MEDCOF-4 Climate Bulletin (1st DRAFT)
Forecasting Section prepared by RCCs from RA I and RA VI (contributors : DWD, Météo-France and INM)

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II. SEASONAL FORECAST FROM DYNAMICAL MODELS

II.1.OCEANIC FORECASTS

II.1.a Sea surface temperature (SST)

Very good consistency of anomaly patterns between ARPEGE (Météo-France model, or MF), ECMWF and NCEP, except in the equatorial Atlantic.

Pacific Ocean: all models enhanced the warm equatorial SST anomaly. And they move it eastward, so that it concerns the eastern two thirds. Warm anomaly east of Australia and cold anomaly along the SPCZ

In the northern hemisphere, a large area of warm anomaly along the western coast of North America, corresponding to a positive PDO pattern.

Indian Ocean: generalized warm anomaly, with a East-West gradient. So IOD is slightly positive.

Atlantic Ocean: some noticeable differences between models in the near the Equator, with fairly strong cold anomaly (up to the Guinea Gulf) with NCEP , the same signal but weaker with ECMWF and an opposite anomaly with ARPEGE. This cold tongue signal, visible in the EUROSIP forecast, should be interpreted with cautious, because generally badly predicted by climate models.

In the Northern hemisphere, a kind of dipole pattern is visible: a cold anomaly from Labrador to the British Isles and a warm anomaly in the South-western tropics (extending along the US coast).

Mediterranean Sea: all models forecast a positive anomaly, in the continuity of current conditions.

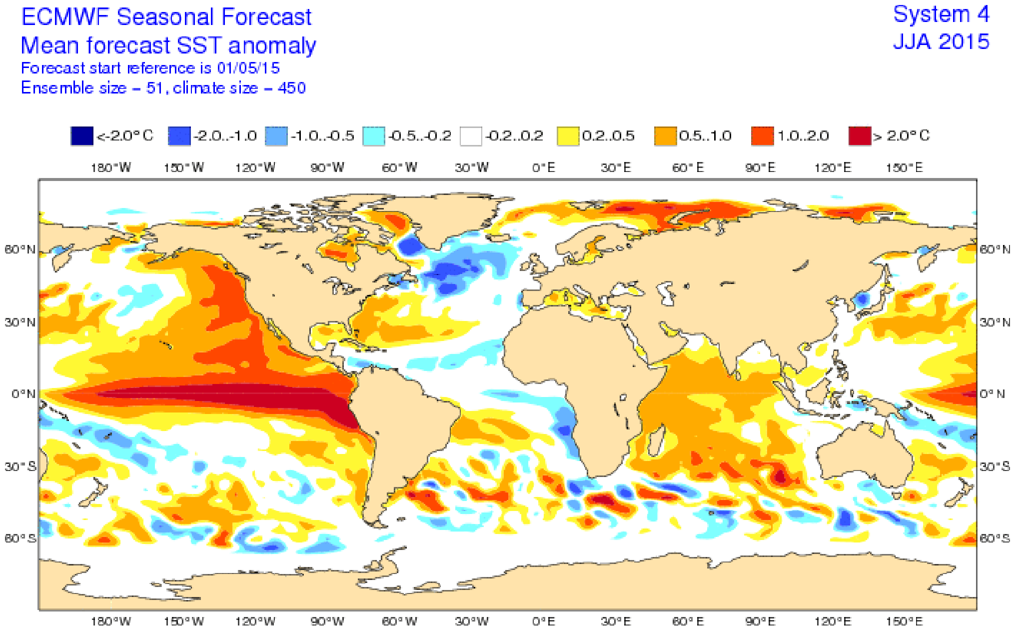


fig.II.1.1: SST anomaly forecast from ECMWF

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

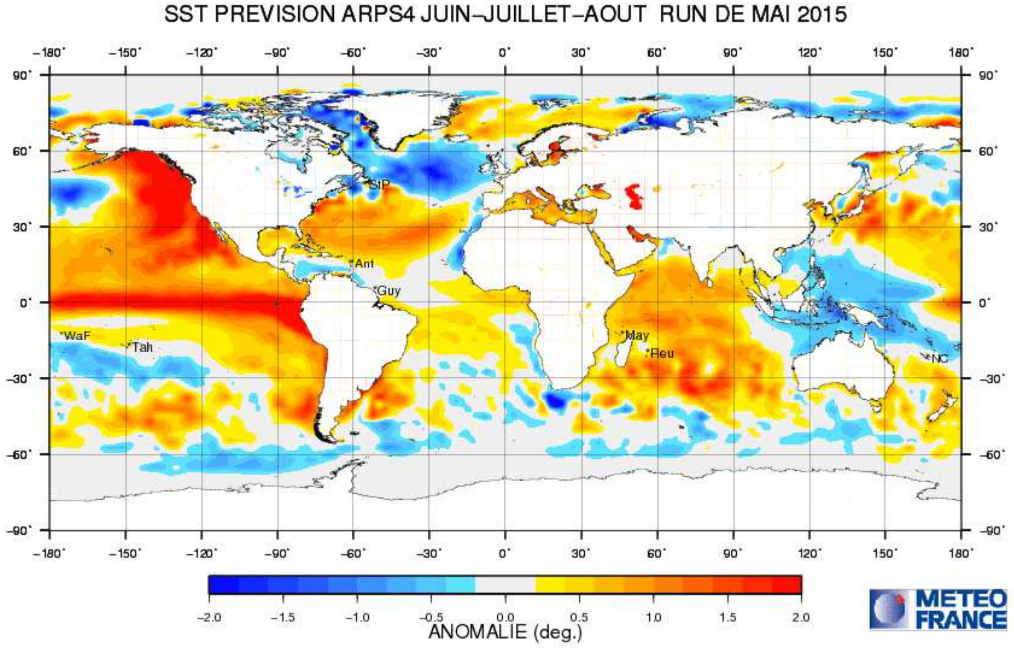


fig.II.1.2: SST Anomaly forecast from Meteo-France (recalibrated with respect of observation).

http://elaboration.seasonal.meteo.fr

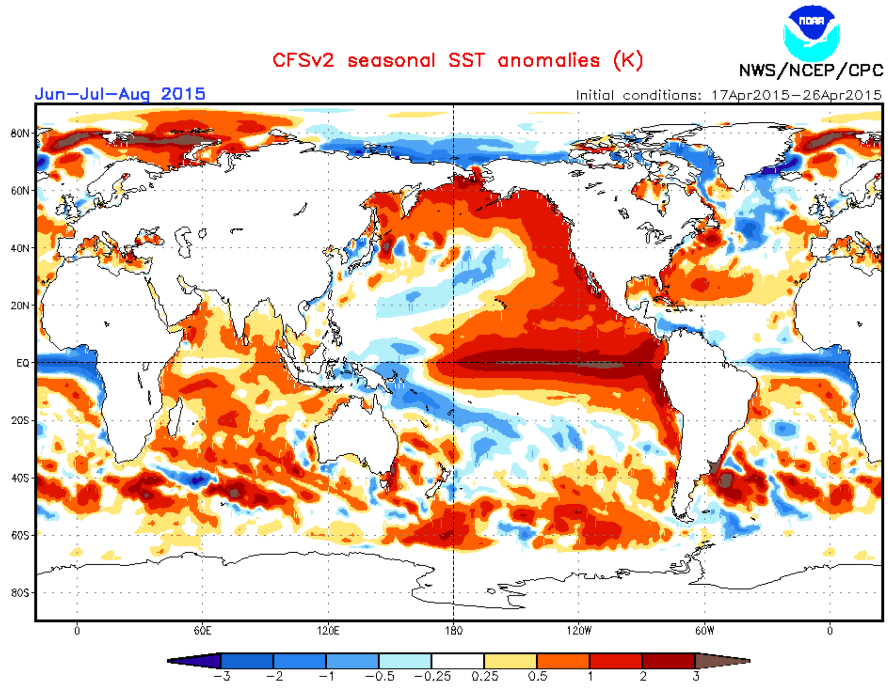


fig.II.1.3: SST anomaly forecast from NCEP.

http://www.cpc.ncep.noaa.gov/products/people/wwang/cfsv2fcst/imagesInd1/glbSSTSeaInd1.gif

