GLOBAL CLIMATE BULLETIN
n°189 – march 2015

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I. DESCRIPTION OF THE CLIMATE SYSTEM (JANUARY 2015)

I.1. Oceanic analysis

January conditions analysis :

In the Pacific ocean

In the equatorial waveguide :

surface : weak generalized warm anomaly. A slight cooling trend since December in the eastern part of the basin. Few change in the western part.

subsurface : no significant anomaly

ENSO : el Niño 3.4 Index near the +0.5°C threshold in January. Negative value in Nino1+2 box. Conclusion : Neutral ENSO conditions in January.

Northern Hemisphere :

Warm SST anomaly between the equator and the Tropic. Strong warm anomaly along the coast of North America. Decreased in January.
Strong cold anomaly from China and Japan to 140°W.
This anomaly combination corresponds to a strongly positive PD0 pattern.

Southern Hemisphere :

Increase of the cold anomaly between 20°S and 40°S eastward of the International Date Line, and along the coast of South America.
Elsewhere : weak warm anomaly northward. Rather strong anomaly nearby Australia. Strong warm anomaly near 40°S and 100°W

Maritime continent :

Cool conditions in January, and coming back to neutral conditions or slightly warmer than normal.

In the Indian Ocean :

Weak warm anomalies in the East. Significant cooling in the western half with switches to cold anomalies (IOD = -0.5).

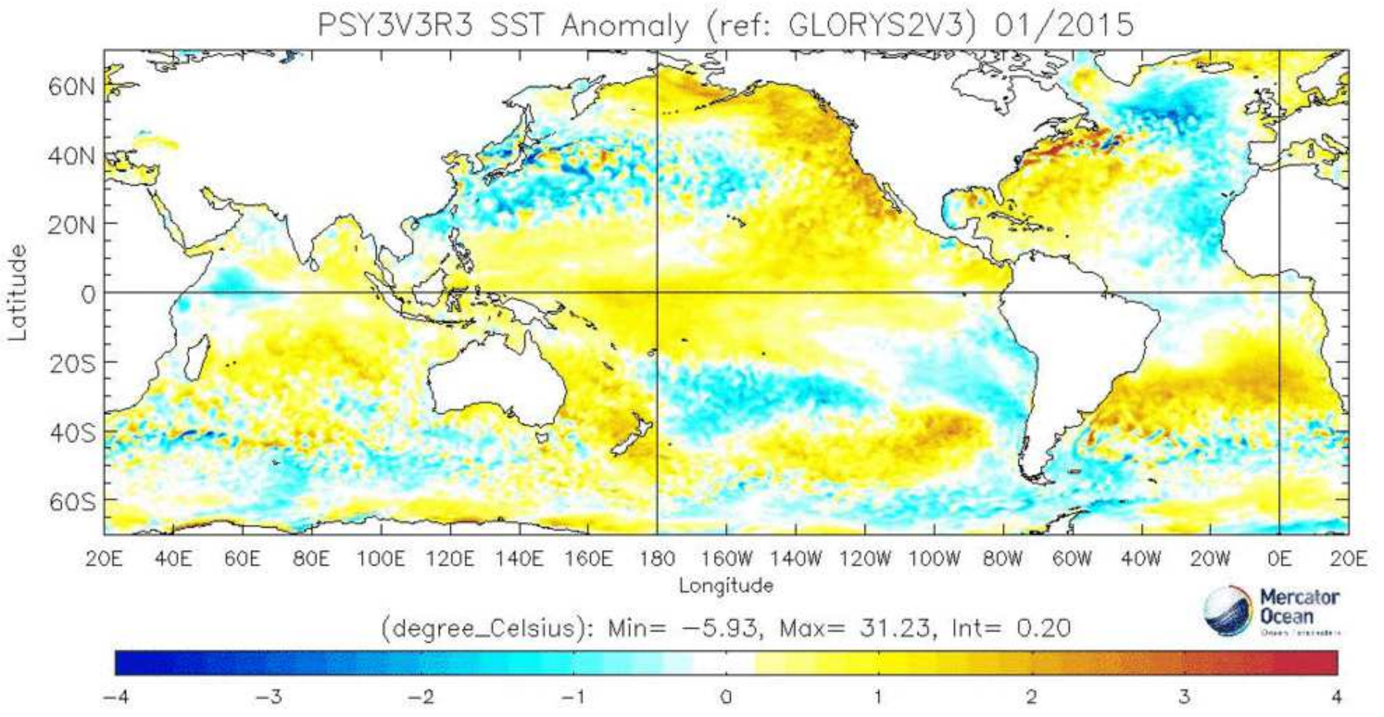
In the Atlantic :

In the tropics : generally neutral or slightly colder than normal.

Northern Hemisphere :

warm anomaly from the West Indies to the coast of North America and to Bermuda.
Cold anomaly elsewhere.

Southern Hemisphere :
Strong warm anomaly from the tropic to 40°S, which has increased in the Eastern part of the basin
Cold anomaly southward.



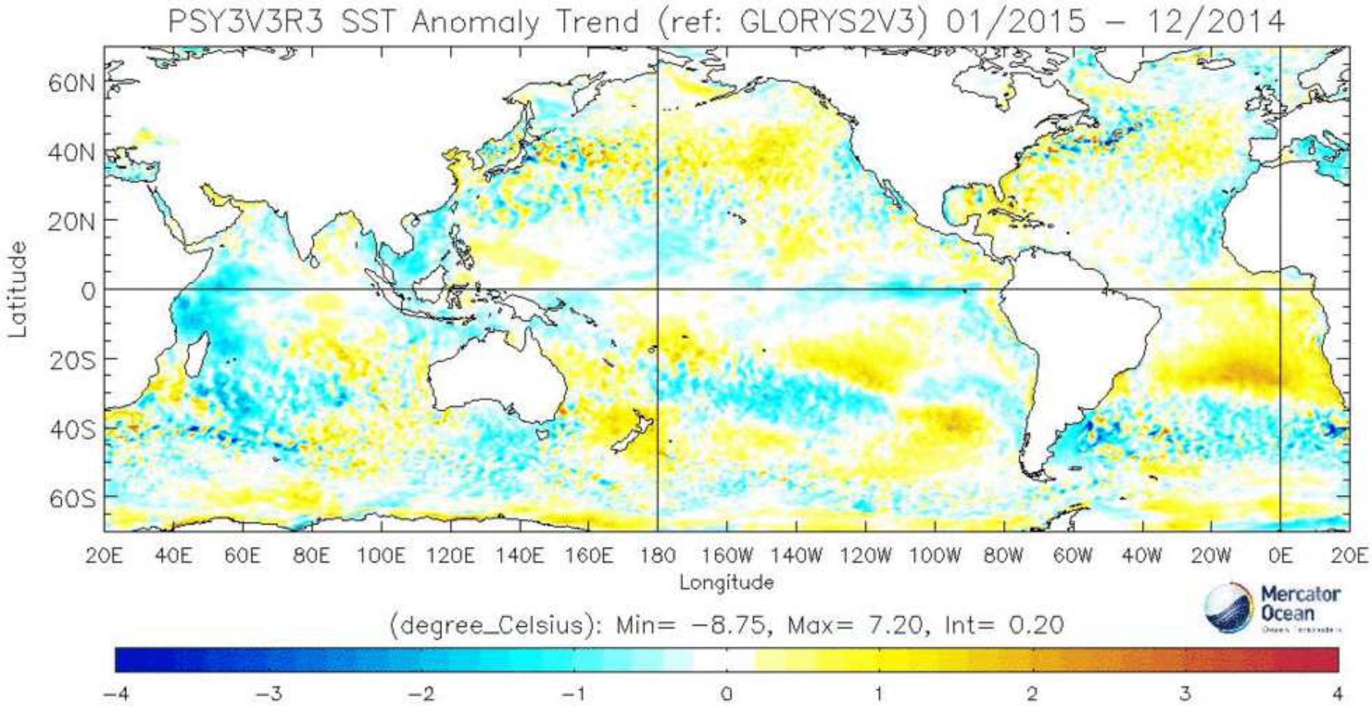


fig.I.1.1: top : SSTs Anomalies (°C) . Bottom : SST tendency (current – previous month), (reference Glorys 1992-2009). http://bcg.mercator-ocean.fr/

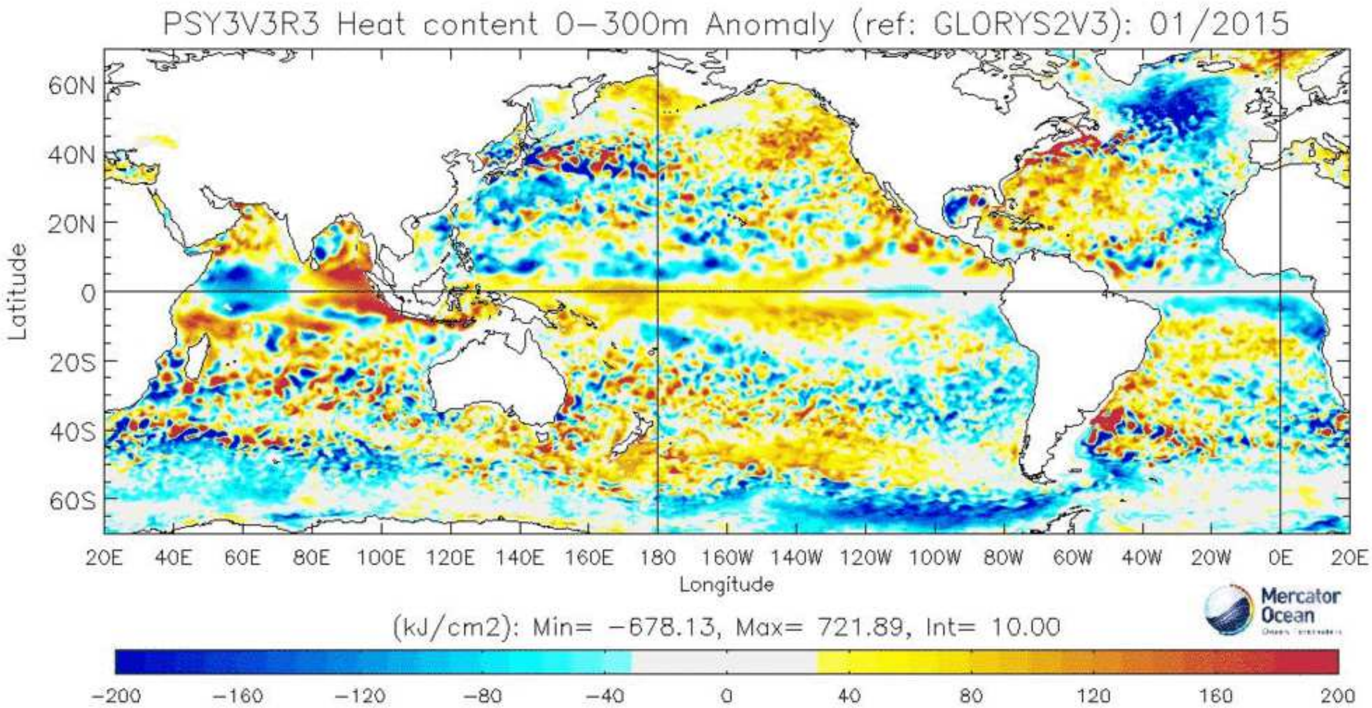


fig.I.1.2: map of Heat Content Anomalies (first 300m, kJ/cm2, reference Glorys 1992-2009) http://bcg.mercator-ocean.fr/

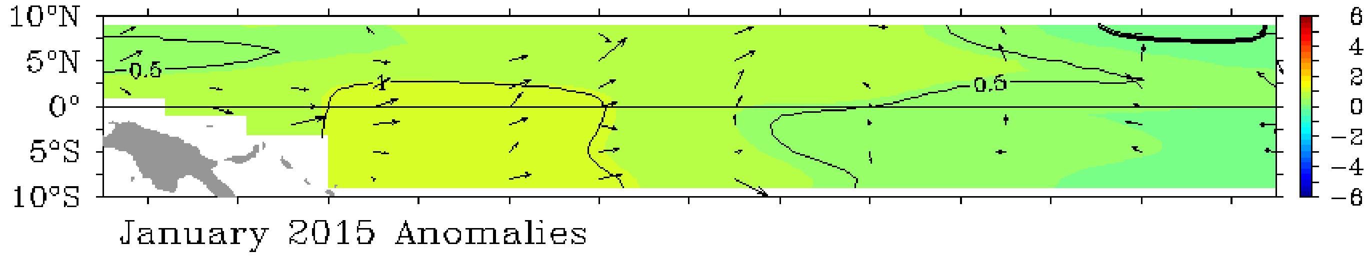


fig.I.1.3: SST Anomalies and Wind anomalies over the Equatorial Pacific from TAO/TRITON. http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/monthly-summary.html

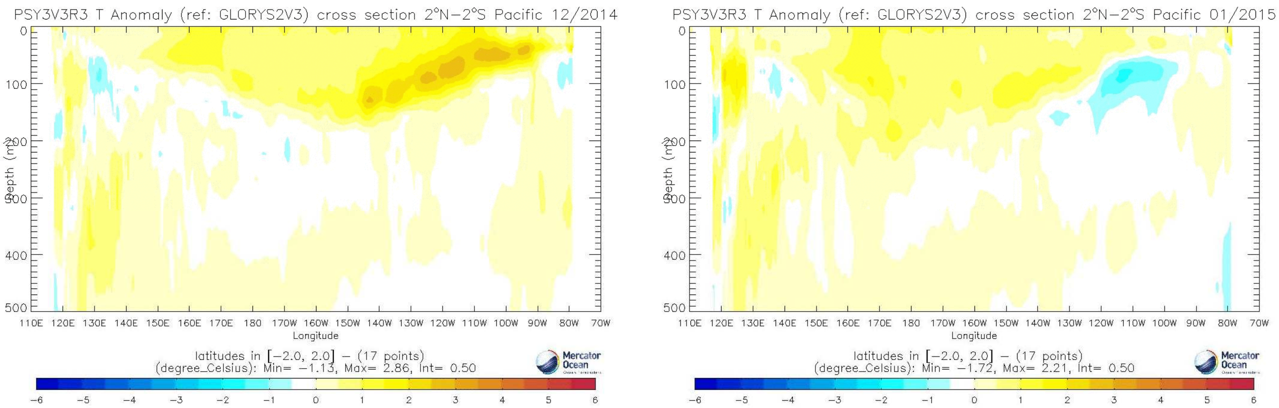


fig.I.1.4: Oceanic temperature anomaly in the first 500 meters in the Equatorial Pacific (previous and current month), http://bcg.mercator-ocean.fr

<u>In the equatorial waveguide (fig. 4 and 5)</u> : no significant anomalies.

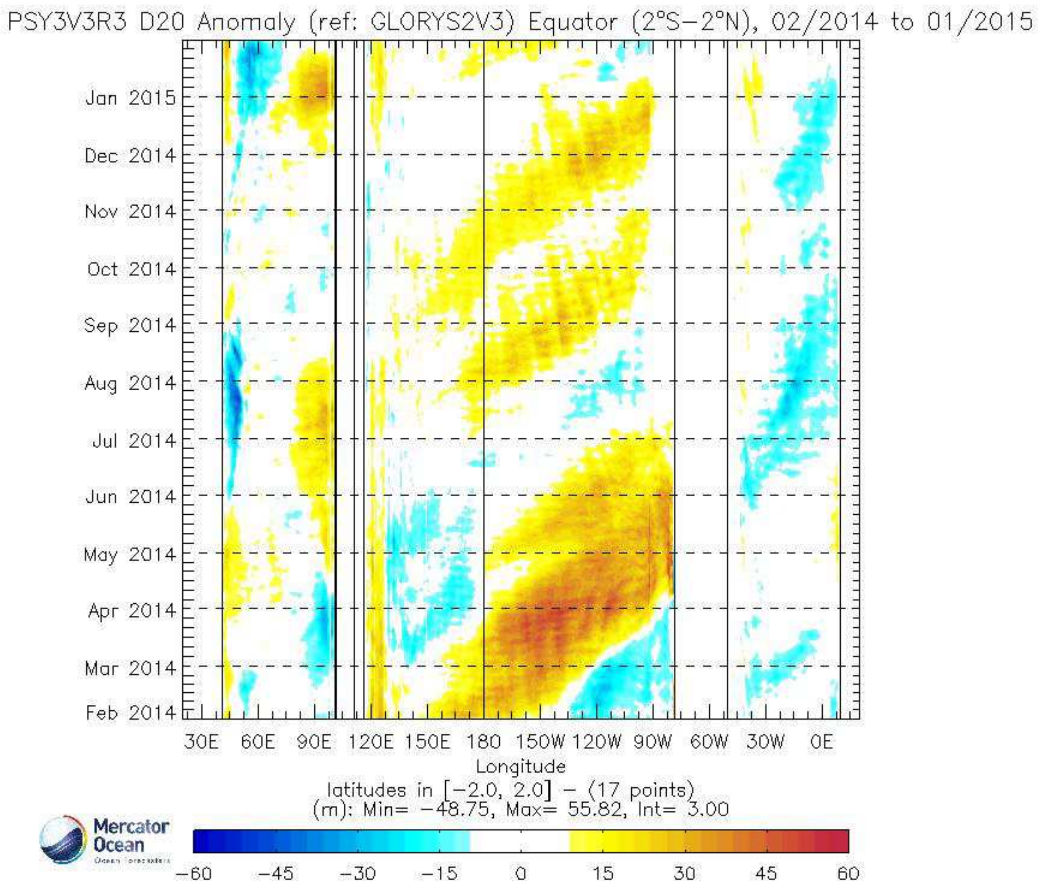


fig.I.1.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 6 month period http://bcg.mercator-ocean.fr/

Sea surface temperature near Europe :

Still warmer than normal in the Arctic Sea and almost all sea surfaces near the European continent except a large area over the East Atlantic. However, warm anomalies are lower than in December 2014 especially in the whole Mediterranean and near the Biscay, SST is now only slightly higher than normal in these areas. Especially in the second half of January 2015 there were some episodes of cold air advection from the north which have cooled the sea surfaces.

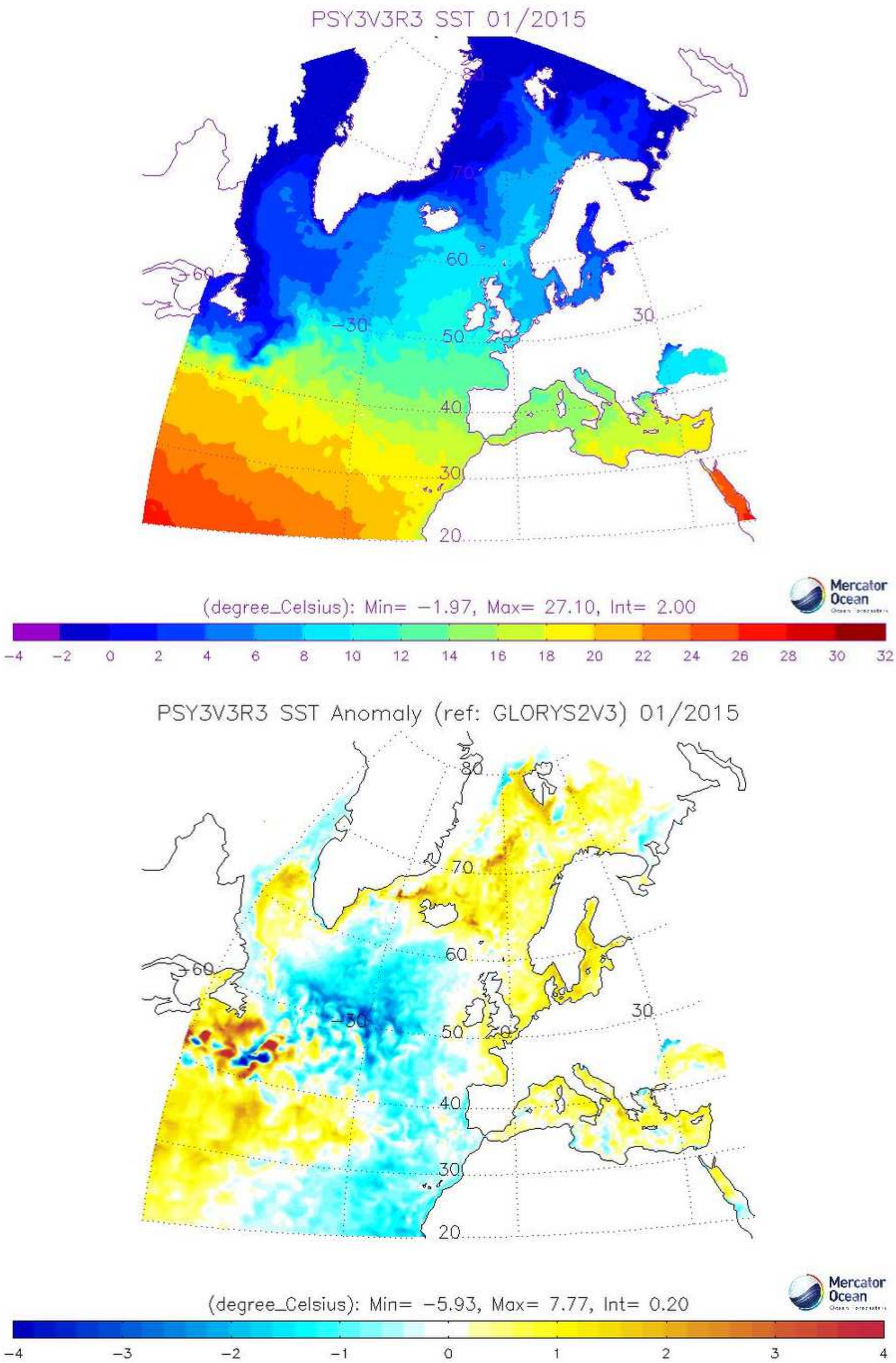


fig.I.1.6 : Mean sea surface temperature in the RA VI Region (Europe) and anomaly (reference Glorys 1992-2009). http://bcg.mercator-ocean.fr/

I.2. ATMOSPHERE

I.2.a General Circulation

Velocity Potential Anomaly field in the high troposphere (fig. 1.2.1 – insight into Hadley-Walker circulation anomalies) :

In the tropical Pacific Ocean, strong upward motion core west, linked with the MJO activity. Smaller upward motion in the Eastern part (170°W, 10°S).

