GLOBAL CLIMATE BULLETIN
n°175 - JANUARY 2014

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I. DESCRIPTION OF THE CLIMATE SYSTEM (NOVEMBER 2013)

I.1. OCEANIC ANALYSIS

I.1.a Global Analysis

At the Surface (fig. 1) :
Still little evolutions in the equatorial regions excepted may be to some warming in the Indian Ocean (mostly Western side). In the tropics, warming in the vicinity of the SPCZ and the South Indian Ocean. In the mid latitudes of the Northern hemisphere mostly warming over the Eastern Pacific and cooling across the Atlantic.

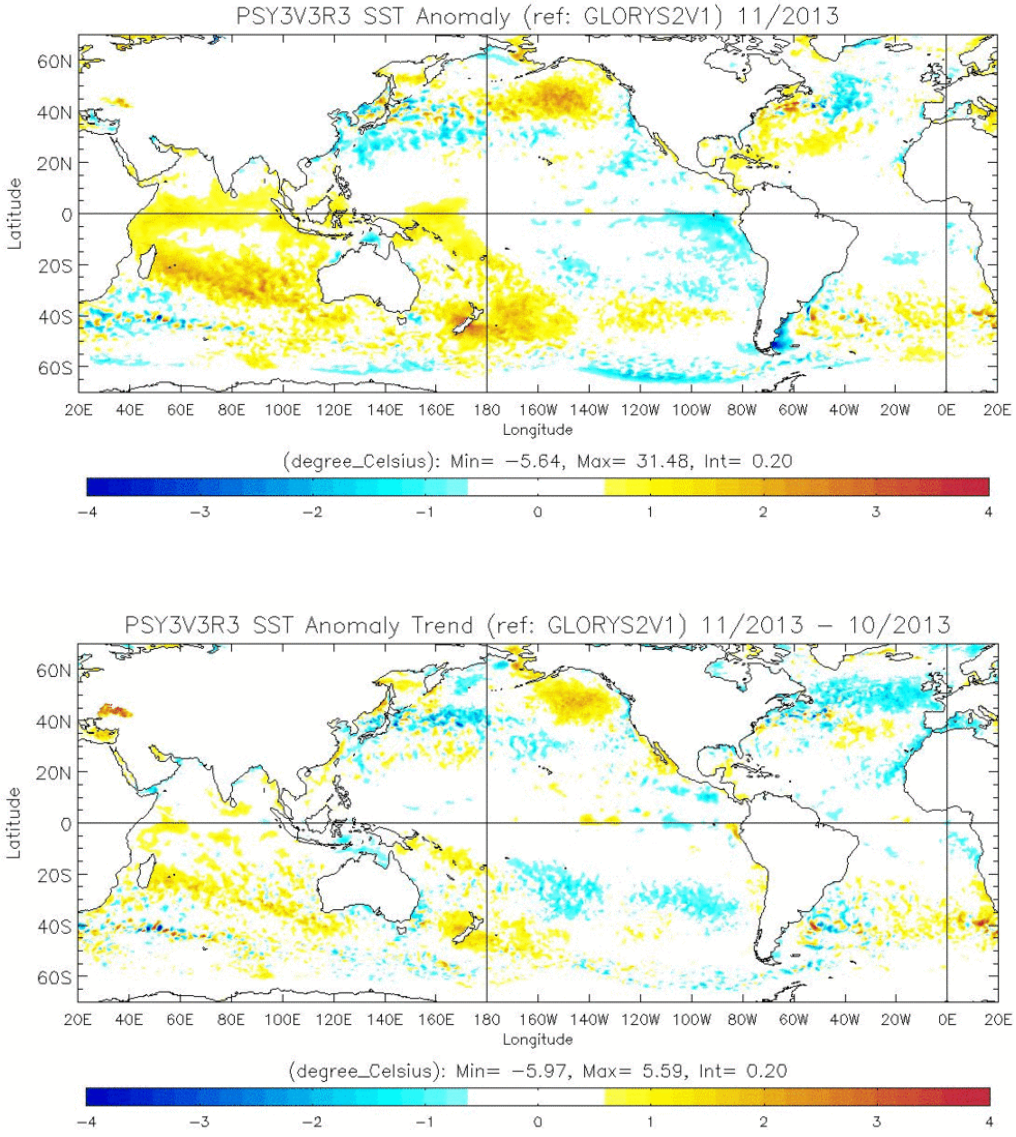


fig.1: top : SSTs Anomalies (°C) (reference Glorys 1993-2009); bottom : SST tendency (current – previous month) http://bcg.mercator-ocean.fr/

In subsurface (fig.2) :

In the Pacific : in the equatorial band (10°N-10°S), heat content anomalies mostly positive West to the dateline (including the vicinity of the Maritime continent), then extension to East of the positive anomaly in the equatorial waveguide. Negative anomaly in the most Eastern part of the basin. Off equator, Strong positive anomalies in the Northern hemisphere between 10°N and 20°N not visible at the surface. In the mid-latitude the signal is consistent with the surface signal.
In the Atlantic : in the equatorial waveguide little anomalies to the exception of positive anomalies in the Guinean Gulf. Negative anomaly just South to the equator. Strong negative anomaly over the Northern Mid-Latitude Atlantic.
in the Southern tropics (excepted close to the African continent – negative anomalies).
In the Indian Ocean : In the equatorial waveguide signal mostly positive in the central part. Consistency with SSTs in the Southern sub-tropics. The IOD is close to 0.

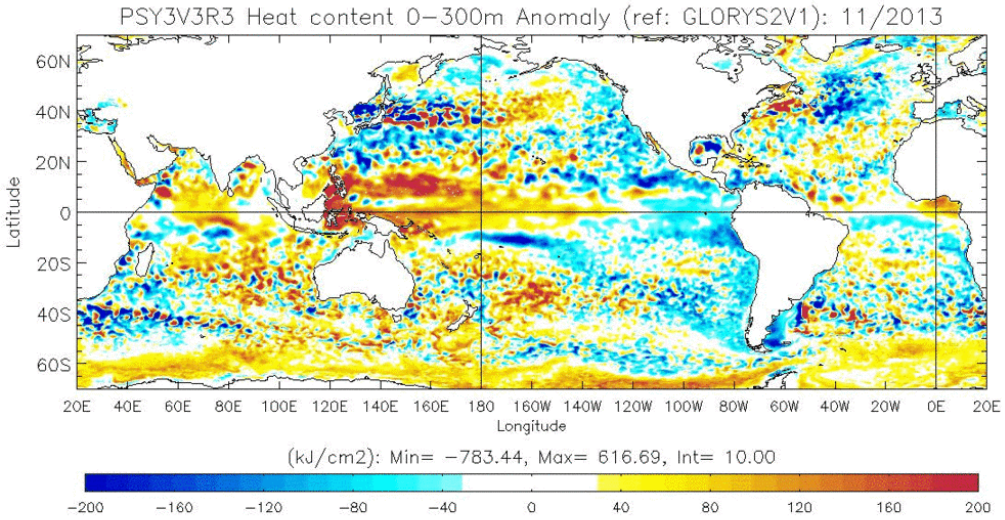


fig.2: map of Heat Content Anomalies (first 300m) (in kJ/cm²). (reference Glorys 1992-2009)
http://bcg.mercator-ocean.fr/

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

Still a (weak) dipole between the Western and most Eastern part of the basin. SOI positive (+0.7) consistently with the dipole pattern and the negative trade wind anomalies over the most western part. In the Niño boxes (4, 3.4, 3 et 1+2 ; see definition in Annex) the monthly averages are respectively 0°3C, 0°C, -0.2°C to -0.5°C from West to East.

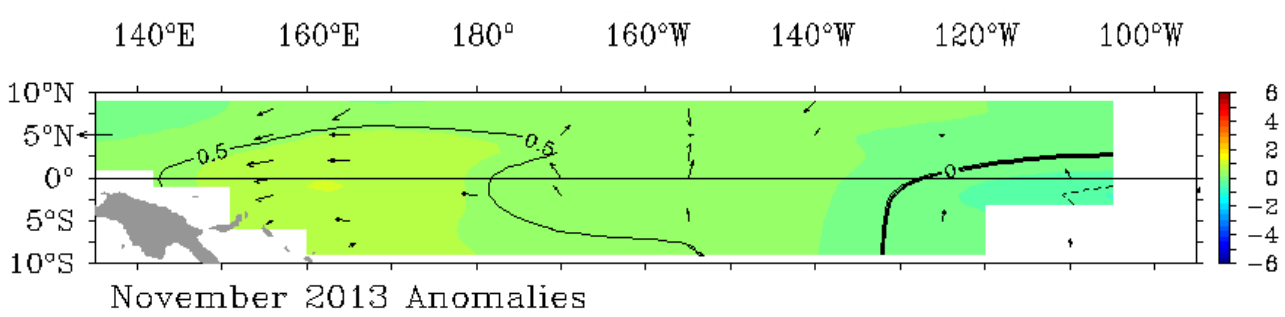


fig.3: SST and Wind anomalies over the Equatorial Pacific from TAO/TRITON.
http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/monthly-summary.html

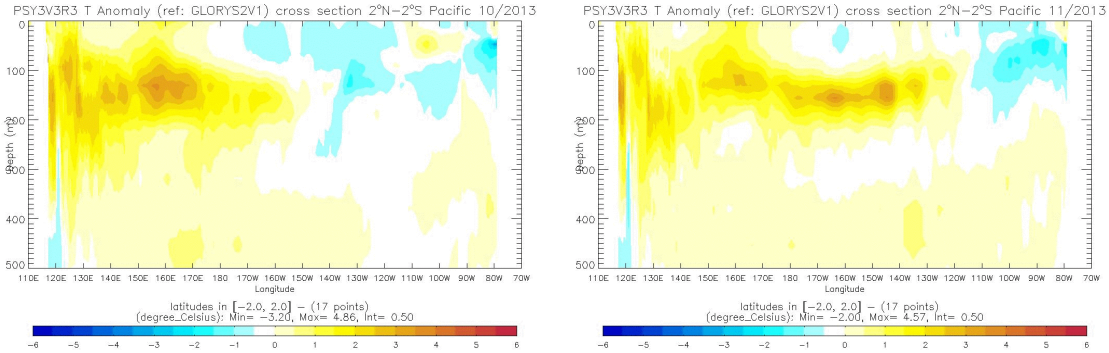


fig.4: Oceanic temperature anomaly in the first *500 metres* in the Equatorial Pacific, in previous month (left) and current month (right) http://bcg.mercator-ocean.fr/

In the equatorial waveguide (fig. 4) : Clear traces of propagation of Kelvin waves under the surface (warmer than normal around 150m) from the Western side and across the basin in the lower layers (around 150m). Consistently relative discharge of the warm reservoir on the most western part. The negative anomaly on the most Eastern side is increasing likely in relationship with both Kelvin wave propagation in the equatorial waveguide and advection from the South along the coast of South America.
The thermocline structure (fig. 5) : Clear traces of wave propagation of positive anomalies across the Pacific starting end of October/Beginning of November.

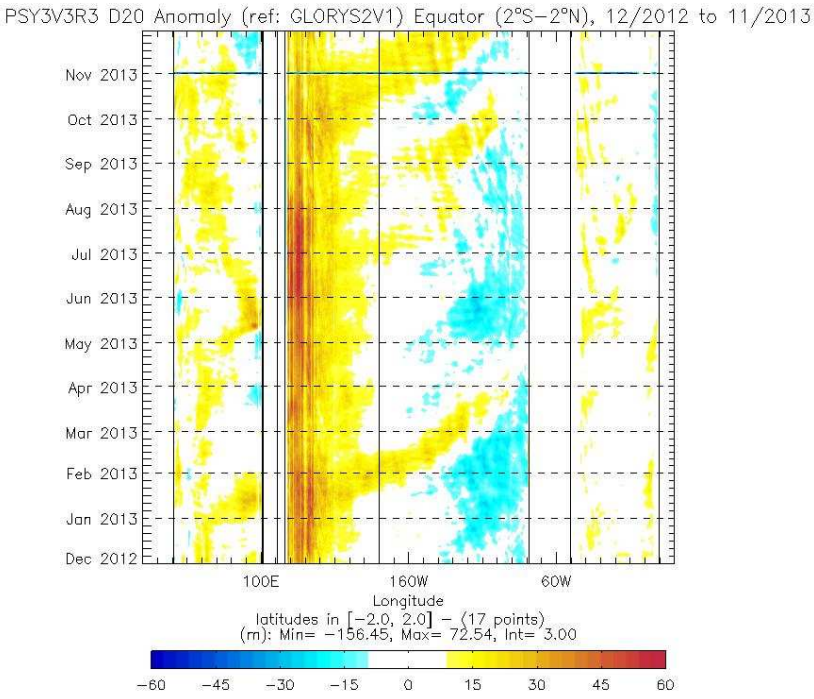


fig.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 24 month period. http://bcg.mercator-ocean.fr/

I.1.c Atlantic Basin

Northern Tropical Atlantic : slightly warmer than normal conditions and little evolutions.
Equatorial waveguide : weak signal, without wave propagation traces.
The Southern Tropical Atlantic : weak negative anomalies.
The TASI index is positive.

I.1.d Indian Basin

Southern Tropical Indian Ocean : Still slightly warmer than normal between Australia and the maritime continent. A positive anomaly conspicuous covering most of the South Tropics/Sub-Tropics.
Equatorial waveguide : weak signal (negative anomaly in the most eastern part), the signal under the surface is not fully consistent with the signal at the surface. The DMI is close to 0.
Northern Tropical Indian Ocean : Slightly warmer than normal more or less everywhere.

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) : Little MJO activity and quite a lot of fragmented cells in the Sub-Tropics and Tropics which could indicate a poor Ocean/Atmosphere coupling at global scale.

On the Pacific : Signal mostly off equator. Divergent circulation anomalies (upward anomaly motion) in the vicinity of Australia (possibly related to the persistence of the SST forcing). Then quite a lot of successive positive and negative cells across the Pacific up to the Eastern part which seem to be more related to mid-latitude activity.
On the Atlantic : Convergent circulation anomalies (downward anomaly motion) over the Southern Tropical Atlantic (especially close to the Greenwich meridian). In the Northern hemisphere, to be quoted the positive anomaly over the Caribbean and extending over Central America and the Northern costal part of South America (at least partly related to dynamical forcing).
On the Indian Ocean : Divergent circulation anomalies (upward anomaly motion) over most of the basin, especially. The (weak) convergent circulation anomaly on the Southern part of the basin is likely dynamically forced.

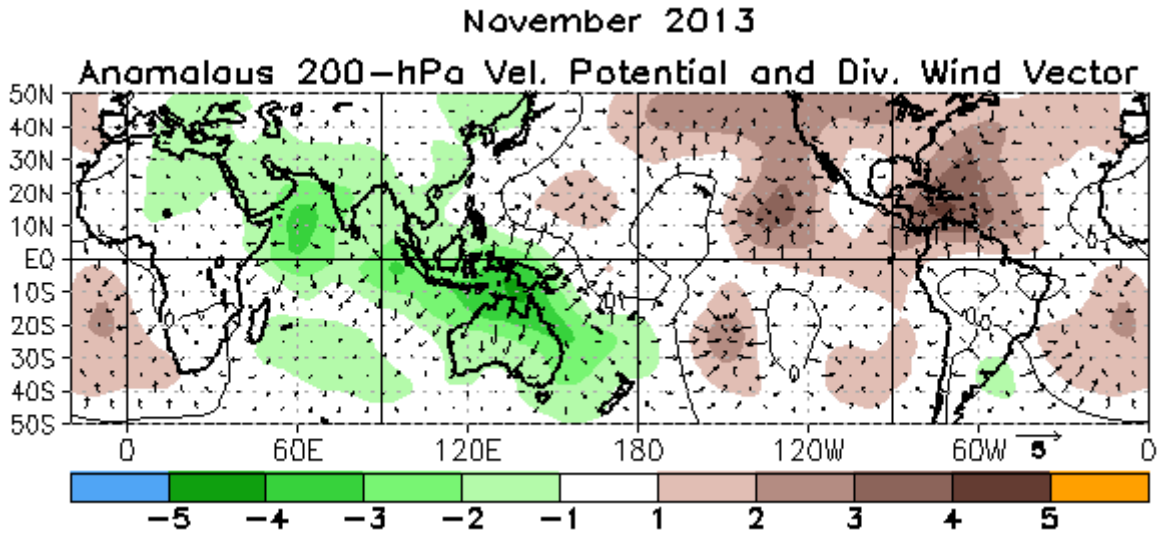


fig.6: Velocity Potential Anomalies at 200 hPa and associated divergent circulation. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly). http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

Stream Function anomalies in the high troposphere (fig. 7 – insight into teleconnection patterns tropically forced) : on average (very) weak signal in the intertropical band. Most of the anomalies are likely related to Mid-Latitude activity and poorly influenced by the Tropics.