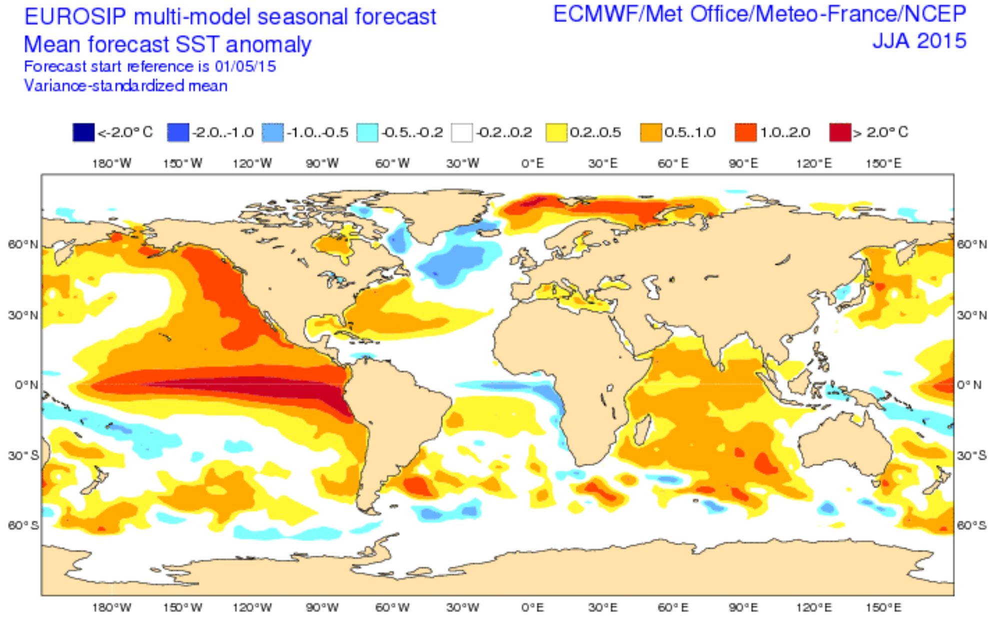


fig.II.1.4: SST Forecasted anomaly from Euro-SIP

II.1.b ENSO forecast

For next months, all the models we have analyzed develop an El Niño. The monthly mean value in the Niño 3.4 box in April is around +0.8°C. Looking at ARPEGE and ECMWF (fig. II.1.5) this trend should continue and accelerate during the next months. This evolution is consistent with the subsurface analysis. The probability that the phenomenon would continue beyond the summer is high, although some runs (a few) forecast a stabilization around +1°C.

As a conclusion, the probability to have El Niño conditions in JJA is very high. The probability for these conditions to persist or increase afterward is high.

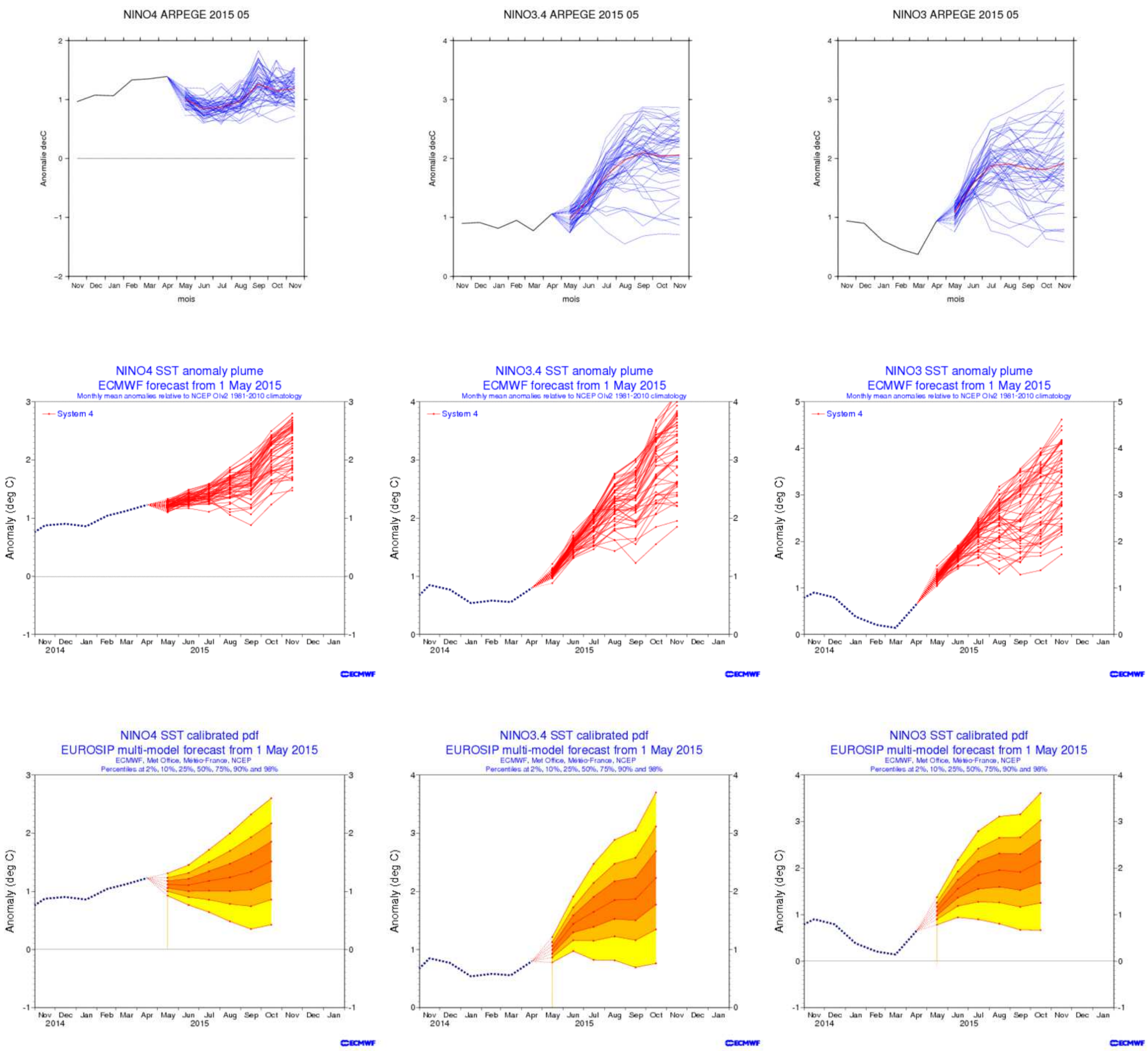


fig.II.1.5: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members - and EuroSIP (bottom) – recalibrated distributions - (http://elaboration.seasonal.meteo.fr , http://www.ecmwf.int/)

II.1.c Atlantic ocean forecasts

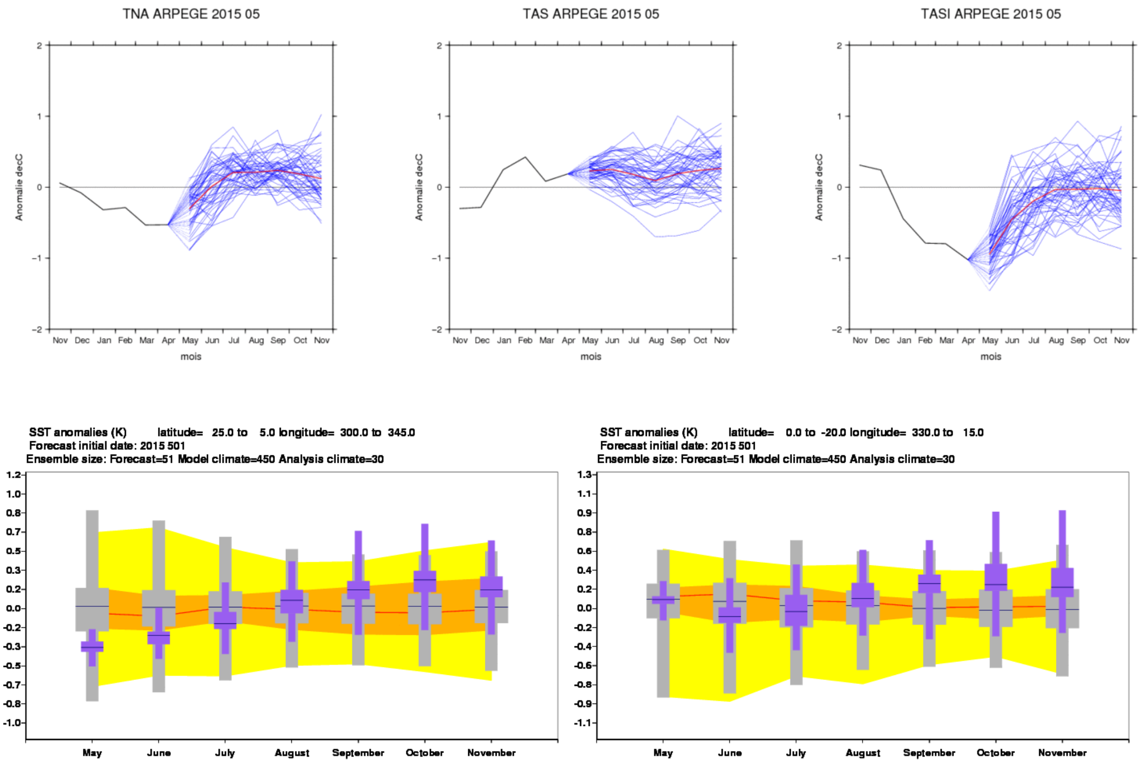
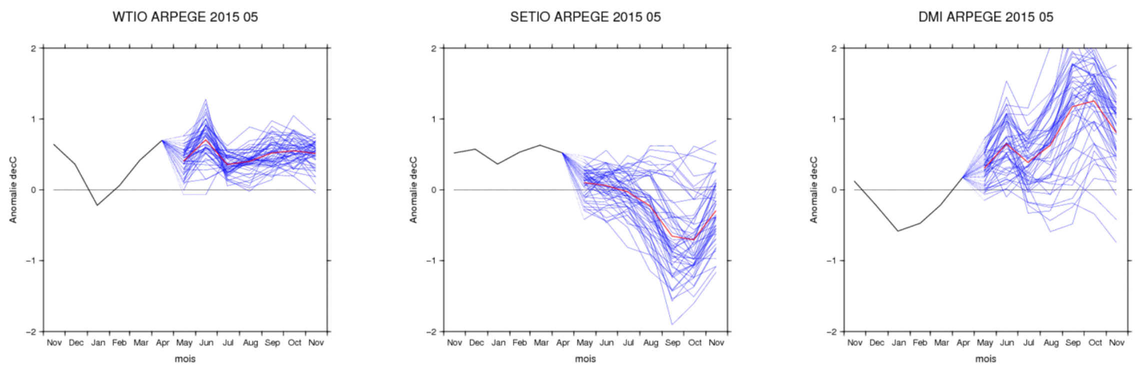


