WMO RA VI Pilot RCC-Network

METEO FRANCE Toujours un temps d'avance

GLOBAL CLIMATE BULLETIN n°165 - MARCH 2013

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I. DESCRIPTION OF THE CLIMATE SYSTEM (JANUARY 2013)

I.1. OCEANIC ANALYSIS

I.1.a Global Analysis

At the Surface (fig. 1) :
Generally speaking, little evolutions in the Tropics.
For the Pacific : In the equatorial wave guide still some cooling of SSTs in the Eastern part. Positive anomalies over the Western part and negative anomaly on the Eastern part (in relationship with a wave propagation under the surface). Over the Western Tropics the warm reservoir is refilling. In the mid/high-latitudes in the South Pacific cooling close and East to the dateline. In the Northern hemisphere cooling close to Kamtchatka.

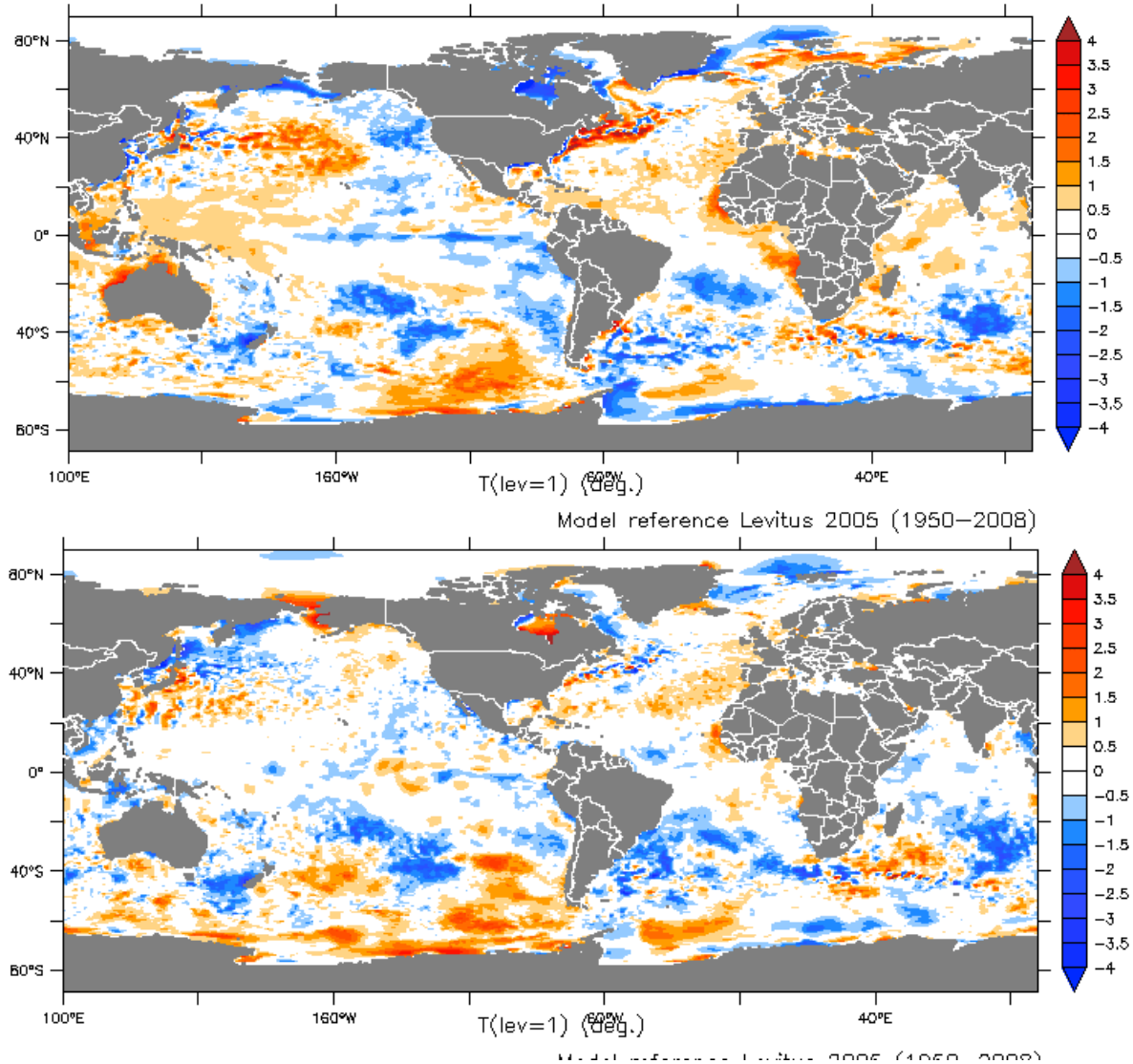


fig.1: **top : SSTs Anomalies in January (°C) (reference 1950-2008)**
bottom : SST tendency (current – previous month) http://bcg.mercator-ocean.fr/

For the Atlantic : little evolution in the Tropical band with still some positive anomaly along the western coast of the African continent from Morocco up to Namibia. The positive anomaly is strengthening over the Guinean Gulf. 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.
In the Indian Ocean : still mostly warmer than normal in the Northern hemisphere. Still positive anomaly close to West Australia. In the mid-latitudes, the southern part is slightly cooling in the centre of the basin. The DMI is close to neutral but the sign is reversing (consistently with the warm reservoir strengthening on the Western Pacific and weakening of SST in WTIO).
In subsurface (fig.2) :
In the Pacific : in the Tropics (including the equatorial waveguide), heat content anomalies mostly negative East to the dateline and positive West to the dateline. 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 (and same pattern than for the Tropics).
In the Atlantic : weakening of the dipole structure in the equatorial waveguide (positive/negative anomaly in the Eastern/Western sides). Positive heat content anomalies along the western coast of the African continent (see SST). Persistence of the strong positive anomaly in the North-Western part of the basin (close to the mid-latitudes). Over South Tropics anomalies are consistent with SST despite the patterns are quite fragmented.
In the Indian Ocean : heat content consistent with SST signal in the Northern hemisphere and Australia. In the equatorial waveguide note the dipole structure consistent with the reverse sign of the DMI.

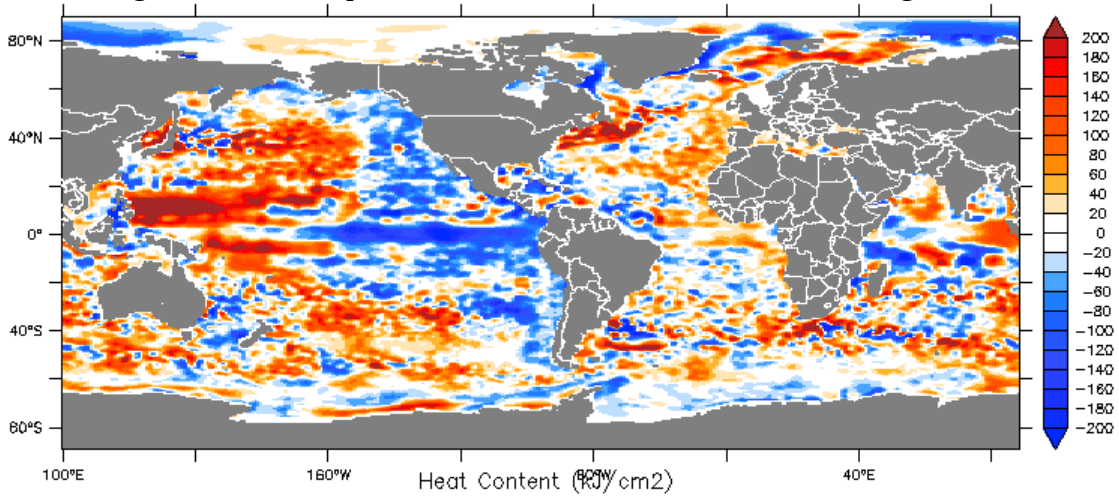


fig.2: map of Heat Content Anomalies (first 300m) in January (kJ/cm²). (reference 1950-2008)
http://bcg.mercator-ocean.fr/

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

Despite the anomalies are still relatively weak, a dipole pattern is developing with positive anomalies on the western side and negative anomalies in the Eastern side. 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 near average (-0,1).

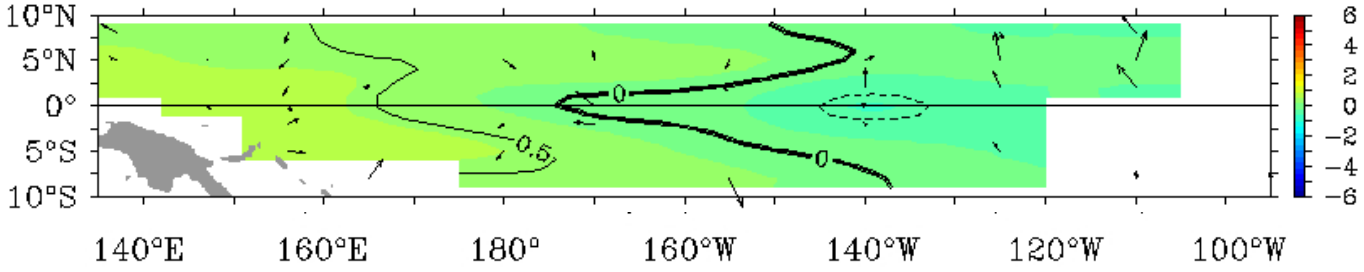


fig.3: SST Anomalies and Wind anomalies in January over the Equatorial Pacific from TAO/TRITON.
http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/monthly-summary.html

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 0,0°C, -0,4°C, -0,6°C and -0,5°C from West to East.

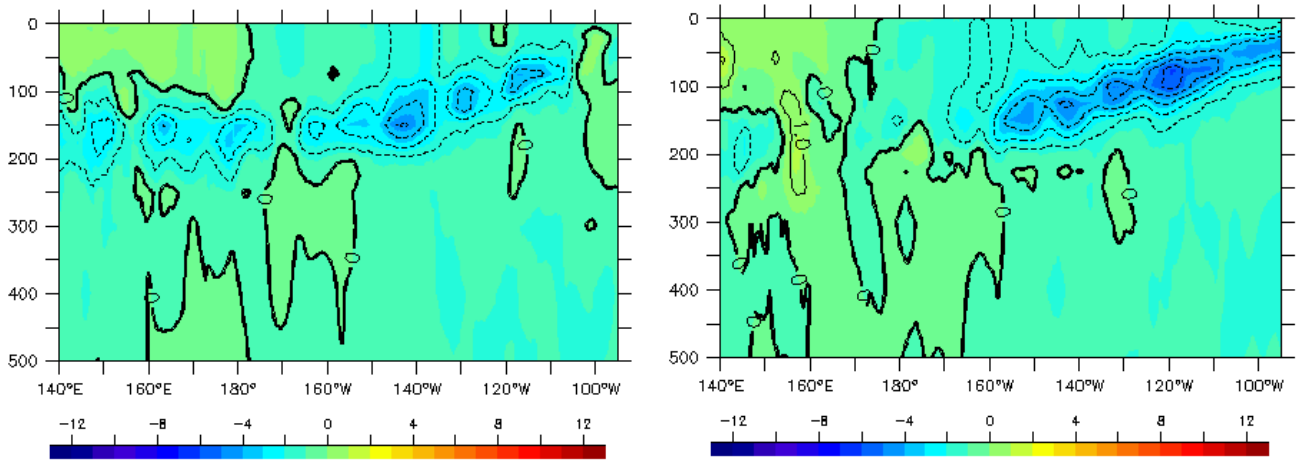


fig.4: Oceanic temperature anomaly in the first *500 metres* in the Equatorial Pacific, in previous month (left) and current month – January (right) http://bcg.mercator-ocean.fr/

In the equatorial waveguide (fig. 4) : traces of propagation of the Kelvin wave (colder than normal) in January under the surface in the Eastern part. The strengthening and thickening of the warm reservoir in the Western part is now conspicuous.
The thermocline structure (fig. 5) : Thinner than normal over most of the Eastern part of the basin consistently with the temperature signal at the thermocline level. Wave propagation signal of the negative anomalies is visible across the basin. Some trace of positive anomaly propagation starting at 150°E.

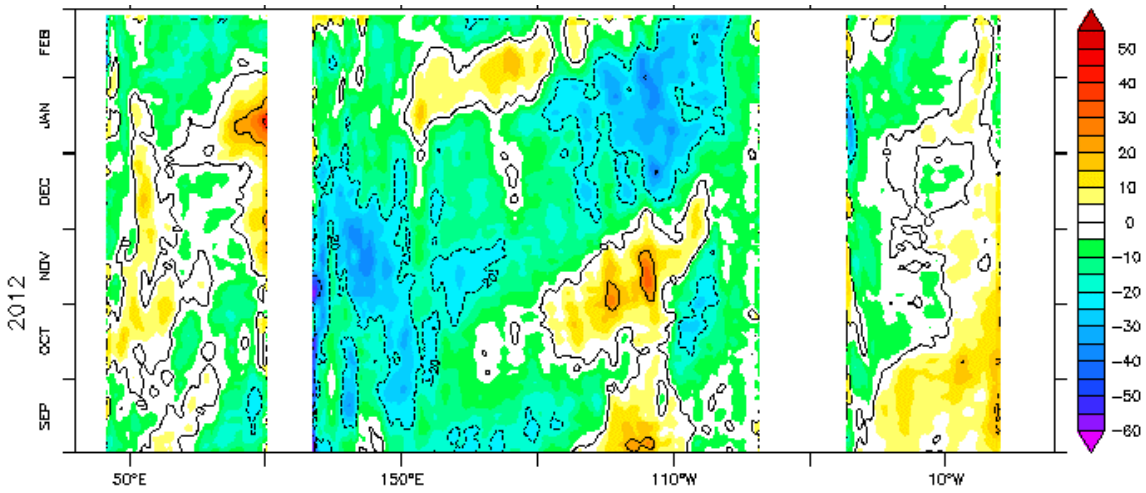


fig.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 6 month period. http://bcg.mercator-ocean.fr/

I.1.c Atlantic Basin

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

I.1.d Indian Basin

Southern Tropical Indian Ocean : warmer than normal close to West Australia.
Equatorial waveguide : warmer than normal conditions in Eastern part and close to normal in Western part. The IOD is close to normal but the sign is reversing.
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) : 3 major anomalies in the Tropics (South Western and Central Pacific, West Indian Ocean, North-East South America) and quite a lot of sub-regional patterns. The 2 positive anomaly cells are likely dynamically forced.
On the Pacific : Strong and wide Divergent circulation anomaly (upward anomaly motion) on the South-Western Tropics which extends far over the Central and Eastern Pacific. This strong signal could be partly related to SSTs and partly to the MJO activity. Additional sub-regional circulation anomaly in the both hemisphere across the Pacific.
On the Atlantic : Strong Convergent circulation anomaly (downward anomaly motion) over the Southern Caribbean and North-East of South America likely in relationship with Walker circulation anomalies. In the Northern hemisphere, to be quoted the dipole structure positive/negative anomalies (downward/upward anomaly motion) over coastal regions of North-West Africa/ regions East to Chad. Convergent circulation anomaly over the western coast of South Africa.
On the Indian Ocean : Strong positive anomaly (convergent circulation anomaly - downward anomaly motion) on the equatorial western side (with southward extension up to the centre of the basin). The equatorial pattern seems also to be partly related to the MJO activity.

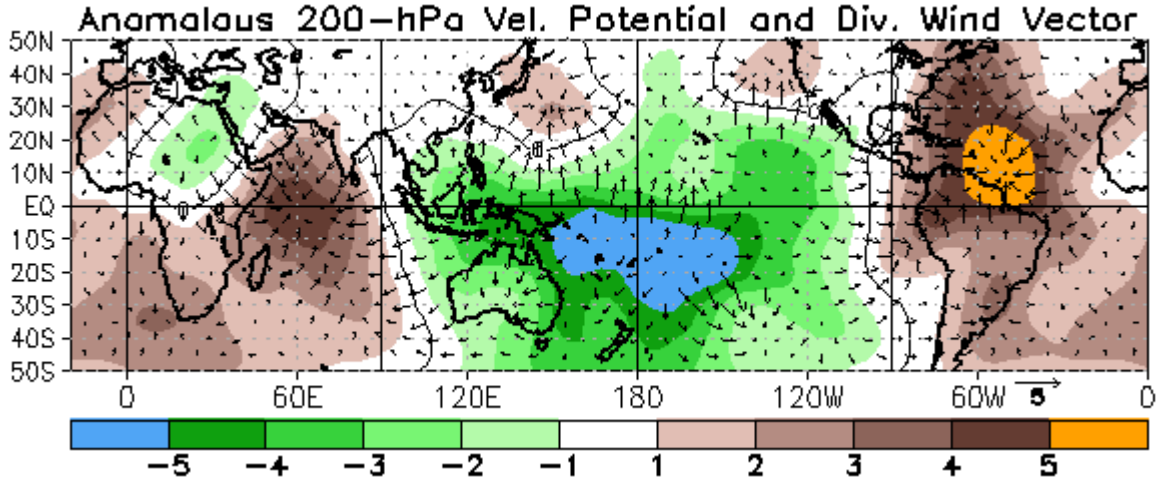


fig.6: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly in January 2013. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

Stream Function anomalies in the high troposphere (fig. 7 – insight into teleconnection patterns tropically forced) : Some strong signal across the Southern Pacific related to the velocity potential anomaly and close to the American continents (both North and South) also in relationship with the convergent circulation anomaly over North-Southern America. Some teleconnection seems to be present along the Eastern coast of the North American continent which extends across the North Atlantic sector.

