GLOBAL CLIMATE BULLETIN
n°206 – August 2016

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I. DESCRIPTION OF THE CLIMATE SYSTEM (JUNE 2016)

OCEANIC ANALYSIS

I.1.a Global analysis

In the Pacific ocean :
- Continuing the rapid decrease of the anomaly of SST in the Box 3.4: 0.0 ° C on average in June (cooling trend in the equatorial central Pacific rail) . Nevertheless , there is a slight slowdown in the fall rate (confirmed with the latest data from the end of July).
- Negative SST anomalies along the equator East of 170W , modulated by waves well visible (tropical instability).
- Positive SST anomalies persistent both sides of the equatorial waveguide in the tropical area .
- In subsurface, movement of the strongest negative anomalies to the east (up to 135 ° W). The negative anomalies decrease (in absolute value) west of the international date line.
- Heat content negative anomalies throughout the equatorial rail (max between 150°W and 130°W: switching - Equatorial Rossby ocean wave ?) .

Maritime continent :
- Cooling in South China Sea
- Warming south of Java
- Elsewhere, little change

In the Indian Ocean :
- Cooling widespread , particularly on the Gulf of Bengal and off Somalia
- The DMI index plunges in June (~ -0.7) .
- Important subsurface dipole (cold in the West, hot in the East)

In the Atlantic:
- Few evolution of the tropical north.
- Warming of the equatorial rail (still no cold tongue south of the equator) , and cooling along the coast of the Gulf of Guinea .
- Warming from Iceland to the Canaries.
- Cooling from the Sargasso Sea to the Azores .

In the Mediterraen :
- Warming in western part .

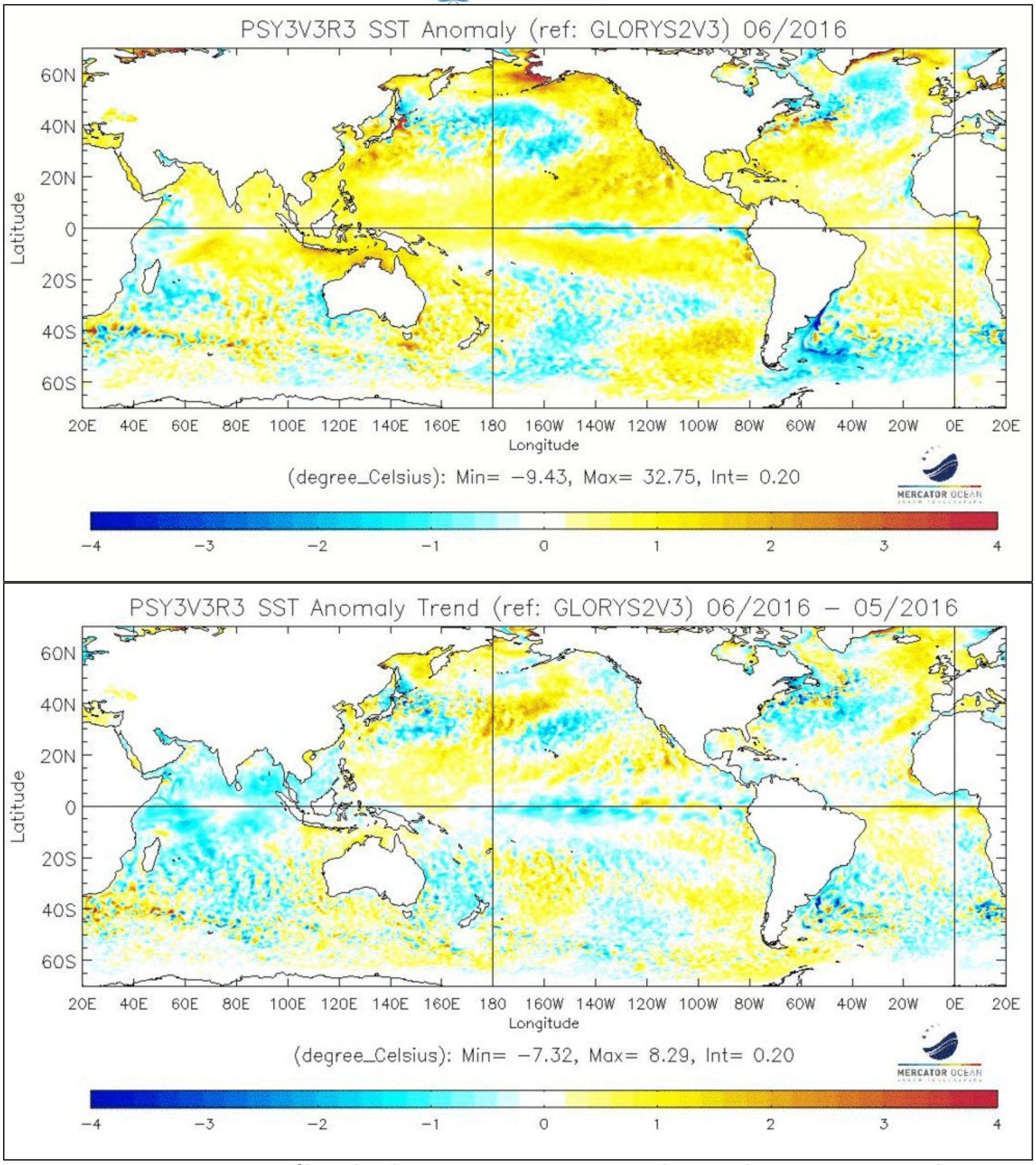


fig.I.1.1: top : SSTs Anomalies (°C) . Bottom : SST tendency (current – previous month), (reference Glorys 1992-2009). http://bcg.mercator-ocean.fr/

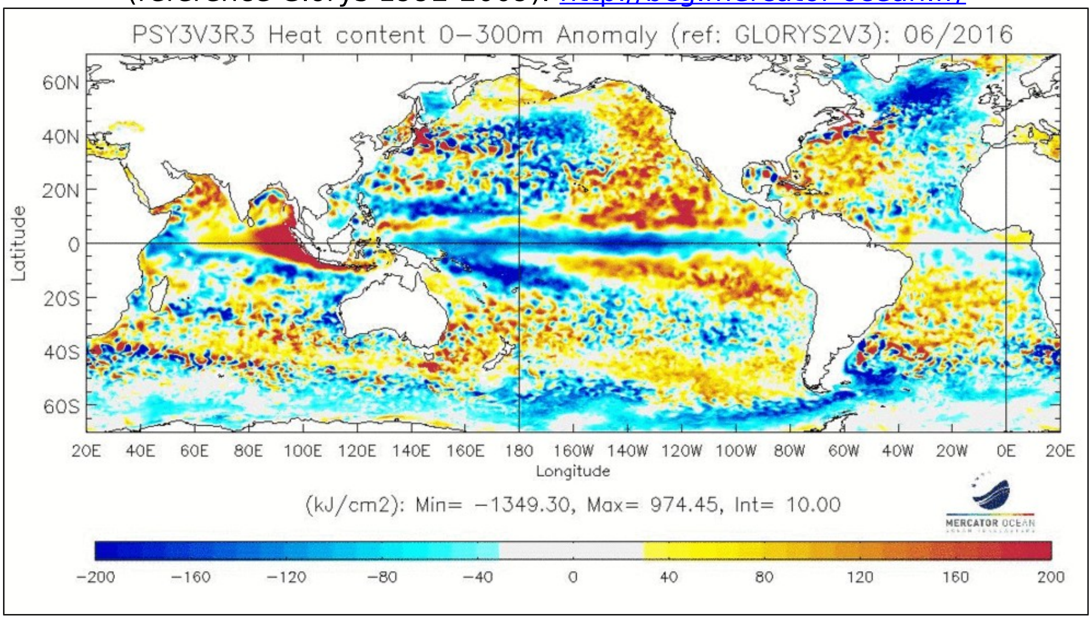


fig.I.1.2: map of Heat Content Anomalies (first 300m, kJ/cm2, reference Glorys 1992-2009) http://bcg.mercator-ocean.fr/

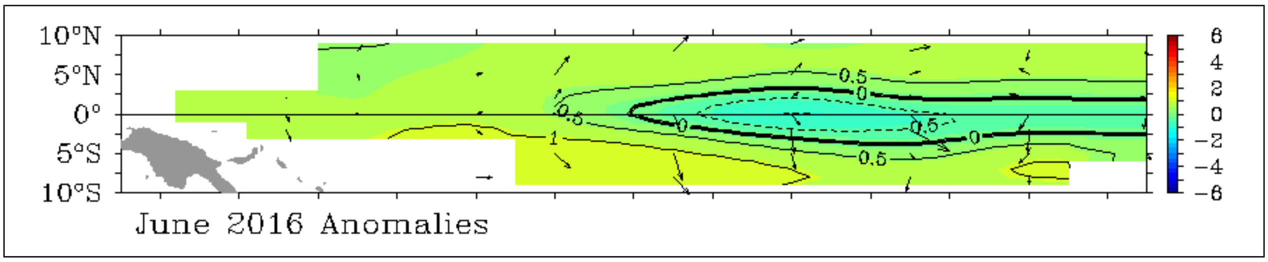


fig.I.1.3: SST Anomalies and Wind anomalies over the Equatorial Pacific from TAO/TRITON. http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/monthly-summary.html

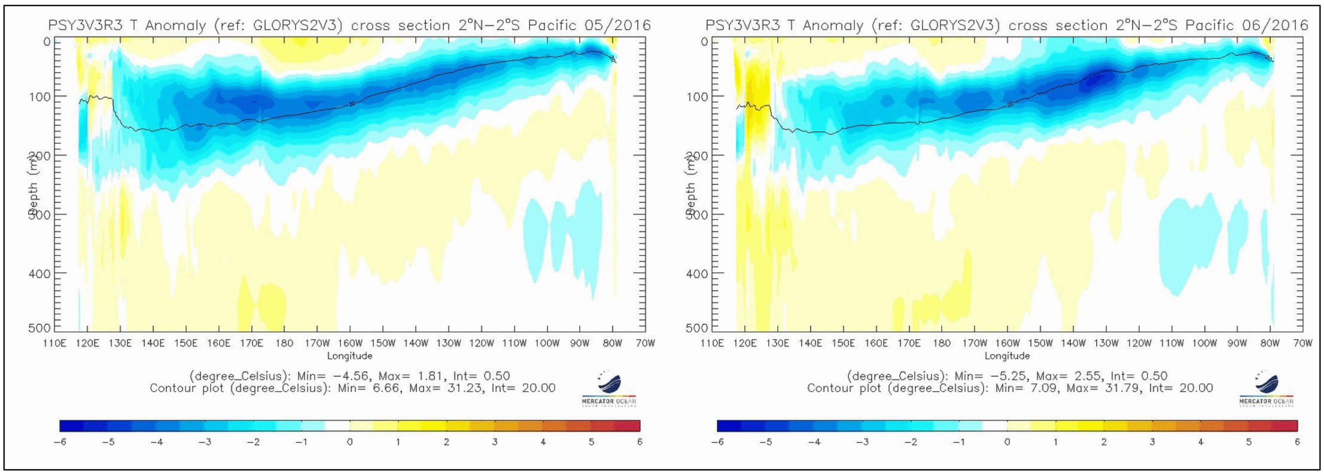


fig.I.1.4: Oceanic temperature anomaly in the first 500 meters in the Equatorial Pacific (previous and current month), http://bcg.mercator-ocean.fr

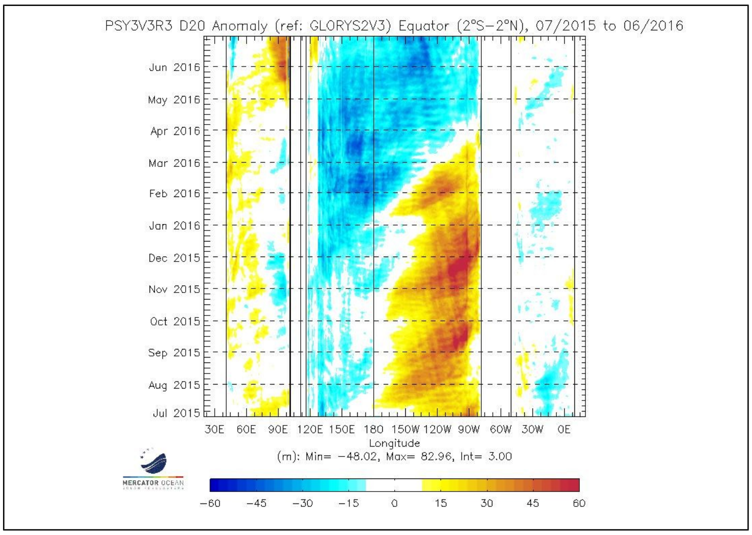


fig.I.1.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 6 month period http://bcg.mercator-ocean.fr/

I.1.b Sea surface temperature Near Europe

Once again still a very mild Arctic SST.

Cold anomaly in the North Atlantic retreated from Europe. Instead significant warming close to Western Europe and in the North Sea, but mainly at the sea surface. Another cold anomaly still remaining near the west coast of Norway, moving northwards compared to May.

Baltic Sea still warmer than normal at least in southern parts, but with smaller anomalies compared to the previous month.

In the Mediterranean only little change of anomalies compared to the usual seasonal warming. Most of the Mediterranean and the Black Sea slightly warmer than normal, parts of the western and central Mediterranean slightly cooler.