fig.II.1.6: SSTs anomaly forecasts in the Atlantic Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

II.1.d Indian ocean forecasts



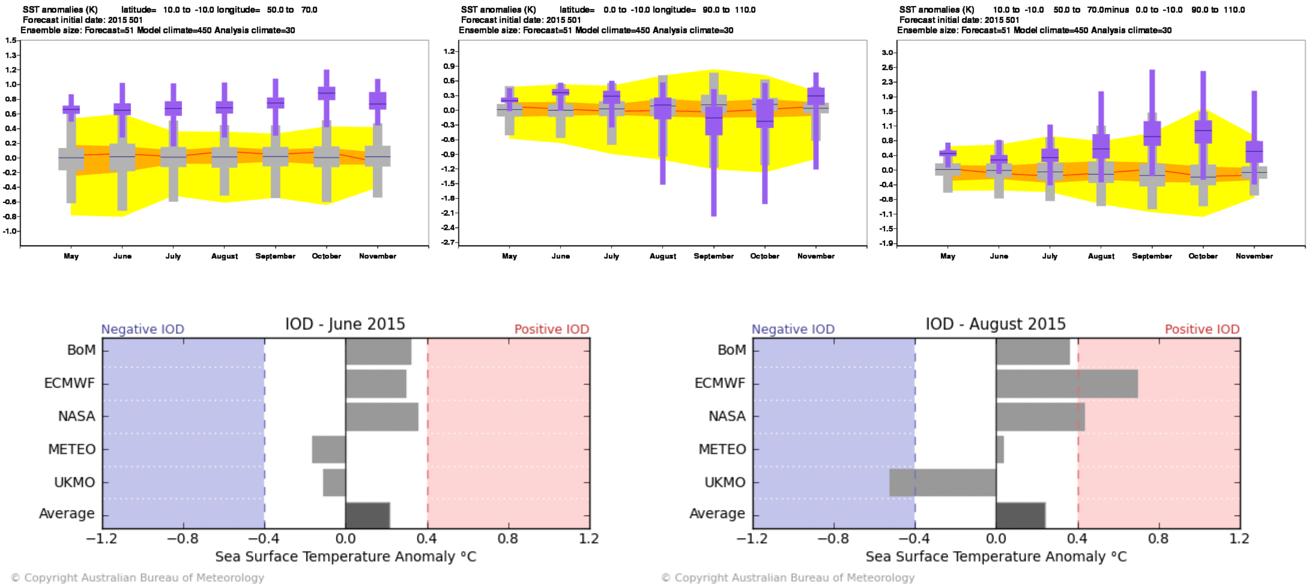


fig.II.1.7: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

II.2. GENERAL CIRCULATION FORECAST

II.2.a Global forecast

Good consistency between models (MF, ECMWF and JMA). They all show strong circulation anomalies related to the ocean anomalies in the Pacific.

Velocity potential anomaly field (cf. fig. II.2.1 – insight into Hadley-Walker circulation anomalies): very strong anomaly dipole, with an upward motion anomaly over the whole Pacific basin, and an opposite anomaly over the Indian basin. We can notice a slight gap between MF and the last 2 models. Note that the signal is weak over the tropical Atlantic Ocean, the weak downward motion anomaly visible in MF and ECMWF seems relevant as a response to El Niño forecast.

Stream Function anomaly field (cf. fig. II.2.1 – insight into teleconnection patterns tropically forced): there are significant anomalies in the tropics, there signs consistent with a response to velocity potential anomalies. But like last month, the streamfunction response seems to be mainly trapped in the tropics. However in the Northern hemisphere, the kind of anomaly dipole between West and East over the North of North-America could reasonably be seen as a response to tropical forcing. Concerning Northern Atlantic and Europe, there isn't any sign of tropical influence.

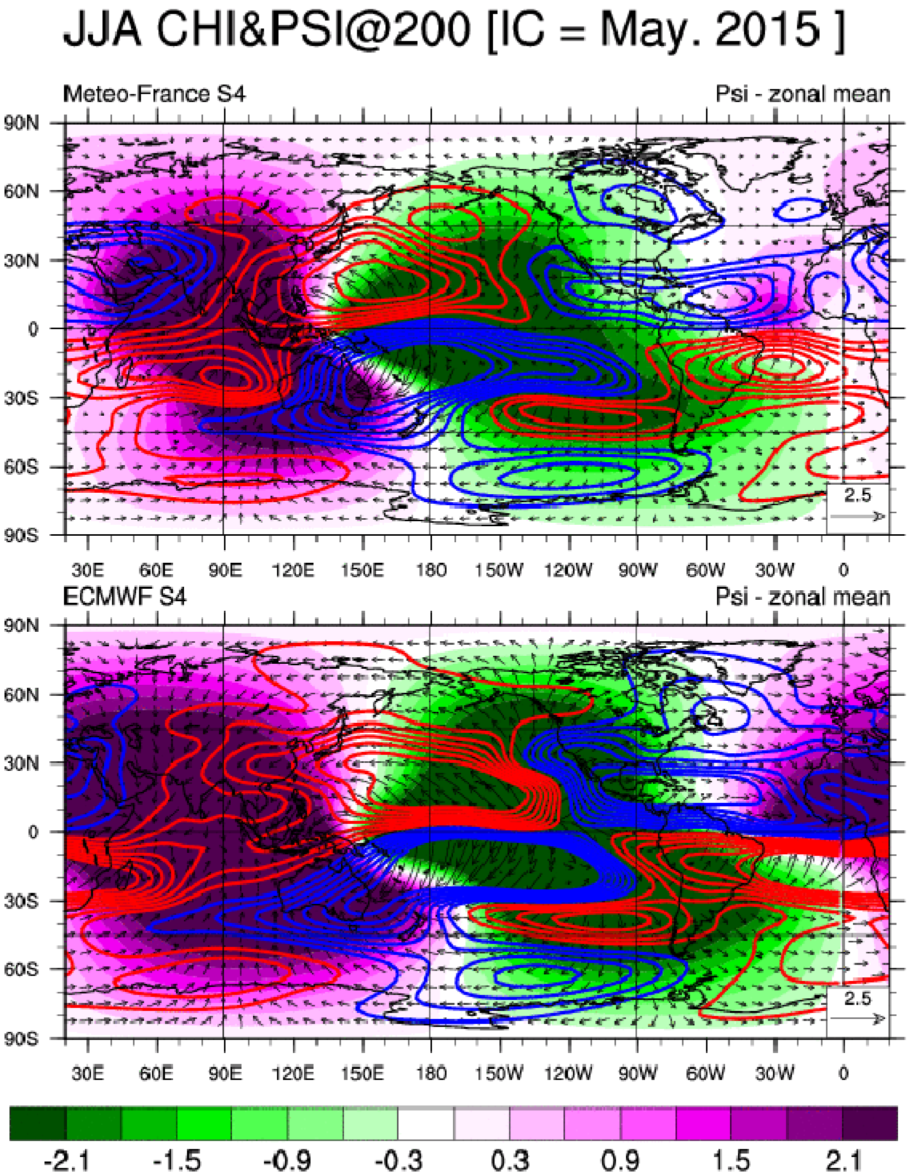


fig.II.2.1: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), associated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa by Météo-France (top) and ECMWF (bottom).

