24: Most likely category of T2m for FMA, issued in January. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.3.c Met Office (UKMO)

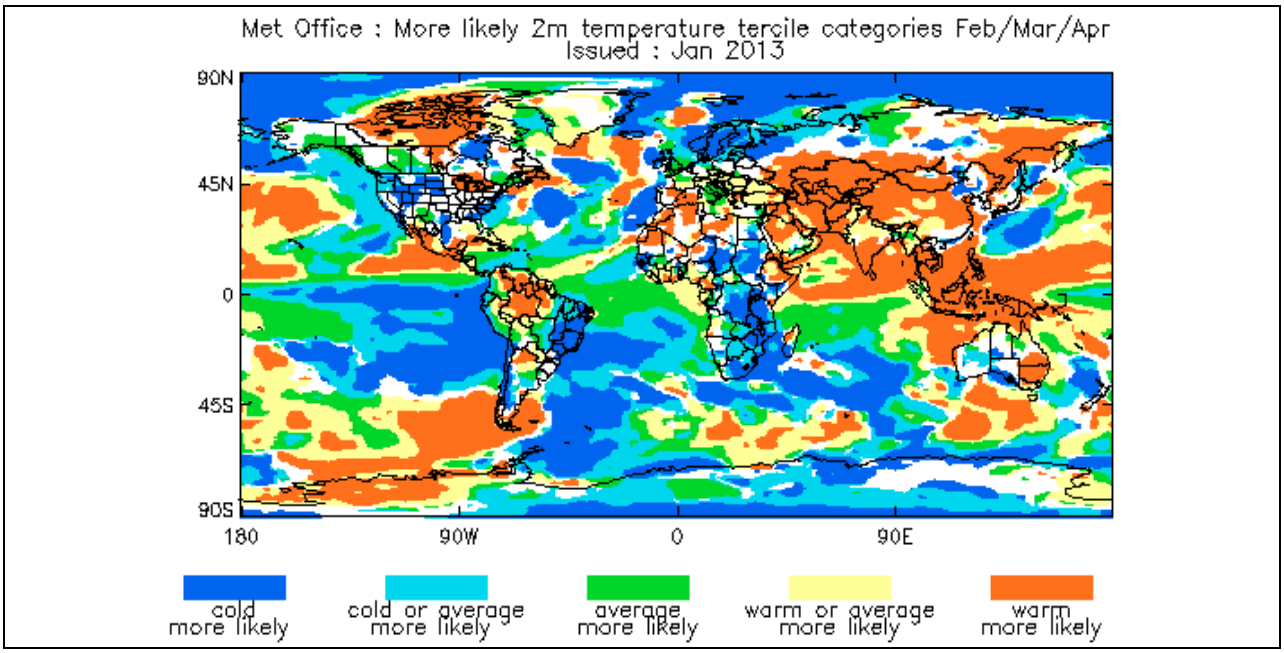


fig.25: Most likely category of T2m for FMA, issued in January from UK Met Office. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://www.metoffice.gov.uk/

II.3.d Japan Meteorological Agency (JMA)

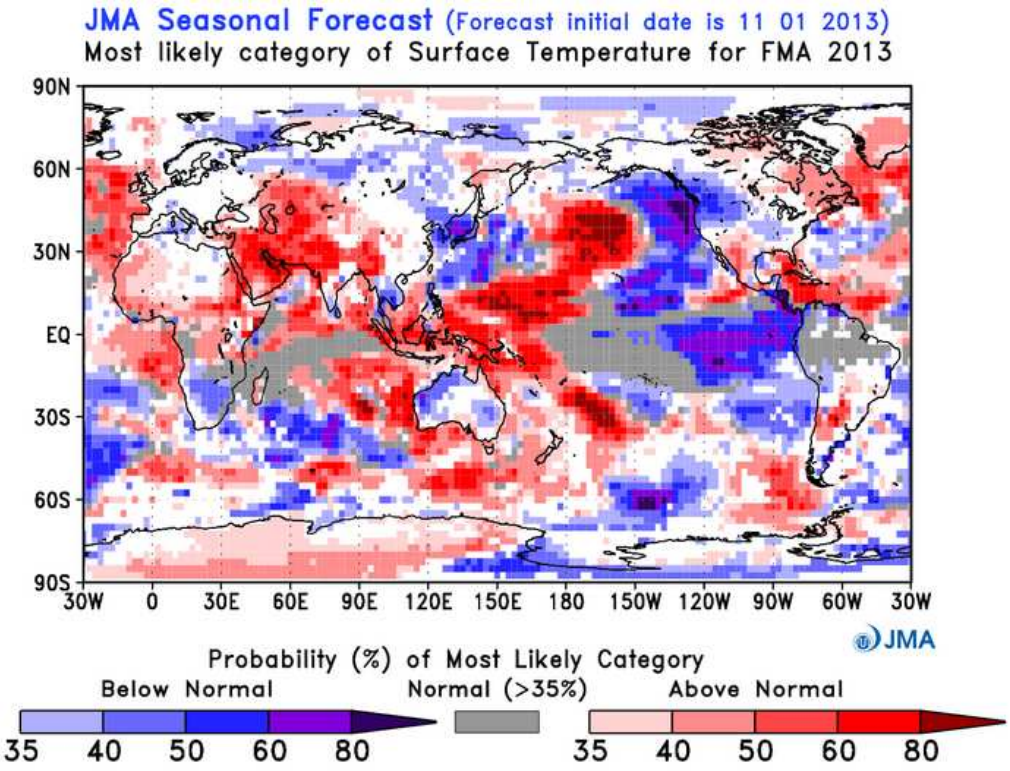


fig.26: Most likely category of T2m for FMA, issued in January from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.html