Vast downward motion anomaly over the South America, the Atlantic Ocean, Africa, northern Indian Ocean and Asia.

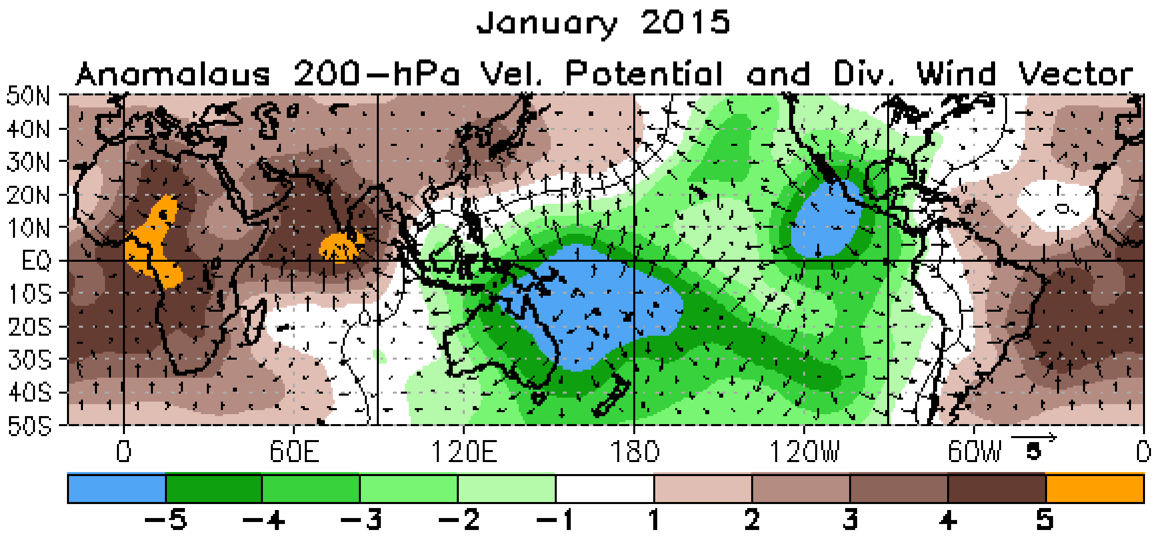


fig.I.2.1: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly). http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

- MJO (fig. I.2.b)

Active on Maritime Continent at the beginning of January, then over western Pacific ocean in the middle of the month.Weaker activity over eastern Pacific at the end of the month.

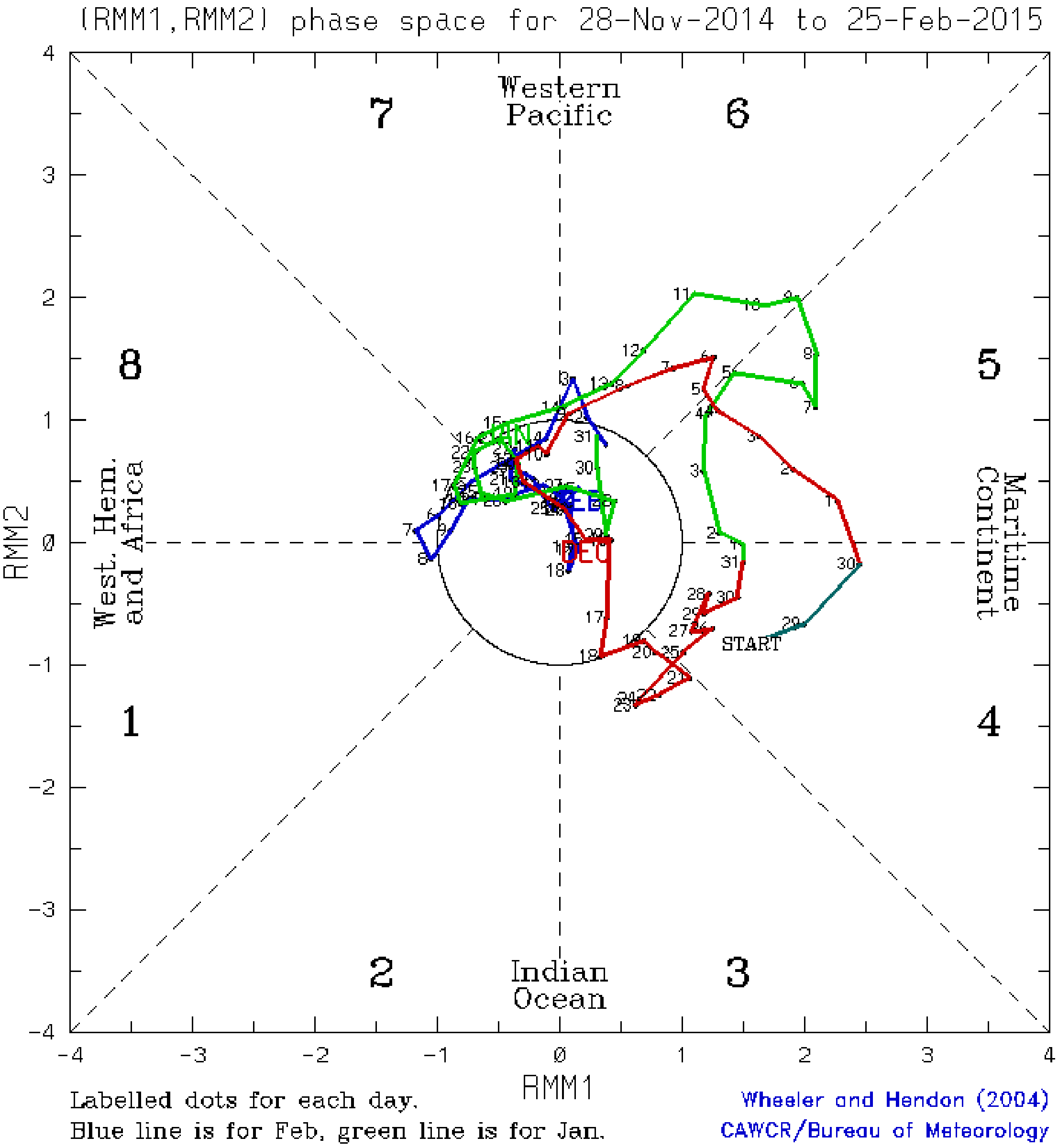


fig.I.2.b: indices MJO http://cawcr.gov.au/staff/mwheeler/maproom/RMM/phase.Last90days.gif

Stream Function anomalies in the high troposphere (fig. 1.2.2 – insight into teleconnection patterns tropically forced) :

Remarkable continuity of the stream function anomaly field in December and January.

Persistence of teleconnection structure over the Atlantic Ocean, with cyclonic anomalies in the tropic and anticyclonic anomalies in the mid-latitudes.

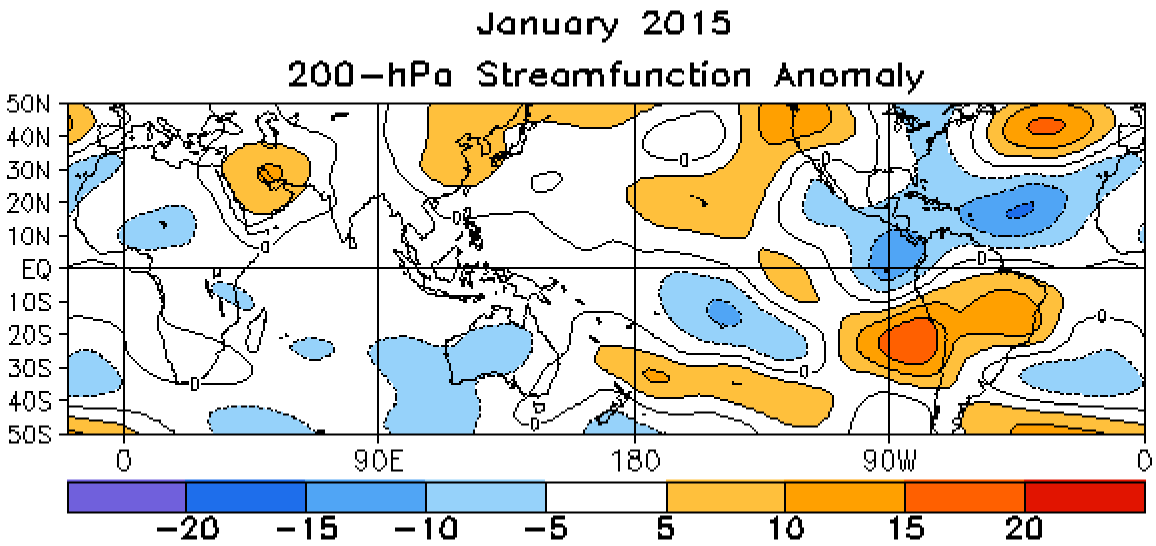


fig.I.2.2: Stream Function Anomalies at 200 hPa.
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

<u>Geopotential height at 500 hPa</u> (fig. 8 – insight into mid-latitude general circulation) :

<u>In the north Atlantic :</u>

Continuity of the anomaly field since December : weak low in the tropics, strong high anomaly in the center of North Atlantic Ocean between the Canada and the Iberian Peninsula, low anomaly from Western Canada to Iceland and Danmark.

<u>Elsewhere :</u>

Strong high geopotentiel anomaly in the extreme northeast of Asia, the Bering Strait and western Canada and the US. Low anomaly over Siberia.

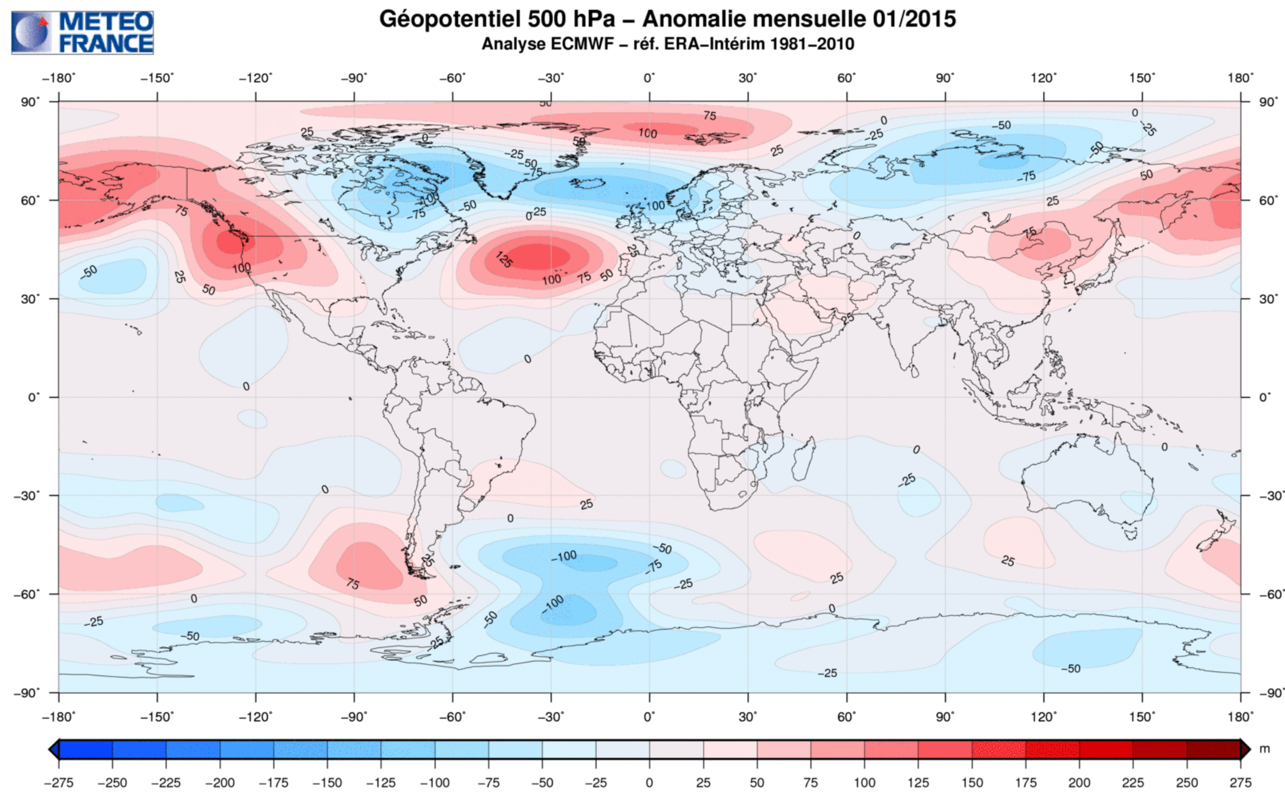


fig.I.2.3: Anomalies of Geopotential height at 500hPa (Meteo-France)

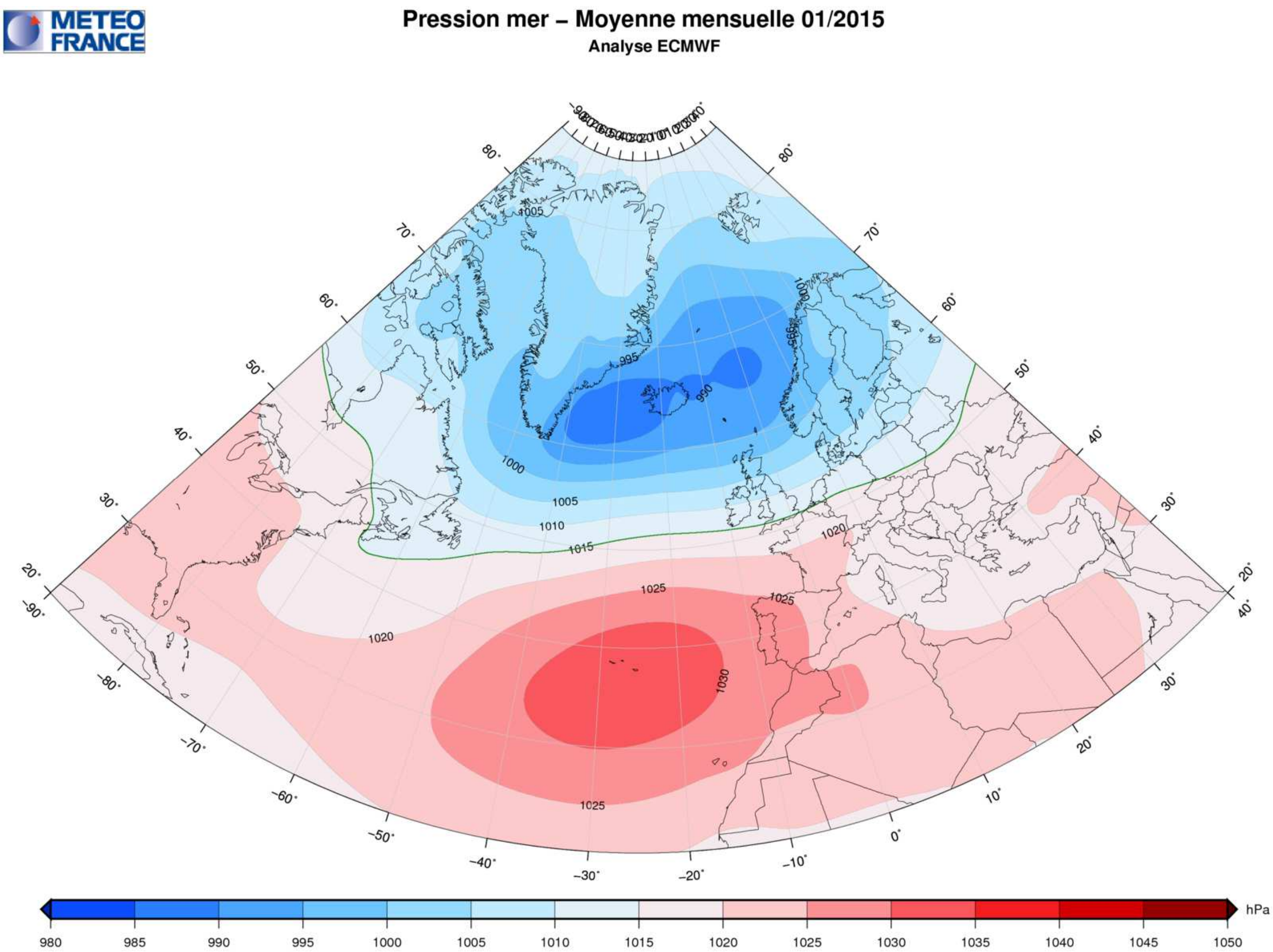
MONTH	NAO	EA	WP	EP-NP	PNA	TNH	EATL/WRUS	SCAND	POLEUR
JAN 15	1.6	1.1	-0.2	1.3	0.1	0.4	-0.2	-0.2	0
DEC 14	1.6	-0.6	-0.1	---	0.4	-0.2	-0.4	-0.4	-0.9
NOV 14	0.6	0.4	0.1	3.2	0.6	---	1.3	1.8	1.8
OCT 14	-0.9	1.0	-0.3	-0.7	1.1	---	-0.4	1.1	-1.0
SEP 14	1.7	0.2	-1.2	0.2	0.8	---	0.5	1.1	1.1
AUG 14	-2.3	0.8	-0.8	-1.0	1.3	---	-1.7	-0.6	1.6
JUL 14	0.2	0.6	-1.6	0.3	0.5	---	-0.3	1.6	-0.9
JUN 14	-0.7	-1.0	-0.3	-0.7	-1.4	---	0.0	0.2	-0.0

Evolution of the main atmospheric indices for the Northern Hemisphere for the last 6 months :

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

Sea level pressure and circulation types over Europe

Like 500 hPa geopotential, also the SLP pattern of January 2015 is very similar to that of December 2014, which means still enhanced westerly flow over the North Atlantic due to both more intense Icelandic Low and Azores High. Therefore, positive NAO mode is still active and the most dominant pattern for Europe. In fact, NAO index values for December 2014 and January 2015 are almost the same (+1.6). However, in contrast to December, the EA mode changed from negative to positive and is relatively strong (+1.1). So the Icelandic Low has become stronger and extended to the east, with the effect that intense low pressure systems had much impact on Scandinavia. The Azores High was not so much extended to the north and the west like in December.