II.2.b North hemisphere forecast and Europe

Geopotential height anomalies (fig. II.2.2 – insight into mid-latitude general circulation anomalies): weak and not well-structured anomalies. MF and ECMWF forecast high geopotential anomalies in North and North-East Europe. A weak negative value is barely visible close to the Iberian Peninsula.

The regime occurrences forecasts of MF and ECMWF (fig II.2.3) are almost in opposition. This reinforces the idea of low predictability of the situation.

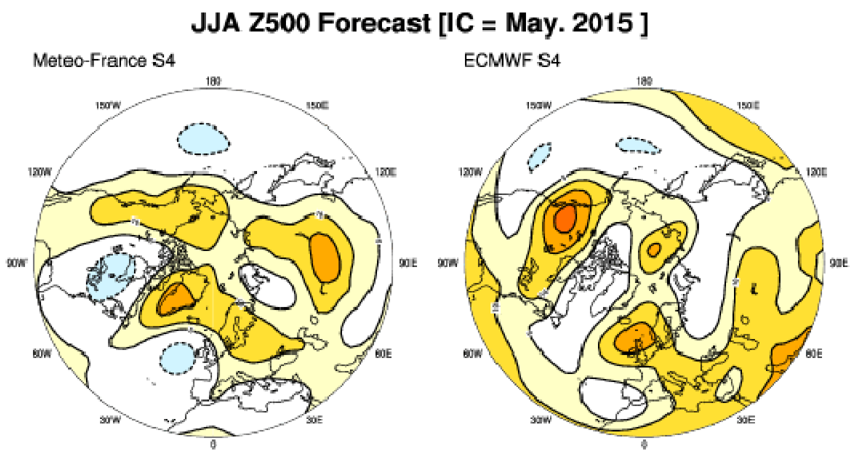


fig.II.2.2: Anomalies of Geopotential Height at 500 hPa from Météo-France (left) and ECMWF (right).

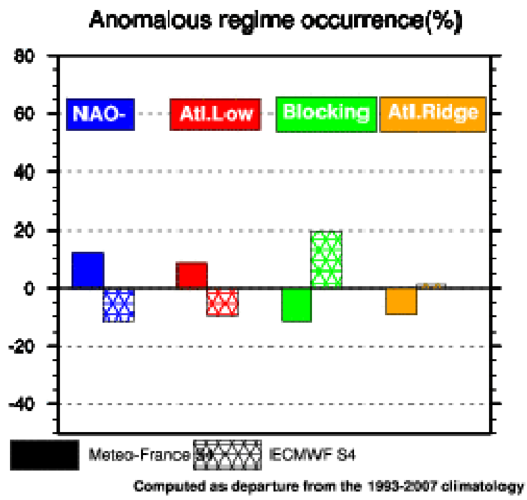


fig.II.2.3: North Atlantic Regime occurrence anomalies from Météo-France and ECMWF : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.

II.3. IMPACT: TEMPERATURE FORECASTS

North America: robust warm signal along the western coast. A cold scenario is expected in the Nord-Eastern part (not the EUROSIP scenario). Elsewhere the most likely scenario is “close to normal”.

Central-America: warmer than normal (ocean influence)

South-America: warm signal in the equatorial regions, along the Pacific coast and in the Nordeste. Inland, the “below normal” scenario is probably linked to the precipitation forecast (above normal).

Australia: warmer than normal.

Asia: warmer than normal.

Africa: warmer than normal, to the exception of the North-Western part (Morocco) with a “close to normal”.

Europe and Mediterranean basin: despite the very low predictability diagnosed previously, there is an “above normal” signal over Europe and the Mediterranean countries in the models that compose EUROSIP. JMA propose another scenario.

II.3.a ECMWF

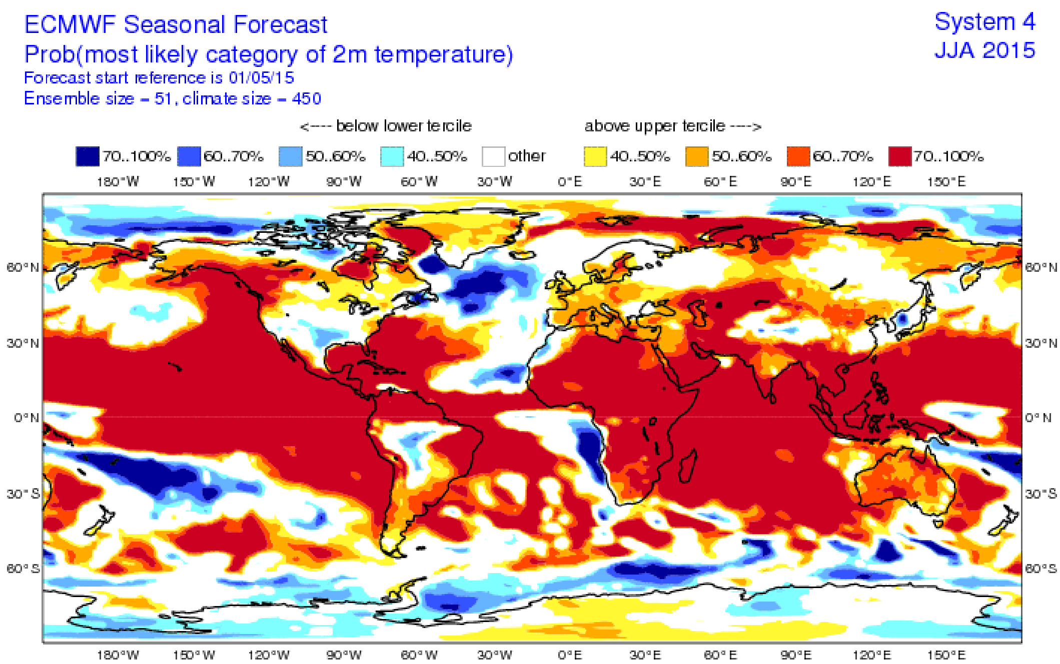


fig.II.3.1: Most likely category probability of T2m from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/

II.3.b Météo-France

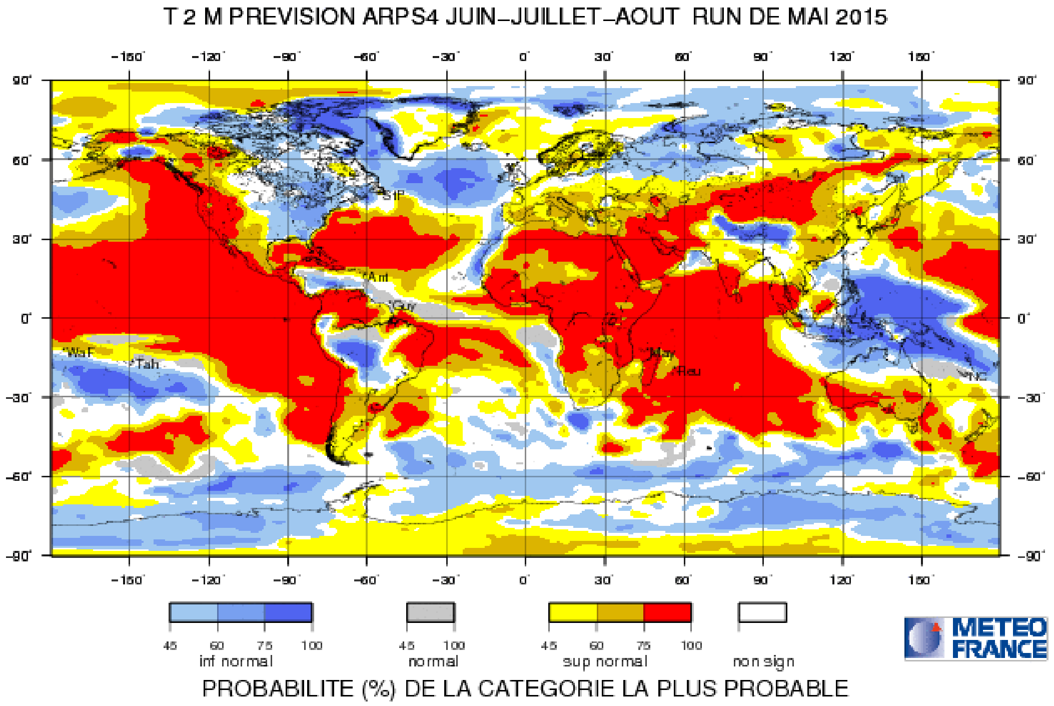


fig.II.3.2: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.3.c Japan Meteorological Agency (JMA)

