GLOBAL CLIMATE BULLETIN
n°207 – September 2016

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I. DESCRIPTION OF THE CLIMATE SYSTEM (JULY 2016)

I.1. OCEANIC ANALYSIS

I.1.a Global analysis

In the Pacific ocean :

- Along the equator : SST continues to decrease from the South American coast to the International Date Line. The SST anomaly in Nino3.4 box became negative in July. In sub-surface, the strong cold Kelvin wave of June, has weakened in July. resulting in a relative attenuation of the cold anomaly around -100 m. Warm surface anomaly is stable west of the International Date Line, despite the negative heat content of the first 300 meters.
- Persistent positive SST anomalies in tropical area both sides of equatorial wave guide, but with a cooling trend in the northeast.
- In the northern hemisphere : clear cooling trend in eastern basin from Gulf of Alaska to the equator and the northwest, from the International Date Line to Japan Sea and Okhostk sea. Conversely, warming trend in south-eastern and central part of northern Pacific. the PDO index should accordingly subside in July.
- In the southern hemisphere : no clear SST trend, already present anomalies persist, with cold anomaly in the center and warm anomalies around

Maritime continent :

- warm anomaly, especially south of Java island where it was further strengthened in July.
- Cooling trend in eastern Timor.

In the Indian Ocean :

- general cooling trend continues, particularly from Bengal gulf to Somalia coast where cold anomaly became very strong.
- the DMI index continues to fall in July (about -1.2).
- Remarkable 0-300m heat content dipole with cold anomaly westward and warm anomaly eastward.

In the Atlantic:

- warn anomaly throughout the tropics, with no significant trend in July. No tongue of cold water near the equator.
- For middle and high northern latitudes : cold anomaly south of Iceland remains, but it is deconstructed by the atmospheric circulation which generates a strong cooling near the British Isles and a warming south of Greenland. Warming to the Azores and significant cooling south-western Portugal linked with atmospheric conditions.
- the equatorial wave guide, cooling tendency emerging, but the Guinea Gulf remains warmer than normal.
- For middle and high southern latitudes : no clear trend, already present cold anomalies south of 30°S persist.

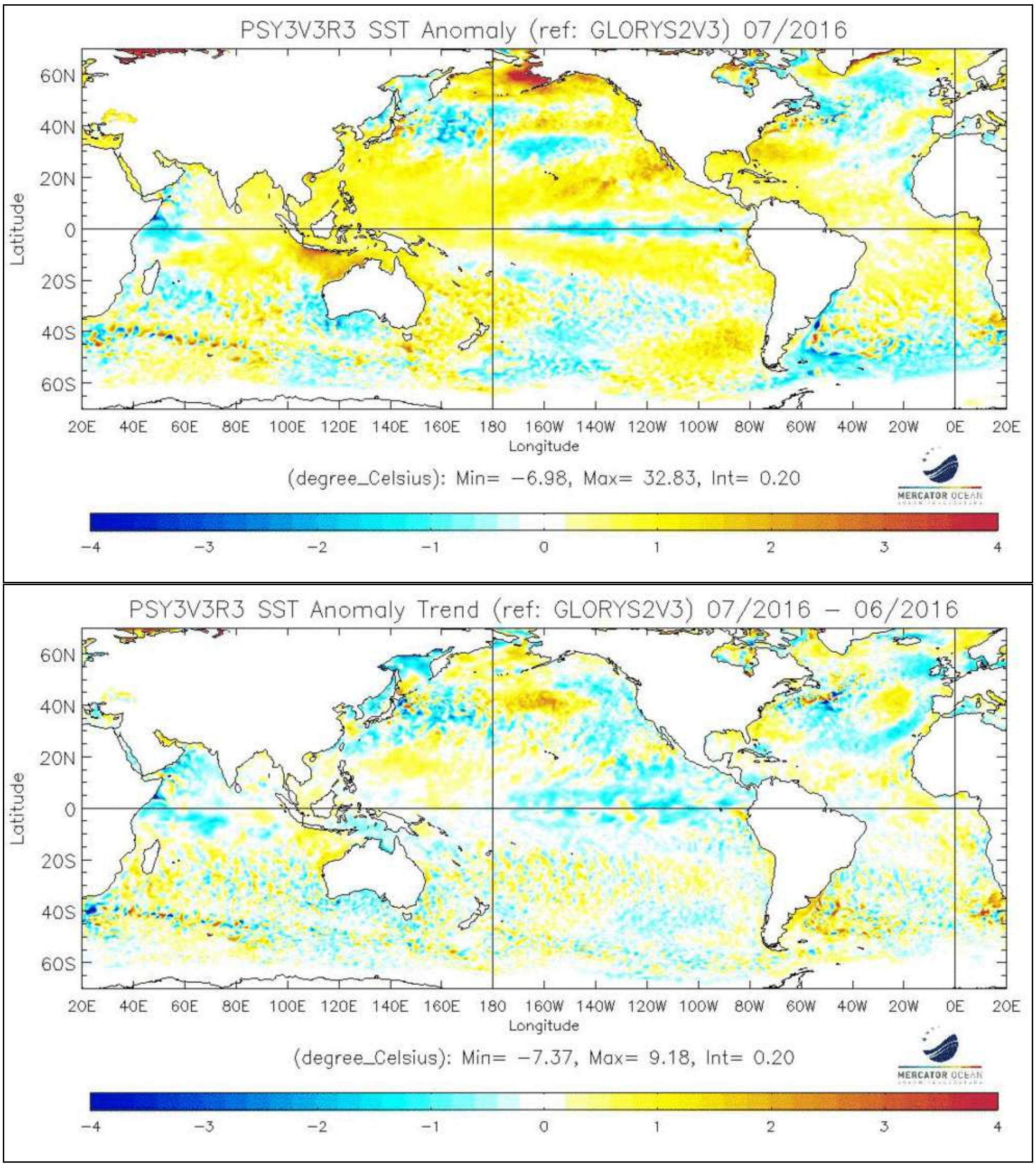


fig.I.1.1: top : SSTs Anomalies (°C) . Bottom : SST tendency (current – previous month), (reference Glorys 1992-2009). http://bcg.mercator-ocean.fr/