II.3.e Euro-SIP

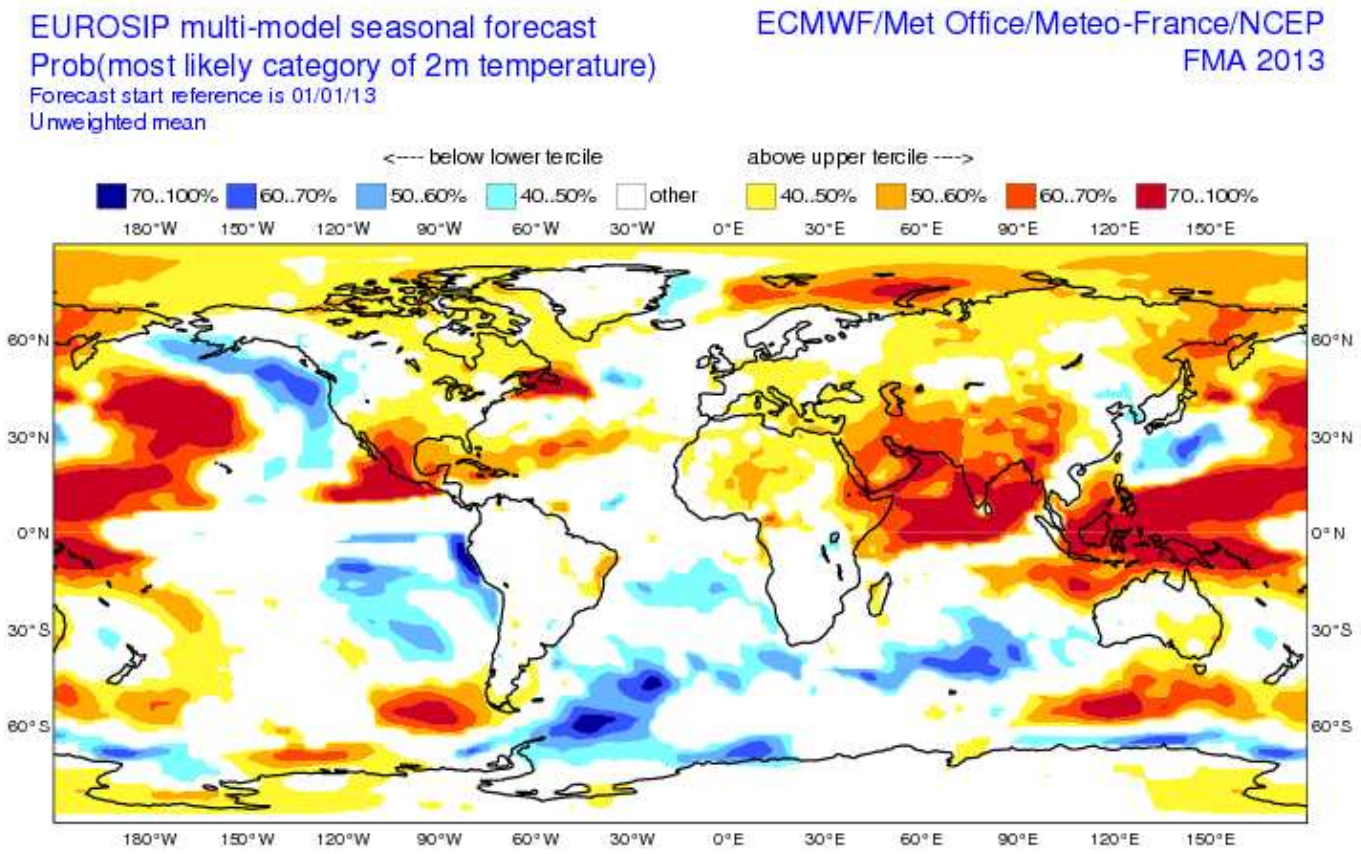


fig.27: Multi-Model Probabilistic forecasts for T2m from EuroSip for FMA, issued in January. (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).

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

North-America : Warmer than normal conditions around the Mexico Gulf including California and North-East regions. Colder than normal over the coastal areas of Alaska and West Canada.
South-America : No signal more or less everywhere.
Australia : Warmer than normal on the Eastern side.
Asia : Warmer than normal conditions over the maritime continent, India and adjacent regions up to the Arabic Peninsula and Siberia. Below normal conditions close to Korea.
Africa : Warmer than normal conditions on the Great Horn of Africa and from Nigeria to North African countries.
Europe : No signal over most of the western part of the continent. Warmer than normal scenario over Central and South-Eastern regions.

II.3.fInternational Research Institute (IRI)

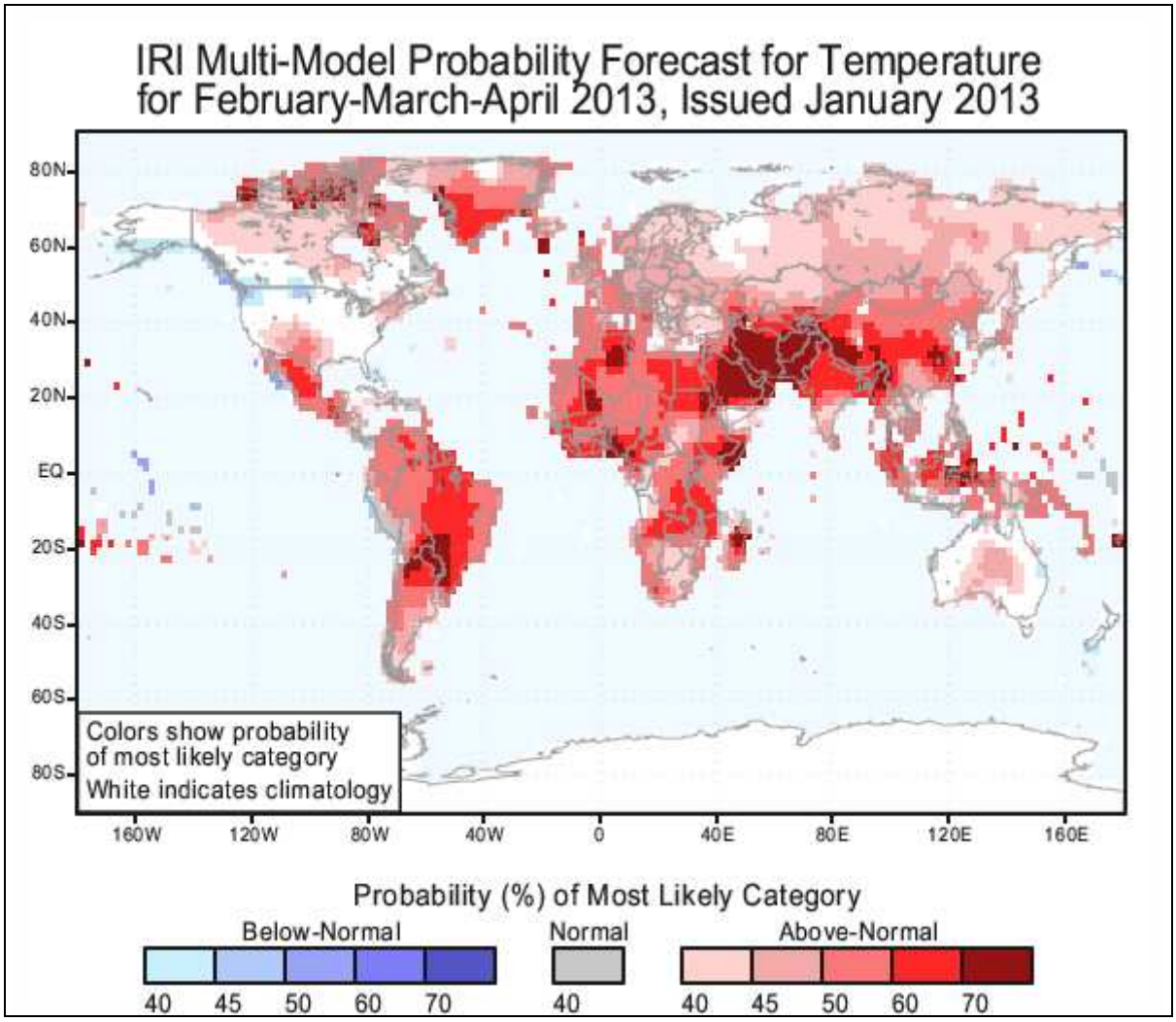


fig.28: Most likely category of T2m for FMA, issued in January from the IRI multi-model ensemble. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://iri.columbia.edu/climate/forecast/net_asmt/

More signal (warmer than normal) with respect of Euro-SIP. So quite a lot of differences over Europe, Asia, Africa and American continents. IRI tends to be warmer than normal in a lot of countries. To be quoted the relative good consistency (with EuroSIP) for the North American continent.

II.4. IMPACT : PRECIPITATION FORECAST

II.4.a ECMWF

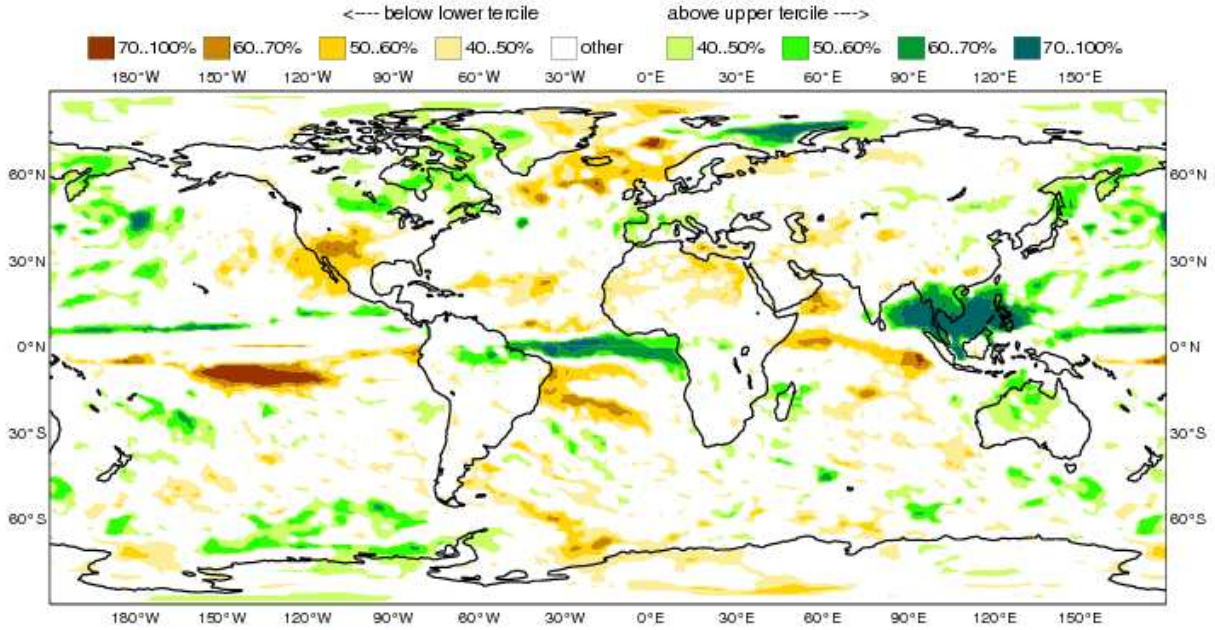


fig.29: Most likely category probability of rainfall from ECMWF for FMA, issued in January. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/charts/seasonal_charts_s2/