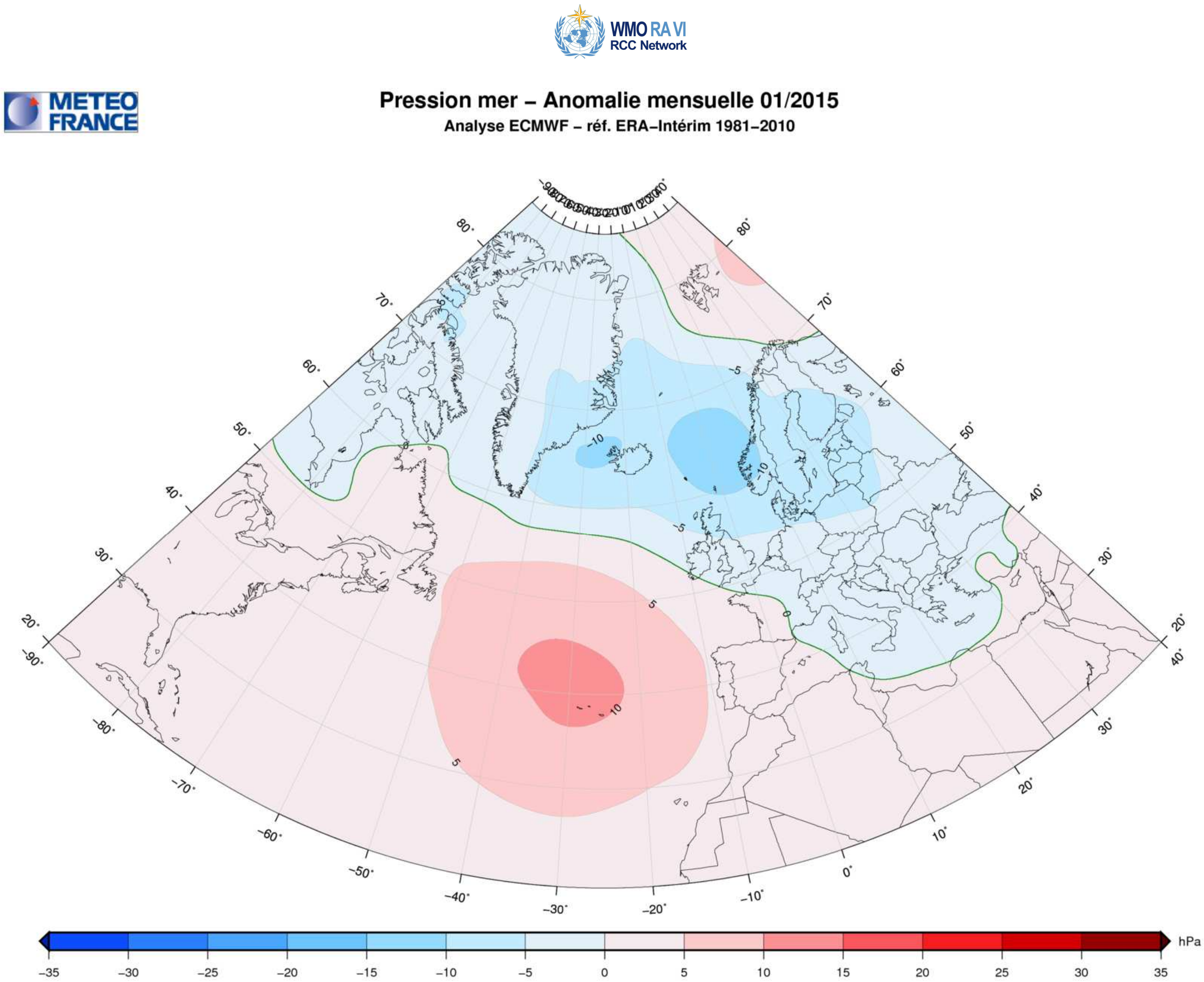
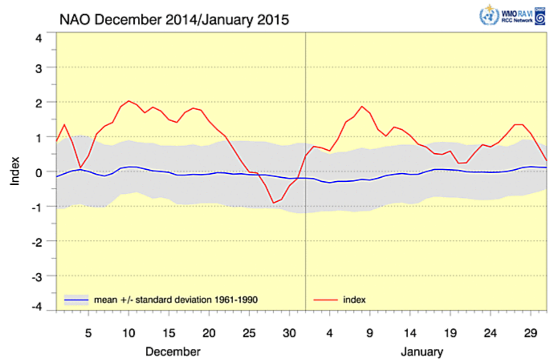


fig.I.2.4: Mean sea level pressure in the RA VI Region (Europe) (top) and 1981-2010 anomalies (bottom).

Circulation indices: NAO and AO

NAO was positive during the whole month of January, showing an ongoing activity of this pattern more or less during the whole month. The AO, too, was positive throughout the month except a very short period with close to zero values. This shows that also the circulation of the whole northern hemisphere has a strong zonal component, which is reflected by a similar pattern over Asia. Recent NAO and AO data and forecasts show the positive mode of these patterns mainly continued also in February and might also continue in March, pointing to a quite high persistency of the northern hemispheric large-scale circulation.



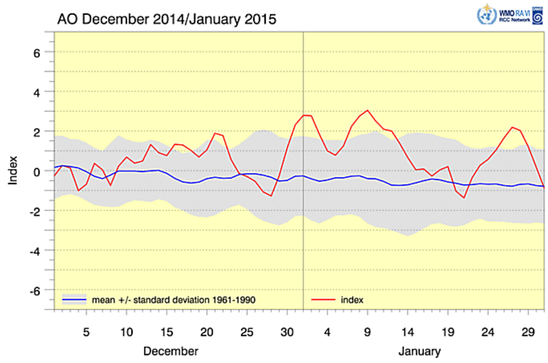
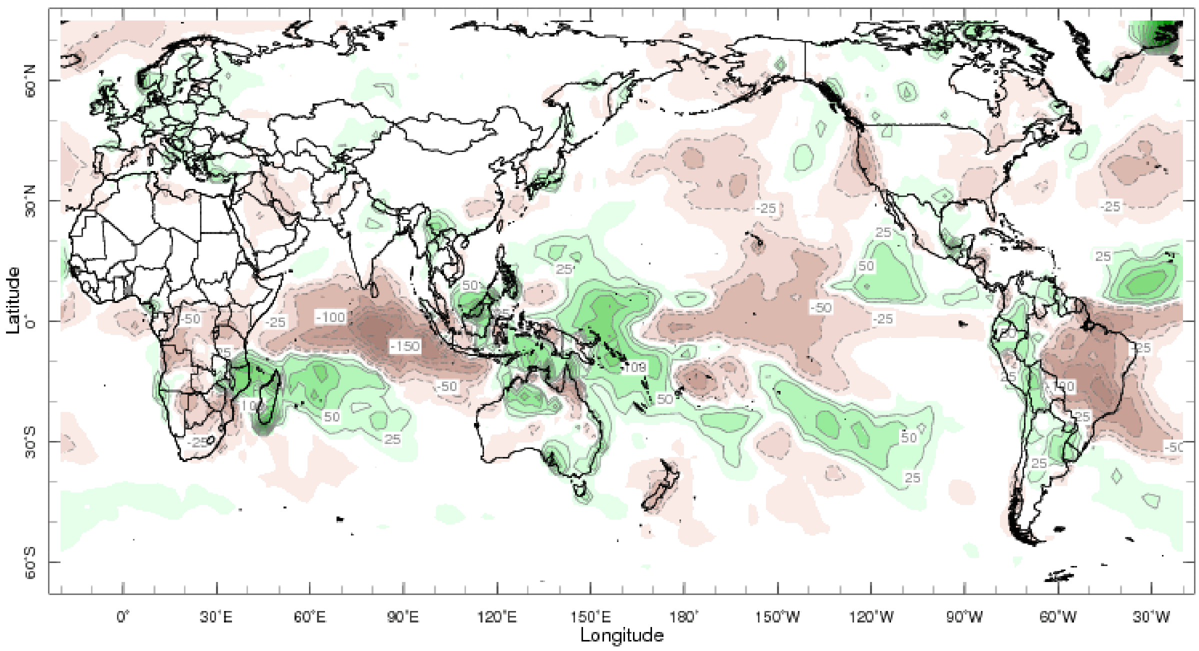


fig.I.2.5: North Atlantic Oscillation (NAO, left) and Arctic Oscillation (AO, right) indices with 1961-1990 mean standard deviation (shading). http://www.dwd.de/rcc-cm , data from NOAA CPC:
http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml

fig. I.2.5a: North Atlantic Oscillation (NAO, left) and Arctic Oscillation (AO, right) indices for the last 4 months and forecasts for the following weeks. Source: NOAA CPC,
http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml

I.2.b Precipitation



Jan 2015

fig.I.2.4: Rainfall Anomalies (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/Anomaly.html

On Europe :

Dry anomaly over southwestern Europe, Portugal, Spain, the South of France and the North of Italy.
Wet anomaly elsewhere.

Elsewhere :

In link with the anomaly of large scale convection, wet anomaly on the Western Pacific Ocean. Wet anomaly nearby Madagascar. Strong dry anomaly on equatorial Indian Ocean. Strong dry anomaly over Brazil and wet anomaly over Andean countries and Argentina. Dry anomaly on the South of Africa.

Precipitation anomalies in Europe:

Mainly wet especially in northwestern, central, northern and northeastern Europe, very consistent to the positive NAO pattern, but also in southeastern Europe including southern Italy and western Turkey, showing that low pressure systems frequently moved to the central and eastern Mediterranean. In contrast, particularly most of the Iberian Peninsula (except the north), much of southern France and the western Mediterranean was drier than normal due to continuing high pressure influence.

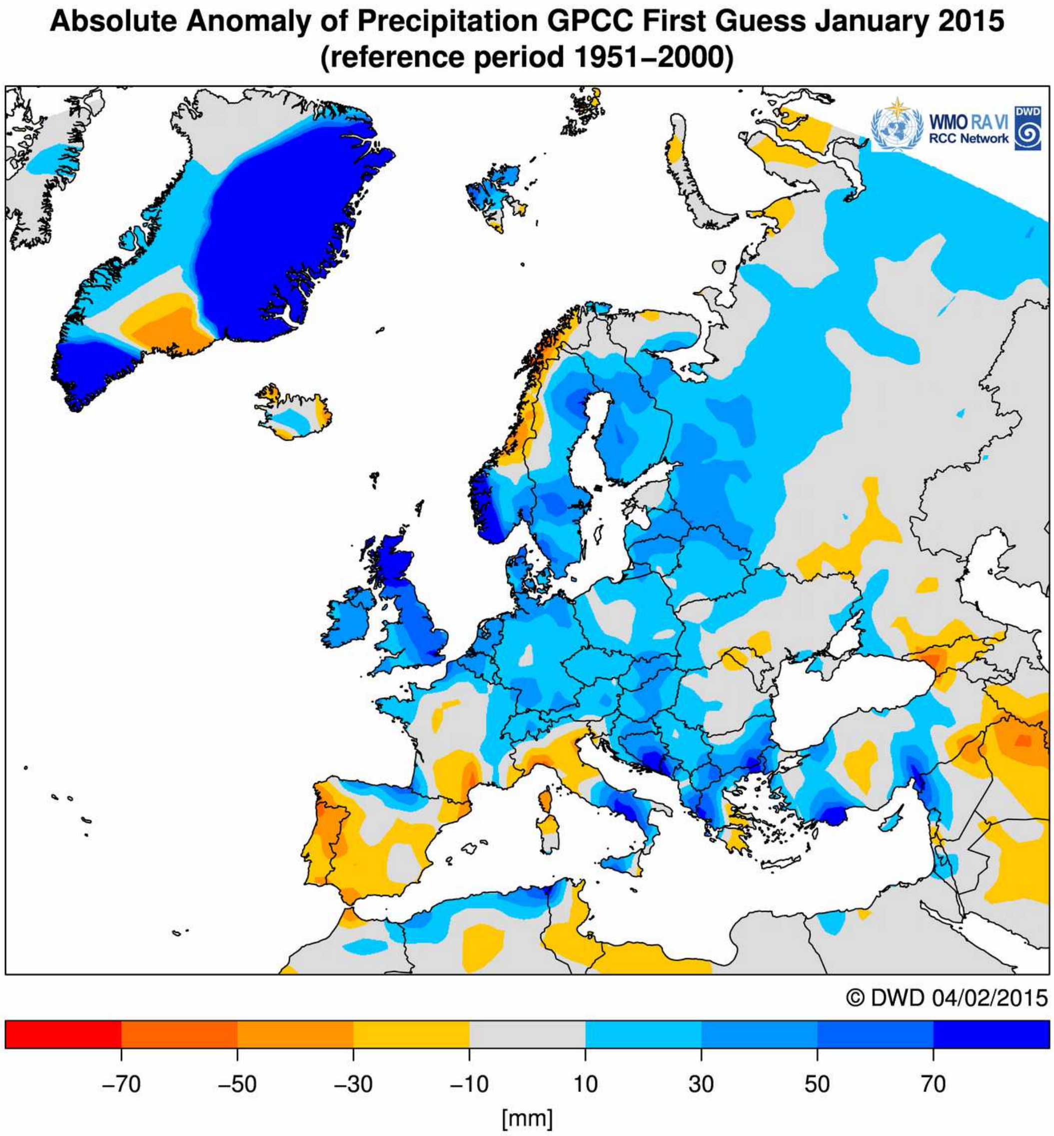


fig.I.2.5: Left: Absolute anomaly (1951-2000 reference) of precipitation in the RA VI Region (Europe), data from GPCC (Global Precipitation Climatology Centre), http://www.dwd.de/rcc-cm. Right: Percentiles of precipitation, 1981-2010 reference. Data from NOAA Climate Prediction Center, http://iridl.ldeo.columbia.edu/maproom/Global/Precipitation/Percentiles.html

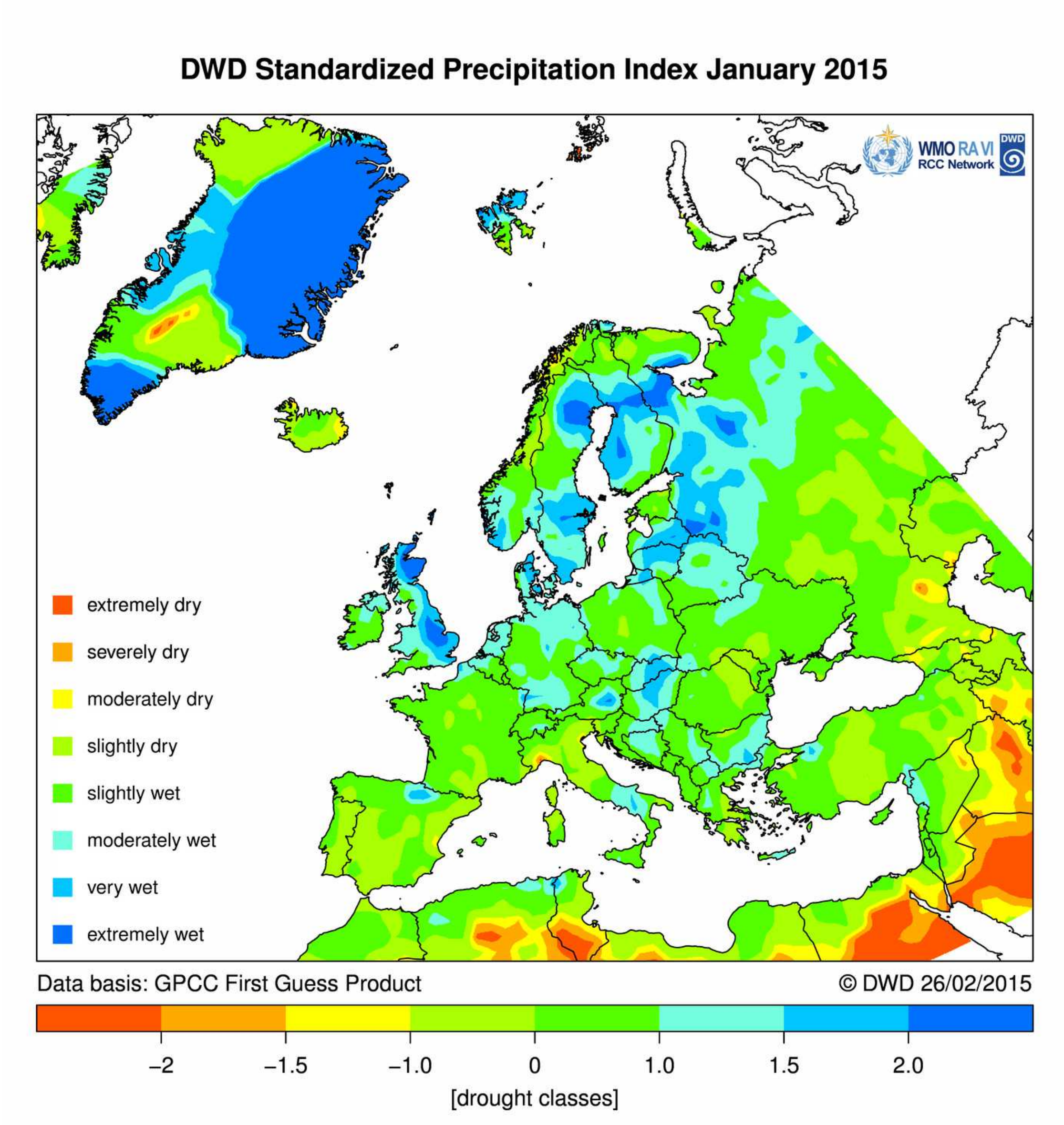


fig. I.2.5a: Standardized Precipitation Index with DWD modification (DWD-SPI), http://www.dwd.de/rcc-cm .

Monthly mean precipitation anomalies in European subregions. Subregions refer to ECMWF land boxes defined in Annex III.3. Anomalies are based on gridded data from GPCC First Guess Product, ftp://ftp-anon.dwd.de/pub/data/gpcc/PDF/GPCC_intro_products_2008.pdf, 1951-2000 reference.

Subregion	Absolute anomaly	Relative of 1951-2000 normal	SPI DWD Drought Index
Northern Europe	+ 36.3 mm	155.7 %	+ 1.119
Southern Europe	+ 9.4 mm	113.6 %	+ 0.412

I.2.c Temperature

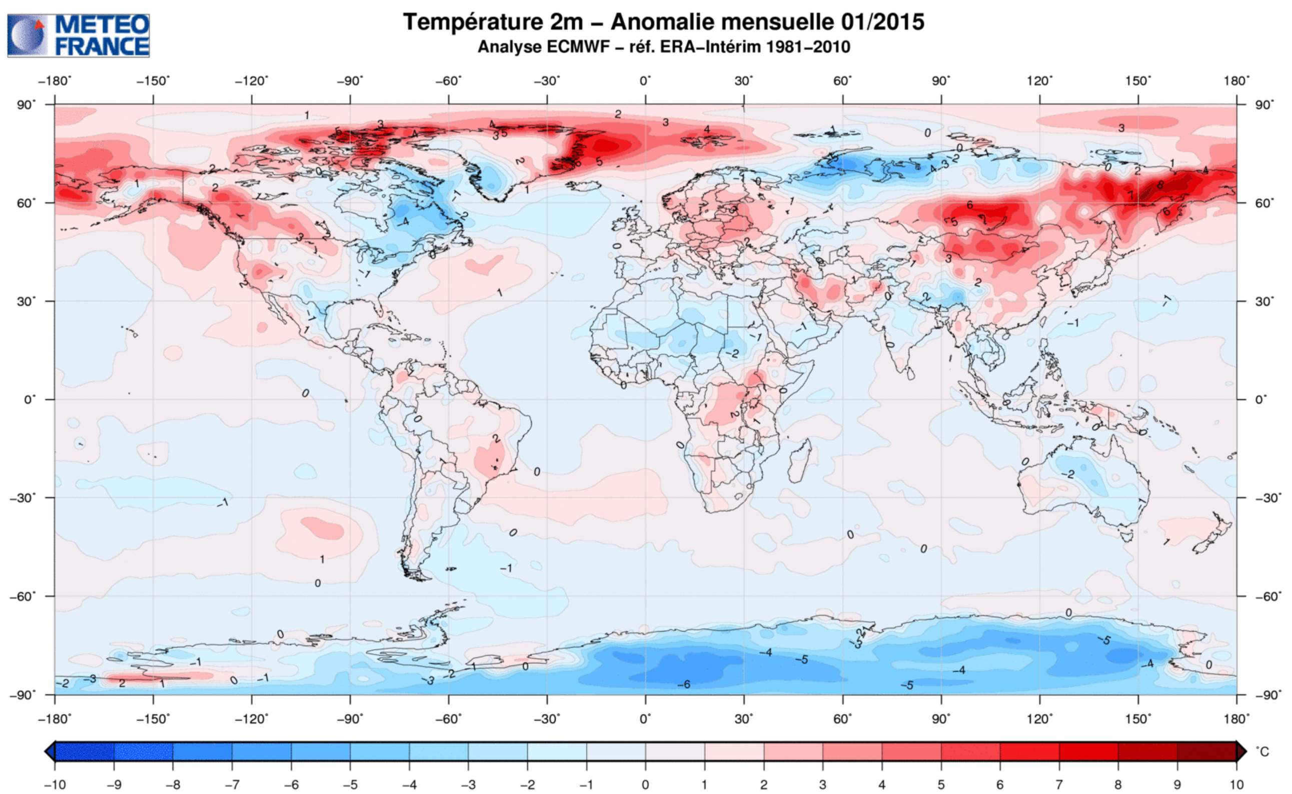


fig.I.2.6: Temperature Anomalies (°C) (Meteo-France)

<u>On Europe</u> :

In January, weak cold anomaly over the Iberian Peninsula. Warm anomaly eslewhere, especially over Nothern and Eastern Europe.