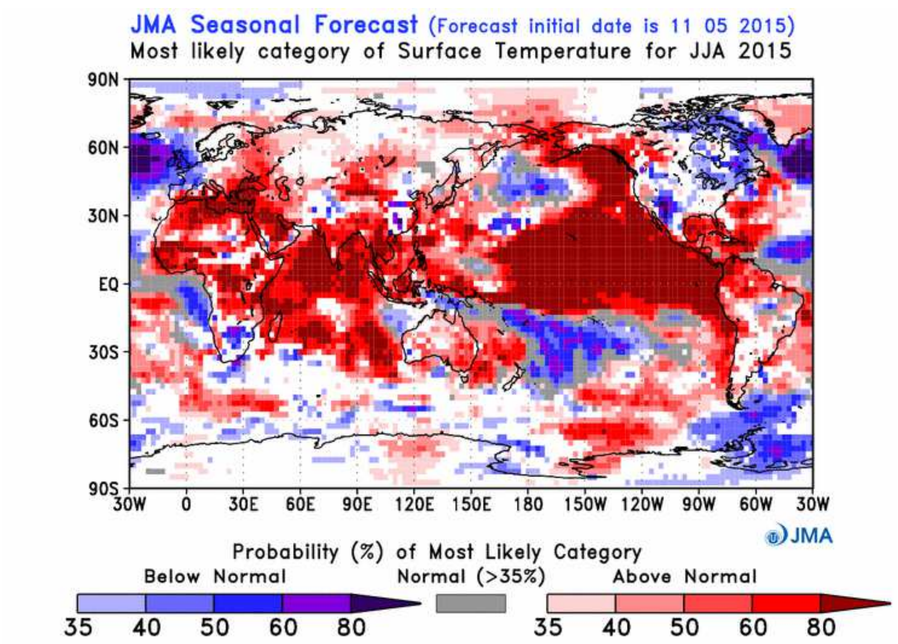


fig.II.3.3: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.php

II.3.d EUROSIP

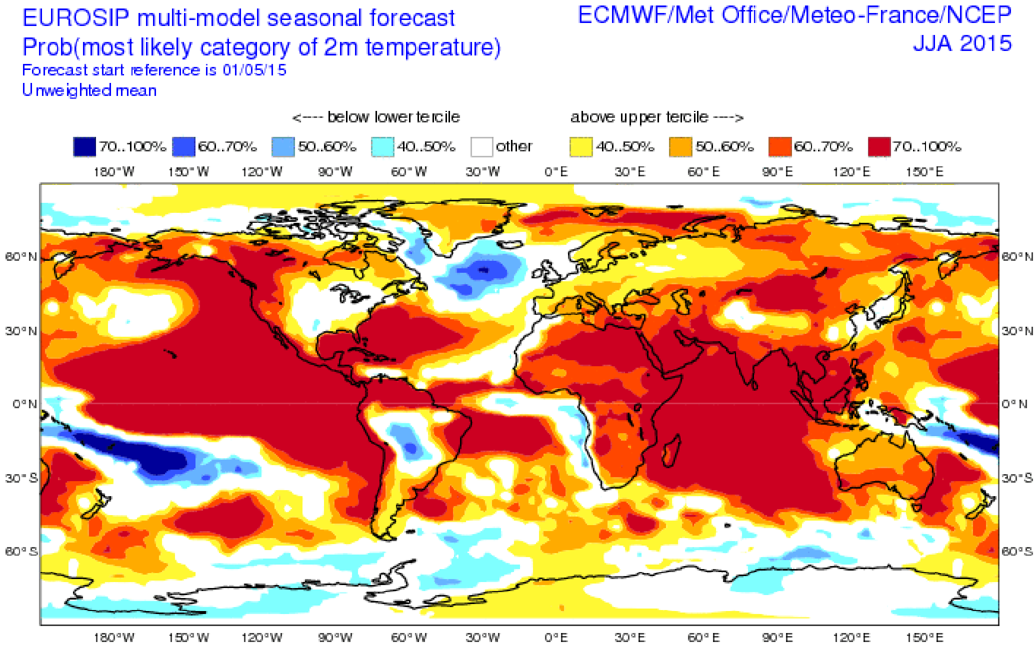


fig.II.3.4: Multi-Model Probabilistic forecasts for T2m from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).

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

II.4. IMPACT : PRECIPITATION FORECAST

Tropical regions: globally a good consistency between models, with classical El Niño impacts over the tropical Pacific regions, the Maritime Continent (and Northern Australia) and western tropical Atlantic Ocean (including Caribbean region, Central-America and North of South-America).

Europe and Mediterranean basin: no clear scenario over Europe. The main signal concerns the Mediterranean basin, with a slightly enhanced probability of “above normal” precipitations. This could be linked to the SST forecast over the basin, which could lead to higher risk of active convection. Unfortunately, the absence of consensus concerning the general circulation is reducing the confidence we could have in this signal.

II.4.a ECMWF

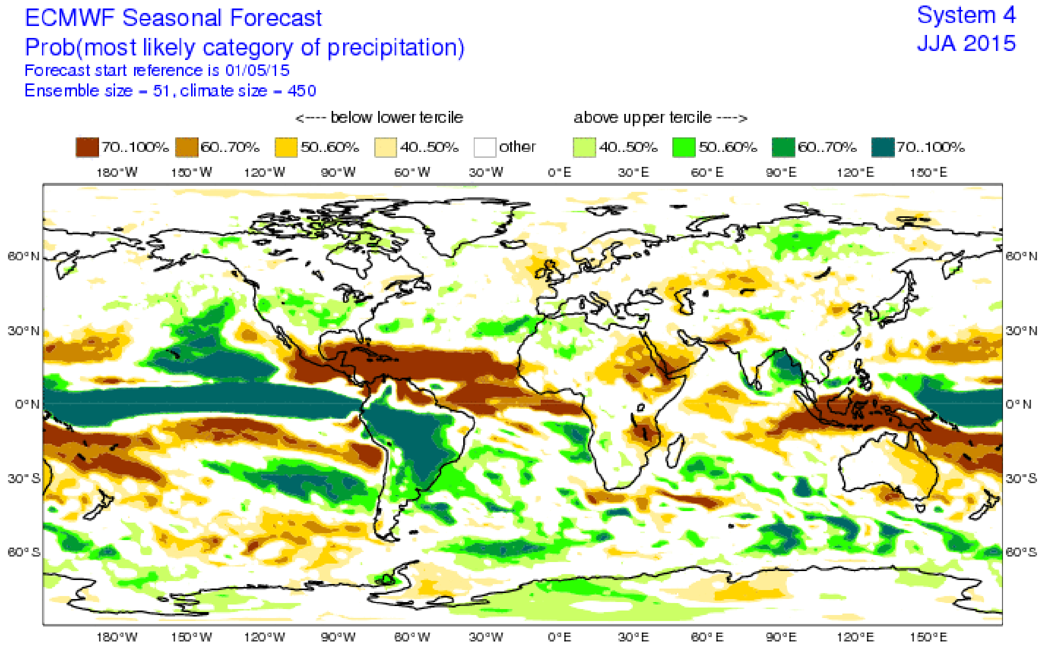


fig.II.4.1: Most likely category probability of rainfall from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/