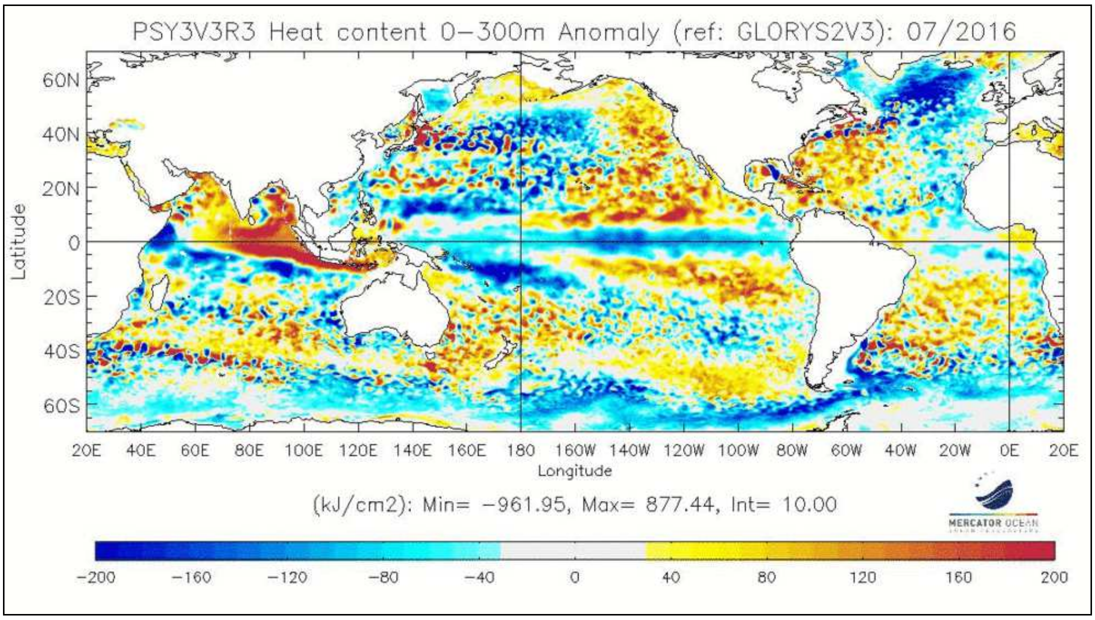


fig.I.1.2: map of Heat Content Anomalies (first 300m, kJ/cm2, reference Glorys 1992-2009)

http://bcg.mercator-ocean.fr/

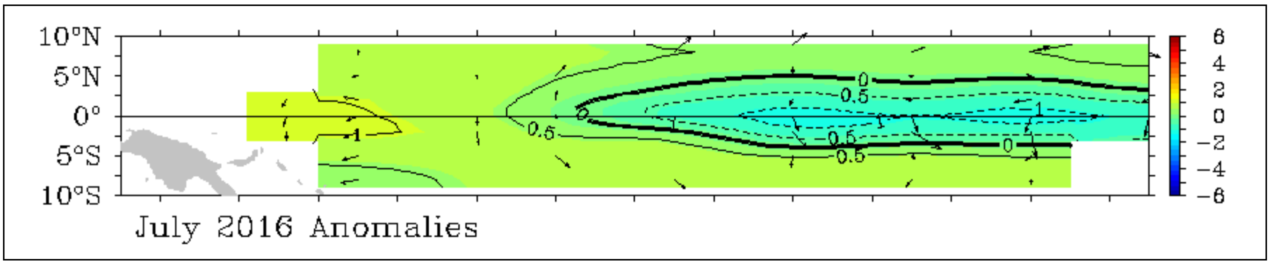


fig.I.1.3: SST Anomalies and Wind anomalies over the Equatorial Pacific from TAO/TRITON.

