GLOBAL CLIMATE BULLETIN
n°208 – October 2016

Table of Contents

I. DESCRIPTION OF THE CLIMATE SYSTEM (AUGUST 2016)

OCEANIC ANALYSIS

I.1.a Global analysis

In the Pacific ocean :

- Along the Equator: continued decay of SST east of the international date line. On the surface, SST anomaly in the box 3.4 to about -0.5 ° C in August. Subsurface, little change: slight warming visible west of the international date line.
- Persistent positive anomalies of SST both sides of the equatorial waveguide in the tropical area.
- On the North Pacific: cooling trend at around 30 ° N, 2 heat poles at around 45 ° N (to be related to abnormalities Z500). Consistent with these new structures, PDO index has decreased to negative in August (-0.66).

Maritime continent :

- Cooling trend between the maritime continent and Australia, but overall still positive SST anomalies.

In the Indian Ocean :

- Warming over west, central cooling.
- Positive anomaly of SST in the Gulf of Bengal.
- The DMI index remains negative in August (~ -0.8).
- Upper ocean heat anomalies always important in the equatorial zone, especially along Indonesia.

In the Atlantic:

- Little change, except around 60 ° N: warming southwest of Iceland and cooling southeast and east of Iceland.
- SST still abnormally warm on the Northwest Atlantic tropical.

In the Mediterranean :

- Widespread cooling. Only the far eastern basin has positive SST anomalies. Elsewhere the anomalies are negative. This cooling is to be compared to atmospheric circulation mainly from the north in August (cf. .http://www.esrl.noaa.gov/psd/cgi-bin/data/composites/comp.pl?var=Vector+Wind&level=Surface&mon1=7&mon2=7&iy=2016&iy=&iy=&iy=&iy=&iy=&iy=&iy=&iy=&iy=&iy=&iy=&iy=&iy=&iy=&iy=&iy=&iy=&iy=&iy=&iy=&ipos[1]=&ipos[2]=&ineg[1]=&ineg[2]=&timefile0=&tstype=0&timefile1=&value=&typeval=1&compval=1&lag=0&labelc=Color&labels=Shaded&type=1&scale=200&labelcon=1&switch=0&cint=&lowr=&highr=&proj=Custom&xlat1=30&xlat2=55&xlon1=340&xlon2=400&custproj=Cylindrical+Equidistant&level1=1000mb&level2=10mb&Submit=Create+Plot).

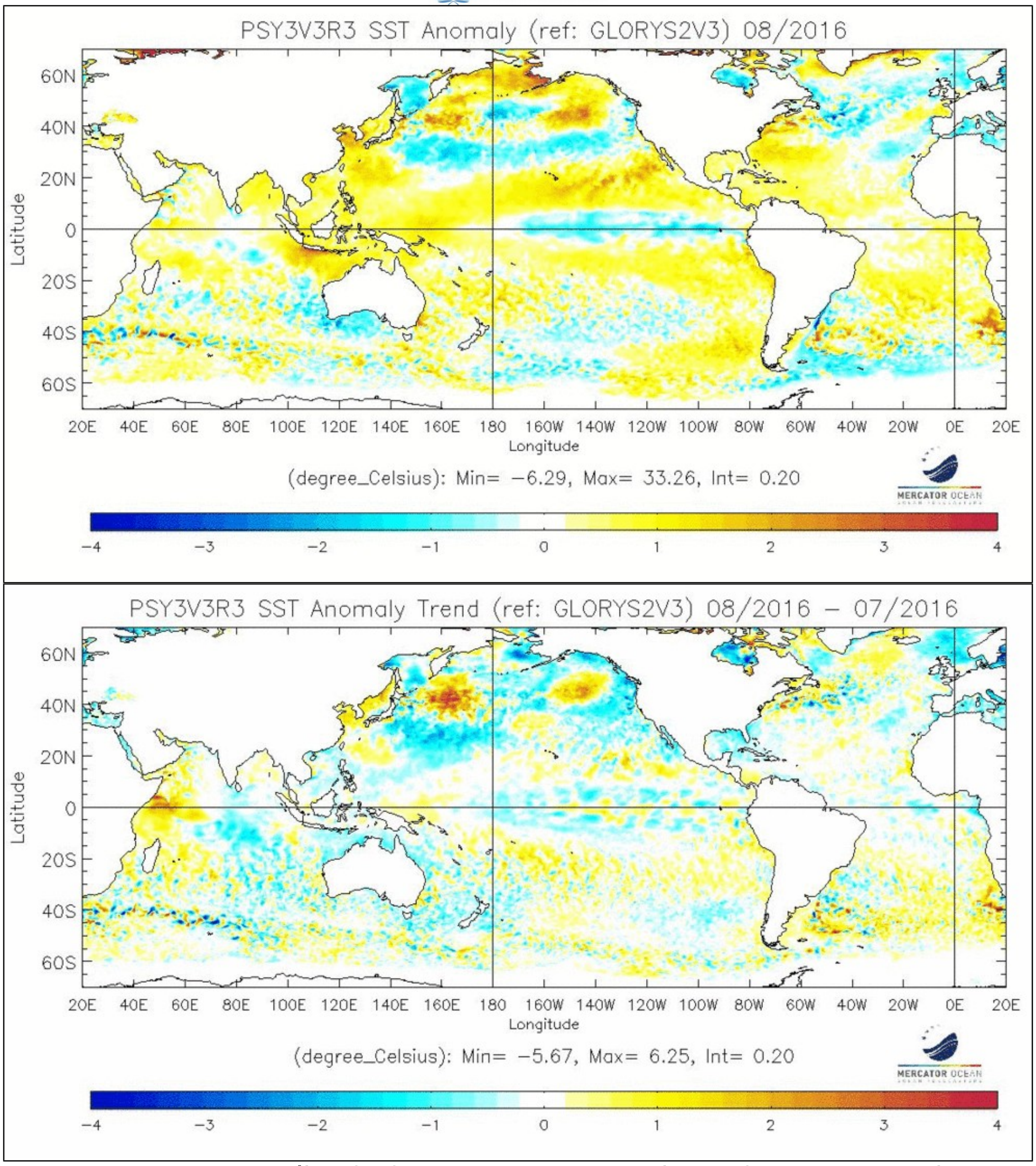

fig.I.1.1: top : SSTs Anomalies (°C) . Bottom : SST tendency (current – previous month), (reference Glorys 1992-2009). http://bcg.mercator-ocean.fr/

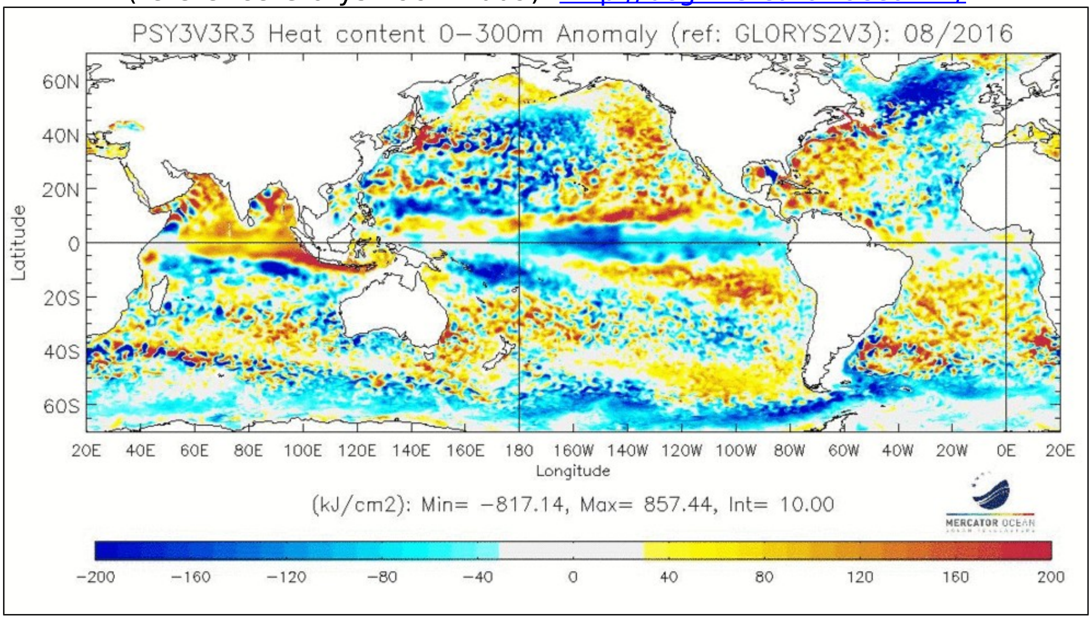

fig.I.1.2: map of Heat Content Anomalies (first 300m, kJ/cm2, reference Glorys 1992-2009)
http://bcg.mercator-ocean.fr/

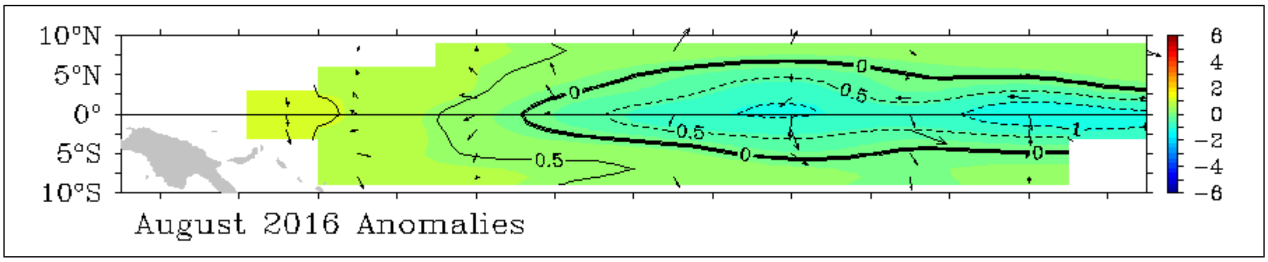

fig.I.1.3: SST Anomalies and Wind anomalies over the Equatorial Pacific from TAO/TRITON.
http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/monthly-summary.html

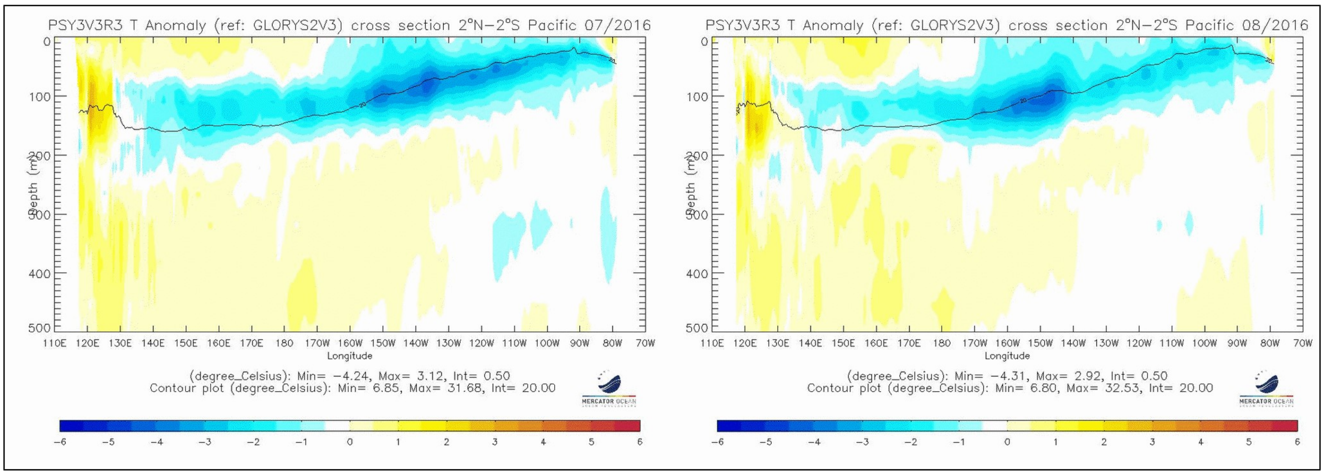

fig.I.1.4: Oceanic temperature anomaly in the first 500 meters in the Equatorial Pacific (previous and current month), http://bcg.mercator-ocean.fr

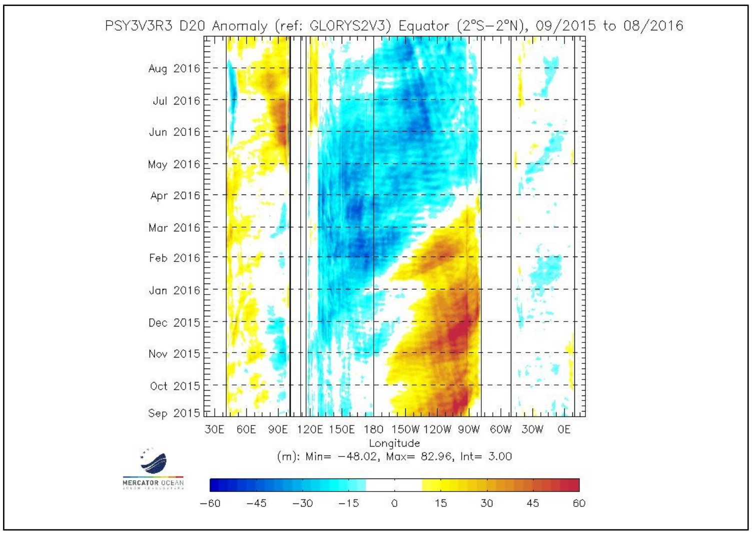

fig.I.1.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 6 month period http://bcg.mercator-ocean.fr/

I.1.b Sea surface temperature Near Europe

Arctic region: very warm, sea ice has melted except at the northern coasts of Greenland.

Significant cooling near Scandinavia and in the North Sea, and also in the Mediterranean. Except the Eastern Mediterranean and the Black Sea, these sea surfaces are colder than normal now, but still warmer deeper in the sea.

Still warmer than normal at the gulf of Biscay (no change) and still slightly colder near western Iberia.

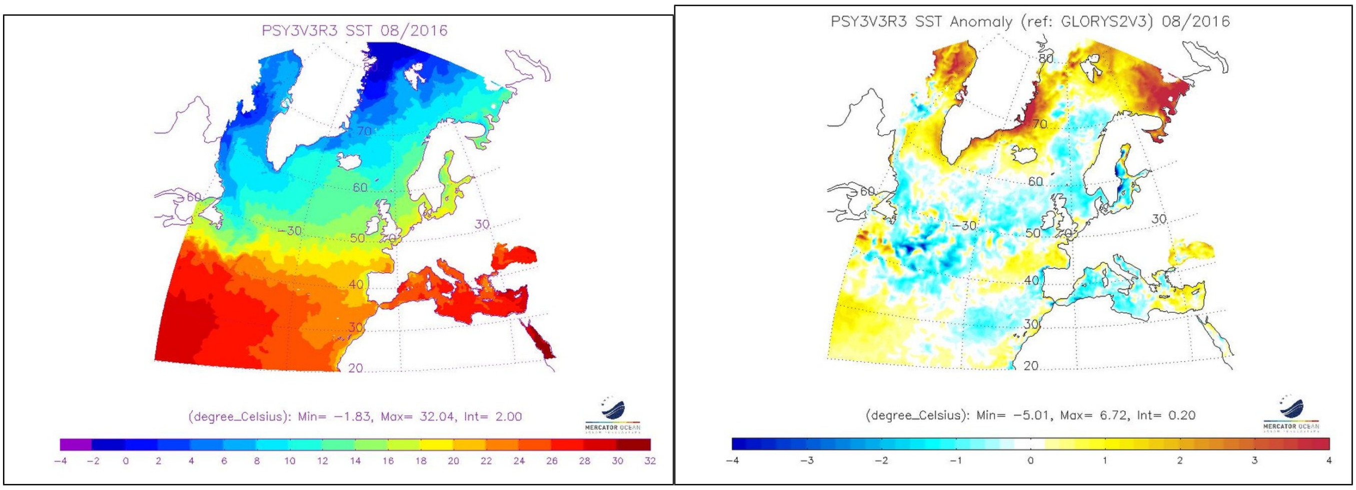

fig.I.1.6 : Mean sea surface temperature in the RA VI Region (Europe) and anomaly (reference Glorys 1992-2009). http://bcg.mercator-ocean.fr/

ATMOSPHERE

I.1.c General Circulation

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

Positive anomaly of VP on Sri Lanka (subsiding) and negative anomaly of VP north of Micronesia (ascending). The anomaly on Sri Lanka is quite consistent with the activity of the MJO (phase 6) in August (trailing portion ; upper-level convergence).

SOI +0.7 in August (https://www.ncdc.noaa.gov/teleconnections/enso/indicators/soi/). The SOI is now positive since May 2016 (inclusive).