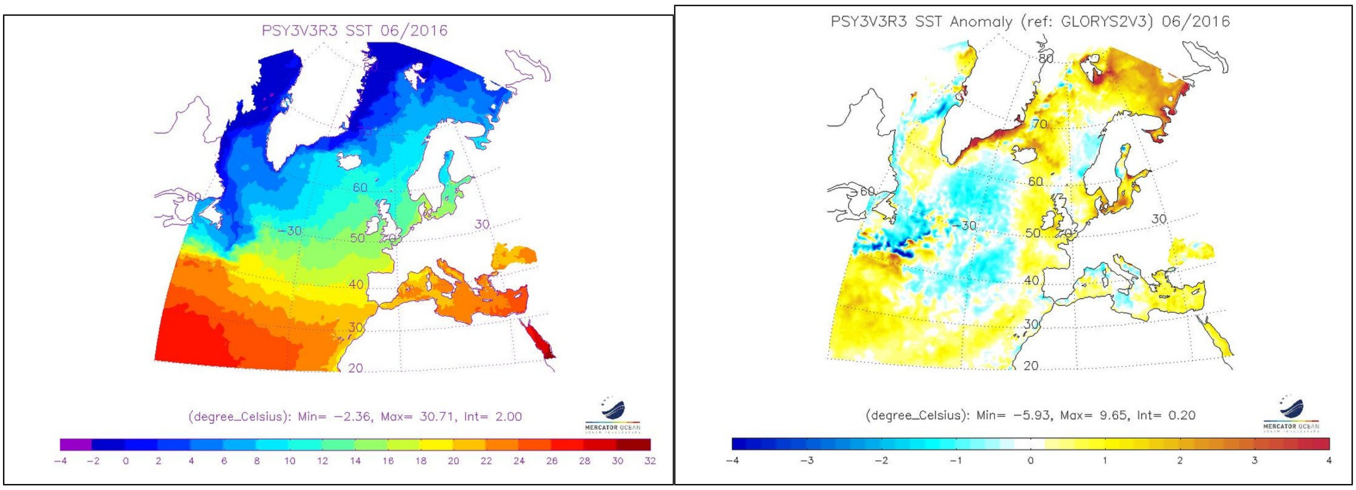


fig.I.1.6 : Mean sea surface temperature in the RA VI Region (Europe) and anomaly (reference Glorys 1992-2009). http://bcg.mercator-ocean.fr/

ATMOSPHERE

I.1.c General Circulation

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

- In June , overall quite similar structures to those of May. Reflect the activity of the MJO and the passage of a very active wave Kelvin over the maritime continent (severe floods in Java June 18 : At least 30 dead) .

- Anomalies observed since April on the East Pacific (upward) and the Tropical Atlantic (downward) are still present (relics Niño Effect PDO + ?) .

- The standardized SOI index continues to rise (+0.6 in June). (https://www.ncdc.noaa.gov/teleconnections/enso/indicators/soi/) .

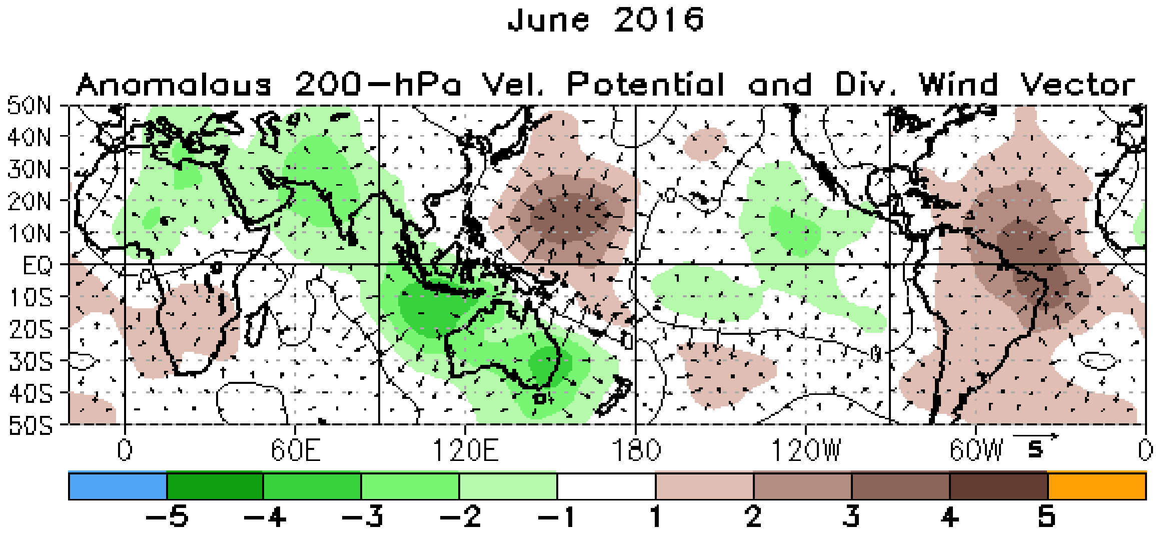


fig.I.2.1: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

MJO (fig. I.2.b):

- Significant activity: a world tour in June , with a maximum of activity in phase 1 to 3 (Africa and Indian Ocean) . Dubbed with the passage of a active Kelvin wave (http://monitor.cicsnc.org/mjo/v2/hov/cfs/chi200.cfs.eqtr.png) .

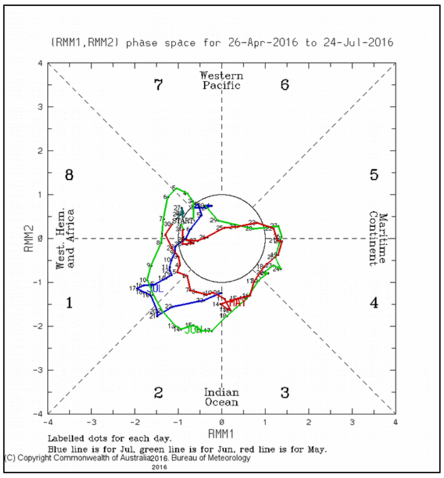


fig.I.2.b: indices MJO http://cawcr.gov.au/staff/mwheeler/maproom/RMM/phase.Last90days.gif

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

- No tropics -> midlatitudes teleconnexions clearly identifiable .

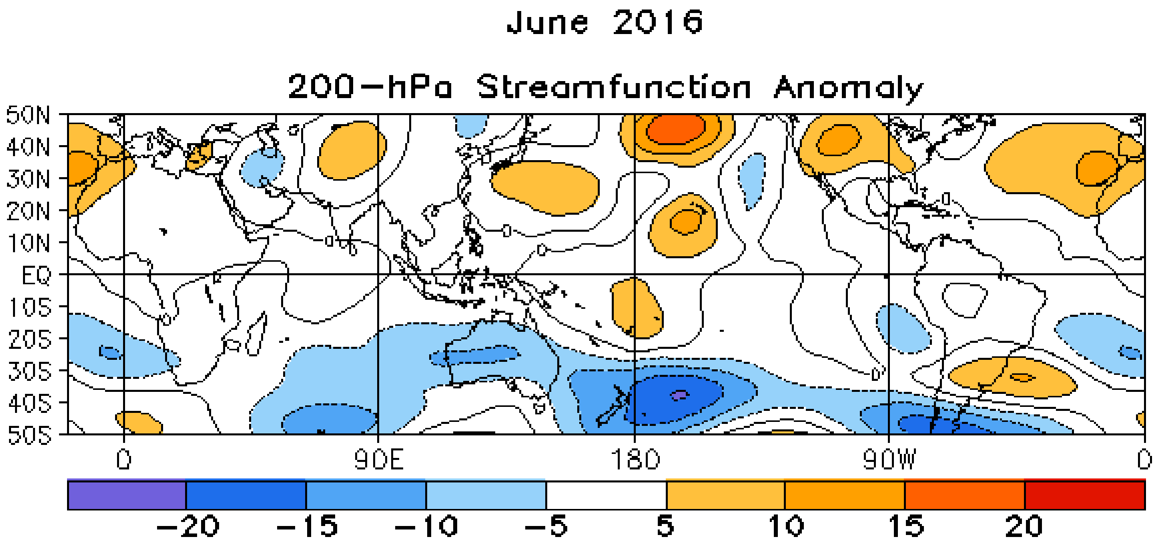


fig.I.2.2: Stream Function Anomalies at 200 hPa.
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

Geopotential height at 500 hPa (fig. 1.2.3 – insight into mid-latitude general circulation):

- In Northern Hemisphere , mostly positive anomalies (except a negative anomaly between North Pole and Beaufort Sea). In particular, significant positive anomalies south of the Aleutian and over Siberia. Positive anomaly on Iceland .

- PNA and NAO are negative (-0.6 and -0.1 resp.) . Positive EA with +0.4 .

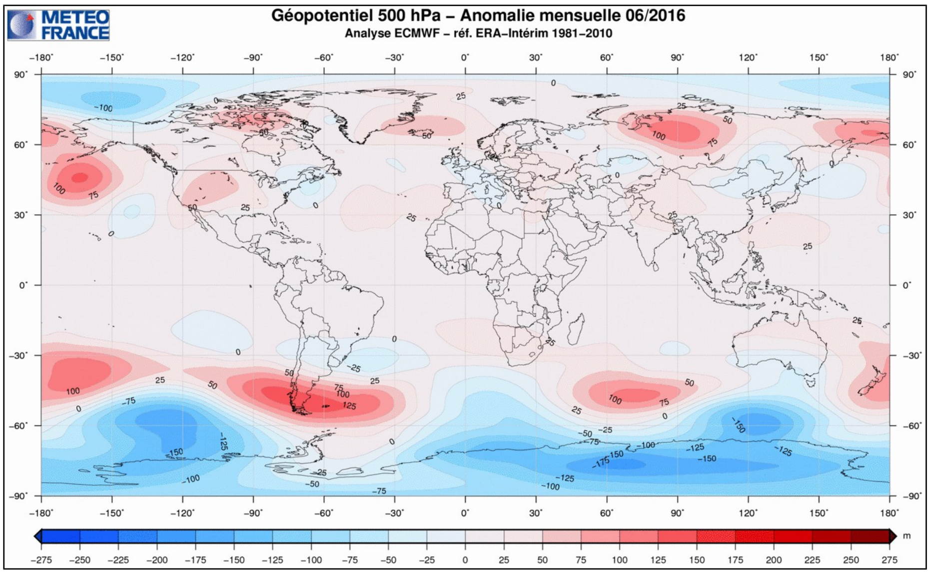


fig.I.2.3: Anomalies of Geopotential height at 500hPa (Meteo-France)

MONTH	NAO	EA	WP	EP-NP	PNA	TNH	EATL/WRUS	SCAND	POLEUR
JUN 16	-0.1	0.4	-0.6	1.3	-0.6	---	-1.9	-1.0	-1.1
MAY 16	-0.7	0.2	0.6	0.1	-0.9	---	-2.0	1.0	-0.4
APR 16	0.3	1.0	-0.3	1.5	0.6	---	-0.5	-0.1	-1.6
MAR 16	0.4	0.7	-0.2	0.2	0.4	---	0.3	-0.2	-0.2
FEB 16	1.3	1.9	1.6	0.2	1.7	0.2	-2.4	-0.5	-2.3
JAN 16	-0.4	1.0	1.0	-0.3	1.9	-0.3	-0.5	-0.7	-2.6
DEC 15	2.0	3.1	0.6	---	0.5	0.0	1.3	0.1	0.6

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 :

Slightly higher intensity of the Azores High, extending to much of southwestern Europe. Icelandic Low, too, more intense than normal and relocated to the south, resulting in a stronger gradient over the North Atlantic. However, this pattern is quite weak in 500 hPa level, so NAO and EA indices are close to zero and do not have a major impact in Europe.

Most dominating pattern was EATL/WRUS (-1.9) with high persistency to the previous month. In summer, this pattern is characterized by a blocking High over Eastern Europe, but only a weak negative geopotential anomaly over western Europe. Although the blocking High is quite weak, the anomaly structure can be identified, and a trough over Europe can be seen even on monthly average.

Further contribution from SCAND pattern, which turned to a negative phase from May to June due to a negative geopotential anomaly in northern Scandinavia. Together with a positive anomaly over Iceland, this dipole causes a cold polar airflow to Scandinavia.

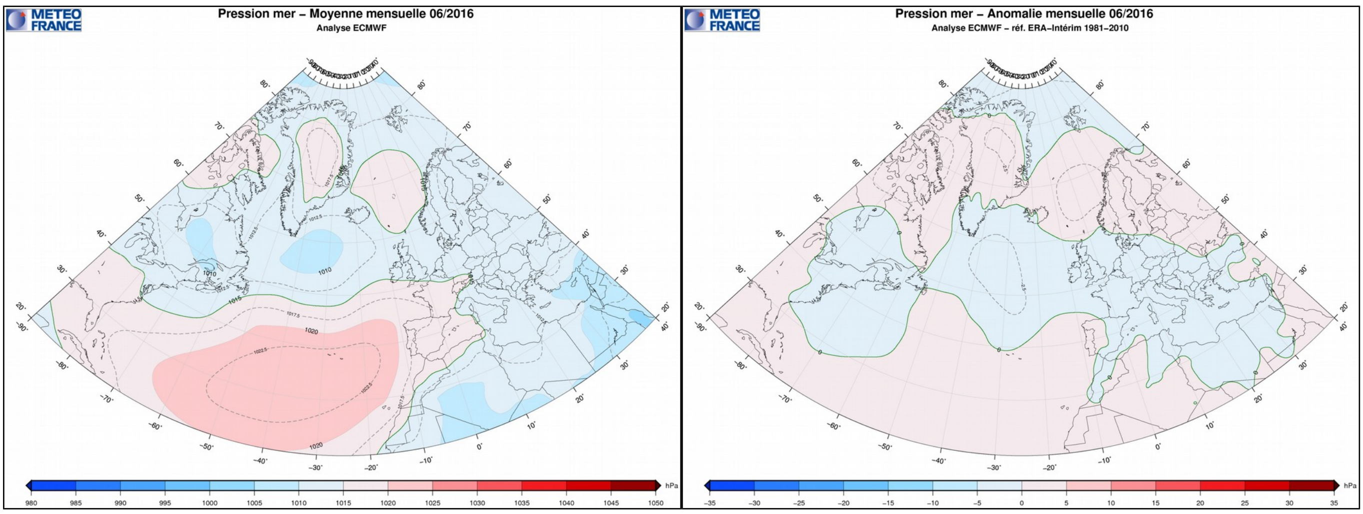


fig.I.2.4: Mean sea level pressure in the RA VI Region (Europe) (left) and 1981-2010 anomalies (right).

Circulation indices: NAO and AO

NAO had a slight negative phase in the first half and a slight positive phase in the second half of the month. This is consistent with the Meteo France weather type classification, which shows also a NAO-phase in the first half of the month, mainly caused by high pressure over Iceland. The cold air intrusion over Scandinavia mentioned above also occurred during that time. The DWD Grosswetterlagen classification shows in fact a westerly, but blocked type just in the last week of June, nevertheless cyclonic types for Europe during much of the month.