http://www.pmel.noaa.gov/tao/jsdisplay/monthly-summary/monthly-summary.html

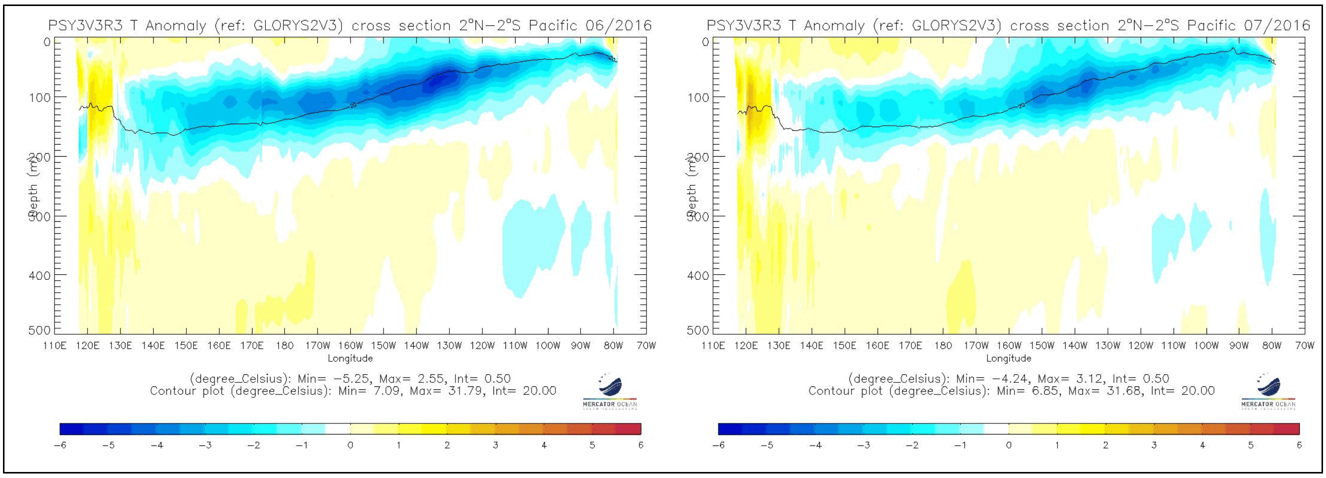


fig.I.1.4: Oceanic temperature anomaly in the first 500 meters in the Equatorial Pacific (previous and current month), http://bcg.mercator-ocean.fr

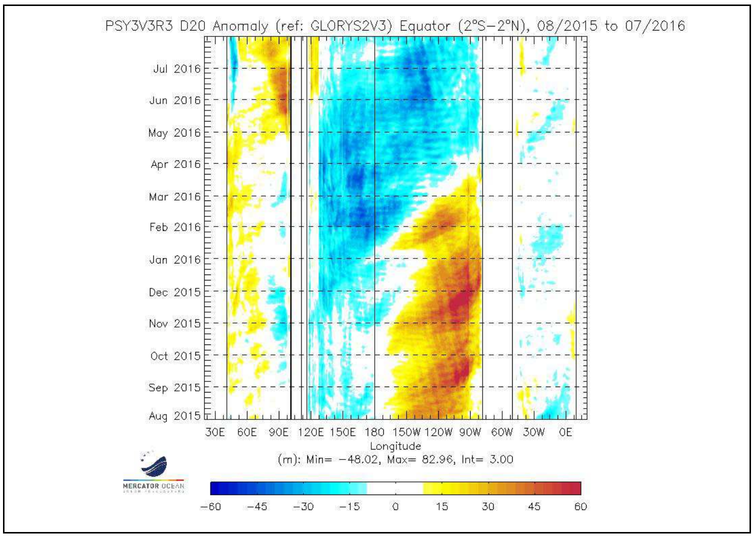


fig.I.1.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 6 month period http://bcg.mercator-ocean.fr/

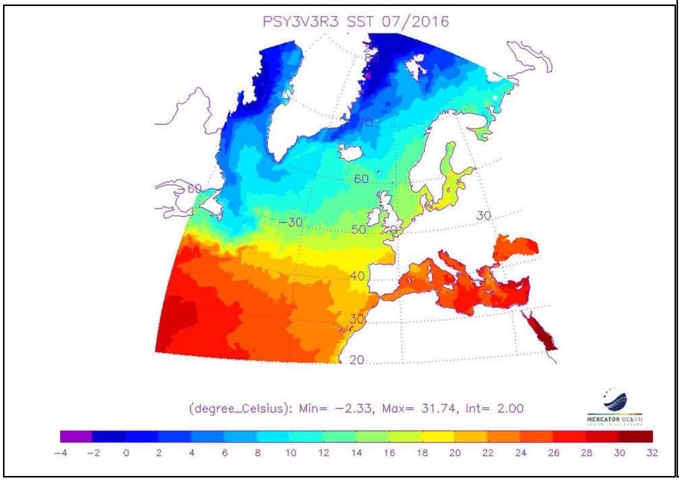
I.1.b Sea surface temperature Near Europe

Once again still a very mild Arctic SST. The sst anomalies at the coast of Greenland and in the Barents Sea increased to more than +3°C, compared to June.

The cold anomaly in the central North Atlantic was very stable and reached up to Ireland and UK. The southern North Sea was slightly cooler than normal. The cold anomaly from the west coast of Norway moved northwards and decreased in comparison to June.

Baltic Sea was still warmer than normal.

In the Mediterranean only little departures from the usual seasonal warming occured. Most of the eastern Mediterranean and the Black Sea were slightly warmer than normal, parts of the western and central Mediterranean slightly cooler.



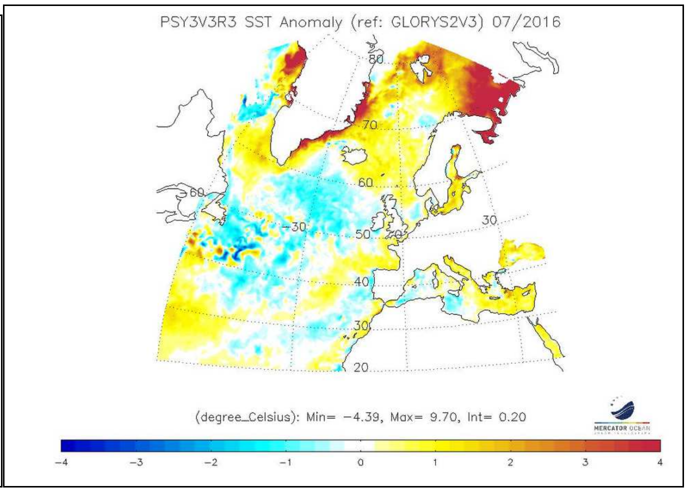


fig.I.1.6 : Mean sea surface temperature in the RA VI Region (Europe) and anomaly (reference Glorys 1992-2009). http://bcg.mercator-ocean.fr/

I.2.ATMOSPHERE

I.2.a General Circulation

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

July average structure shows a main downward motion core in western Pacific (in contradiction with the SST) and an upward motion core over Africa. Elsewhere, the cores are weaker, with an upward motion core over the eastern Pacific and downward motion cores over the Indian Ocean and over an area of the West Indies to Brazil.