II.4.b Météo-France

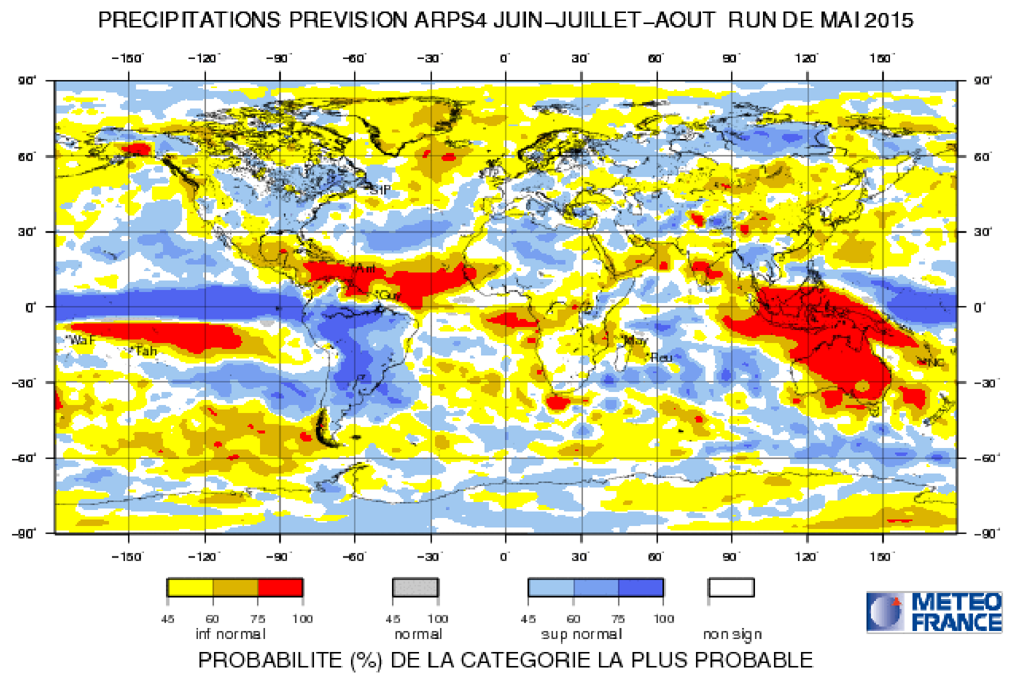


fig.II.4.2: Most likely category of Rainfall. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Japan Meteorological Agency (JMA)

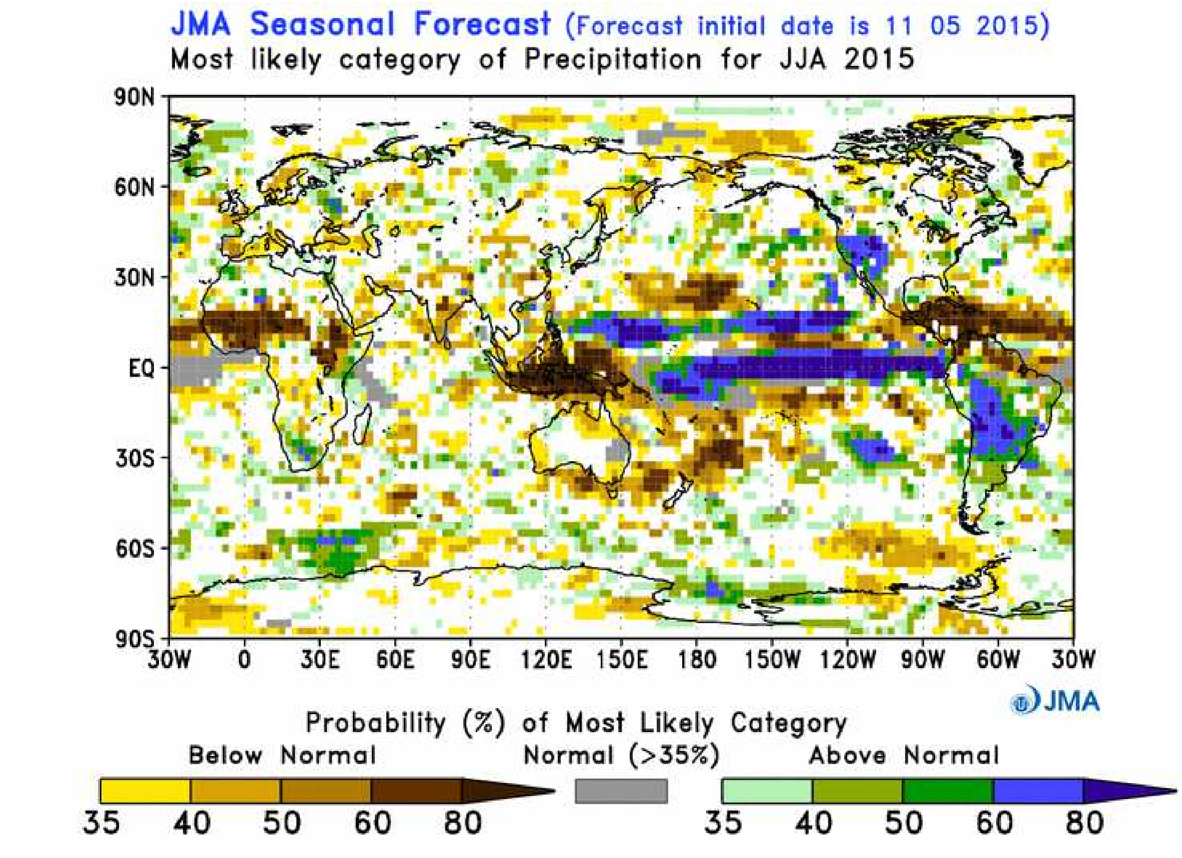


fig.II.4.5: Most likely category of Rainfall from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.php

II.4.d EUROSIP

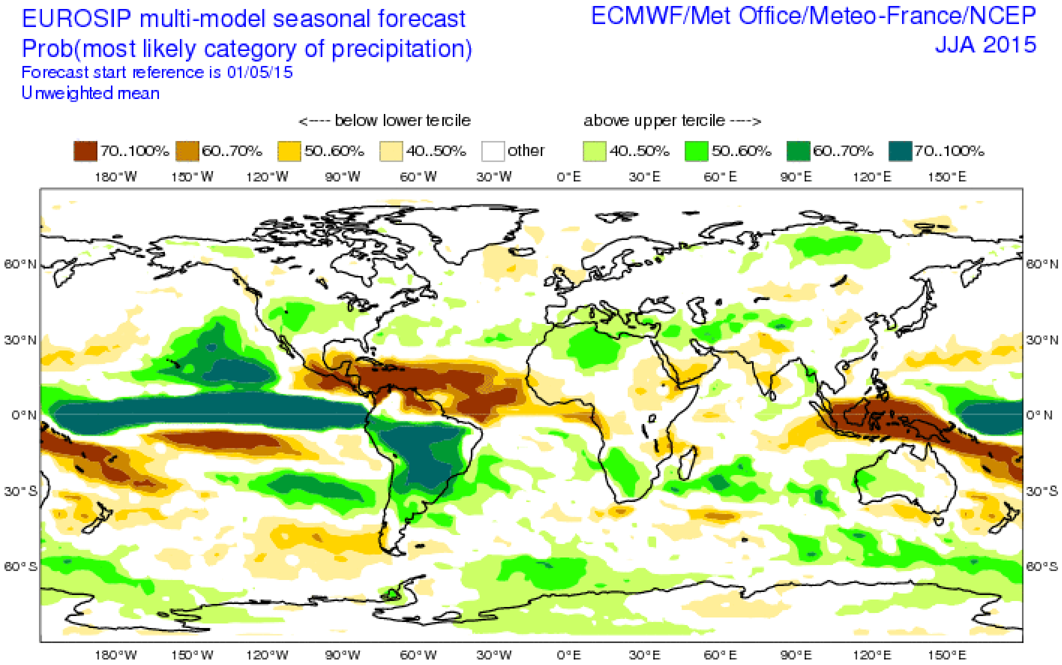


fig.II.4.7: Multi-Model Probabilistic forecasts for precipitation from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal).

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

II.5. REGIONAL TEMPERATURES and PRECIPITATIONS

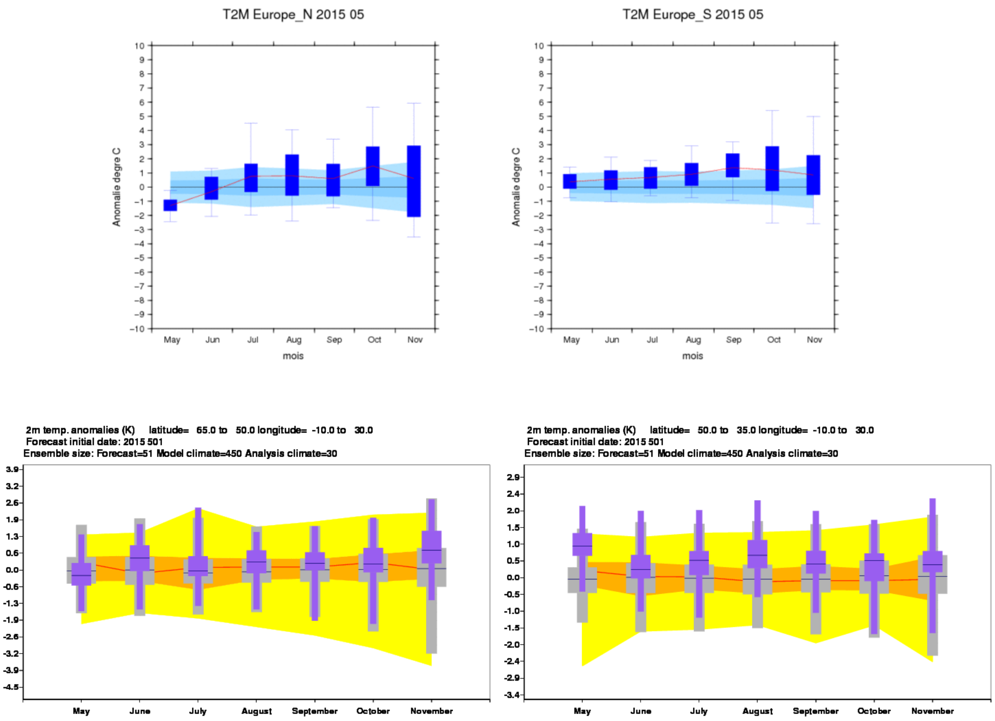


fig.II.5.1 : Climagrams for Temperature in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