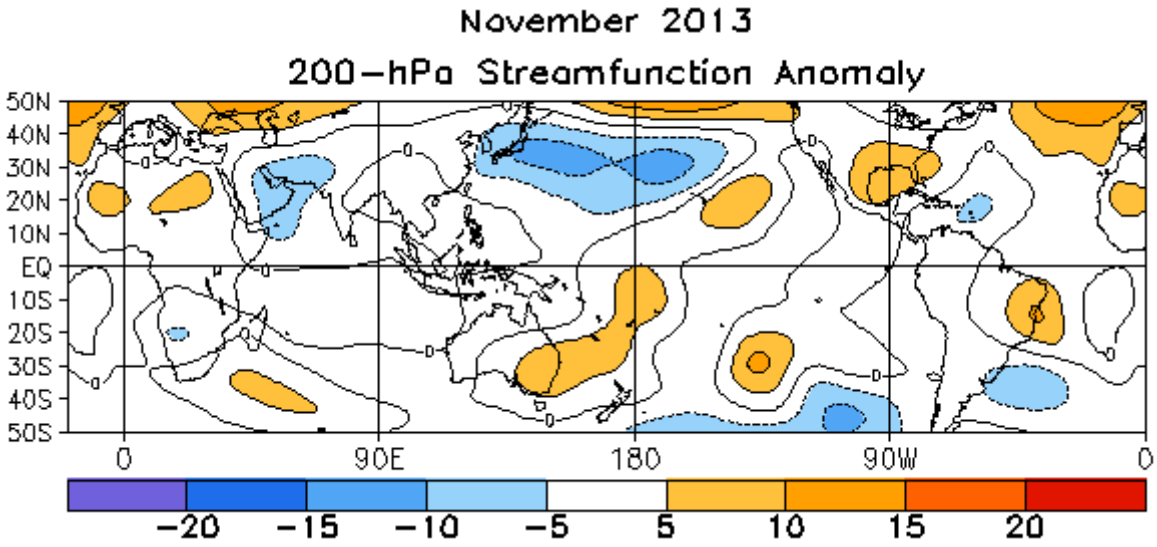


fig.7: Stream Function Anomalies at 200 hPa.
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

Geopotential height at 500 hPa (fig. 8 – insight into mid-latitude general circulation) : Consistently with the previous analysis, only little anomalies coming from the Tropics. Some anomalies observed in the mid/high latitudes of the North Pacific, across the Atlantic (AR-like regime?), over the Mediterranean basin, Siberia without forgetting the Polar Vortex.
Some activity in the atmospheric modes ; main active modes are found over the Pacific : East-North Pacific (1.2) and PNE (-1.1) ; over Europe a positive NAO (0.8) and negative Scandinavian mode (-0.7). To be quoted the Polar Eurasian mode (+2.6).

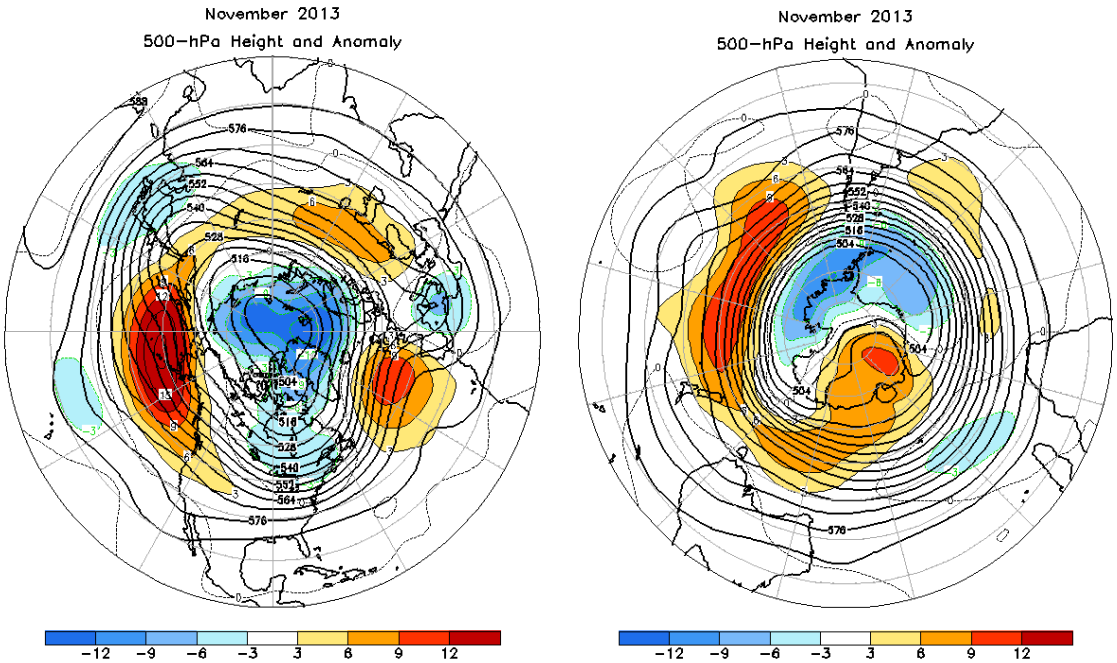


fig.8: Anomalies of Geopotential height at 500hPa (left North Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige9.shtml, and right South Hemisphere http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige15.shtml)

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
NOV 13	**0.8**	**0.1**	**0.0**	**1.2**	**-1.1**	**---**	**-0.9**	**-0.7**	**2.6**
OCT 13	-0.9	1.4	-0.1	1.0	-0.2	---	0.6	0.7	0.8
SEP 13	0.4	-0.6	1.9	-1.4	0.4	---	-0.6	0.4	-1.6
AUG 13	1.1	0.3	-0.2	-1.1	-0.1	---	-1.9	-0.8	0.0
JUL 13	0.7	0.6	-0.9	0.9	-0.7	---	-0.2	0.0	-0.3
JUN 13	0.8	0.7	-0.5	1.7	-0.4	---	-2.3	0.3	0.0

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

I.2.b Precipitation

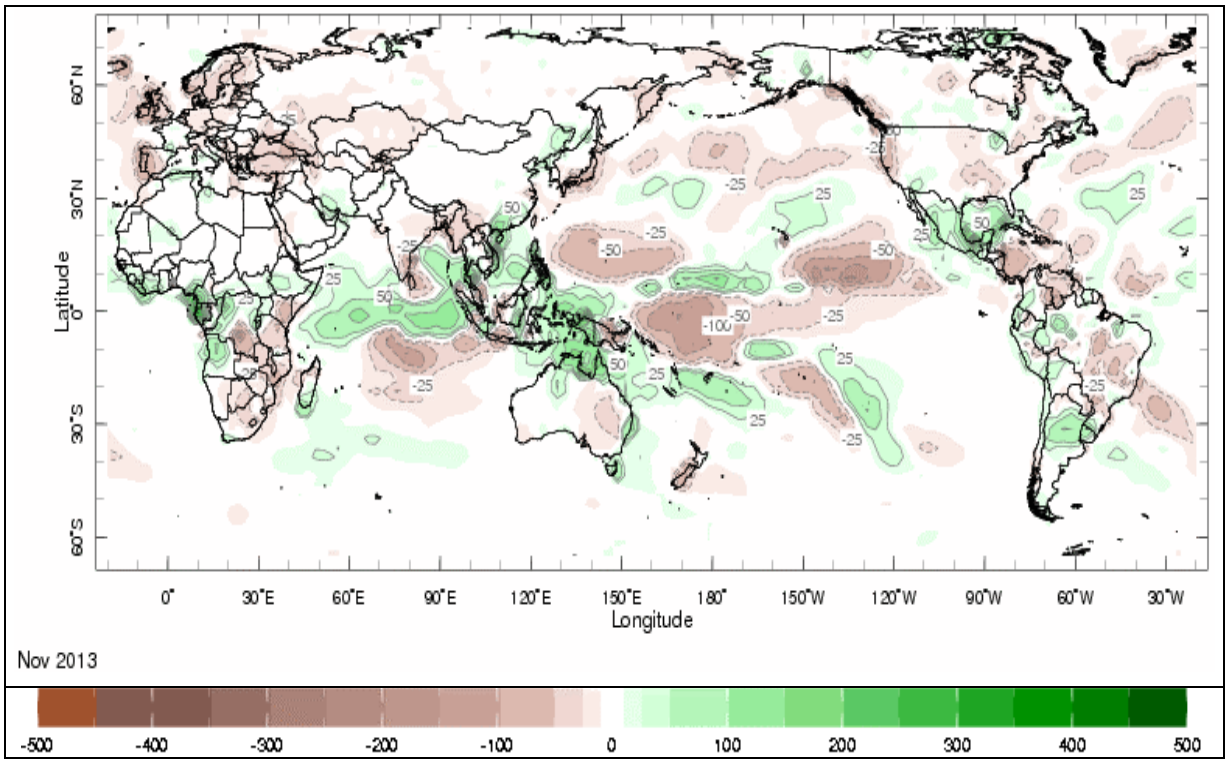


fig.9: Rainfall Anomalies (in mm) (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.
http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/

Pacific : good consistency with the Velocity Potential anomalies. In the vicinity of Australia (positive anomaly), and then the succession of negative/positive anomalies across the Pacific.
Atlantic/Africa : negative anomaly over part of the Brazil and the Caribbean. Some wetter than normal conditions close to the Guinean Gulf.
Indian Ocean : A strong positive anomaly in the equatorial regions (mostly consistent with the SSTs) ; the negative anomaly over the Southern central Indian Ocean is consistent with the Velocity Potential filed anomaly.
Australia : a contrast between the Northern coast (wetter than normal) and the Eastern part (some drier than normal conditions).
North America : Dipole pattern (positive/negative anomalies) between Mexico and Eastern part of US (extending on Eastern Canada).
Europe : mostly drier than normal over Europe, especially the most West part of Europe, Scandinavia, and South-Eastern part of Europe (up to Kazakhstan to some extent).

I.2.cTemperature

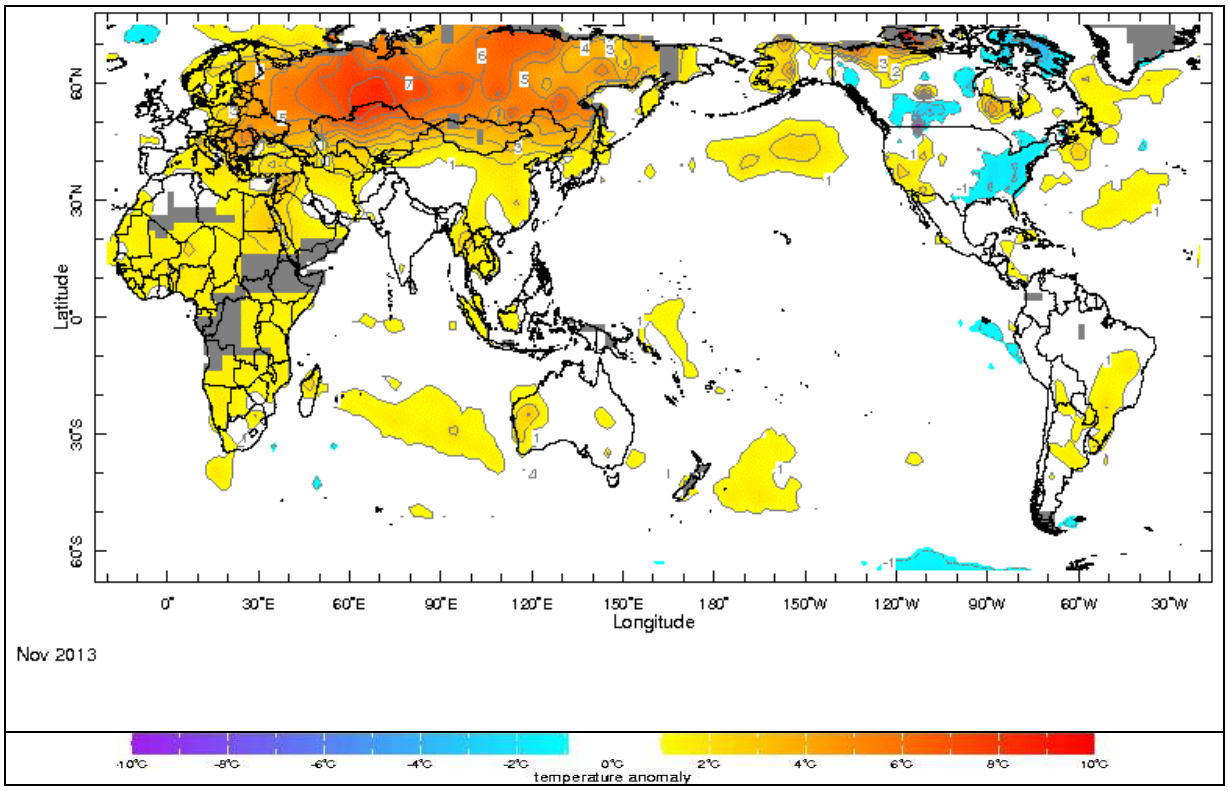


fig.10: Temperature Anomalies (in °C) (departure to the 1979-2000 normal)
http://iridl.ldeo.columbia.edu/maproom/.Global/.Atm_Temp/Anomaly.html

North-America : West/East dipole (positive/negative anomalies) over US and some strong positive anomalies over the most North-Western part of the continent.
South-America : warmer than normal conditions part of Brazil (and Argentina to some extent).
Australia : Little anomalies to the exception of the most western part (positive anomaly).
Asia : Very strong positive anomalies over the Northern part of the continent which extends on the Eastern side up to the Gulf of Thailand.
Africa : Warmer than normal conditions more or less everywhere extending toward the Arabic Peninsula.
Europe : Warmer than normal conditions everywhere to the exception of the western façade.

I.2.d Sea Ice

In Arctic (fig. 11 - left) : below normal sea-ice extension (negative anomaly not so far to 2 standard deviation) but less than the previous year (which was in the record).
In Antarctic (fig. 11 - right) : well above normal sea-ice extension anomaly (on the record) with some large regional modulation.