AO generally shows a similar behavior, which would mean that a hemispheric change of circulation occurred around the middle of the month from higher to lower air mass exchange between polar and middle latitudes.

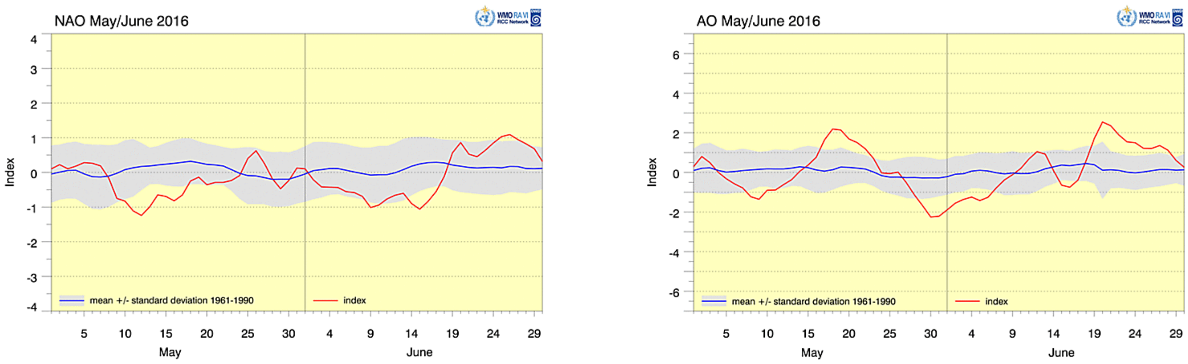


fig.I.2.5: North Atlantic Oscillation (NAO, left) and Arctic Oscillation (AO, right) indices with 1961-1990 mean standard deviation (shading). http://www.dwd.de/rcc-cm , data from NOAA CPC: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml

I.1.d Precipitation

Structures of precipitation correlated with SST in the Tropical Pacific .

- Important surplus over maritime continent (activity of the MJO and the passage of a Kelvin wave)

- Indian monsoon begins visible on the Bay of Bengal .

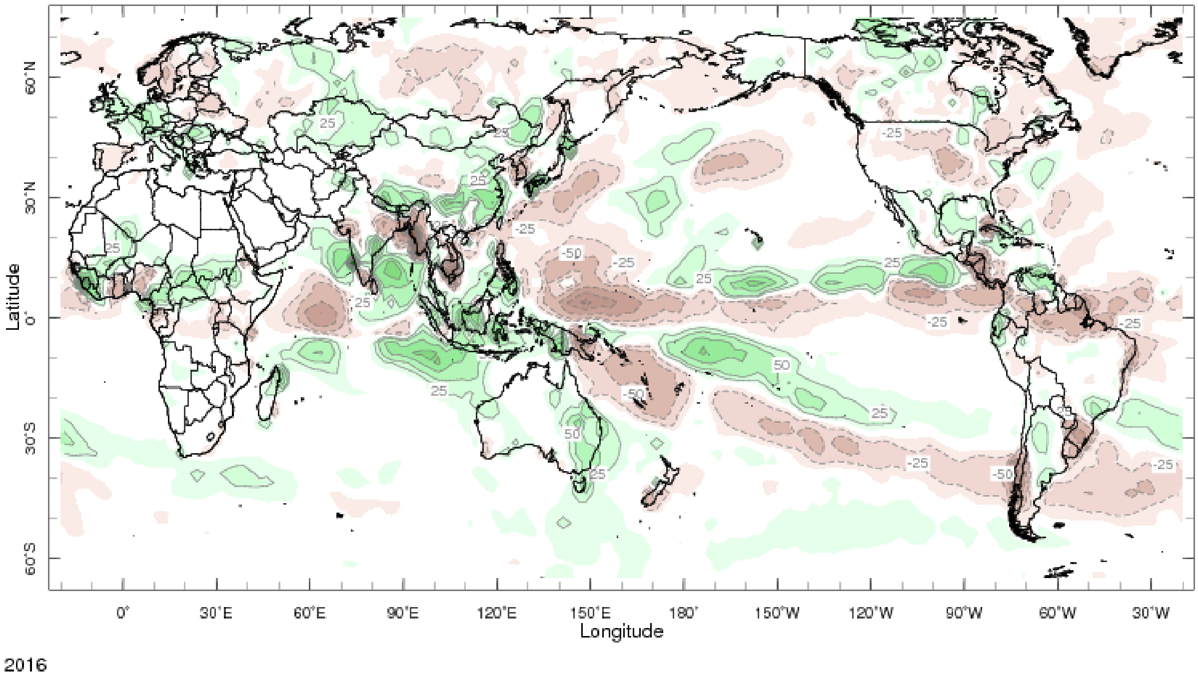


fig.I.2.6: Rainfall Anomalies (mm) (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.
http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/Anomaly.html

Precipitation anomalies in Europe:

In spite of relatively low geopotential anomalies, precipitation shows quite high anomalies in a multipole structure:

- Dry area over Iberia/southern France due to Azores high influence,

- Very wet area from Ireland/UK over western/central Europe to the Adriatic region and Romania, consistent with trough over western Europe / low over central Europe, particularly due to heavy rains at the beginning of the month,

- Dry area from Iceland / southern Scandinavia to eastern Europe, consistent with high pressure, partly blocking,

- Wet area over northern/eastern Scandinavia due to negative SCAND phase

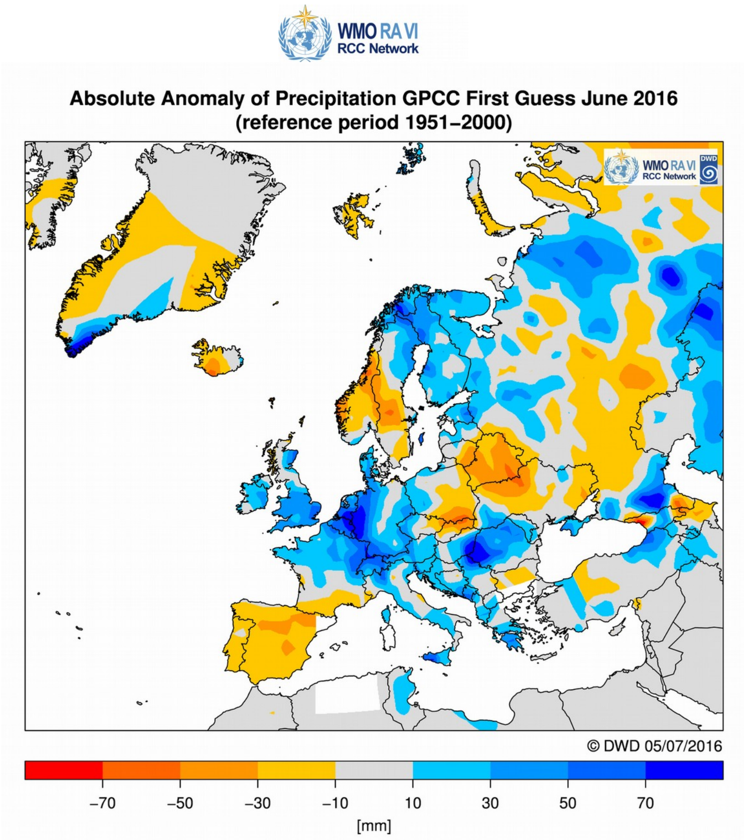


fig.I.2.7: Absolute anomaly (1951-2000 reference) of precipitation in the RA VI Region (Europe), data from GPCC (Global Precipitation Climatology Centre), http://www.dwd.de/rcc-cm.

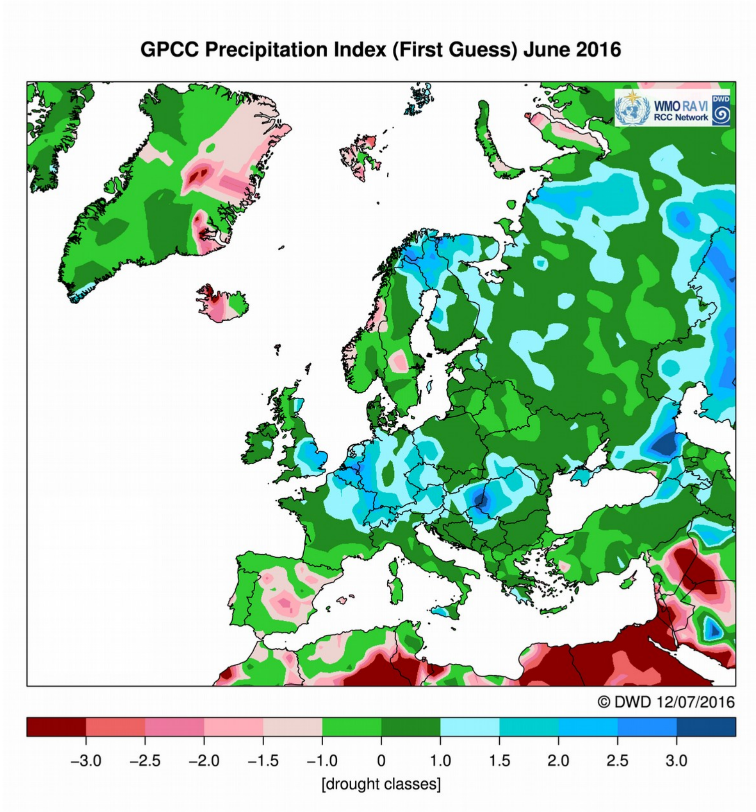


fig. I.2.8: GPCP Precipitation Index http://www.dwd.de/rcc-cm .

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	GPCP Drought Index
Northern Europe	+4.9 mm	+0.383
Southern Europe	+3.9 mm	+0.156

Please note: new drought index since January 2016. The GPCC drought index, which also considers evaporation in addition to precipitation replaces the former SPI-DWD.

I.1.e Temperature

- The first six months of 2016 have been the warmest half-year on record (since 1880 – Credits NASA-GISS)
- The month of June is also a record .
- Strong positive temperature anomaly over Siberia .

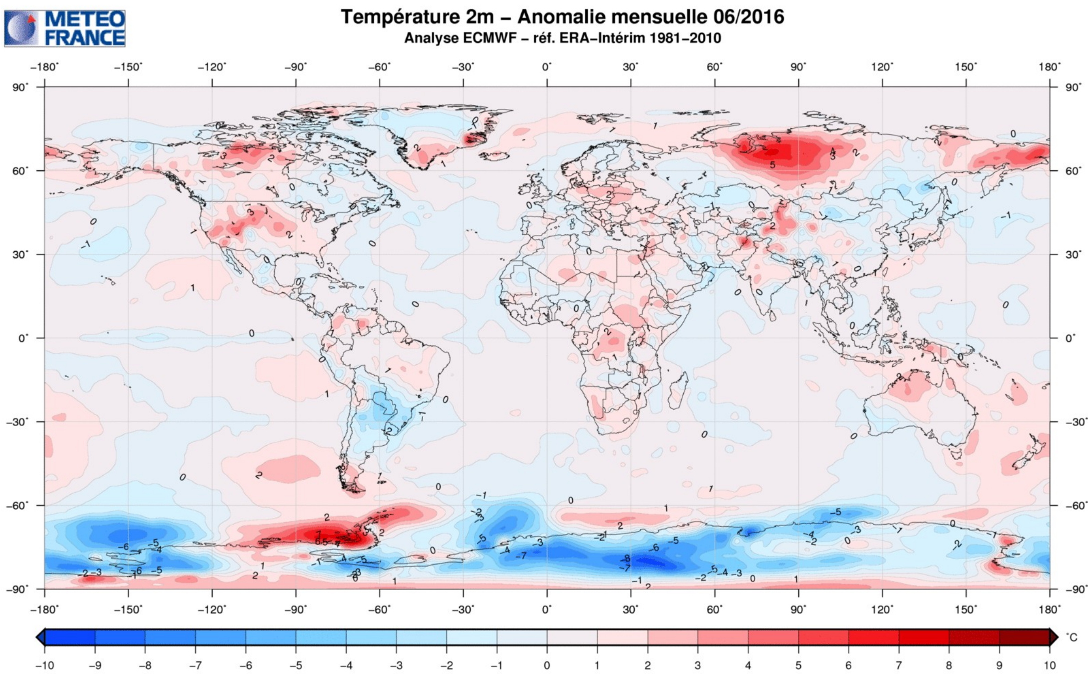


fig.I.2.9: Temperature Anomalies (°C) (Meteo-France)

Temperature anomalies in Europe:

Northern Europe was mainly warmer than normal, especially the northeast, reflecting the anticyclonic conditions particularly in 500 hPa.

Large parts of the southern half of Europe were colder than normal, partly due to the cold spell in the middle of the month, partly due to cooling after convective events.