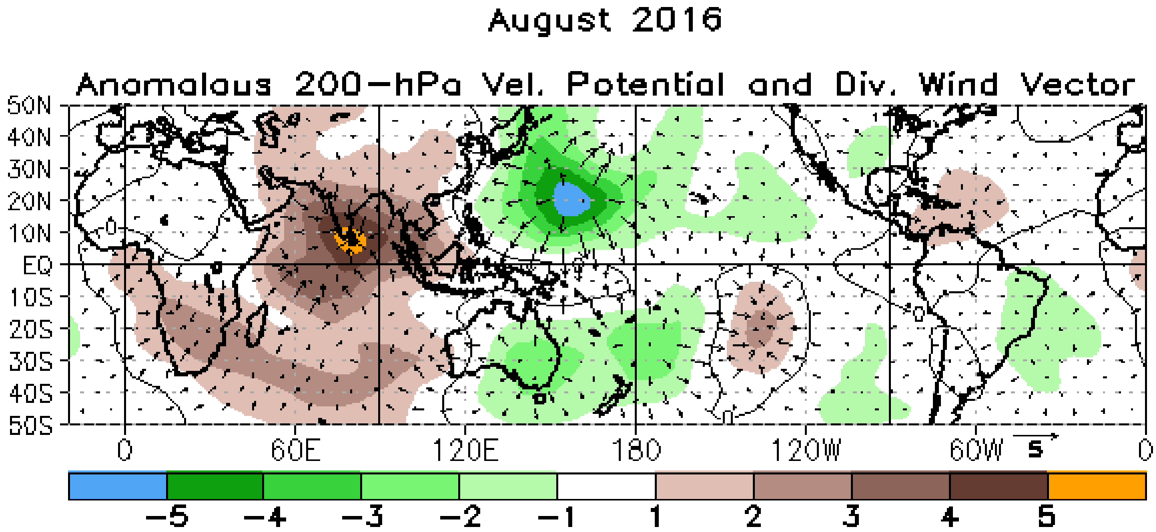

fig.I.2.1: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

MJO (fig. I.2.1.b)

- significant activity from August 12 to August 27 in the dial 6 which favored the downward motion over Sri Lanka (http://monitor.cicsnc.org/pub/mjo/v2/hov/cfs/olr.cfs.eqtr.png)

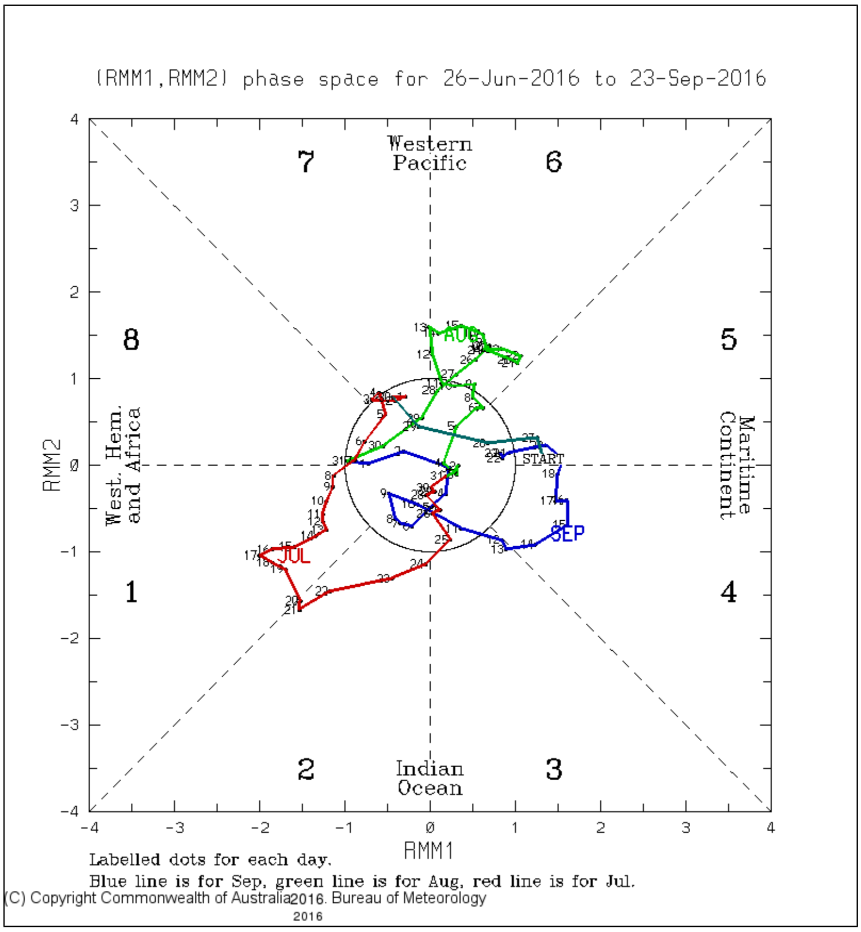

fig.I.2.b: indices MJO http://cawcr.gov.au/staff/mwheeler/maproom/RMM/phase.Last90days.gif

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

No teleconnection visible to the mid latitudes.

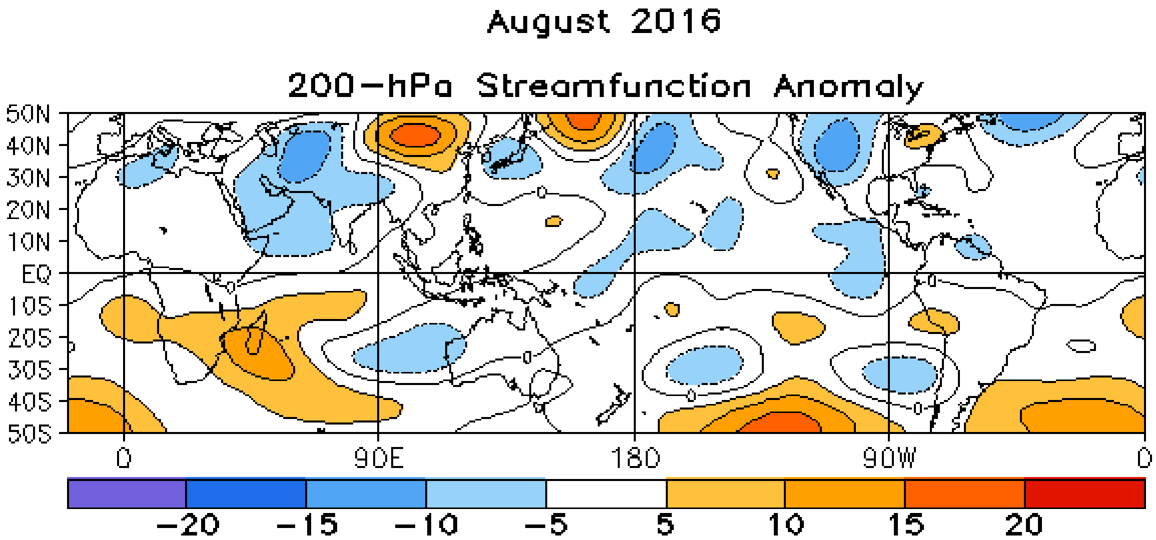

fig.I.2.2: Stream Function Anomalies at 200 hPa.
http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

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

- On Northern Hemisphere, succession of anomalies anticyclonic / cyclonic around a negative anomaly centered on the North Pole (see also http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/fige9 .shtml). Specifically on the North Atlantic and Europe: a negative anomaly south of Greenland and a positive anomaly centered on the Bay of Biscay. This is visible with the following values of variability modes in August (see table just below).

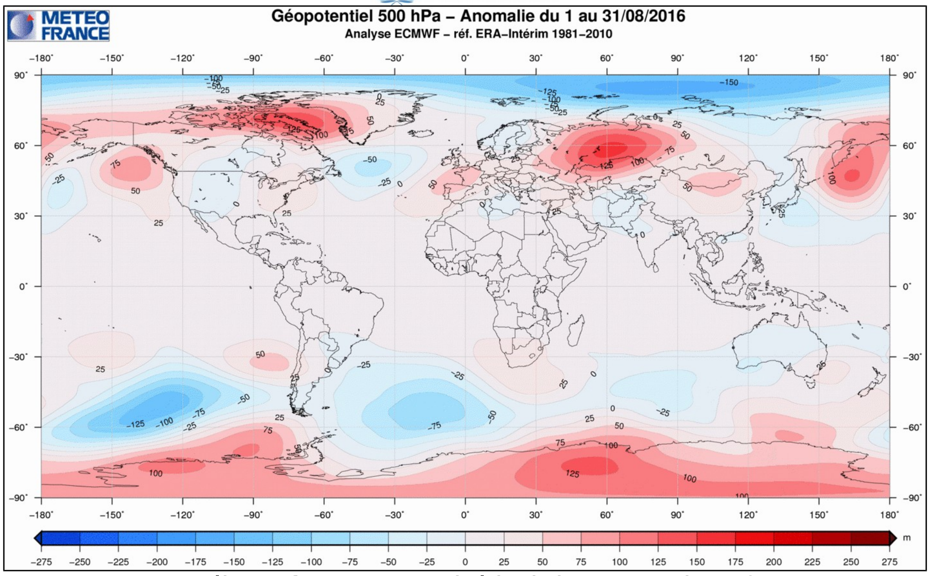

fig.I.2.3: Anomalies of Geopotential height at 500hPa (Meteo-France)

MONTH	NAO	EA	WP	EP-NP	PNA	TNH	EATL/WRUS	SCAND	POLEUR
AUG 16	**-2.2**	**2.1**	**-0.4**	**-0.4**	**-0.9**	**---**	**-3.3**	**-0.4**	**2.4**
JUL 16	-1.7	1.8	-1.4	-0.4	0.5	---	-1.0	-0.7	-0.2
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	1.1	-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

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

Very significant SLP and circulation patterns this month:

High pressure bridge from the North Atlantic over Central and southern Europe to Russia, and low pressure north and south of it except another persistent high pressure centre over Greenland. The Azores High is much more intense than normal and has a large extension to Europe. The Icelandic Low on the other hand is slightly weaker than normal, but has a large extension to the south, causing quite a high gradient between these two pressure centres and a relatively strong westerly flow over Ireland, UK and southern Scandinavia.

Strongly negative phase of NAO has continued from July and intensified, formed by the dipole of Greenland High and Icelandic Low. Similarly persistent a positive EA pattern, formed by the dipole Icelandic Low and Azores High with their extensions.

Even more intense the Russian High, given by an extremely high EATL/WRUS index of -3.3, though this pattern is also very persistent (negative index since April 2016)

High pressure over Central Europe also forms a dipole with very low pressure in the Arctic, resulting in a positive POLEUR pattern.

Due to extended high pressure, blocking situations were dominant this month (on 13 out of 31 days according to MF circulation classification). DWD Grosswetterlagen classification shows mainly high pressure and westerly patterns, but no trough patterns.

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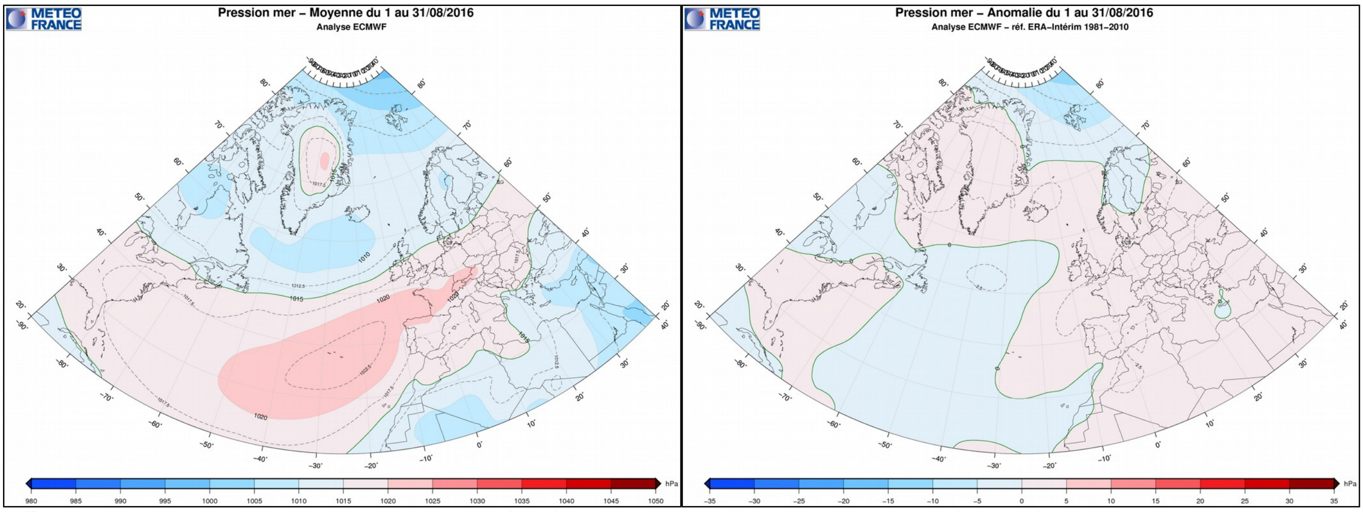


fig.I.2.4: Mean sea level pressure in the RA VI Region (Europe) (left) and 1981-2010 anomalies (right).

Circulation indices: NAO and AO

NAO was negative during the whole month, showing the high persistence of this pattern. AO almost positive the whole month, thus relatively little exchange between polar and middle latitudes. In fact, the dipole of negative geopotential anomalies in the Arctic and strong positive anomalies in latitudes of around 60°N extends over much of the northern hemisphere.

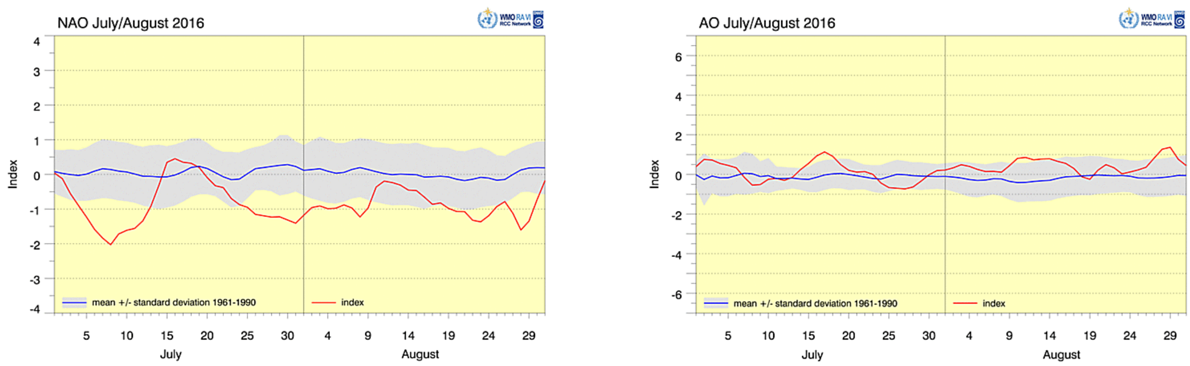


fig.I.2.5: North Atlantic Oscillation (NAO, left) and Arctic Oscillation (AO, right) indices with 1961-1990 mean standard deviation (shading). http://www.dwd.de/rcc-cm , data from NOAA CPC: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml

I.1.d Precipitation

- African monsoon still active and Indian monsoon active but in the northern part of the subcontinent.
- On Europe: in connection with the geopotential structure deficit over Western Europe.

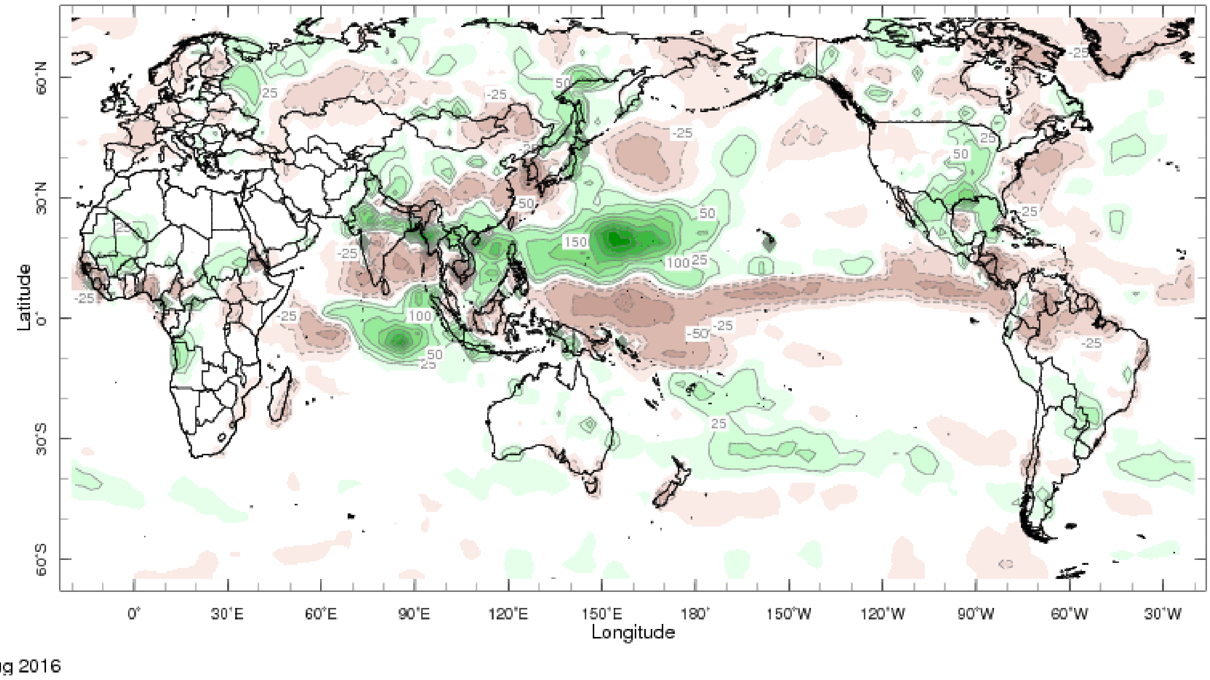


fig.I.2.6: Rainfall Anomalies (mm) (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.
http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/Anomaly.html

Precipitation anomalies in Europe:

Very distinct precipitation distribution in Europe. Very little precipitation from Iberia over France, Central and parts of eastern Europe due to persistent and extended high pressure. To be noted extreme drought conditions in parts of France, but also northern Spain and locally in Russia.