Standardized SOI +0.4 in July. (https://www.ncdc.noaa.gov/teleconnections/enso/indicators/soi/)

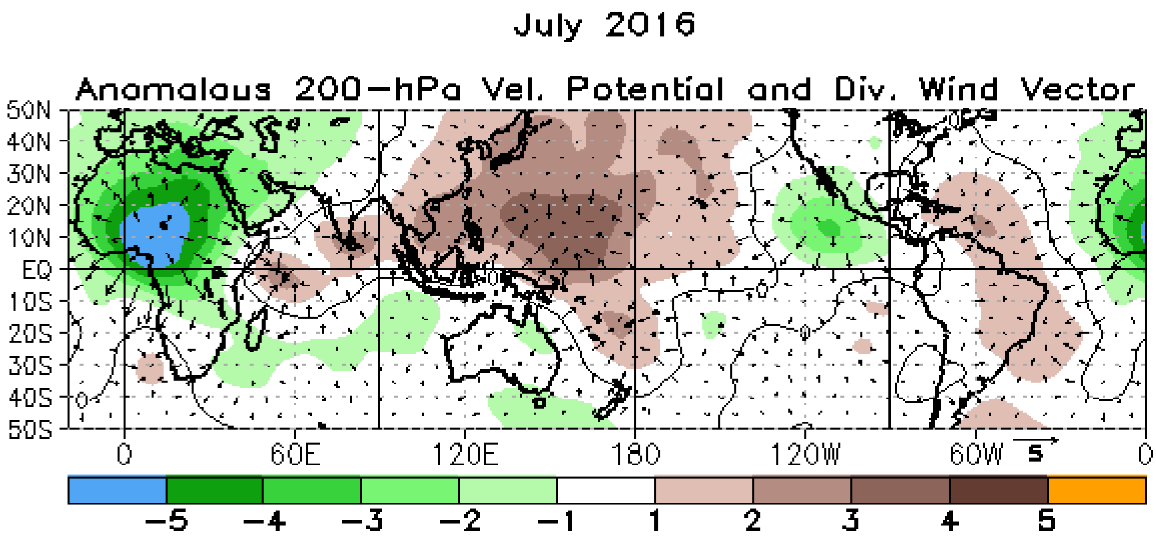


fig.I.2.1: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).

http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml

MJO (fig. I.2.1.b)

- Significant activity from July 8 to July 24 in the dials 1 and 2 which favored the downward motion over Indian Ocean during the first 15 days then over Maritime continent in the second half of the month and the upward motion over Africa.

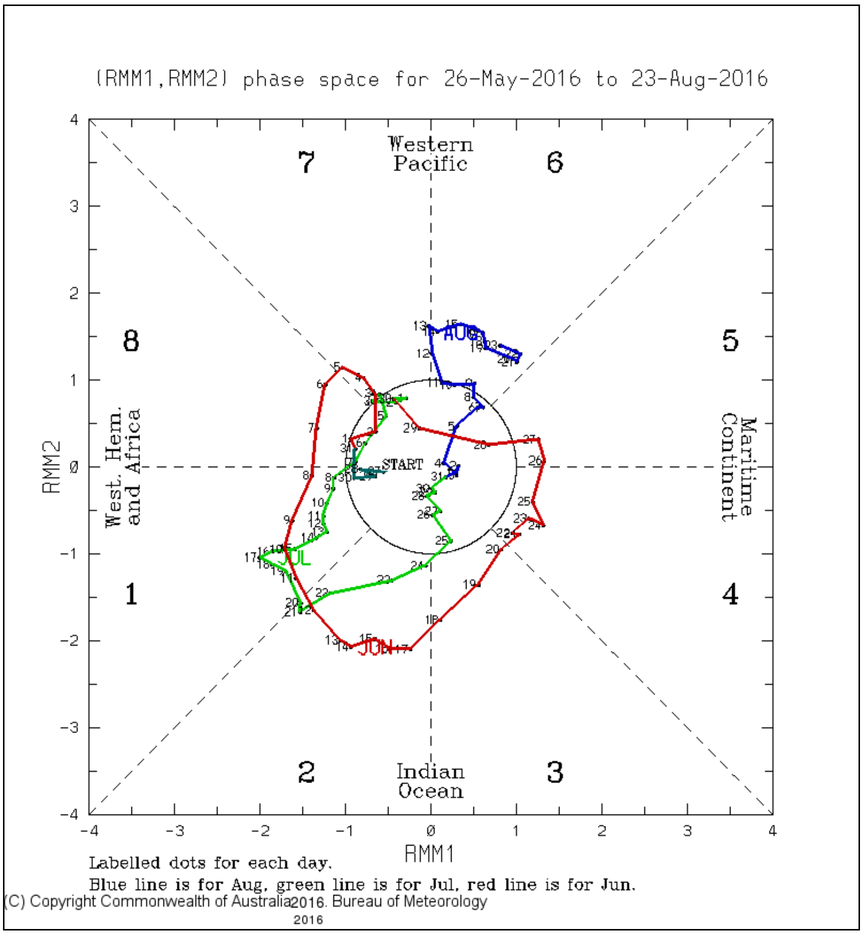


fig.I.2.b: indices MJO http://cawcr.gov.au/staff/mwheeler/maproom/RMM/phase.Last90days.gif

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

Very few anomalies in July and no teleconnection to the mid latitudes..