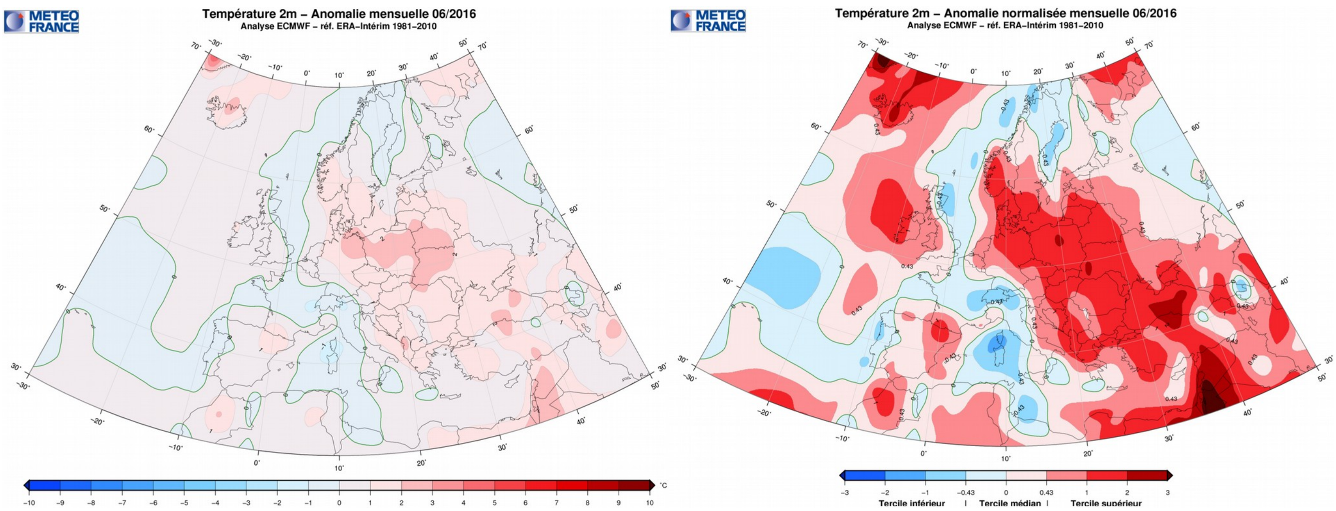


fig.I.2.10: Left graph: Absolute anomaly of temperature in the RA VI Region (Europe). Right graph: Standardized temperature anomalies

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	+1.2°C
Southern Europe	+1.6°C

I.1.f Sea ice

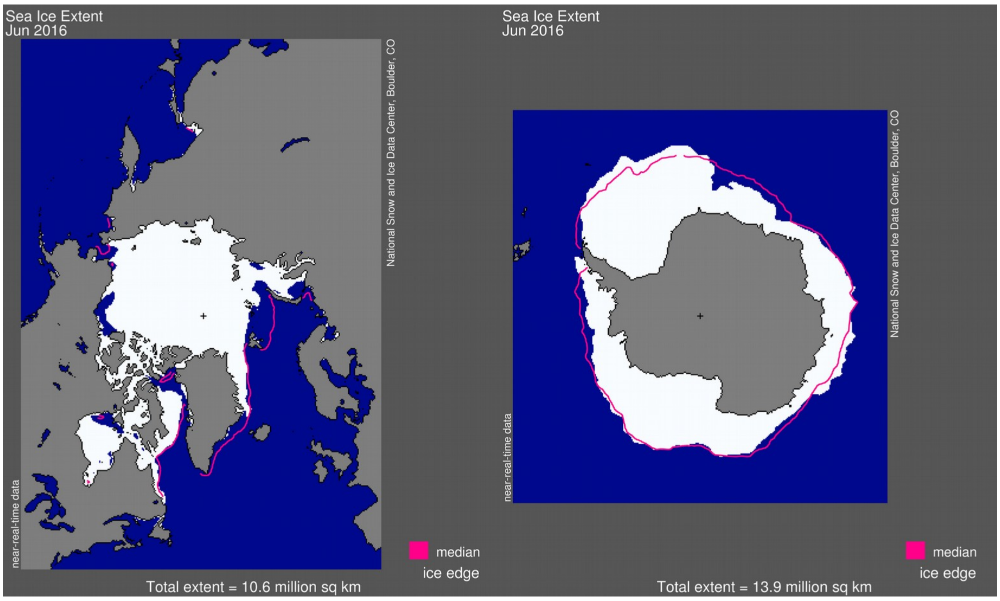


fig.I.2.11: Sea-Ice extension in Arctic (left), and in Antarctic (right). The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

In the Arctic (fig. 1.2.11 and 1.2.12 - left) : Always on Record low (< -2 std). Arctic sea ice extent during June 2016 averaged 10.60 million square kilometers, the lowest in the satellite record for the month. We remain on the 2012 curve , the minimum record year extension of the sea ice at the end of melting (September 2012) .
In the Antarctic (fig. 1.2.11 and 1.2.12 - right) : Extension near normal at the end of June..

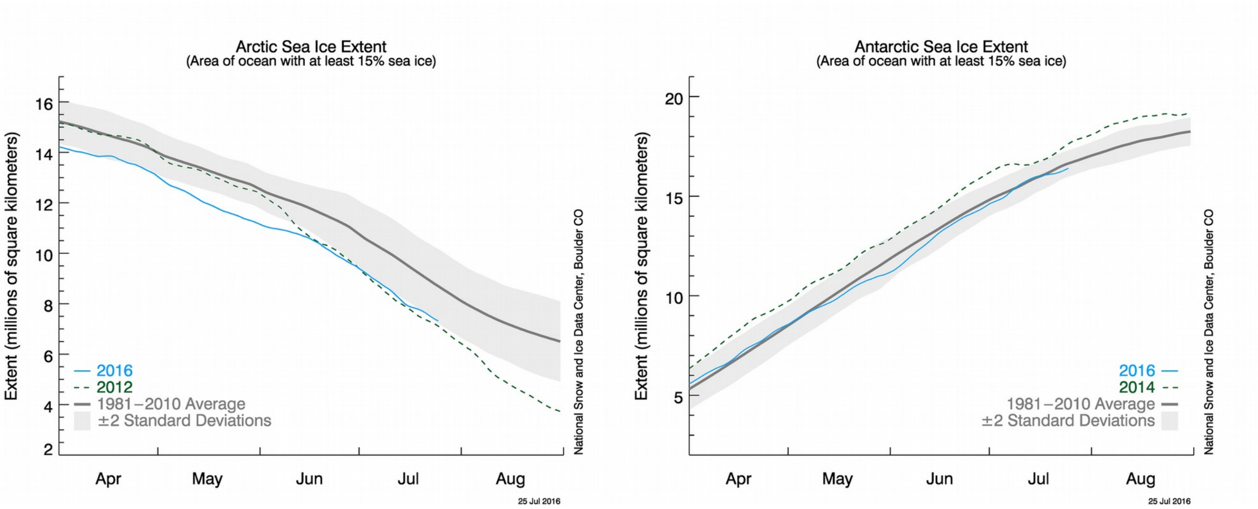


fig. I.2.12 : Sea-Ice extension evolution from NSIDC.
http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png

II. SEASONAL FORECAST FROM DYNAMICAL MODELS

La Niña conditions (low intensity) , or Neutral .

Important notice : the new ARPEGE System 5 model is the one that contribute to the Eurosip consensus from this month onward. However, for technical reasons, some figures shown this month still originate from the former ARPEGE System 4.

OCEANIC FORECASTS

II.1.a Sea surface temperature (SST)

anomaly patterns for the next 3 months do not significantly differ from the previous forecast.

Pacific Ocean: On the equatorial rail, models are in fairly good agreement, suggesting a negative anomaly of SST which extends beyond the date change line (westward). ECMWF provides a little less cold and less extensive scenario.

Positive SST anomalies are expected to continue in two hemispheres on either side of the equatorial rail (positive Interdecadal Pacific Oscillation structure).

Indian Ocean: Western SST negative anomaly (WTIO box) and positive in the East (SETIO box). The models are in good agreement, although ECMWF offers a much less pronounced negative anomaly along the African coast (but it offers many beautiful positive anomaly in the East). The DMI index is negative (IOD so negative mode).

Atlantic Ocean: for the North Atlantic : positive anomalies from Florida to the Azores, and over the Labrador Sea. The negative anomaly over Atlantic center seems to deconstruct and disappear (it is mostly offered by ARPEGE S4 and S5). Tropical North Atlantic with normal values.

Few signal over the Gulf of Guinea: the cold tongue is virtually absent in all simulations (some very little signal in CFS and ARPEGE S5). The 2 ARPEGE models (S4 and S5) offer a large upwelling along the African coast (Mauritania), the result of a strengthening of the NE trade winds (also visible in the forecasts).

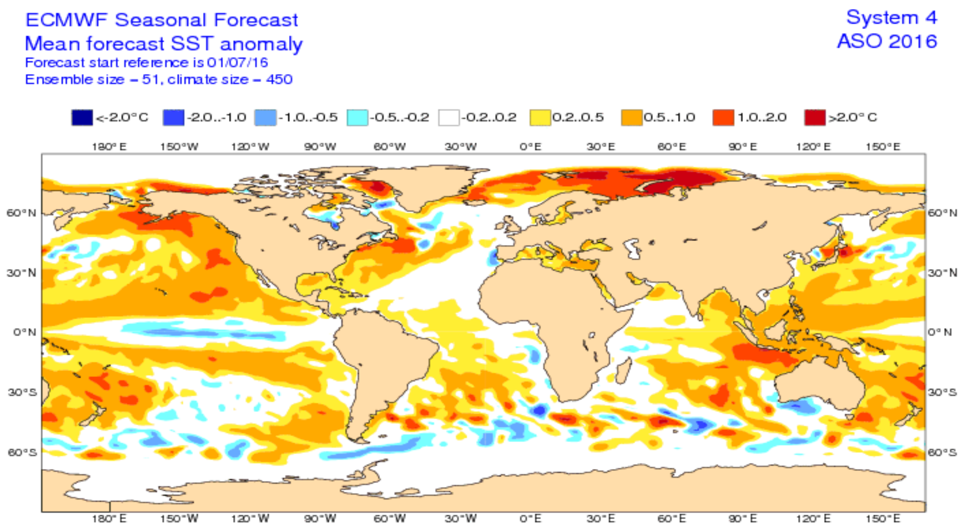


fig.II.1.1: SST anomaly forecast from ECMWF
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

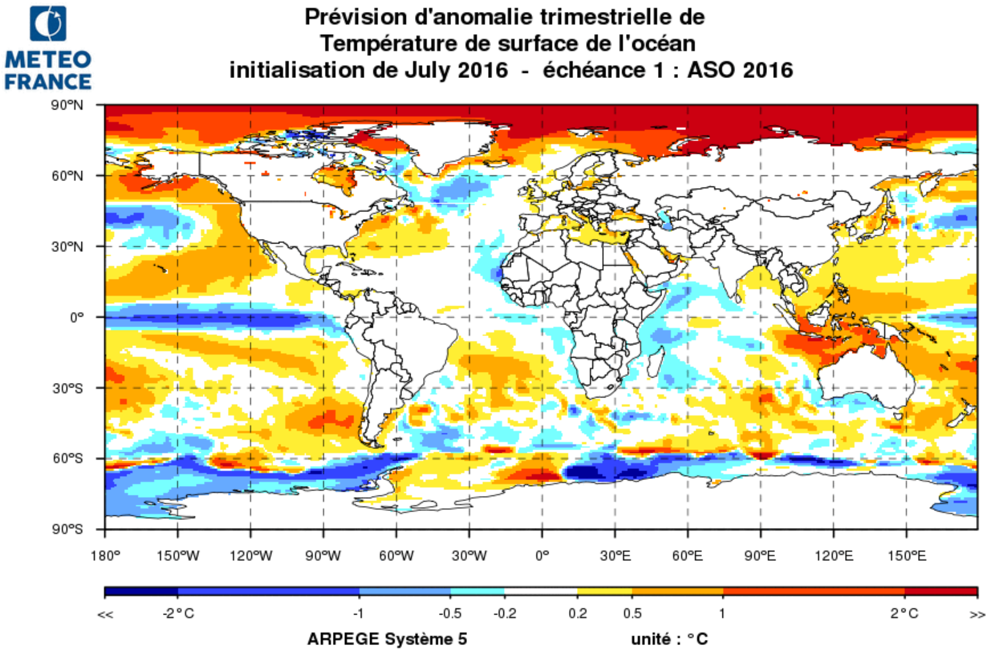


fig.II.1.2: SST Anomaly forecast from Meteo-France (recalibrated with respect of observation).
http://elaboration.seasonal.meteo.fr

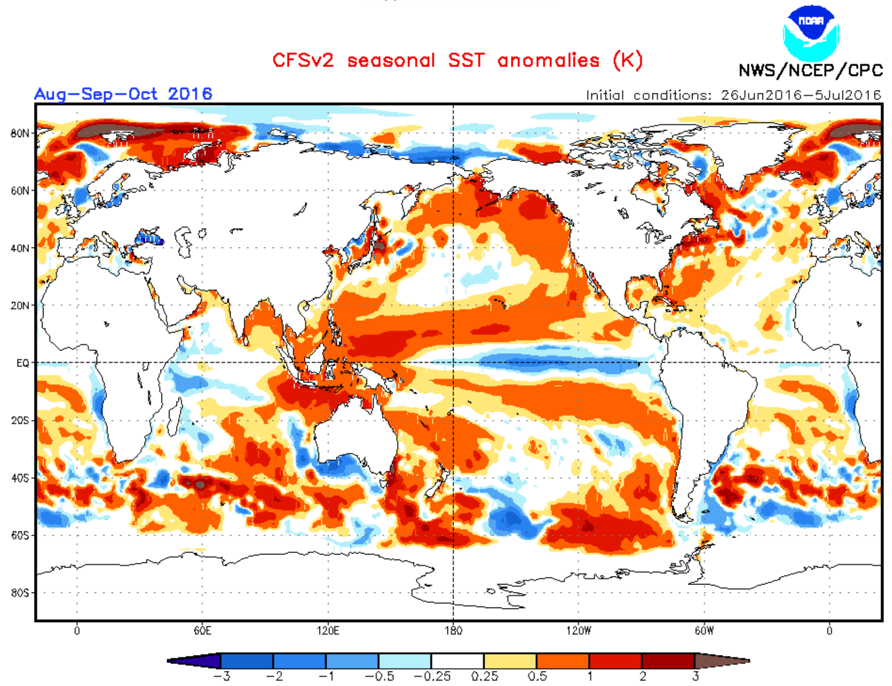


fig.II.1.3: SST anomaly forecast from NCEP. http://www.cpc.ncep.noaa.gov/products/people/wwang/cfsv2fcst/imagesInd1/glbSSTSeaInd1.gif

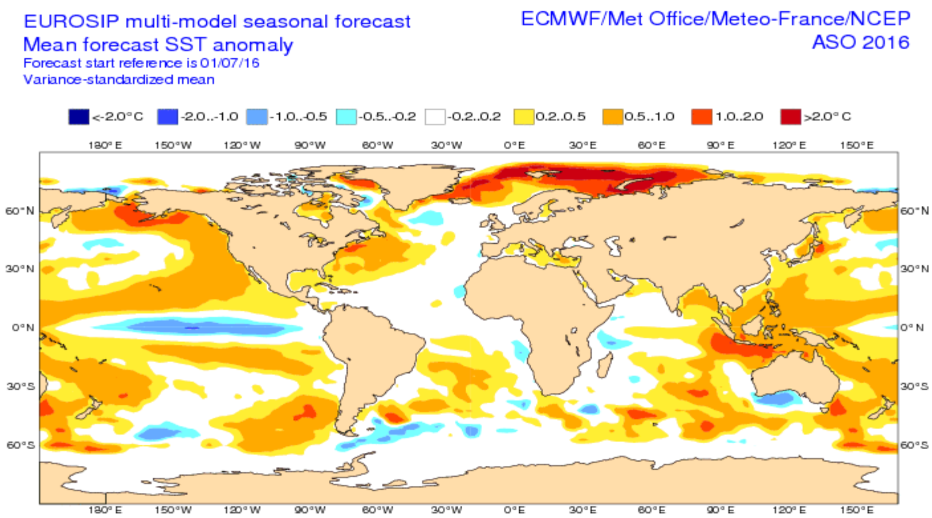


fig.II.1.4: SST Forecasted anomaly from Euro-SIP

II.1.b ENSO forecast

Forecast Phase: *Low Niña or neutral.*

The models have slightly slowed down this month and moderate their impulse to propose Niña . Thus, the probability for La Niña and neutral phases are with EUROSIP , both in the order of 50% for the next quarter ASO . The IRI offers the same scenario. ECMWF is among the less cold models. Statistically, Niña episodes in terms of positive PDO have mitigated effects (see http://www.nature.com/articles/srep06651#f4).