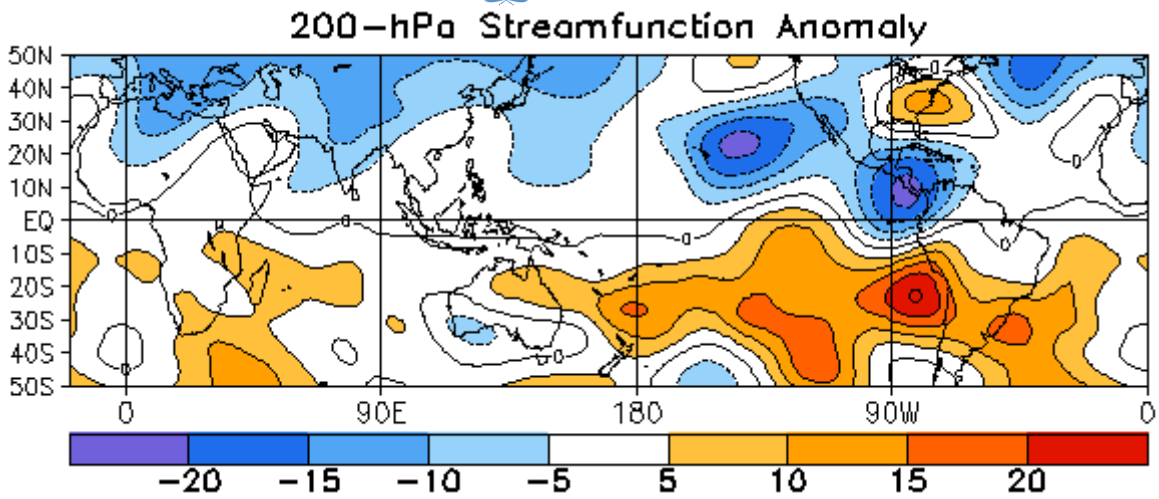


fig.7: Stream Function Anomalies at 200 hPa in January 2013.
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

Geopotential height at 500 hPa (fig. 8 – insight into mid-latitude general circulation) : In relationship with previous discussion, the main anomalies in the mid/high latitudes are mostly related to mid-latitude dynamic to the notable exception of the wave train which start over the Eastern coast of US and lands close to Morocco. The main active modes are the TNH (1.3), the Polar/Eurasian mode (-1.9) and (important for Europe) the East-Atlantic mode (+0.9) partly related to the teleconnection pattern already pointed out.

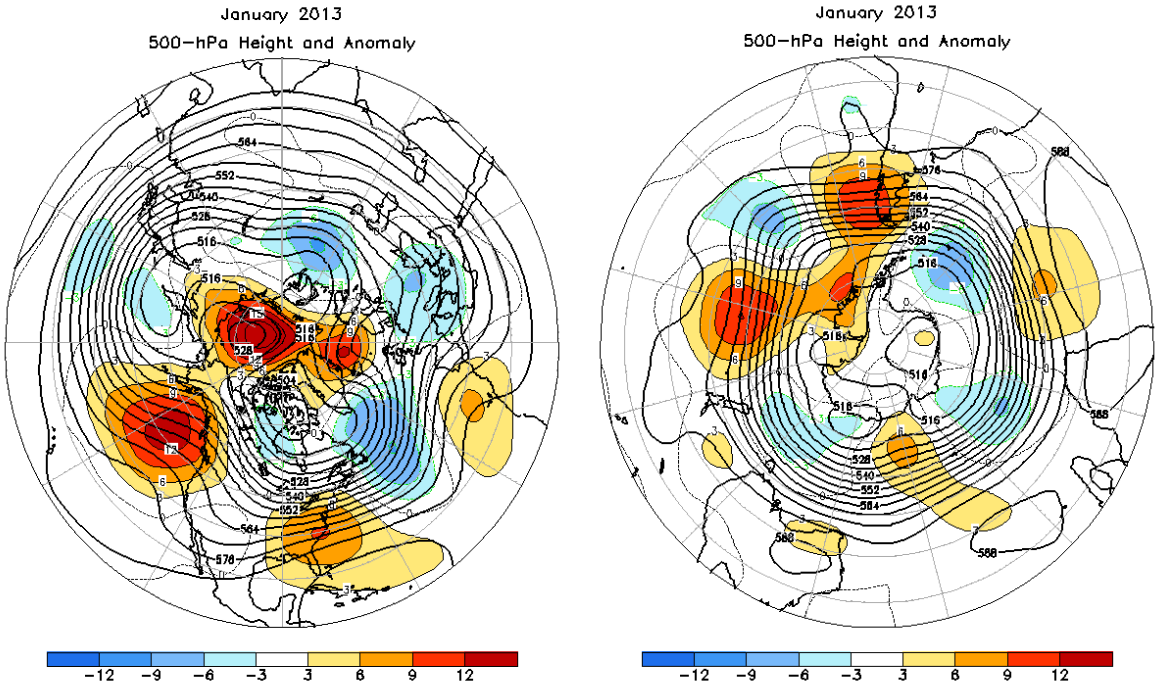


fig.8: Anomalies of Geopotential height at 500hPa in January 2013 (left North Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige9.shtml, and right South Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige15.shtml)

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
JAN 13	**-0.1**	**0.9**	**0.1**	**0.1**	**0.1**	**1.3**	**0.5**	**0.1**	**-1.9**
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

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

I.2.b Precipitation

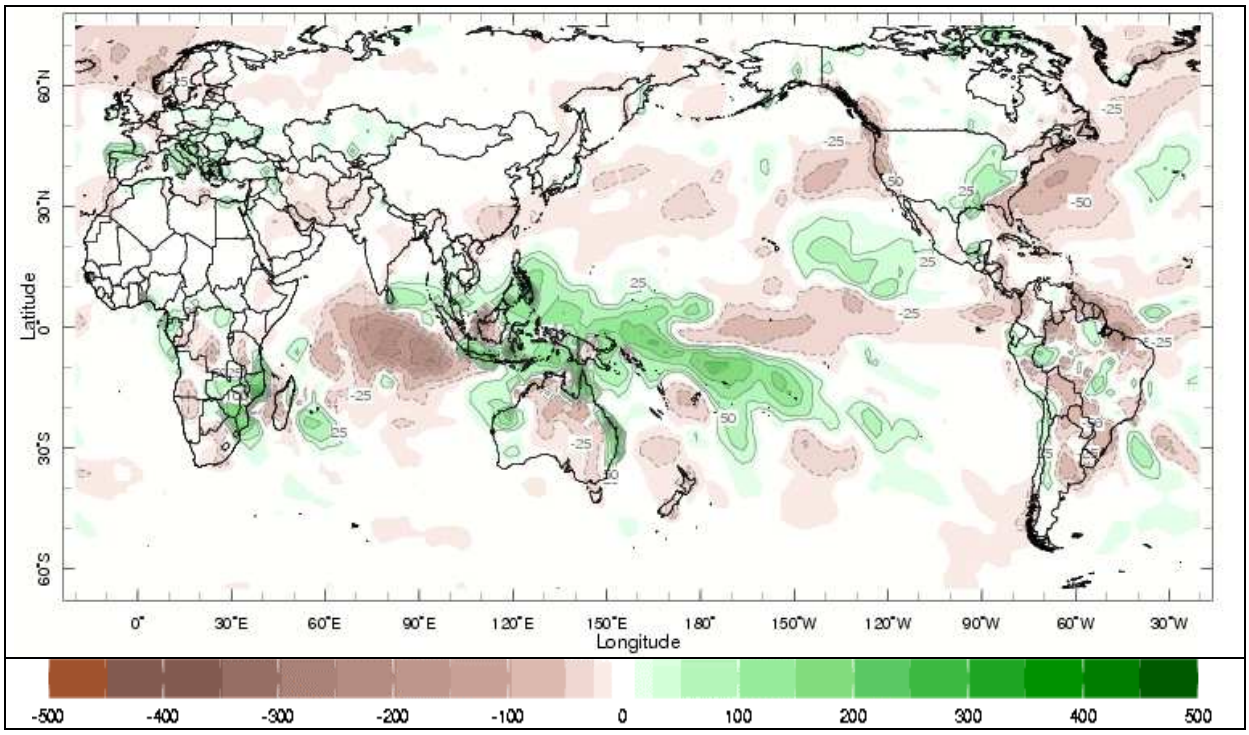


fig.9: Rainfall Anomalies (mm) in January 2013 (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.
http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/

In relationship with the Velocity Potential anomaly field, the patterns are :
Pacific : good consistency with the Divergent Circulation anomalies and the MJO activity; especially over the South-Western Tropics and the SPCZ region.
Atlantic/Africa : Strong negative anomaly centred over the North-Western coast of South America and Argentina.
Indian Ocean : strong negative anomaly over most of the central part.
Australia : great spatial variability in relationship with sub-regional patterns.
North America : mostly dry over coastal area of West Canada and US and along the Eastern coast of North American continent (consistent with the Geopotential height anomalies). Wet band from Texas up to the Great Lake region.
Over Europe : to be quoted the positive anomalies (wet) over North-West of Spain and South-West of France and also around the Mediterranean basin. Some dry conditions over the most North-West of Europe.

I.2.cTemperature

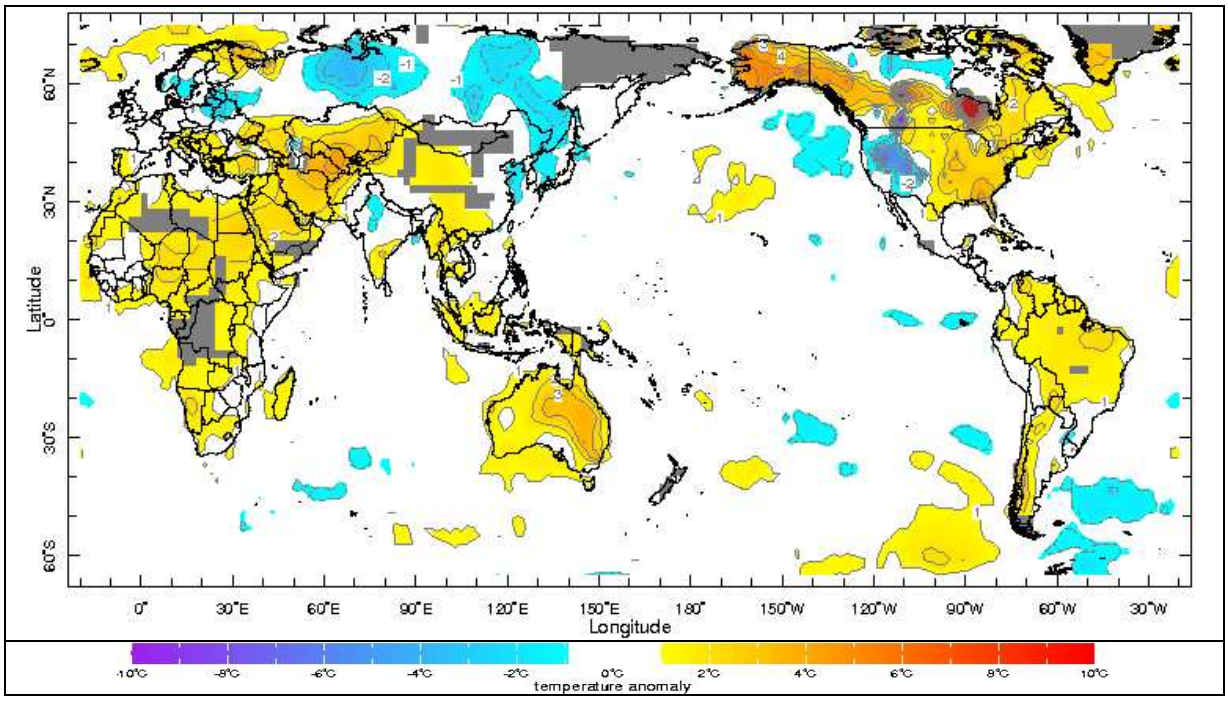


fig.10: Temperature Anomalies (°C) in January 2013 (departure to the 1979-2000 normal) http://iridl.ldeo.columbia.edu/maproom/.Global/.Atm_Temp/Anomaly.html

North-America : Strong anomalies. Warmer than normal conditions over most of Canada and dipole negative/positive anomalies over West/East US.
South-America : mostly Warmer than normal conditions to the exception of Argentina and Peru.
Australia : Warmer than normal conditions everywhere.
Asia : Awrmer than normal over South-East Asia and South India and colder than normal over Eastern Siberia.
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. Contrasted 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 record (negative anomaly close to 2011-2012 value).
In Antarctic (fig. 11 - right) : above normal sea-ice extension anomaly with some large regional modulation.

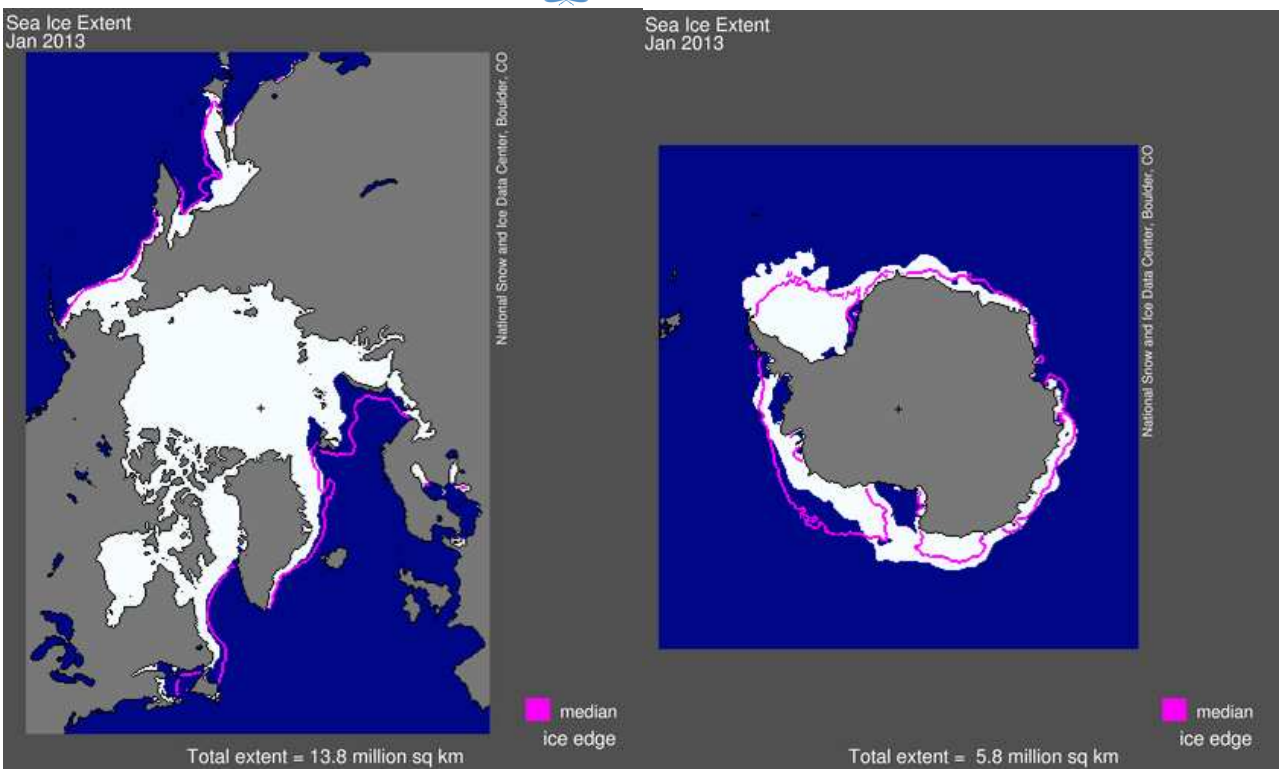


fig.11: Sea-Ice extension in Arctic (left), and in Antarctic (right) in January 2013. The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

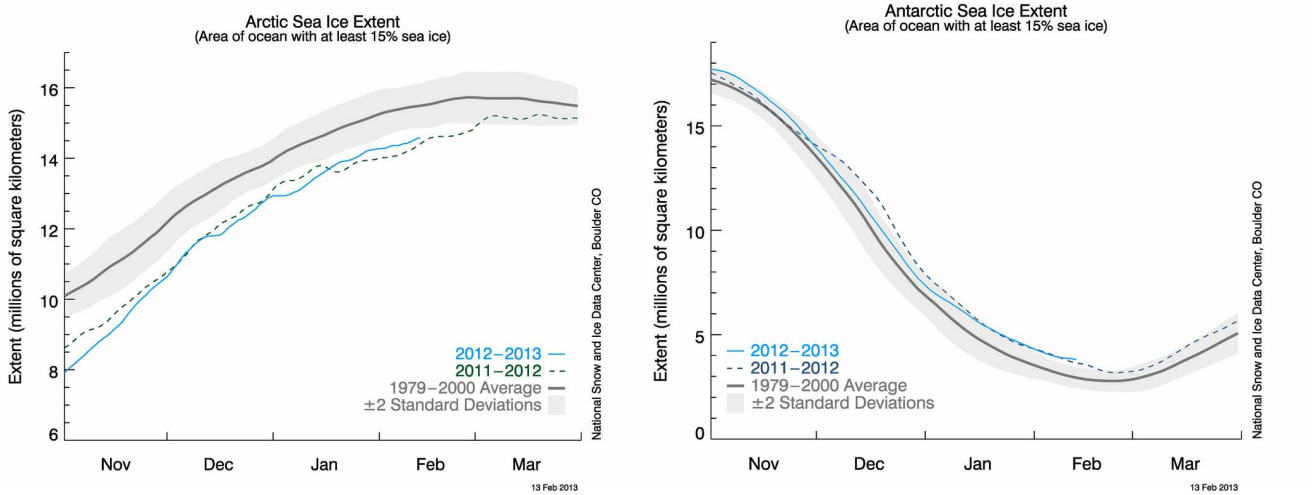


fig. 9bis : Sea-Ice extension evolution from NSIDC
http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png