Westerly cyclonic patterns were shifted to the north, resulting in much precipitation over Scandinavia and northern Russia. Much precipitation also over western Russia due to a quasi-stationary front. Over the Mediterranean some low pressure situations with convective precipitation lasting for several days over southern Italy, western Balkans/Greece and parts of Turkey.

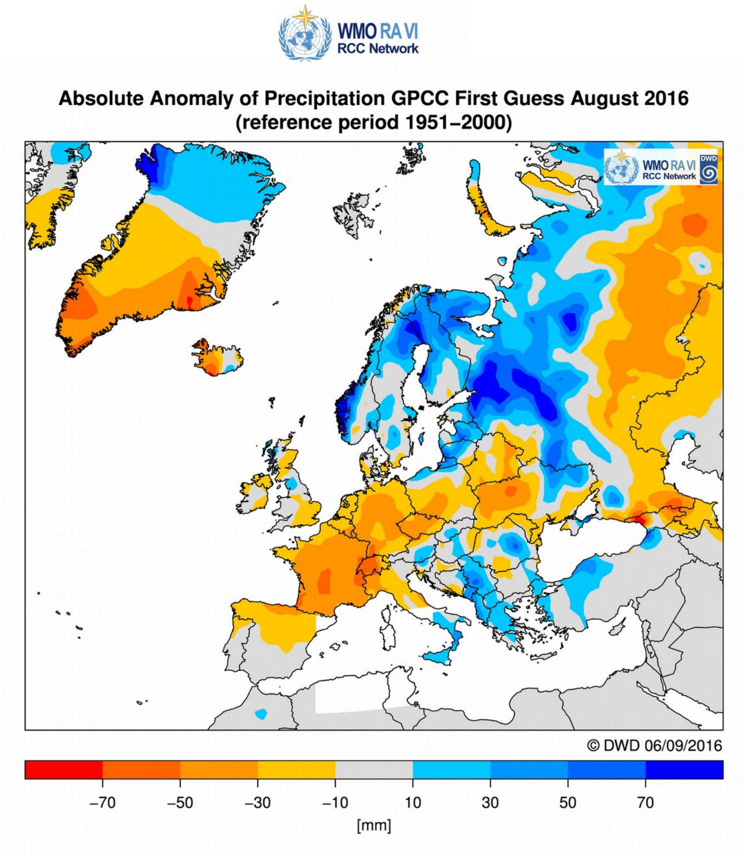


fig.I.2.7: Absolute anomaly (1951-2000 reference) of precipitation in the RA VI Region (Europe), data from GPCC (Global Precipitation Climatology Centre), http://www.dwd.de/rcc-cm.

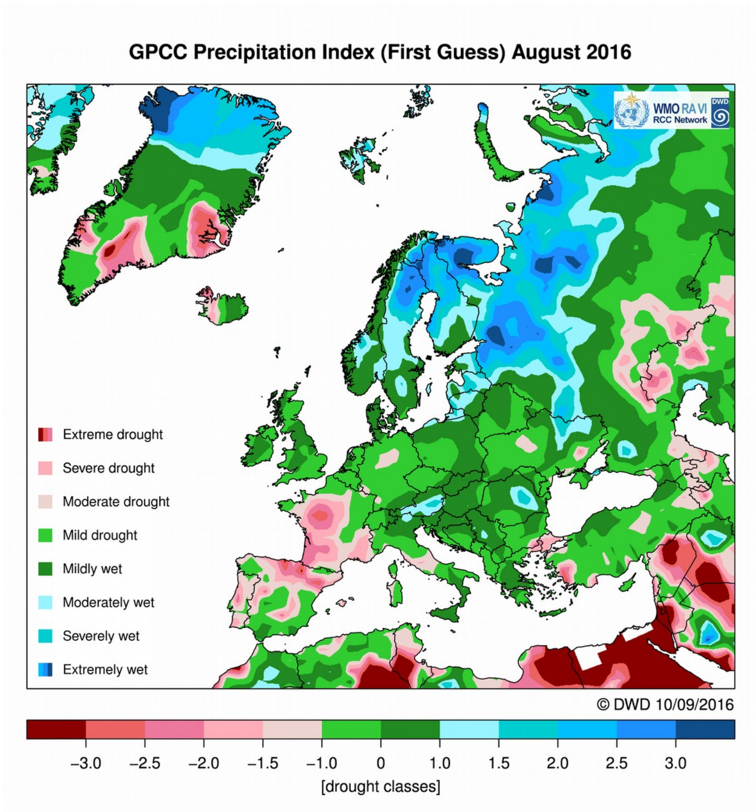


fig. I.2.8: GPCP Precipitation Index http://www.dwd.de/rcc-cm .

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	GPCC Drought Index
Northern Europe	+2.9 mm	+0.491
Southern Europe	-12.4 mm	-0.560

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

August 2016 again a record for the global temperature since 1880 (see http://data.giss.nasa.gov/gistemp/news/20160912/). 2016 continues to be top dog. Strong positive anomaly in Russia (northern Kazakhstan).

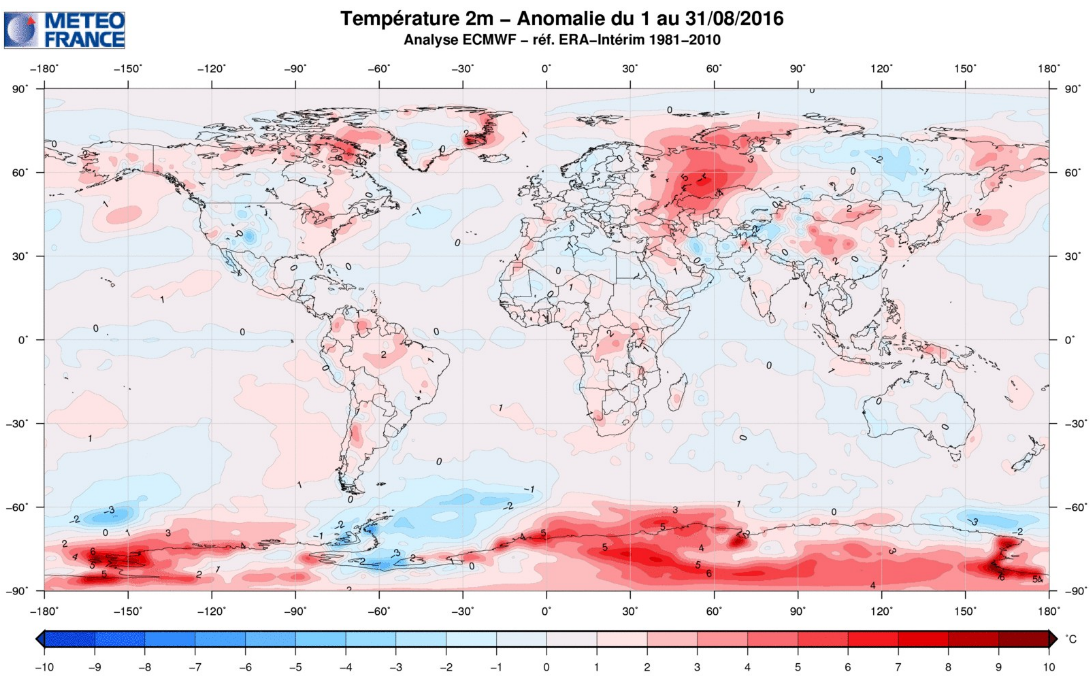


fig.I.2.9: Temperature Anomalies (°C) (Meteo-France)

Temperature anomalies in Europe:

Very warm especially east of western Russia with a sharp separation from cooler air over the remaining parts of Europe. Nevertheless high pressure caused slightly positive anomalies over much of western and parts of Central Europe, mainly due to a heat wave in late August with high pressure and a few days of southwesterly advection afterwards. Highest maxima were above 41°C in Spain and above 38°C in France.

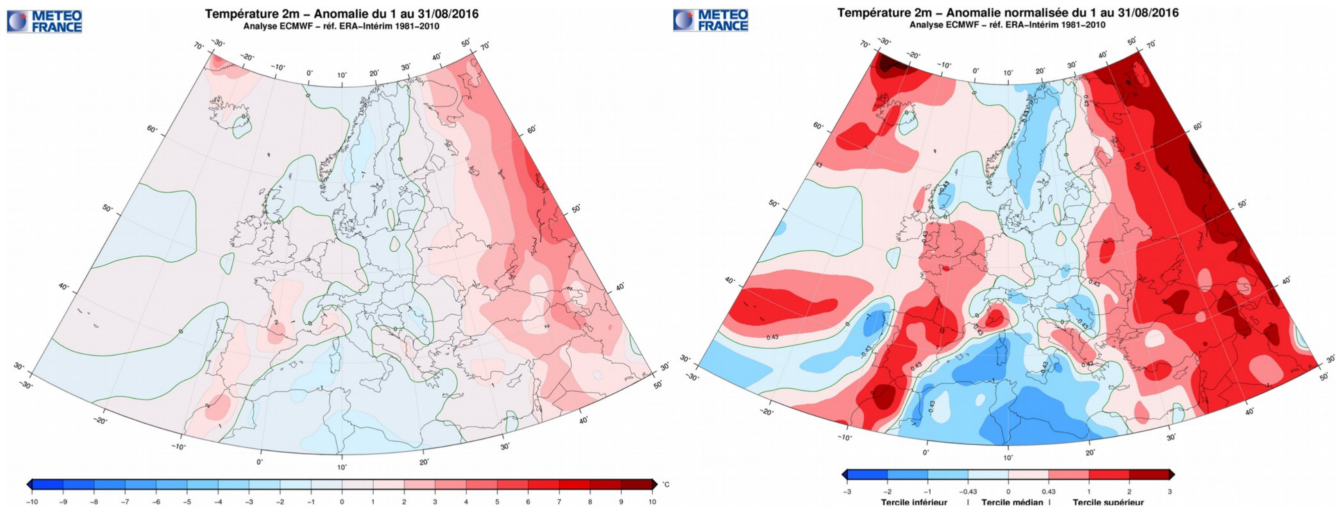


fig.I.2.10: Left graph: Absolute anomaly of temperature in the RA VI Region (Europe). Right graph: Standardized temperature anomalies

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	+0.7 °C
Southern Europe	+1.3 °C

I.1.f Sea ice

In the Arctic (fig. 1.2.11 and 1.2.12 - left) : still strong extension deficit.

In the Antarctic (fig. 1.2.11 and 1.2.12 - right) : extension near normal.

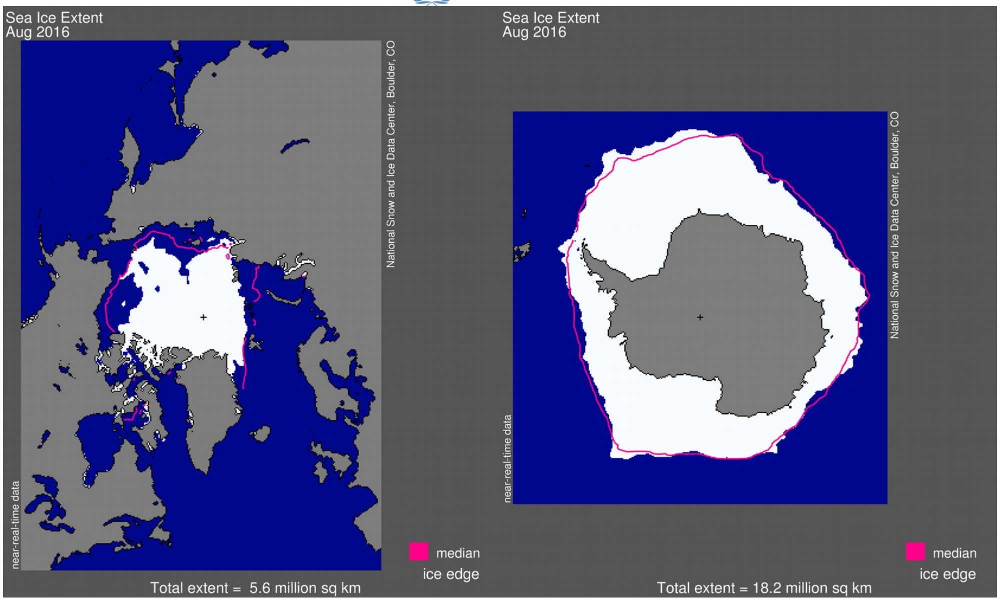


fig.I.2.11: Sea-Ice extension in Arctic (left), and in Antarctic (right). The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

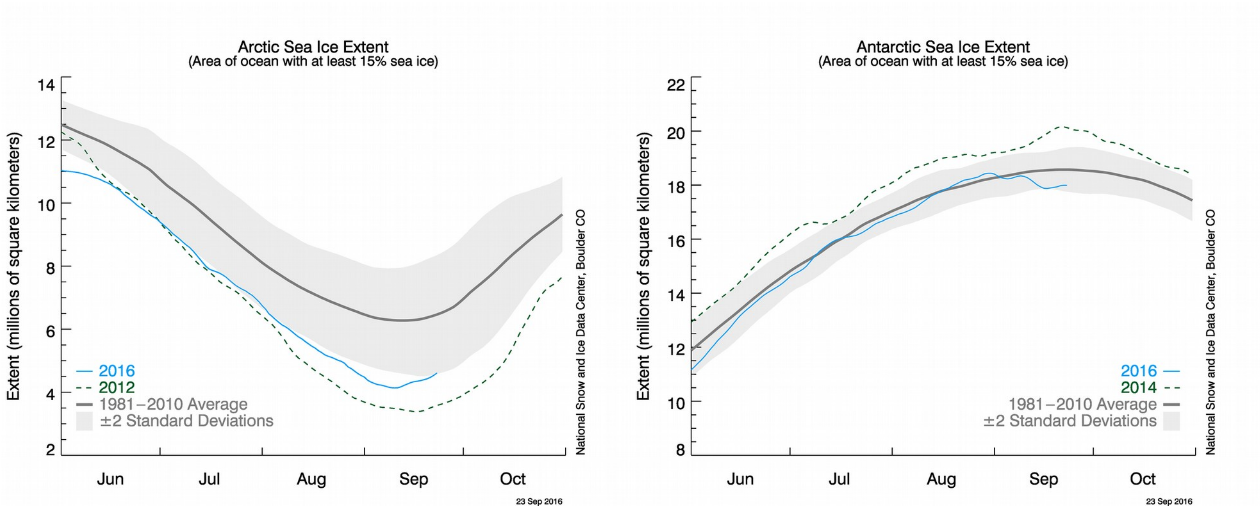


fig. I.2.12 : Sea-Ice extension evolution from NSIDC.
http://nsidc.org/data/seaice_index/images/daily_images/N_stddev_timeseries.png

II. SEASONAL FORECAST FROM DYNAMICAL MODELS

Note : the new ARPEGE System 5 model contributes now to the EUROSIP consensus.

II.1. OCEANIC FORECASTS

II.1.a Sea surface temperature (SST, figure II.1.1 to II.1.4)

- Pacific Ocean: On the equatorial rail, models (consensus) expect a negative anomaly of SST east of the international date line. ECMWF provides a warmer scenario than NCEP, and especially than ARPEGE (more cold and whose negative anomalies extend to the South American coast). Positive SST anomalies are expected to continue to either side of the rail between the tropics. On the west, the positive anomalies persist from Melanesia to northeast of New Guinea.
- Indian Ocean: The current cooling of surface temperatures should continue. Nevertheless, over west and south of Sumatra positive anomalies resist. But the IOD should gradually return to 0 at the end of the period.
- Atlantic Ocean: In the northern hemisphere always a positive anomaly in the most western part of the basin. The cold anomaly in the North Atlantic center should remain. Eastern part is more and less normal. South Atlantic warmer than normal.