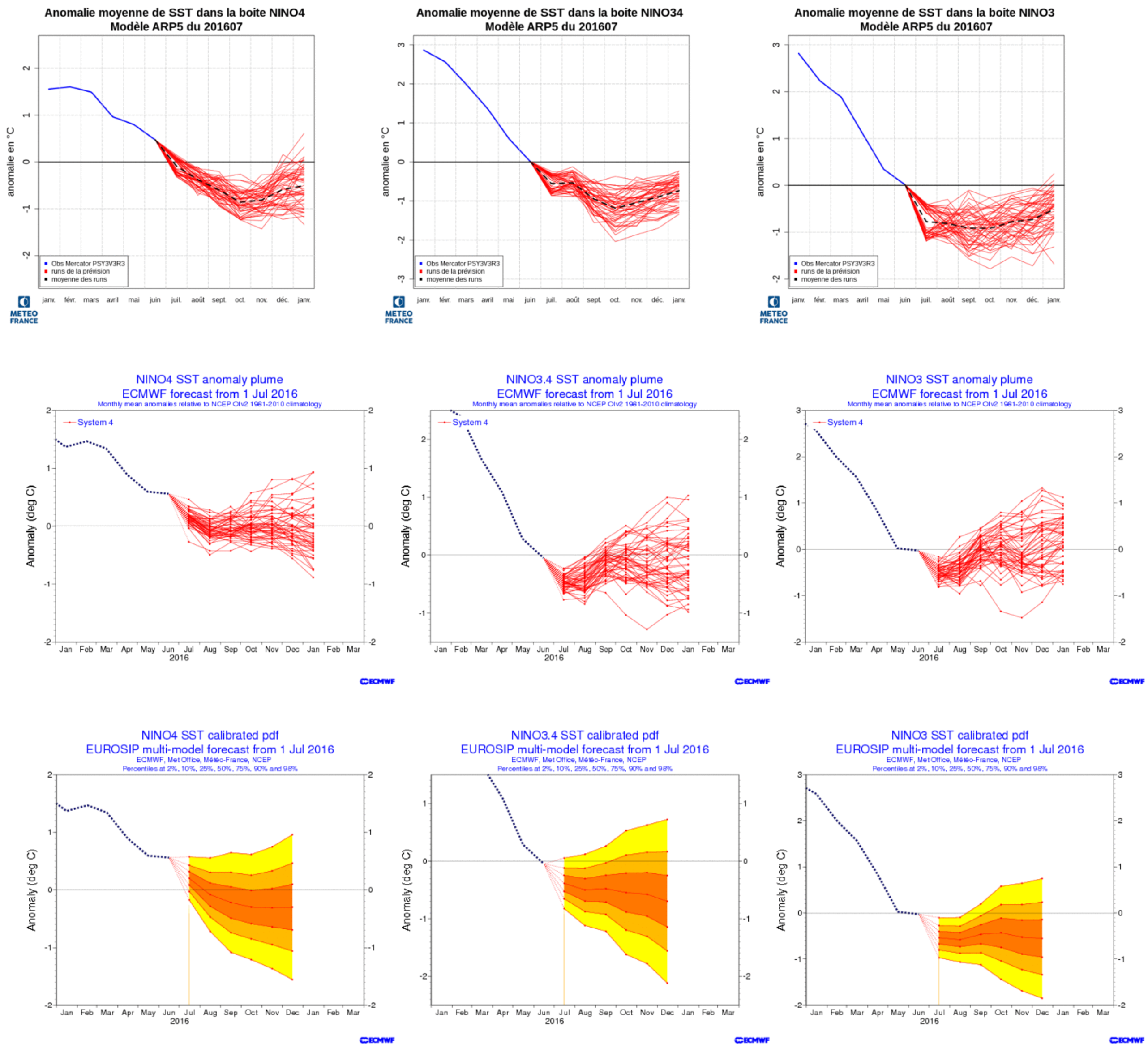


fig.II.1.5: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members - and EuroSIP (bottom) – recalibrated distributions - (http://elaboration.seasonal.meteo.fr , http://www.ecmwf.int/)

II.1.c Atlantic ocean forecasts

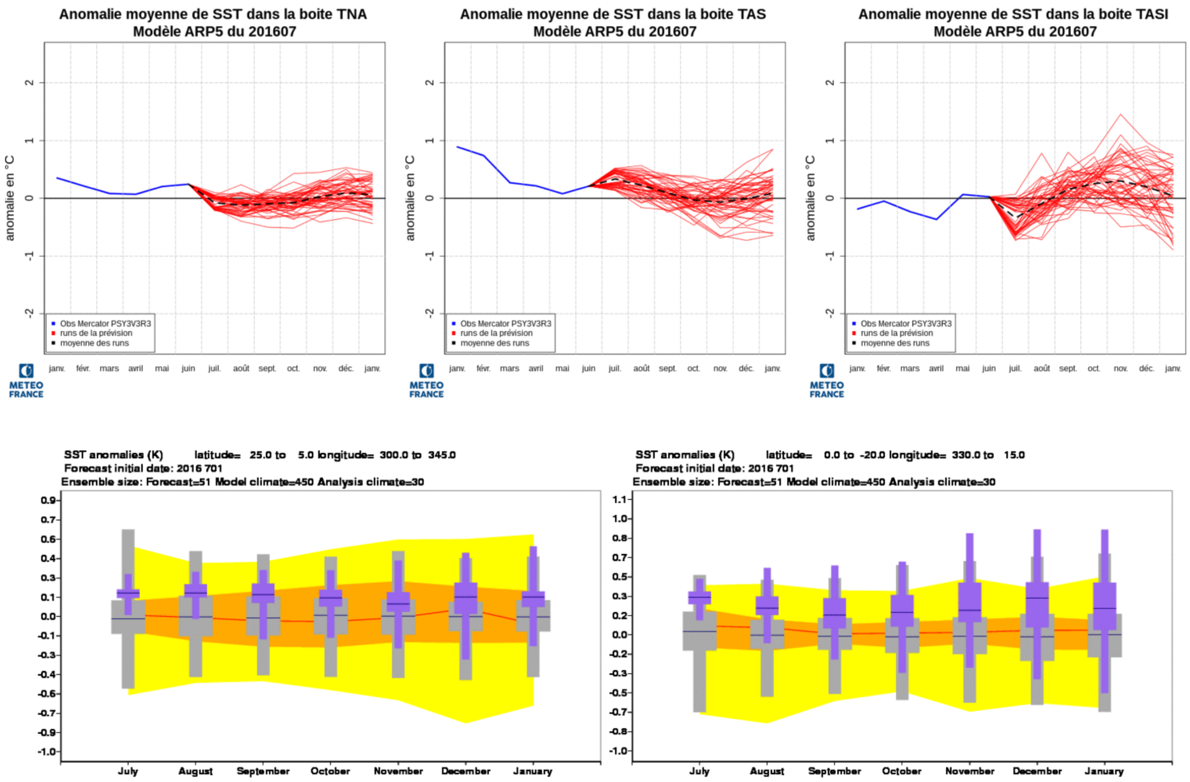


fig.II.1.6: SSTs anomaly forecasts in the Atlantic Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

II.1.d Indian ocean forecasts

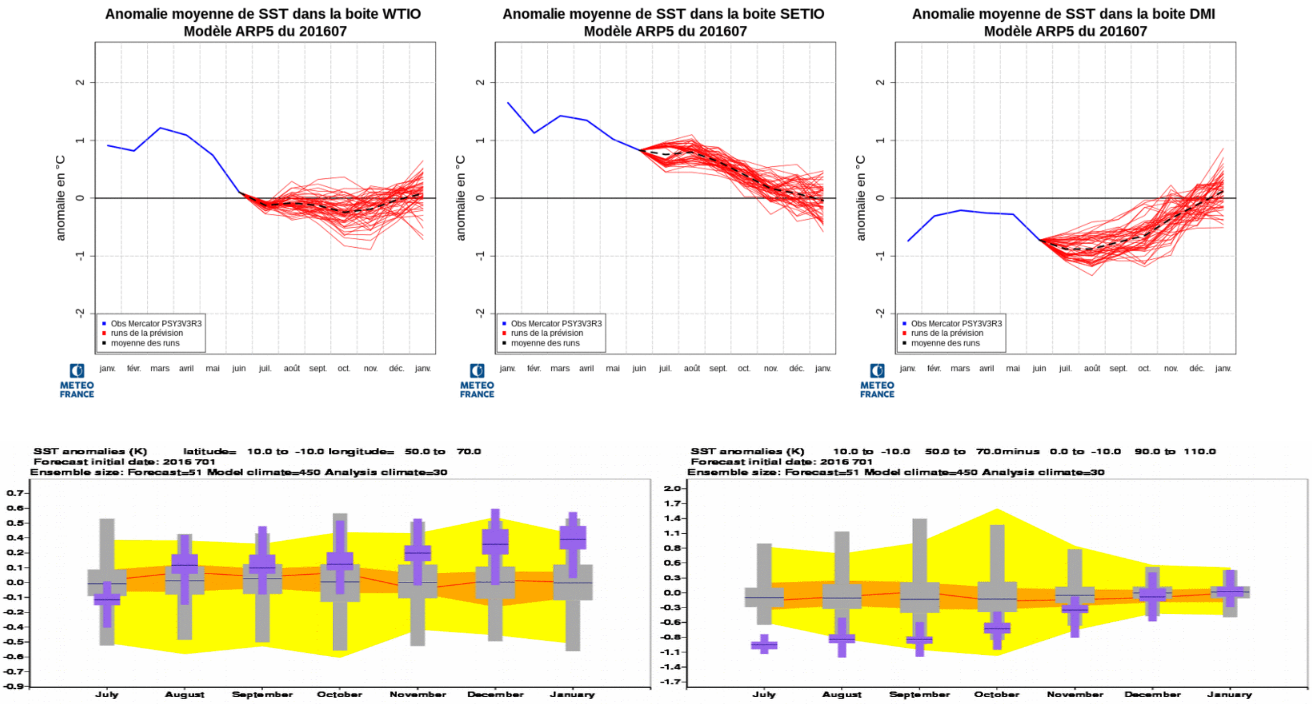


fig.II.1.7: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

GENERAL CIRCULATION FORECAST

II.1.e Global forecast

Velocity potential anomaly field (cf. fig. II.2.1 – insight into Hadley-Walker circulation anomalies) and **Stream Function anomaly field** (cf. fig. II.2.1 – insight into teleconnection patterns tropically forced):

- Potential velocity : fairly good agreement between the models. Upward motion anomaly from India to Western Australia (in connection with the negative IOD) . Large area of subsidence anomaly on Africa and the Atlantic. On the Pacific , the agreement between model is less straightforward , but found a subsiding area in the West and a rising area just north of the equator. This global organization probably has its roots in the very negative IOD . We are going to a wave number 1 structure at the global level , excited by what is happening on the Indian Ocean.

- Stream function : pretty good consistency between models. The signals are stronger on Indian Ocean, Atlantic and the Americas. For Europe , the models seem to lean more towards subsidence and anti-cyclonic circulations.

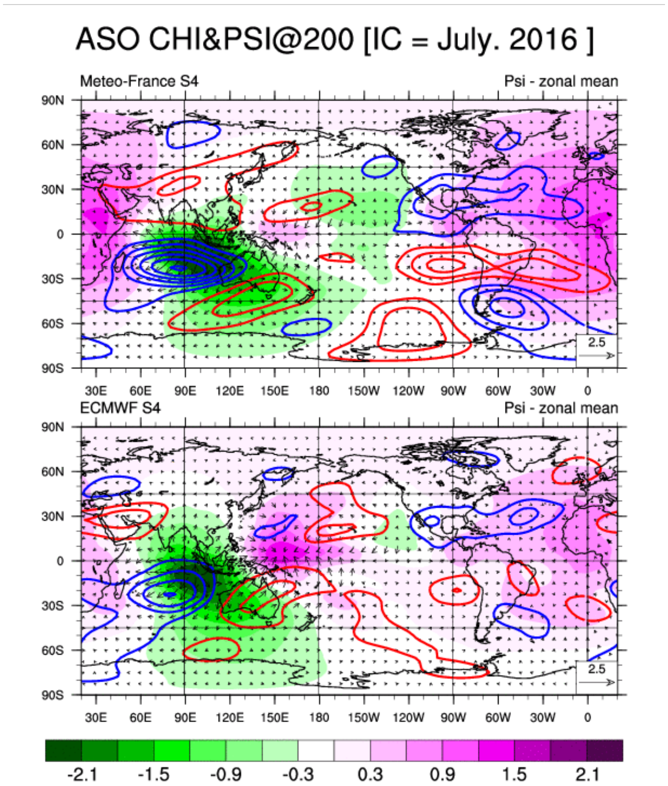


fig.II.2.1: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), associated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa by Météo-France (top) and ECMWF (bottom).

II.1.f North hemisphere forecast and Europe

Geopotential height anomalies (fig. II.2.2 – insight into mid-latitude general circulation anomalies):

The models agree rather provide a context of anticyclonic circulation over the whole northern hemisphere . This is confirmed by the small predominance of blocking and ridge regimes.