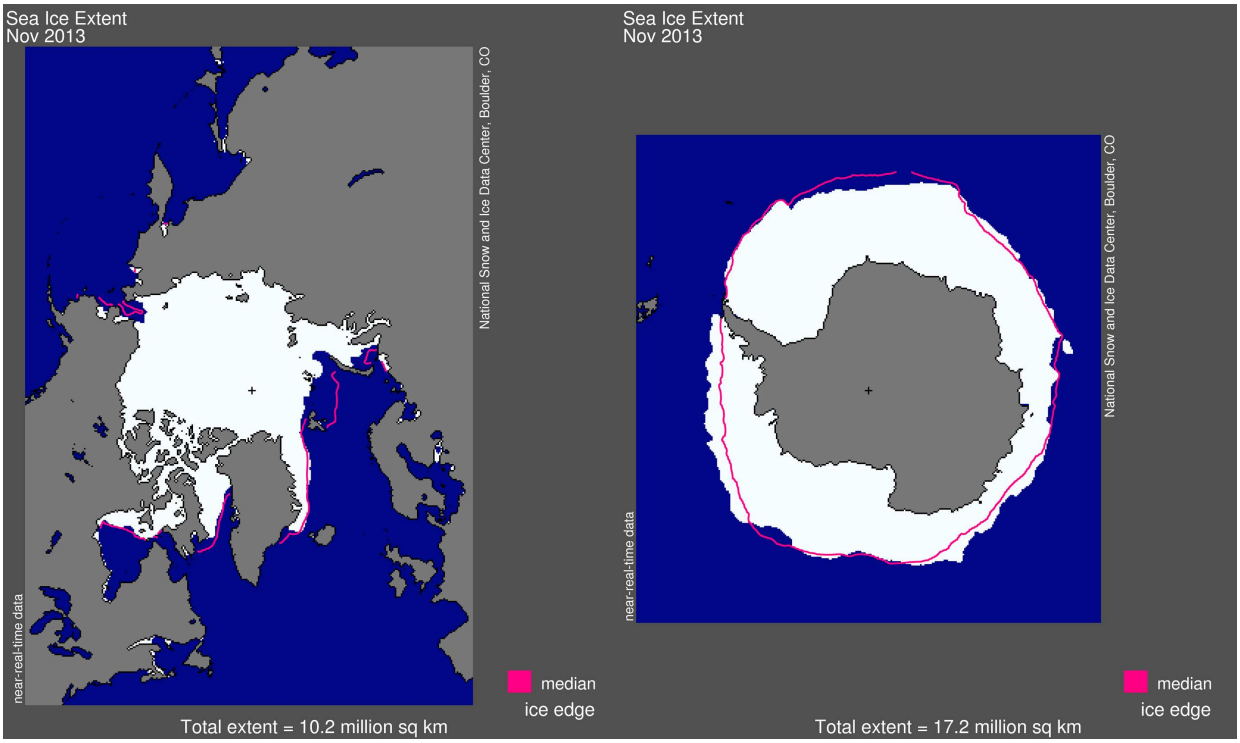


fig.11: Sea-Ice extension in Arctic (left), and in Antarctic (right). The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

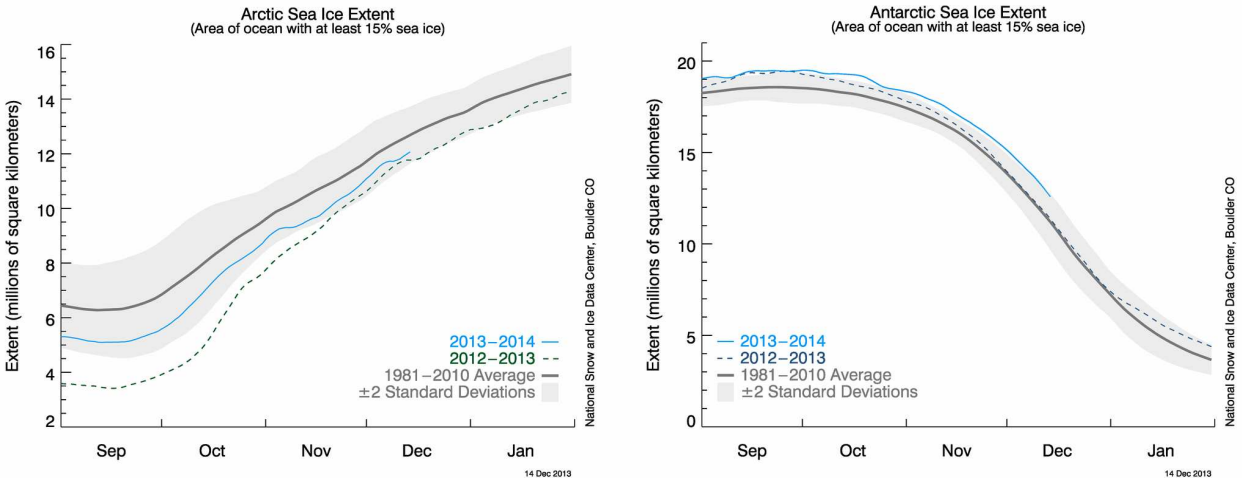


fig. 9bis : Sea-Ice extension evolution from NSIDC
http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png

II.SEASONAL FORECASTS FOR JFM FROM DYNAMICAL MODELS

II.1. OCEANIC FORECASTS

II.1.a Sea Surface Température (SST)

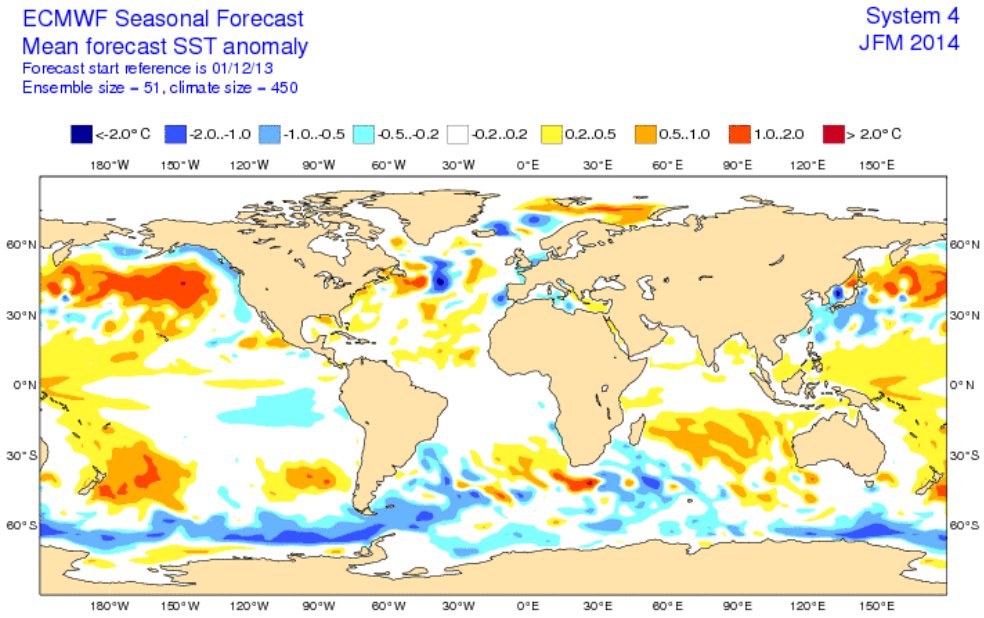


fig.12: SST anomaly forecast (in °C) from ECMWF.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

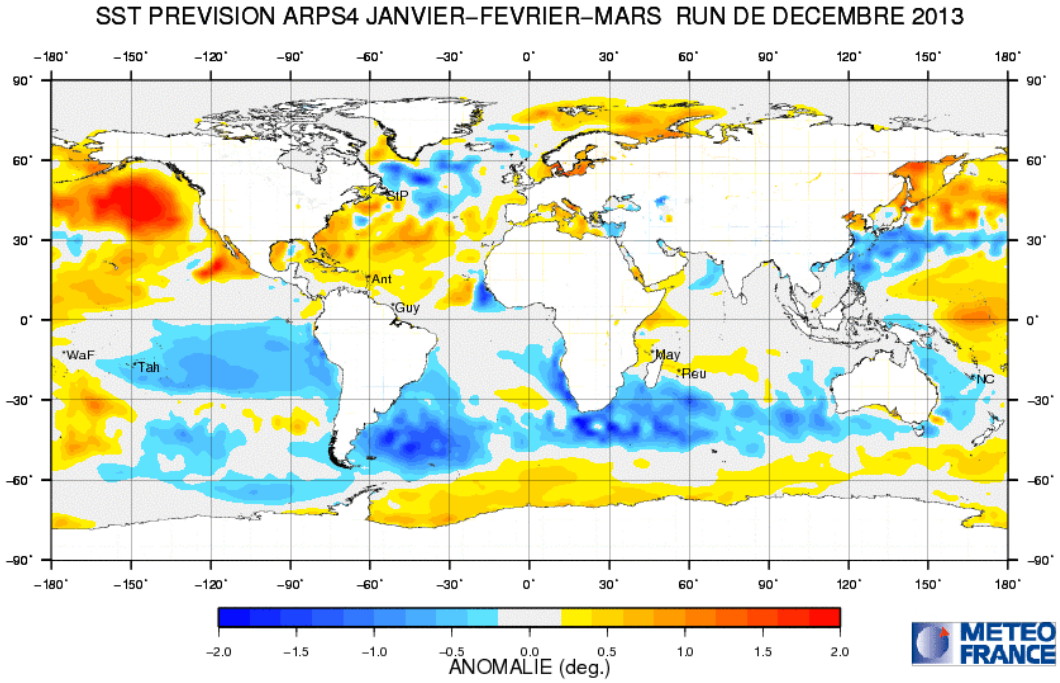


fig.13: SST Anomaly forecast (in°C - recalibrated with respect of observation) from Météo-France.
http://elaboration.seasonal.meteo.fr/

For the 2 individual models :
Whatever the differences in the post-processing of the anomalies (including reference period for the hindcast ; 81-2010 for ECMWF and 91-2010 for MF system 4), some consistent SST forecasts (taking into account the hindcast period differences).
Pacific : consistent signal in both models for a warming in the equatorial waveguide West to the dateline. However, MF warming is shifted eastward with respect of ECMWF's ones leading to differences over the SPCZ regions. Off equator on the East-Southern Tropics, development of a negative anomaly (between 0° and 30°S in MF and less extended in ECMWF). Very good consistency over the Northern hemisphere (to the exception of the coastal area of North America).
Atlantic : in both model good consistency in the Northern Tropics and mid-latitudes. Close to normal in the Southern Tropics but some differences in the Southern Sub-tropics (partly related to the hindcast issue).
Indian Ocean : consistent forecast in both models for close to normal conditions in the Tropical band. Warmer than normal conditions in the Southern Sub-Tropics in ECMWF less visible in MF.

In Euro-SIP :
Some robust patterns appear in the tropics across the Pacific.
Pacific : generally speaking very consistent with MF and ECMWF across the basin (positive anomaly West to the dateline and negative anomaly in the East-Southern Tropics). Quite consistent patterns in the subtropics and the mid-latitudes of both hemispheres.
Atlantic : Weak signal over the Tropics. Slight warmer than normal conditions in the North Tropical Atlantic. Some consistency along the Eastern coast of North America close to Newfoundland
Indian Ocean : weak signal over a large portion of the Tropical basin. Warmer than normal conditions in the Southern Tropics/Sub-Tropics.

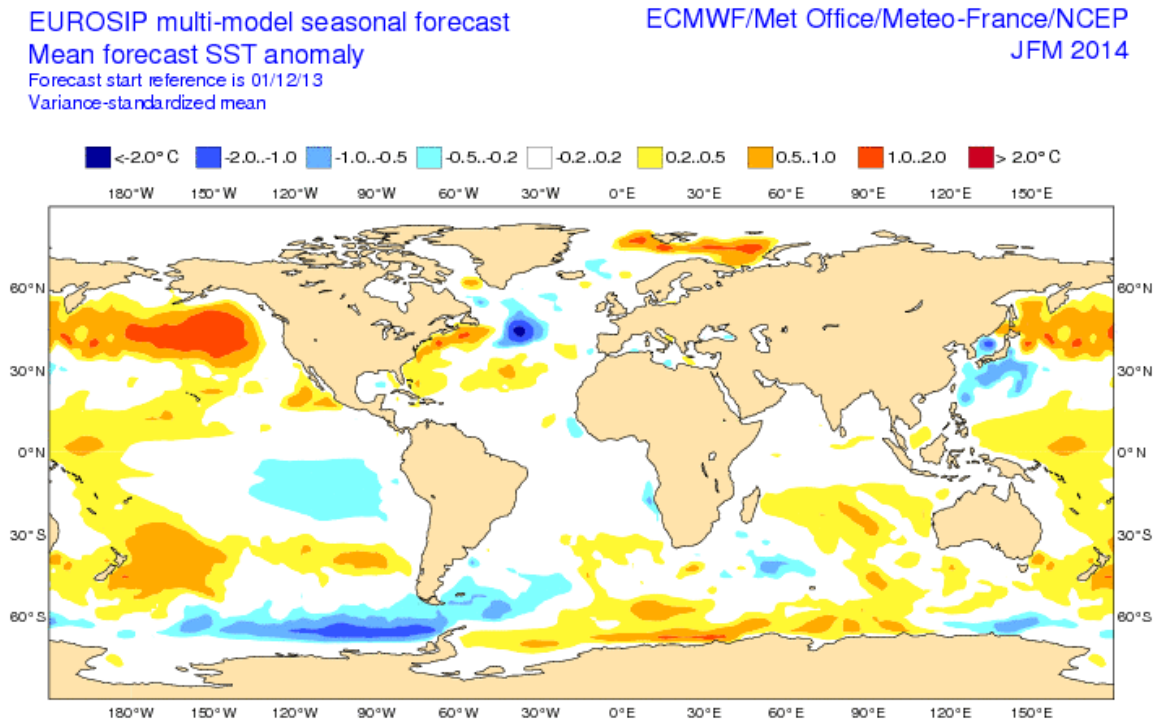


fig.14: SST Forecasted anomaly (in °C) from Euro-SIP.

II.1.b ENSO Forecast :

Forecasted Phase for JFM : neutral

For JFM : the majority of the models are in the range of neutral conditions for the targeted period despite some are close to Niño threshold (and one in Niña conditions – uncertainty less large than previously). Most of the dynamical models show a tendency to a warming on time (with an increased trend at spring on the Eastern part).

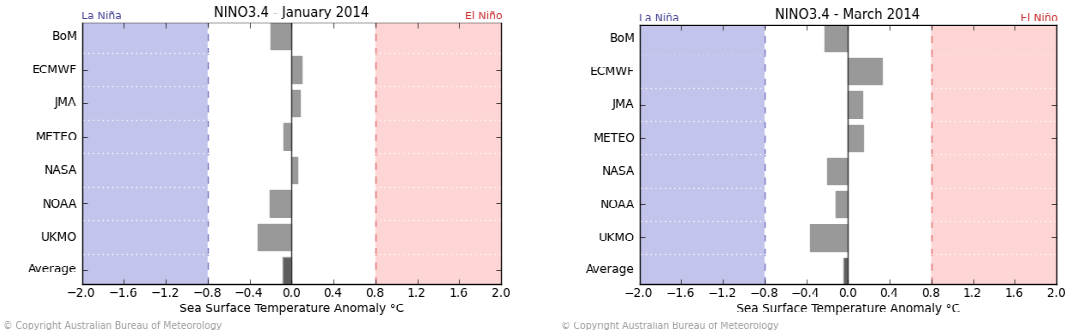
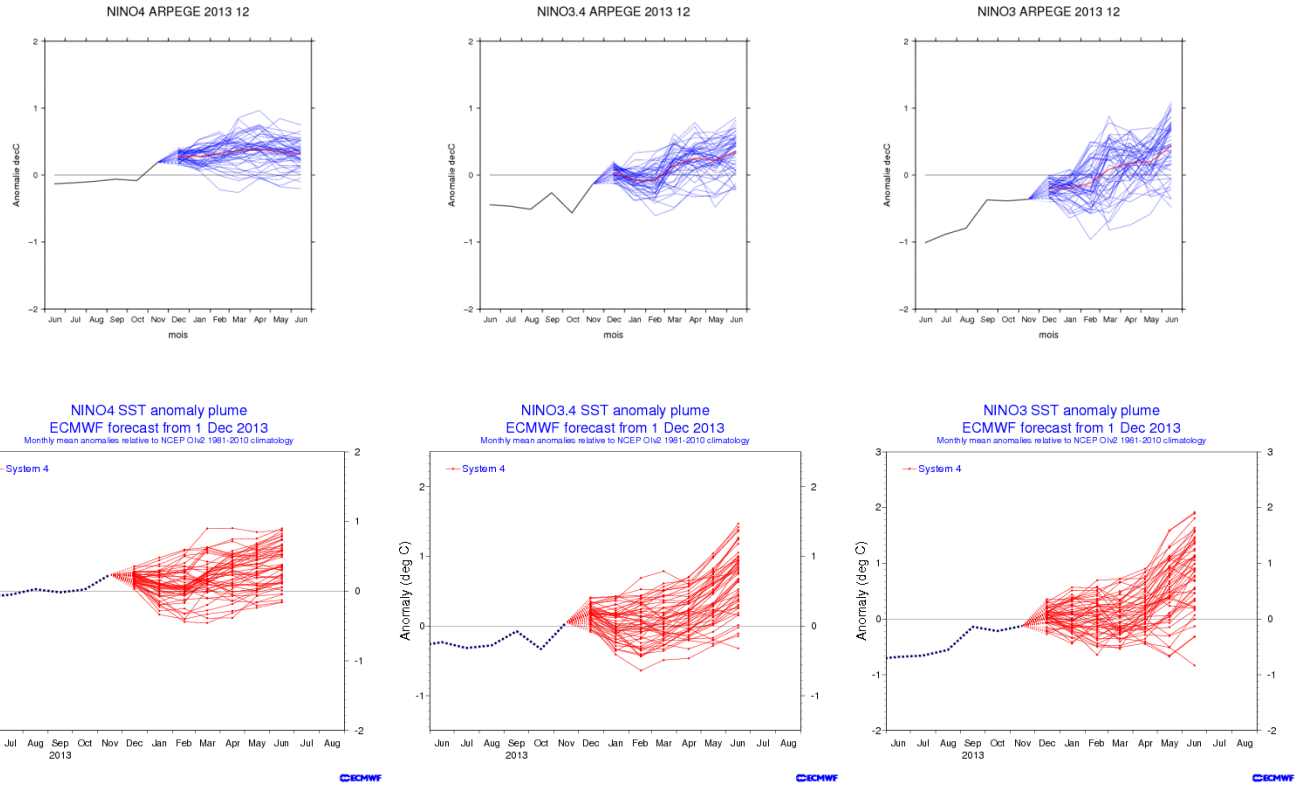


fig.15: Synthesis of Niño 3.4 forecasts (120° to 165°W) issued by IRI :
http://iri.columbia.edu/climate/ENSO/currentinfo/SST_table.html

Plumes from Météo-France and ECMWF for the 3 Niño boxes (see definition in Annex – fig. II.1.5) : In both models and on average, prevailing conditions in the normal range for JFM. In both models progressive warming. In both models quite large uncertainty. In EuroSIP Plumes, close to normal conditions on average ; the spread seems to be reduced in the central part of the basin.