<u>**Elsewhere :**</u>

Warm anomaly on Western Canada and USA, cold anomaly on Eastern Canada

Warm anomaly on China, Mongolia, southern and eastern Siberia. Very strong in the center of the Siberia.

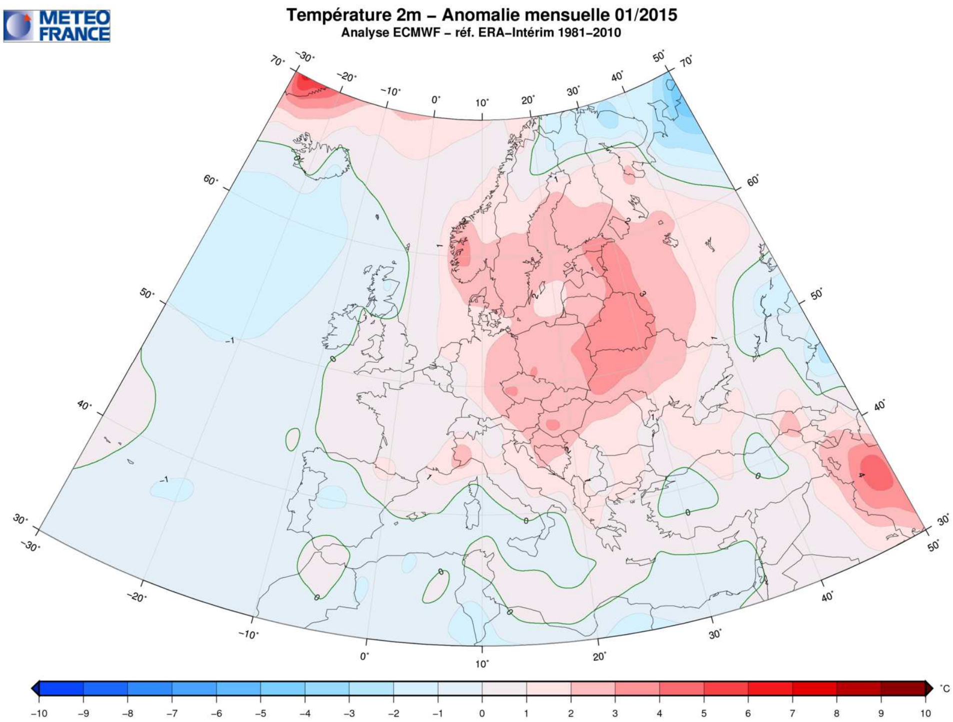
Cold anomaly on Australia.

Cold anomaly over Saharan Africa. Warm anomaly over the South of Africa and the Middle East.

Warm anomaly in Brazil.

<u>Temperature anomalies in Europe:</u>

Warm anomaly in northern and middle latitudes of Europe, weak cold anomaly in Iberia and also partly cold in Turkey, very typical feature of a winter NAO pattern.



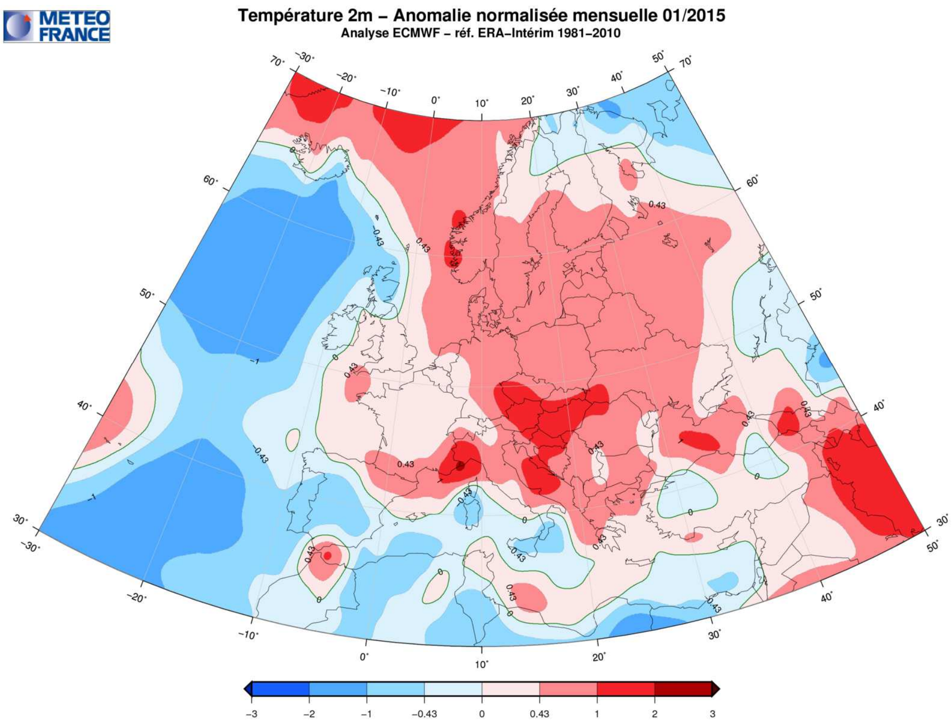


fig.I.2.7: Left graph: Absolute anomaly of temperature in the RA VI Region (Europe). Right graph: Standardized temperature anomalies

Monthly mean temperature anomalies in European subregions: Subregions refer to ECMWF land boxes defined in Annex III.3. Anomalies are based on gridded CLIMAT data from DWD, http://www.dwd.de/rcc-cm, 1961-1990 reference.

Subregion	Anomaly
Northern Europe	+ 2.5 °C
Southern Europe	+ 1.1 °C

I.2.d Sea ice

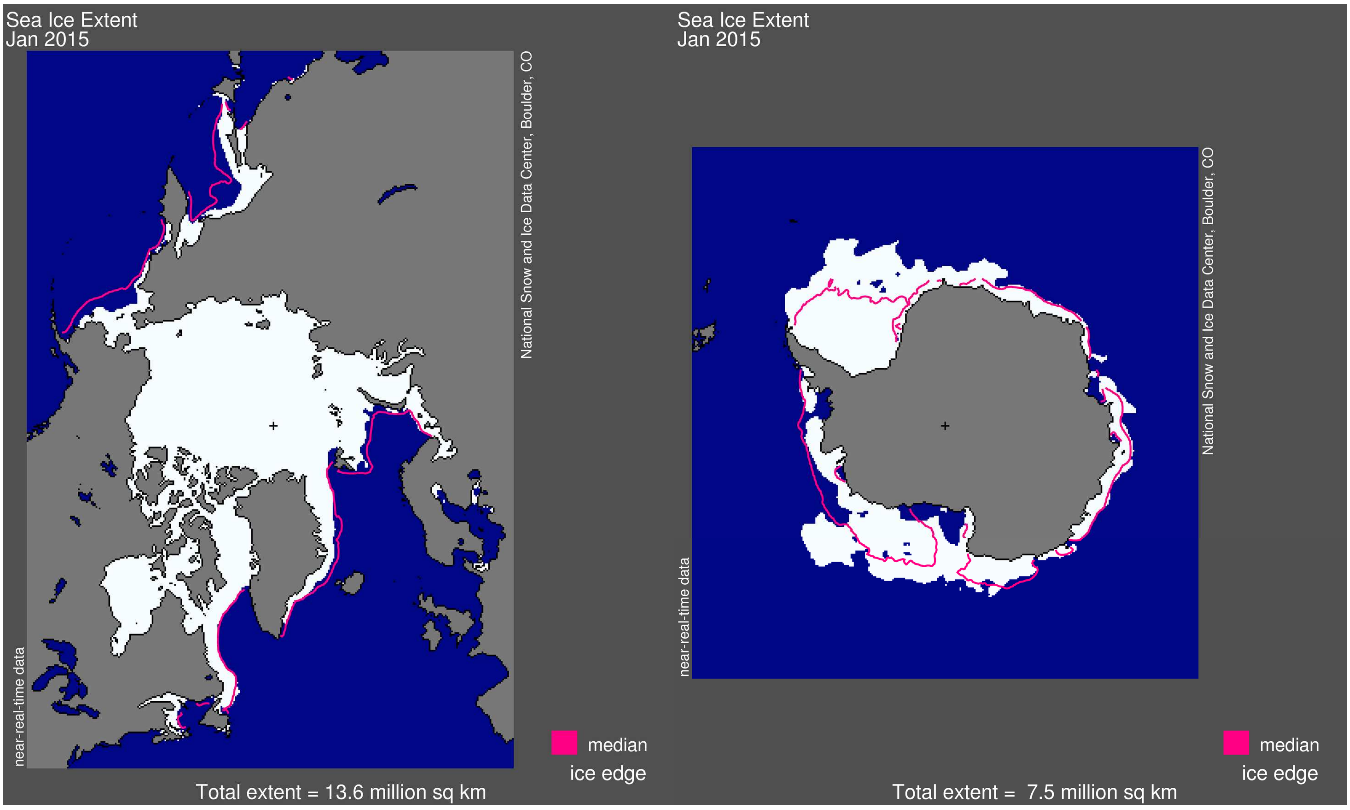


fig.I.2.6: Sea-Ice extension in Arctic (left), and in Antarctic (right). The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

In Arctic (fig. 1.2.6 and 1.2.7 - left) : below normal sea-ice, mainly on the Pacific side.
In Antarctic (fig. 1.2.6 and 1.2.7 - right) : above normal sea-ice extension.

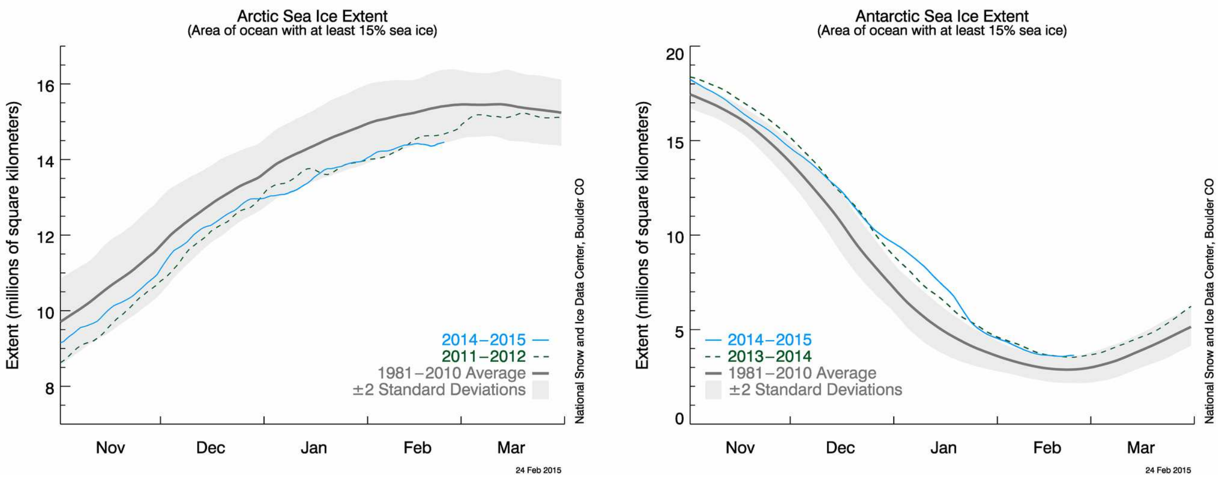


fig. I.2.7 : Sea-Ice extension evolution from NSIDC.
http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png

II. SEASONAL FORECAST FROM DYNAMICAL MODELS

II.1. OCEANIC FORECASTS

II.1.a Sea surface temperature (SST)

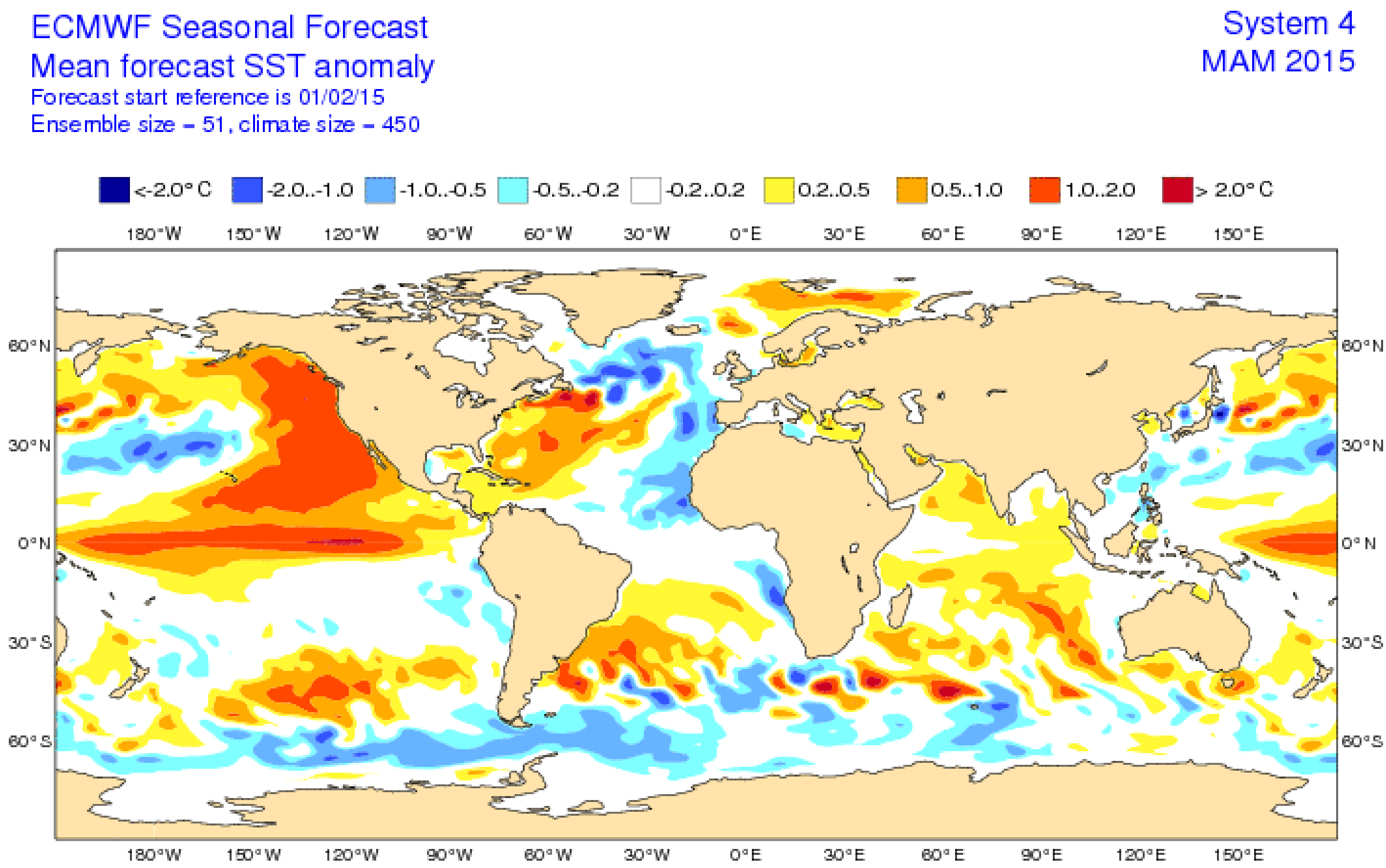


fig.II.1.1: SST anomaly forecast from ECMWF

http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

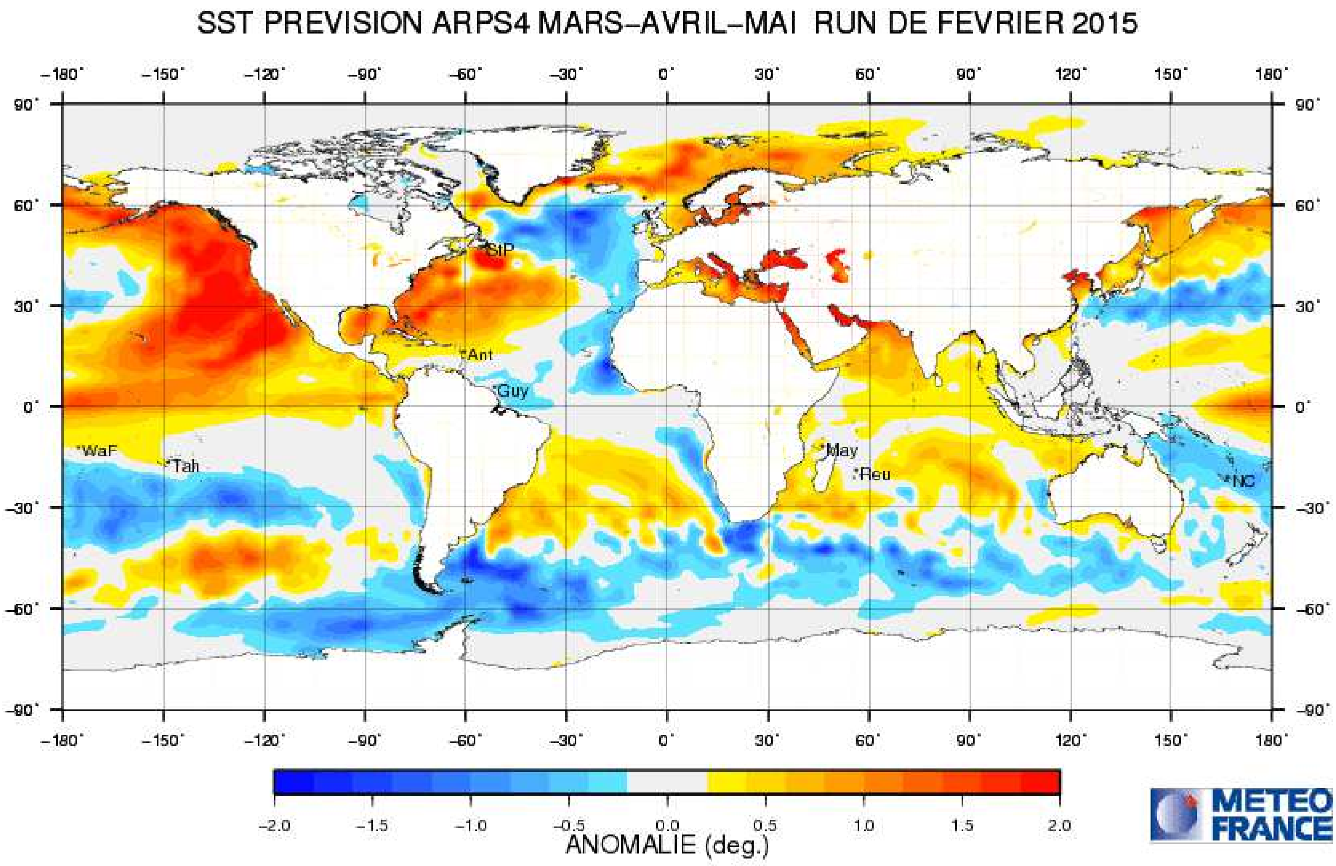


fig.II.1.2: SST Anomaly forecast from Meteo-France (recalibrated with respect of observation). http://elaboration.seasonal.meteo.fr

For the 2 individual models :

Quite good consistency of SST anomaly field between the two models. However, MF is colder than ECMWF in the Southern Pacific.

The MAM forecast maintains a great continuity with the analysis of previous months.

Little change expected in particular in the Pacific equatorial waveguide for the next 3 months. Strong persistent PDO structure.