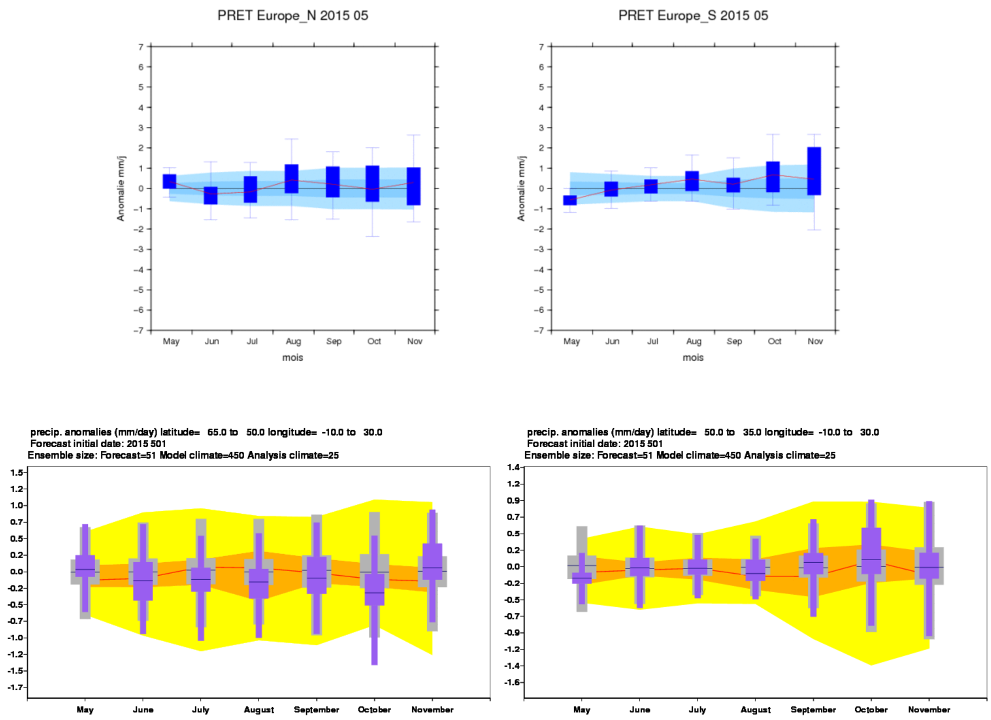


fig.II.5.2 : Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

II.6. MODEL'S CONSISTENCY

Not yet available

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

For SST :

For Z500 :

For T2m :

For Precipitation :

II.7. "EXTREME" SCENARIOS

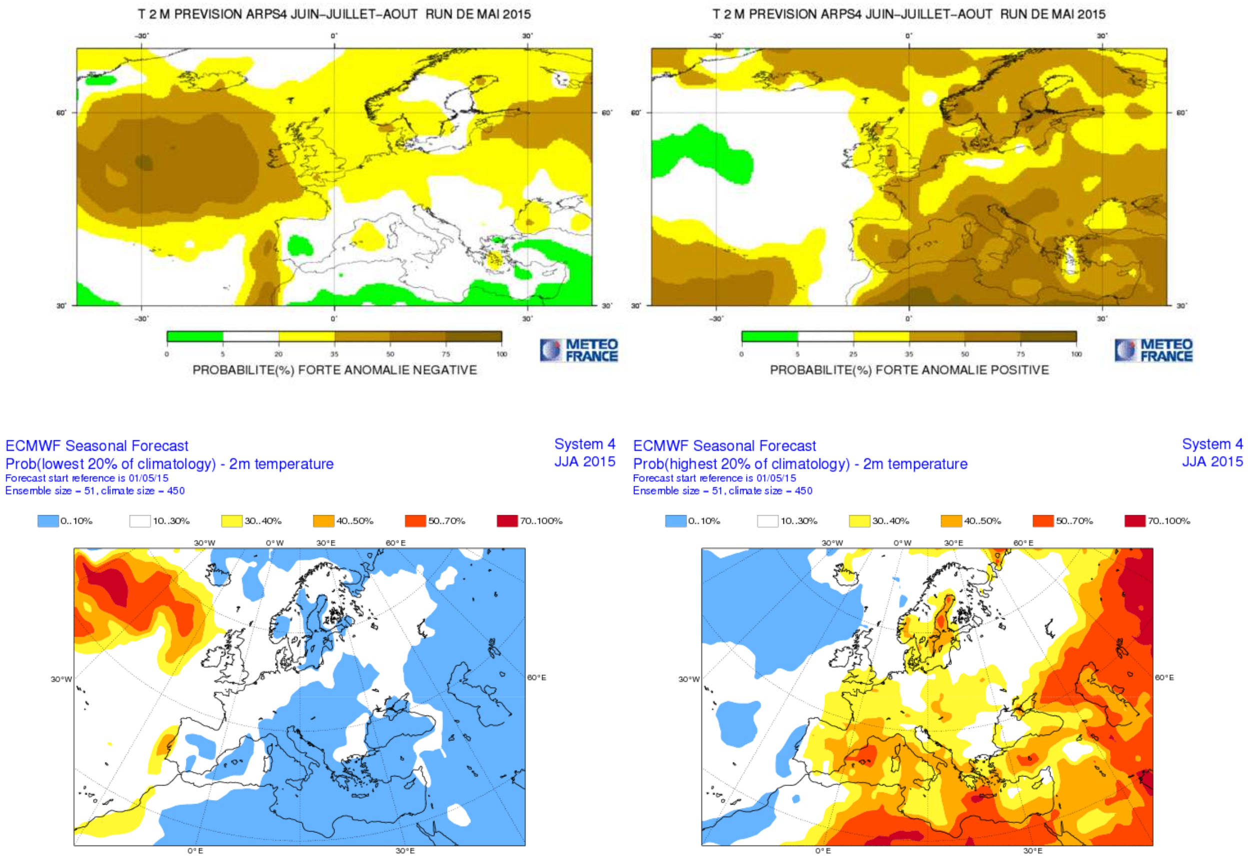


fig.II.7.1 : Top : Meteo-France T2m probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution). Bottom : ECMWF T2m probability of « extreme » below normal conditions (left - lowest ~20% of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