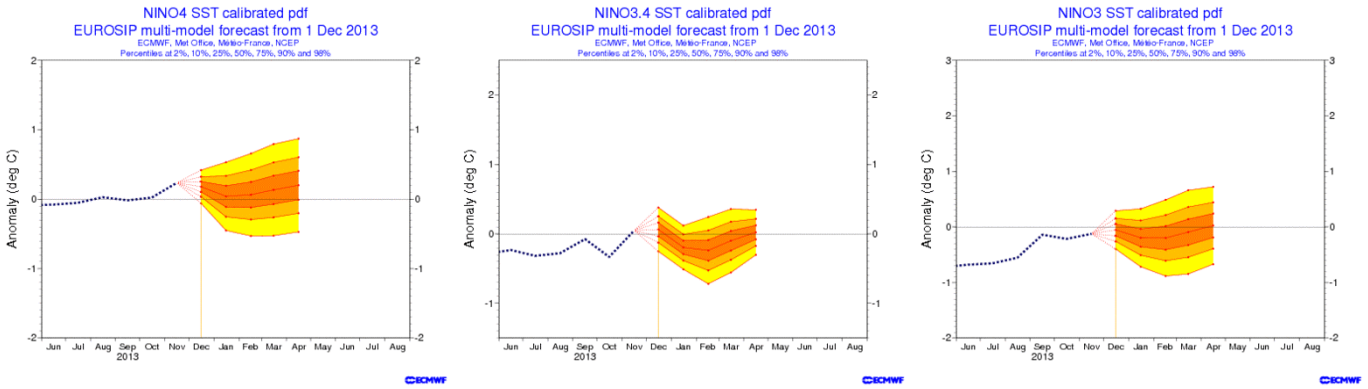


fig.16: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members - and EuroSIP (bottom) – recalibrated distributions.
(http://www.ecmwf.int/)

II.1.c Atlantic Ocean forecasts :

Forecasted Phase: Above Normal in the Northern Tropics, Below Normal evolving to Normal in the Southern Tropics - TASI on the positive side

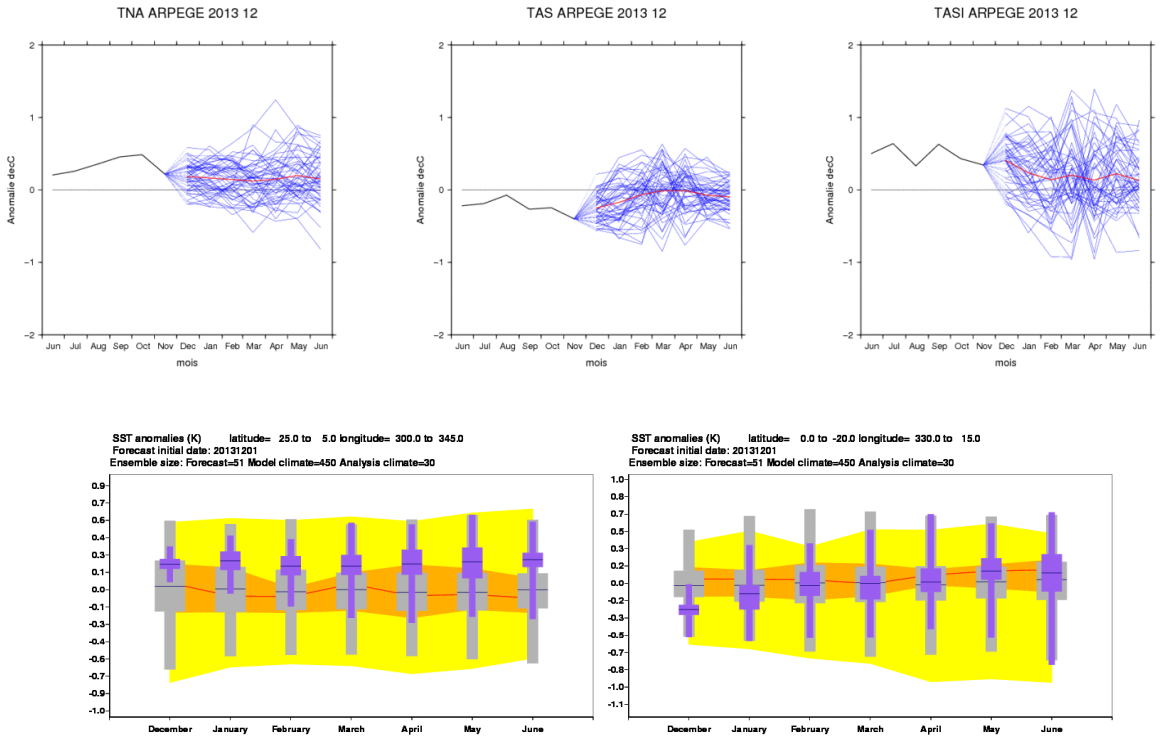


fig.17: SSTs anomaly forecasts in the Atlantic Ocean boxes from Météo-France (top) and ECMWF (bottom), plumes / climagrams correspond to 51 members and monthly means.

North Tropical Atlantic : warmer than normal conditions in both models. Evolution very similar. Larger spread in MF vs ECMWF.
South Tropical Atlantic : starting with Colder than normal conditions and progressive warming then in both models leading to Normal conditions beginning of Spring.
The inter-hemispheric SST gradient is consistent between the two models and positive.
TASI : the TASI index is positive for JFM even the spread is large (in MF).

II.1.d Indian Ocean forecasts :

Forecasted Phase: West and East boxes slightly positive
IOD slightly positive

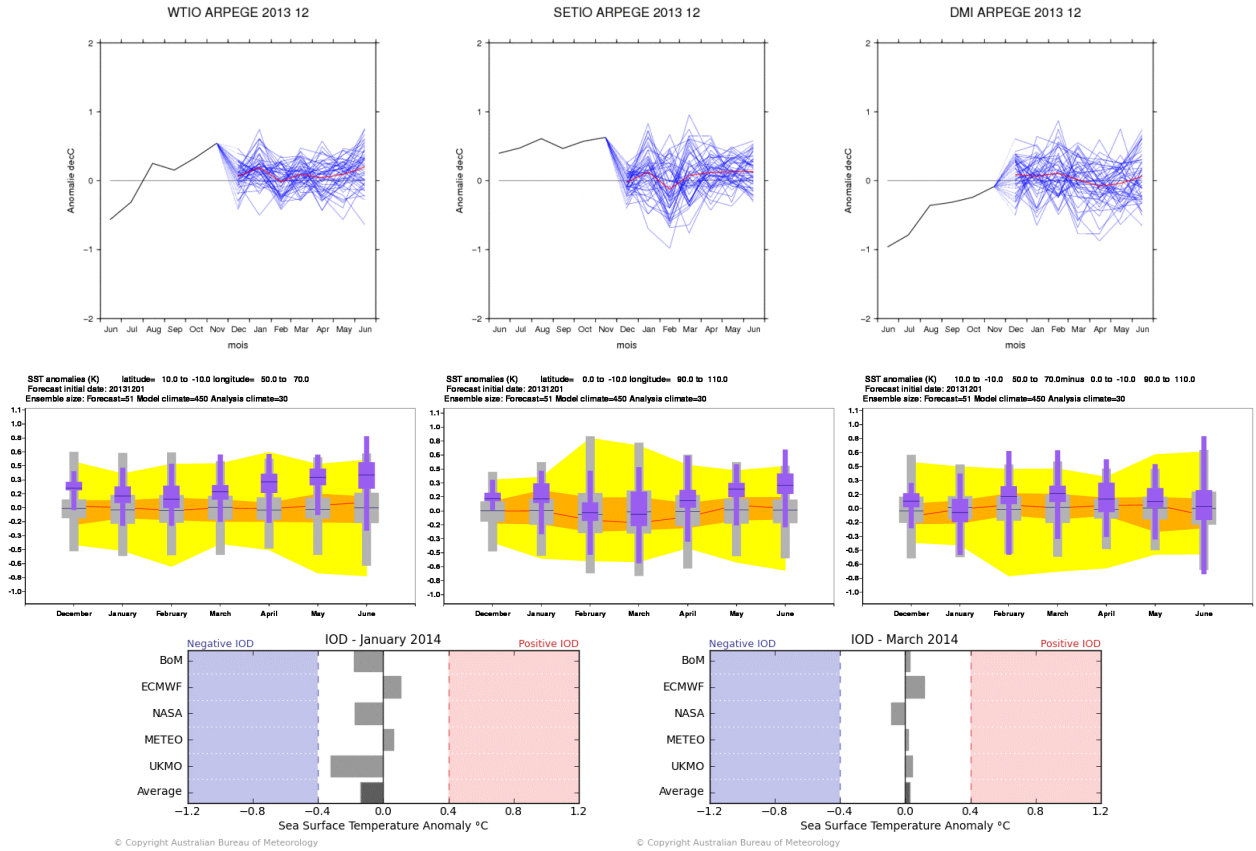


fig.18: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France (top), ECMWF (middle), plumes / climagrams correspond to 51 members and monthly means. Synthesis for IOD (bottom) for several GPCs from BoM

In WTIO : little differences in the two models. Mostly Warmer than normal.
In SETIO : Mostly Above normal conditions in both models. The differences can be related to hindcast issues. Large spread with respect of WTIO.
DMI (IOD) : Slightly positive on JFM. Quite large spread in both models. The evolution to the close to neutral value is confirmed by other models.

II.2. GENERAL CIRCULATION FORECAST

II.2.a Global Forecast

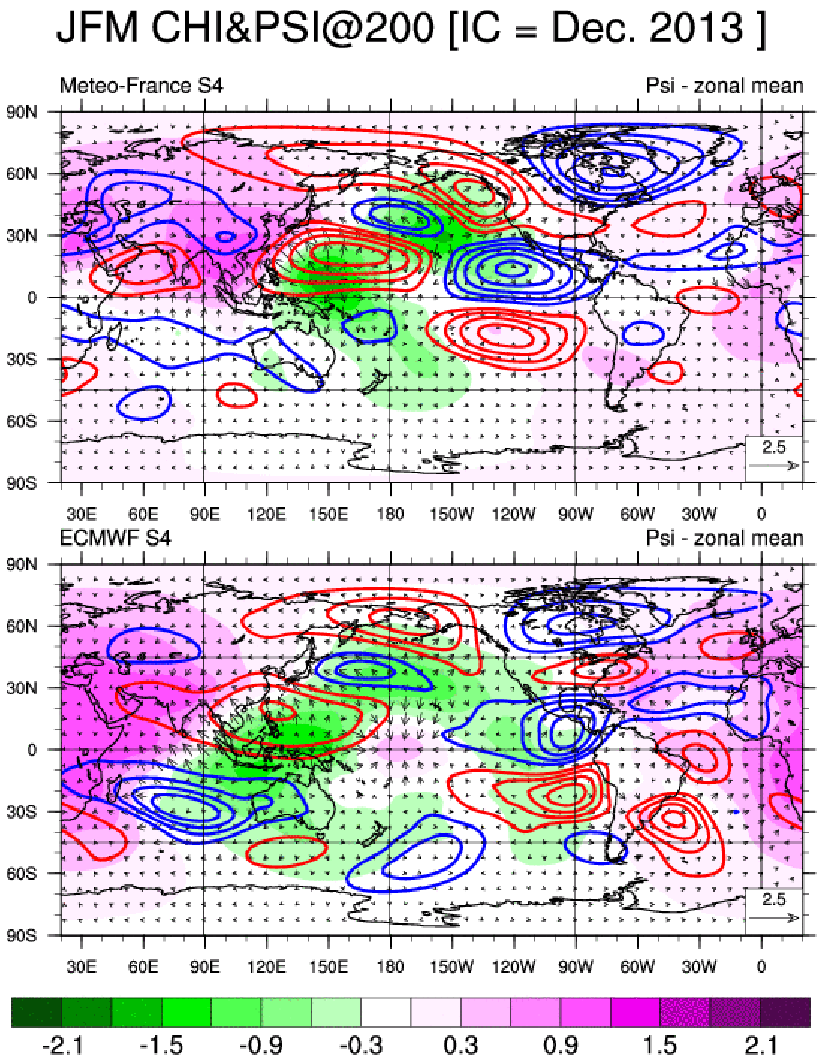


fig.19: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), associated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa by Météo-France (top) and ECMWF (bottom).

Velocity potential anomaly field (cf. fig. 19 – insight into Hadley-Walker circulation anomalies) :
Some consistency in the general patterns but differences in the location likely related to the differences of location in SST anomalies (especially over the warm pool - see SST discussion).

Over the Pacific : On warm pool; negative anomaly (Divergent circulation anomaly - upward motion anomaly) in both models (extending along the SCPZ region in MF) but with a clear Eastward shift (~30° of Longitude) in MF compared to ECWMF. and some similarity East to the date line; positive anomaly (Convergent circulation anomaly - downward motion anomaly).
Over Indian Ocean : Unconsistent signal in relationship with the previous SST anomalies location differences; in MF Convergent circulation anomaly over East Asia while there is a large contrast between Western (West to 90°E) and Eastern part (vicinity of the maritime continent) in ECMWF. To be quoted the upward motion anomaly in the central Southern Indian Ocean in both models.
Over Atlantic : Noticeable signal in ECMWF in term of Convergent circulation (downward motion) anomalies in the Eastern South Atlantic which exists to some extent also in MF. region (and especially

close to North-Eastern coast of South America) while only little signal over the Caribbean in MF. These differences could likely be related to the differences in SST scenarios.
One can quote that the ECMWF solution is close to the one proposed by JMA. Adding the consideration on the current state of the SSTs and Velocity Potential fields, their solutions seem to be more consistent and could be privileged for this forecast (at least close to the Pacific).

Stream Function anomaly field (cf. fig. 19 – insight into teleconnection patterns tropically forced) : without consideration on the exact location of the patterns, the atmospheric response is quite consistent in both models ; in addition JMA shows a solution close to ECMWF.

Over the Pacific : In both models, the atmospheric response is quite consistent in Northern Hemisphere with a meridionnal propagation from Western Tropics toward the Bering Sea/Alaska (and landing over Greenland) despite it's not looking like a canonical Gill response. Over the Eastern Pacific also the indication of consistent atmospheric responses. However, the patterns are not similar in terms of location leading to differences in terms of impact over the continents.
Over the Atlantic : here also some consistency between the response of the 2 models (confirmed by JMA forecast). In the Northern Hemisphere, ECMWF develops a response in the Tropics and mid-latitudes. There is clear similarities in MF even if the exact location is a bit different.

As a conclusion the predictability for JFM seems to be fairly good in the Tropics and over the Pacific. It is a bit weaker over the Indian Ocean (but good consistency for the Southern sub-tropics and Northern Tropics). For Europe there is a quite consistent signal in the models. So one could infer some weak but existing predictability at least for Western Europe.