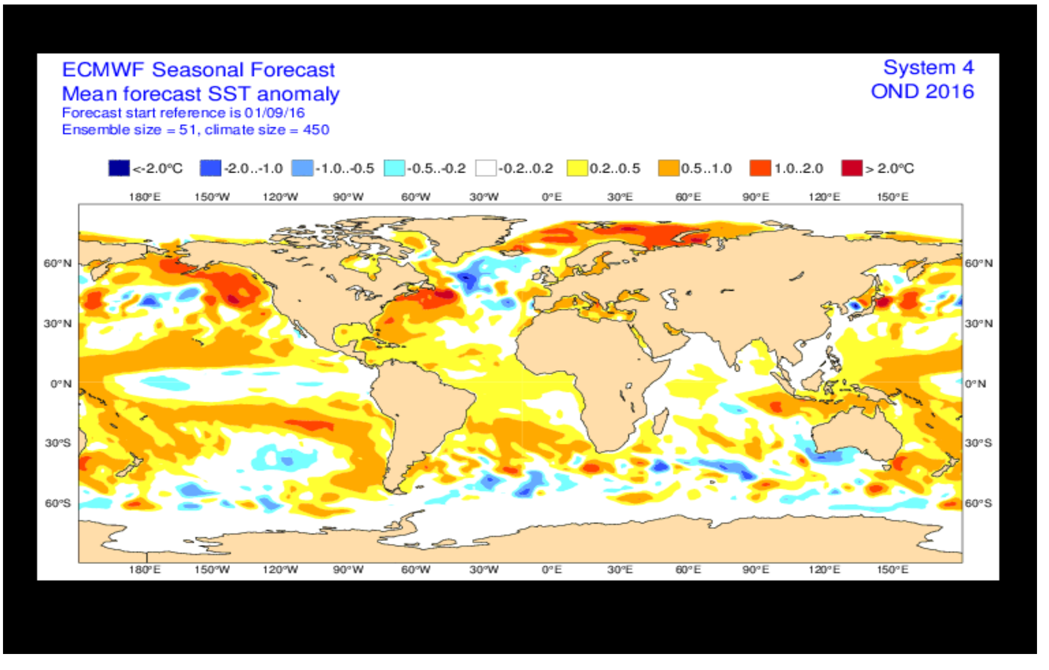


fig.II.1.1: SST anomaly forecast from ECMWF
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/group/

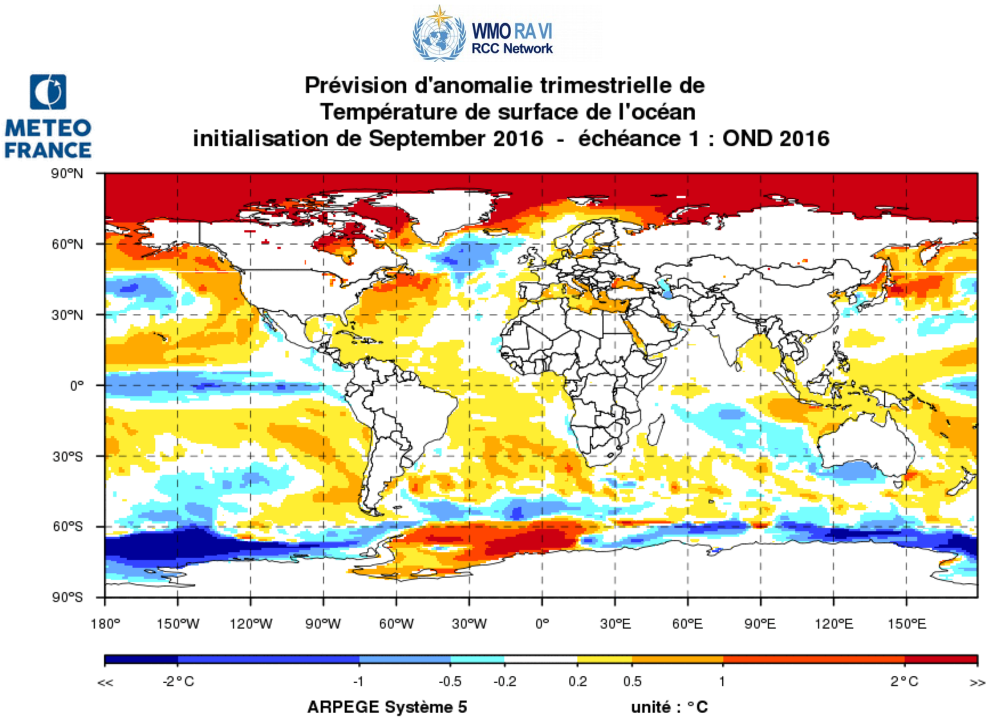


fig.II.1.2: SST Anomaly forecast from Meteo-France (recalibrated with respect of observation).
http://elaboration.seasonal.meteo.fr

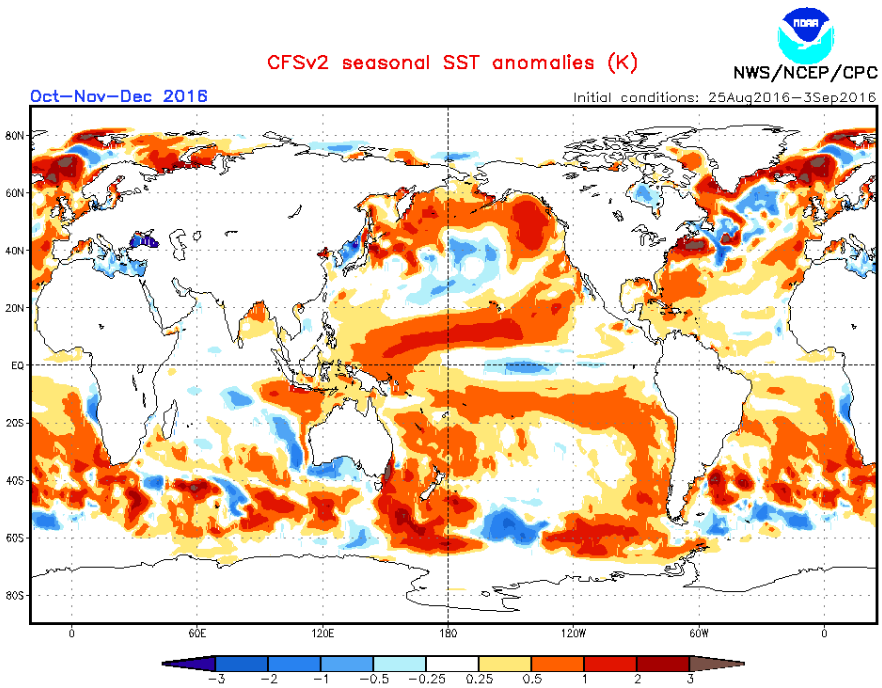


fig.II.1.3: SST anomaly forecast from NCEP.
http://www.cpc.ncep.noaa.gov/products/people/wwang/cfsv2fcst/imagesInd1/glbSSTSeaInd1.gif

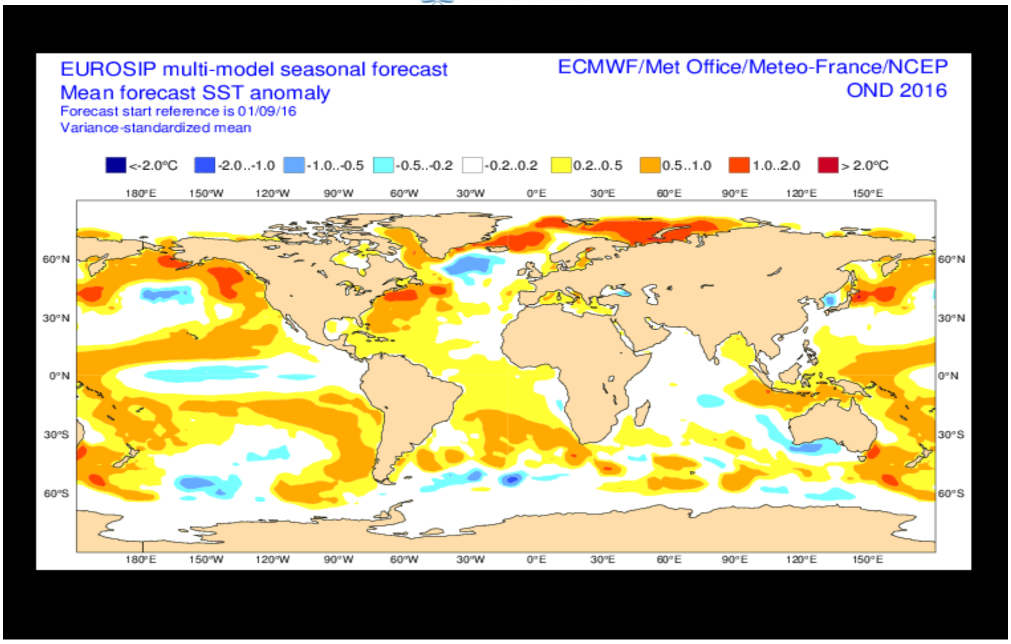
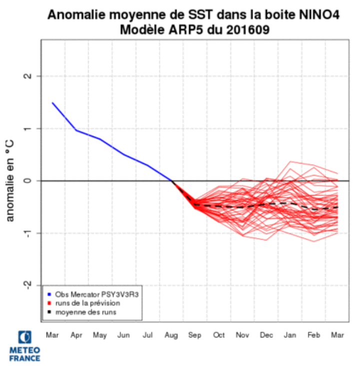


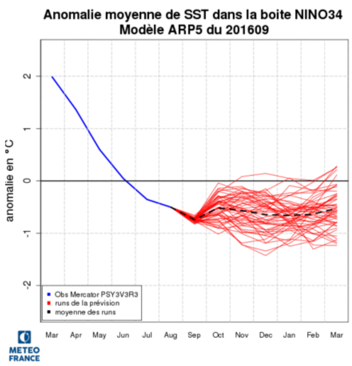
fig.II.1.4: SST Forecasted anomaly from Euro-SIP

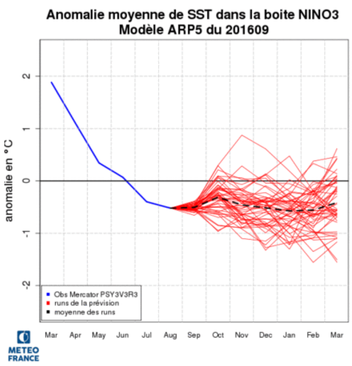
II.1.b ENSO forecast :

Forecast Phase: *Neutral or weak La Niña.*

EUROSIP, as the synthesis of IRI, converge towards a neutral phase or weak La Niña (probability slightly greater than 50%). The possibility of staying in a neutral phase is however quite likely scenario (around 45%). This forecast is consistent with the positive PDO which generally reduces Niña episodes. (See http://www.nature.com/articles/srep06651#f4). Moreover, containment of negative SST anomalies to the central equatorial Pacific rather promotes Modoki type La Niña (if it occurred). More information on ENSO Modoki phases on http://www.jamstec.go.jp/frcgc/research/d1/iod/e/elnmodoki/about_elnm.html .







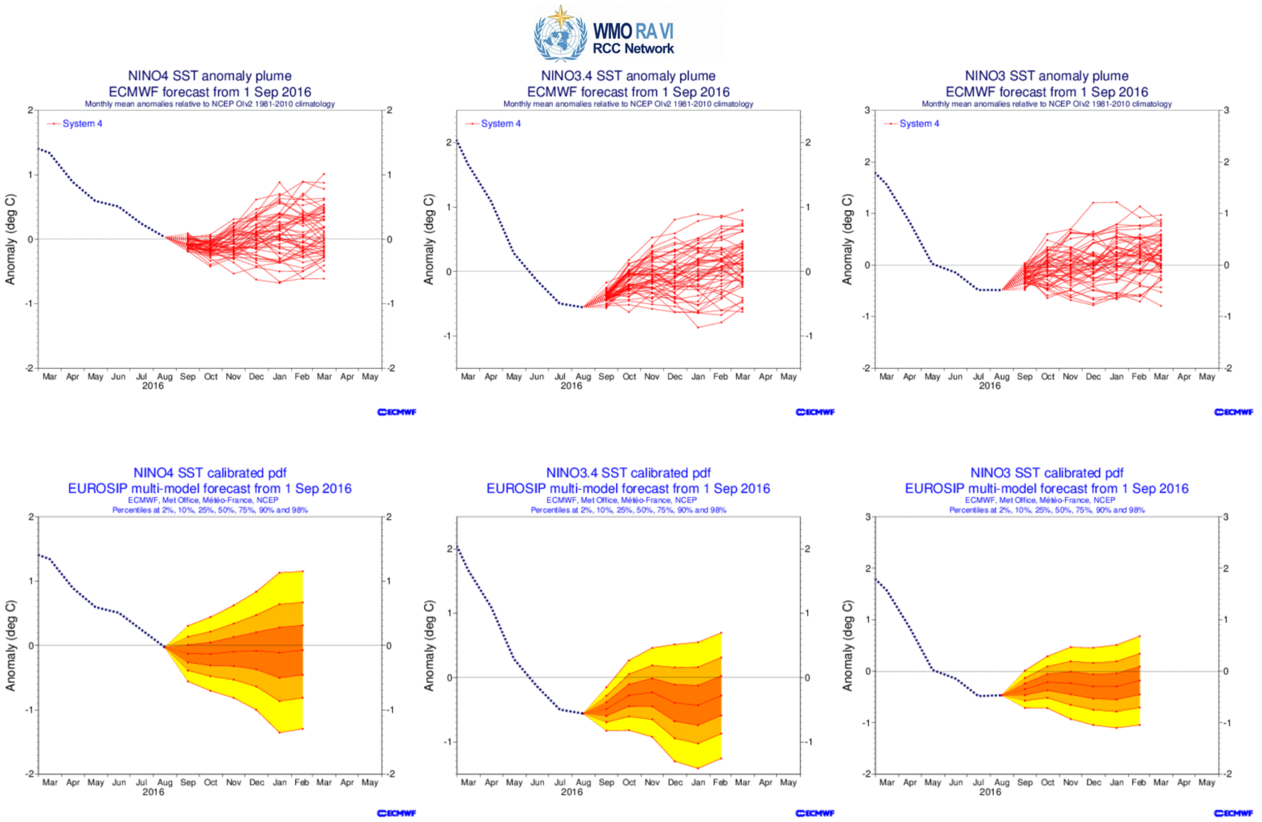


fig.II.1.5: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members - and EuroSIP (bottom) – recalibrated distributions - (http://elaboration.seasonal.meteo.fr , http://www.ecmwf.int/)