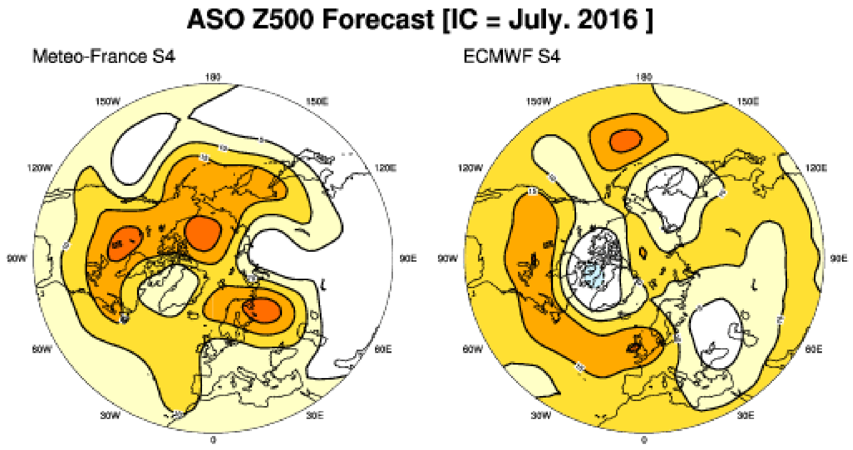


fig.II.2.2: Anomalies of Geopotential Height at 500 hPa from Météo-France (left) and ECMWF (right).

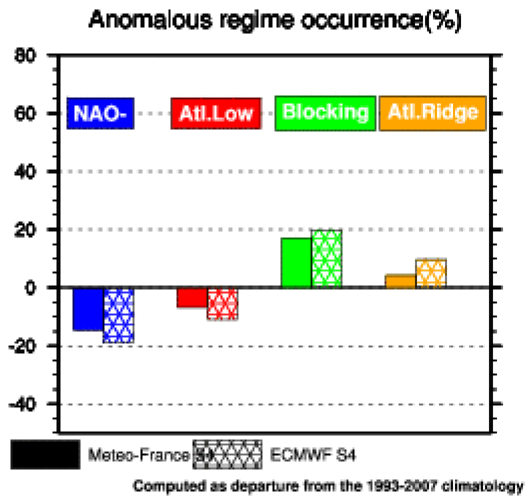


fig.II.2.3: North Atlantic Regime occurrence anomalies from Météo-France and ECMWF : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.

IMPACT: TEMPERATURE FORECASTS

Positive anomalies across the globe are planned largely dominate the world. Only the African monsoon region and the southern half of Australia could experience temperatures below seasonal values (EUROSIP scenario).

European side , only the Mediterranean regions of Europe and the North East of Europe are expected to experience warmer than normal scenario .

II.1.g ECMWF

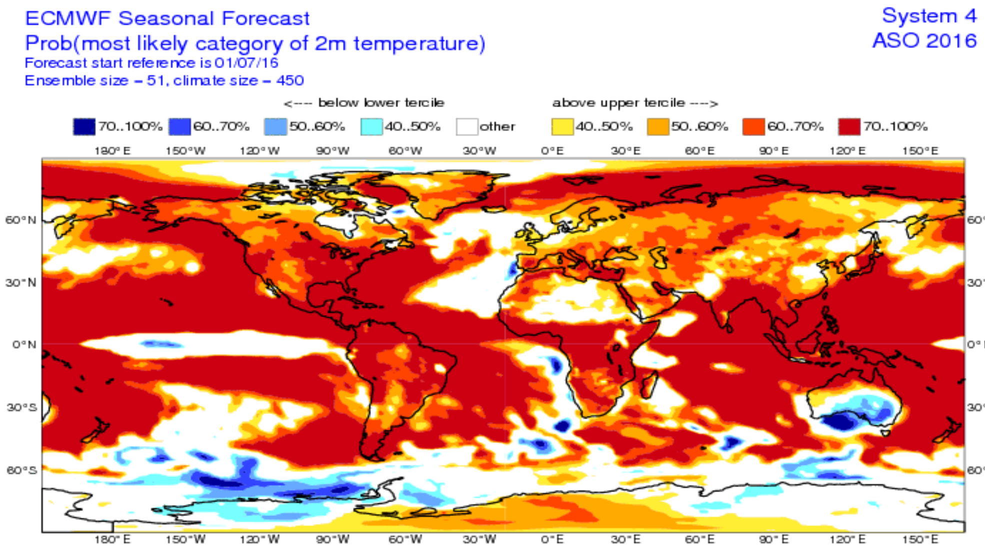


fig.II.3.1: Most likely category probability of T2m from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/

II.1.h Météo-France

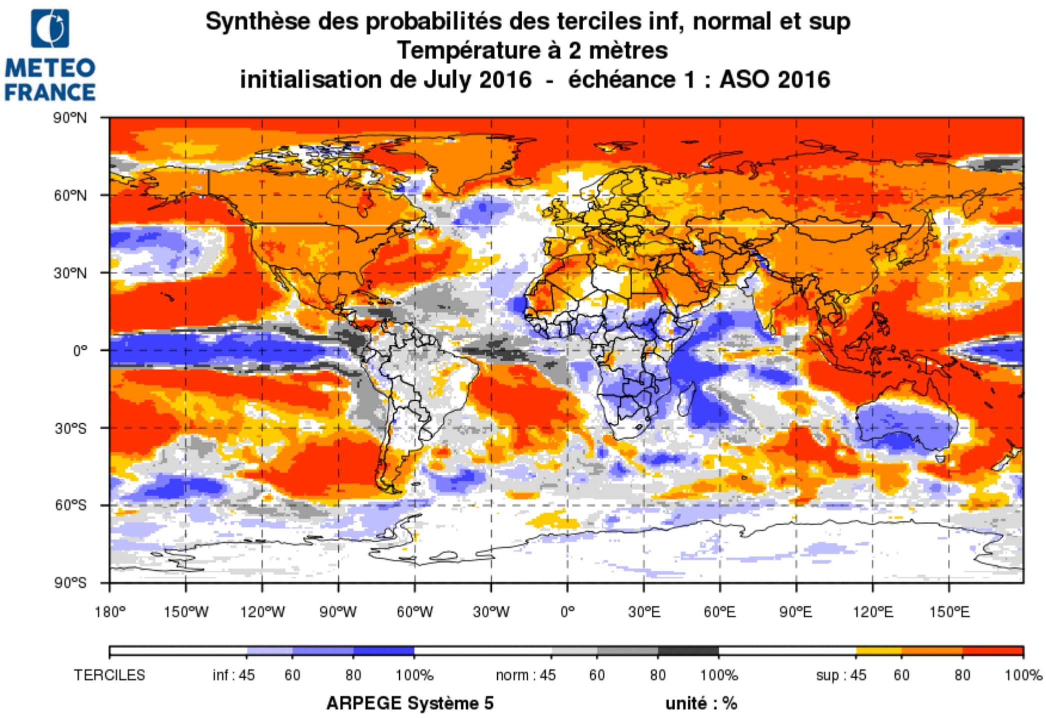


fig.II.3.2: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.1.i Japan Meteorological Agency (JMA)

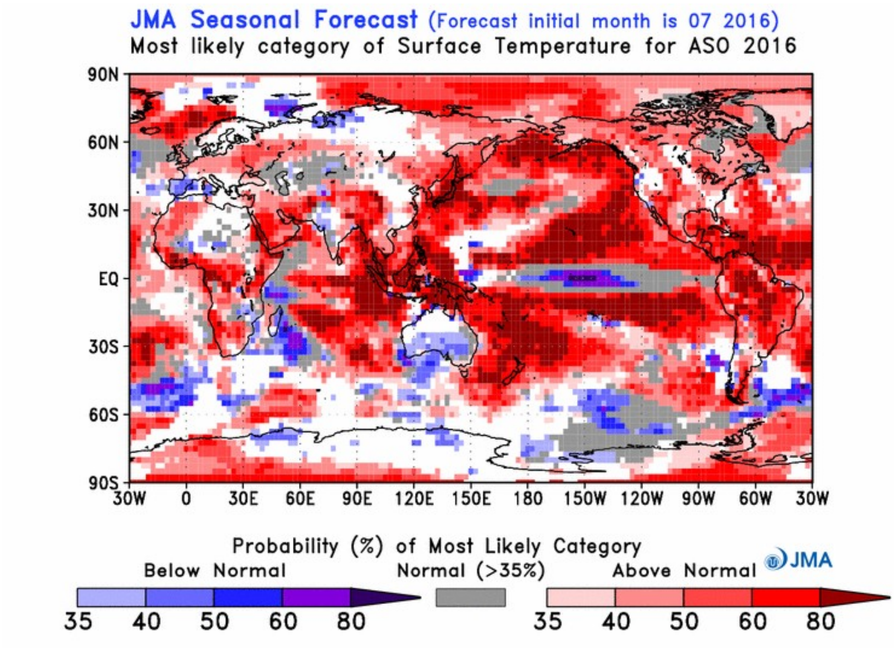


fig.II.3.3: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.php

II.1.j EUROSIP

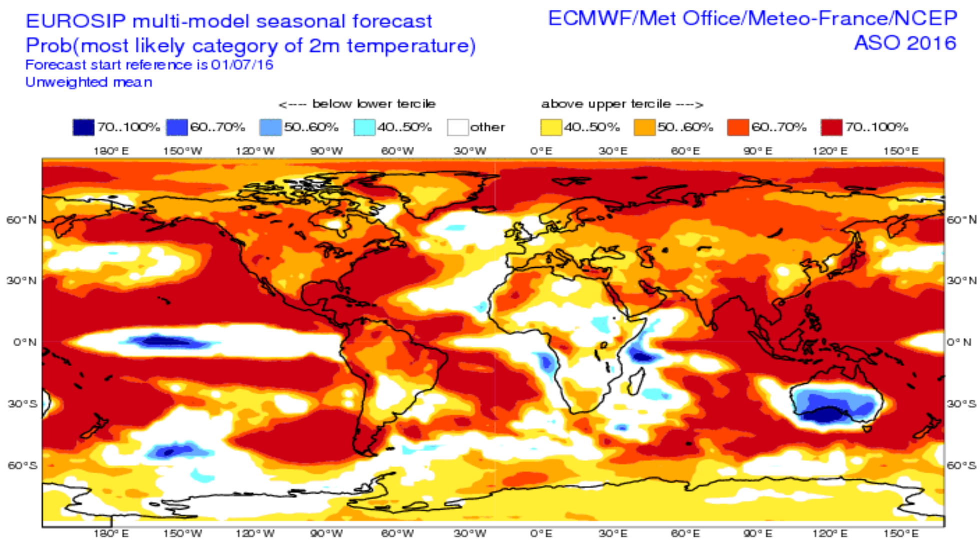


fig.II.3.4: Multi-Model Probabilistic forecasts for T2m from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/

IMPACT : PRECIPITATION FORECAST

On the Pacific along the equator, related cooling of the SST , dry anomaly is planned to expand to the west between 5 ° N and 5 ° S over the entire basin . Positive anomalies persist on each other , related to the positive IPO .

In connection with the strong divergence anomaly at 200 hPa and SST over the Indian Ocean dipole (see index expected negative DMI) , wet anomalies are planned from Australia to Indonesia. Further west on the other hand , drier conditions are provided along Somalia. Moreover, the global situation is not favorable to an active monsoon on West Africa . It should be more active on the eastern Sahel to Sudan .

For Europe , drier than normal scenario over the Iberian Peninsula. Elsewhere , no preferred scenario .

II.1.k ECMWF

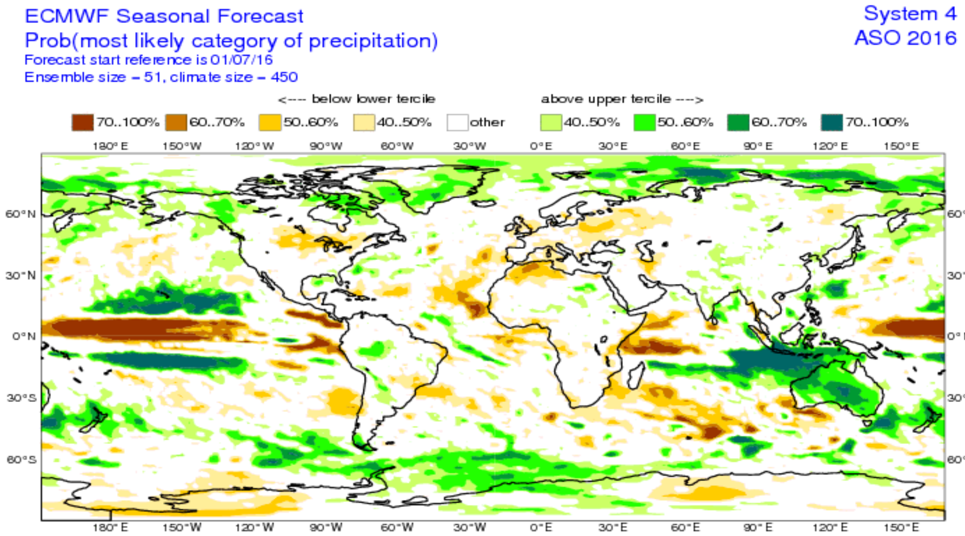


fig.II.4.1: Most likely category probability of rainfall from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/