II.2.b North hemisphere forecast and Europe

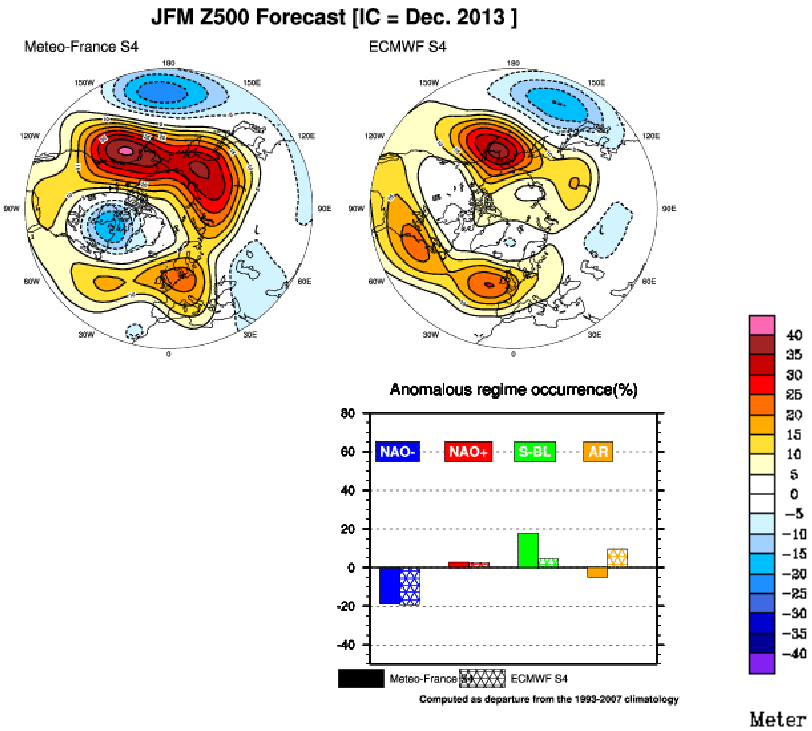


fig.20: Anomalies of Geopotential Height (top) at 500 hPa from Meteo-France (left) and ECMWF (right). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip and North Atlantic Regime occurrence anomalies (bottom) from Météo-France and ECMWF : vertical bars represent the excitation 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, some consistency in the Stream Function Anomalies over North Atlantic ; especially in terms of anticyclonic circulation close to Western Europe. Strong signal in the Geopotential Heigh coming from the West Pacific but unfortunately with quite large positioning differences between the 2 models (in ECMWF more WP-like response while in MF more PNA-like response). The ECMWF solution could be privileged (see previous discussion). The differences between the two models can likely be related to SST anomalies location (especially over the Western Pacific).
North Atlantic Circulation Regimes (fig. 20) : As a consequence, a consistent signal in the regimes forecast corresponding to a deficit of NAO – circulations. In ECMWF some tendency to Atlantic Ridge exceedance and in MF some tendency to Blocking regime exceedance.

II.3. IMPACT : TEMPERATURE FORECASTS

II.3.a ECMWF

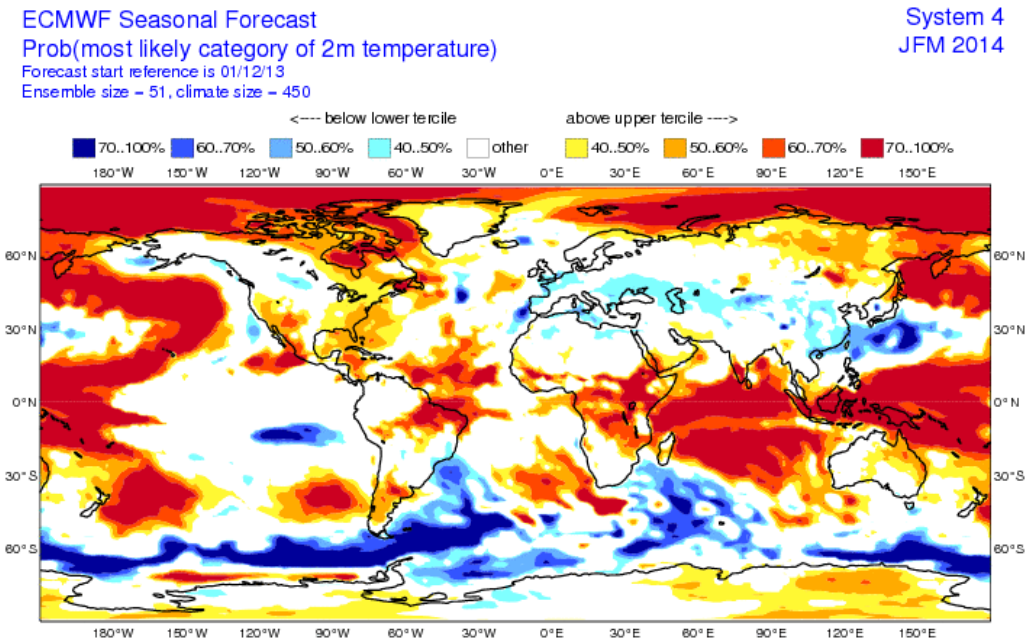


fig.21: Most likely category probability of T2m from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

II.3.b Météo-France

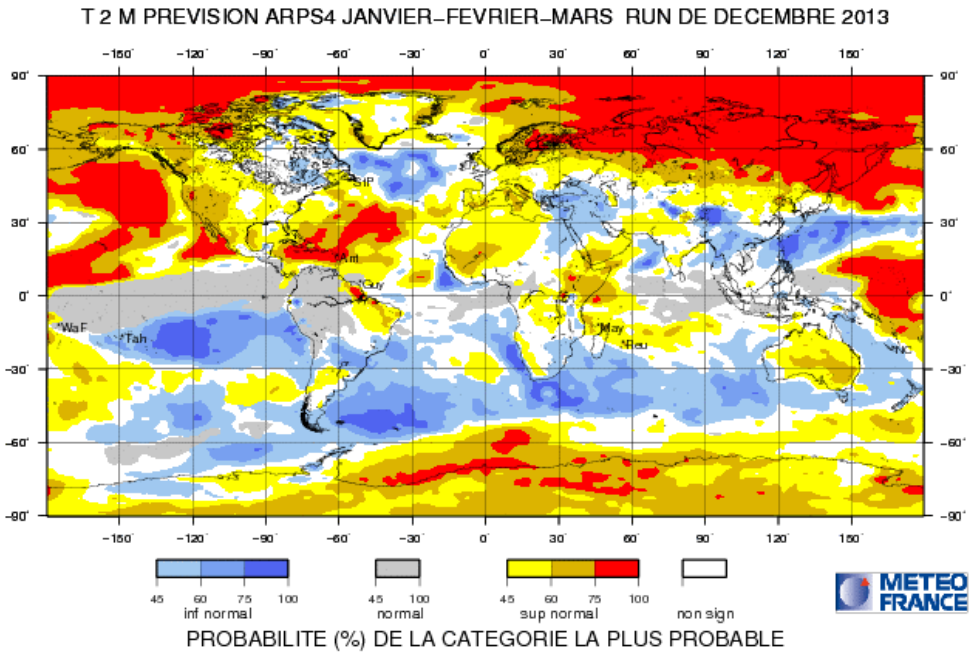


fig.22: Most likely category of T2m from Meteo-France. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.3.c Met Office (UKMO)

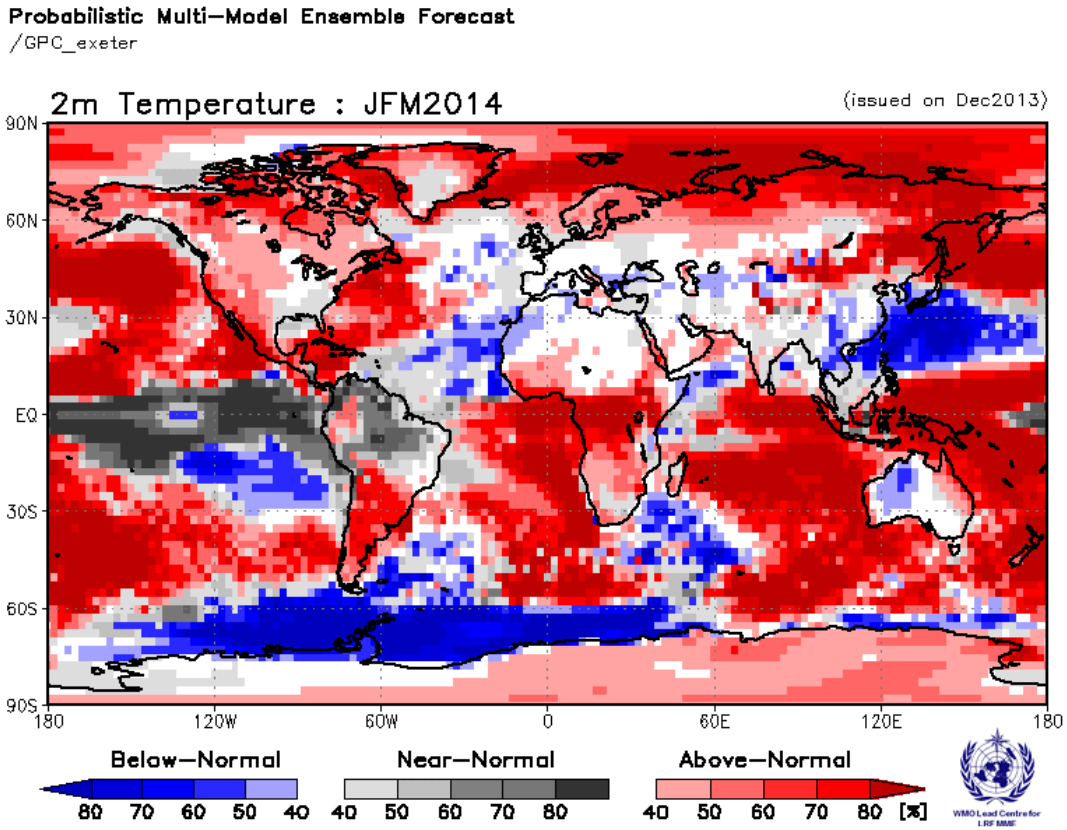


fig.23: **Most likely category of T2m Anomaly from UK Met Office.** **https://www.wmolc.org/**

II.3.d Climate Prediction Centre (CPC)

fig.24: **Most likely category of T2m Anomaly from CPC.** **https://www.wmolc.org/**

II.3.e Japan Meteorological Agency (JMA)

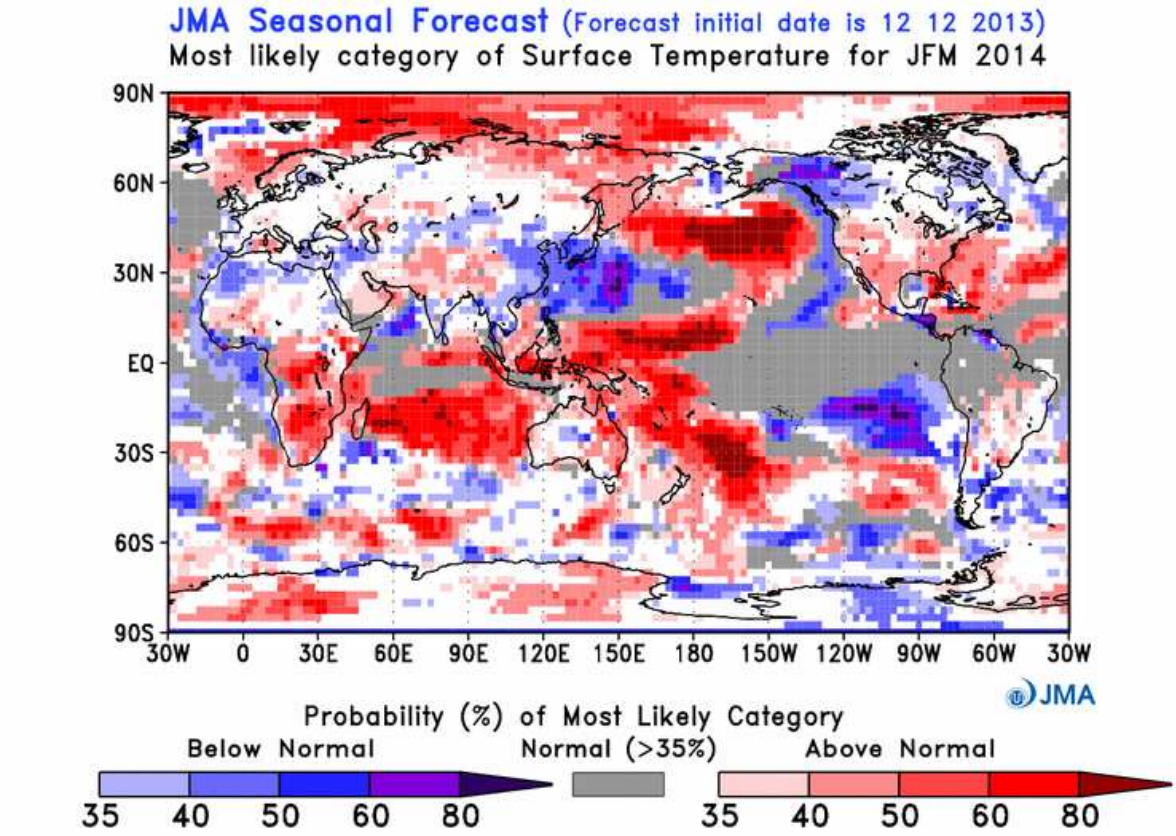


fig.25: Most likely category of T2m from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/

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

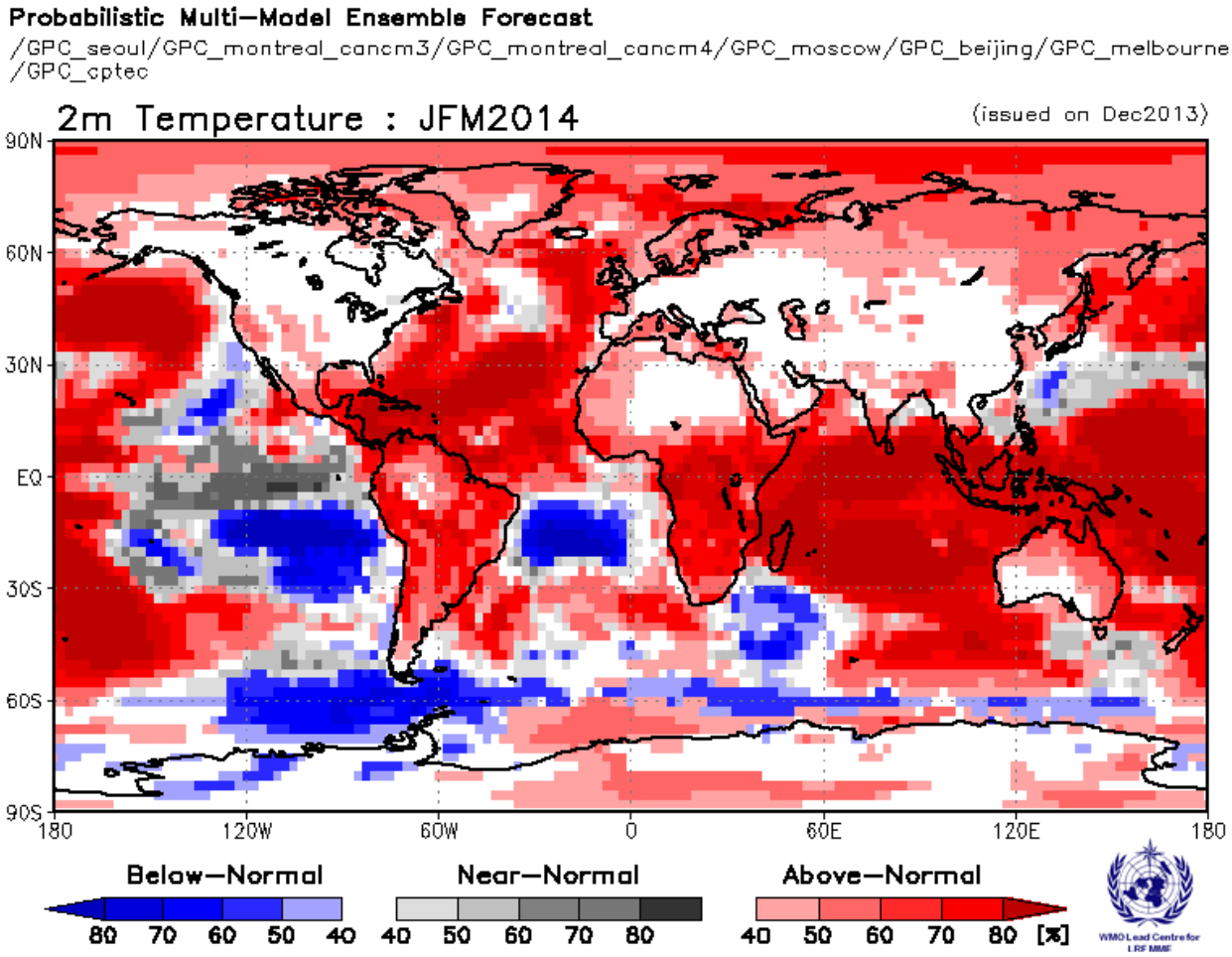


fig.26: MME most likely category of T2m from LC-MME. The MME composition corresponds to the GPCs not used in EuroSIP https://www.wmolc.org/