II.4.b Météo-France

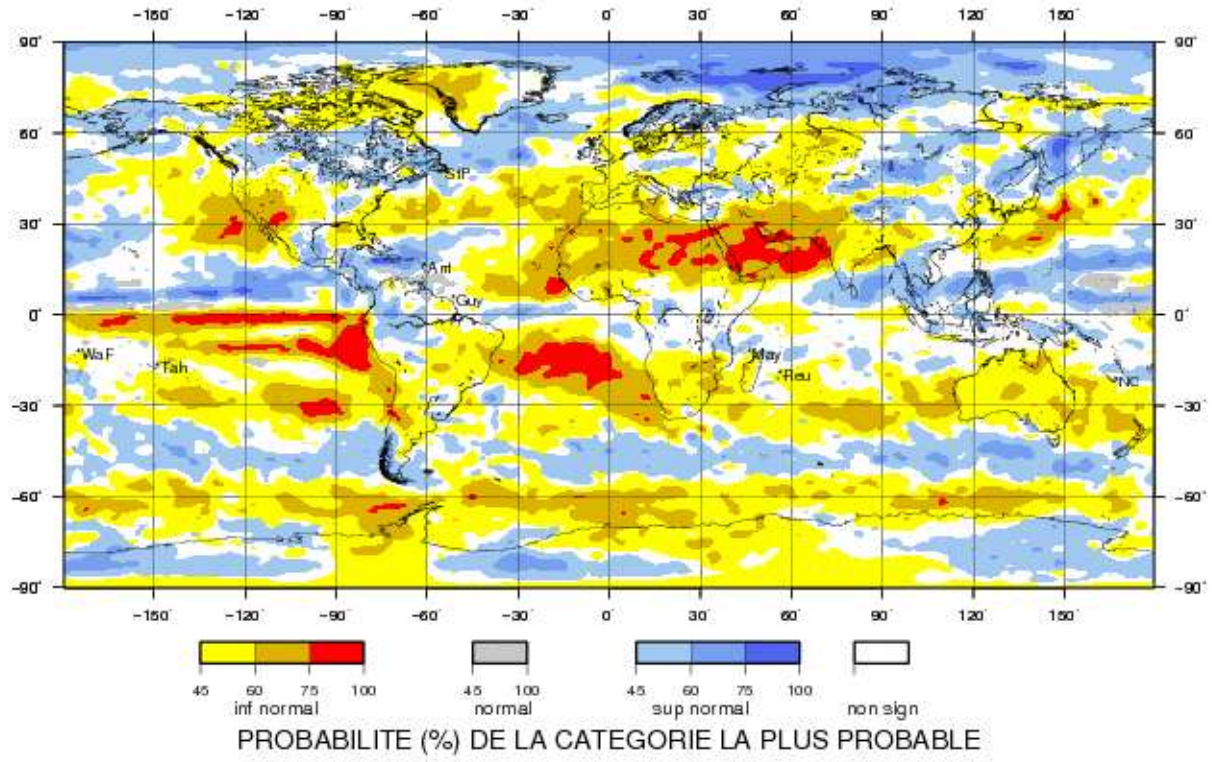


fig.30: Most likely category of Rainfall for FMA, issued in January. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Met office (UKMO)

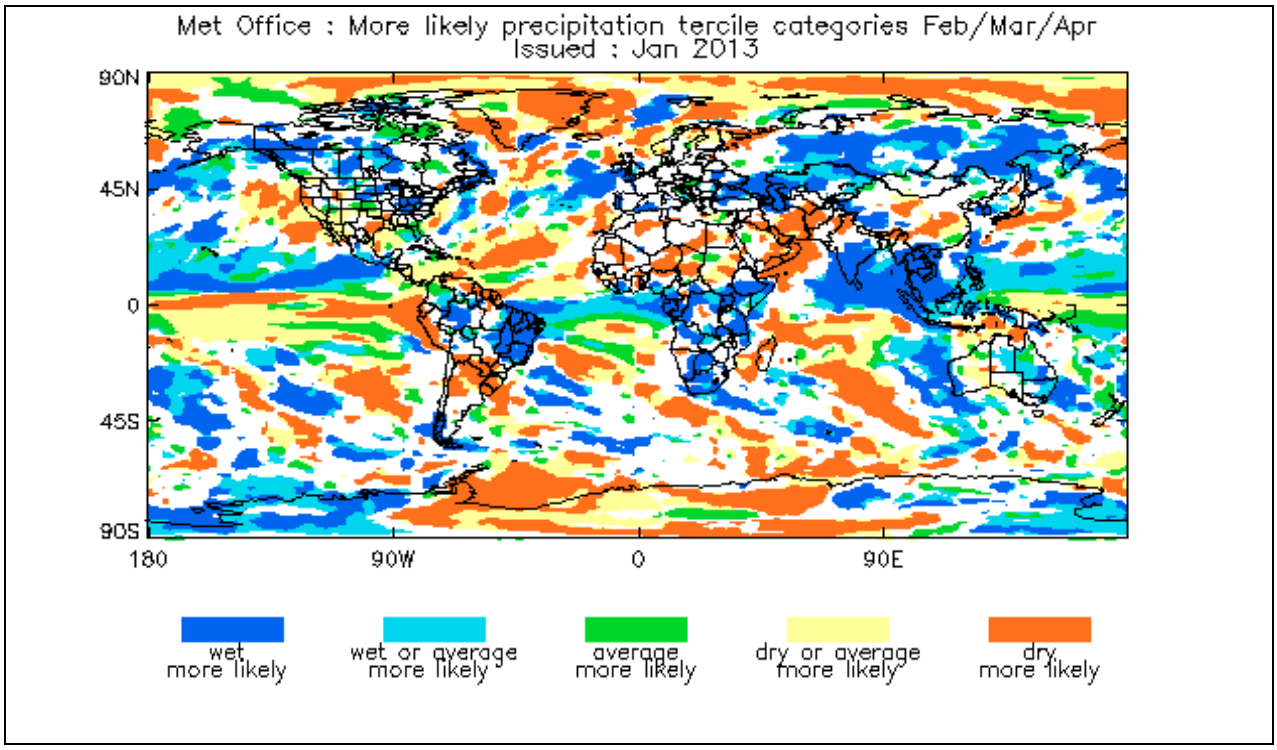


fig.31: Most likely category of Rainfall for DJF, issued in November from UK Met Office. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://www.metoffice.gov.uk/

II.4.d Japan Meteorological Agency (JMA)