II.1.c Atlantic ocean forecasts

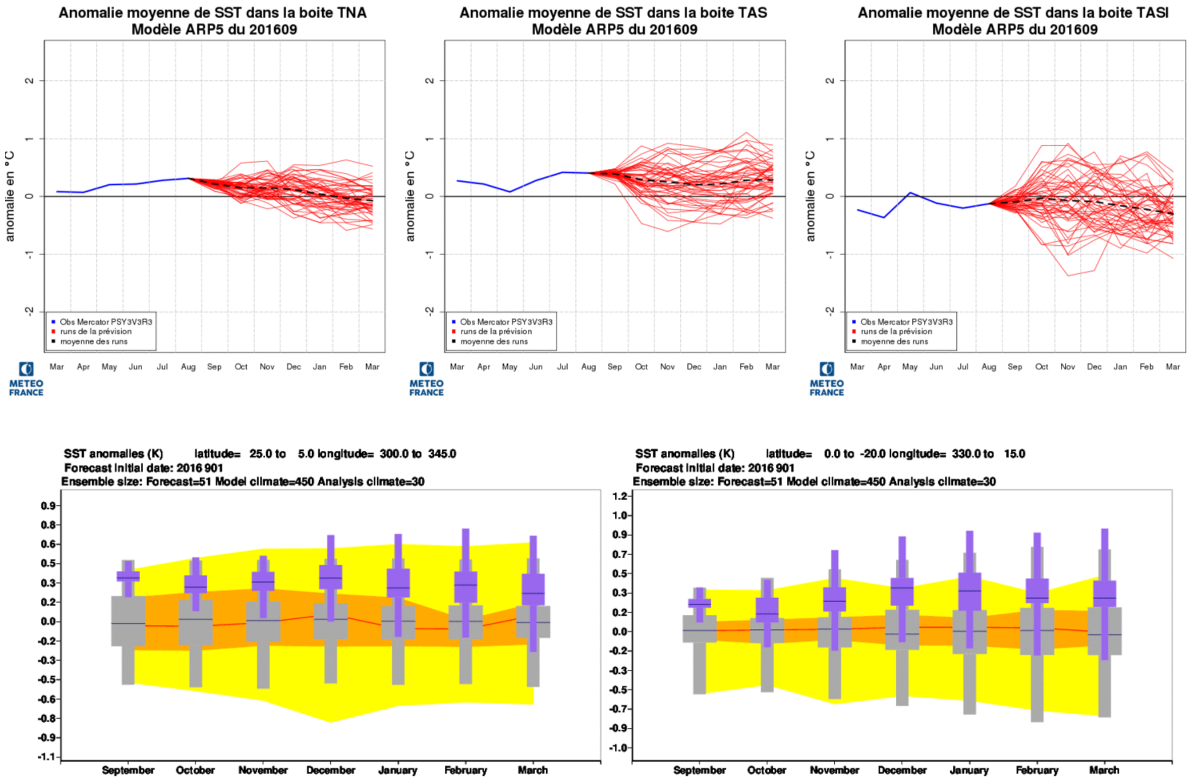
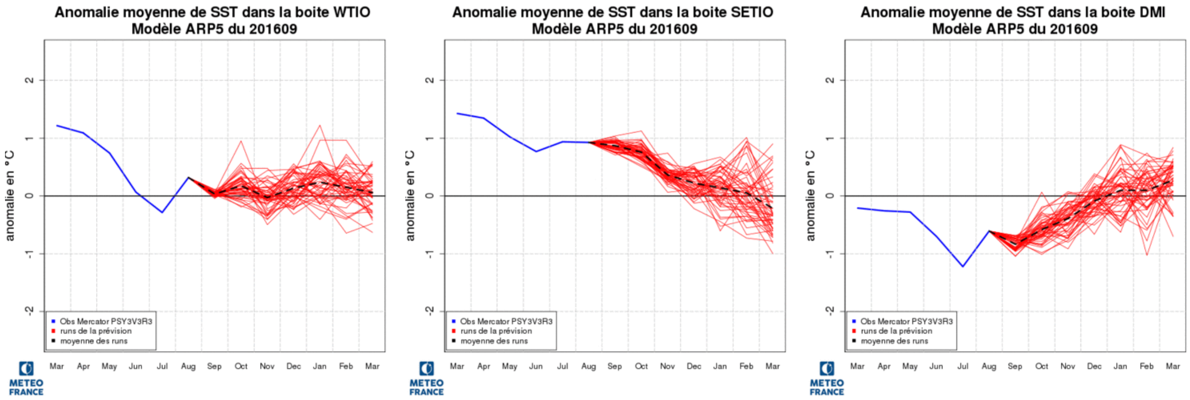


fig.II.1.6: SSTs anomaly forecasts in the Atlantic Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

II.1.d Indian ocean forecasts



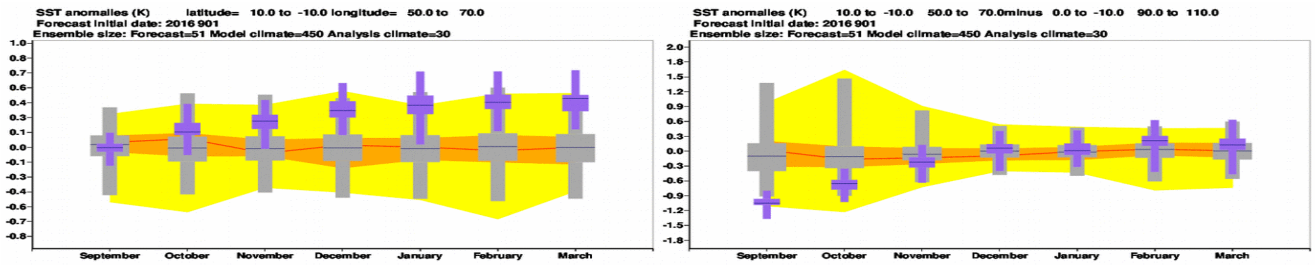


fig.II.1.7: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

II.2. GENERAL CIRCULATION FORECAST

II.2.a Global forecast

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):

Velocity potential : quite good models consistency. Wave structure number 2, with 2 ascending poles (maritime continent & Brazil) and 2 subsiding pole (central Pacific & Indian Ocean north of Madagascar). This structure is fairly consistent with La Niña Modoki type (see http://www.jamstec.go.jp/frcgc/research/d1/iod/e/elnmodoki/about_elnm.html). It is also suggested by the JMA composite (cf. http://ds.data.jma.go.jp/tcc/tcc/products/clisys/enso_statistics/fig/c200/c200_comp_NINO.3_6moncc-_month11_3mon_lag0.png). Note that the anomalies are not pronounced (compared to anomalies which one could argue with La Niña). Ocean forcing / coupling seems low.

Stream Function anomaly : in consistency with velocity potential in the inter tropical belt : Quadrupole between 30 ° E and 120 ° E looks okay. It is still the Indian Ocean and the far western Pacific that perform a forcing ? Strengthening of the Walker circulation. No negative PNA response as one might expect if Niña. No visible teleconnections towards the middle latitudes of the northern hemisphere.

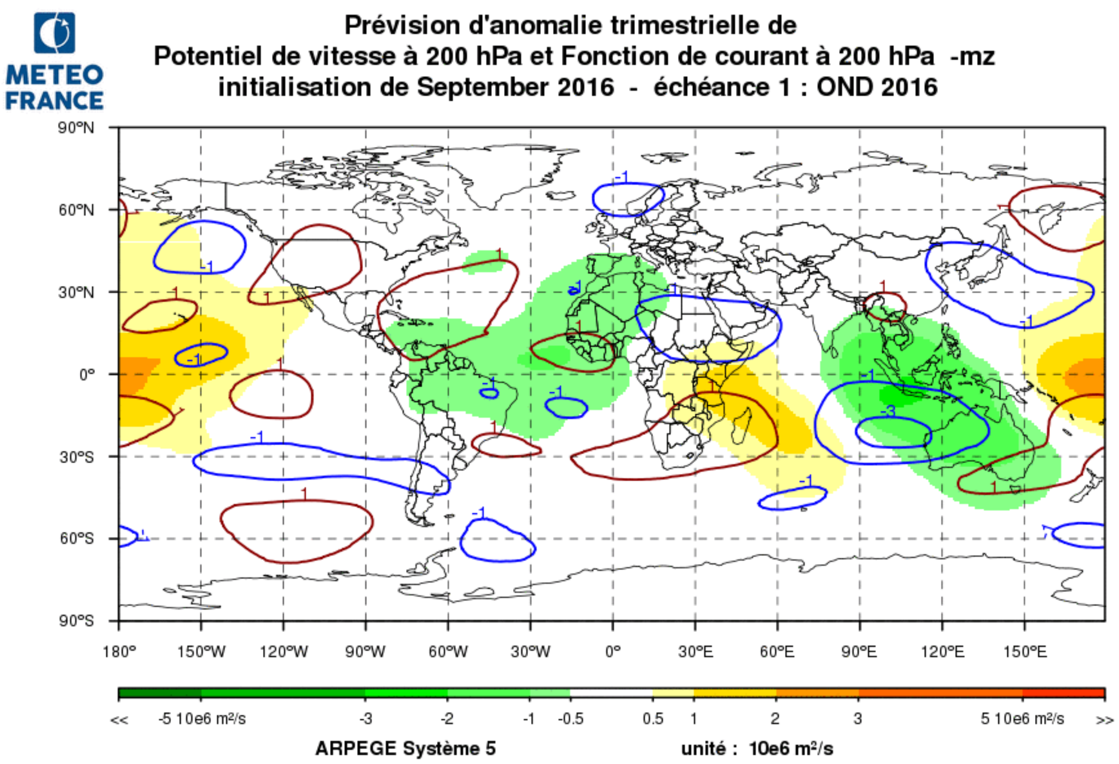
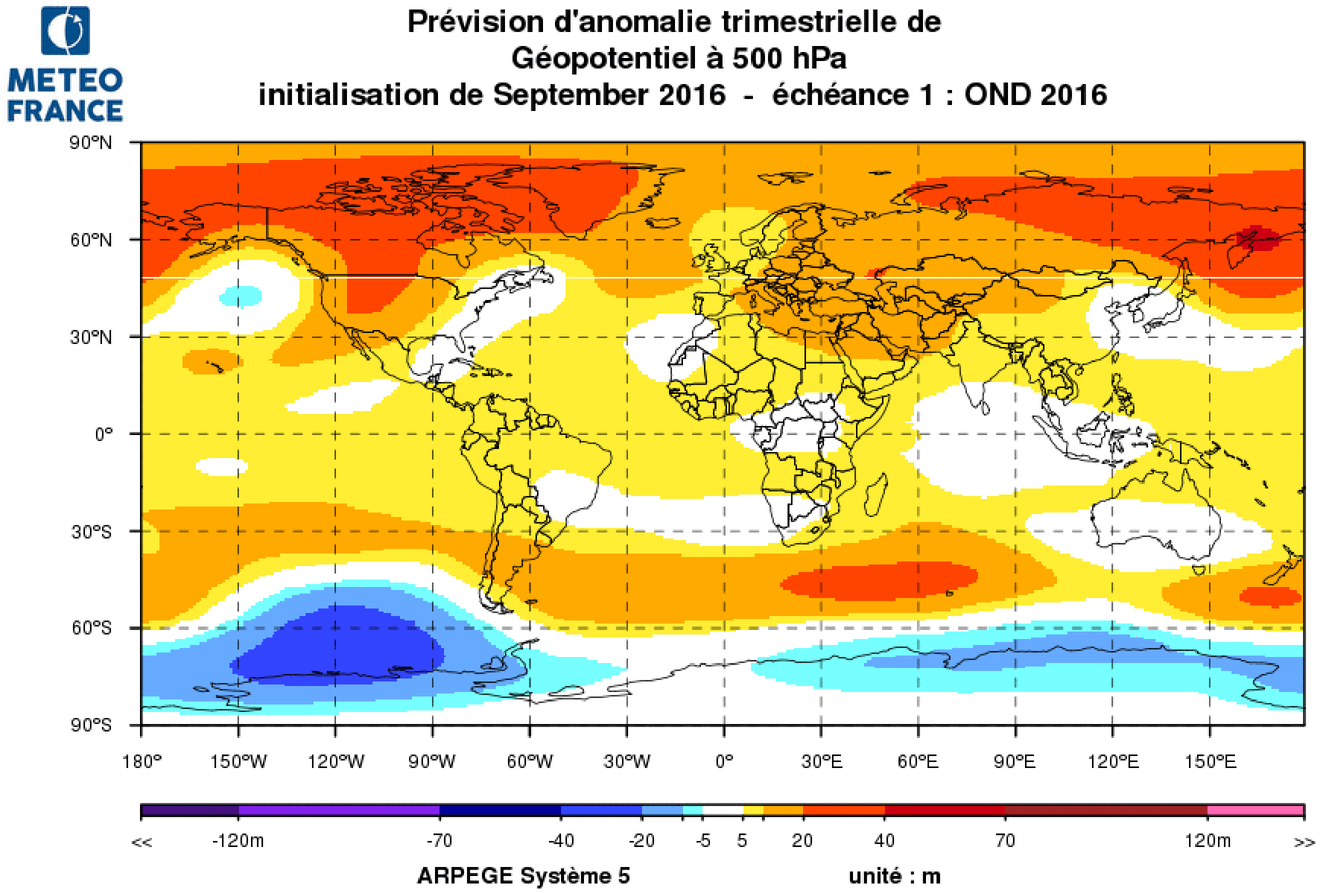


fig.II.2.1bis: Velocity Potential anomaly field χ (shaded area – green negative anomaly and yellow positive anomaly) and Stream Function anomaly ψ (isolines – red positive and blue negative in NH) at 200 hPa by Météo-France ARPEGE-S5.

II.2.b North hemisphere forecast and Europe

<u>Geopotential height anomalies</u> (fig. II.2.2 and II.2.3 – insight into mid-latitude general circulation anomalies) :

Even if the models agree in the order 0 sens of the overall anticyclonic anomalies on the North Pole and over the high to middle latitudes, the positions of geopotential positive anomalies diverge significantly from one model to another (even if such ECMWF and ARPEGE may have some similarities). Difficult in this context to prefer a circulation rather than another. The only scenario that seems rather unlikely is NAO + (NCEP suggests instead that scenario - not shown here - but it is isolated).



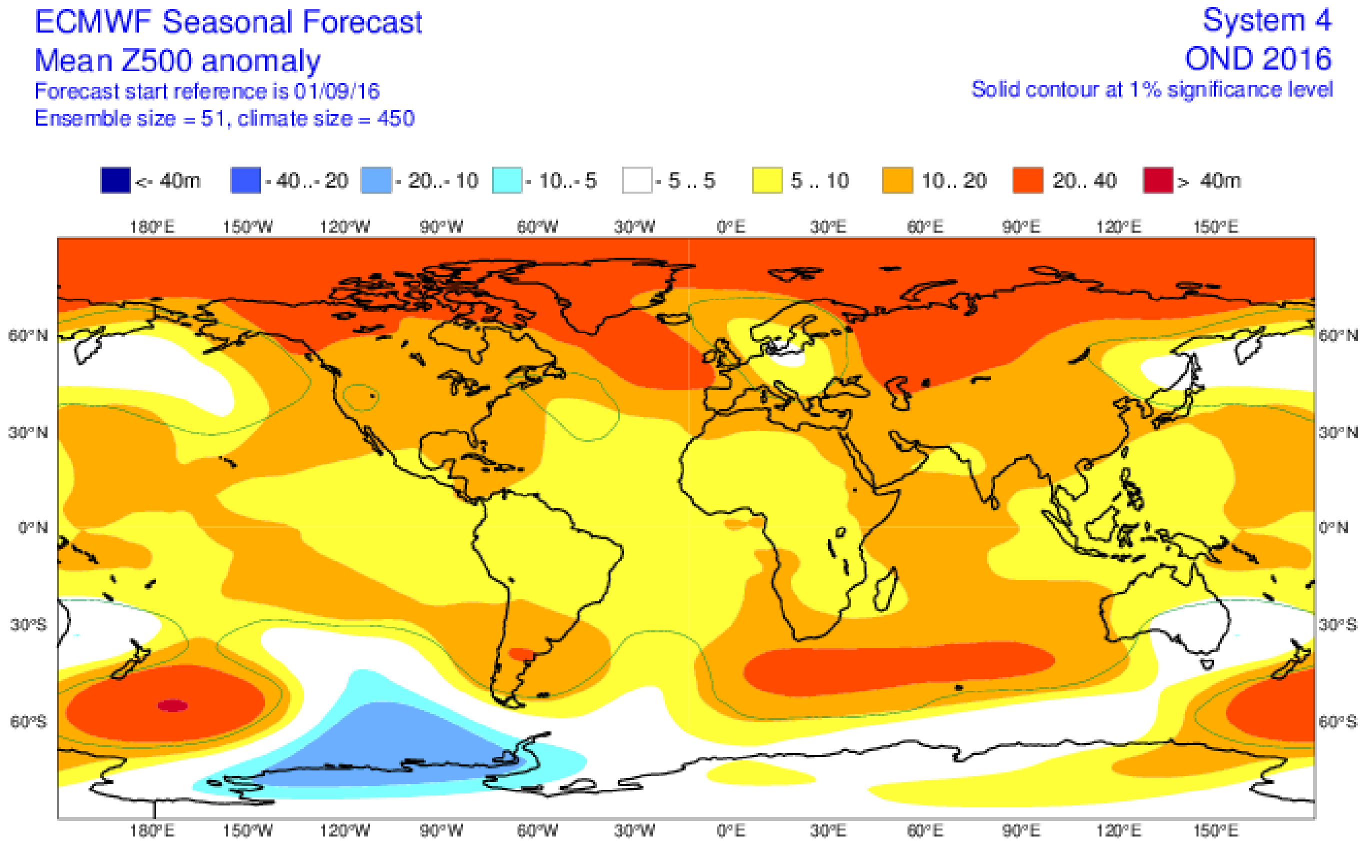
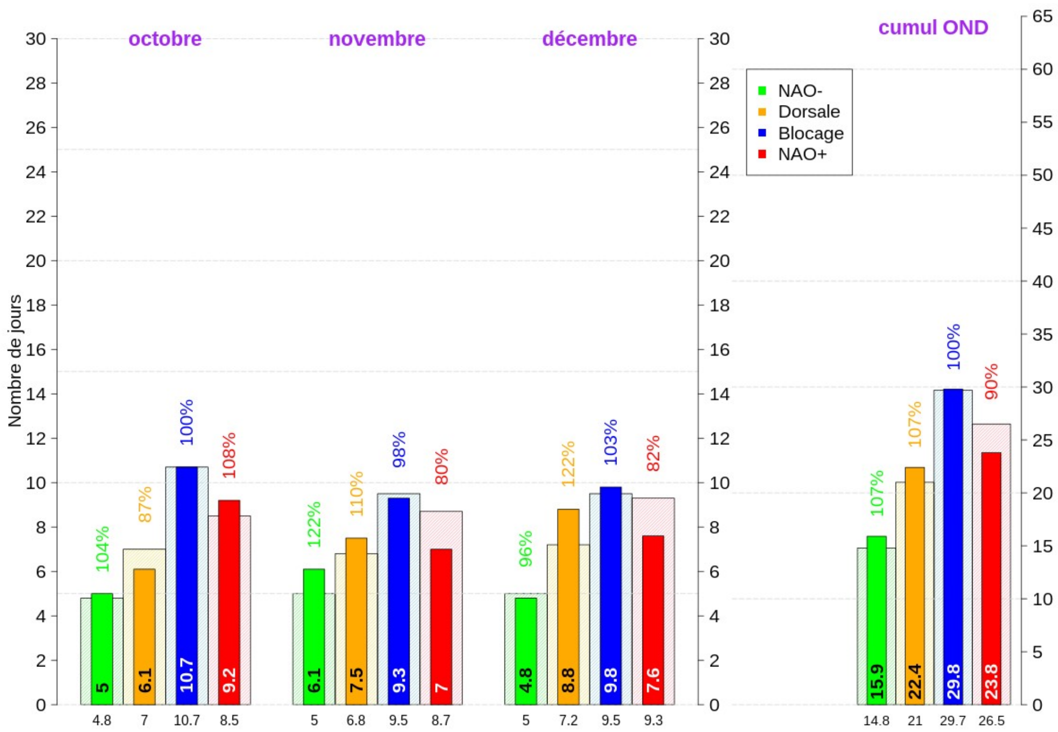


fig.II.2.2: Anomalies of Geopotential Height at 500 hPa from Météo-France (top) and ECMWF (bottom).