II.3.g Euro-SIP

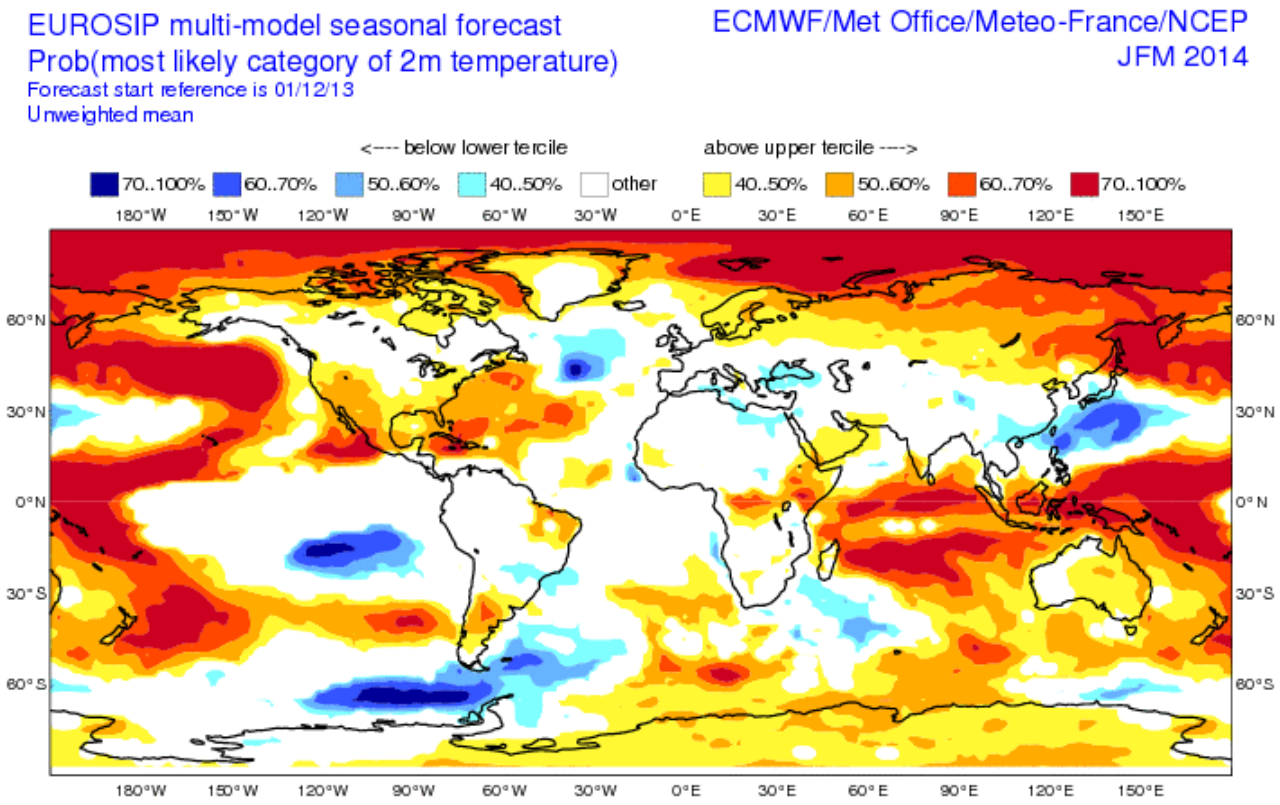


fig.27: Multi-Model Probabilistic forecasts for T2m from EuroSip.
(2 Categories, Below and Above normal – White zones correspond to No signal and Normal).

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

North-America : enhanced probabilities (Warmer than normal) in the most Northern regions and over a large portion of US up to Mexico. Same signal over part of Central America and the Caribbean.
South-America : Some consistent signal over the Southern and North-Eastern part of the continent (warmer than normal).
Australia : enhanced probabilities for warmer than normal conditions over most of the continent.
Asia : Mostly Warmer than normal conditions in the mid and high latitudes ; strong probability in the vicinity of the maritime continent.
Africa : Warmer than normal conditions over Equatorial and Eastern regions .
Europe : Enhanced probabilities for Warmer than normal conditions over the most Northern regions especially the Eastern part. Slightly enhanced probability for colder than normal scenario over coastal areas of Mediterranean basin.

II.4. IMPACT : PRECIPITATION FORECAST

II.4.a ECMWF

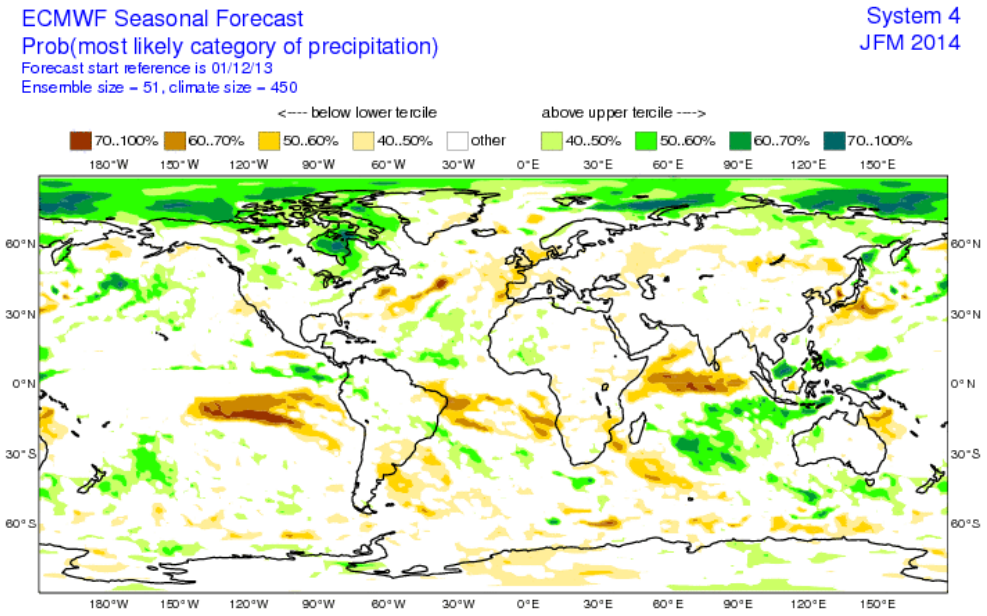


fig.28: Most likely category probability of rainfall from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/charts/seasonal_charts_s2/

II.4.b Météo-France

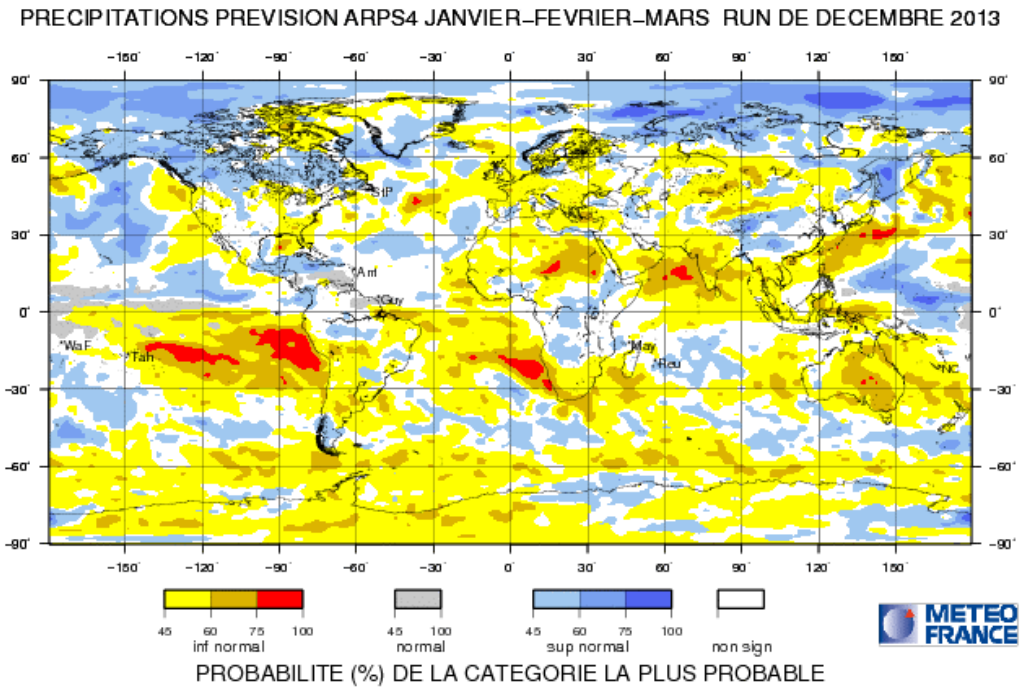


fig.29: Most likely category of Rainfall from Meteo-France. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Met office (UKMO)

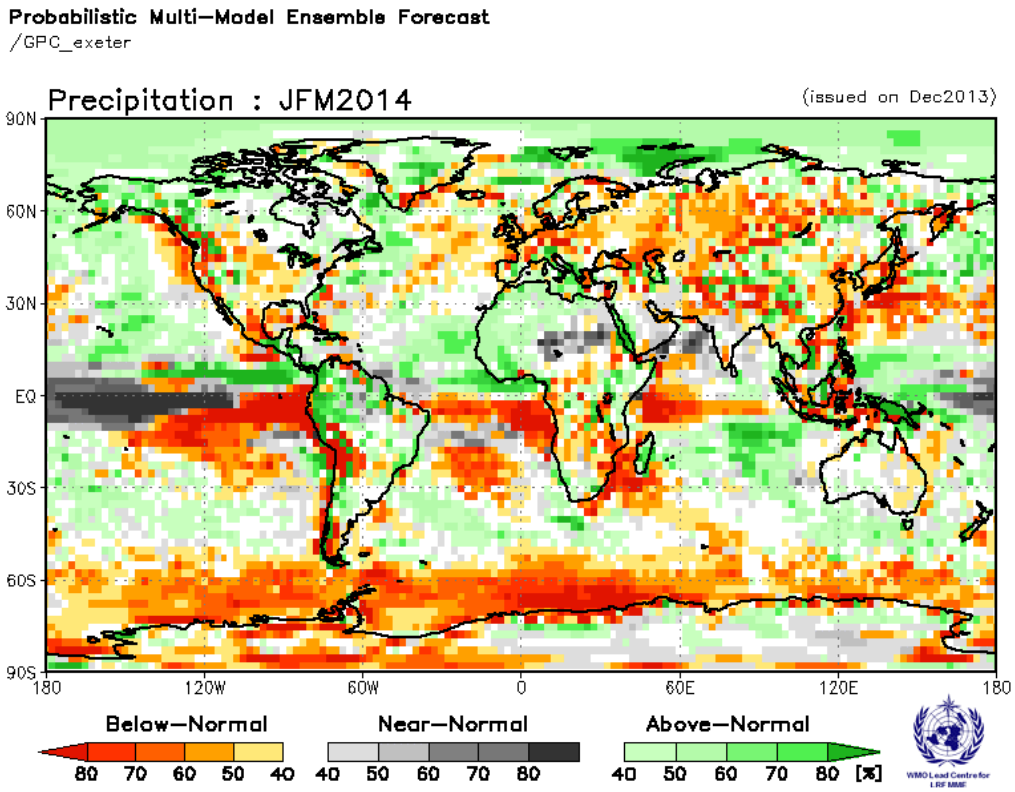


fig.30: Category probabilities of Rainfall from UK Met Office. https://www.wmolc.org/

II.4.d Climate Prediction Centre (CPC)

fig.31: Most likely category of Rainfall from CPC. https://www.wmolc.org/

II.4.e Japan Meteorological Agency (JMA)

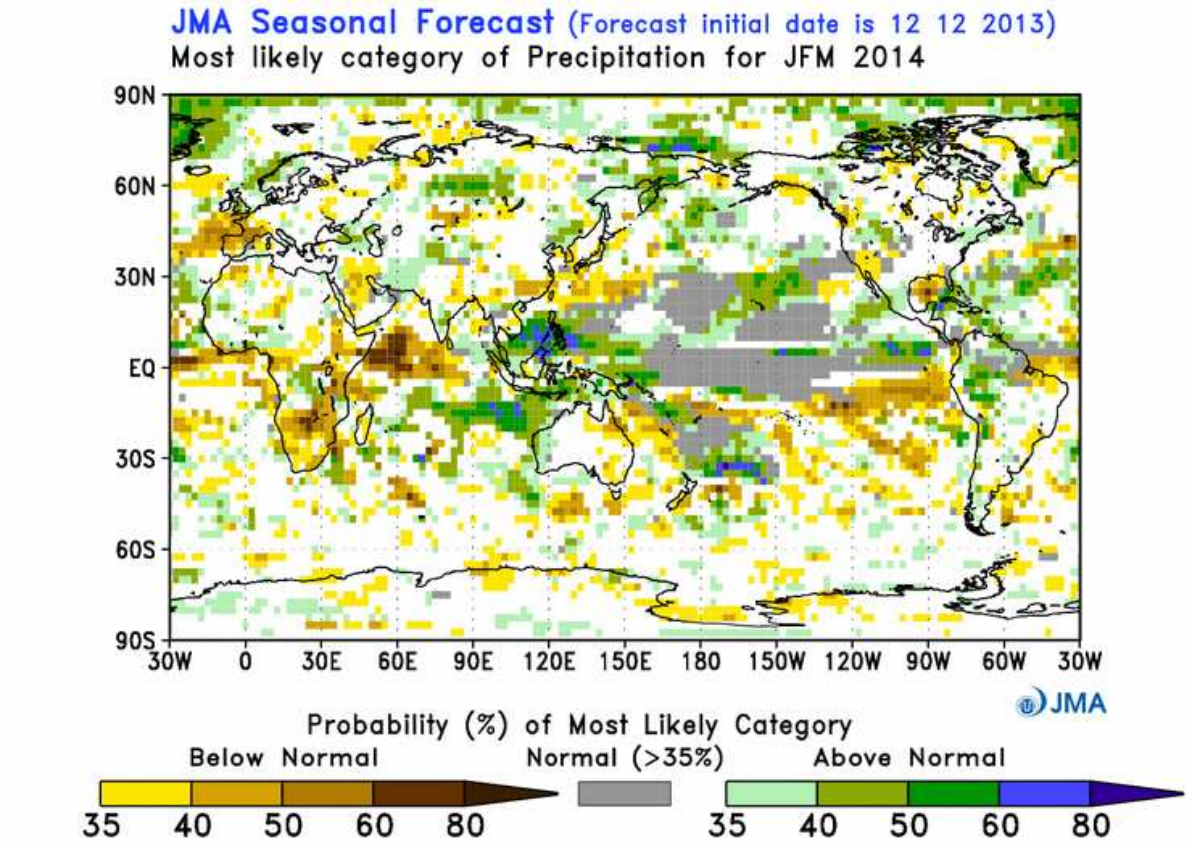


fig.32: Most likely category of Rainfall from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/