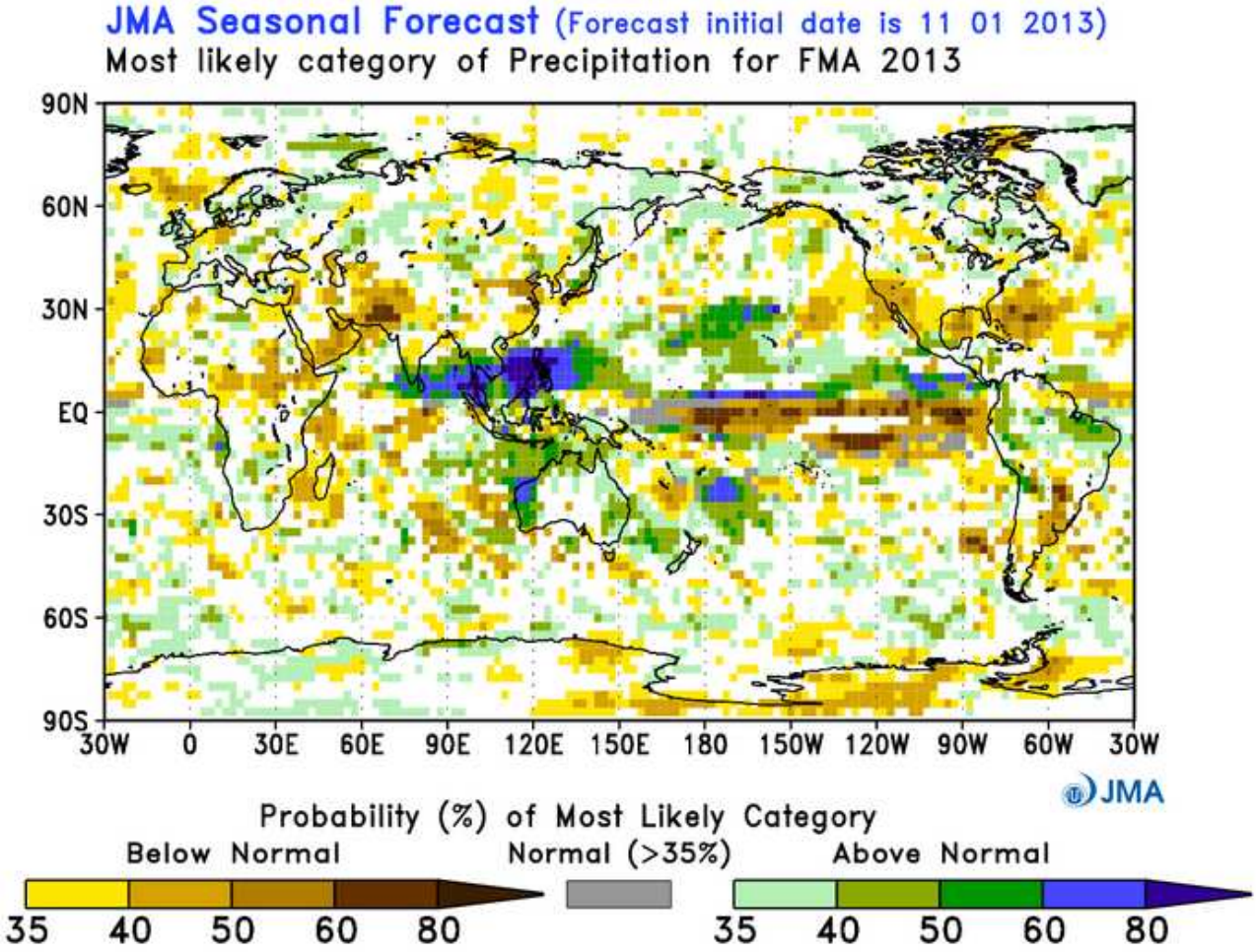


fig.32: Most likely category of Rainfall for FMA, issued in January from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.html

II.4.e Euro-SIP

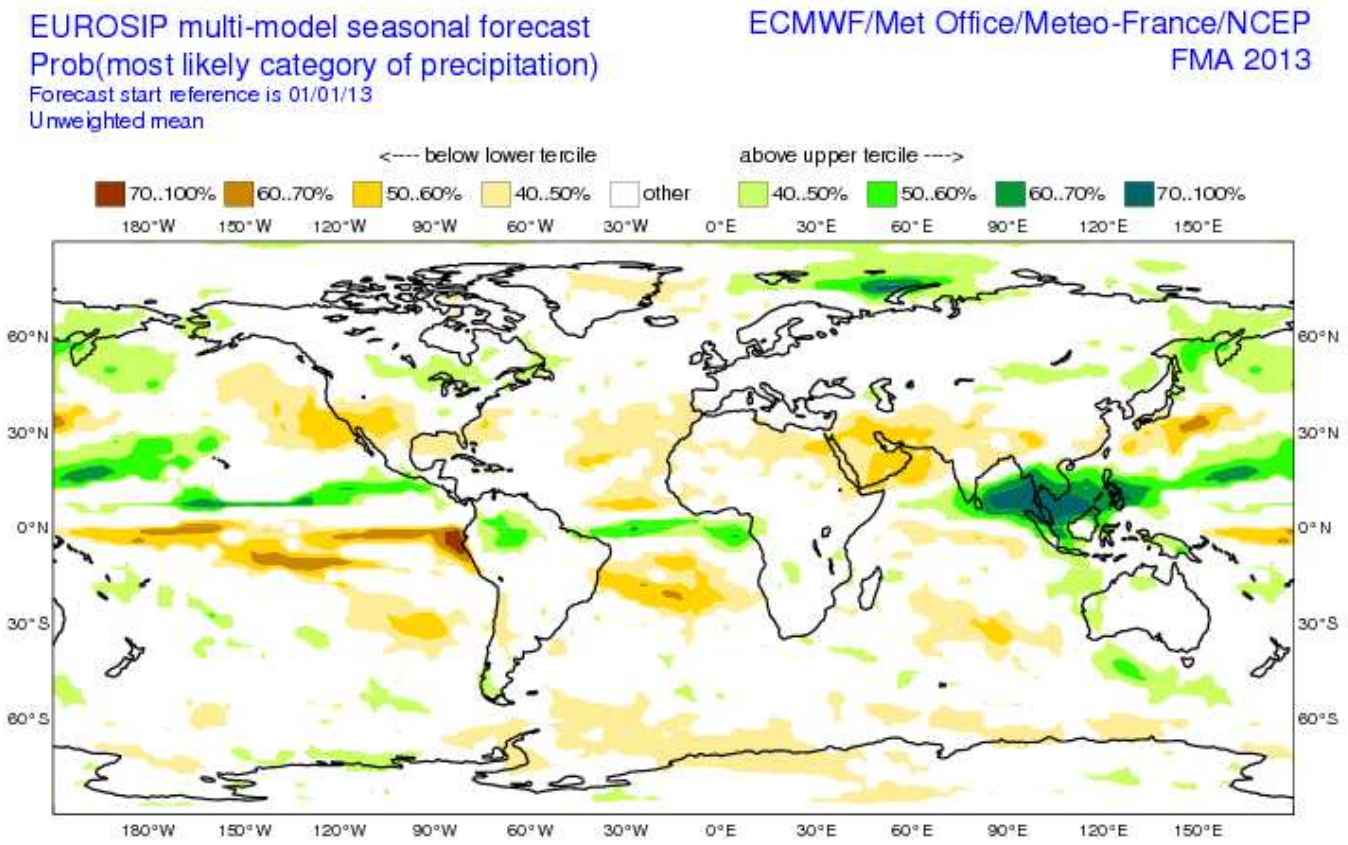


fig.33: Multi-Model Probabilistic forecasts for precipitation from EuroSip for FMA, issued in January. (2 Categories, Below and Above normal – White zones correspond to No signal).

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

Some consistent signal around the Pacific ; wet scenarios over the maritime continent, equatorial Atlantic, and North West Tropics in the Pacific and dry scenarios over the Arabic Peninsula (and adjacent regions), California and South US.
For Europe (and more generally for the mid latitude of Northern Hemisphere) Not too much signal excepted around the East-Southern side of the Mediterranean basin (slight enhanced probabilities for the dry scenario).