Régimes de temps d' HIVER : comparaison entre ARPEGE système 5 et sa clim initialisation de septembre 2016



Régimes de temps d' ETE : comparaison entre ARPEGE système 5 et sa clim initialisation de septembre 2016

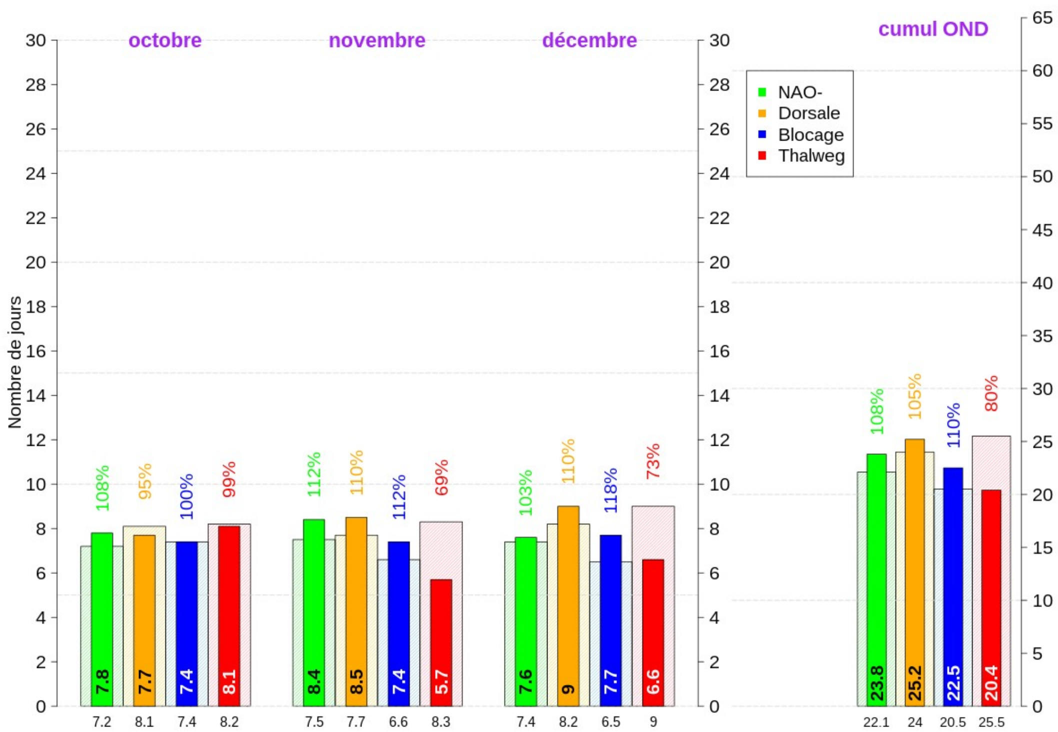


fig.II.2.3bis: North Atlantic Regime occurrence anomalies from Meteo-France ARPEGE-S5 : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes (winter regimes at the top, summer regimes at the bottom).

II.3. IMPACT: TEMPERATURE FORECASTS (FIGURE II.3.1 TO II.3.4)

Positive anomalies dominate in the forecast across the globe. Over Europe, the context of forecasting temperature negative anomalies over the North Atlantic still seems to influence forecast of weak anomalies over the continent (but is not found on past situations) thereby weak signal on Europe ; warm scenario is slight majority with a higher probability on the Mediterranean and the North of Europe.

II.3.a ECMWF

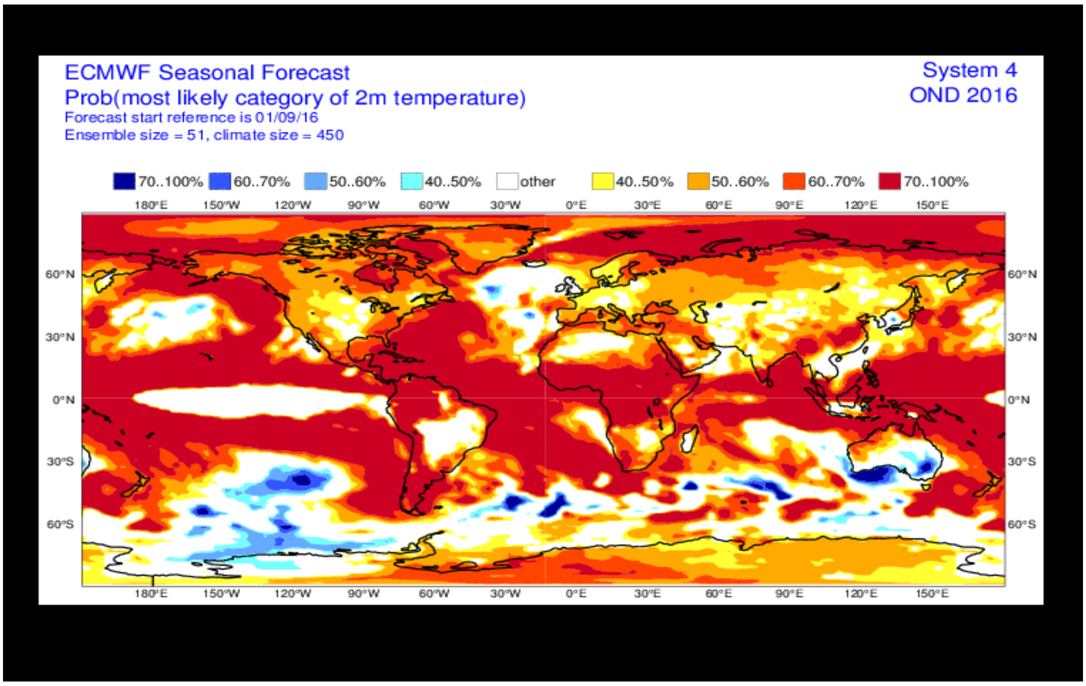


fig.II.3.1: Most likely category probability of T2m from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/

II.3.b Météo-France

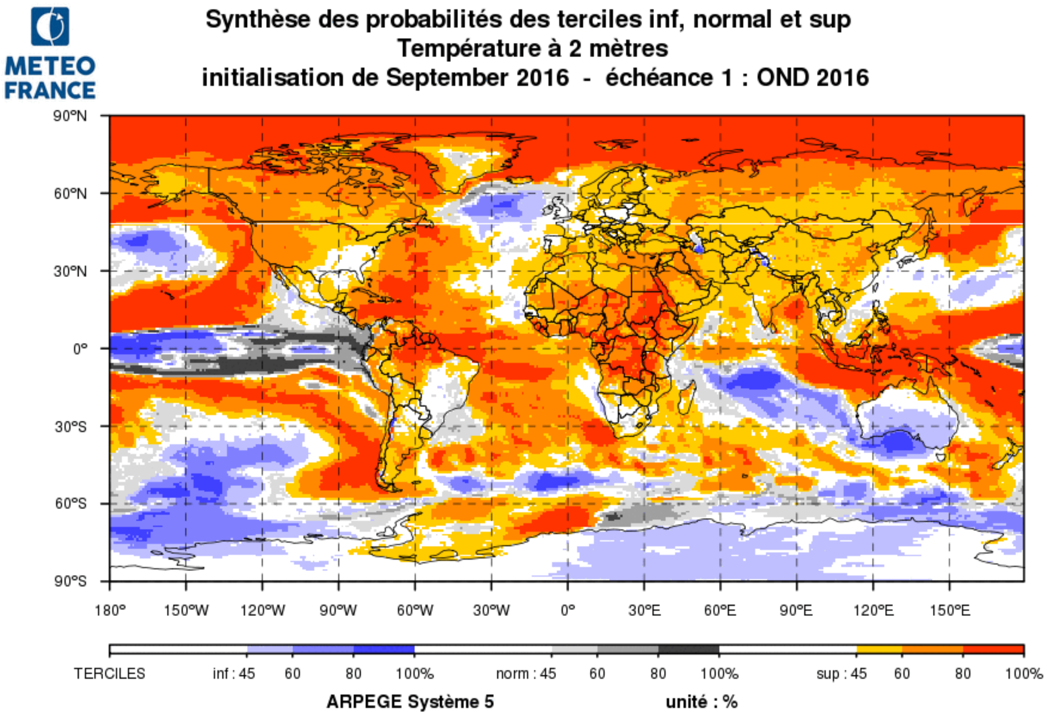


fig.II.3.2: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.3.c Japan Meteorological Agency (JMA)

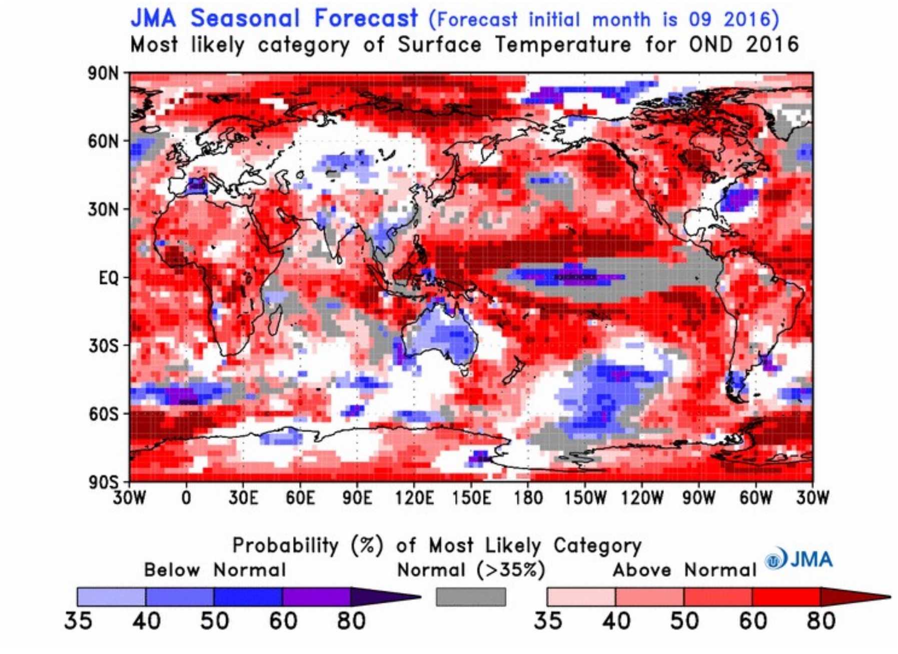


fig.II.3.3: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.php

II.3.d EUROSIP

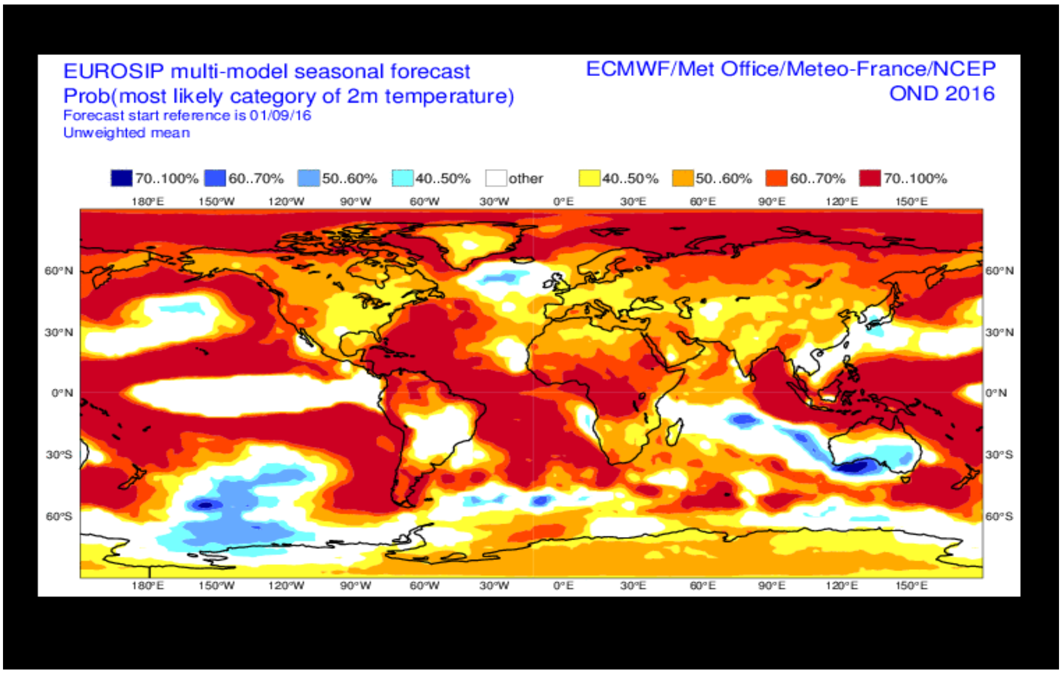


fig.II.3.4: Multi-Model Probabilistic forecasts for T2m from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/

II.4. IMPACT : PRECIPITATION FORECAST

In consistency with the expected ENSO phase, very likely dry anomaly along the equator in the Pacific Ocean, very likely wet anomaly both sides and over Maritime Continent. Dry anomaly over western Indian Ocean and Eastern Africa (Great Lakes region) linked with the anomaly of large-scale subsidence.

Over Europe, no signal, except perhaps a dry anomaly on the extreme southwest of the continent (Portugal) and a wet anomaly along the North Sea and the Baltic Sea.