II.SEASONAL FORECASTS FOR MAM FROM DYNAMICAL MODELS

II.1. OCEANIC FORECASTS

II.1.a Sea Surface Température (SST)

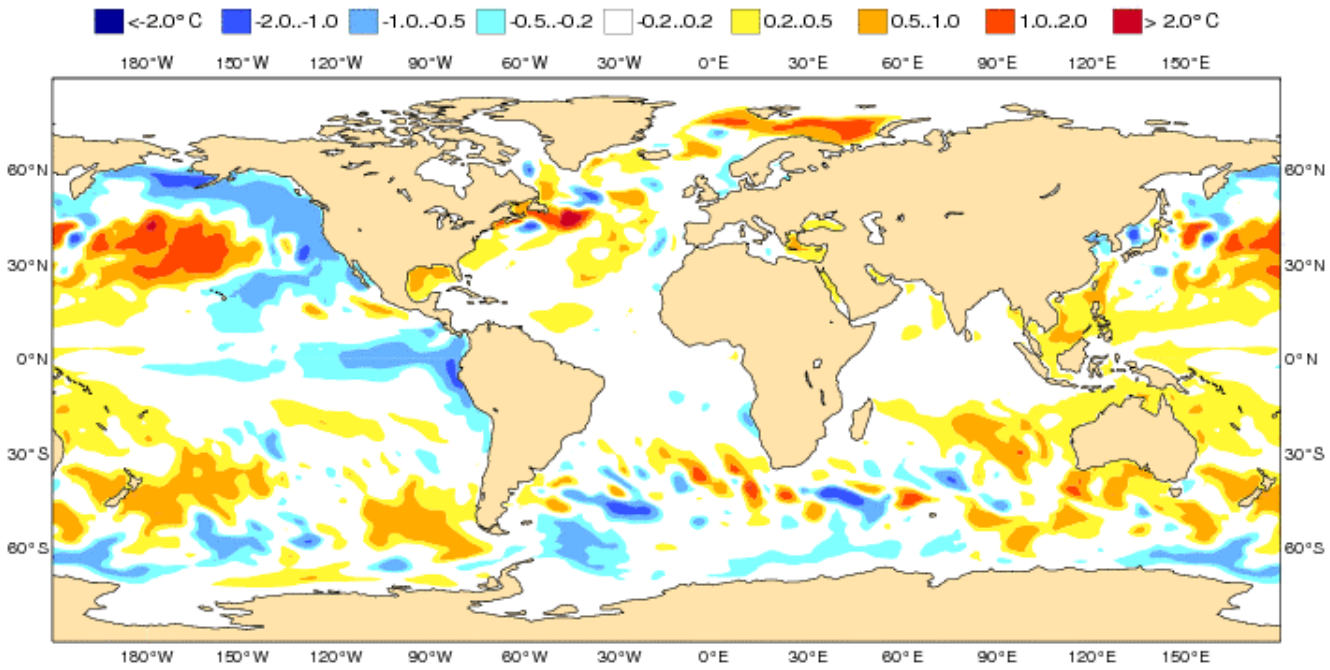


fig.12: SST anomaly forecast (in °C) from ECMWF for MAM, issued in February.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

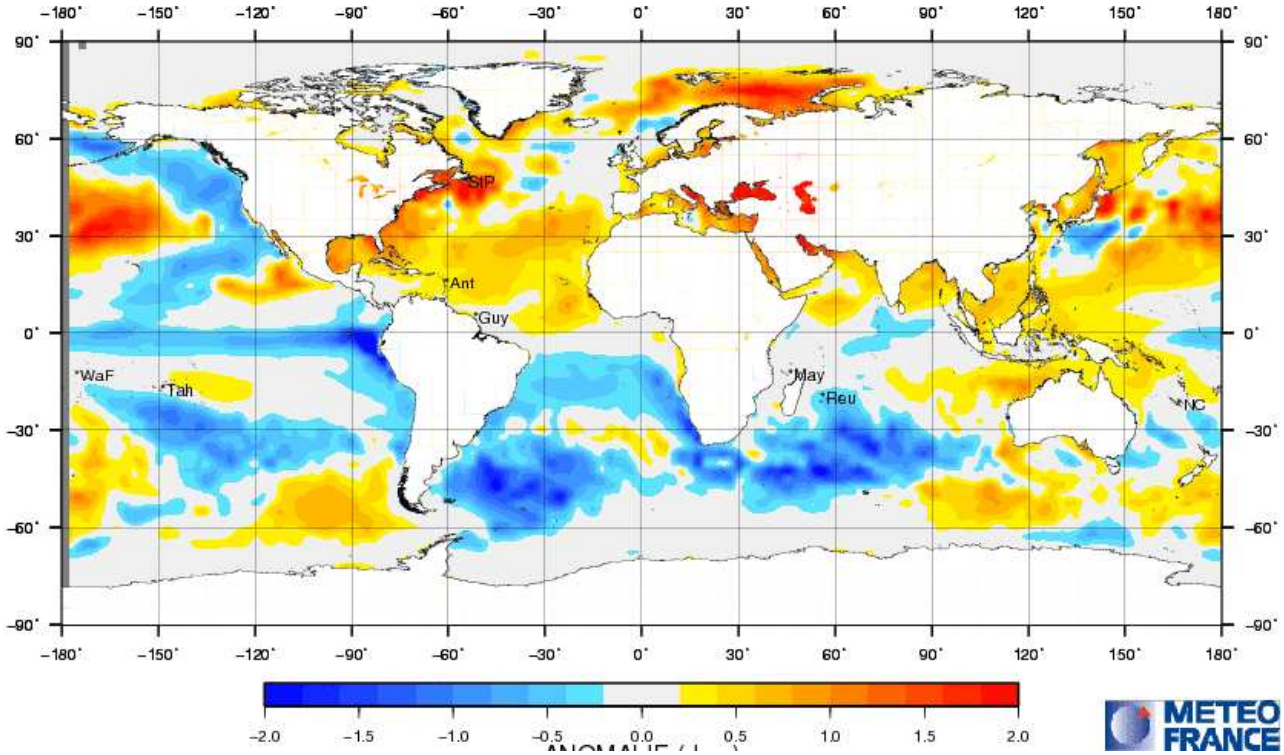


fig.13: SST Anomaly forecast (recalibrated with respect of observation) from Météo-France for MAM, issued in February. http://elaboration.seasonal.meteo.fr/

For the 2 individual models :

At large scale quite consistent over most of the Tropics and the mid-latitudes despite some sub-regional differences and a different reference period for the hindcast (81-2010 for ECMWF and 91-2010 for MF system 4). The main difference are in the Southern hemisphere.

Pacific : along the equator colder than normal conditions on the Eastern and Central part of the basin in MF while the cold SSTs are present only in the Eastern part in ECMWF. Both models develop the warm reservoir in the Western part. In the Northern hemisphere very consistent forecasts with warmer than normal conditions in the Western and Central part (excepted South to Japan) and colder than normal conditions close to the Western coast of North American continent. 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 in ECMWF.

Atlantic : in both model consistency in Tropical and mid-latitudes of North Atlantic (mostly warmer than normal conditions) even if anomalies are not too strong. ECMWF develops a warm signal in the Guinean Gulf while it is very weak in MF (possibly related to the hindcast size). In the Southern Atlantic, less consistency despite one can see some similarity (negative anomaly in the Tropics, positive anomaly in the sub-tropics and negative anomaly in the mid-latitudes).

Indian Ocean : consistent from the Northern Indian Ocean up to 30°S. Then some large differences over the central and Western part of the basin. Warm anomalies close to Australia, extending westward in the Tropics. Weak signal in the equatorial waveguide.

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 : colder than normal in the Central and Eastern part of the basin. The warm reservoir develops in the Western part. In the mid-latitudes of the Northern hemisphere dipole pattern Warmer/colder than normal in the Western-Central/Eastern part of the basin.

Atlantic : Weak signal over the Tropics (both South and North). Some consistency over the mid-latitudes of the Northern and Southern Hemisphere (mostly in the western part).

Indian Ocean : weak signal in the Northern hemisphere and mostly warmer than normal conditions close to Australia.

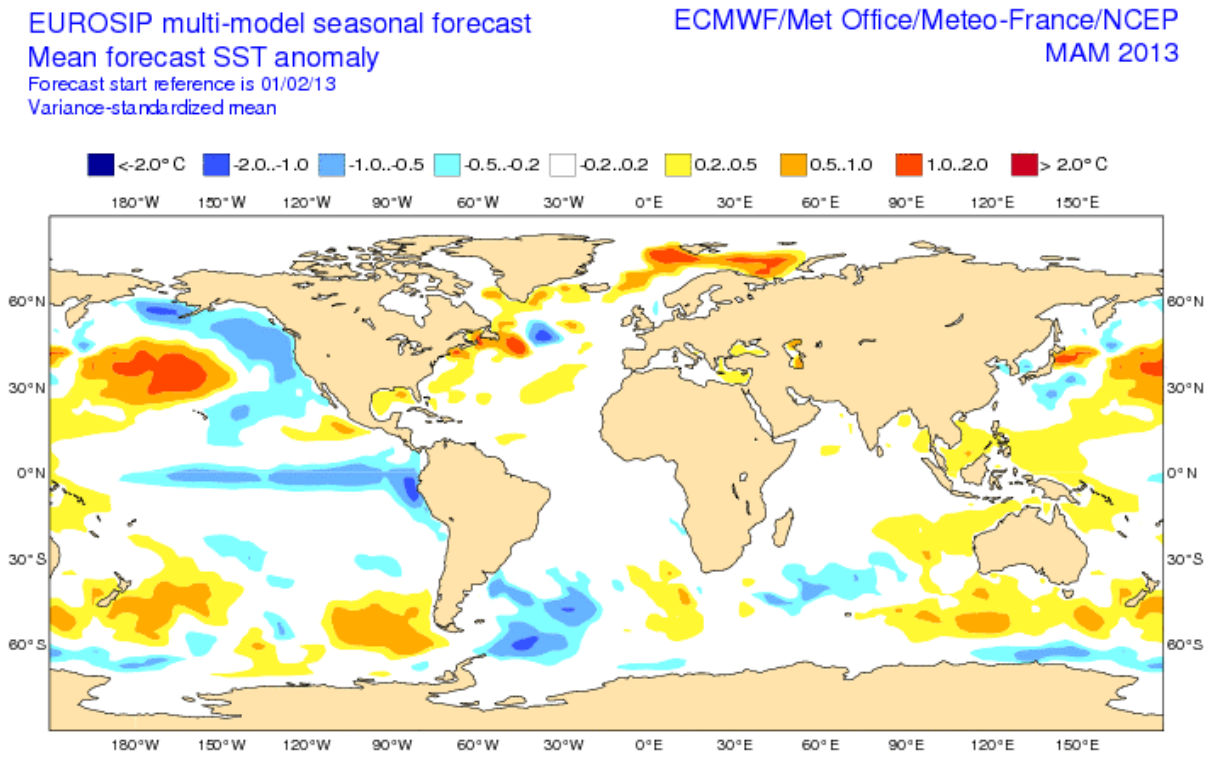


fig.14: SST Forecasted anomaly (in °C) from Euro-SIP valid for MAM, issued in February.

II.1.b ENSO Forecast :

Forecasted Phase for MAM : 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 MAM : the majority of the models (both statistical and dynamical) indicate a cold central Pacific but above the La Niña threshold. So Neutral conditions should prevail for the spring period (and likely beyond).

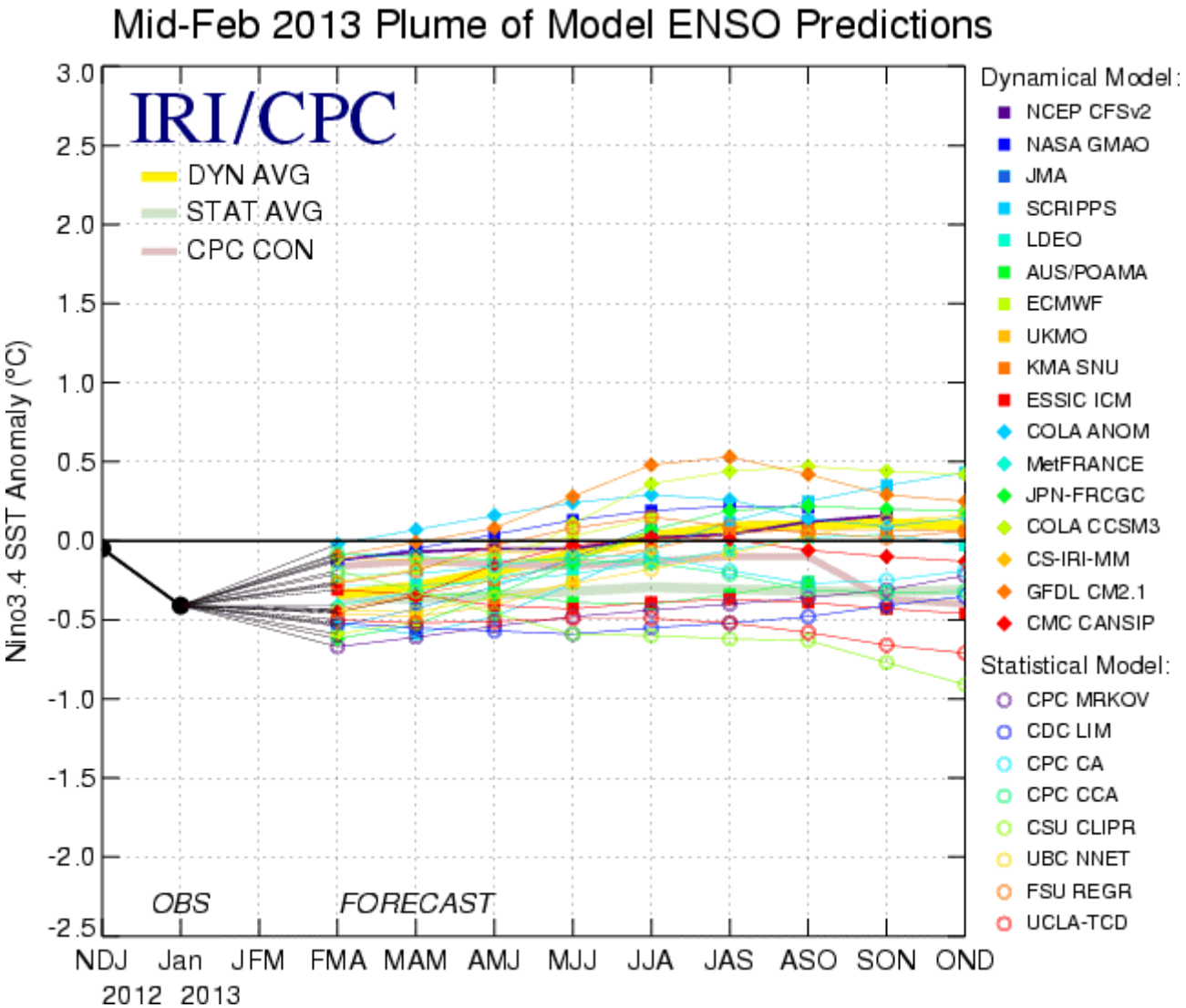


fig.15: Synthesis of Niño 3.4 forecasts (120° to 165°W) issued in January by IRI :
http://iri.columbia.edu/climate/ENSO/currentinfo/SST_table.html

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.

SEASON	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON
Value « La Niña »	*-0,55*	*-0,45*	*-0,40*	*-0,45*	*-0,50*	*-0,50*	*-0,50*	*-0,55*	*-0,75*
Value « El Niño »	*0,50*	*0,40*	*0,40*	*0,45*	*0,45*	*0,45*	*0,45*	*0,50*	*0,70*
Average, statistical models	*-0.4*	*-0.4*	*-0.3*	*-0.3*	*-0.3*	*-0.3*	*-0.3*	*-0.3*	*-0.3*
Average, dynamical models	-0.3	-0.3	-0.2	-0.1	0	0.1	0.1	0.1	0.1
Average, all models	**-0.3**	**-0.3**	**-0.2**	**-0.2**	**-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 ENSO thresholds are not reached on average for the MAM period ; the minimum value of SSTs seems to be reached in January. One can notice that also in both models the spread dramatically increase from the Centre up to the East of the basin.