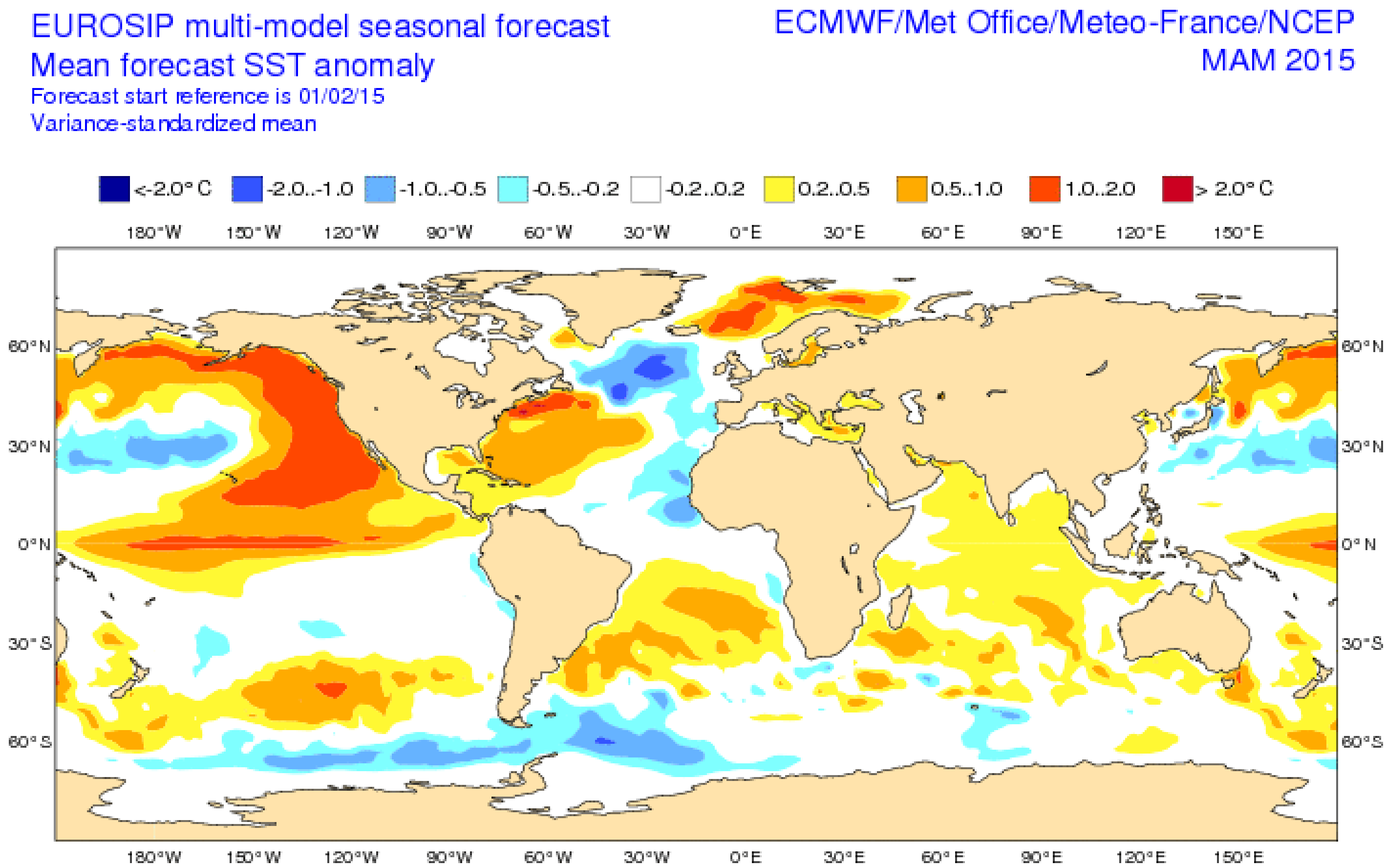


fig.II.1.3: SST Forecasted anomaly from Euro-SIP

II.1.b ENSO forecast :

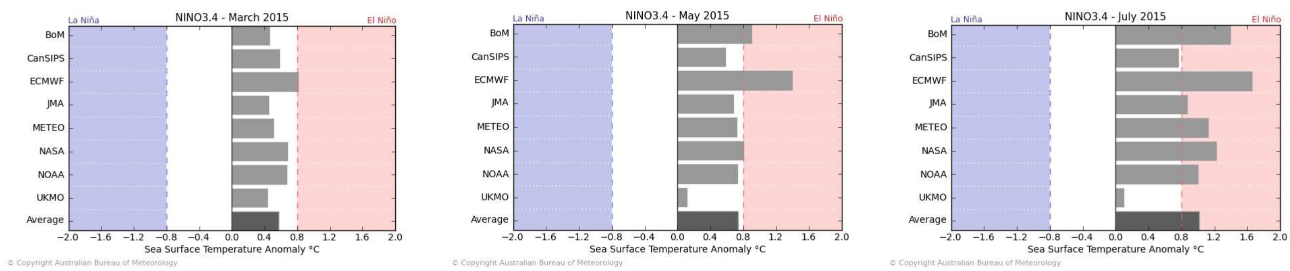


fig.II.1.4: Synthesis of Niño 3.4 forecasts (120° to 165°W) by IRI :

http://iri.columbia.edu/climate/ENSO/currentinfo/SST_table.html

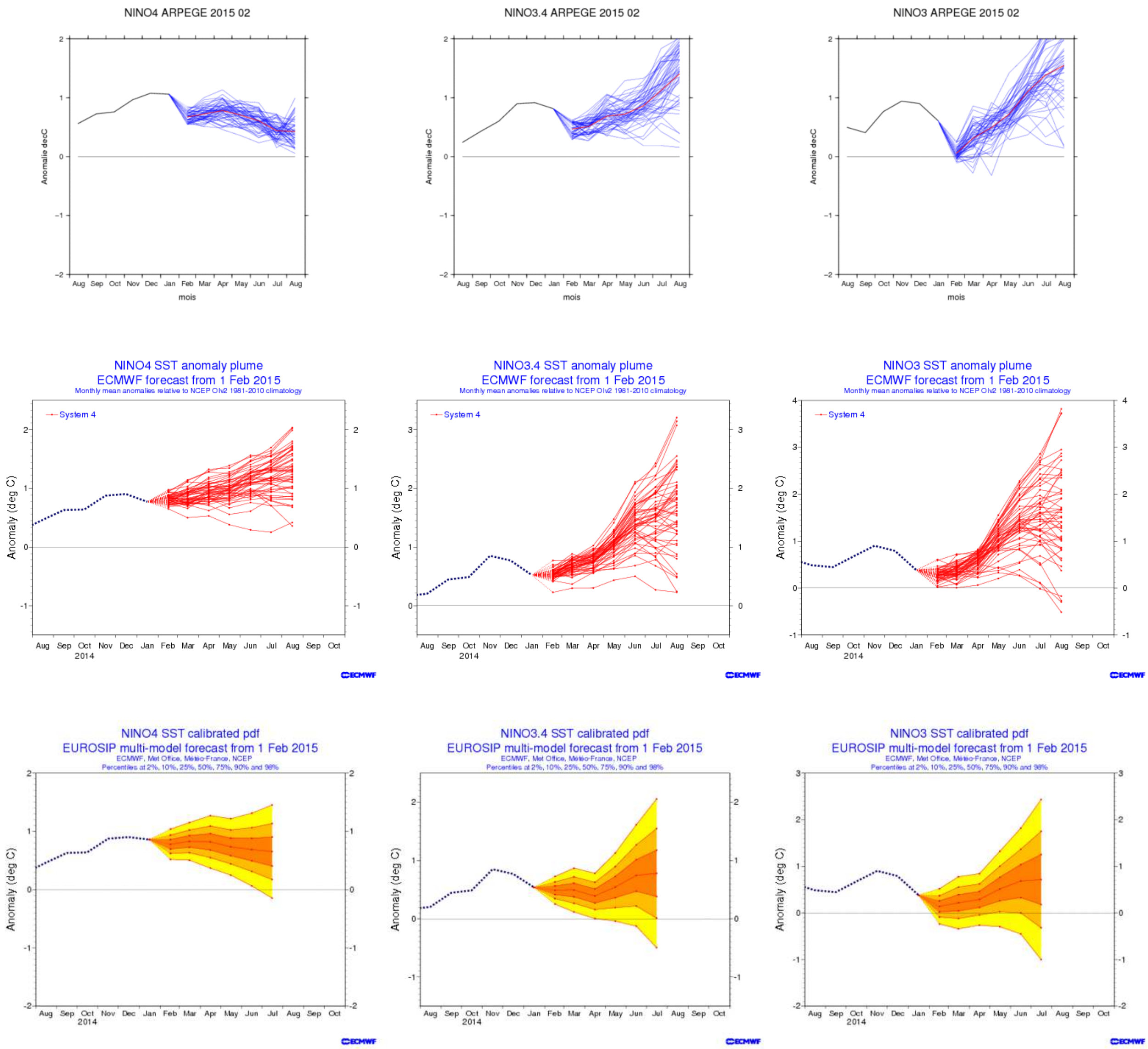


fig.II.1.5: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members - and EuroSIP (bottom) – recalibrated distributions - (http://elaboration.seasonal.meteo.fr , http://www.ecmwf.int/)

Due to the good models consistency In the Equatorial Pacific Ocean, the EUROSIP plume diagram spread for Nino3.4 box is weak for the next 3 months.

The anomaly in Nino3.4 box should continue in weakly positive values just below the threshold of +0.5°C. Possible beginning of a warming at quarter end but the dispersion of runs also becomes more important.

Conclusion : Neutral conditions.

I.1.c Atlantic ocean forecasts

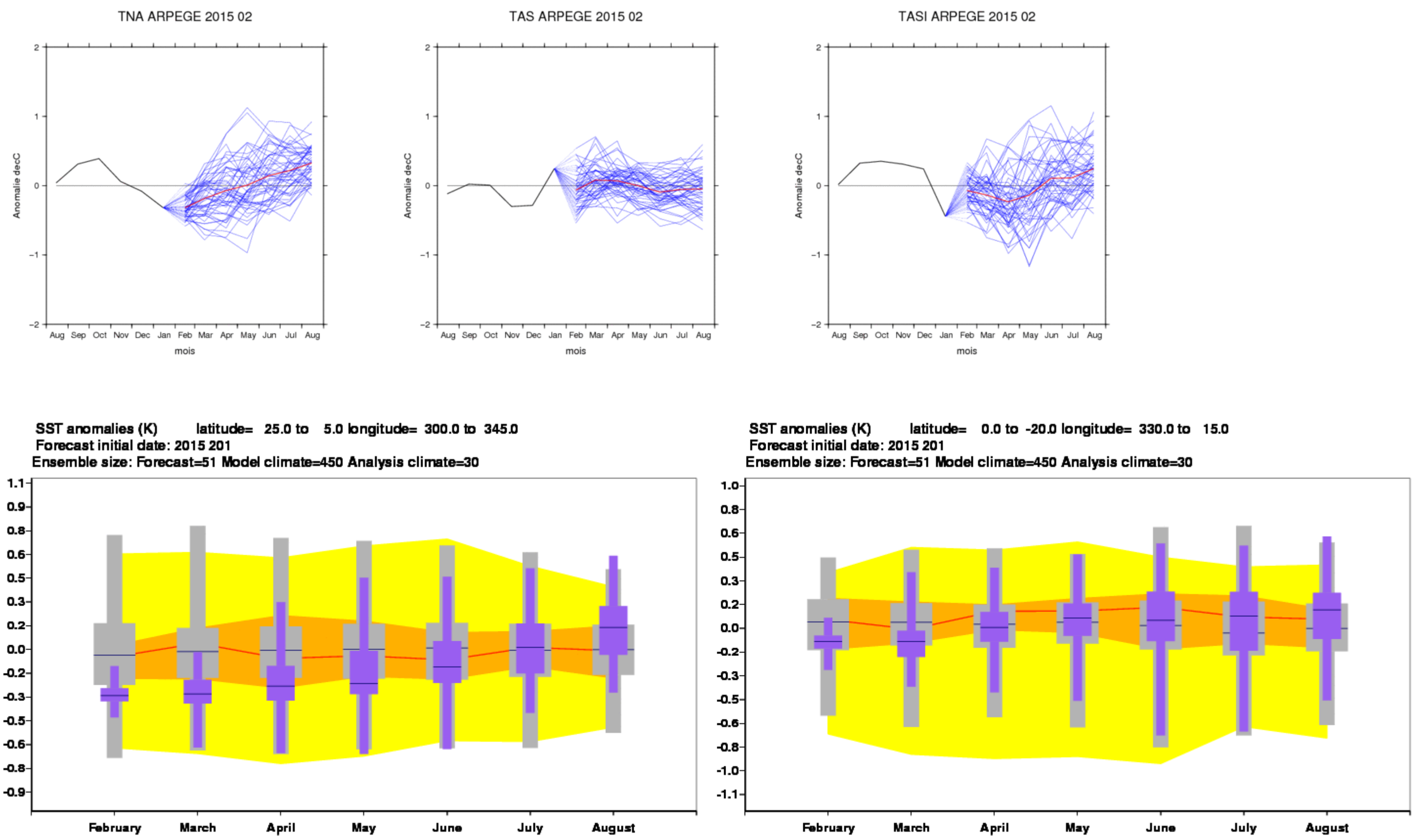
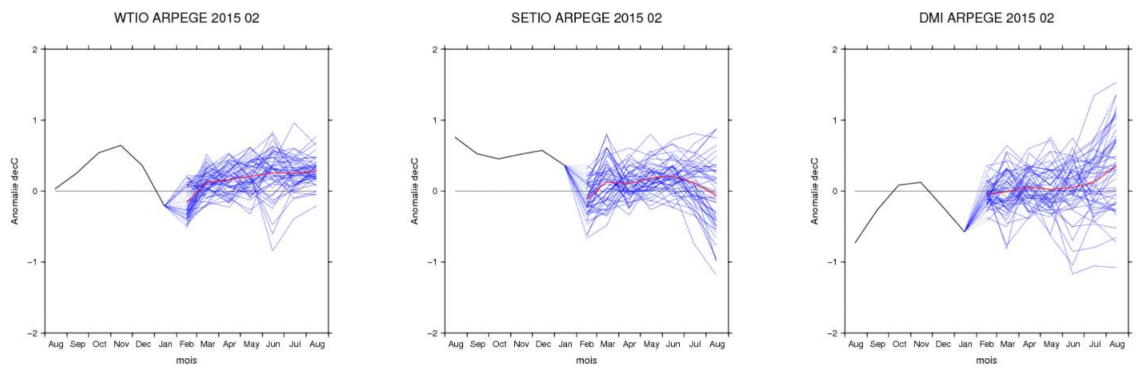


fig.II.1.6: SSTs anomaly forecasts in the Atlantic Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

I.1.d Indian ocean forecasts



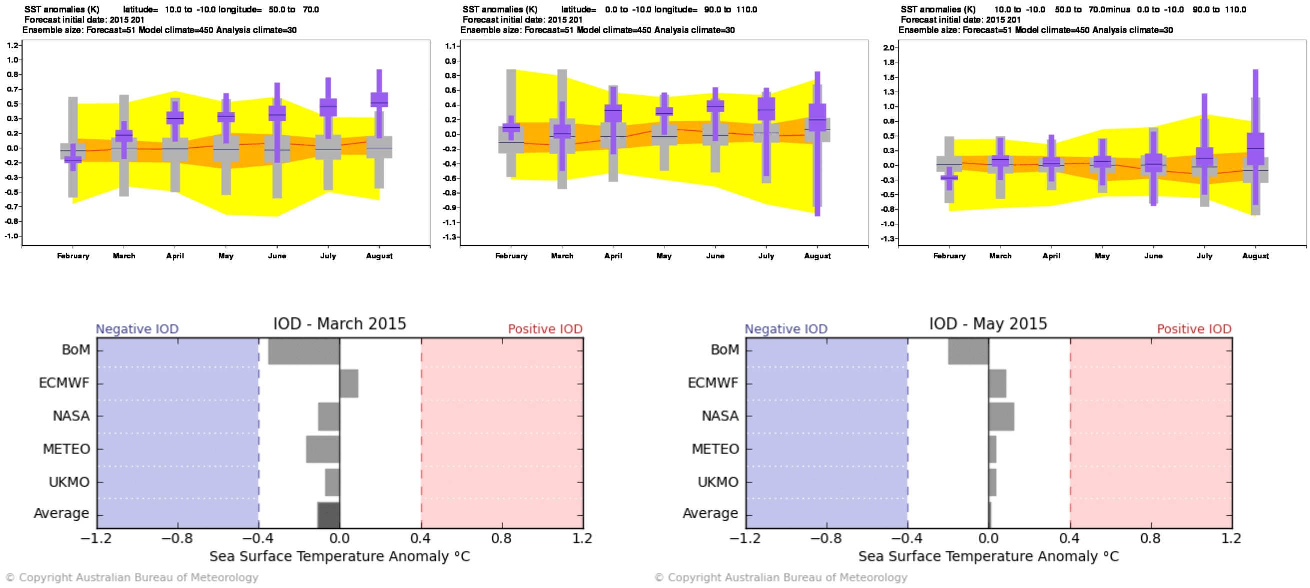


fig.II.1.7: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

DMI (IOD) : close to neutral

II.2. GENERAL CIRCULATION FORECAST

II.2.a Global forecast

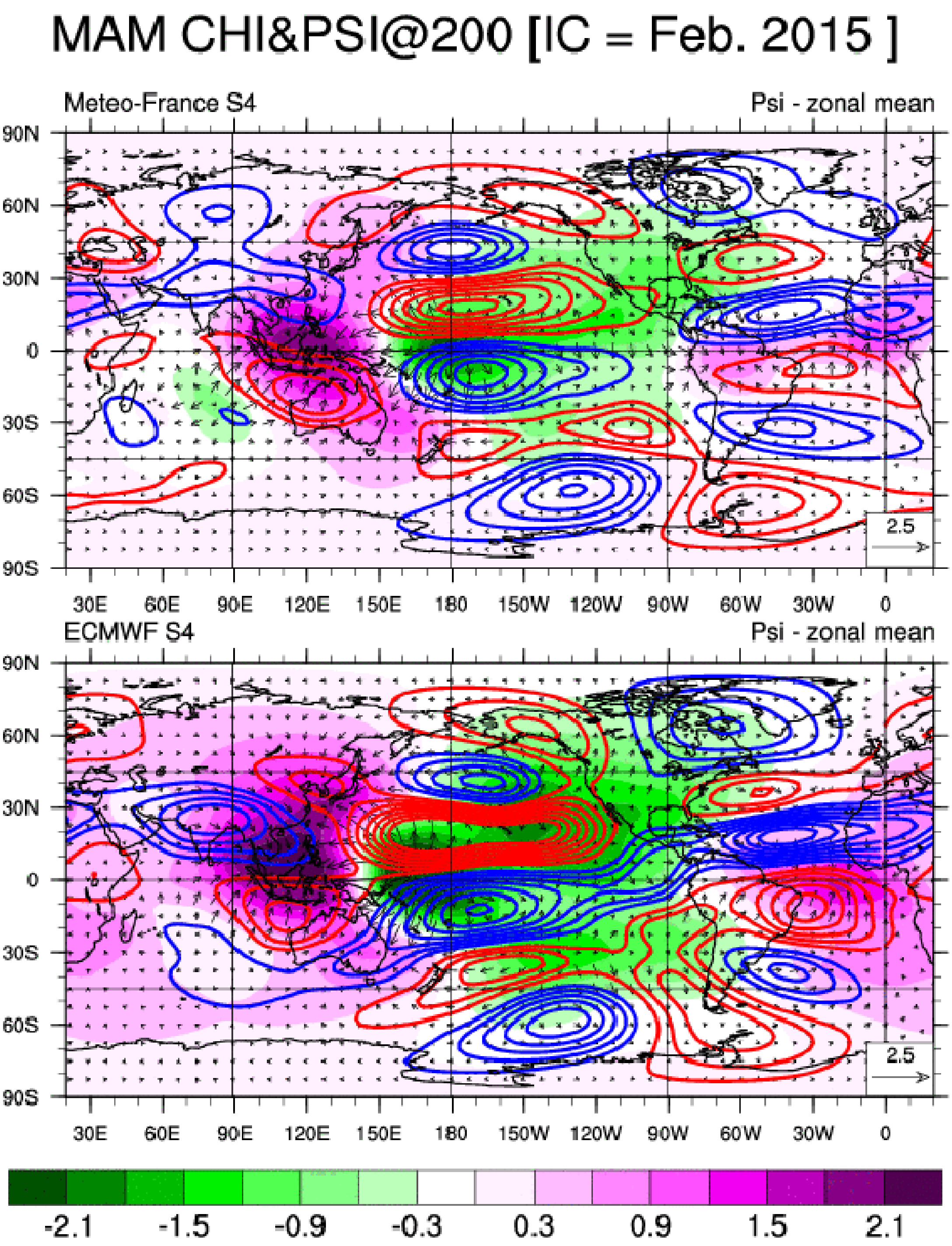


fig.II.2.1: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), associated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa by Météo-France (top) and ECMWF (bottom).

Quite good consistency between ECMWF and MF models.

Velocity potential anomaly field (cf. fig. II.2.1 – insight into Hadley-Walker circulation anomalies) :

In line with previous months, wide upward motion area forecasted over the Pacific with maximum intensity over western basin. Strong downward motion area on Maritime Continent.
Downward motion area forecasted on the Atlantic, and a part of South America and Africa. This zone is wider in ECMWF forecasts.

Stream Function anomaly field (cf. fig. 19 – insight into teleconnection patterns tropically forced) :

In the Pacific Ocean, teleconnection pattern of PNA type, onto Canada.