II.4.a ECMWF

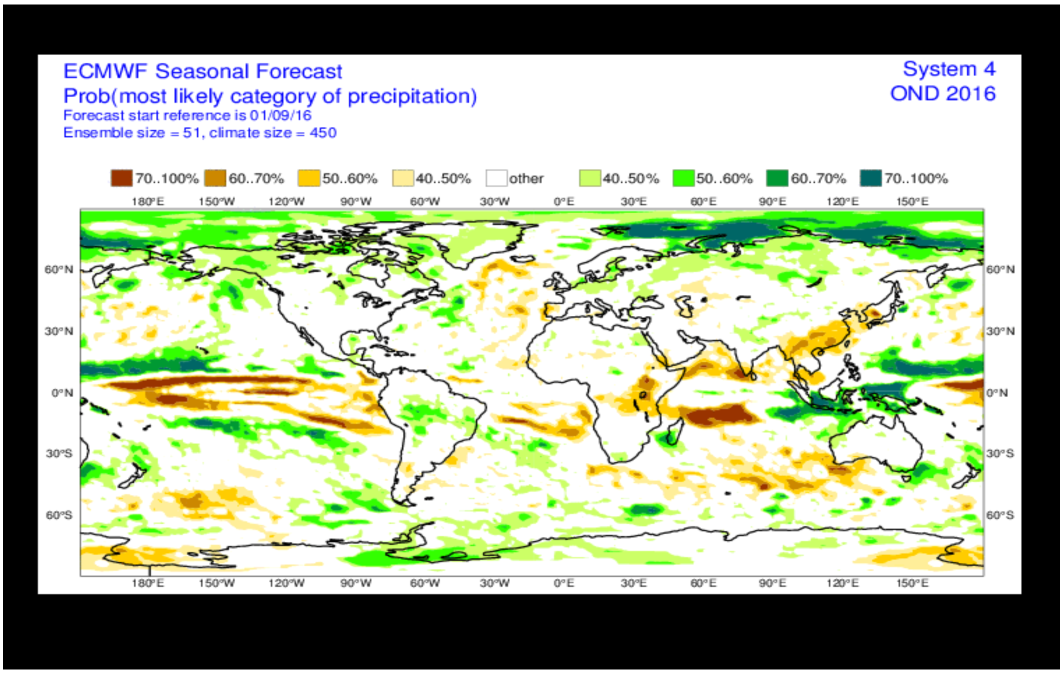


fig.II.4.1: Most likely category probability of rainfall from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/

II.4.b Météo-France

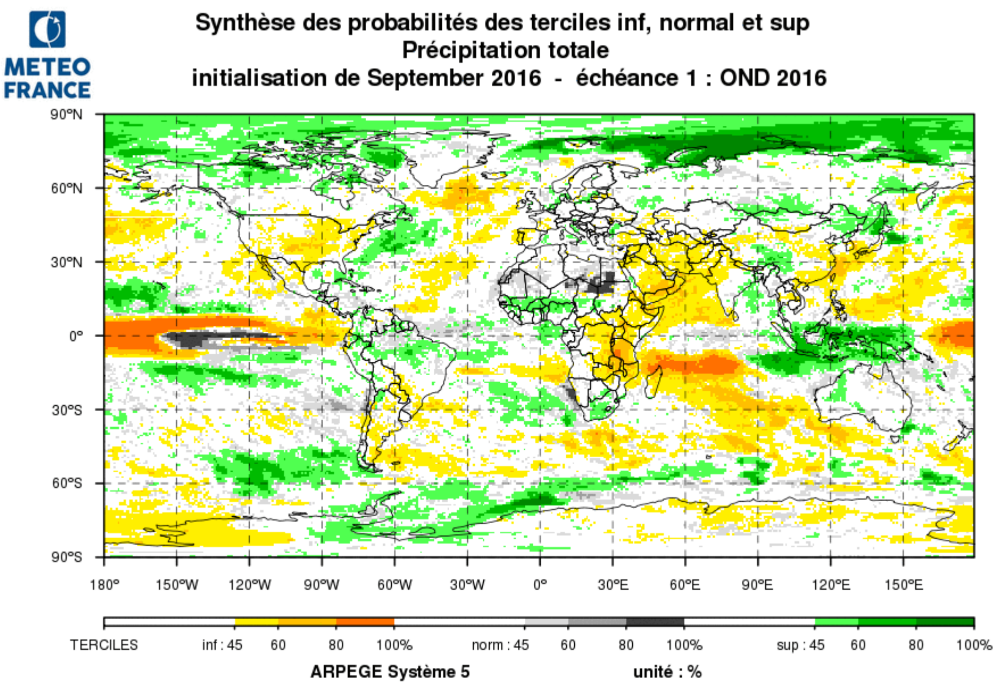


fig.II.4.2: Most likely category of Rainfall. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Japan Meteorological Agency (JMA)

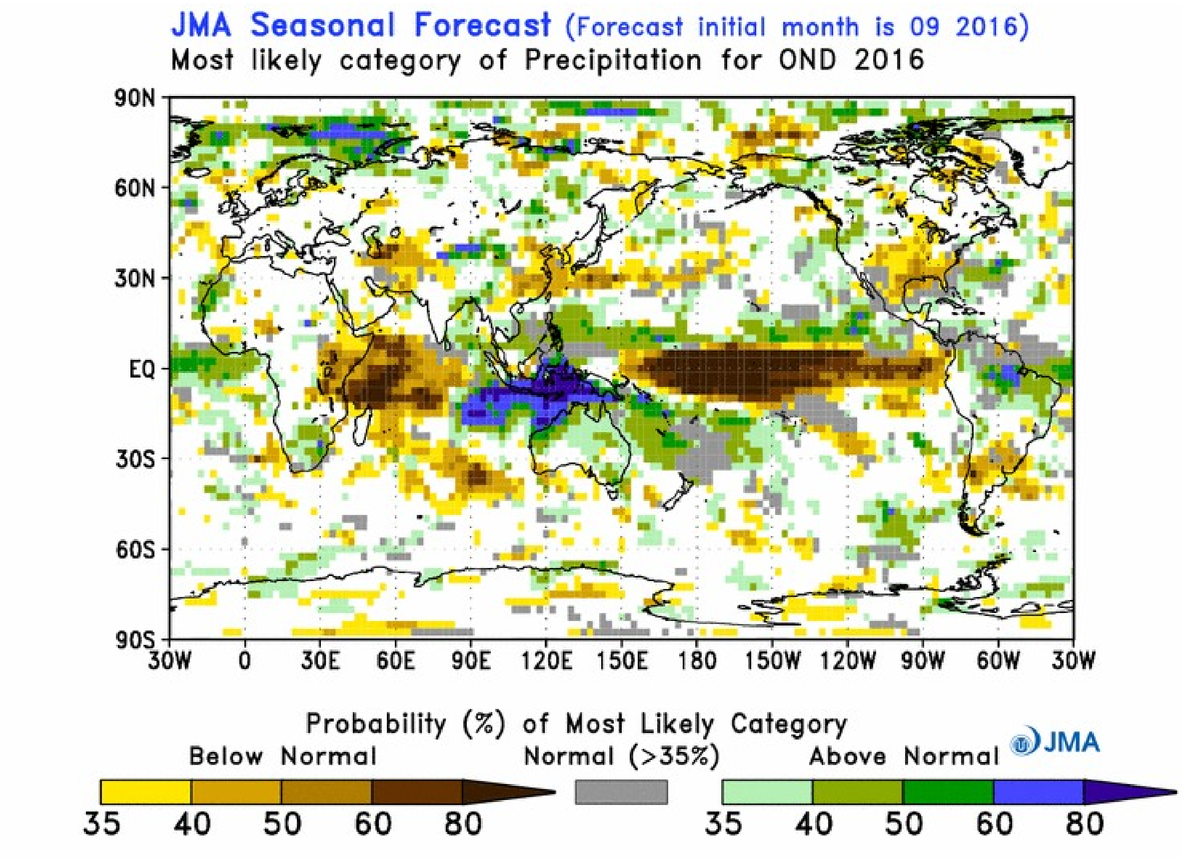


fig.II.4.5: Most likely category of Rainfall from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal.
http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.php

II.4.d EUROSIP

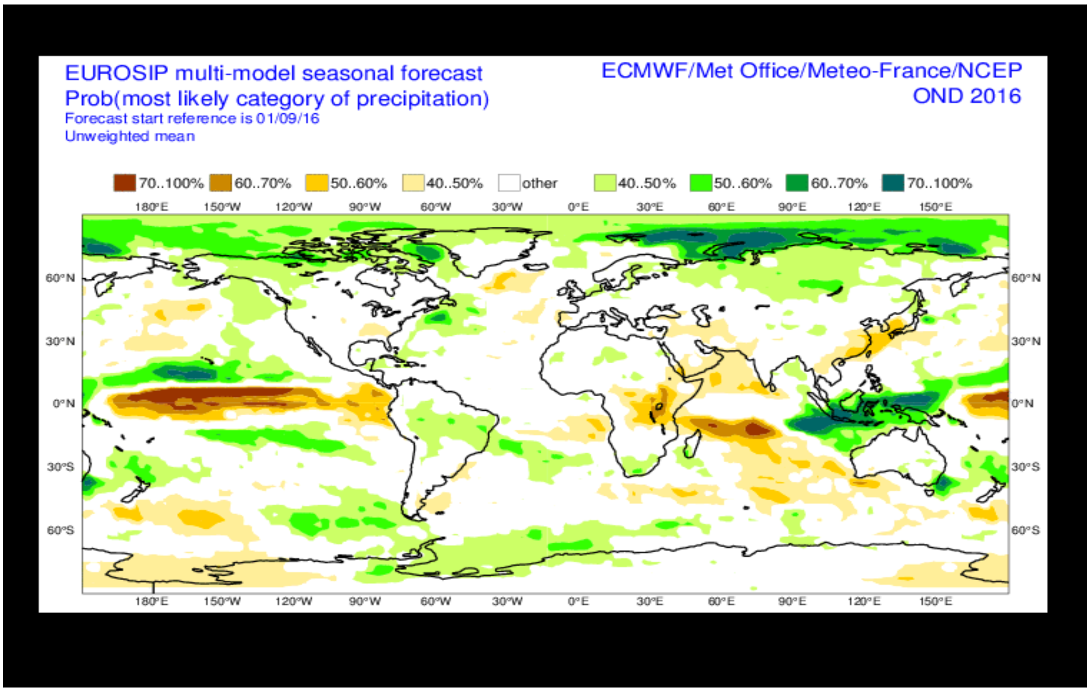


fig.II.4.7: Multi-Model Probabilistic forecasts for precipitation from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal).
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/

II.5. REGIONAL TEMPERATURES AND PRECIPITATIONS

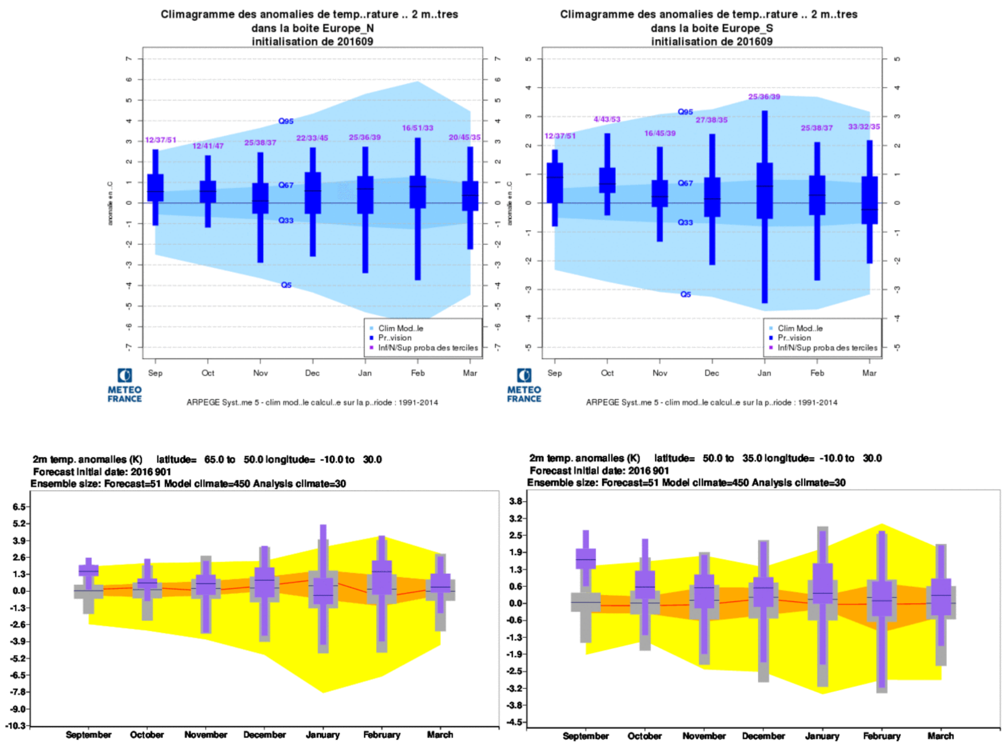


fig.II.5.1 : Climagrams for Temperature in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

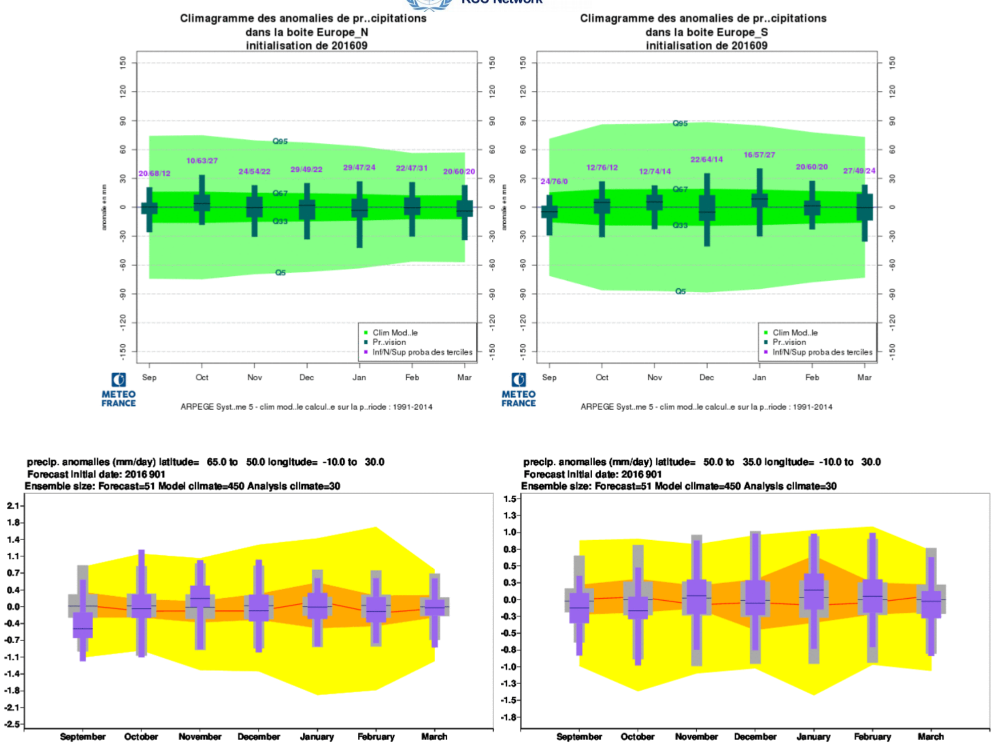
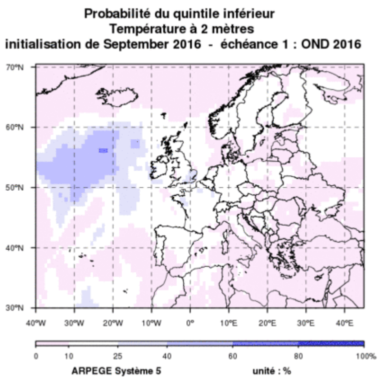


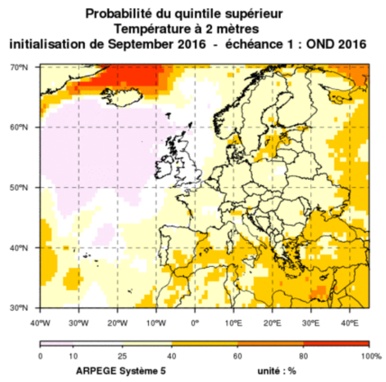
fig.II.5.2 : Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

II.6. MODEL'S CONSISTENCY

Not available

II.7. "EXTREME" SCENARIOS





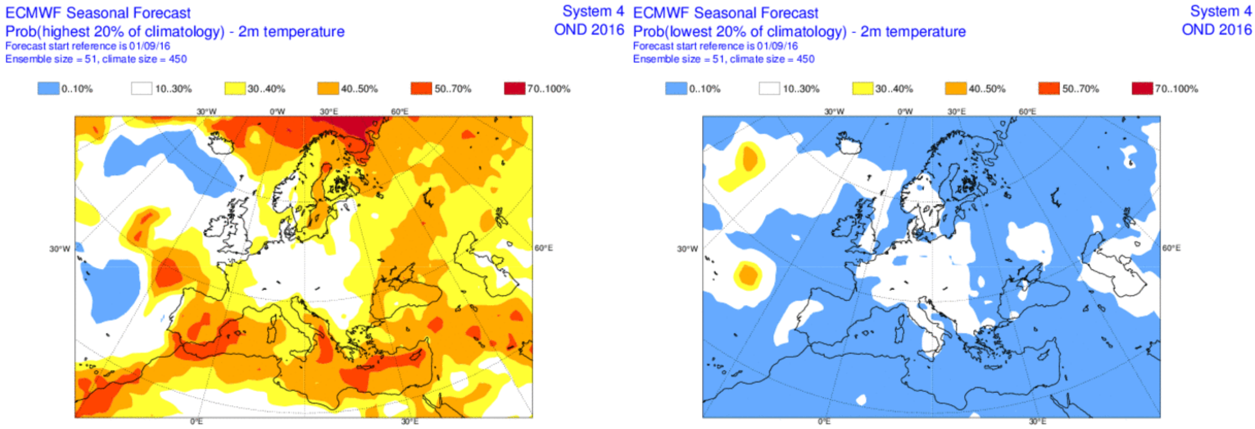


fig.II.7.1 : Top : Meteo-France T2m probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution). Bottom : ECMWF T2m probability of « extreme » below normal conditions (left - lowest ~20% of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