II.4.f International Research Institute (IRI)

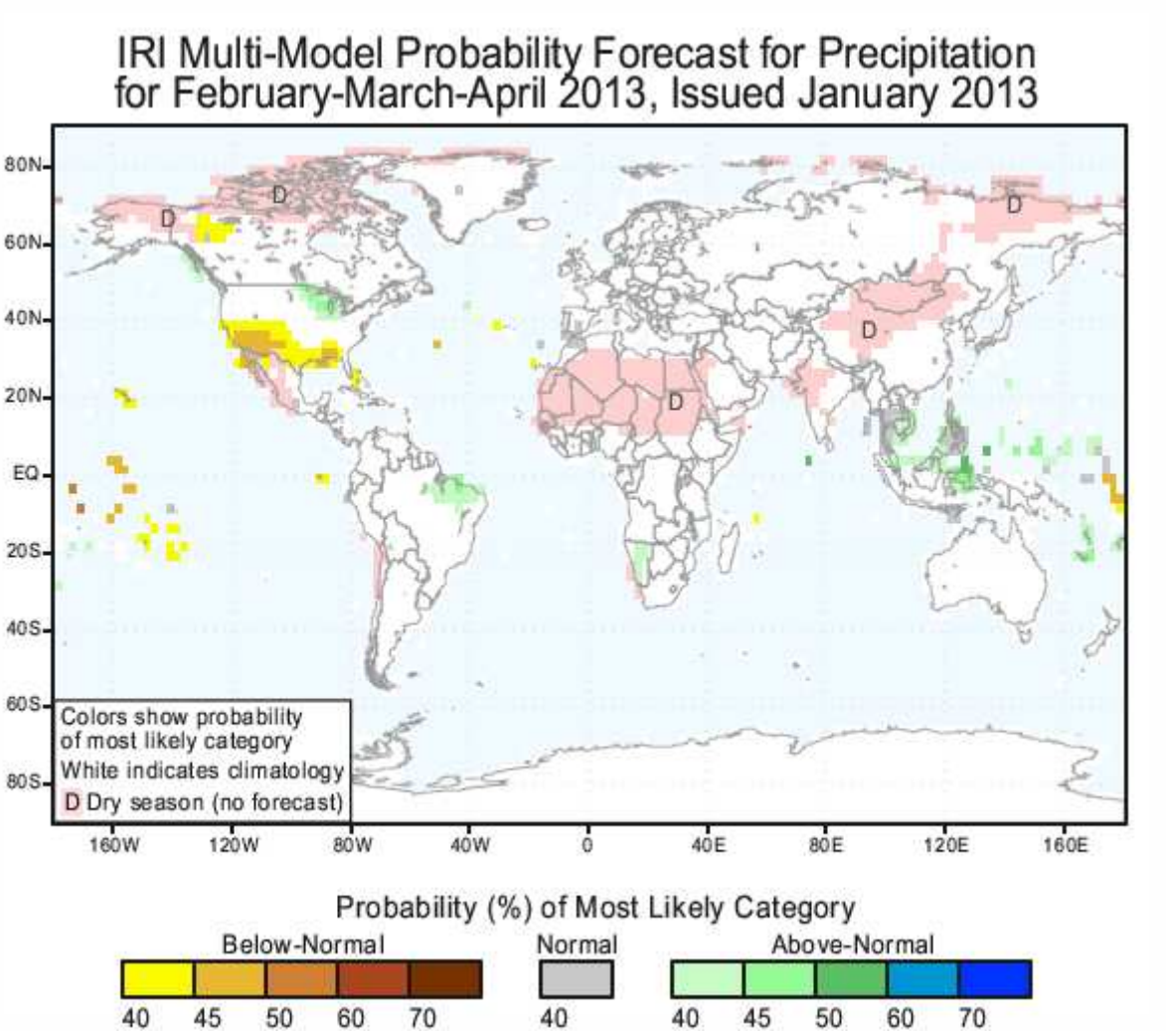


fig.34: Most likely category of Rainfall for FMA, issued in January from the IRI multi-model ensemble. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://iri.columbia.edu/climate/forecast/net_asmt/

The IRI forecast shows No Signal more or less everywhere to the very local areas.
Consequently, over Europe, there is a clear indication for No Privileged Scenario (Climatology forecast). Some similarity with EuroSIP over the maritime continent and South US.

II.5. REGIONAL TEMPERATURES

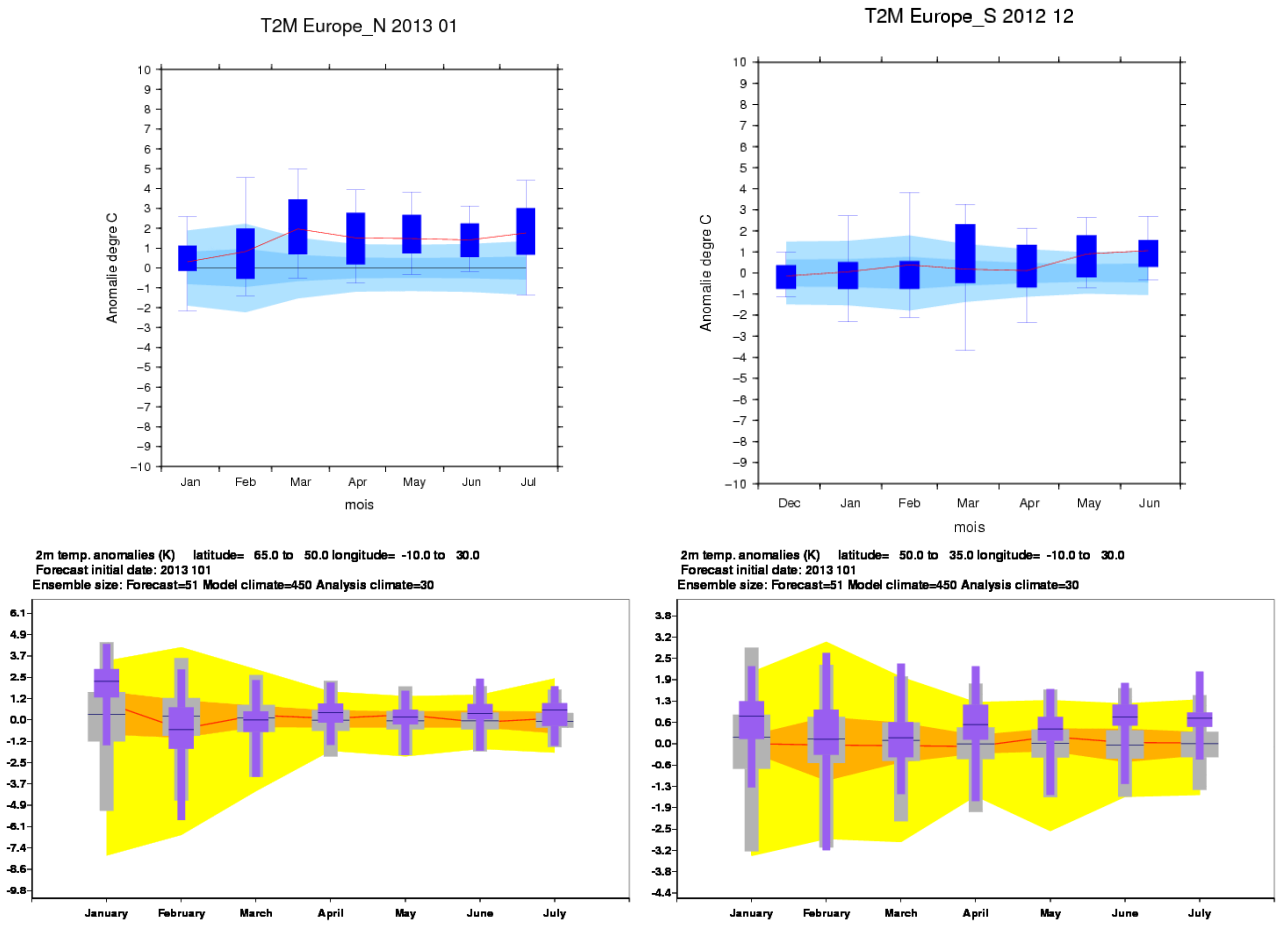


fig.35: Climagrams for T2m in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom) issued in January.

For both Northern and Southern Europe : little consistency between the 2 models (in relationship with the Z500 differences and North Atlantic circulation regimes) and large spread (with respect of the climate reference).
Take care that due to the system change (from system 3 to system 4) the verification scores are not available yet.