II.1.l Météo-France

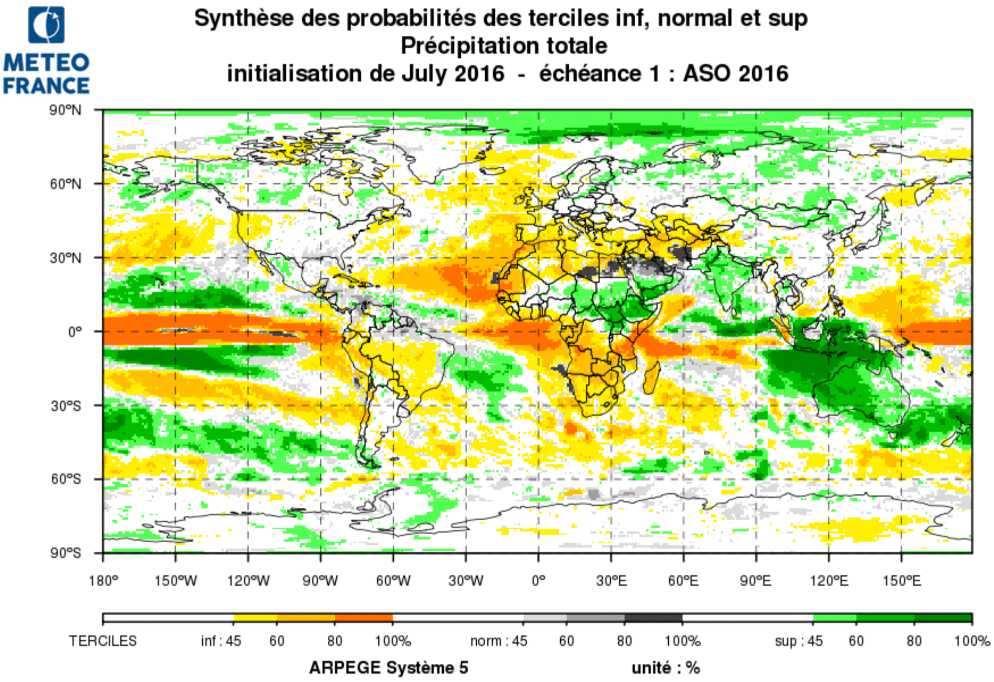


fig.II.4.2: Most likely category of Rainfall. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.1.m Japan Meteorological Agency (JMA)

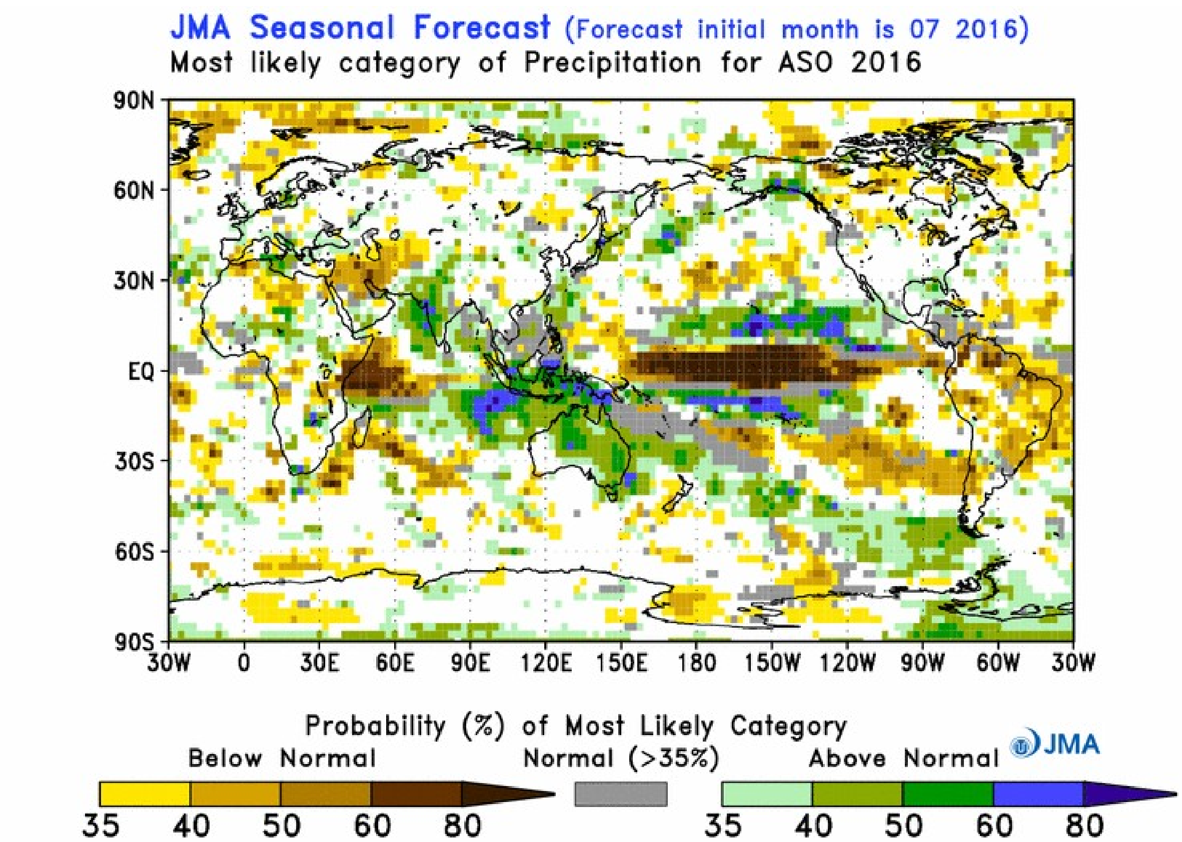


fig.II.4.5: Most likely category of Rainfall from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.php

II.1.n EUROSIP

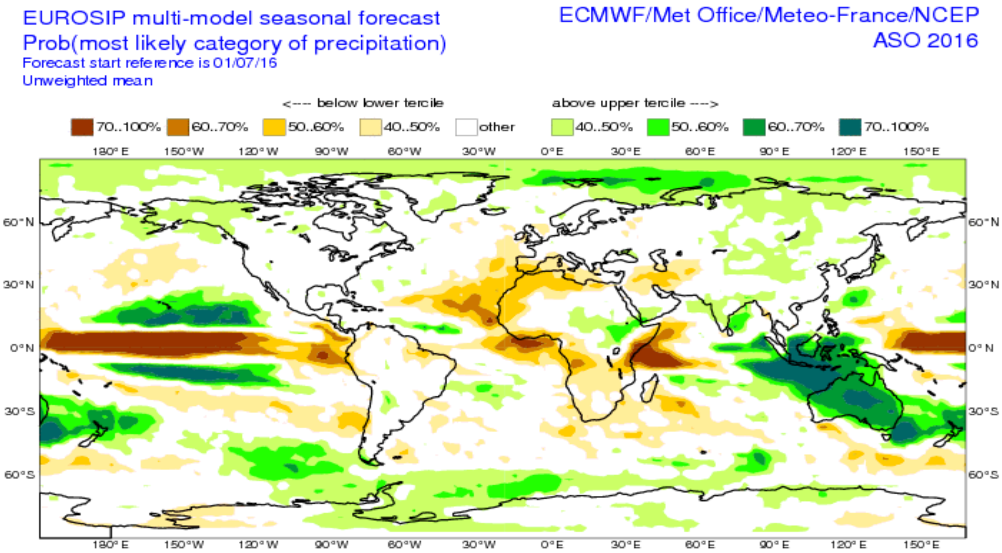
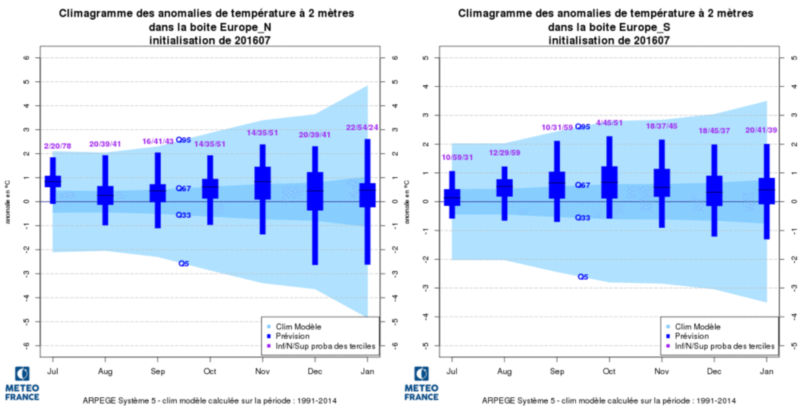


fig.II.4.7: Multi-Model Probabilistic forecasts for precipitation from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/

REGIONAL TEMPERATURES AND PRECIPITATIONS



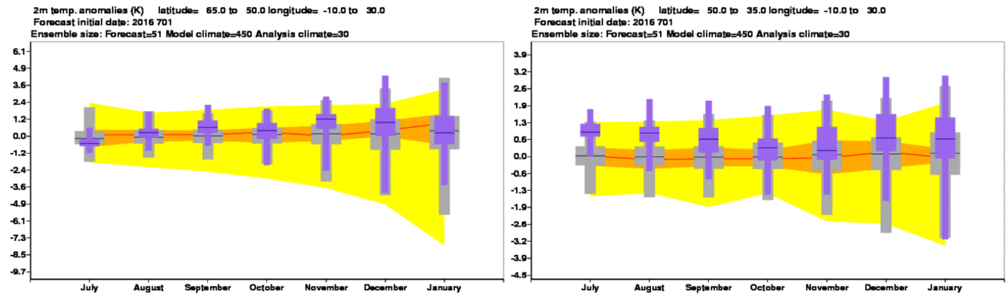


fig.II.5.1 : Climagrams for Temperature in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

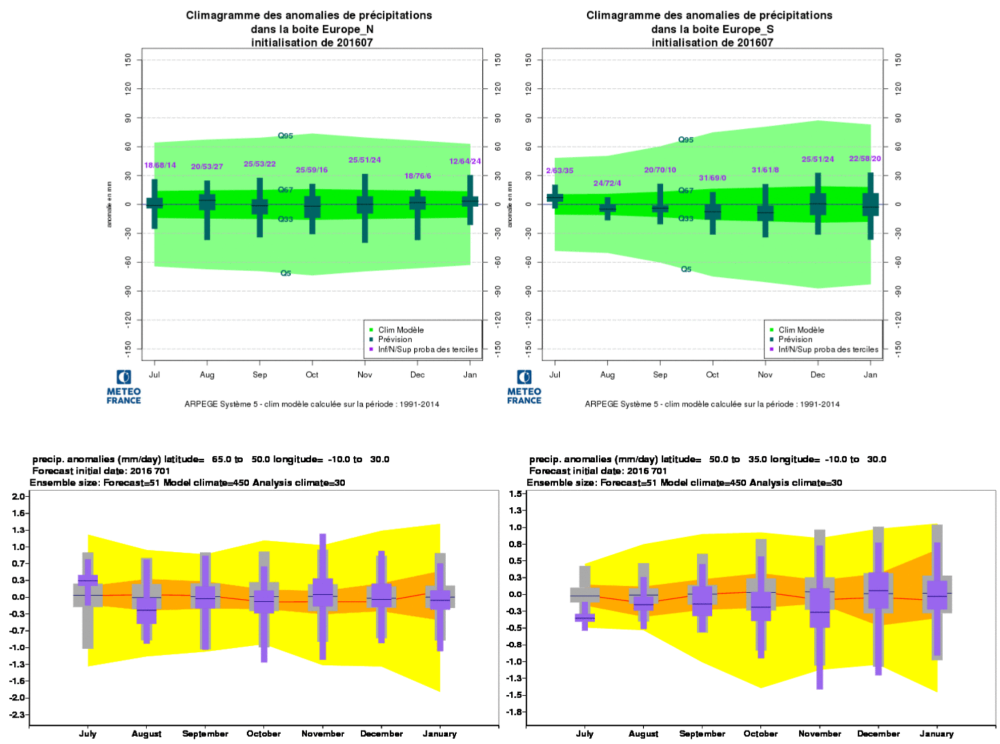


fig.II.5.2 : Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

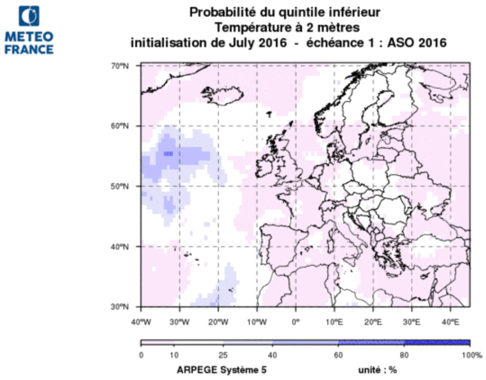
MODEL'S CONSISTENCY

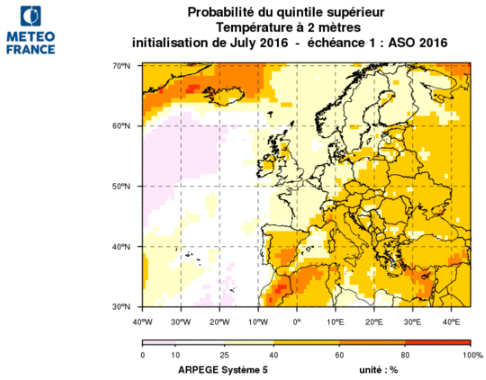
Not available

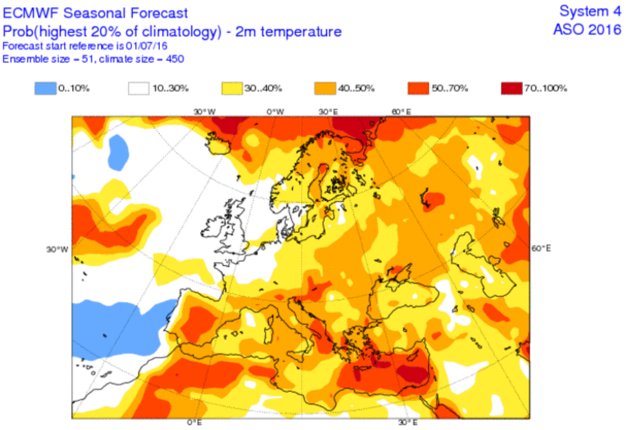
fig.II.6.1 : GPCs Consistency maps from LC-MME http://www.wmolc.org/

For SST :
For Z500 :
For T2m :
For Precipitation :