NIÑO 4 NIÑO 3.4 NIÑO 3

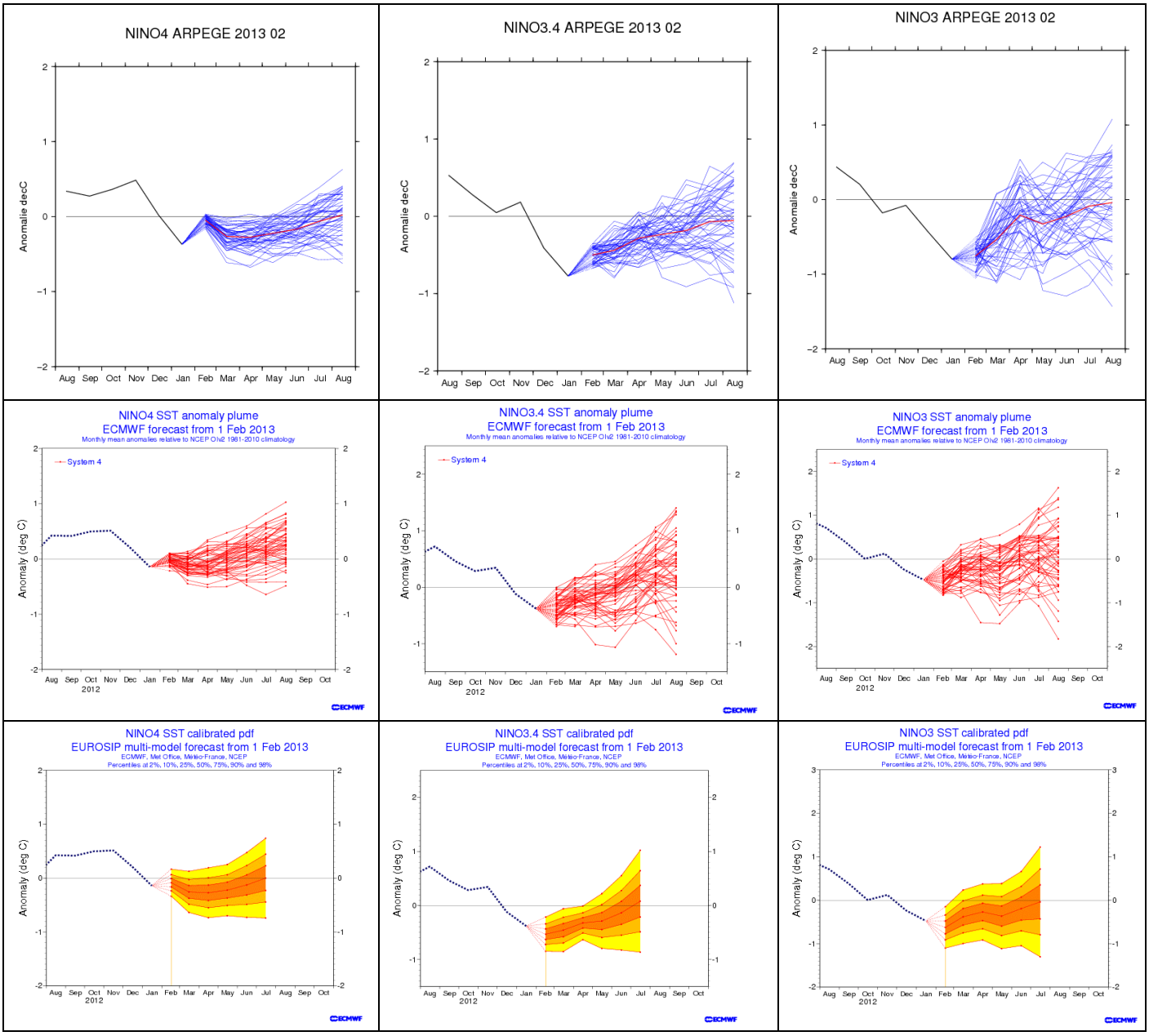


fig.16: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members - and EuroSIP (bottom) – recalibrated distributions - issued in February.
(http://www.ecmwf.int/ **)**

II.1.c Atlantic Ocean forecasts :

Forecasted Phase: ***warmer than normal in the Northern, slightly colder than normal in Southern Tropics***

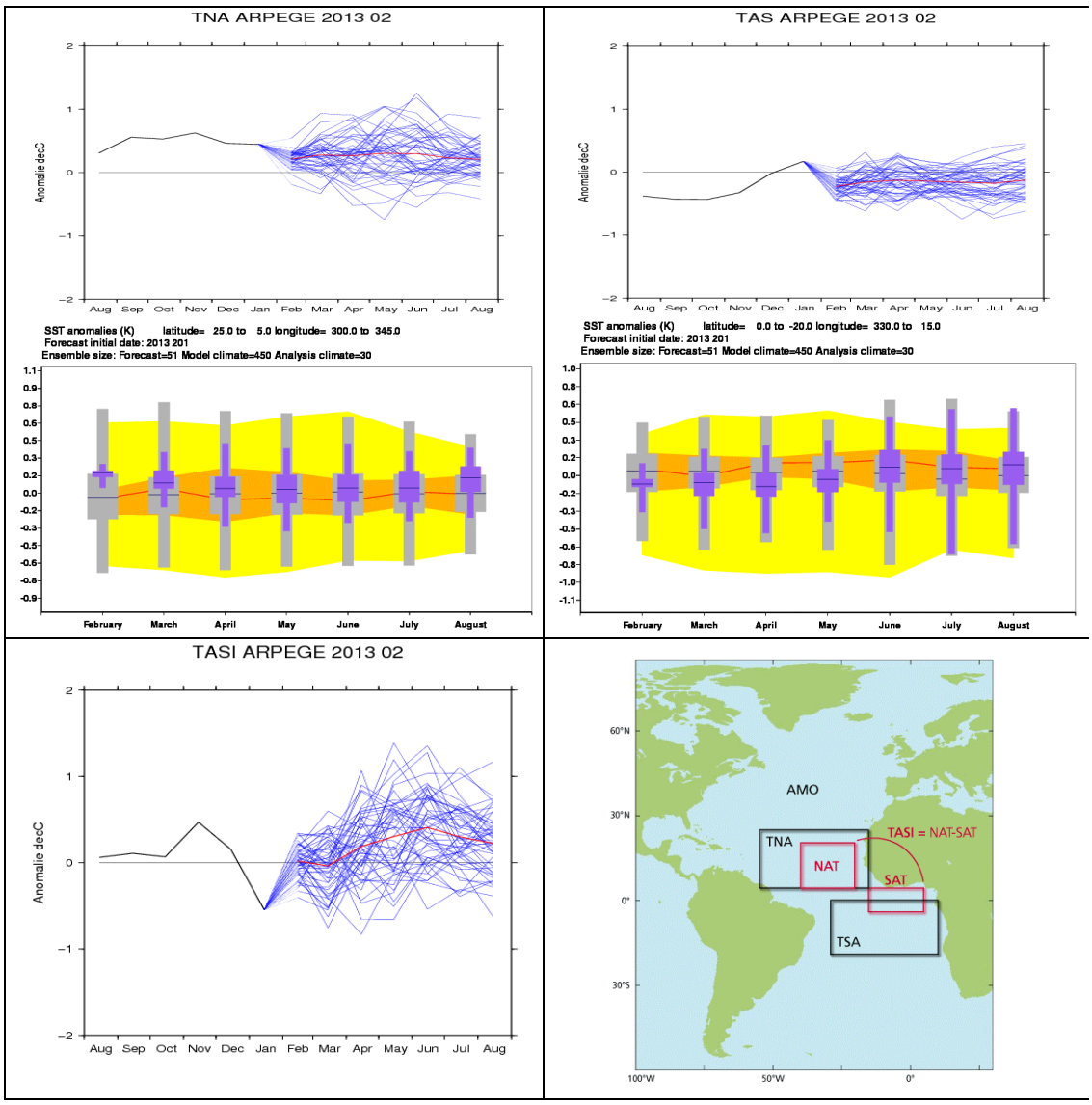


fig.17: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, issued in February, plumes / climagrams correspond to 51 members and monthly means.

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 close to neutral*

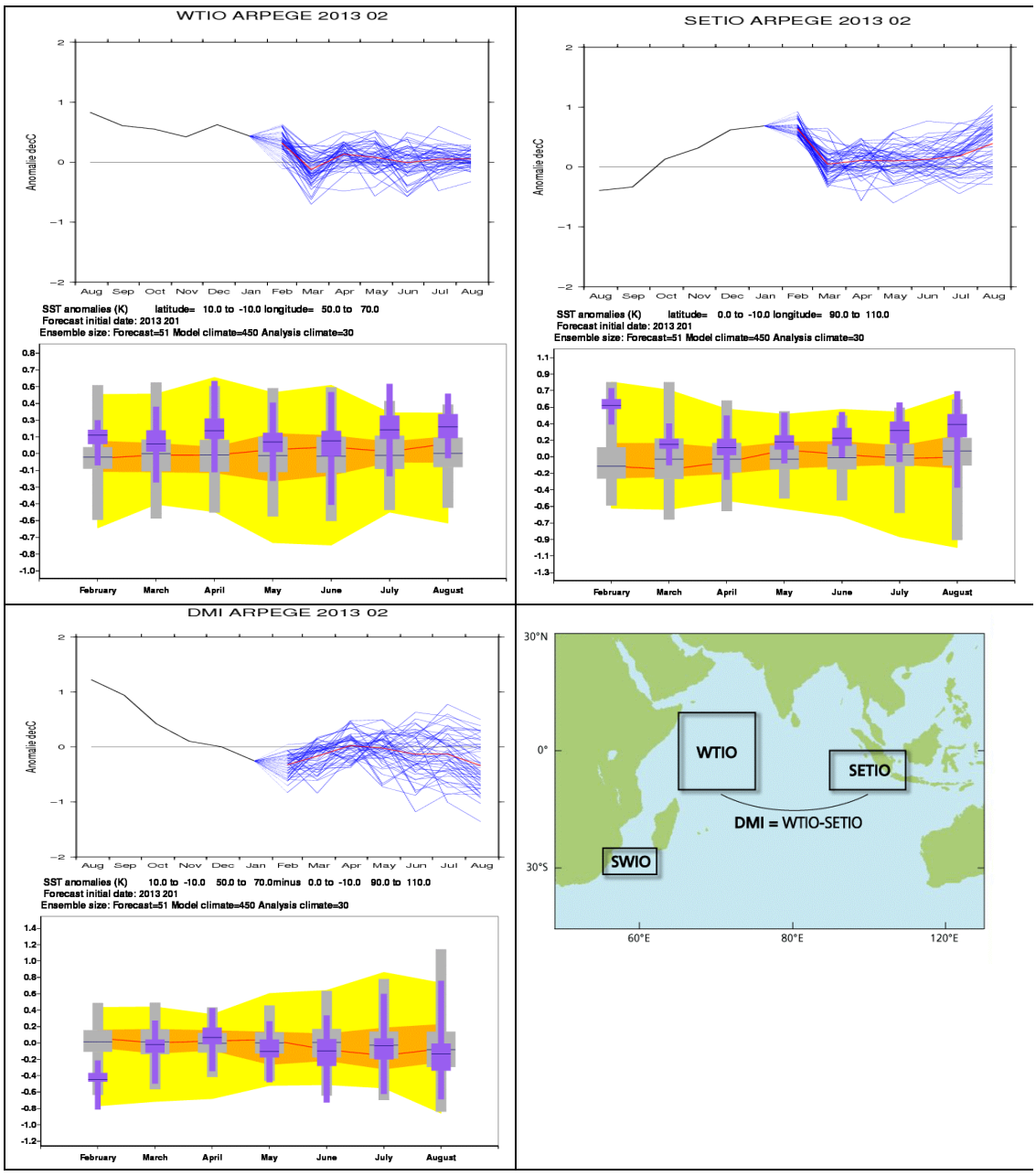


fig.18: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, issued in February, plumes / climagrams correspond to 41 / 51 members and monthly means.

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

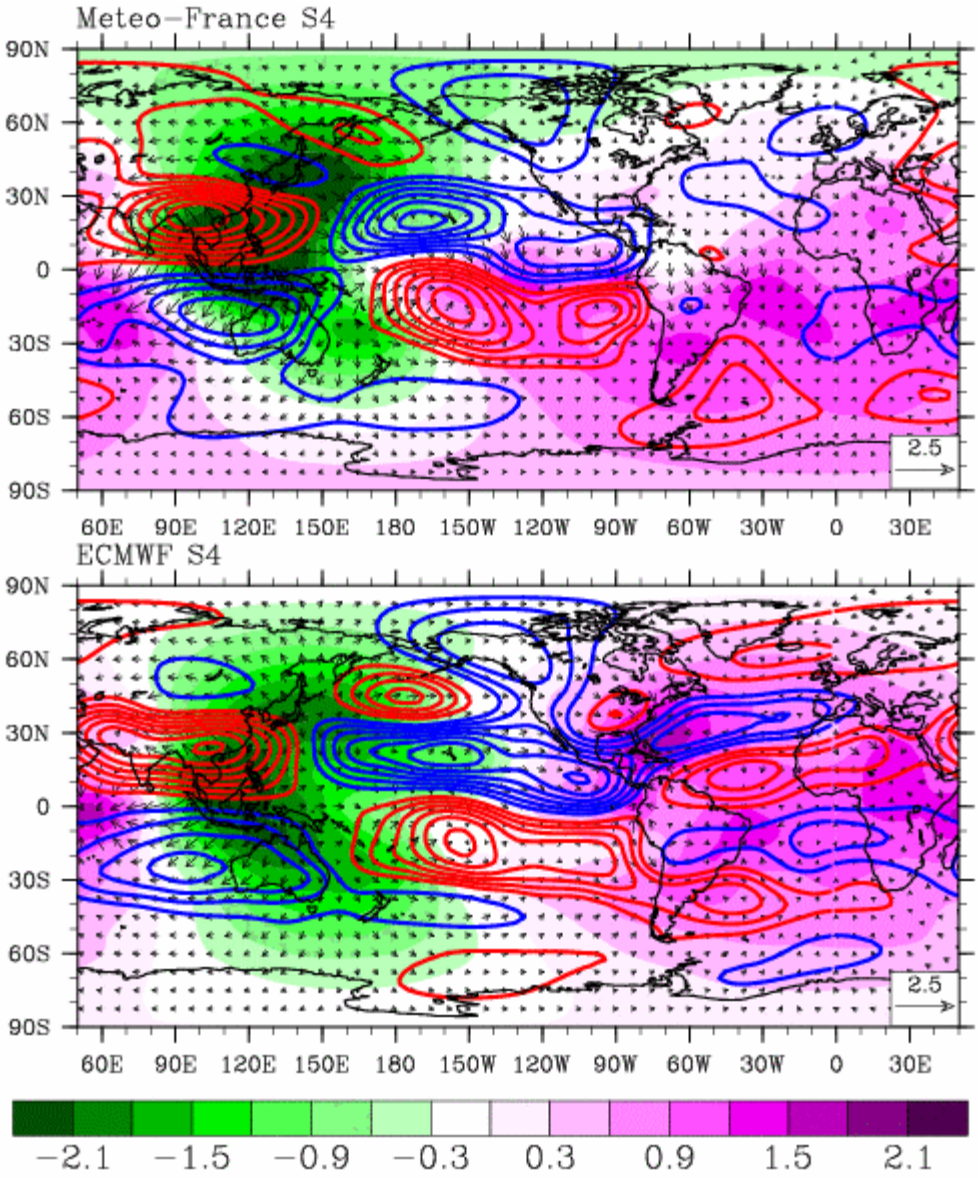


fig.19: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), associated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa for FMA, issued in January by Météo-France (top) and ECMWF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

Velocity potential anomaly field (cf. fig. 19 – insight into Hadley-Walker circulation anomalies) :
in the Tropics : atmospheric response quite consistent over the Pacific ; atmospheric response quite different over North Atlantic.
Over the Pacific : Good consistency between the 2 models with a contrasted behaviour between the Western and Central/eastern part of the tropical basin. Consequently Divergent circulation anomaly (upward motion) over the West Tropics extending both Northward and Southward along the Eastern coast of Asia and toward Australia (consistently with SSTs) and Convergent circulation anomaly (downward motion) in the Eastern Pacific.
Over Indian Ocean : very consistent signal in both models ; increased convergent circulation anomaly over Western Indian Ocean in relationship with West Pacific anomaly which extends over the African continent.

Over Atlantic : the models show some consistency over South Atlantic but large differences over North Atlantic.

Stream Function anomaly field (cf. fig. 19 – insight into teleconnection patterns tropically forced) :
In both models, over the Pacific a teleconnection pattern is visible from Tropics toward the mid-latitudes ; West Pacific mode active in MF while the teleconnection is more related to the central Pacific in ECMWF. Over the Atlantic the differences are large over the Northern hemisphere while there is some similarity over the Southern Atlantic. In ECMWF, a large portion of the Atlantic signal seems to be related with the tropical circulation anomalies (see velocity potential field).

II.2.b North hemisphere forecast and Europe

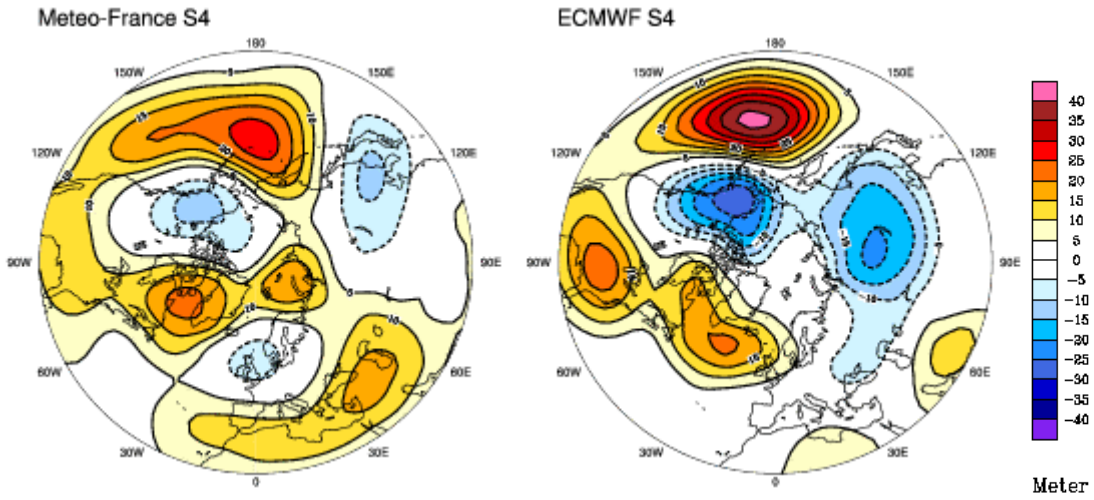


fig.20: Anomalies of Geopotential Height at 500 hPa for MAM, issued in February from Météo-France (left) and ECMWF (right).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip

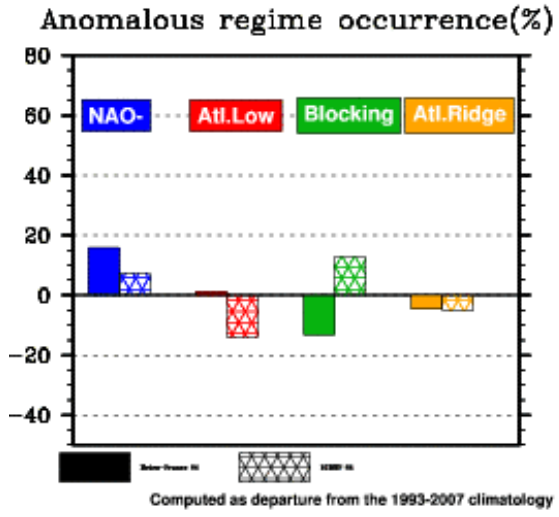


fig.21: North Atlantic Regime occurrence anomalies from Météo-France and ECMWF : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.