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

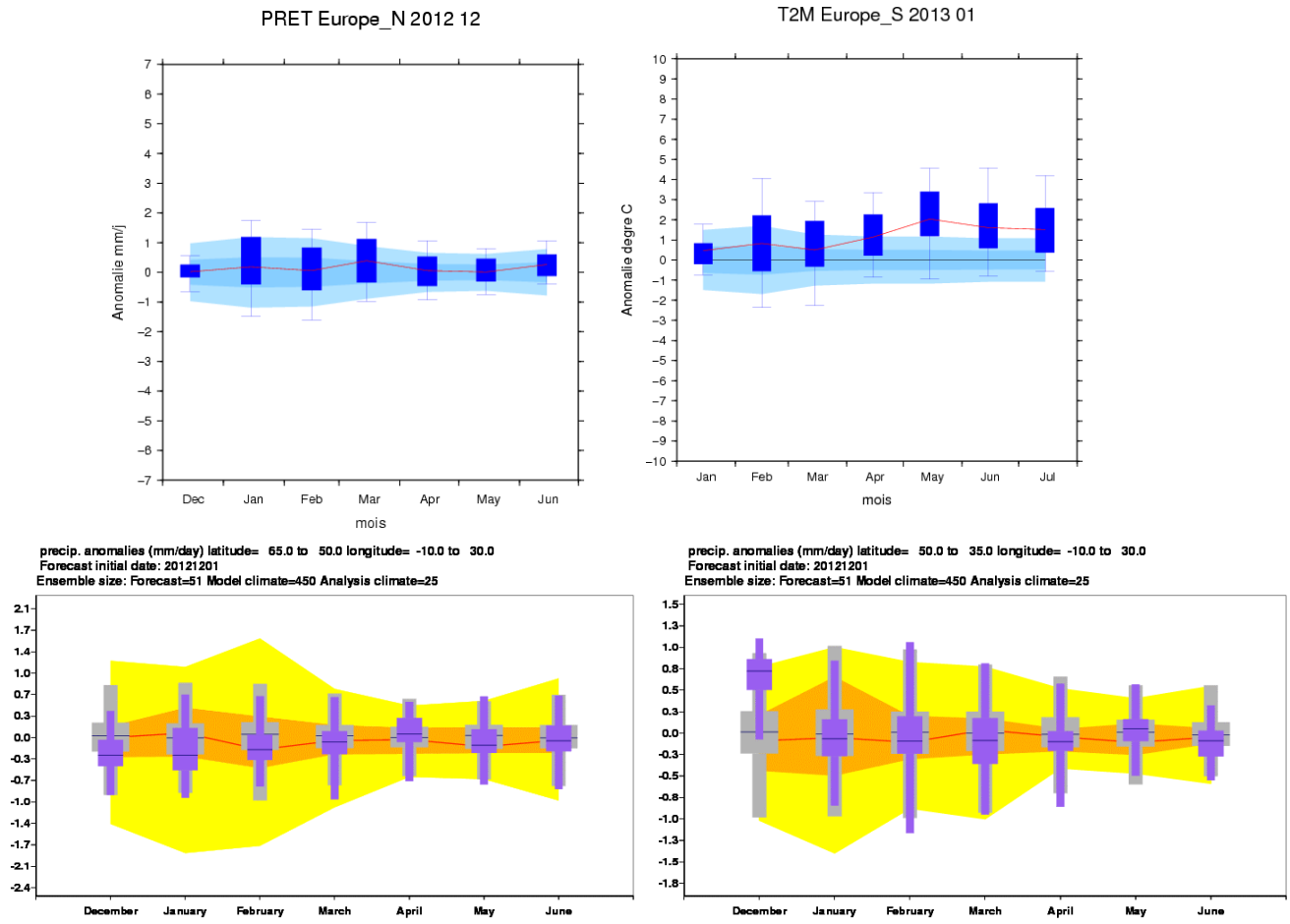


fig.36: Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom), issued in January.

For Northern Europe : Large spread in the evolution of the 2 models and conditions close to Climatology in ECMWF and above normal in MF.
For Southern Europe : no similarity in the time evolution of the 2 models. The spread is larger than the climate reference.
So these intraseasonal evolutions should be considered as indicating No Signal.
Take care that due to the system change (from system 3 to system 4) the verification scores are not available yet.

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

II.6. MODEL'S CONSISTENCY

II.6.a GPCs consistency maps

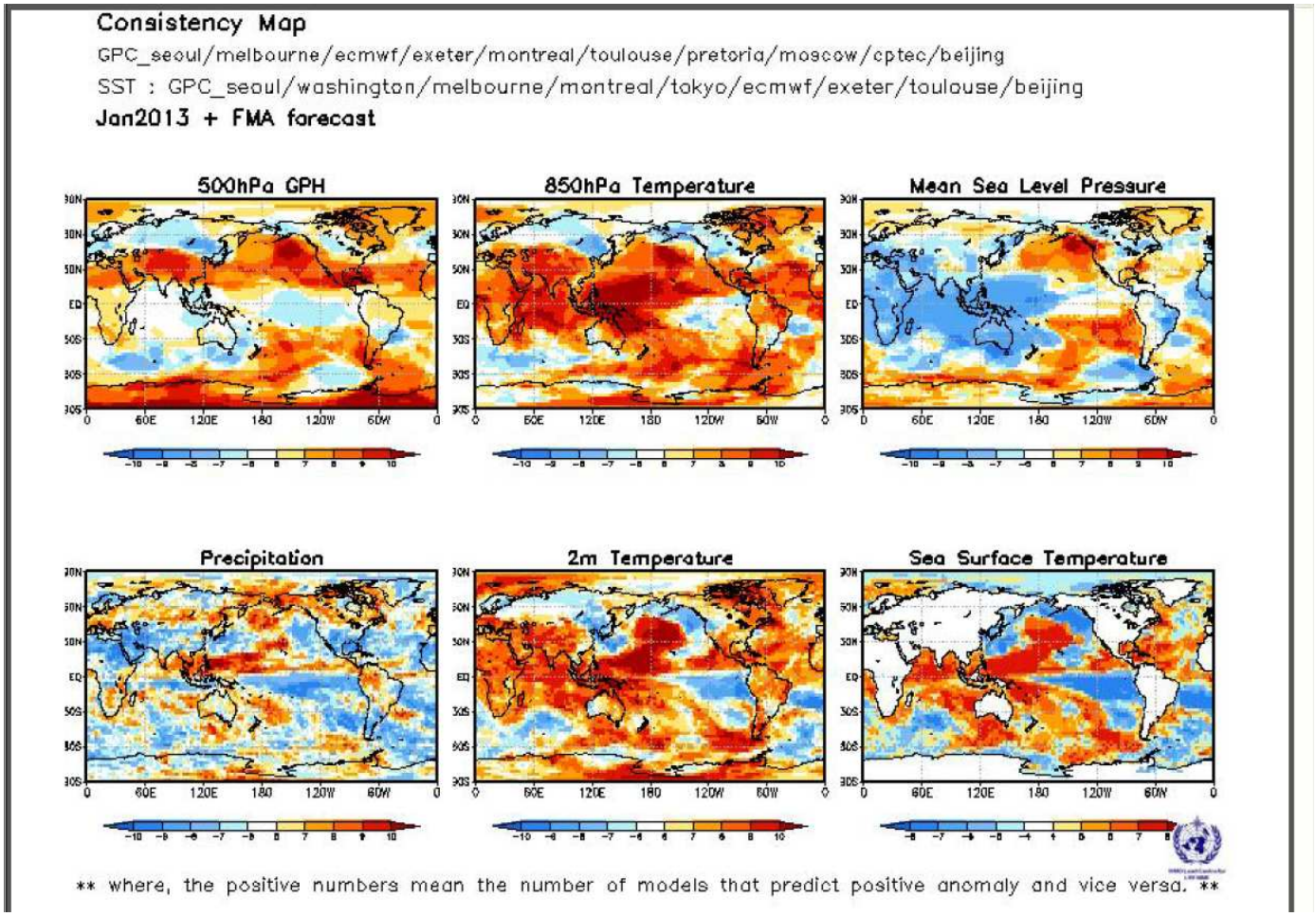


fig.37: ***GPCs Consistency maps from LC-MME*** *http://www.wmolc.org/*

For SST : fairly good consistency for a warmer than normal Indian Ocean, Warm Tropical North Atlantic and Cool Tropical South Atlantic, the Pacific (including Tropics and mid-latitudes in the North Hemisphere).
For Z500 : Little consistency over the North Atlantic mid and high latitude and Europe.
For T2m : some consistent signal over South-Eastern regions (Above normal scenario). Consistency over Africa, Arabic Peninsula and Indian regions, Maritime continent and the Southern and North Eastern part of the North American continent. So some similarity with Euro-SIP and above normal scenarios.
For precipitation : less consistency over the continents but some trace of Below normal conditions for South US, regions close to the Arabic Peninsula and North Africa.