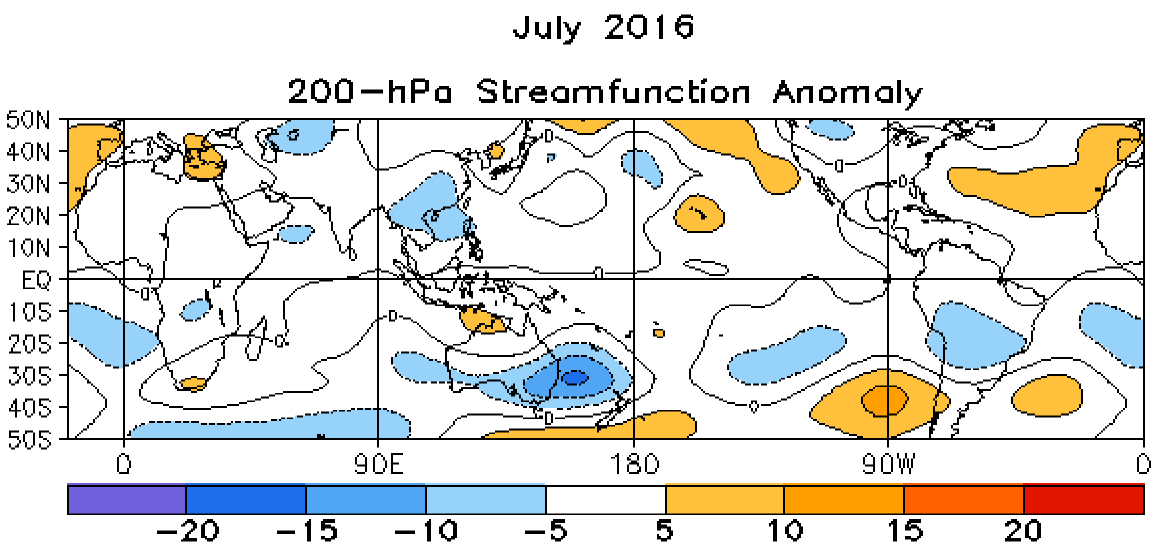


fig.I.2.2: Stream Function Anomalies at 200 hPa.

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 : negative anomaly on USA-Canada border to south of Newfoundland and across the North Atlantic to another negative anomaly core center on Faroe Islands. Positive anomalies on southern Europe, Greenland and northern Pacific.

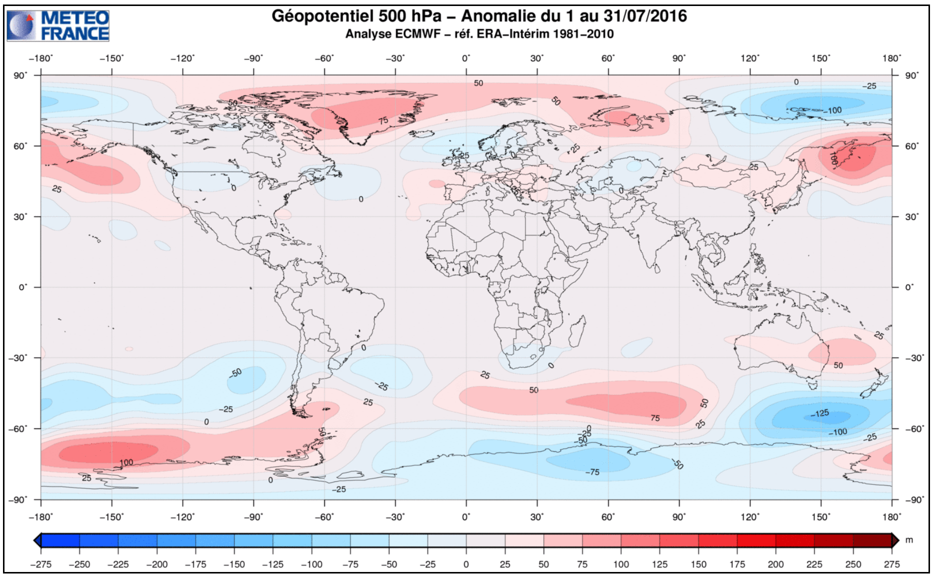


fig.I.2.3: Anomalies of Geopotential height at 500hPa (Meteo-France)

MONTH	NAO	EA	WP	EP-NP	PNA	TNH	EATL/WRUS	SCAND	POLEUR
JUL	**-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
FEB 16	1.4	1.9	1.6	0.2	1.7	0.2	-2.4	-0.5	-2.3
JAN 16	-0.4	1.0	1.0	-0.4	1.9	-0.3	-0.5	-0.7	-2.6

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 southwestern Europe. The Icelandic Low, more intense than normal, located to the south-east, resulting in negative pressure anomalies extended from Newfoundland to Scandinavia. Due to the higher pressure above Greenland the NAO index is negative but with high impact. EA indix with a value of +1.8 indicates the shift of Icelandic Low and Azores High to the south-east and is the most dominating pattern together with the NAO.

The EATL/WRUS pattern is defined by lower pressure over the central Northatlantic and northern Russia with above normal pressure inbetween (i.e. northern Germany and Denmark). The negative value of -1.0 of this index explains to some extend the higher pressure anomalies in the area of the Azores High.