"EXTREME" SCENARIOS







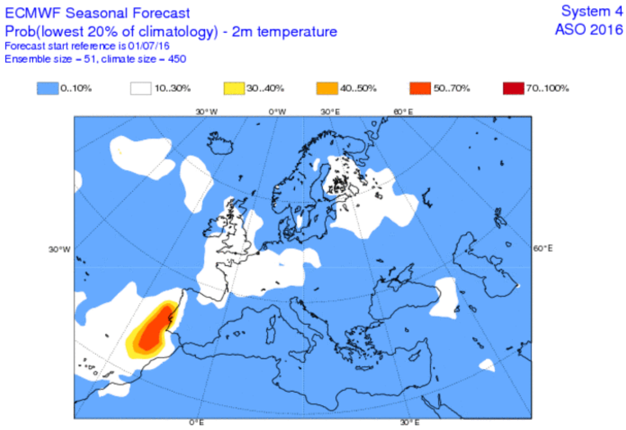
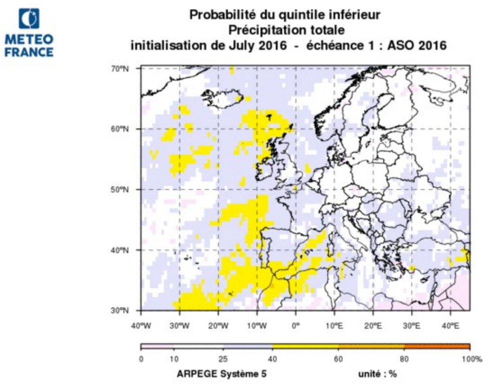
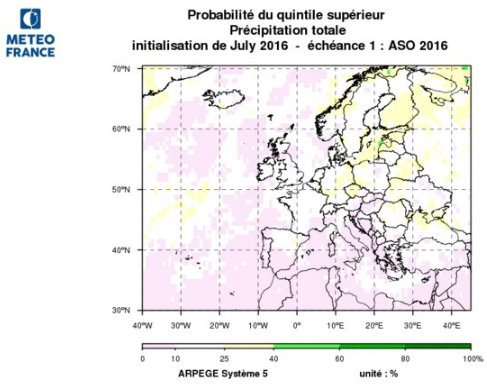


fig.II.7.1 : Top : Meteo-France T2m probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution). Bottom : ECMWF T2m probability of « extreme » below normal conditions (left - lowest ~20% of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





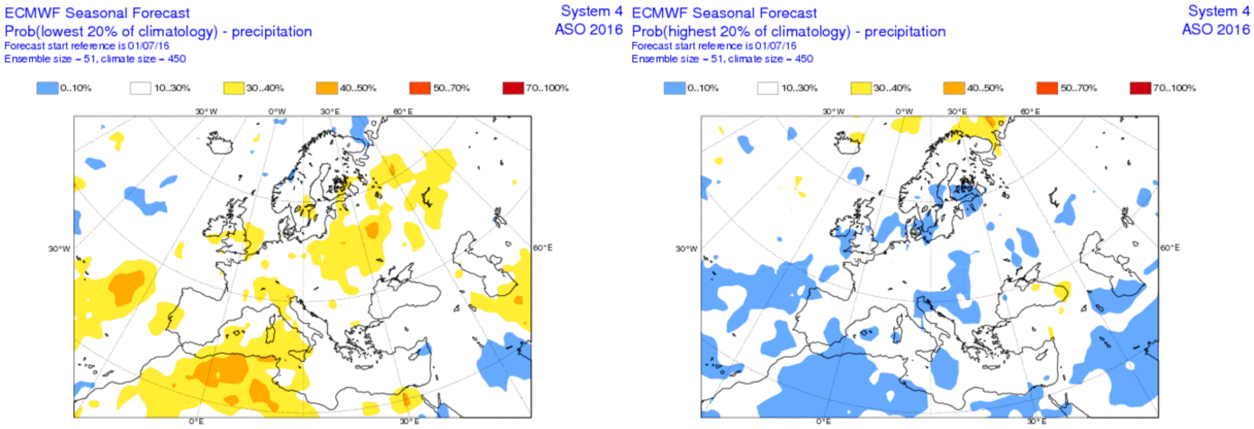


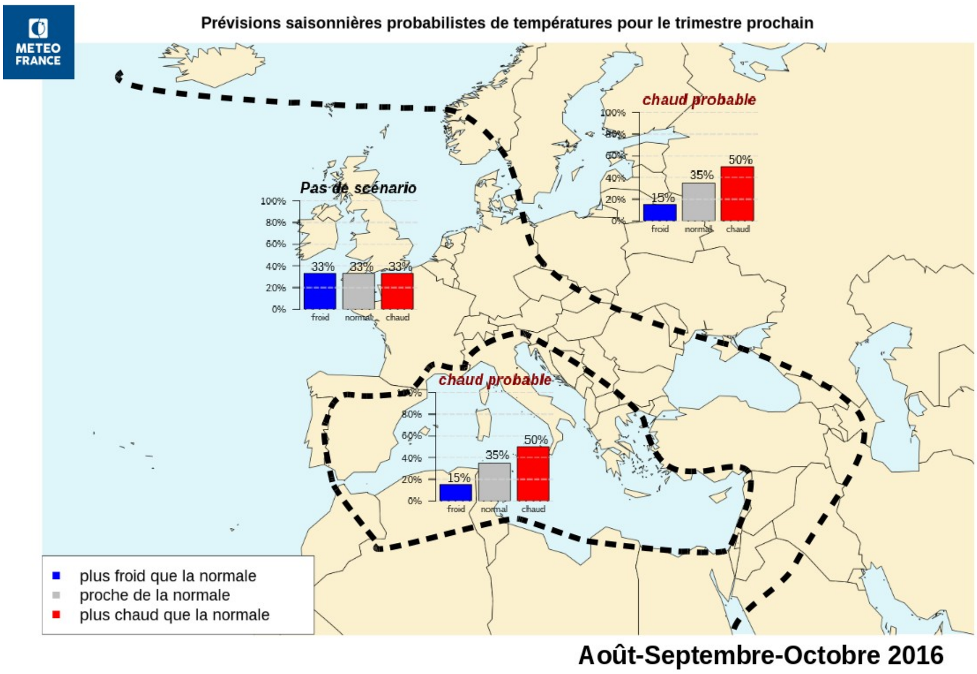
fig.II.7.2 : Top : Meteo-France rainfall probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution).
Bottom : ECMWF rainfall probability of « extreme » below normal conditions (left - lowest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

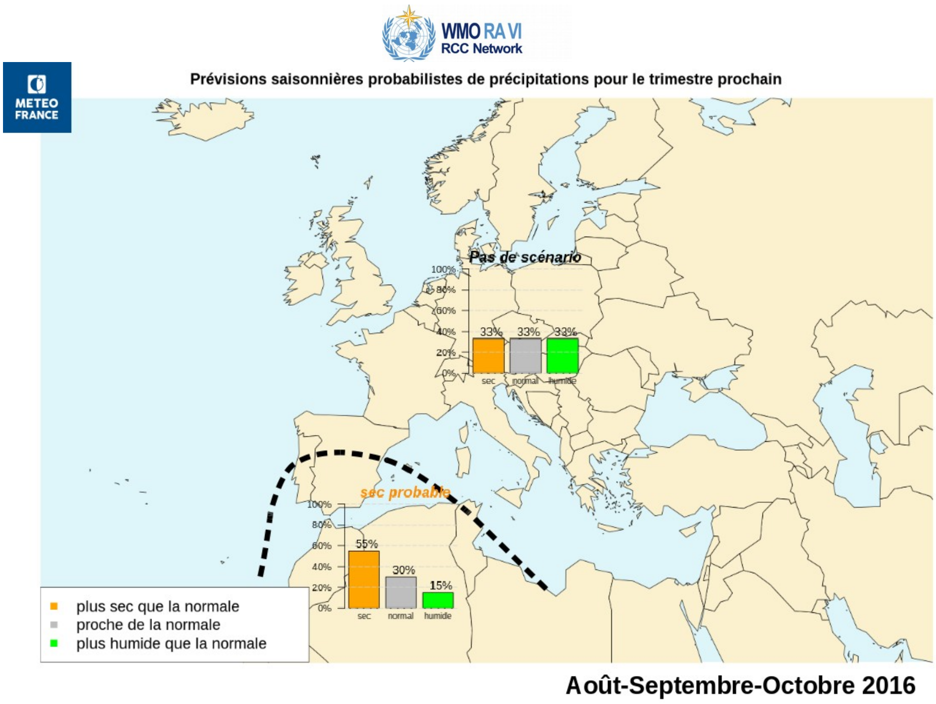
DISCUSSION AND SUMMARY

II.1.o Forecast over Europe

Temperatures: warmer than normal scenario favored over the countries bordering the Mediterranean sea, from Poland to Finland, to Norway and Sweden.

Precipitation: No scenario, except the Iberian peninsula where a dry signal emerges.





II.1.p Tropical cyclone activity

Forecast activity slightly higher than normal on Pacific Northwest . On the North Atlantic, the overall activity of the season is still expected near normal .

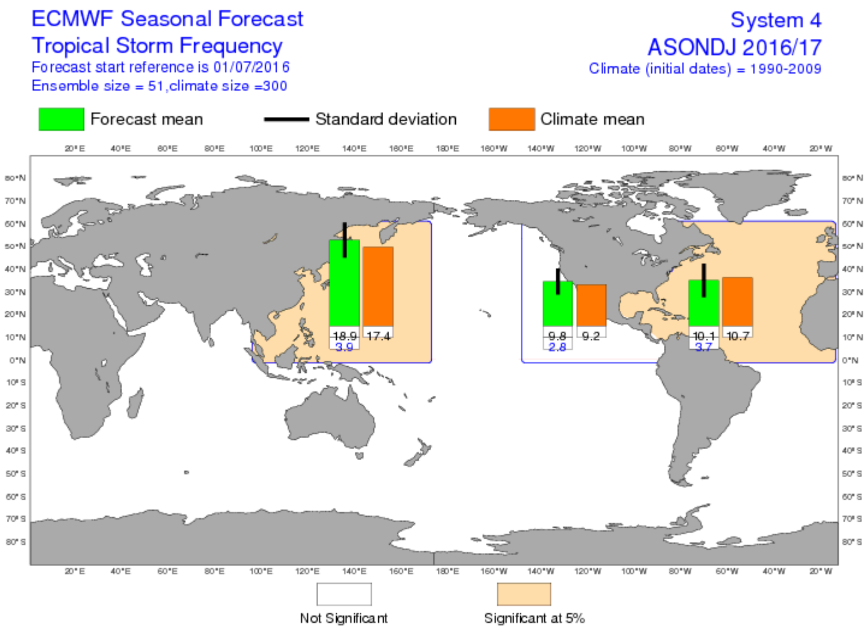


fig.II.8.1: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/

II.2. 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.

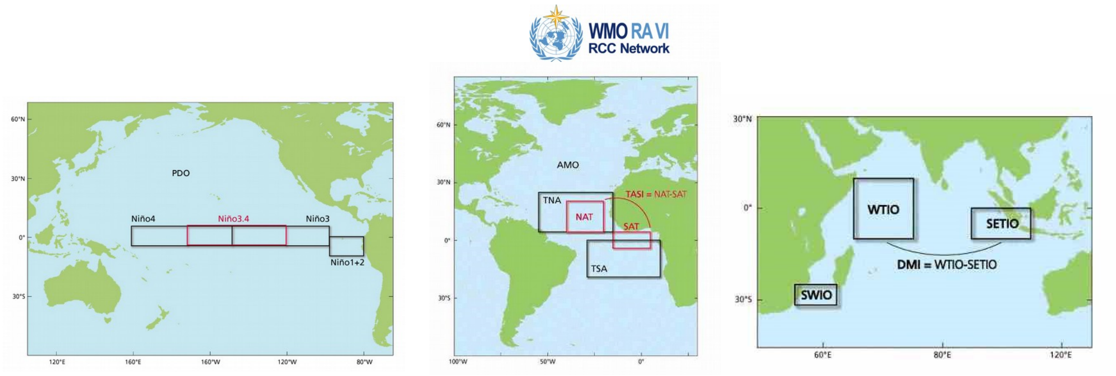
II.3. « NINO », SOI INDICES AND OCEANIC BOXES

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).

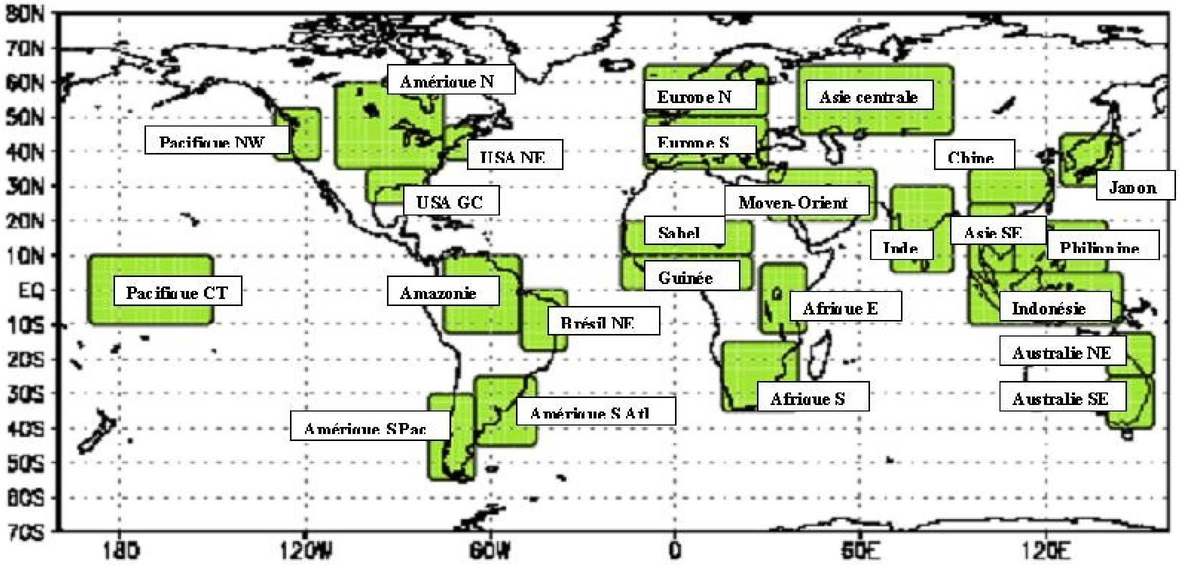
Associated to the oceanic « El Niño / La Niña » events, and taking into account the strong ocean/atmopshere coupling, the atmosphere shows also interanual variability associated to these events. It is monitored using the SOI (Southern Oscillation Index). This indice is calculated using standardized sea 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.4.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.5. 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).