Geopotential height anomalies (fig. 20 – insight into mid-latitude general circulation anomalies) :
As seen on the Stream Function anomalies, there is a great similarity on the Pacific and then large differences over the North Atlantic sector. However, the positive Geopotential Height anomaly close to Greenland could be at least partly related to Tropical SST forcing as discussed in the Stream Function

section..

North Atlantic Circulation Regimes (fig. 21) : As a consequence, the circulation regimes forecasts are quite different between MF and ECMWF. However, the stream function anomalies can at least partly explain the increase of the frequency of NAO – regimes.

General atmospheric circulation in MF in the low troposphere (see fig. 22) : as the mid-latitude circulation in MF seems to be more related to the internal dynamic, the zonal and meridionnal circulation over Europe don't show clear signal to the exception of the most North-Western regions consistently with the positive anomaly in Z500 already discussed and the increase of NAO – situations.

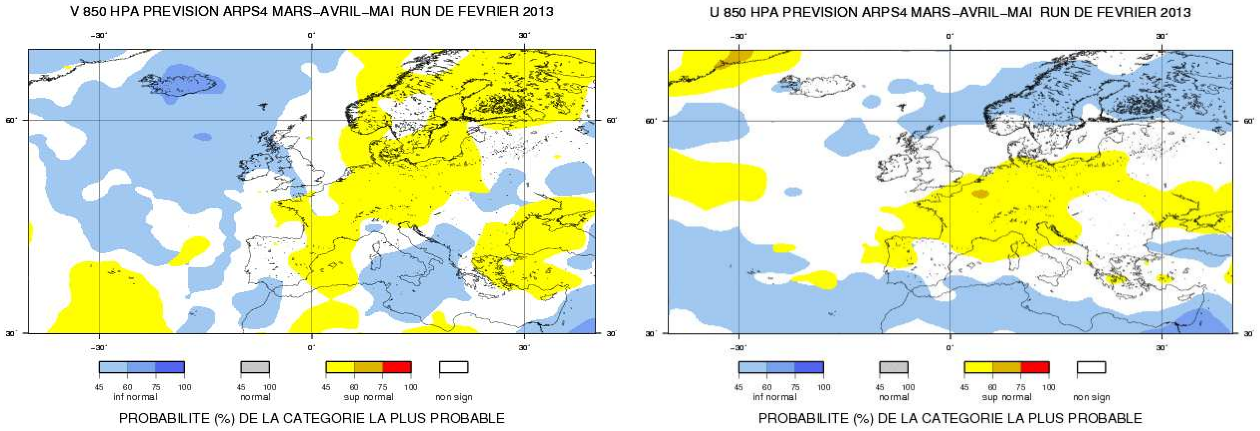


fig.22: Most likely category for the meridional (left) and zonal (right) wind at 850 hPa for MAM, issued in February from Météo-France.

II.3. IMPACT : TEMPERATURE FORECASTS

II.3.a ECMWF

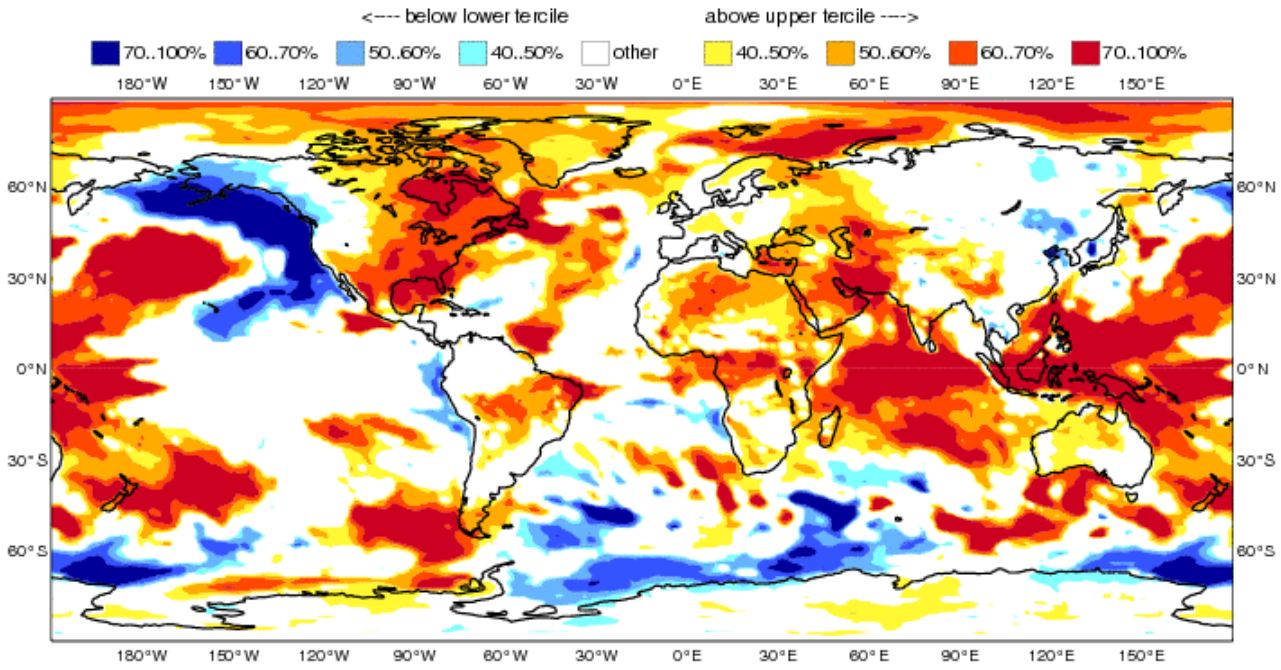


fig.23: Most likely category probability of T2m from ECMWF for MAM, issued in February. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

II.3.b Météo-France

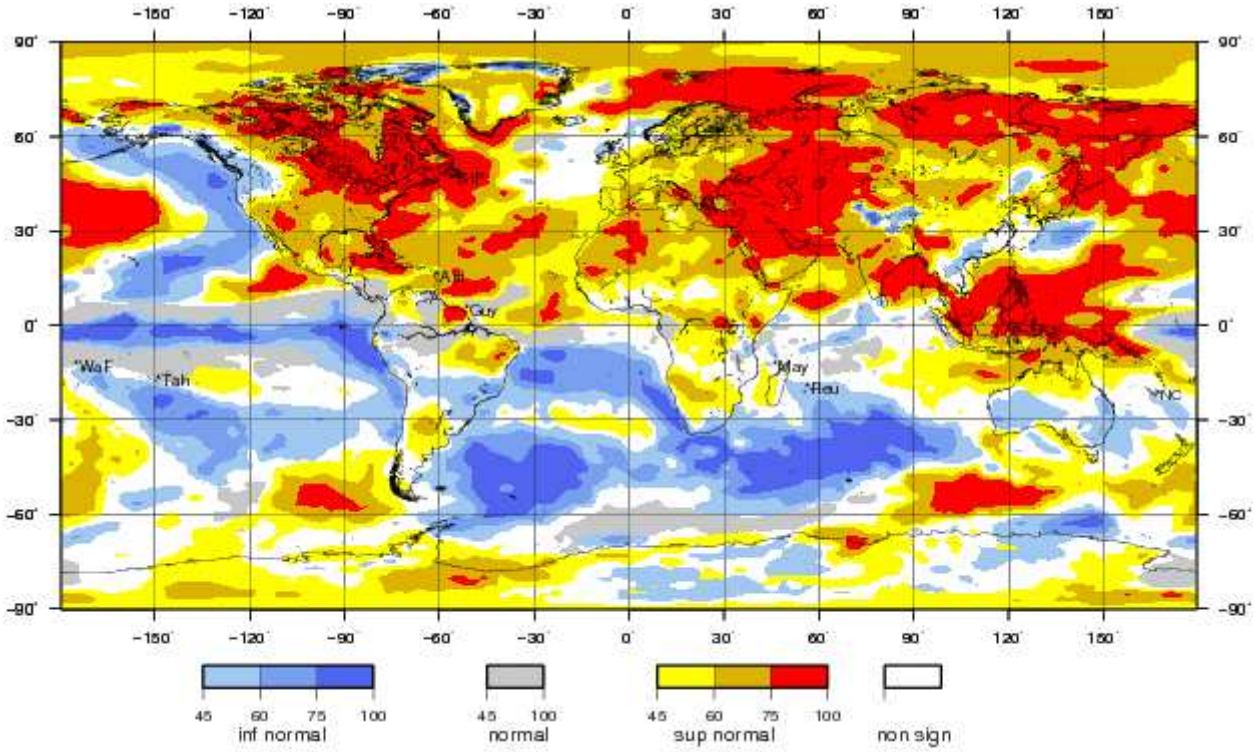


fig.24: Most likely category of T2m for MAM, issued in February. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.3.c Met Office (UKMO)

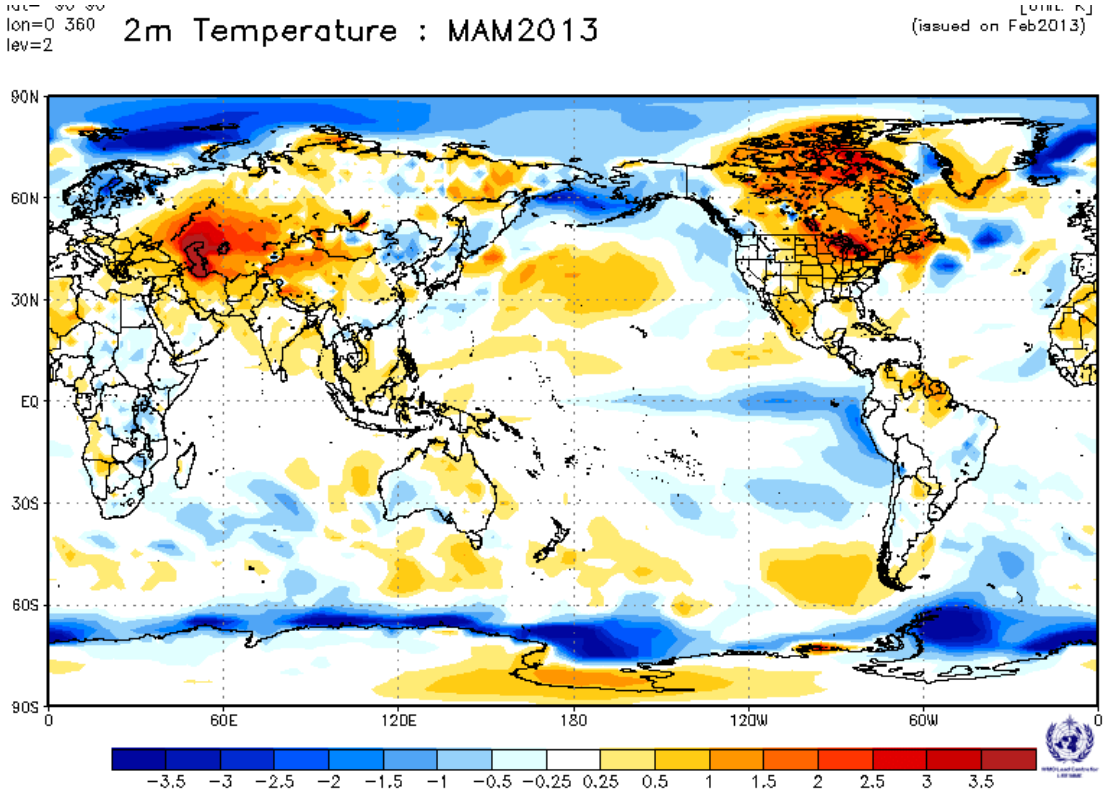


fig.25: T2m anomaly for MAM, issued in February from UK Met Office. https://www.wmolc.org/

II.3.d Climate Prediction Centre (CPC)

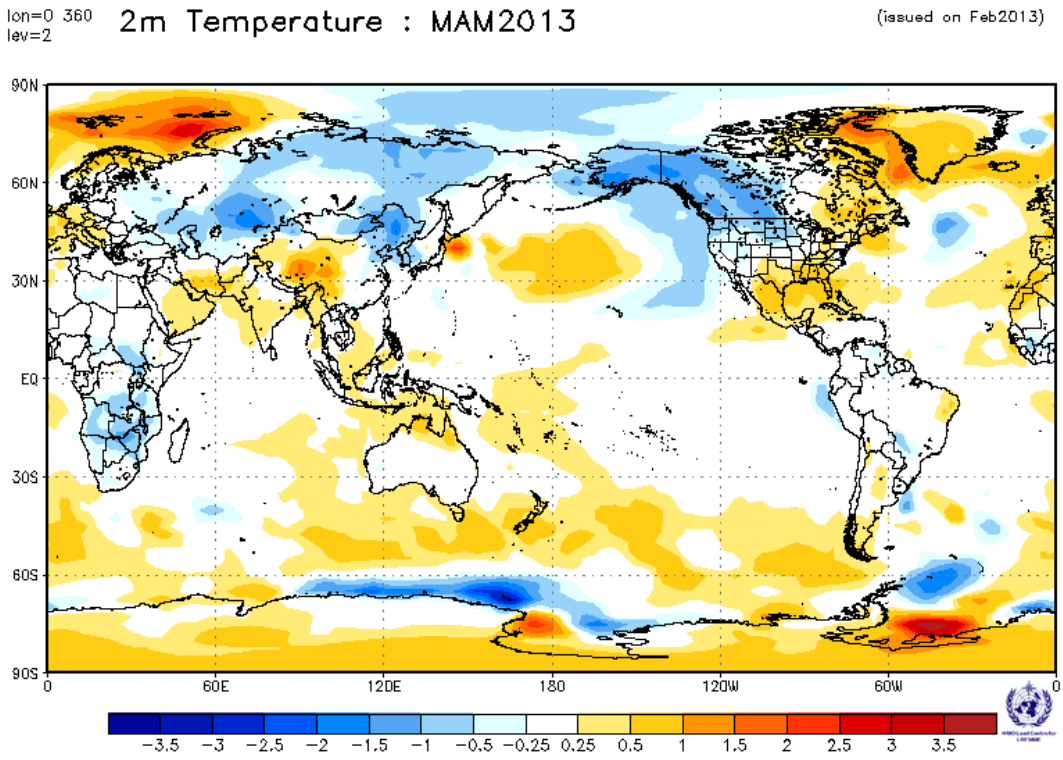


fig.26: T2m Anomaly for MAM, issued in February from CPC. https://www.wmolc.org/

II.3.e Japan Meteorological Agency (JMA)

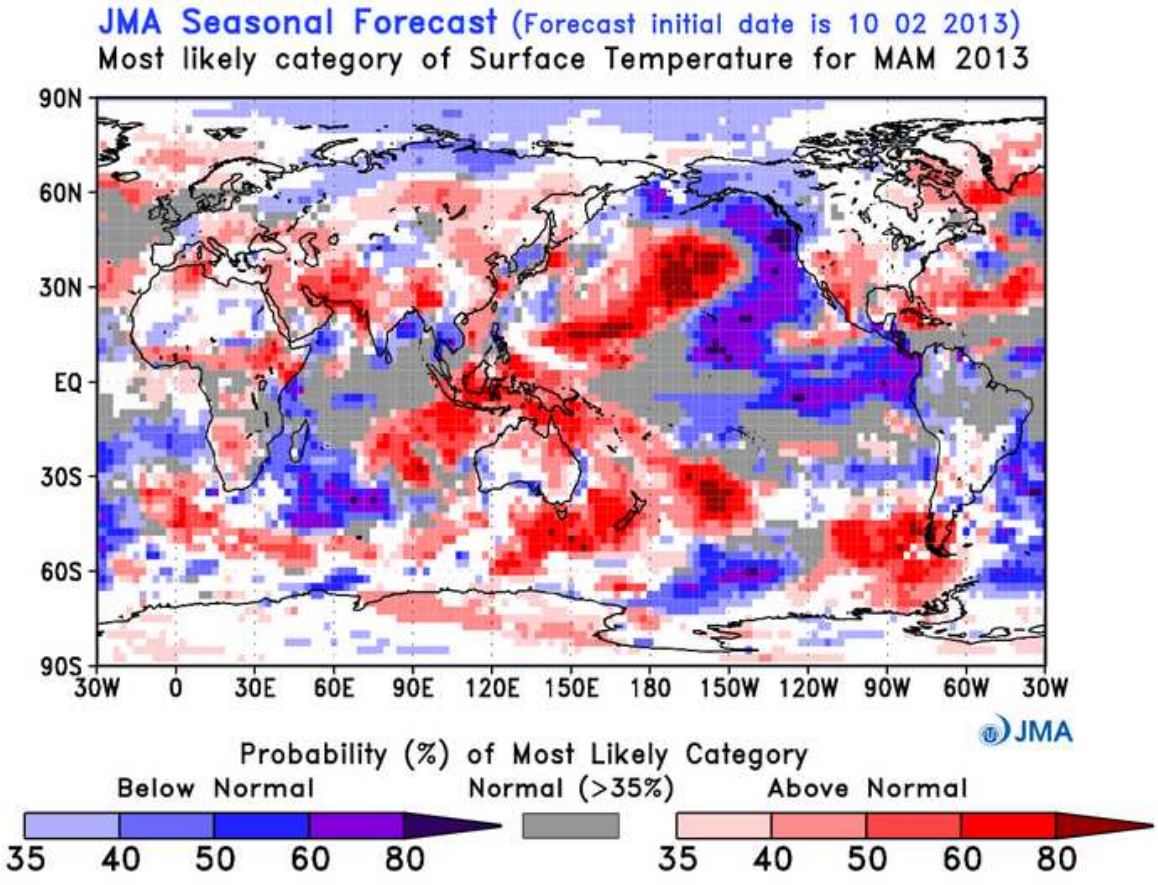


fig.27: Most likely category of T2m for FMA, issued in February from MAM. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/