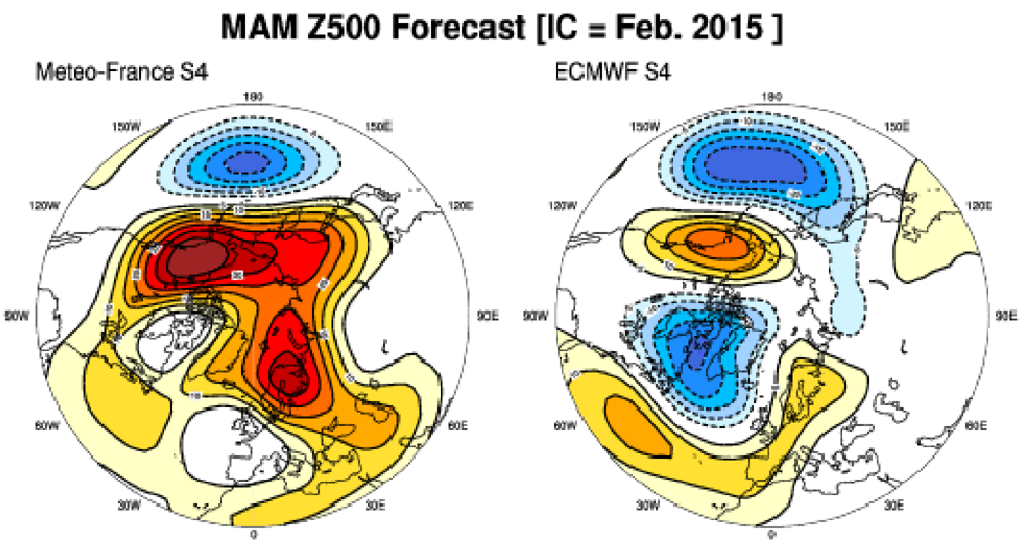
In the Atlantic, a teleconnection is also forecasted with active patterns Westward.

Europe is far from action centres. The 2 models agree the first month with an anticyclonic anomaly, but diverge significantly afterward. On average over the quarter, they are very different for this area.

II.2.b North hemisphere forecast and Europe

Geopotential height anomalies (fig. 20 – insight into mid-latitude general circulation anomalies) :

Big difference this month between ECMWF and MF models regarding Europe and more generally concerning anomaly intensities expected for North hemisphere.



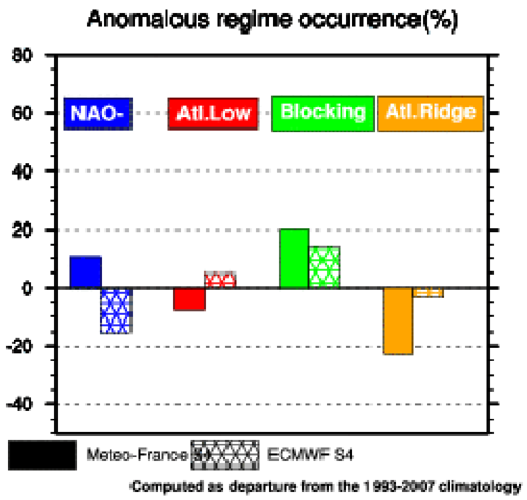


fig.II.2.2: Anomalies of Geopotential Height at 500 hPa from Météo-France (left) and ECMWF (right). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip

fig.II.2.3: North Atlantic Regime occurrence anomalies from Meteo-France and ECMWF : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.

North Atlantic Circulation Regimes (fig. 21) :

Forecasted regime occurrence anomalies are quite different. MF promotes NAO- while ECMWF does the opposite. Both forecasts more Scandinavian blocking than normal.

II.3. IMPACT: TEMPERATURE FORECASTS

II.3.a ECMWF

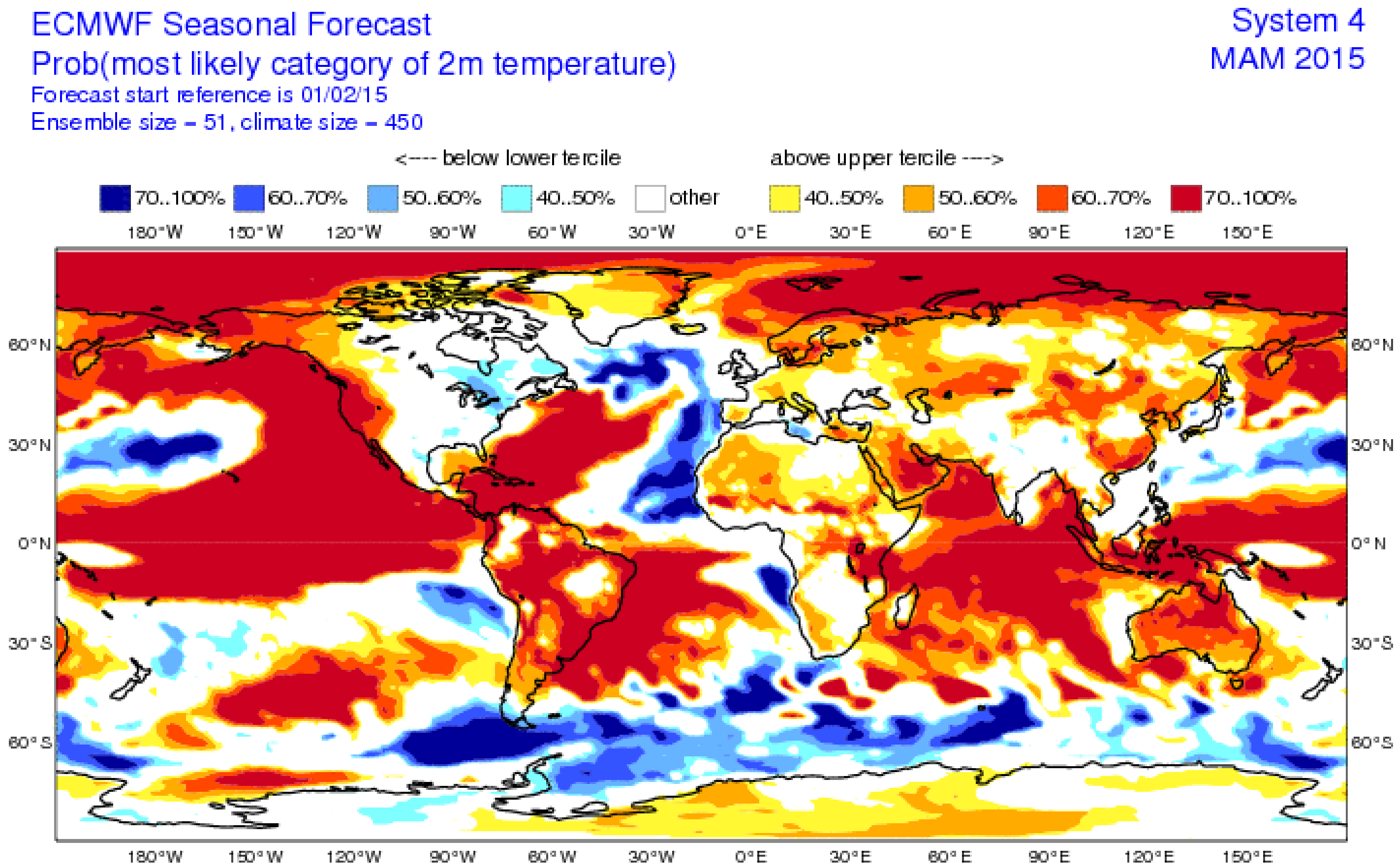


fig.II.3.1: Most likely category probability of T2m from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).

http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seaso...

II.3.b Météo-France

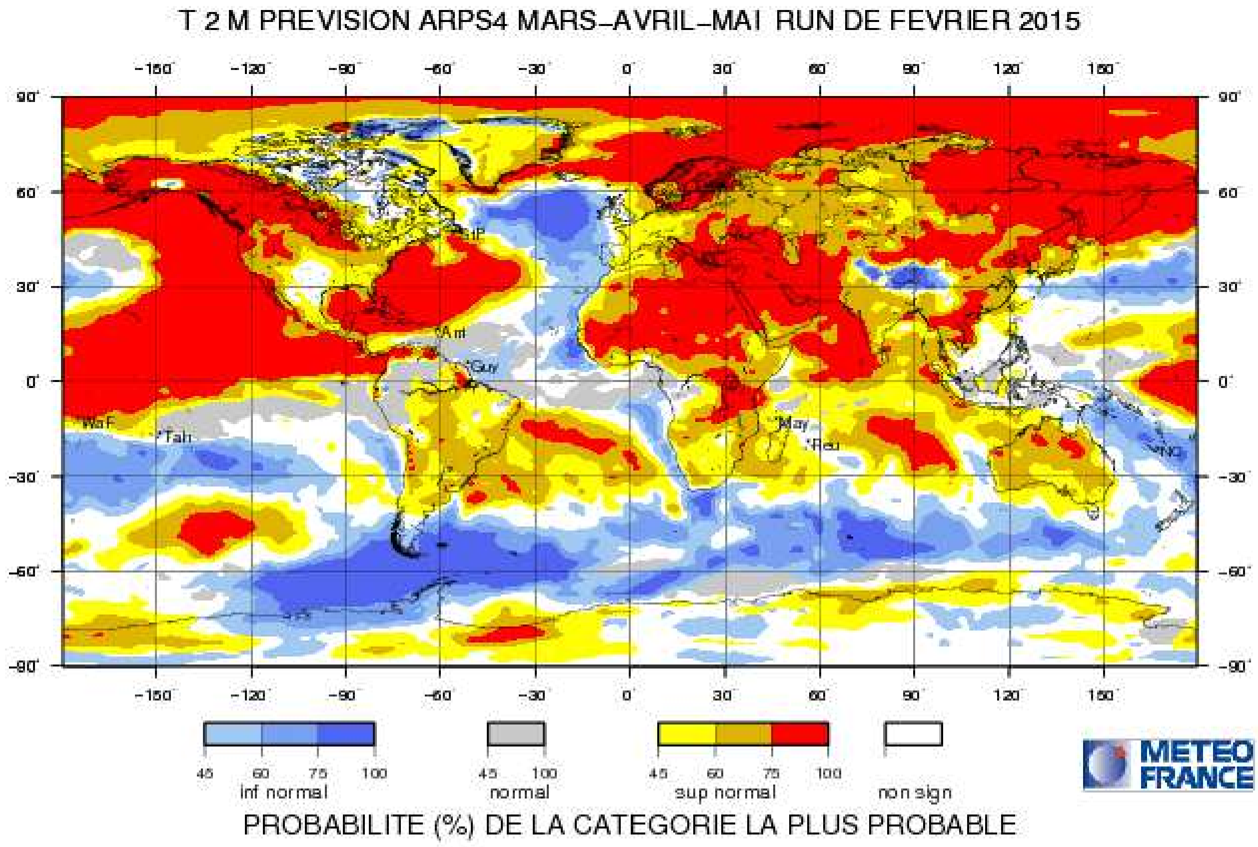


fig.II.3.2: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.3.e Japan Meteorological Agency (JMA)

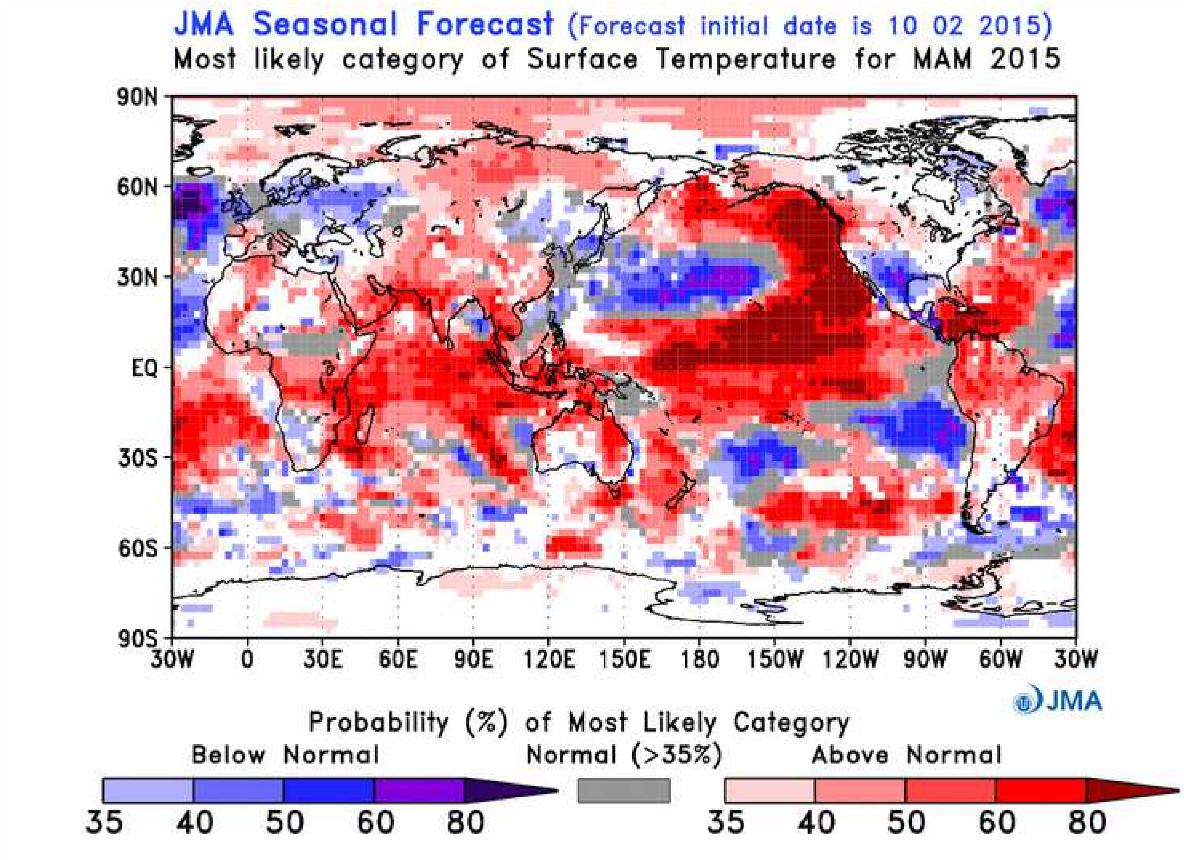


fig.II.3.5: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.

http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.php

II.3.g EUROSIP

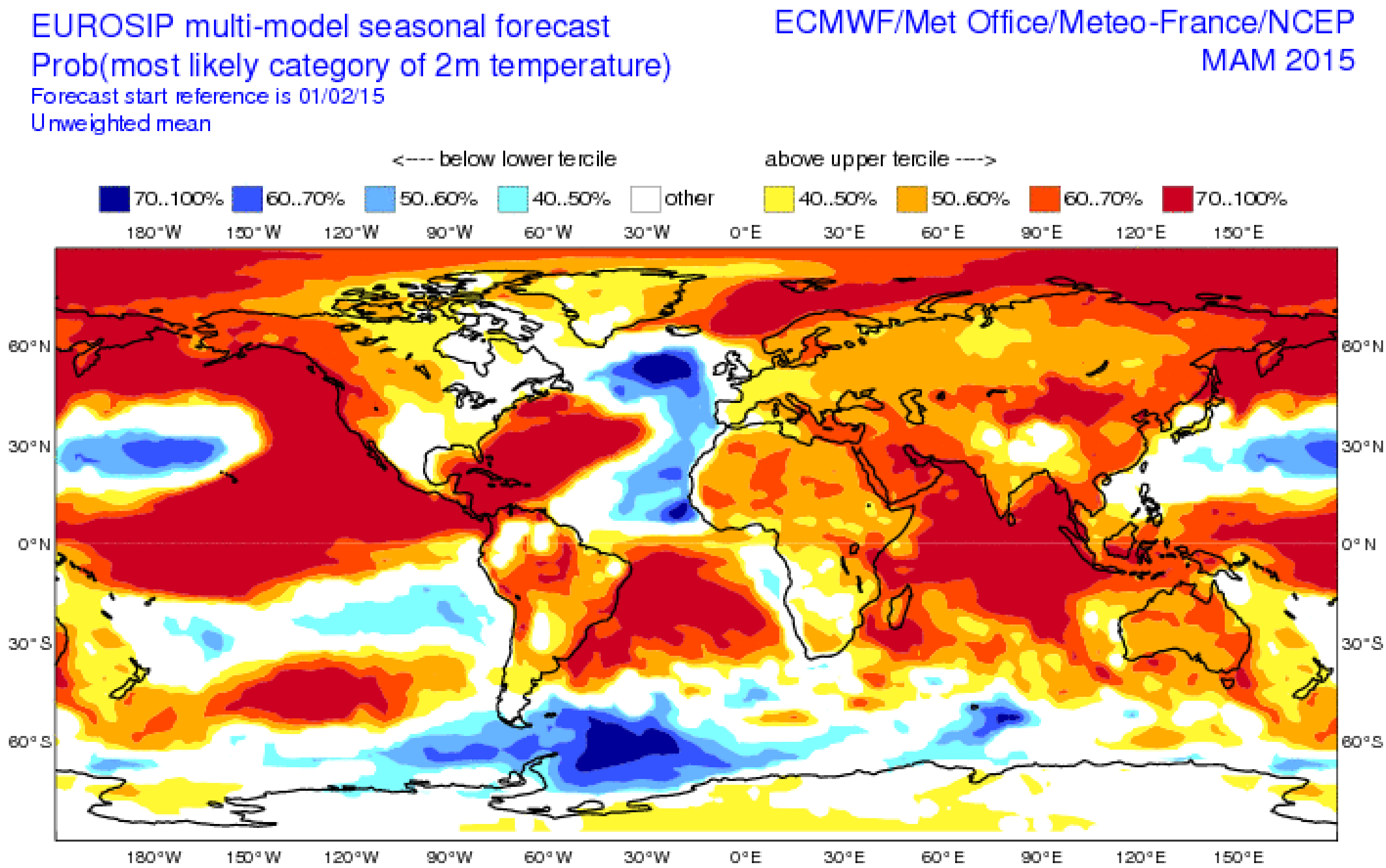


fig.II.3.7: Multi-Model Probabilistic forecasts for T2m from EuroSip (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmv2/param_euro/seasonal_charts_2tm/

On Europe : weakly enhanced probabilities for warm anomalies likely linked with climate change.