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

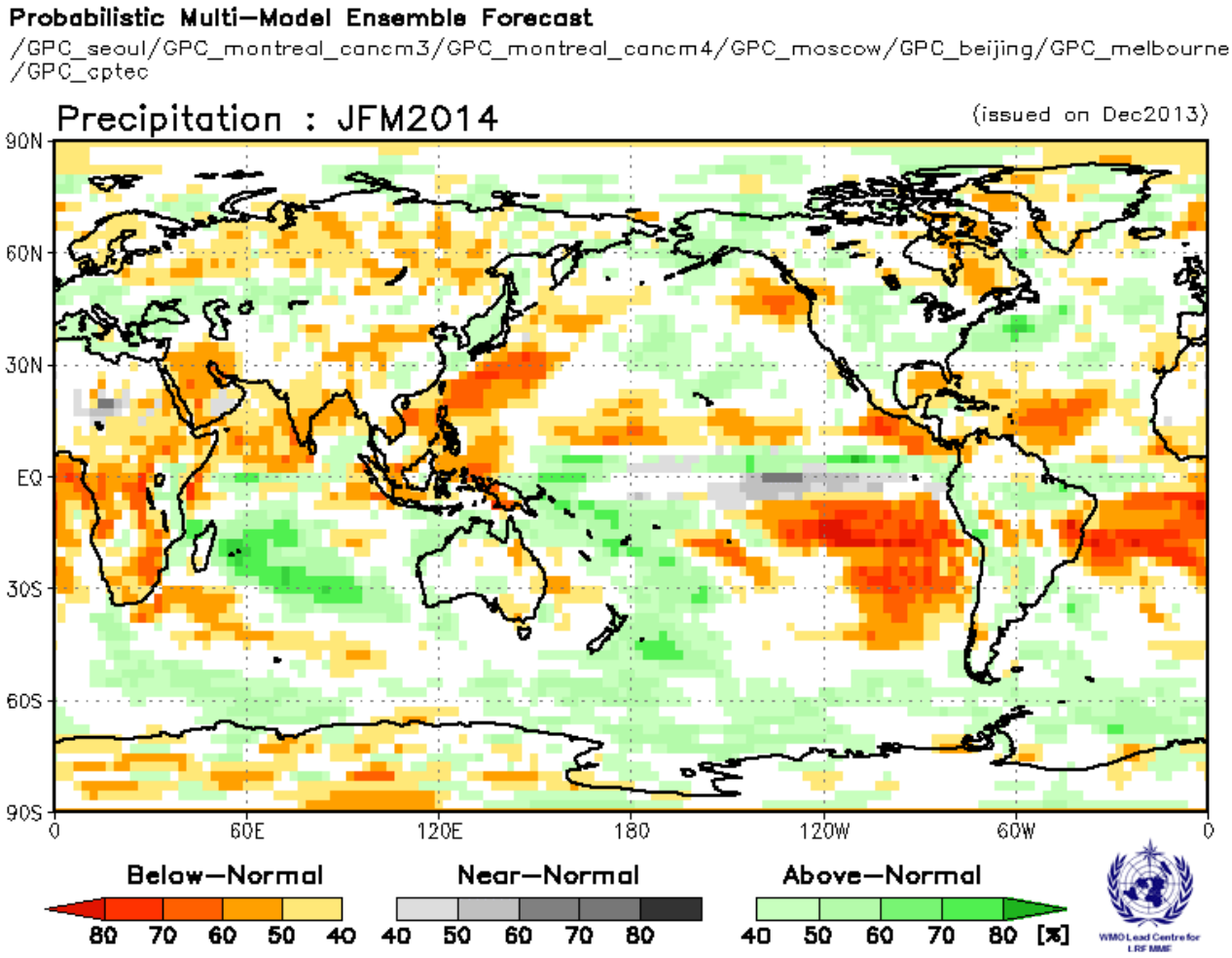


fig.33: **MME most likely category of Rainfall from LC-MME. The MME composition corresponds to the GPCs not used in EuroSIP. https://www.wmolc.org/**

II.4.g Euro-SIP

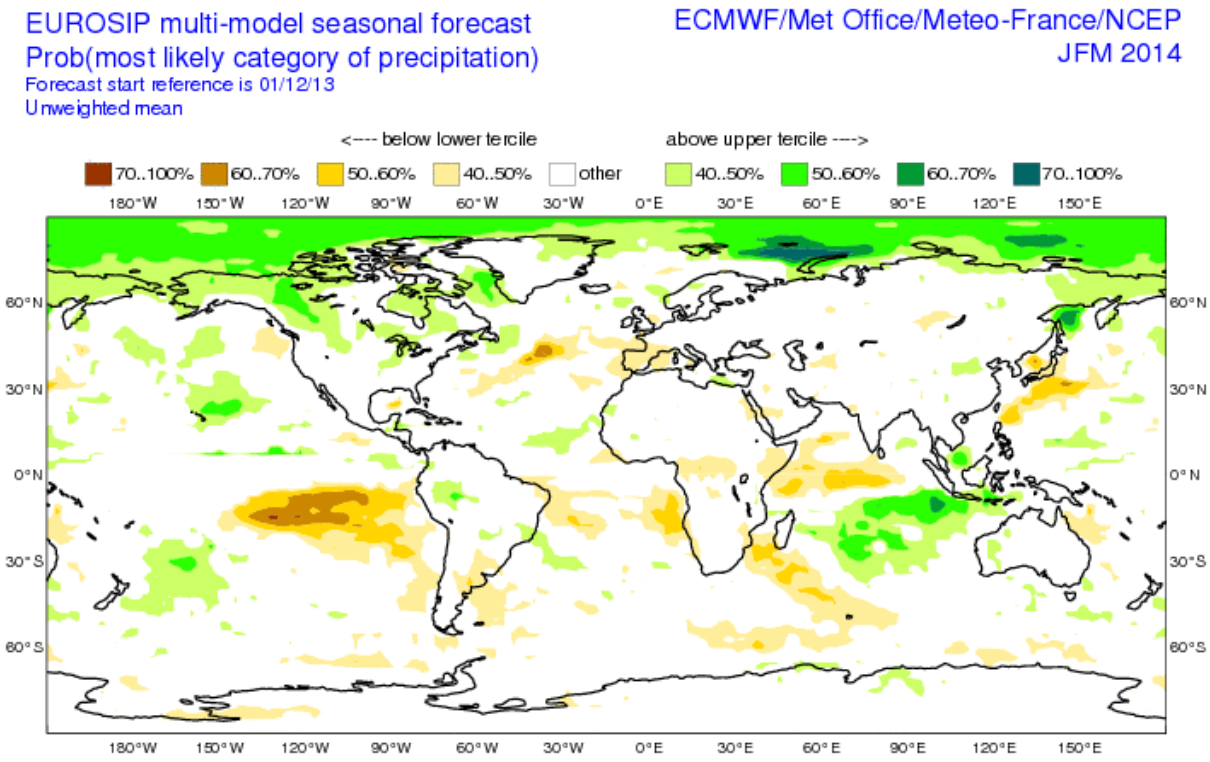


fig.34: Multi-Model Probabilistic forecasts for precipitation from EuroSip. (2 Categories, Below and Above normal – White zones correspond to No signal).

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

In the Tropics : A very few consistent signals ; slightly enhanced probabilities for wet scenarios close to Maritime continent. Slightly enhanced probabilities for dry scenarios over equatorial and Eastern Africa and part of Argentina.

For Europe : No signal more or less everywhere to the exception of the South Western part of Europe (slightly enhanced probability for dry scenario).

II.5. REGIONAL TEMPERATURES

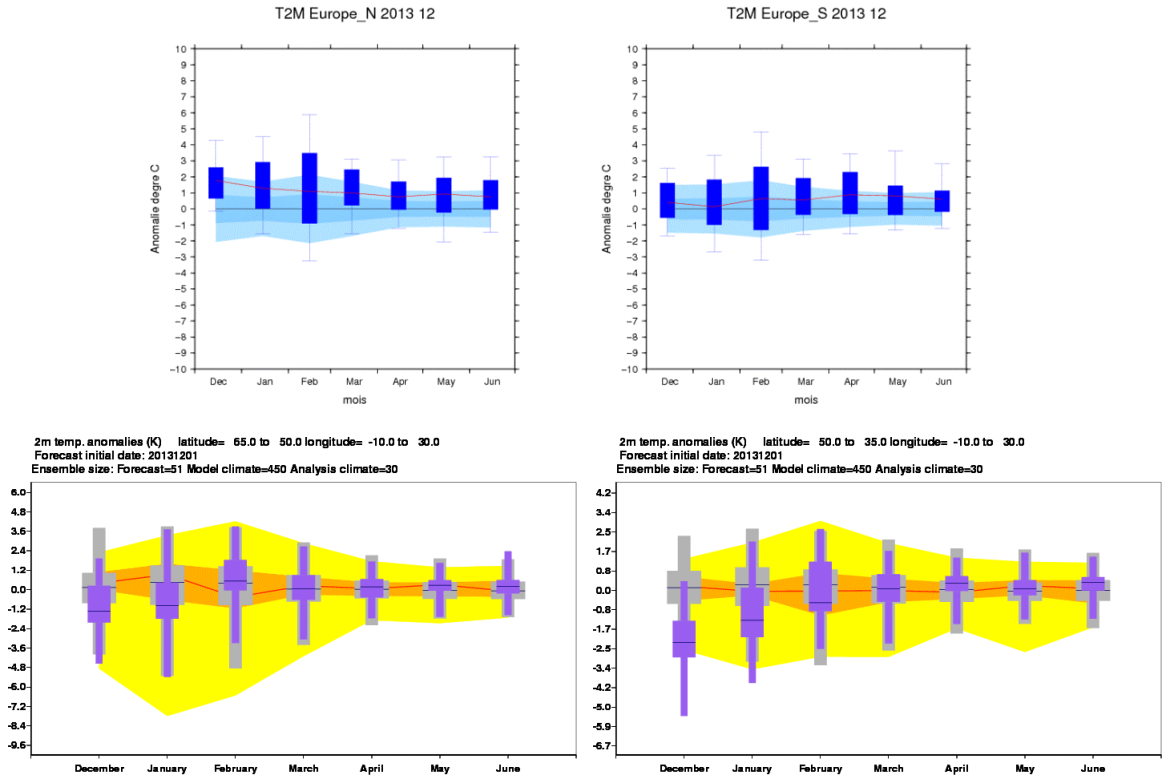


fig.35: Climagrams for T2m in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom - idem).

For Northern Europe: inconsistent signal between the 2 models. Above normal conditions in MF while ECMWF starts with Below Normal conditions and return close to normal in March. Note the large spread (with respect of the climate reference) in both models.

For Southern Europe: same comment ; inconsistent signal between the 2 models. MF mostly Above Normal while ECMWF is mostly Below Normal. The spread is very large in both models.

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

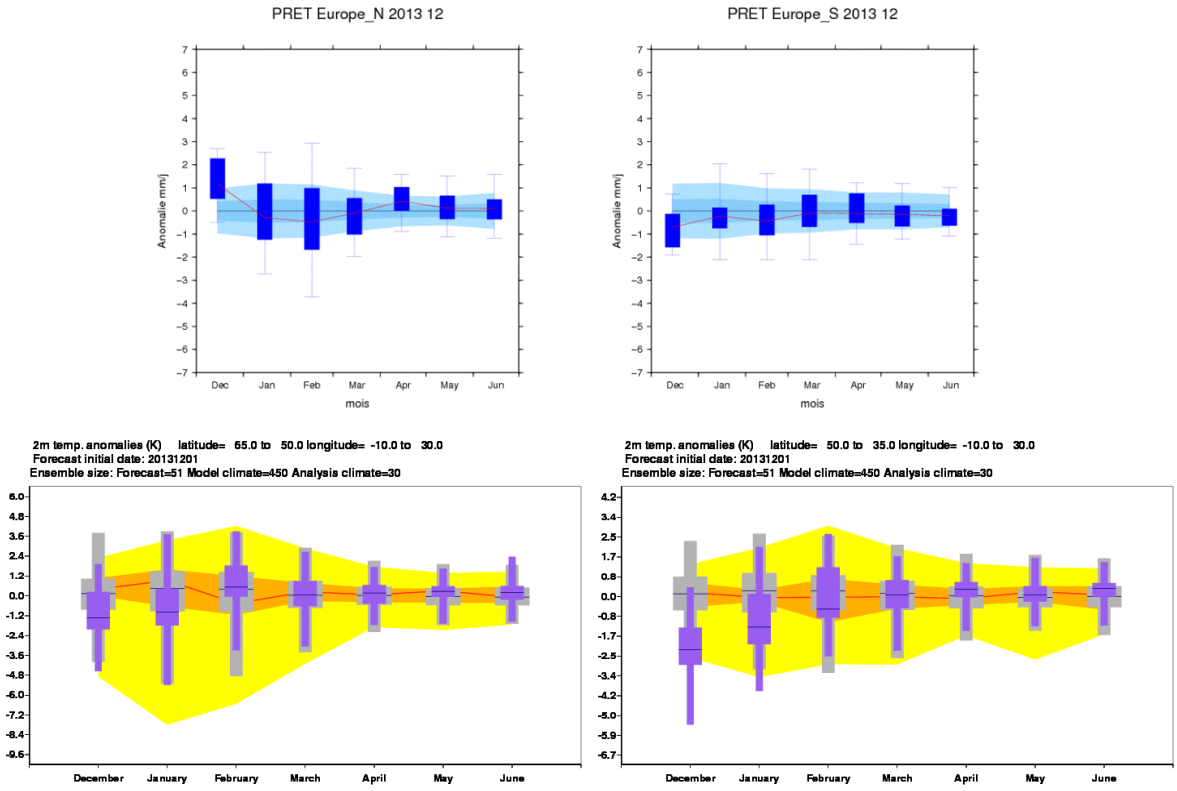


fig.36: Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom - idem).

For Northern Europe : Only little consistency between the 2 models. Above than normal in December and then Below normal conditions in MF while ECMWF starts with Below Normal conditions and evolves toward Above Normal conditions in February. The spread is (very) large.
For Southern Europe : Some consistency for Below normal conditions (despite located at different months). The spread is (very) large.
Adding the weak but existing predictability, one could suggest to take the Below Normal scenario for Southern Europe as a “reasonable” solution.
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

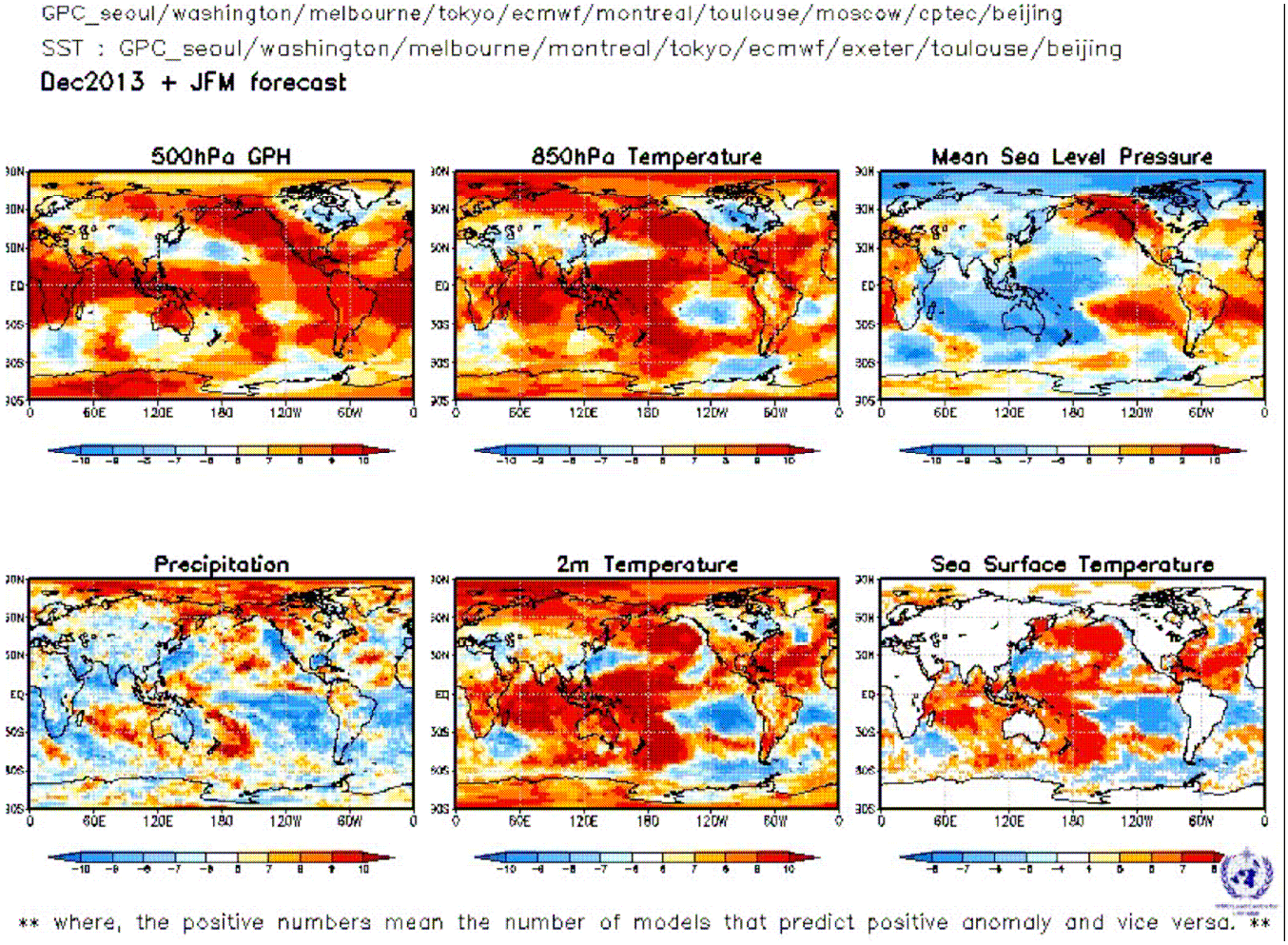


fig.37: ***GPCs Consistency maps from LC-MME*** *http://www.wmolc.org/*

For SST : Very consistent signal (warmer than normal) in the warm pool and along the SCPZ regions, in the Eastern part and Southern Sub-Tropics of the Indian Ocean and in Tropical Atlantic (both North and South).