II.7. "EXTREME" SCENARIOS

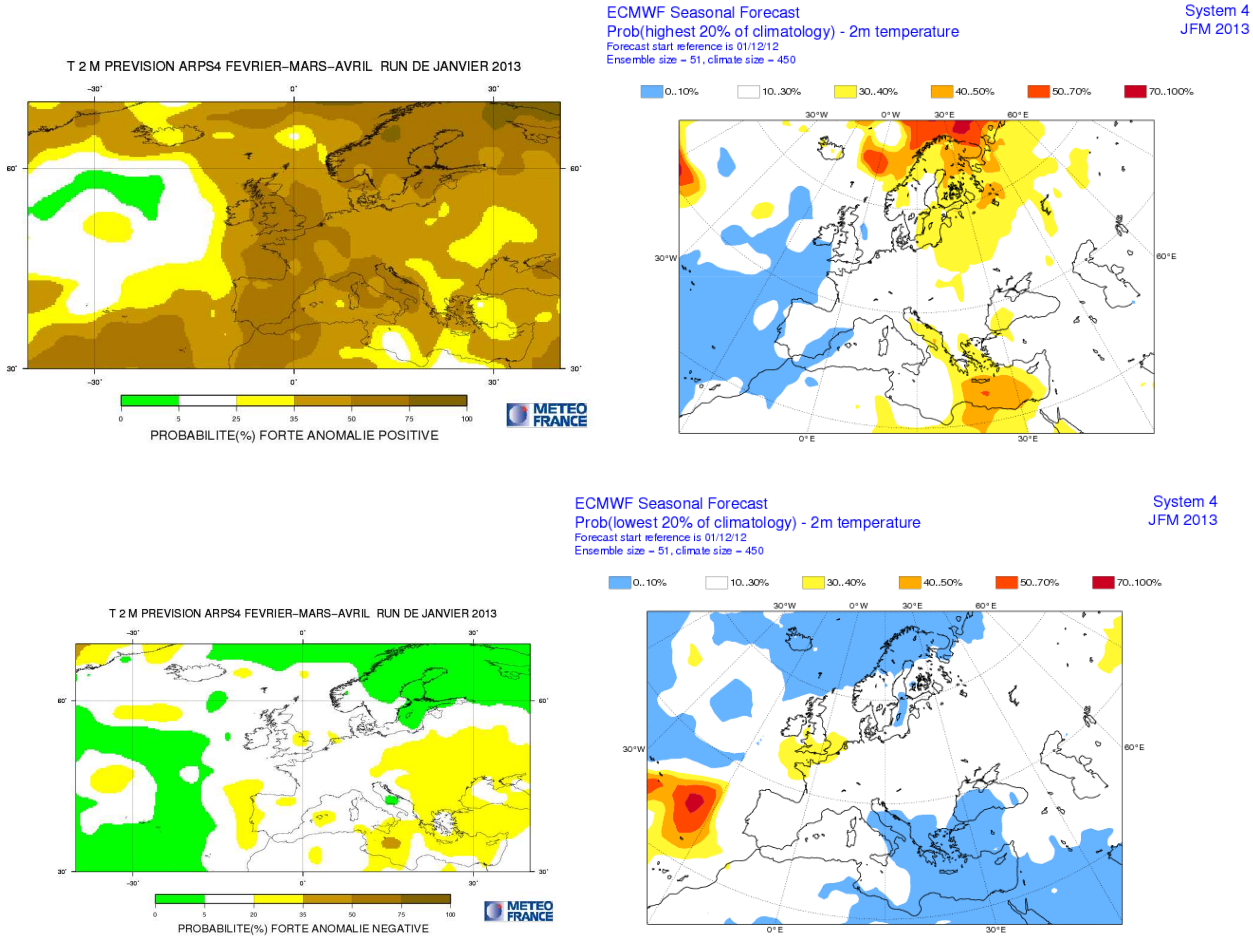


fig.38: Top : Probability of « extreme » above normal conditions for T2m for Meteo-France (left - highest ~15% of the distribution) and ECMWF (right - highest 20% of the distribution).
Bottom : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the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

No consistency between the 2 models for the Very Above Normal scenario (to the exception of the most Northern regions of Western Europe) and for very Below Normal scenario neither .
So in relationship with the very limited predictability and the different response of the models, it seems difficult to use these forecast.
Take care that due to the system change (from system 3 to system 4) the verification scores are not available yet.

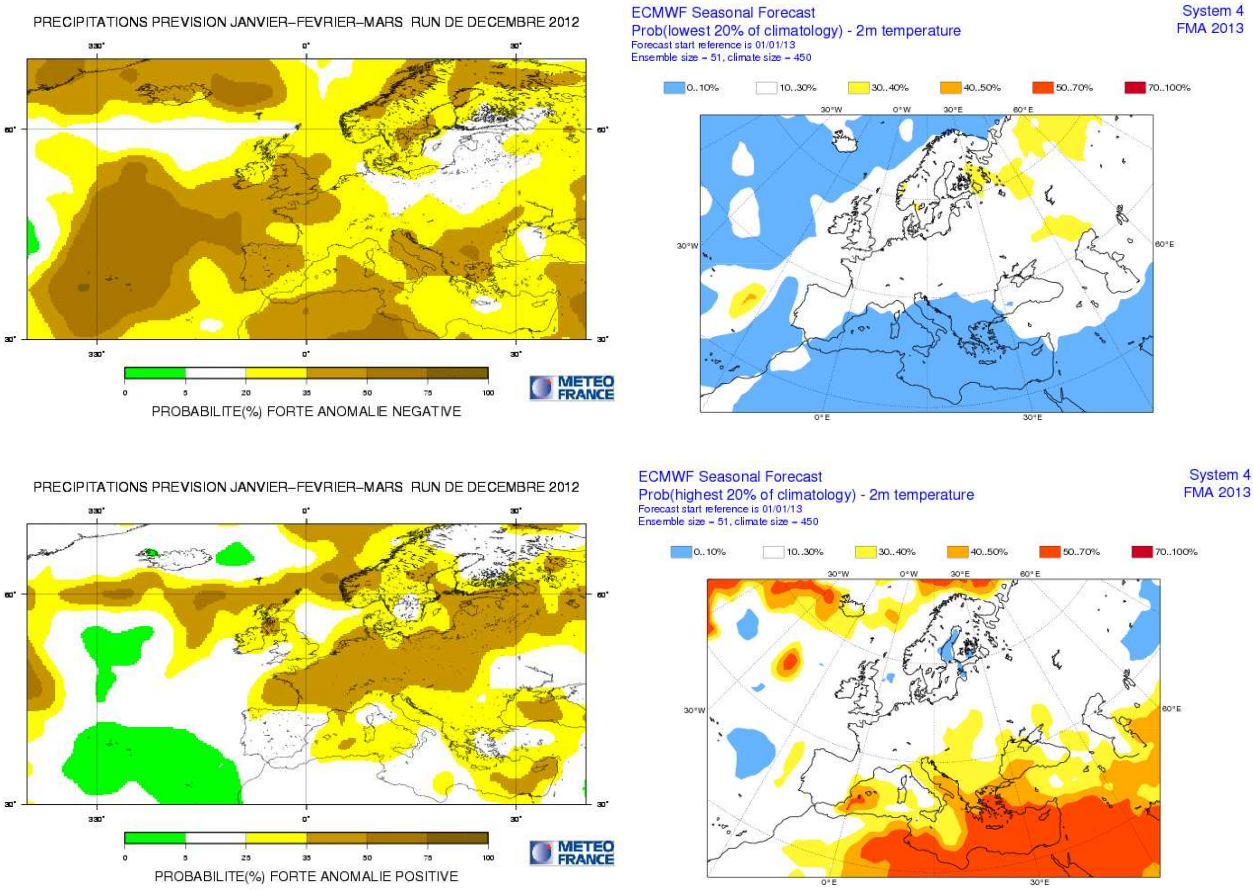


fig.39: Top : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the distribution) and ECMWF (right - lowest 20% of the distribution)
Bottom : Probability of « extreme » Above normal conditions for rainfall for Meteo-France (left - highest ~15% of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