II.3.f Lead Centre on Multi Model Ensemble (LCMME)

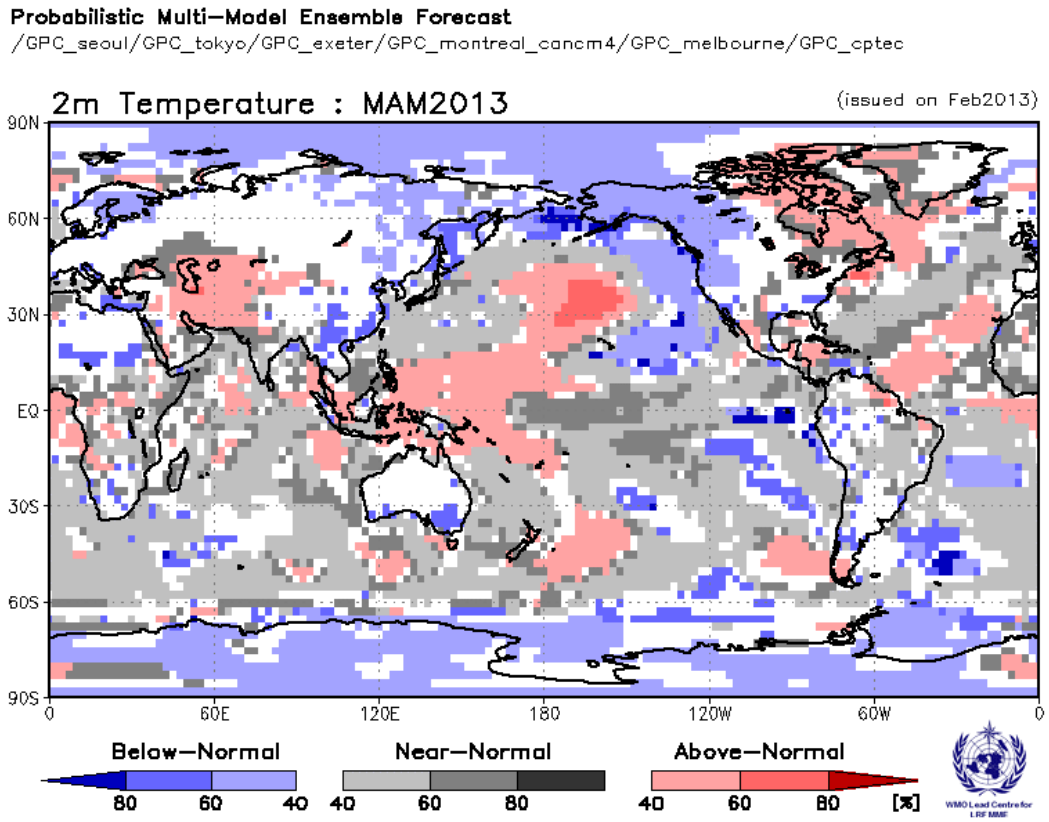


fig.28: Most likely category of T2m for MAM, issued in February from the LC-MME (multi-model ensemble). Categories are Above, Below and Close to Normal. White zones correspond to No Signal. https://www.wmolc.org/

II.3.g Euro-SIP

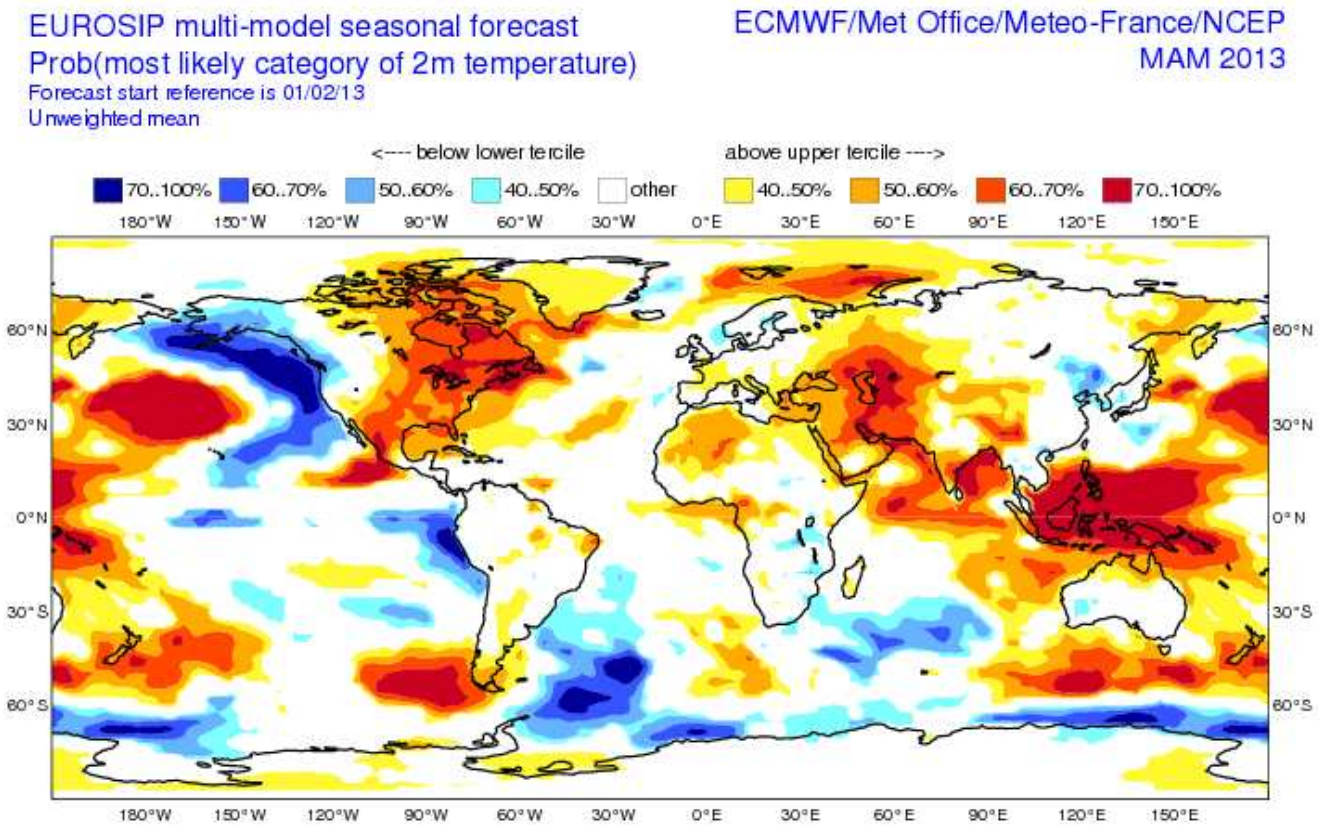


fig.29: Multi-Model Probabilistic forecasts for T2m from EuroSip for MAM, issued in February. (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).

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 up to the Hudson Bay (including a large portion of US). 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 Northern coast.
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 over North African countries.
Europe : No signal over most of the western part of the continent. Warmer than normal scenario over Eastern and South-Eastern regions.

II.4. IMPACT : PRECIPITATION FORECAST

II.4.a ECMWF

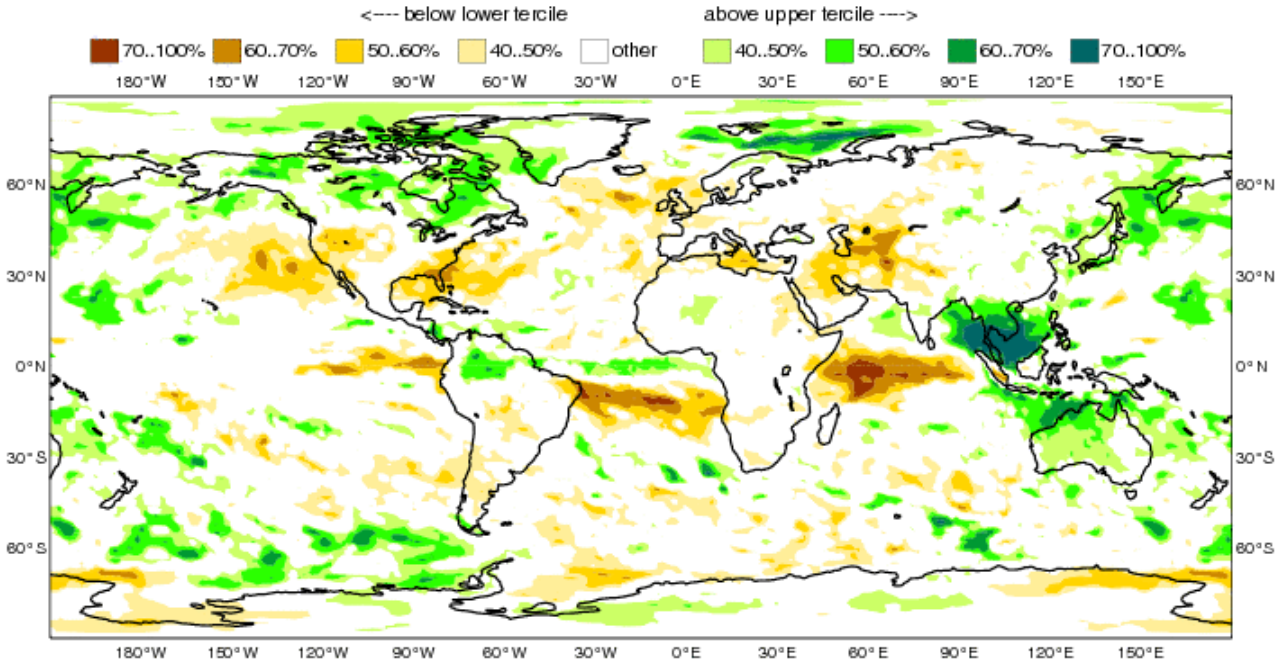


fig.30: Most likely category probability of rainfall from ECMWF for MAM, issued in February. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/charts/seasonal_charts_s2/

II.4.b Météo-France

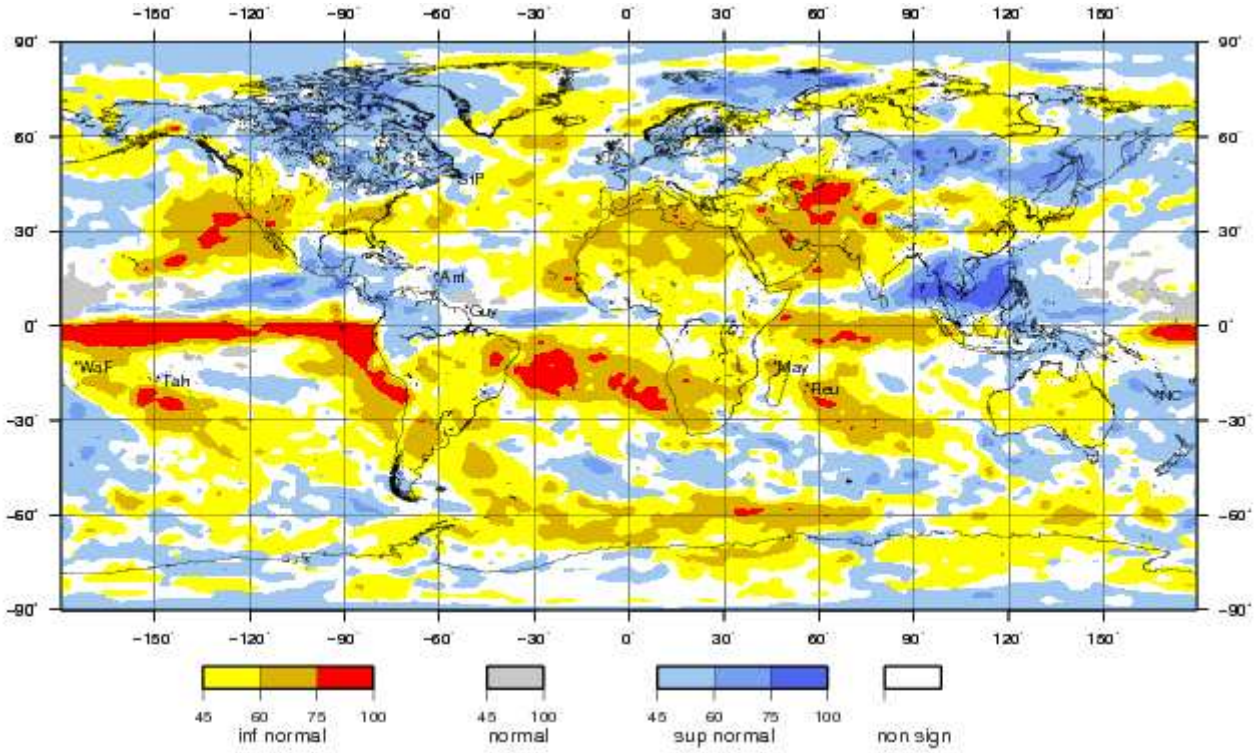


fig.31: Most likely category of Rainfall for MAM, issued in February. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Met office (UKMO)

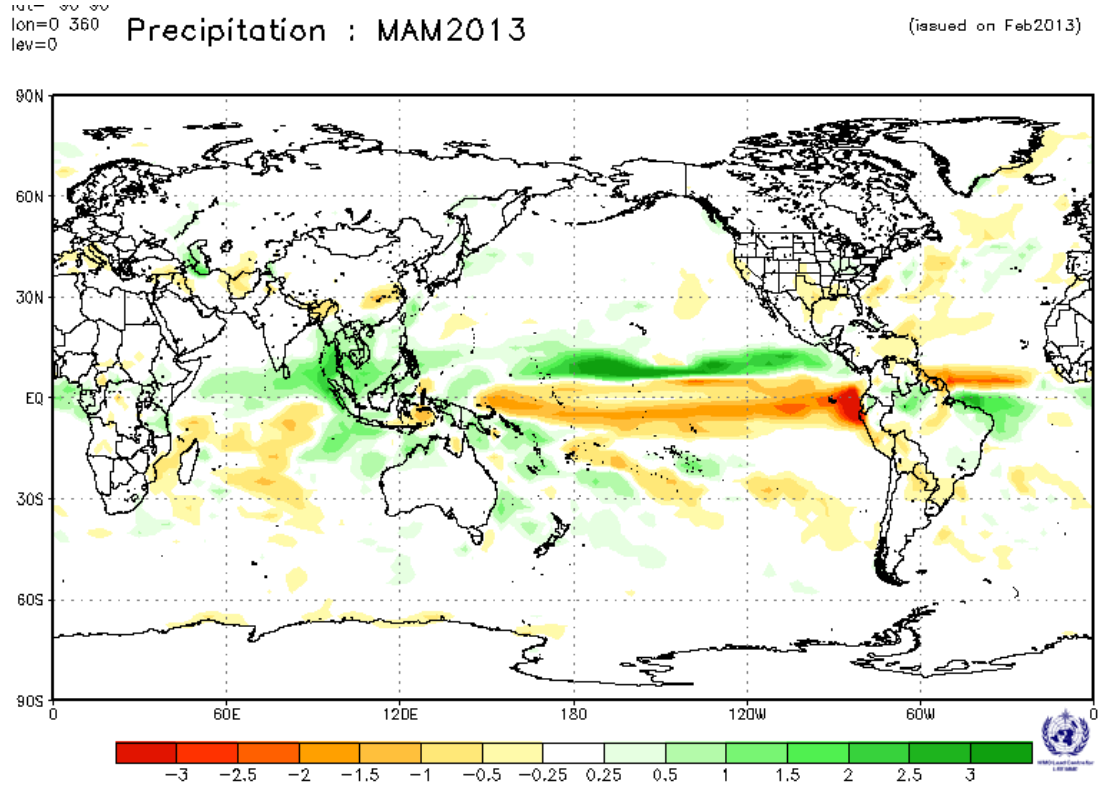


fig.32: Rainfall anomaly for MAM, issued in February from UK Met Office. https://www.wmolc.org/

II.4.dClimate Prediction Centre (CPC)