For Z500 : Mostly Above normal consistent signal in the Tropics and in Northern hemisphere along the Western coast of North America. For the Atlantic, some consistent signal for Above Normal conditions over the Eastern part of the basin (consistent with a deficit of NAO – occurrences). Still Above Normal conditions over South America and Australia.

For T2m : Some consistent signal (warmer than normal) over Equatorial and Southern Africa, The Subtropical part of the Indian Ocean, the regions in the vicinity of the Maritime Continent and the Warm Pool, the US, Central America and the Caribbean, the Nordeste and the Southern part of South America.

For precipitation : Some consistent signal : Drier than normal Equatorial and Southern Africa,India and the Arabic Peninsula, the North Eastern part of Australia, The Nordeste and the Southern part of South-America. For Wetter than normal some consistent signal along the SCPZ regions, over North Pacific (both Asian and American continent).

II.7. "EXTREME" SCENARIOS

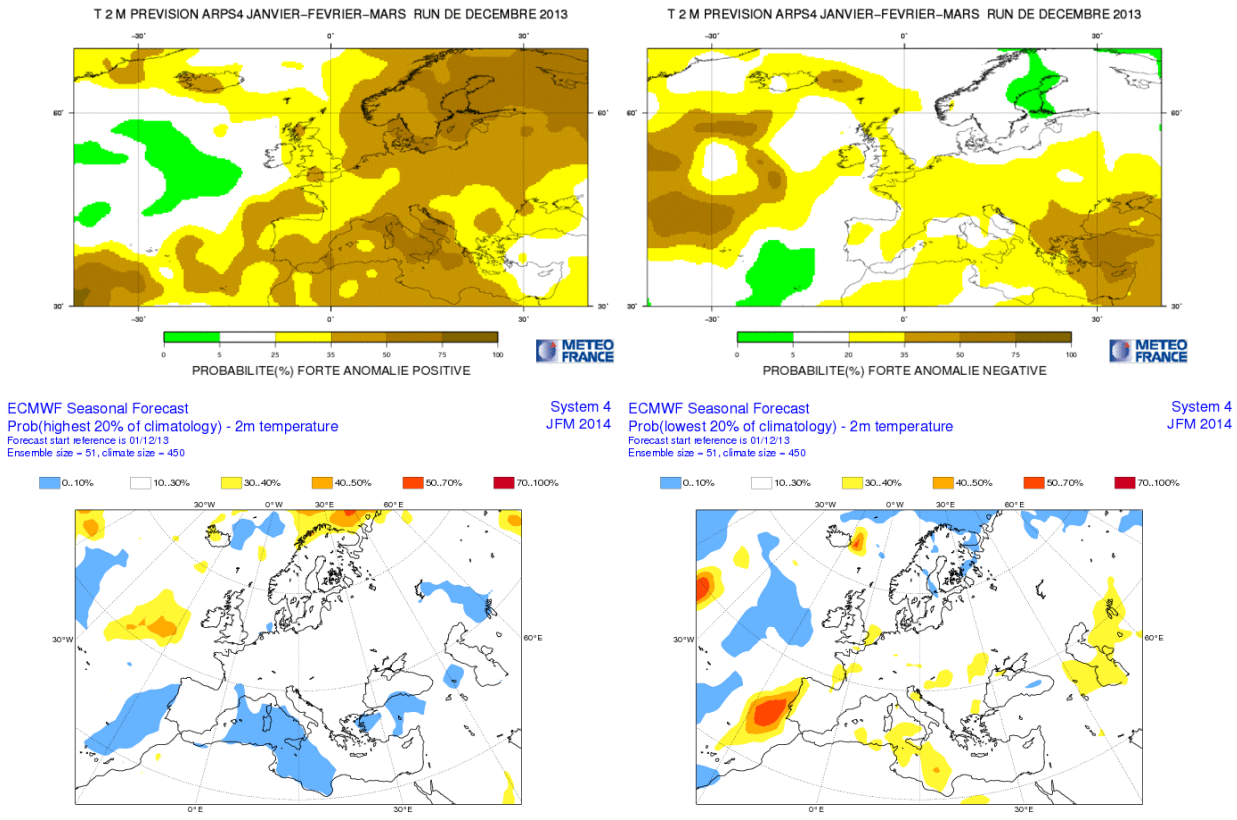


fig.38: Top : Probability of « extreme » above normal conditions from T2m for Meteo-France (left - highest ~15% of the distribution and right lowest ~15% of the distribution)
Bottom : idem from ECMWF (left - highest 20% of the distribution and right lowest 20% of the distribution).

To be noted the divergent scenarios proposed by MF (enhanced probabilities for both categories)
No consistency for both scenarios to the exception of some cells across the Mediterranean basin and close to the Caspian sea for the Very Below Normal scenario. So 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.

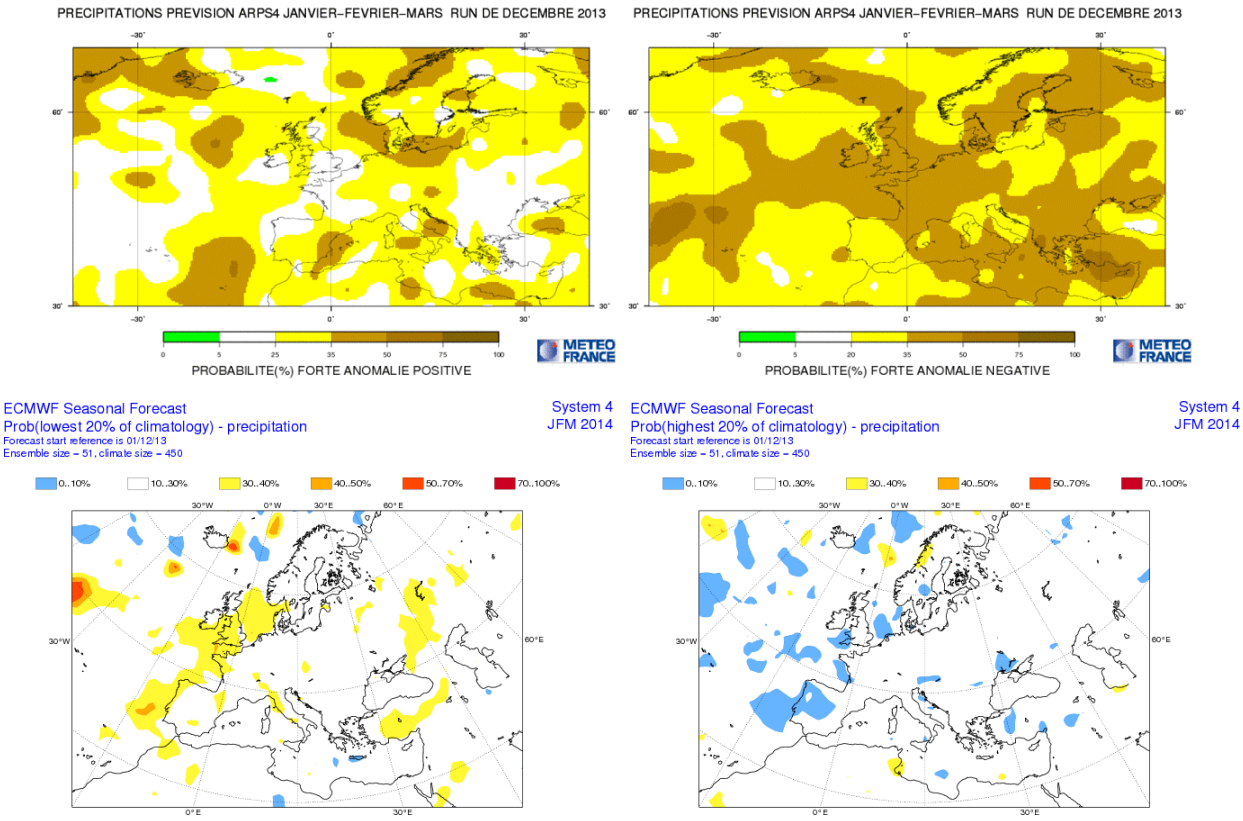


fig.39: Top : Probability of « extreme » above normal conditions for rainfall from Meteo-France (left - highest ~15% of the distribution and right lowest ~15% of the distribution)
Bottom : idem from ECMWF (left - highest 20% of the distribution and right lowest 20% of the distribution).).

Mostly No signal in ECMWF while there are traces of divergent scenarios in MF (strong enhanced probabilities for one category and some slight enhanced probabilities for the other extreme scenario).
So it seems difficult to use these forecasts.
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 major comment is about the current predictability in the climate system. The oceanic forcing remains quite low to the exception of the vicinity of the warm pool. However, the current predictability seems to be better than the previous month especially for tropical regions. Some weak (tele) connection patterns on the North Atlantic seem to be possibly active leading to a consistent response in the geopotential heigh over the Eastern Atlantic (deficit of NAO – regimes). However, the ECMWF and MF differences (in term of location) could likely be interpreted in terms of model uncertainty. So in such a context, the EuroSIP forecasts are likely a good synthesis of possible scenarios over European regions. **For rainfall, "No Privileged Scenario"** covers most of the European continent to the exception of the **South Western regions** where **Drier than Normal conditions** could be privileged consistently with the Z500 forecasts. **For temperature** : despite the weak but existing predictability **"No Privileged Scenario"** should be privileged taking into account the model uncertainty over Europe. However, for **the South-Eastern Europe** one can privilege the **Below Normal Scenario** (slightly enhanced probabilities) and the **Avove Normal scenario** for the **Northern European regions (especially the Eastern part).**
Obviously, some downscaled information could detail these scenarios for specific countries or sub-regions.

Tropical Cyclone activity

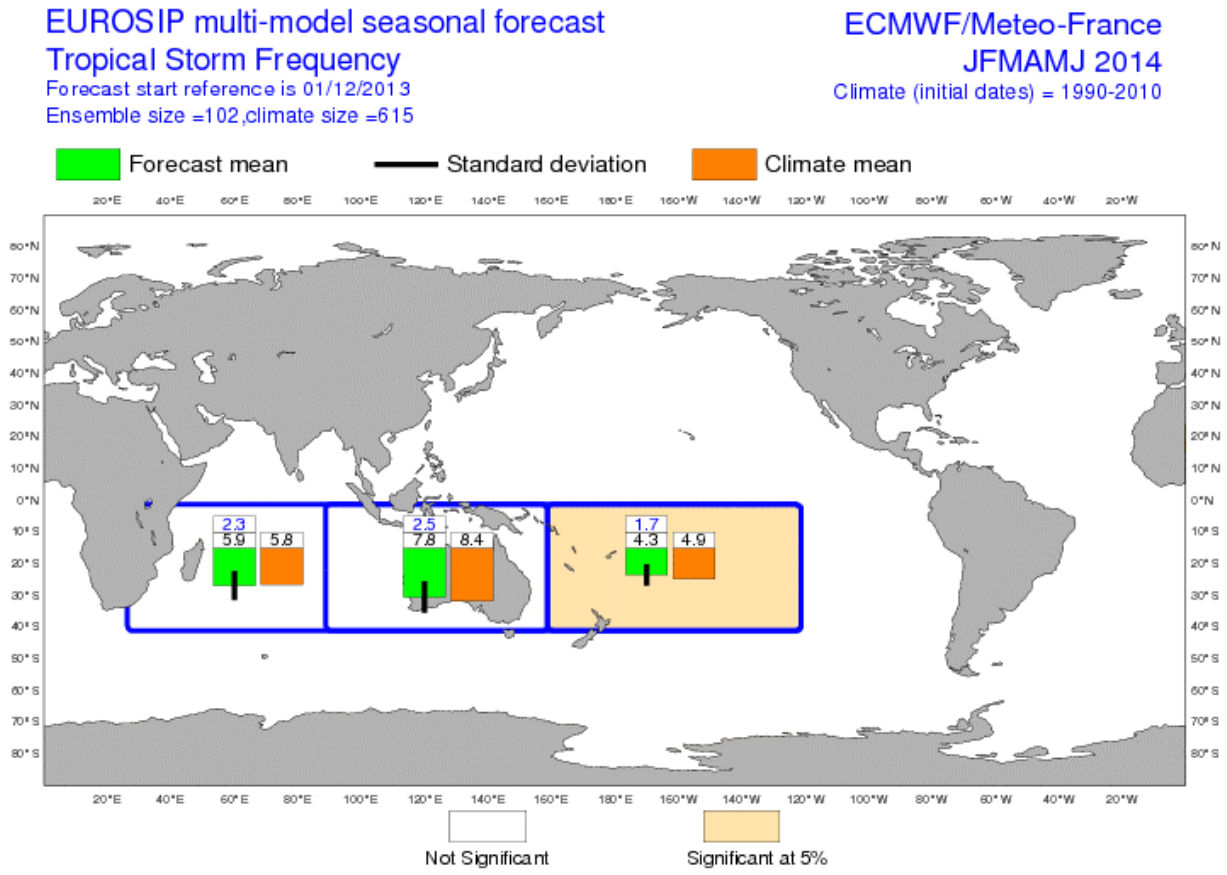


fig.40: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtrop/trop_euro/eurosip_tropical_storm_frequency/

For the Tropical Cyclone season, Euro-Sip forecasts indicate weakened Topical Cyclone activity over the South Western Pacific, and close to normal condition elsewhere.

WMO RA VI
Pilot RCC-Network

Synthesis of Temperature forecasts for January-February-March 2014 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	*above normal*	*no privileged scenario*	*no privileged scenario*	*no privileged scenario*	*below 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 January-February-March 2014 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*	***Below normal***	*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, CPTEC, 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.
■ LC-MME and Euro-SIP provide multi-model forecasts. Euro-Sip is presently composed using 4 models (ECMWF, Météo-France, NCEP and UK Met Office). LC-MME uses information coming from most of the GPCs ; providing deterministic and probabilistic combinations of several coupled and forced models.

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 », SOI INDICES AND OCEANIC BOXES

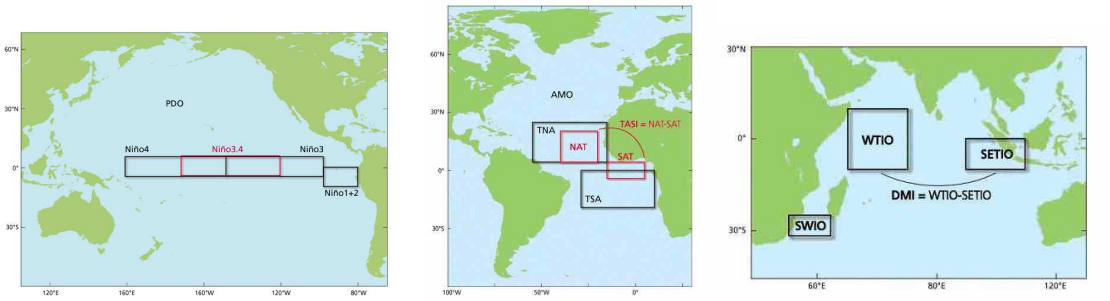
El Niño and La Niña events primarily affect tropical regions and are monitored by following the SST evolution in specific area of the equatorial Pacific.

- 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).

Oceanic boxes used in this bulletin :



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.