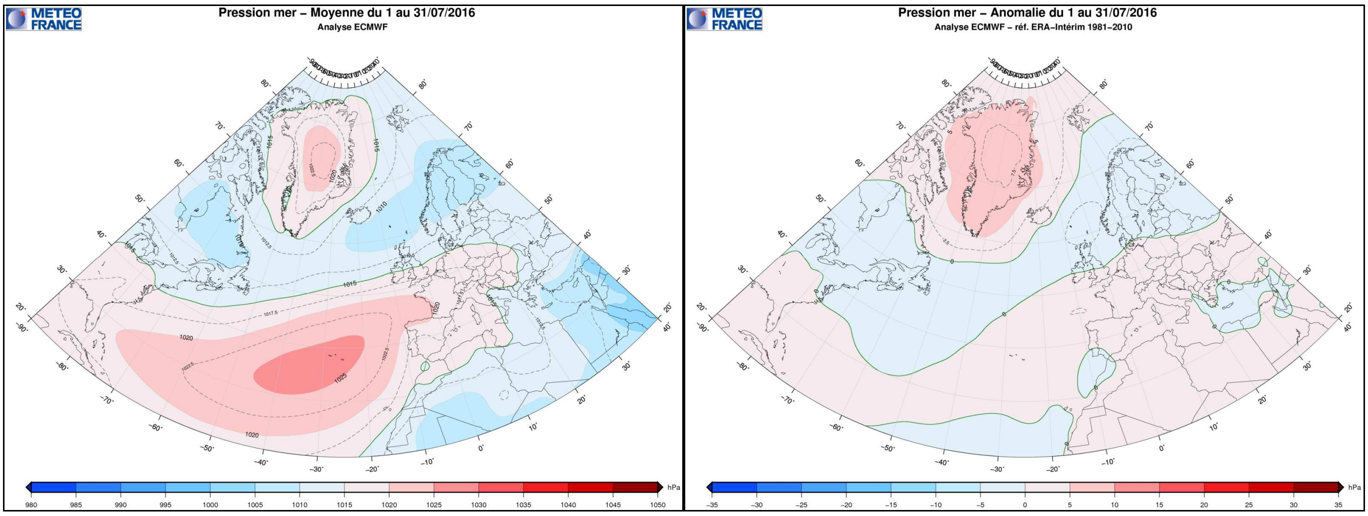


fig.I.2.4: Mean sea level pressure in the RA VI Region (Europe) (left) and 1981-2010 anomalies (right).

Circulation indices: NAO and AO

The NAO had two negative phases in the first and second half and around the middle of the month some days with slightly positive phase. The DWD Grosswetterlagen classification shows in the beginning of the month and during the last week of July westerly types. Around the middle of the month a trough moved over central Europe followed by a high over central Europe and a high over Scandinavia.

The AO Index showed during most of the month values within the standard deviation only in the middle of the month some days with positive AO index values above 1.0 occurred.

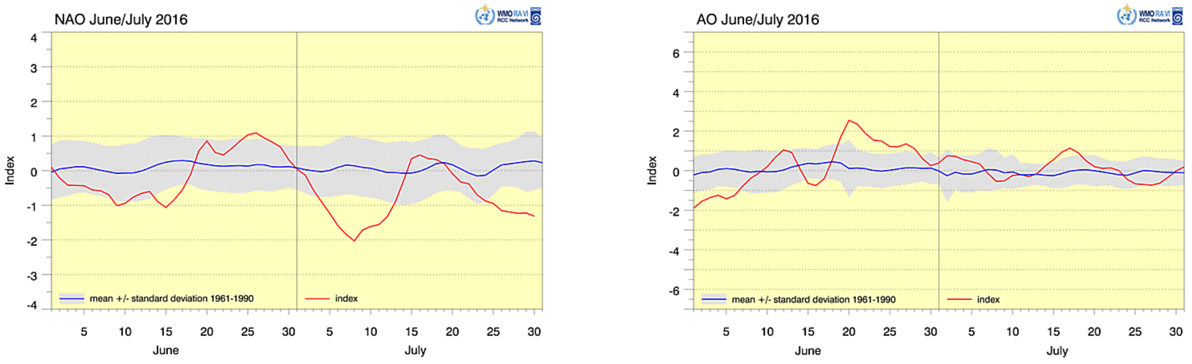


fig.I.2.5: North Atlantic Oscillation (NAO, left) and Arctic Oscillation (AO, right) indices with 1961-1990 mean standard deviation (shading). http://www.dwd.de/rcc-cm , data from NOAA CPC: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml

I.2.b Precipitation

- Active African and Indian monsoon with generally above normal rainfall.
- Generally above normal rainfall on southern Maritime Continent, weaker in the north, Southeastern Asia and along the equator across Pacific Ocean.
- below normal on Mexico Gulf, West Indies, Central America and northern of South America