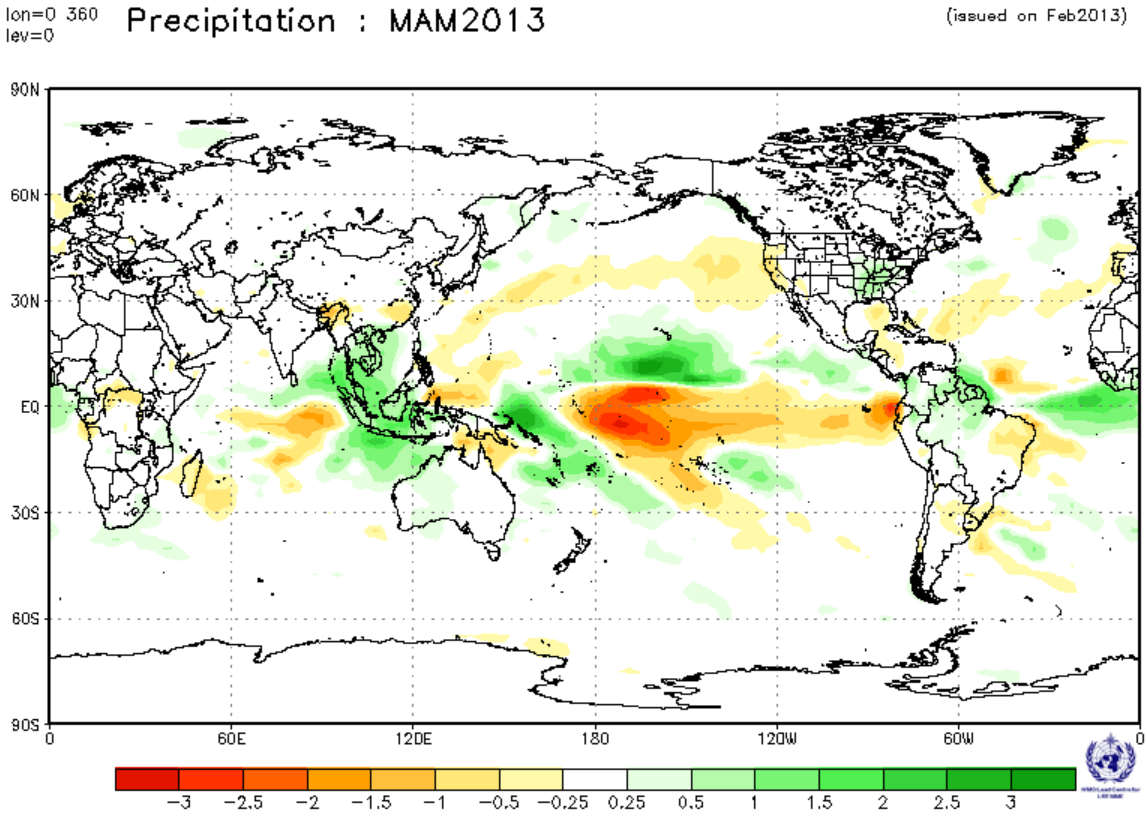


fig.33: Rainfall Anomaly for MAM, issued in February from CPC. https://www.wmolc.org/

II.4.e Japan Meteorological Agency (JMA)

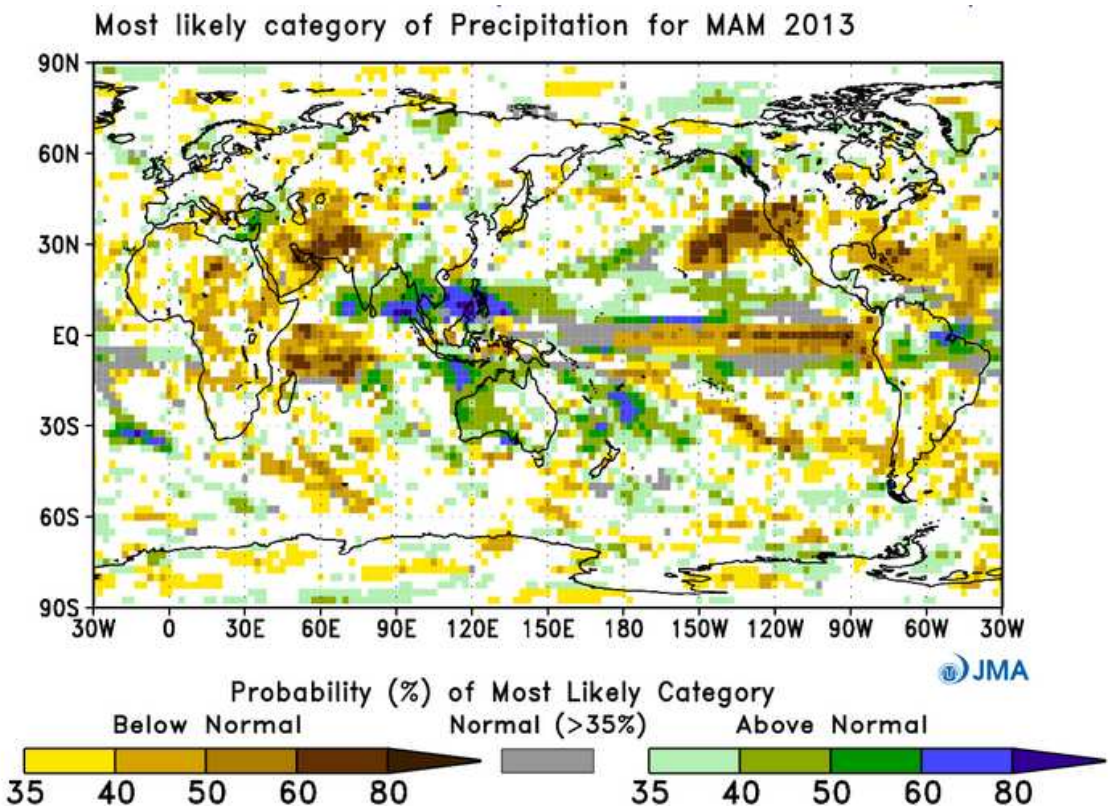


fig.34: Most likely category of Rainfall for MAM, issued in February from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/

II.4.f Lead Centre on Multi Model Ensemble (LCMME)

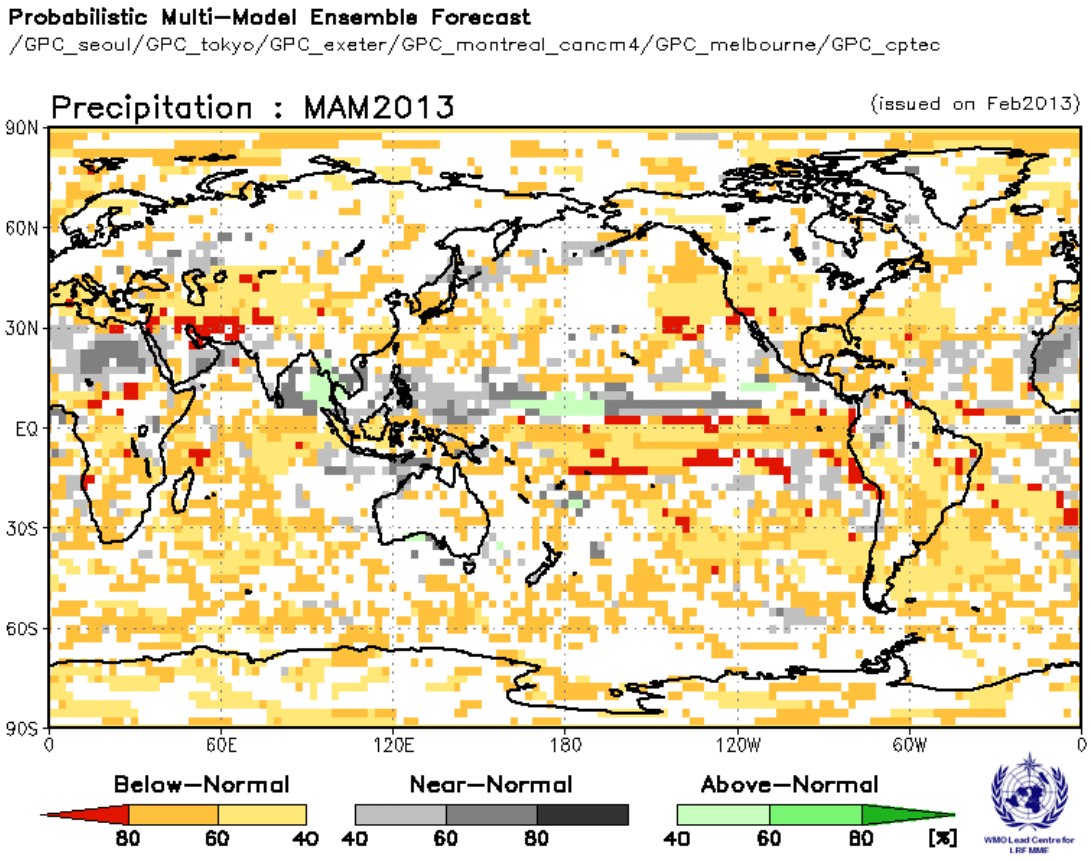


fig.35: Most likely category of Rainfall for MAM, issued in February from the LC-MME (multi-model ensemble). Categories are Above, Below and Close to Normal. White zones correspond to No Signal. https://www.wmolc.org/

II.4.g Euro-SIP

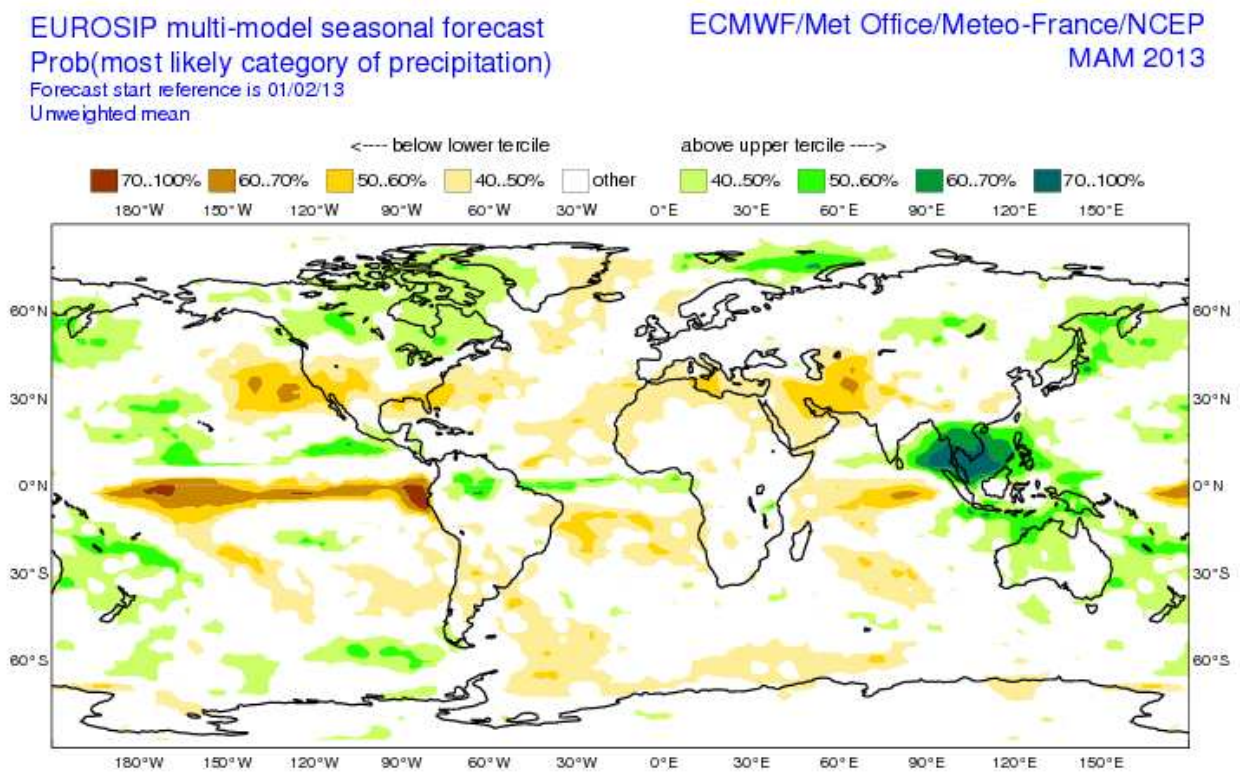


fig.36: Multi-Model Probabilistic forecasts for precipitation from EuroSip for MAM, issued in February. (2 Categories, Below and Above normal – White zones correspond to No signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmv2/param_euro/seasonal_charts_2tm/

Some consistent signal in the Tropics and especially around the Pacific ; wet scenarios over the maritime continent/South-East Asia and SPCZ region, equatorial Atlantic and dry scenarios over the Western and Eastern coast of US.
For Europe No signal everywhere and more generally for the mid latitude of Northern Hemisphere to the exception, for Canada, of the region North to the Great Lakes.

II.5. REGIONAL TEMPERATURES

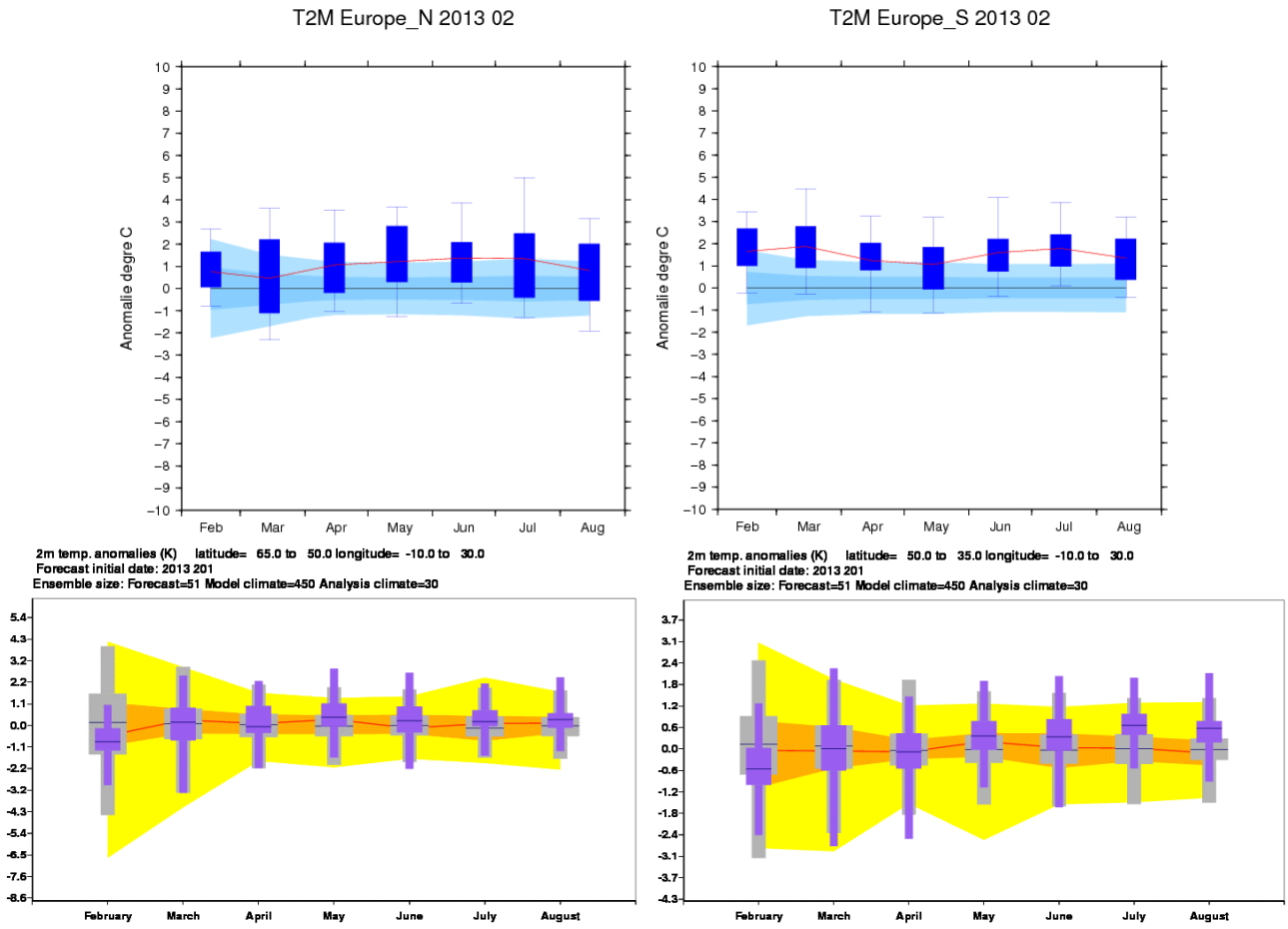


fig.37: Climagrams for T2m in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom) issued in February.