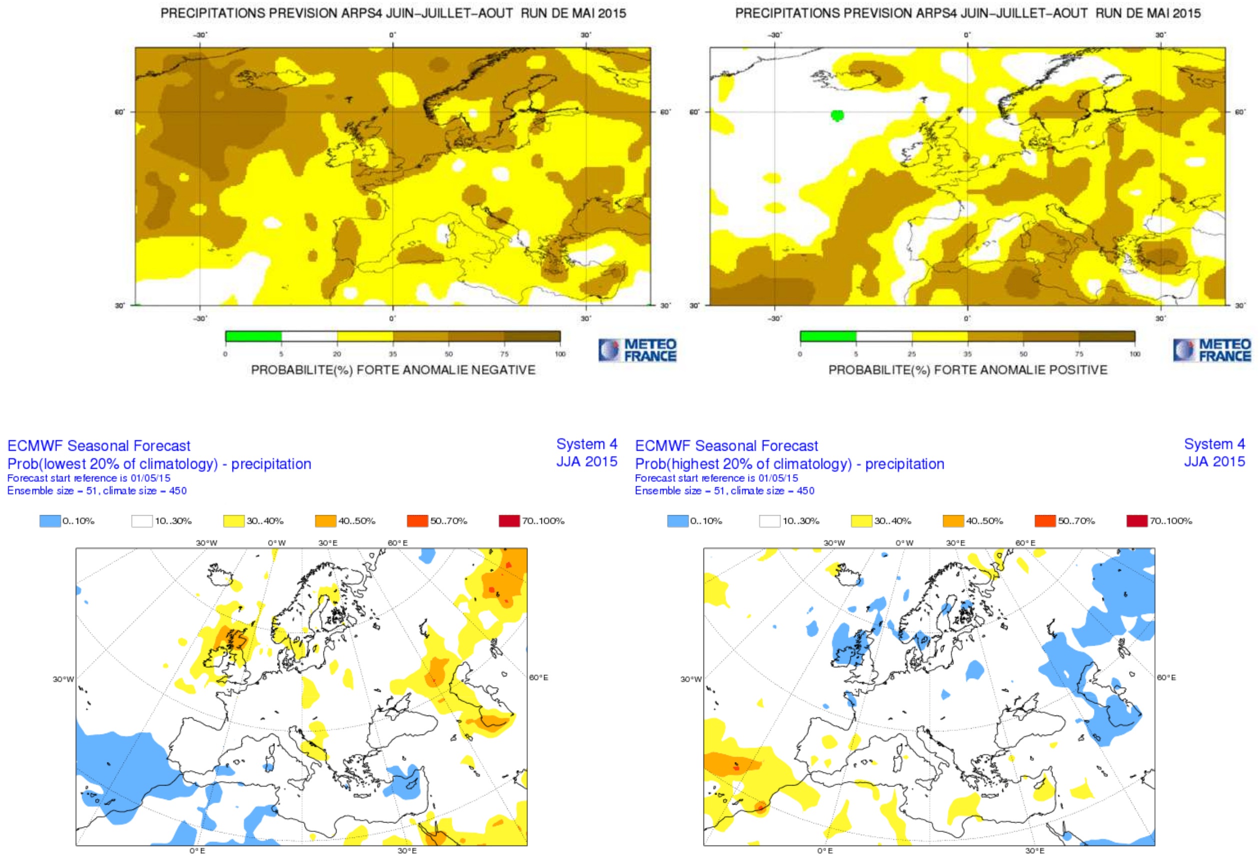


fig.II.7.2 : Top : Meteo-France rainfall probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution).

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).

II.8. DISCUSSION AND SUMMARY

II.8.a Forecast over Europe and North Africa

II.8.b Tropical cyclone activity

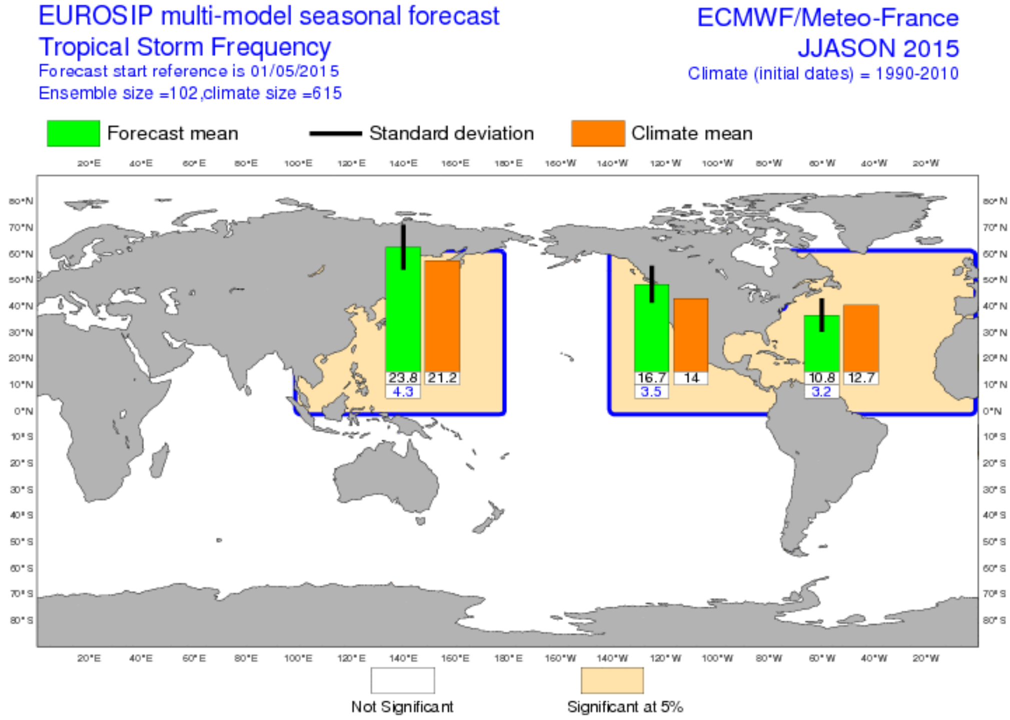


fig.II.8.1: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF).

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

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Synthesis of Temperature forecasts for June-July-August 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*

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

Synthesis of Rainfall forecasts for June-July-August 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

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.

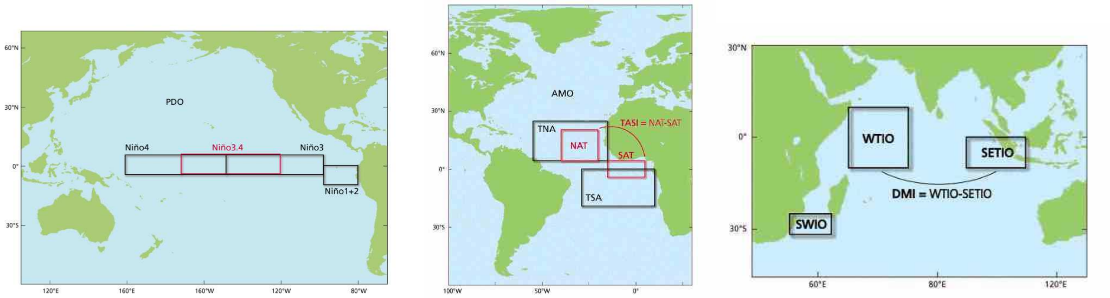
III.2. « NINO », SOI INDICES AND OCEANIC BOXES

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).

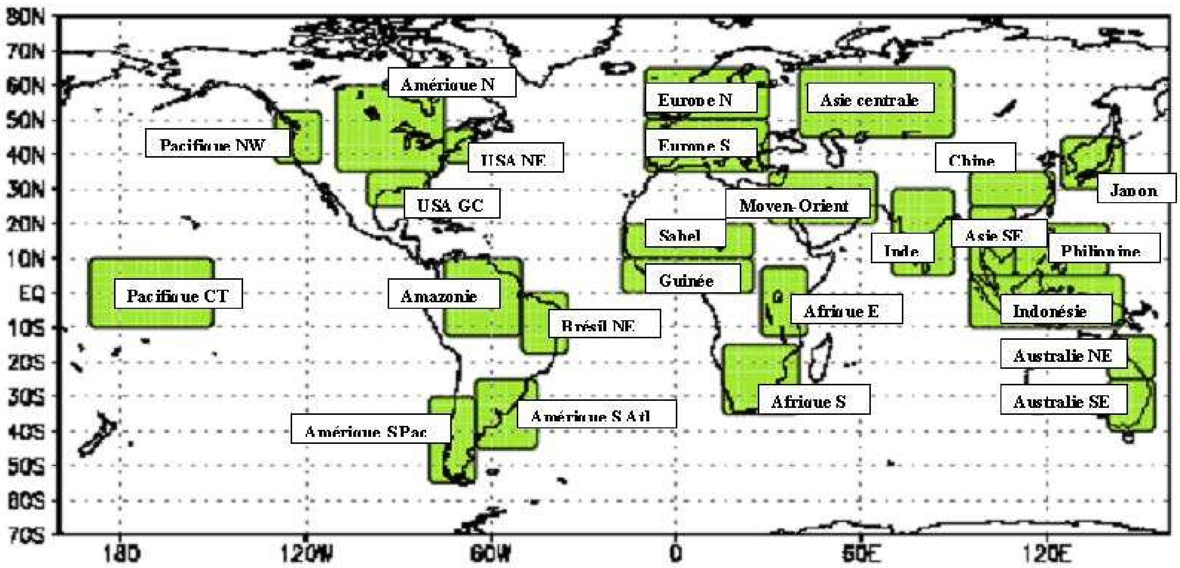
Associated to the oceanic « El Niño / La Niña » events, and taking into account the strong ocean/atmopshere coupling, the atmosphere shows also interanual variability associated to these events. It is monitored using the SOI (Southern Oscillation Index). This indice is calculated using standardized sea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



III.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).