The probability of very Below Normal scenario is enhanced (and sometime very high) everywhere in MF while it is close to climatology in ECMWF.
For the very Above scenario, no consistency.
Take care that due to the system change (from system 3 to system 4) the verification scores are not available yet.

II.8. DISCUSSION AND SUMMARY

Forecast over Europe

For this forecast the first and main comment is about the very limited predictability in the climate system which is reflected by some large differences within the models simulations. This is illustrated by the large differences in the atmospheric response of MF and ECMWF over the mid latitudes of the North Hemisphere and especially over the North Atlantic sector.
For rainfall, "No Privileged Scenario" covers most of the European continent. There is only a little signal for the South Eastern side of Mediterranean regions (below Normal scenario).
For temperature : the Above Normal scenario could prevail for Central and South-East Europe. There is more uncertainty over the western façade of Europe (No privileged scenario).
However, some downscaled information could details these scenarios for specific countries or sub-regions.

Tropical Cyclone activity

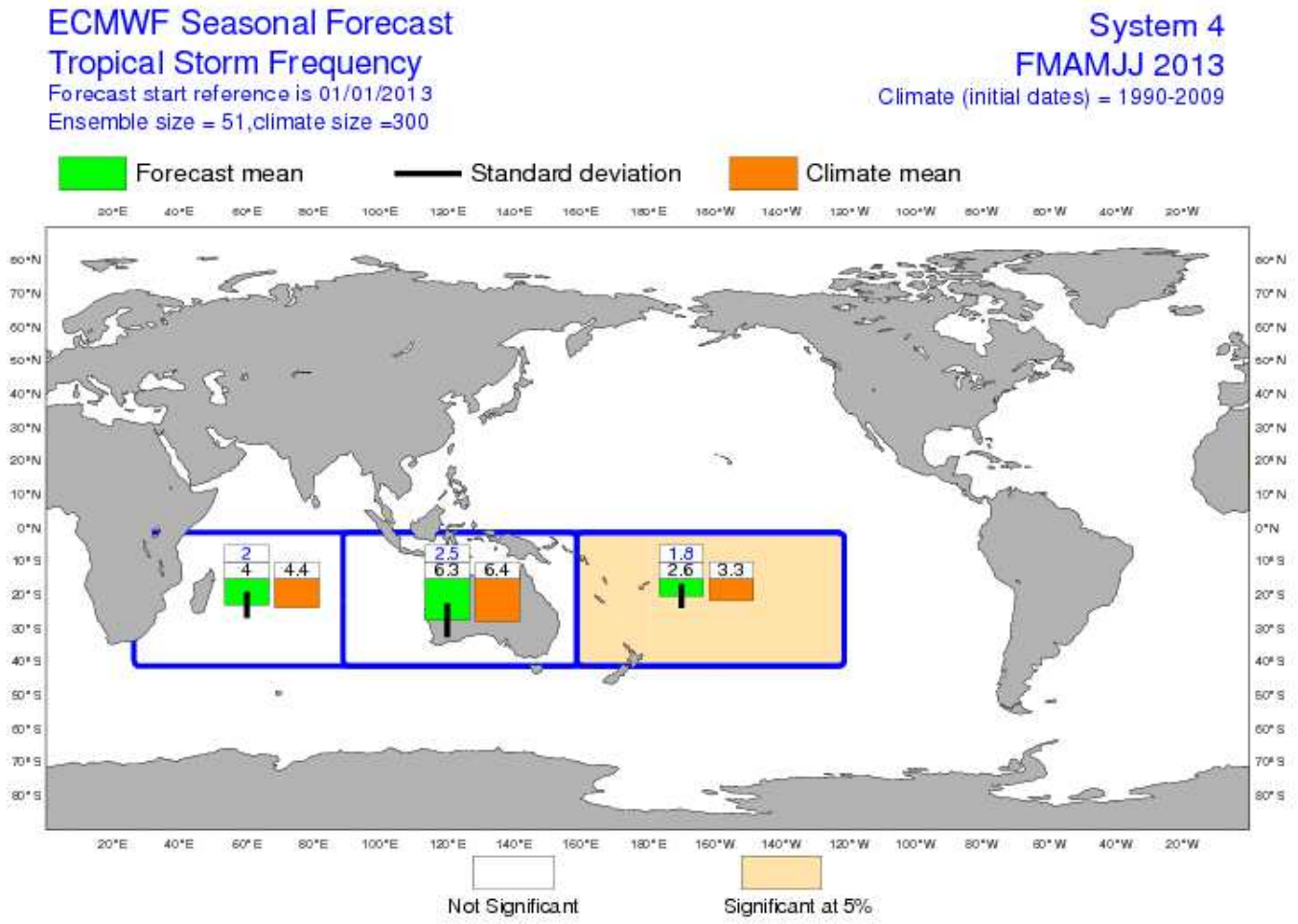


fig.40: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF) for the FMAMJJ 2013 period, issued in January.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtrop/trop_euro/eurosip_tropical_storm_frequency/

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

Synthesis of Temperature forecasts for February-March-April 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*	*above normal*	*no privileged scenario*	*above normal*

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

WMO RA VI
Pilot RCC-Network

Synthesis of Rainfall forecasts for February-March-April 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).

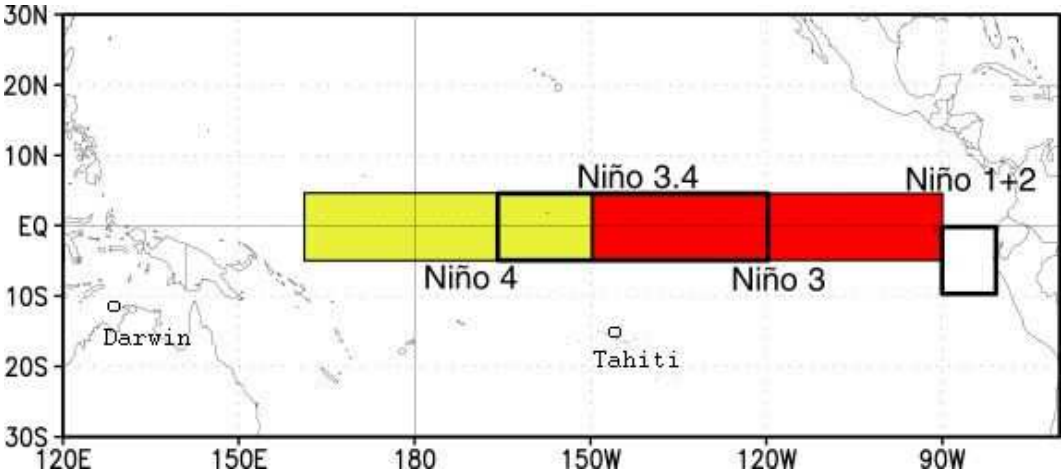
In order to better interpretate the results, it is recommended to look to verification maps and graphs which give some insight into the expected level of skill for a specific parameter, region and period. A set of scores is presented on the web-site of the Lead-Centre for Verification (see http://www.bom.gov.au/wmo/lrfvs/)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