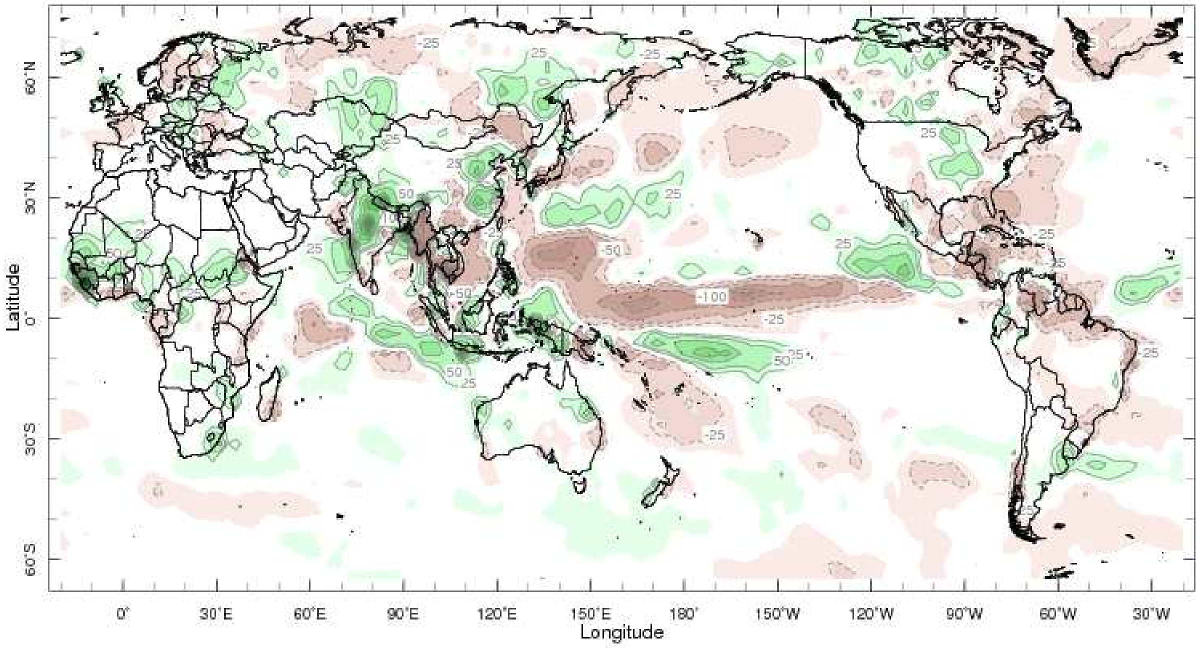


fig.I.2.6: Rainfall Anomalies (mm) (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.
http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/Anomaly.html

Precipitation anomalies in Europe:

Precipitation shows quite high anomalies in a band over Europe from Balkans to northern Russia and northern Scandinavia:

- Dry area over Iberia/southern France southern UK due to the Azores high influence,
- Very wet area from Balkans, Belarus to northern Russia and northern Scandinavia consistent with several troughs moved over central Europe together with heavy thunderstorms with 432 mm (or 318 % of the normal) gathered in Norway.
- Dry area from Iceland to Greenland,
- Wet area over south-western Scandinavia northern UK.

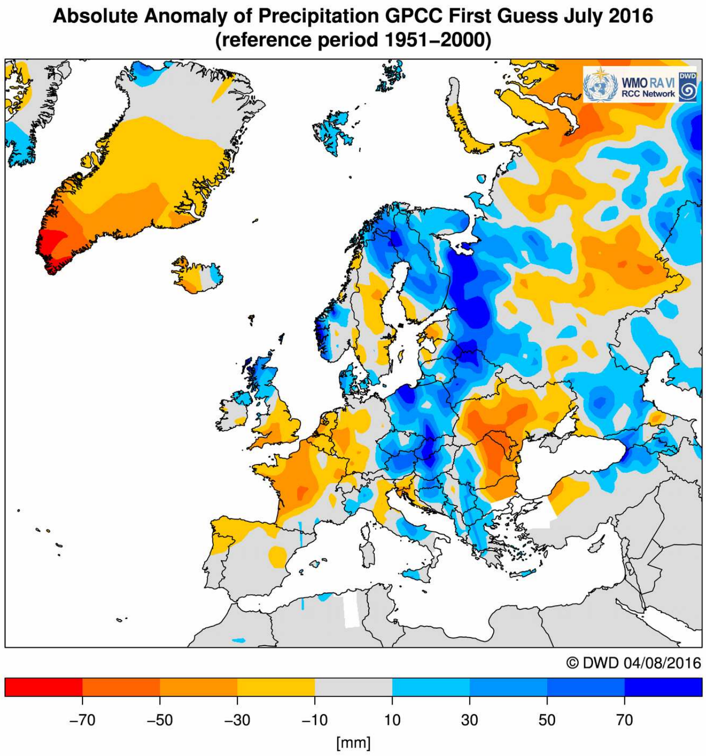


fig.I.2.7: Absolute anomaly (1951-2000 reference) of precipitation in the RA VI Region (Europe), data from GPCC (Global Precipitation Climatology Centre), http://www.dwd.de/rcc-cm.

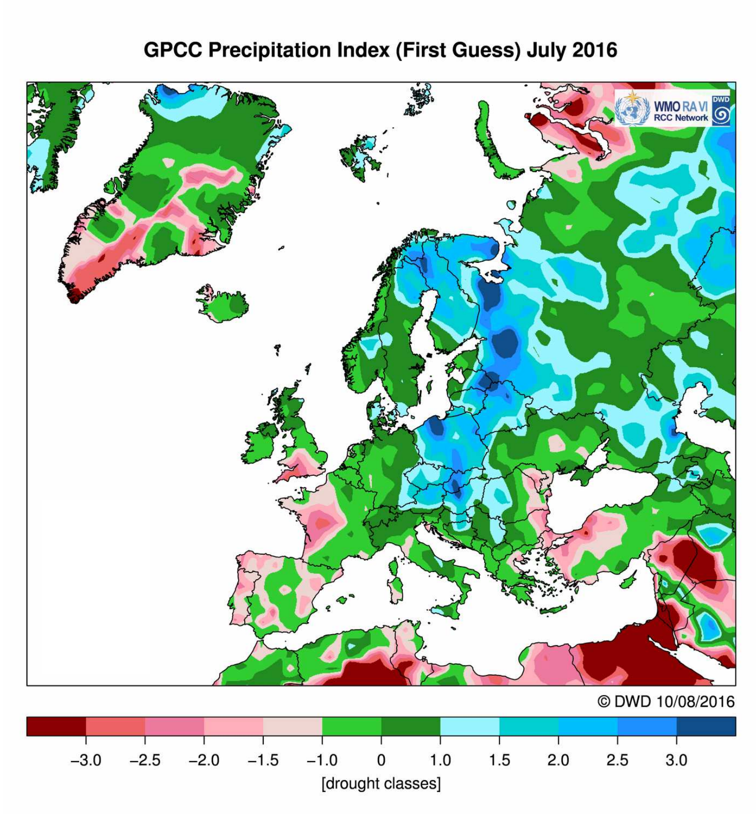


fig. I.2.8: GPCP Precipitation Index http://www.dwd.de/rcc-cm .