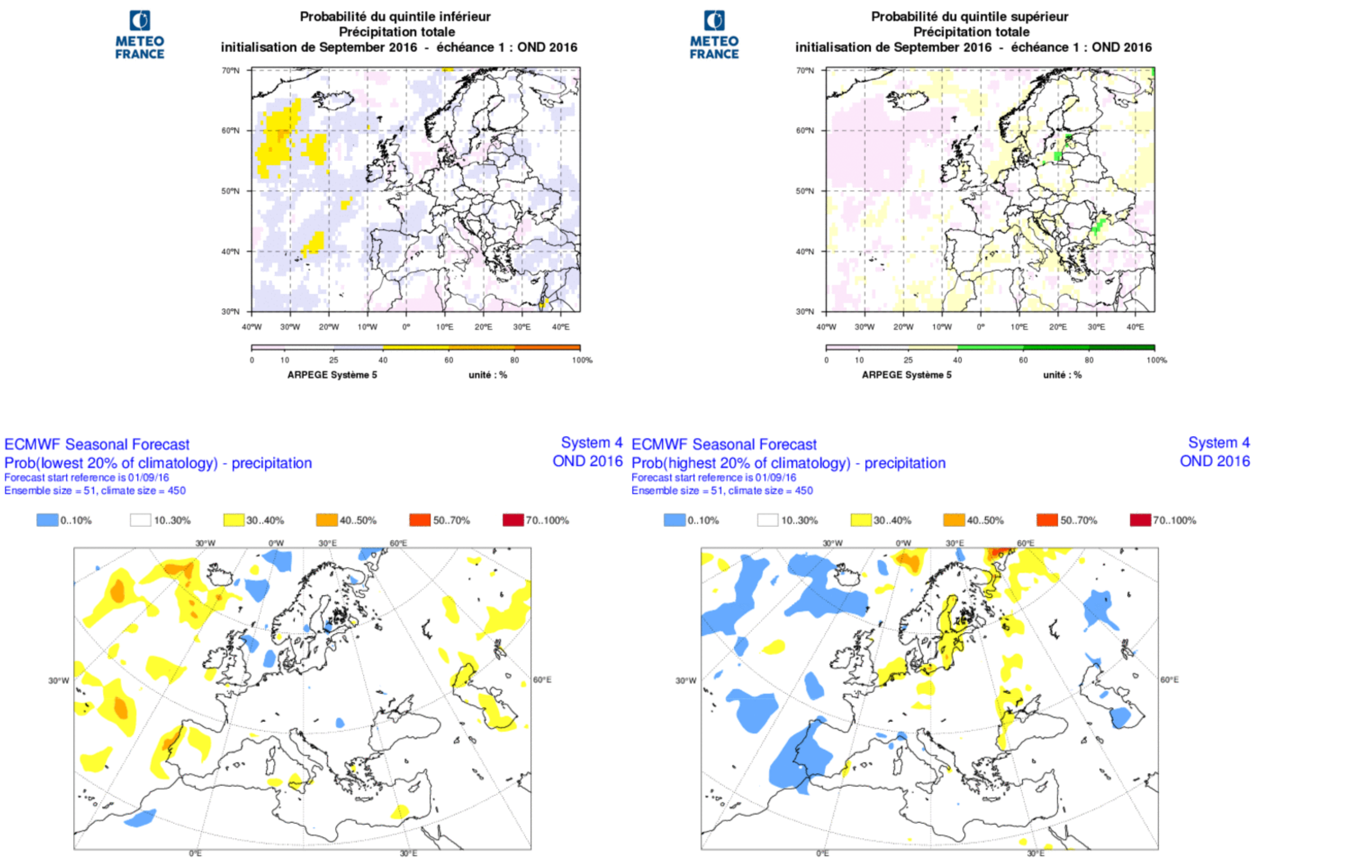
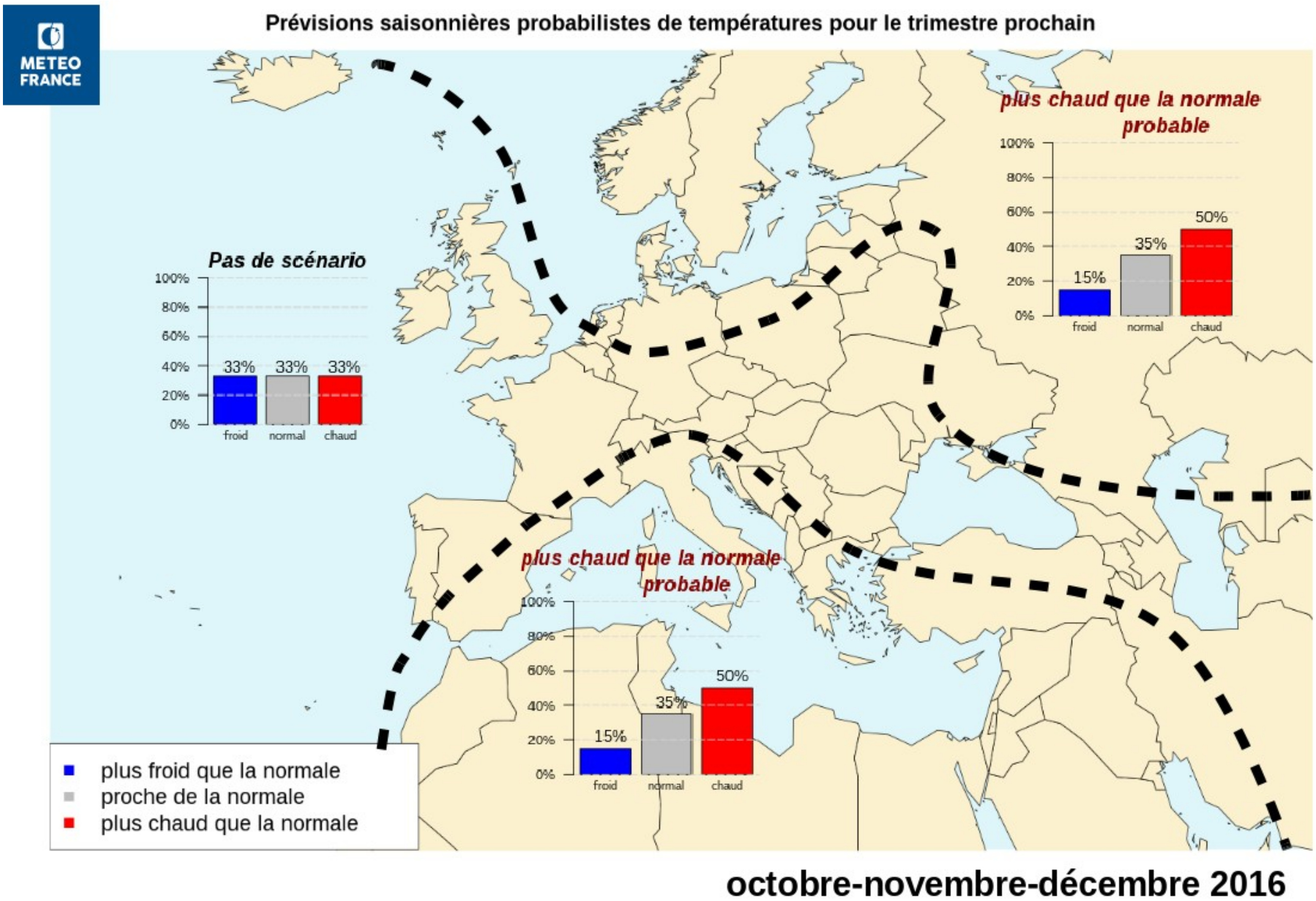


fig.II.7.2 : Top : Meteo-France rainfall probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution).
Bottom : ECMWF rainfall probability of « extreme » below normal conditions (left - lowest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

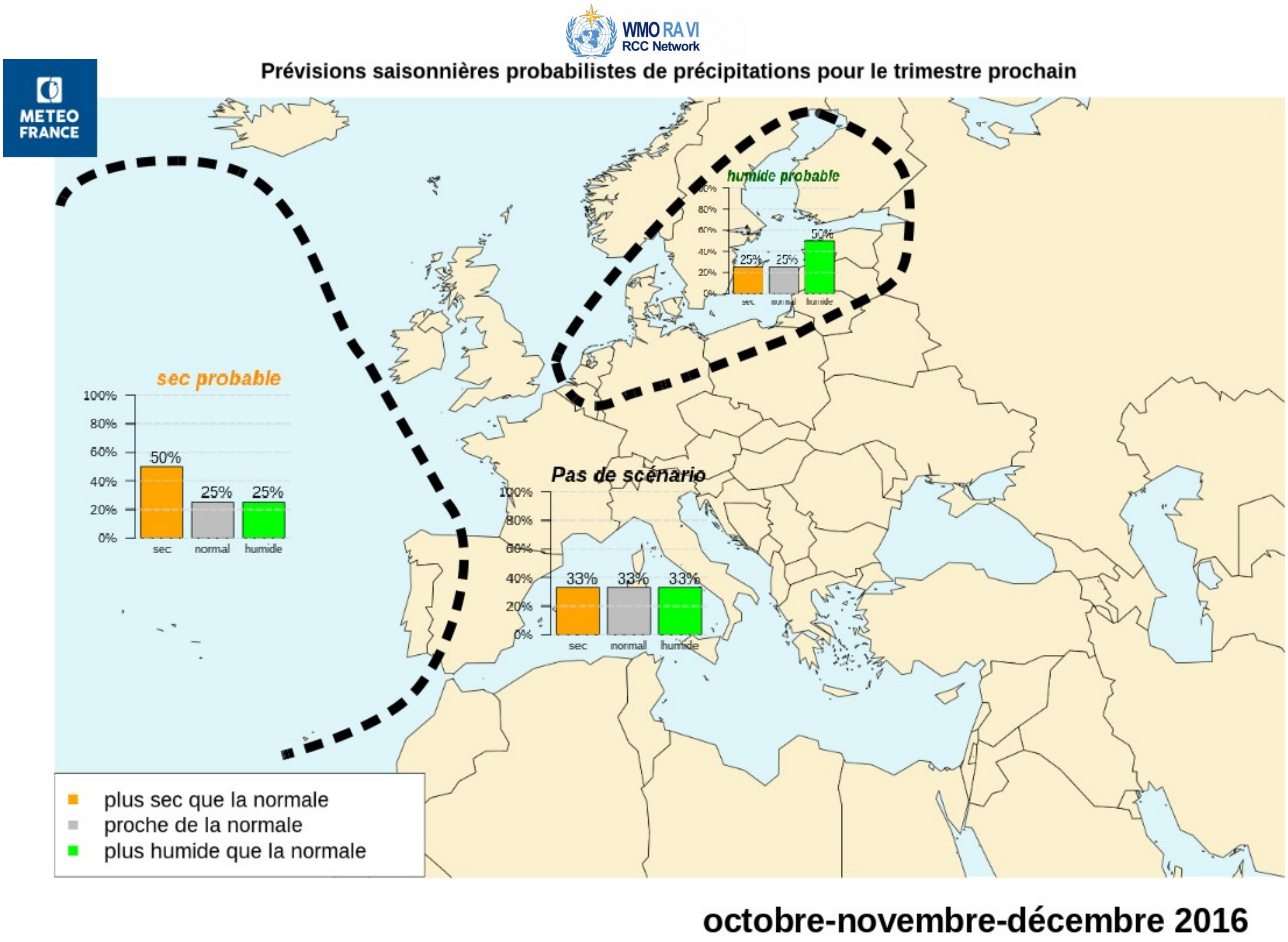
II.8. DISCUSSION AND SUMMARY

II.8.a Forecast over Europe

Temperatures: warmer scenario likely on the Mediterranean and the North of Europe.



Precipitation: Generally no scenario, except on the extreme southwest of the continent (dry likely) and an area stretching along the coast of the North Sea and Baltic Sea (likely wet).



II.8.b Tropical cyclone activity

Slightly above than normal activity over Northwest Pacific. Slightly lower than normal activity expected on the southwest Indian Ocean. (see fig II.8.1)

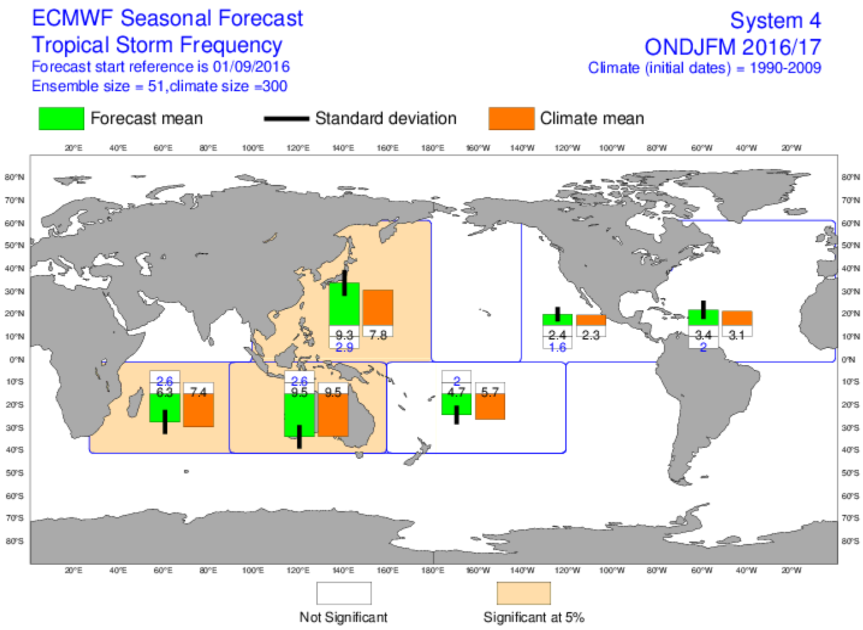


fig.II.8.1: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/

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.

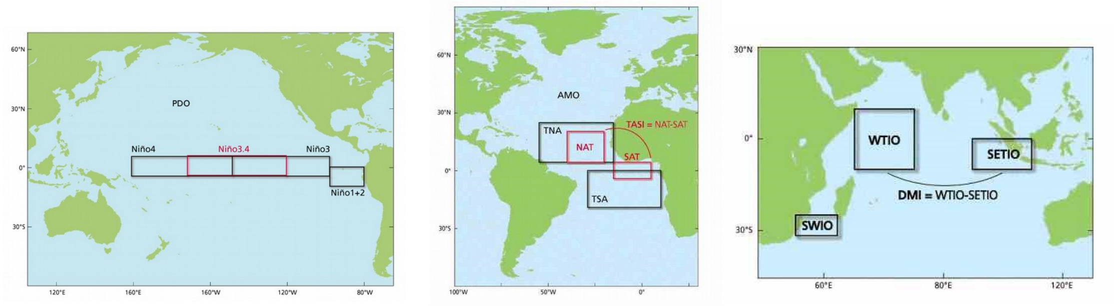
III.2. « NINO », SOI INDICES AND OCEANIC BOXES

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).

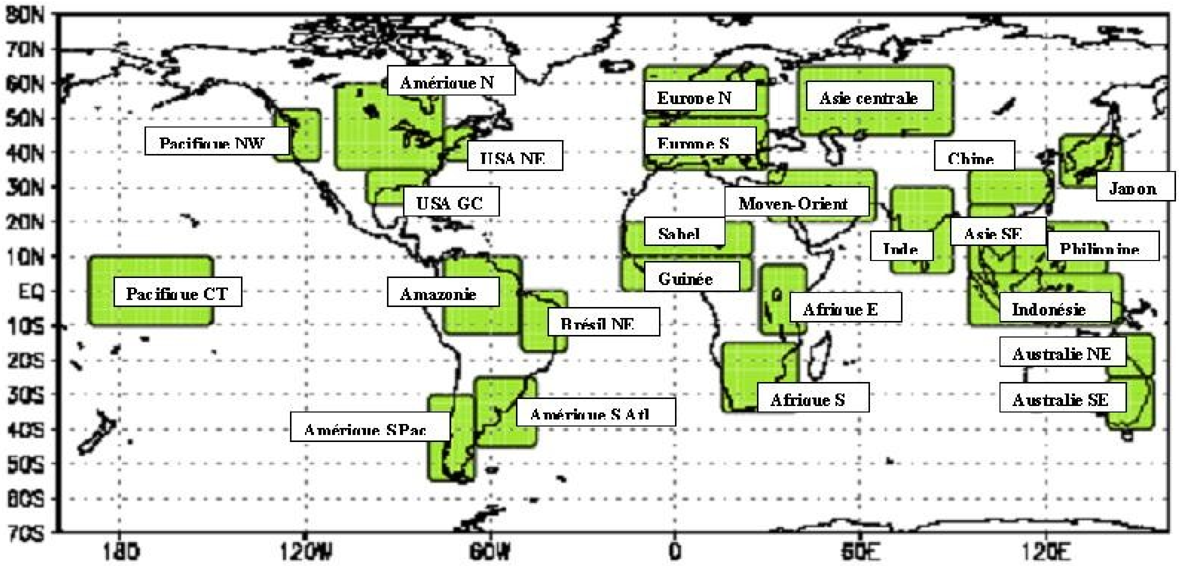
Associated to the oceanic « El Niño / La Niña » events, and taking into account the strong ocean/atmopshere coupling, the atmosphere shows also interanual variability associated to these events. It is monitored using the SOI (Southern Oscillation Index). This indice is calculated using standardized sea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