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

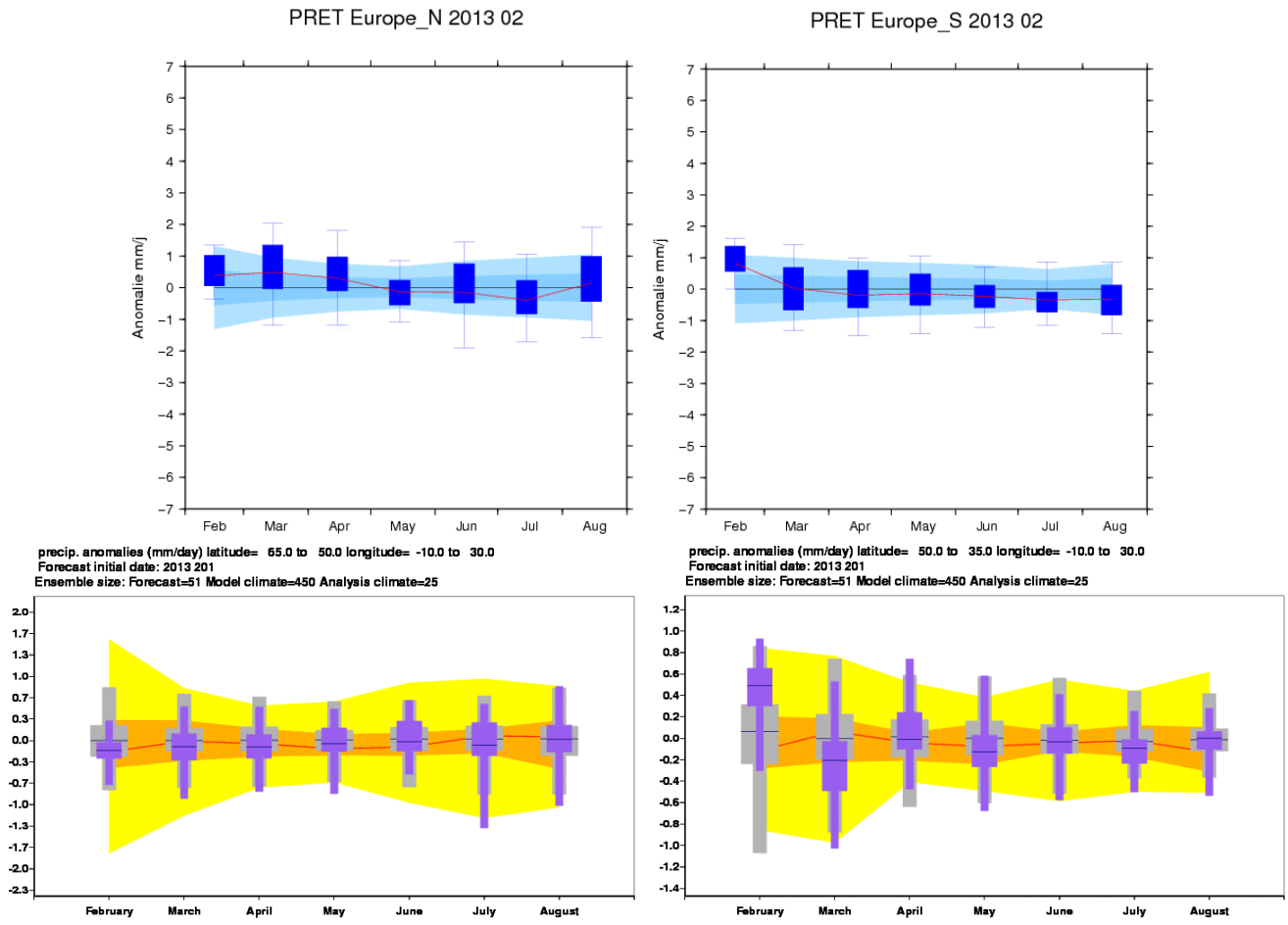


fig.38: Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom), issued in February.

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. Signal close to climatology.
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

Not available for this month

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

For SST :
For Z500 :
For T2m :
For precipitation :

II.7. "EXTREME" SCENARIOS

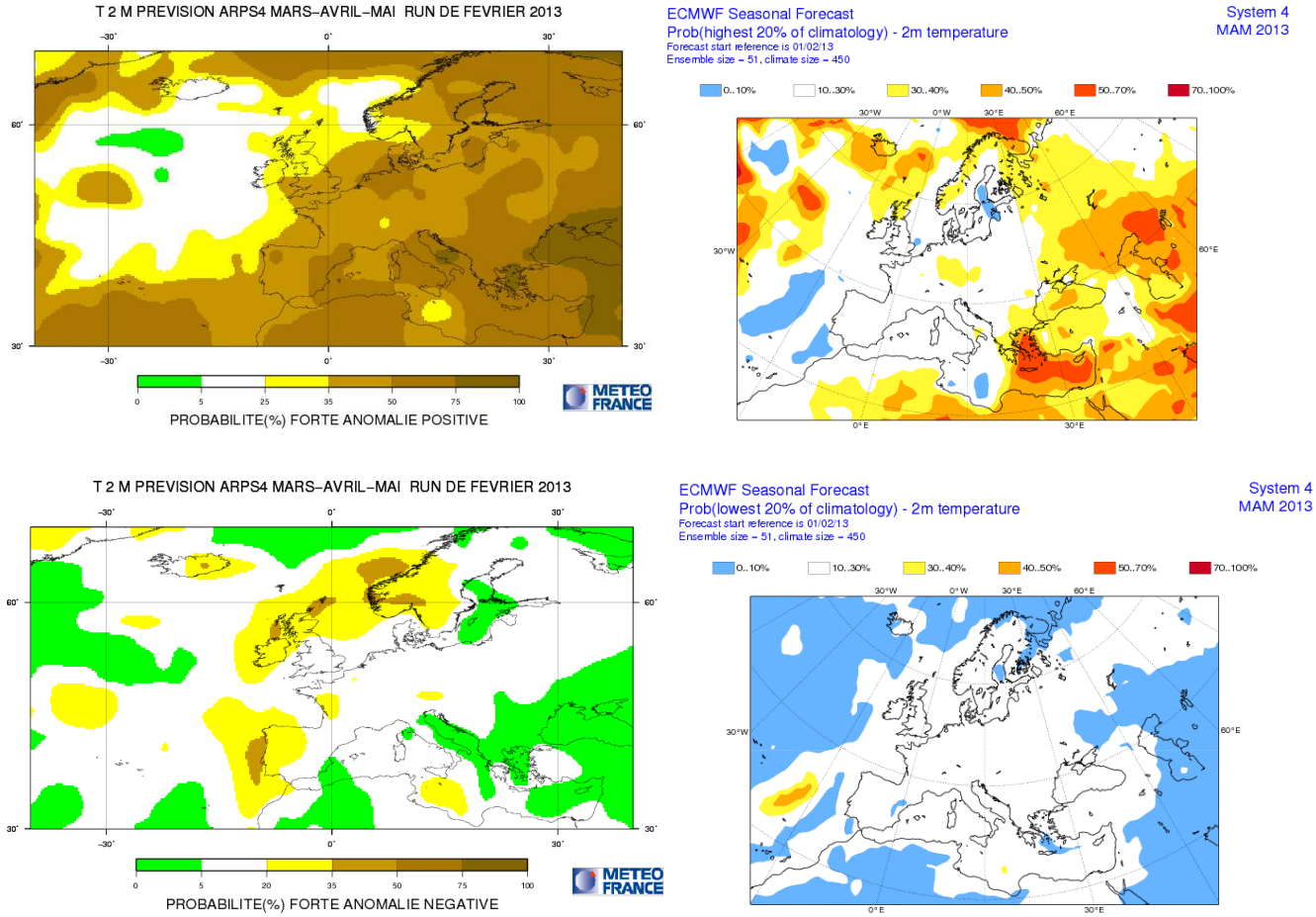


fig.40: Top : Probability of « extreme » above normal conditions for T2m for Meteo-France (left - highest ~15% of the distribution) and ECMWF (right - highest 20% of the distribution).
Bottom : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the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

No consistency between the 2 models for the Very Above Normal scenario (to the exception of the most Eastern regions of Europe) and for no signal for very Below Normal scenario.
So in relationship with 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.

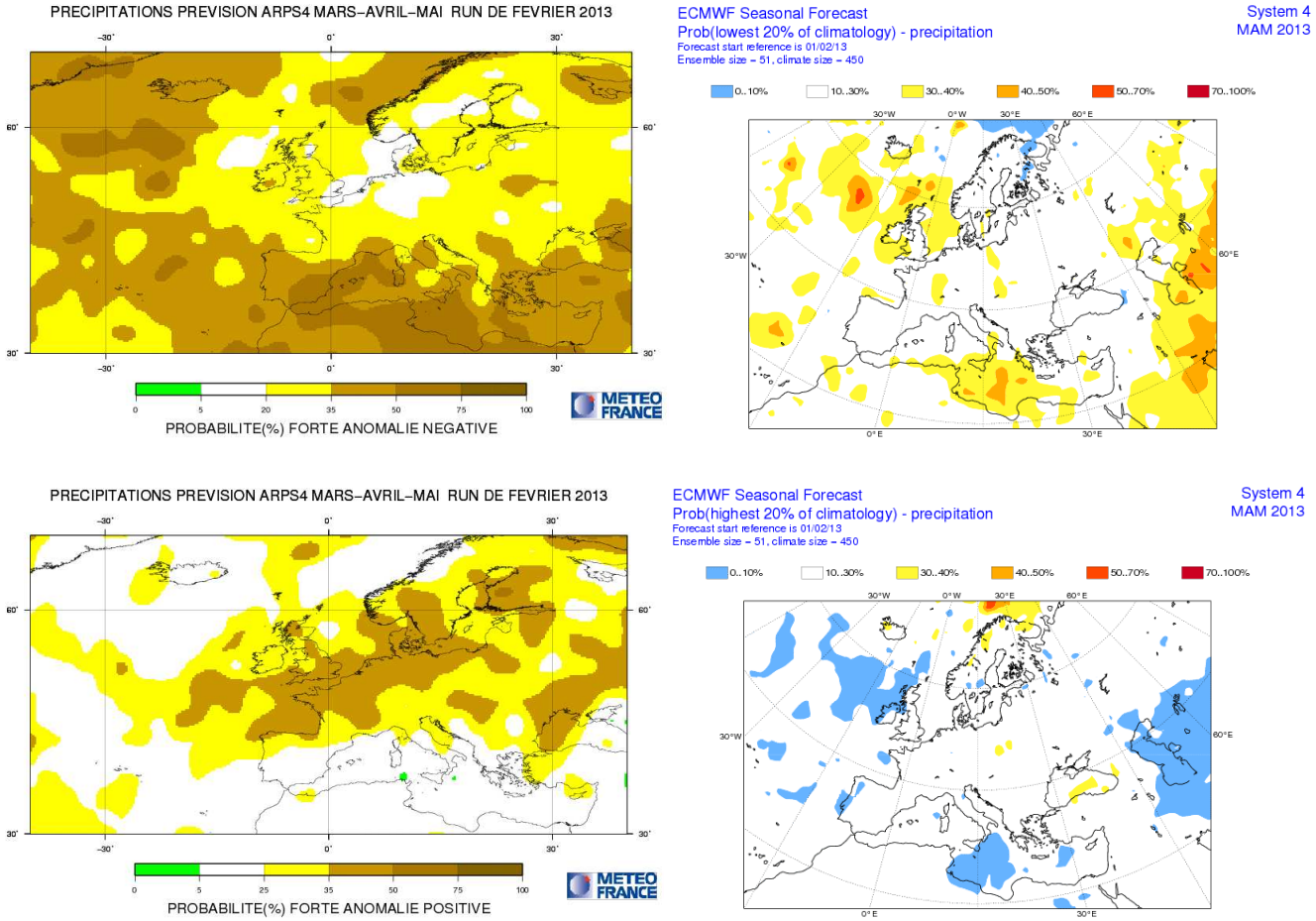


fig.41: Top : Probability of « extreme » Below normal conditions for rainfall for Meteo-France (left - lowest ~15% of the distribution) and ECMWF (right - lowest 20% of the distribution)
Bottom : Probability of « extreme » Above normal conditions for rainfall for Meteo-France (left - highest ~15% of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

The probability of very Below Normal scenario is enhanced (and sometime very high) everywhere in MF while it is close to climatology in ECMWF to the exception of limited regions in the Mediterranean area.
For the very Above scenario, no consistency (in relationship with Z500 differences).
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 predictability in the climate system; It is quite well present around the Pacific basin and in the Tropical regions while it is more disputable for the North Atlantic sector and as a consequence for Europe (see differences between ECMWF and MF).
So in such a context, the EuroSIP forecasts are likely a good synthesis of possible scenarios across the panet and more specifically over European regions.
For rainfall, “No Privileged Scenario” covers most of the European continent.
For temperature : the Above Normal scenario could prevail for East 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

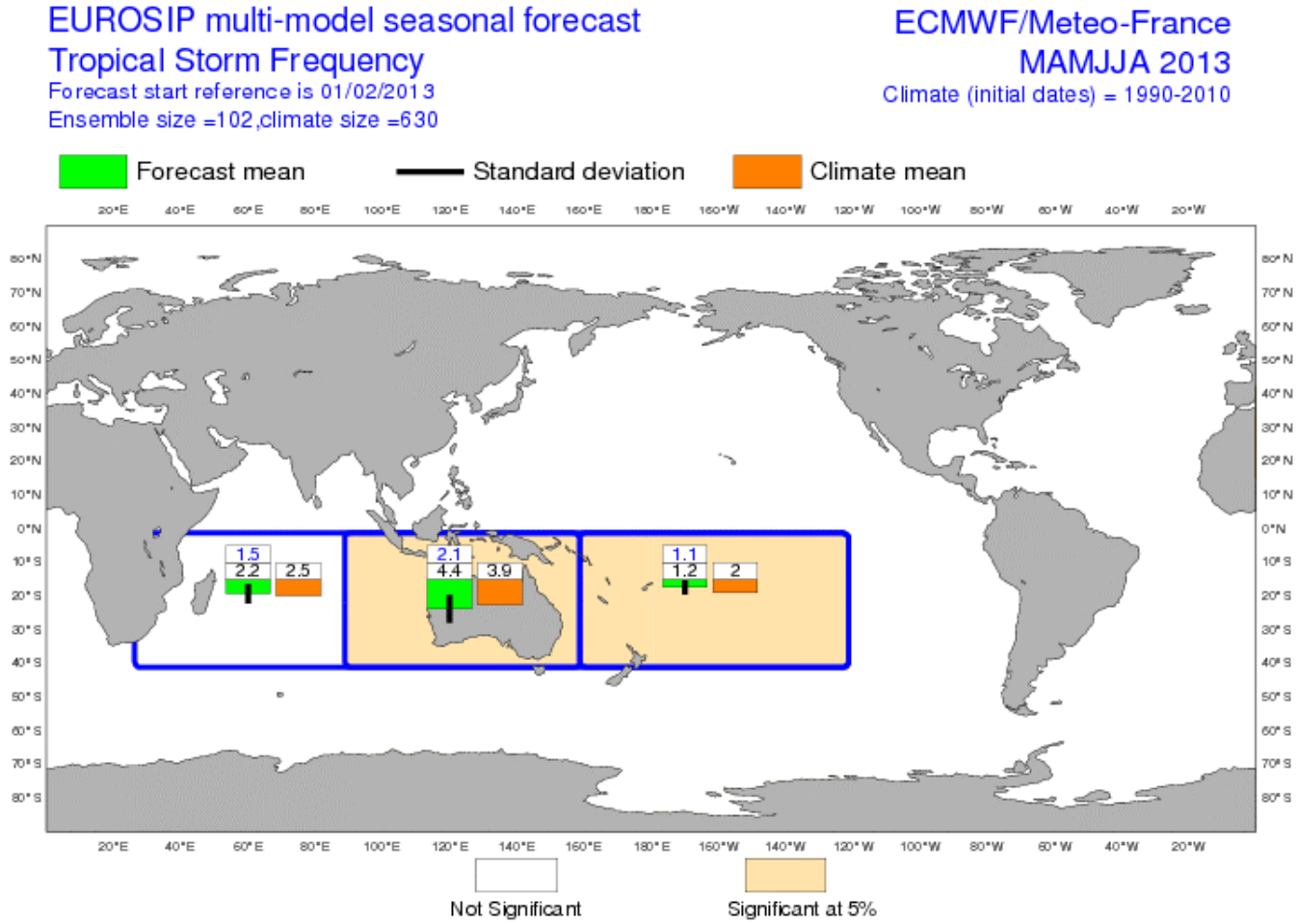


fig.42: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF) for the FMAMJJ 2013 period, issued in January.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtrop/trop_euro/eurosip_tropical_storm_frequency/

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, slightly enhanced activity close to Australia (signal significant with respect of the climatology) and a Below normal activity over the South-West Pacific.

WMO RA VI
Pilot RCC-Network

Synthesis of Temperature forecasts for March-April-May 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					
CPC					
JMA					
synthesis					
LC-MME					
Eurosip					
privileged scenario by RCC-LRF node	*no privileged scenario*	*no privileged scenario*	*no privileged scenario*	*above normal*	*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 March-April-May 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					
CPC					
JMA					
synthesis					
LC-MME					
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).

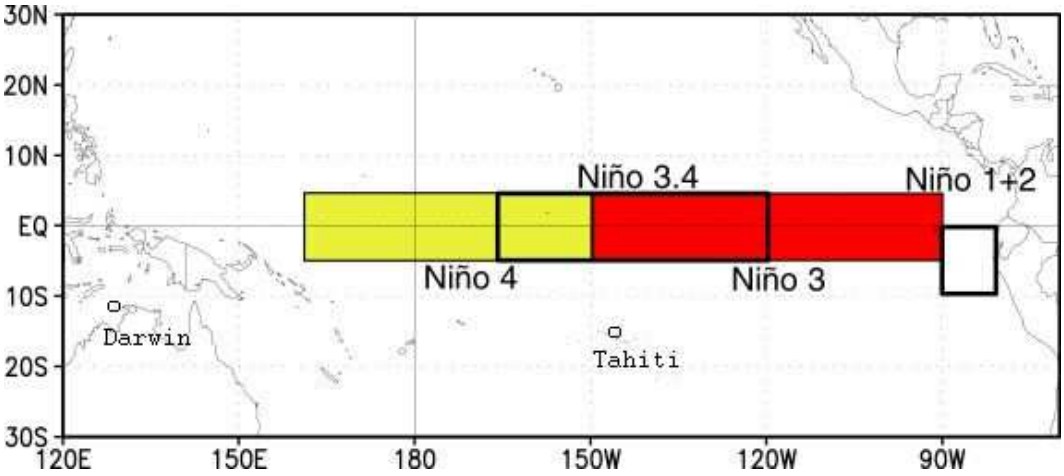
In order to better interpretate the results, it is recommended to look to verification maps and graphs which give some insight into the expected level of skill for a specific parameter, region and period. A set of scores is presented on the web-site of the Lead-Centre for Verification (see http://www.bom.gov.au/wmo/lrfvs/)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