Elsewhere : generally enhanced probabilities for warm anomalies.
Exceptions : few areas over oceans have enhanced probabilities for cold anomalies in connect with cold SST (Southern Pacific, centre of northern Pacific et Eastern North Atlantic). Over lands, no signal or near normal in half East of North America and the South of Africa

II.4. IMPACT : PRECIPITATION FORECAST

II.4.a ECMWF

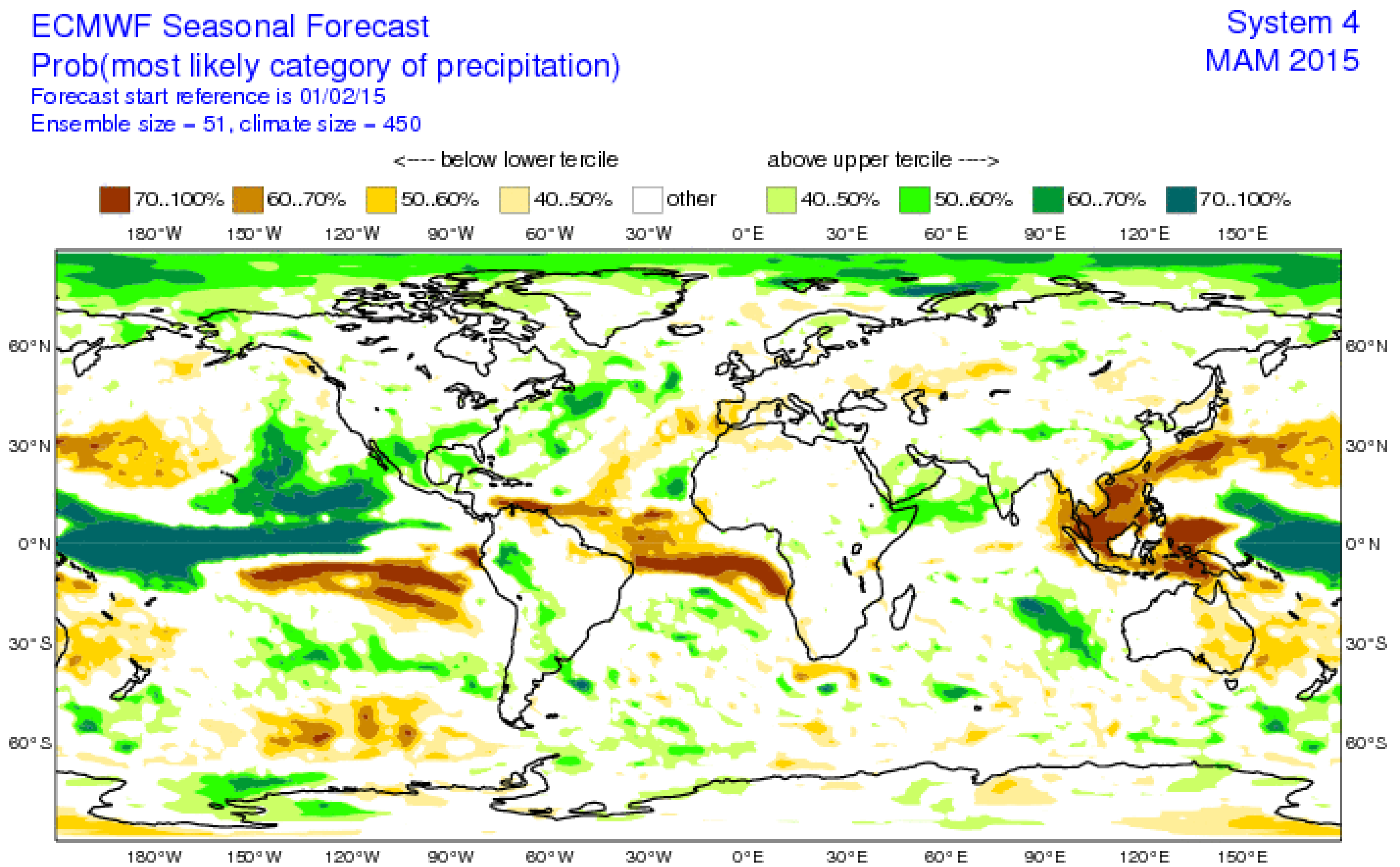


fig.II.4.1: Most likely category probability of rainfall from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

II.4.b Météo-France

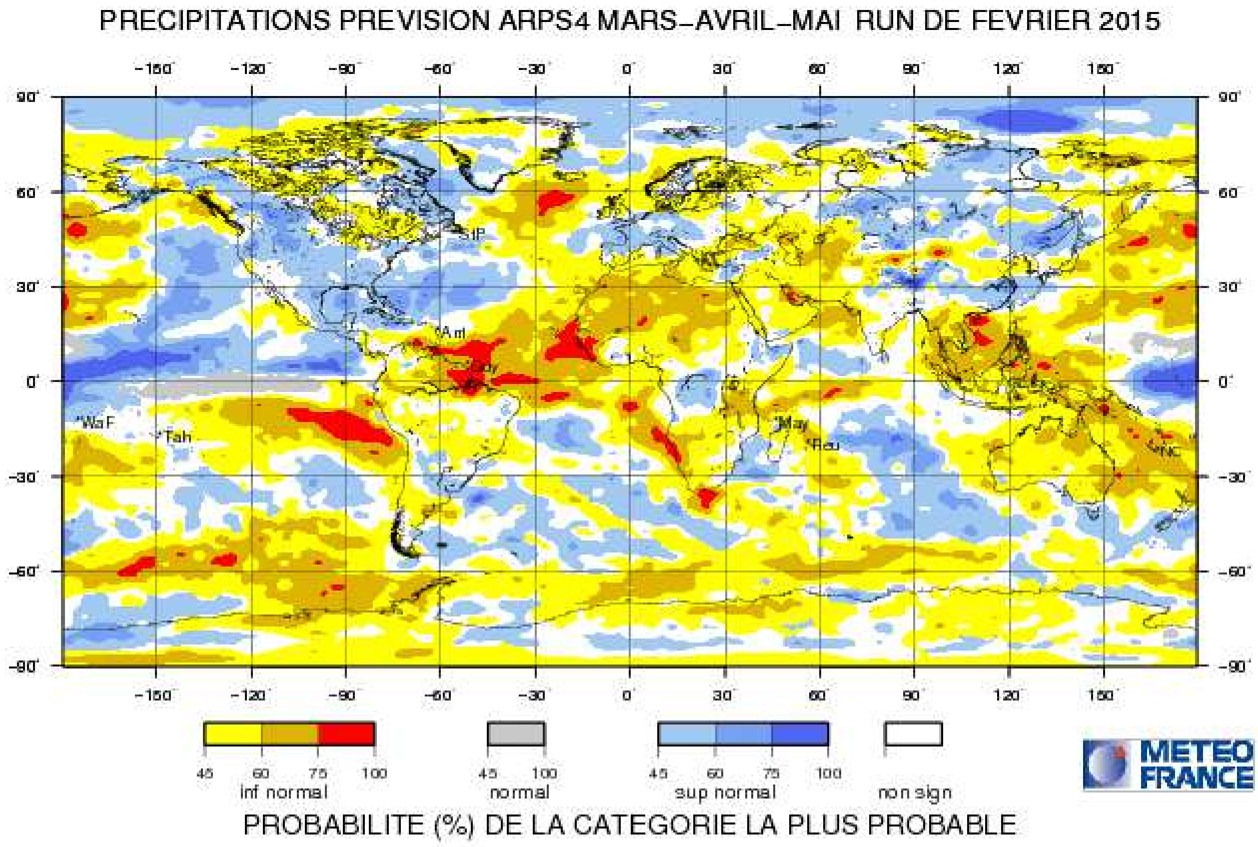


fig.II.4.2: Most likely category of Rainfall. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.e Japan Meteorological Agency (JMA)

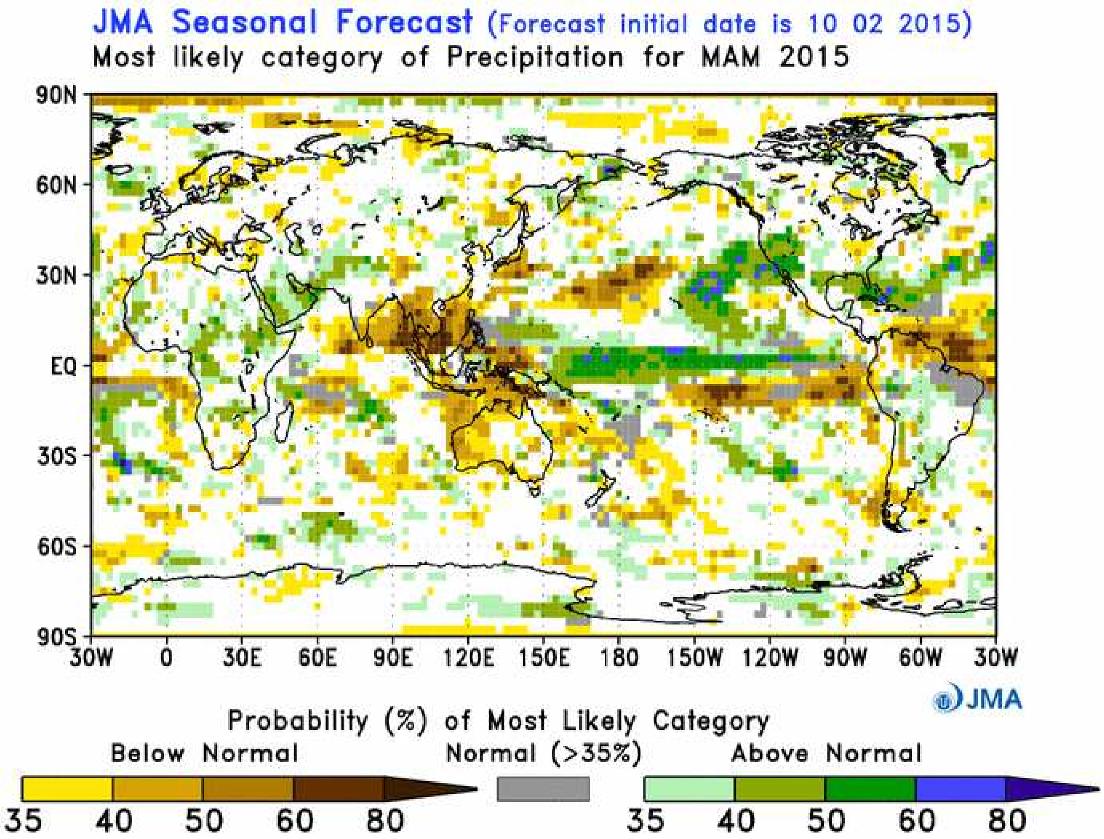


fig.II.4.5: Most likely category of Rainfall from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.

http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.php

II.4.g EUROSIP

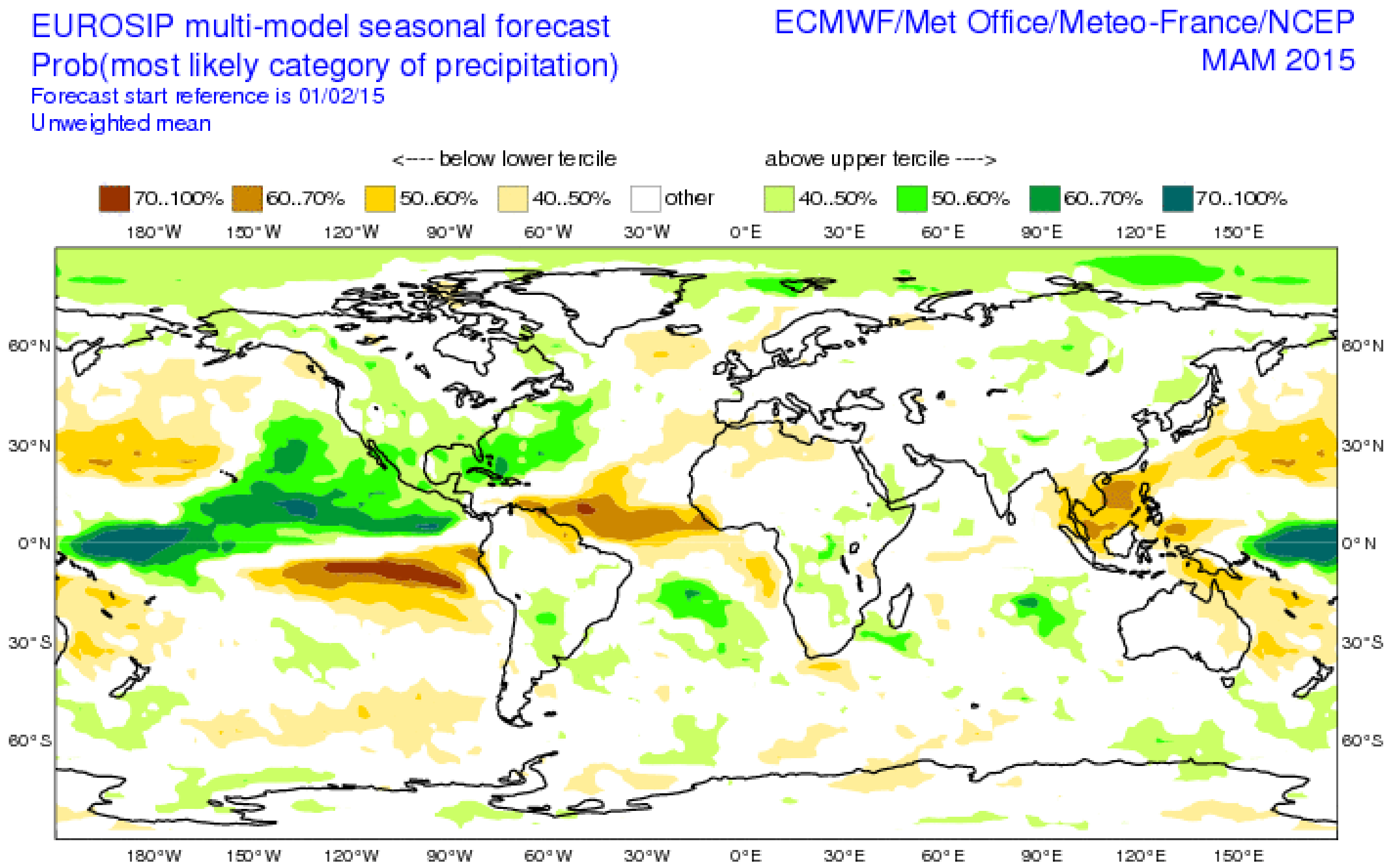


fig.II.4.7: Multi-Model Probabilistic forecasts for precipitation from EuroSip (2 Categories, Below and Above normal – White zones correspond to No signal).

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

On Europe : no signal

On North America : enhanced probabilities for a wet scenario.

Maritime Continent : enhanced probabilities for a dry anomaly in connection with downward motion anomaly.

Pacific Ocean : form equatorial area of the Western basin to North American coasts, enhanced probabilities for a wet anomaly. Dry anomaly expected in both sides.

Atlantic Ocean : drier than normal in the equatorial area, wetter than normal from Gulf of Mexico to Bermuda and in the middle of South Atlantic.

II.5. REGIONAL TEMPERATURES and PRECIPITATIONS

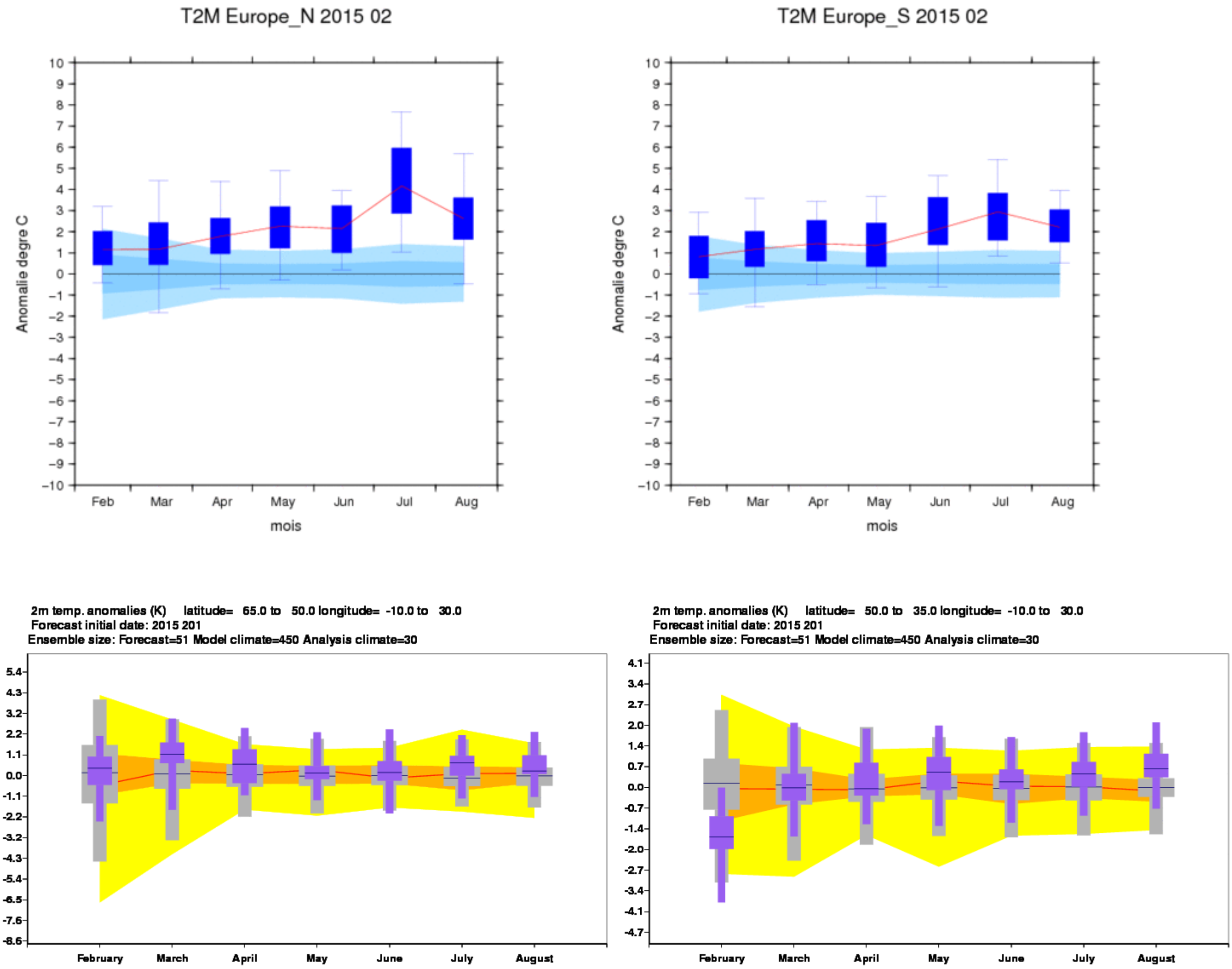


fig.II.5.1 : Climagrams for Temperature in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

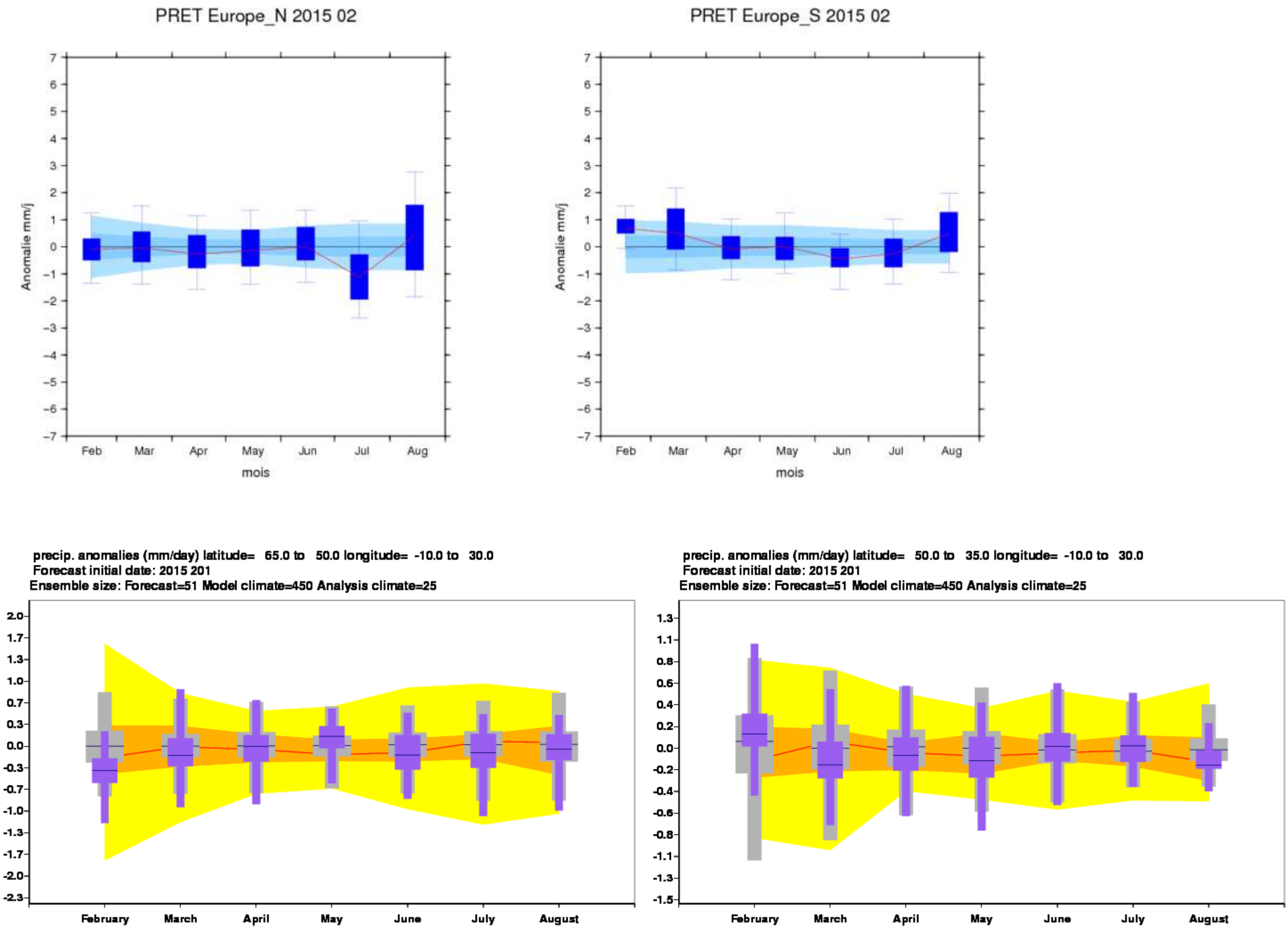


fig.II.5.2 : Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

II.6. MODEL’S CONSISTENCY

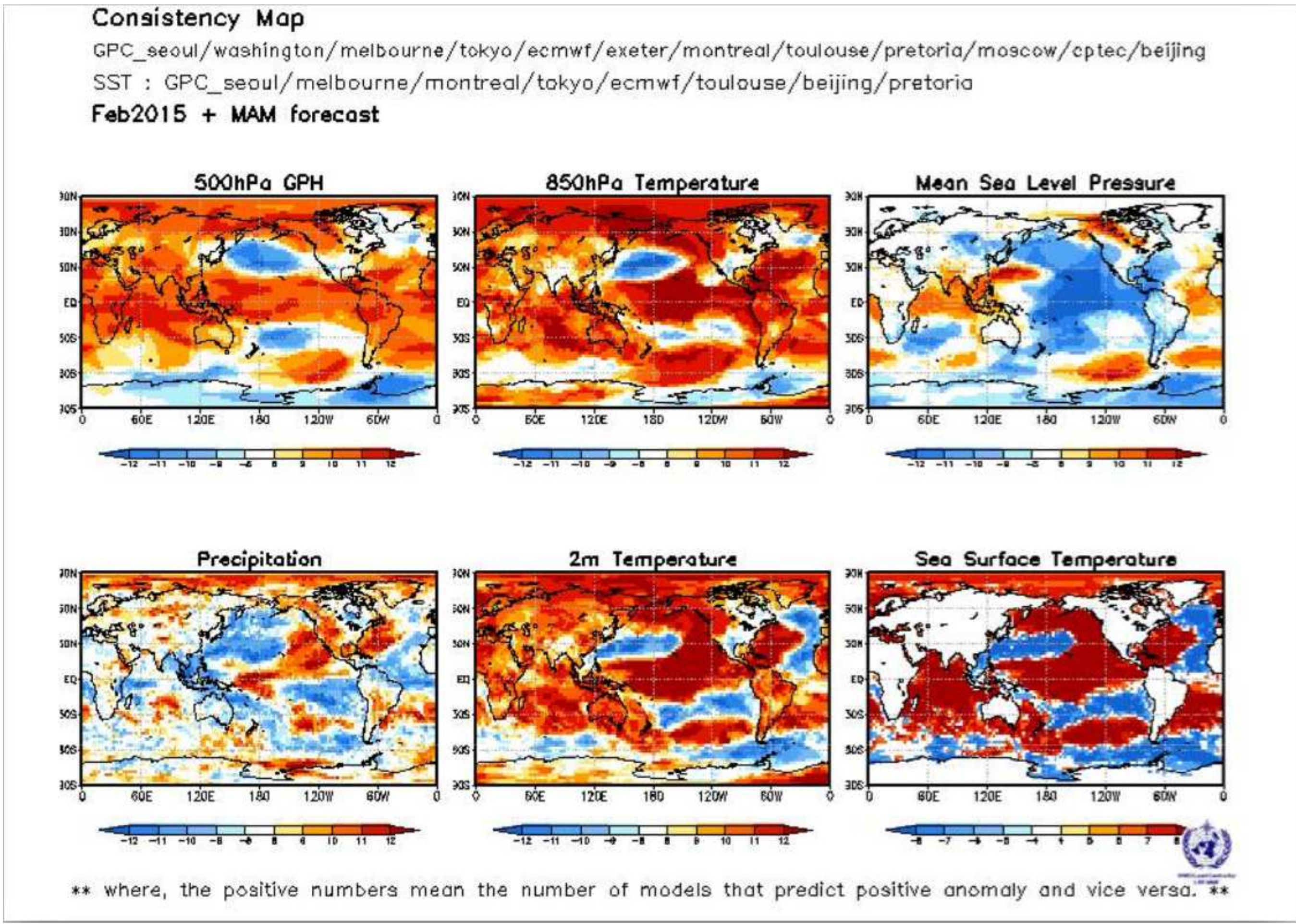


fig.II.6.1 : GPCs Consistency maps from LC-MME http://www.wmolc.org/

For SST : very good consistency between models

For Z500 : good consistency except on Northern Atlantic between Greenland and Europe.

For T2m : quite good consistency except on North-eastern America

For Precipitation : no consistency over Europe, Asia and Africa

II.7. "EXTREME" SCENARIOS

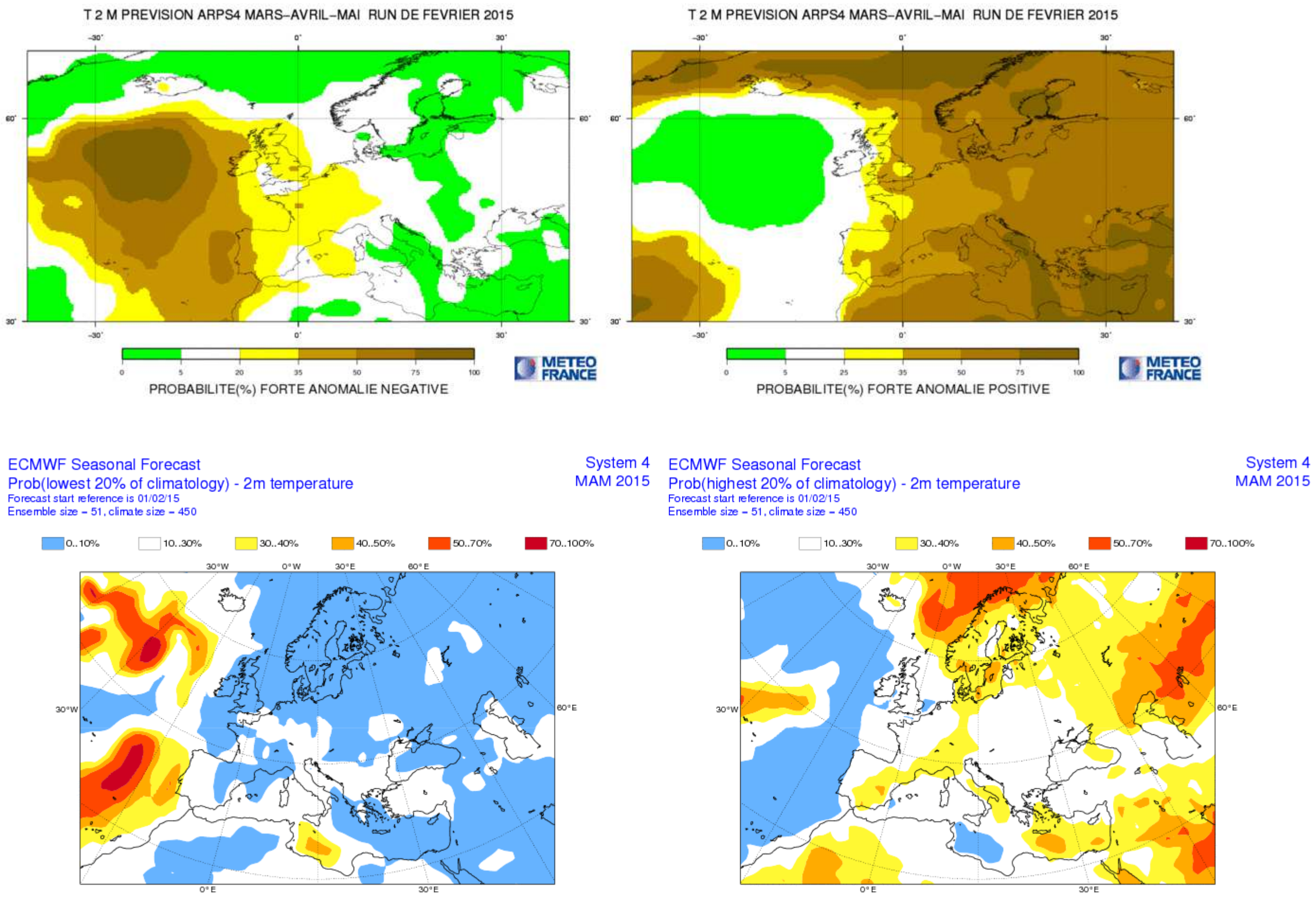


fig.II.7.1 : Top : Meteo-France T2m probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution). Bottom : ECMWF T2m probability of « extreme » below normal conditions (left - lowest ~20% of the distribution) and "extreme" above normal conditions (right – highest ~20% of the distribution).

A slightly higher than normal probability of extreme warm anomaly in western Europe in MF. The warm signal is stronger in the half Eastern Europe.

No clear signal in ECMWF in western Europe, higher than normal probability of warm anomaly in the Eastern and Northern part of Europe.

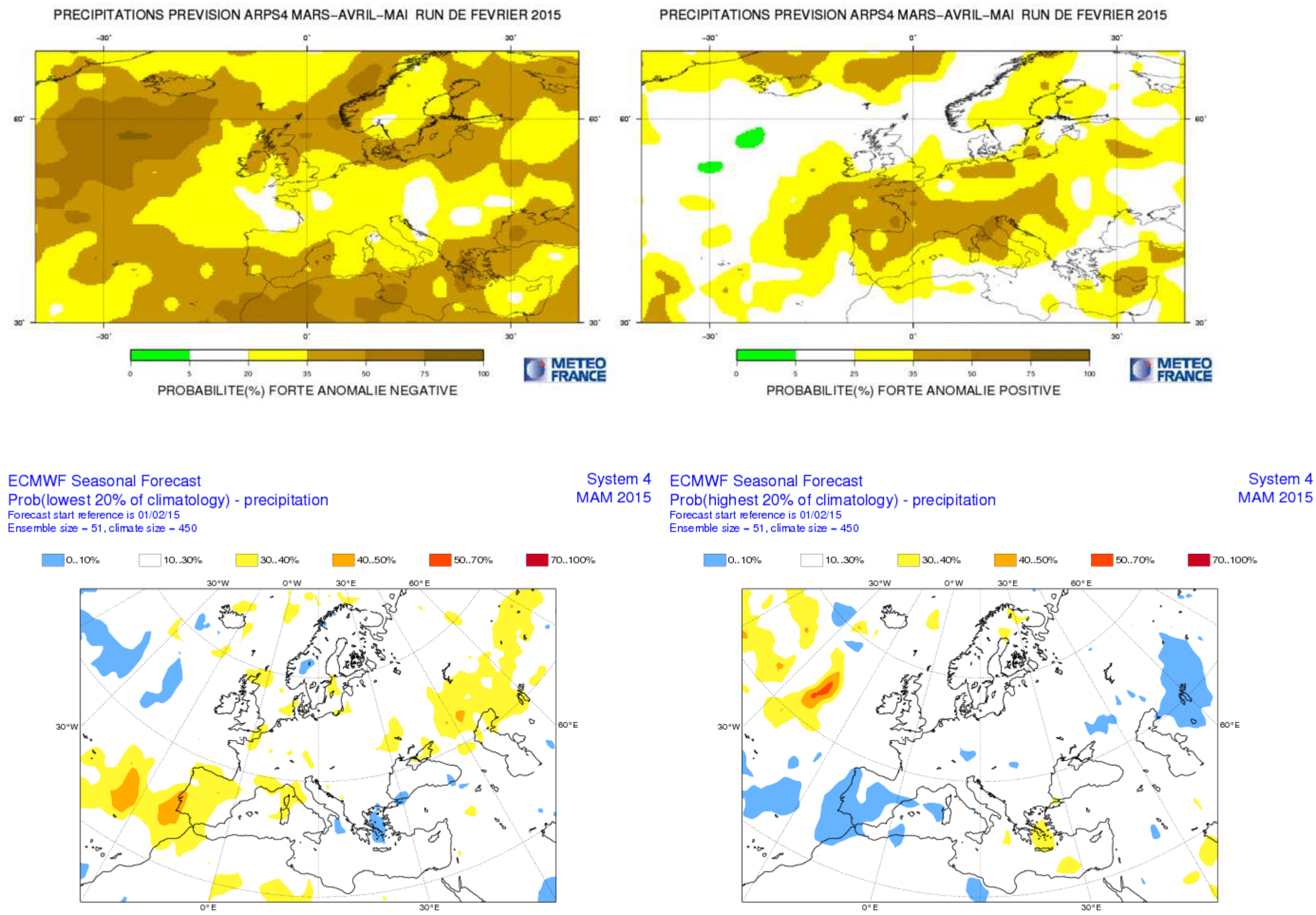


fig.II.7.2 : Top : Meteo-France rainfall probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution).
Bottom : ECMWF rainfall probability of « extreme » below normal conditions (left - lowest ~20% of the distribution) and "extreme" above normal conditions (right – highest ~20% of the distribution).

No consistency between the 2 models : a wet signal in MF. A drier than normal signal in Iberian peninsula in ECMWF but no clear signal elsewhere.

II.8. DISCUSSION AND SUMMARY

II.8.a Forecast over Europe

Over the Northern hemisphere, models show teleconnections from tropics to mid-latitude in the Pacific and in the western part of the Atlantic Ocean. Unfortunately, in Europe and particularly in Western Europe, models are not consistent. It is impossible to choose a baseline scenario for precipitations. However a warmer than normal signal appears which seems more reliable on Eastern and Nothern Europe.

II.8.b Tropical cyclone activity

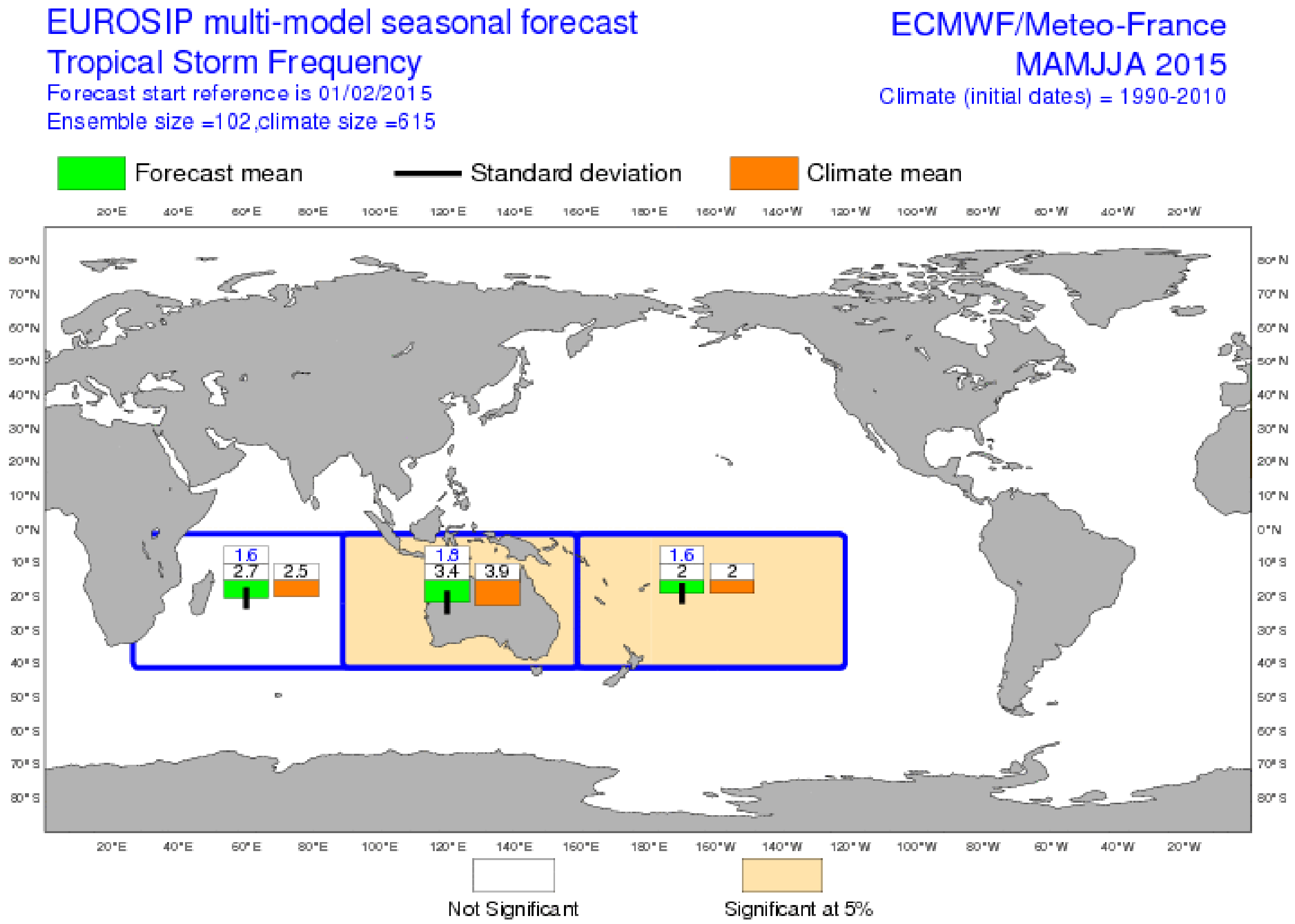


fig.II.8.1: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtrop/trop_euro/eurosip_tropical_storm_frequency/

The signal of a stronger cyclonic activity than normal in western Indian Ocean seems to decrease at the end of season. Cyclonic activity remains weaker than normal in the Eastern Indian Ocean.

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WMO RA VI
RCC Network

Synthesis of Temperature forecasts for March-April-Mai 2015 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
MF					
ECMWF					
JMA					
synthesis					
Eurosip					
privileged scenario by RCC-LRF node	***above normal***	***above normal***	***above normal***	***above normal***	***above normal***

T Below normal (Cold)

T close to normal

T Above normal (Warm)

No privileged scenario

Synthesis of Rainfall forecasts for March-April-Mai 2015 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**
MF					
ECMWF					
JMA					
synthesis					
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

II. ANNEX

II.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.

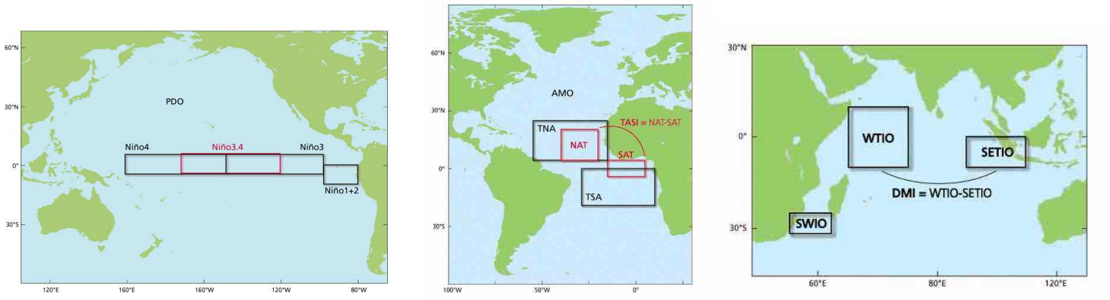
II.2. « NINO », SOI INDICES AND OCEANIC BOXES

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).

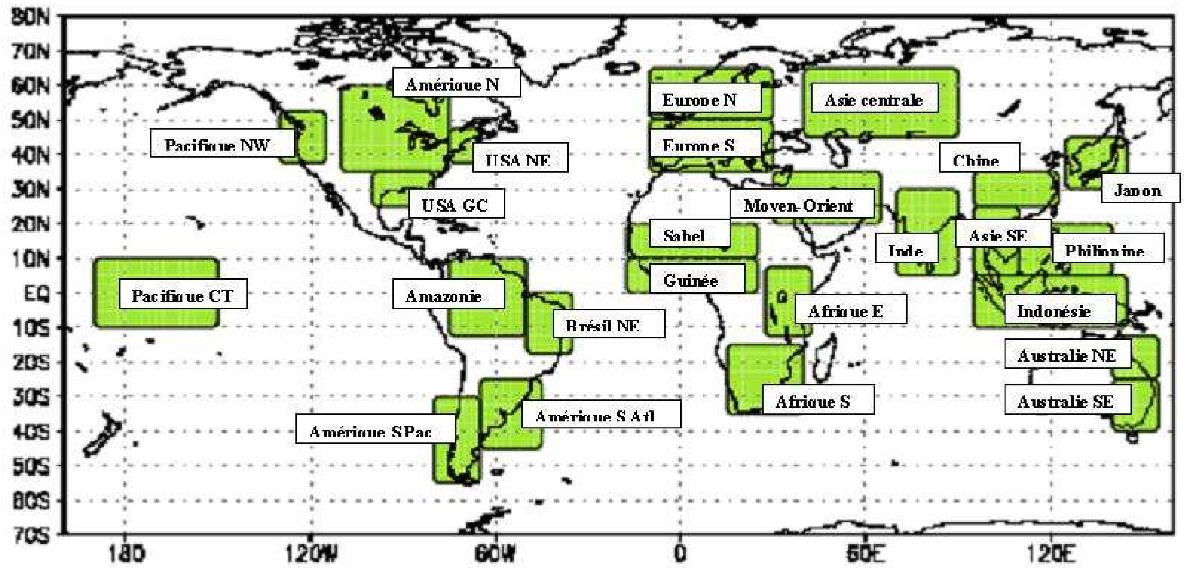
Associated to the oceanic « El Niño / La Niña » events, and taking into account the strong ocean/atmopshere coupling, the atmosphere shows also interanual variability associated to these events. It is monitored using the SOI (Southern Oscillation Index). This indice is calculated using standardized sea 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 :



II.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.



II.4. ACKNOWLEDGEMENT

This bulletin is edited by the RCC-LRF Node of the RCC Network in Toulouse for the RA VI. It is a joint effort of the RCC-Climate Monitoring Node (led by DWD) and the RCC-LRF Node (Co-Led by Météo-France).