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	+9.8 mm	+0.630
Southern Europe	-6.0 mm	-0.420

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.2.c Temperature

- For the 15th consecutive month, the global temperature of July was the highest since global temperature records began (in 1880).
- July anomalies have no large scale structures.

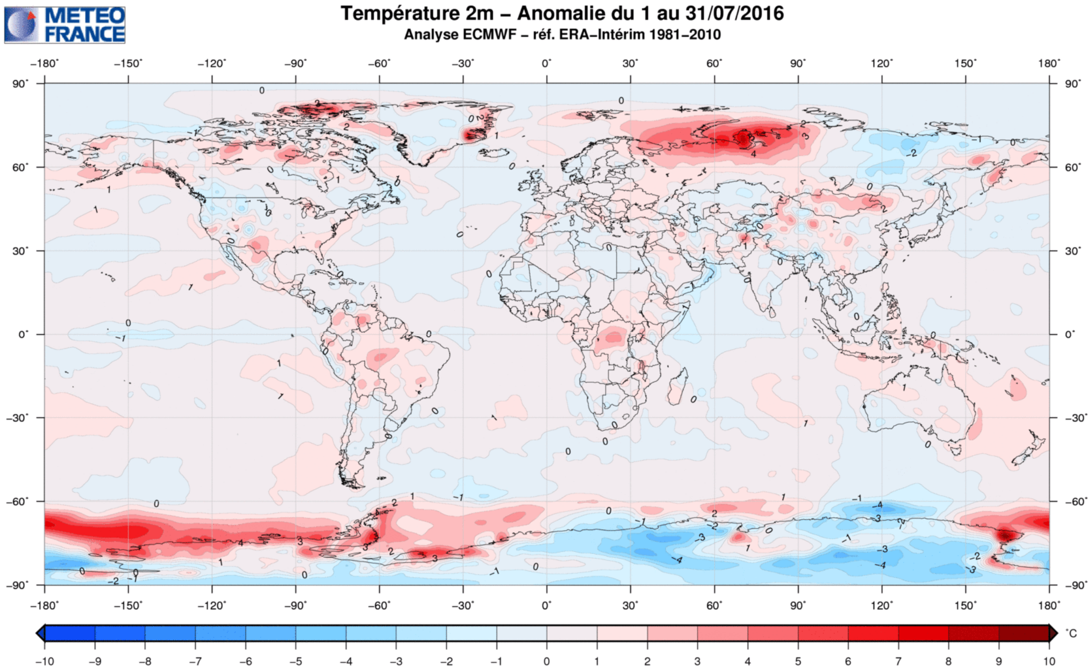


fig.I.2.9: Temperature Anomalies (°C) (Meteo-France)

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

Northern Europe was warmer than normal, especially the northeast, reflecting the anticyclonic conditions.

Large parts of the southern half of Europe were also warmer than normal.

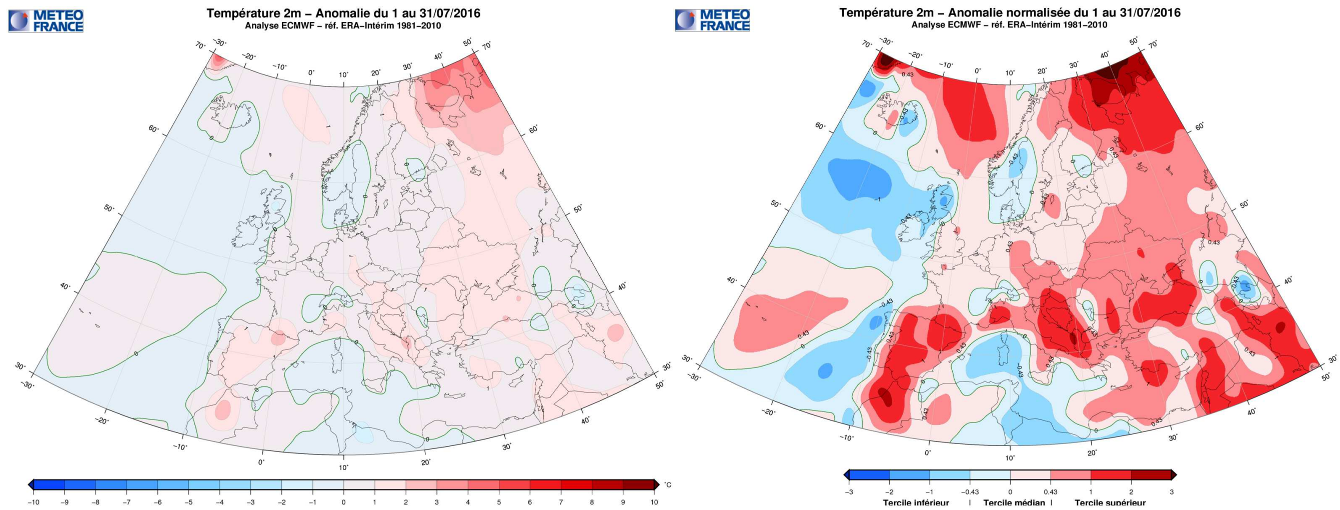


fig.I.2.10: Left graph: Absolute anomaly of temperature in the RA VI Region (Europe). Right graph: Standardized temperature anomalies

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.2.d Sea ice

In the Arctic (fig. 1.2.11 and 1.2.12 - left) : still at record low level (about -2 std).

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

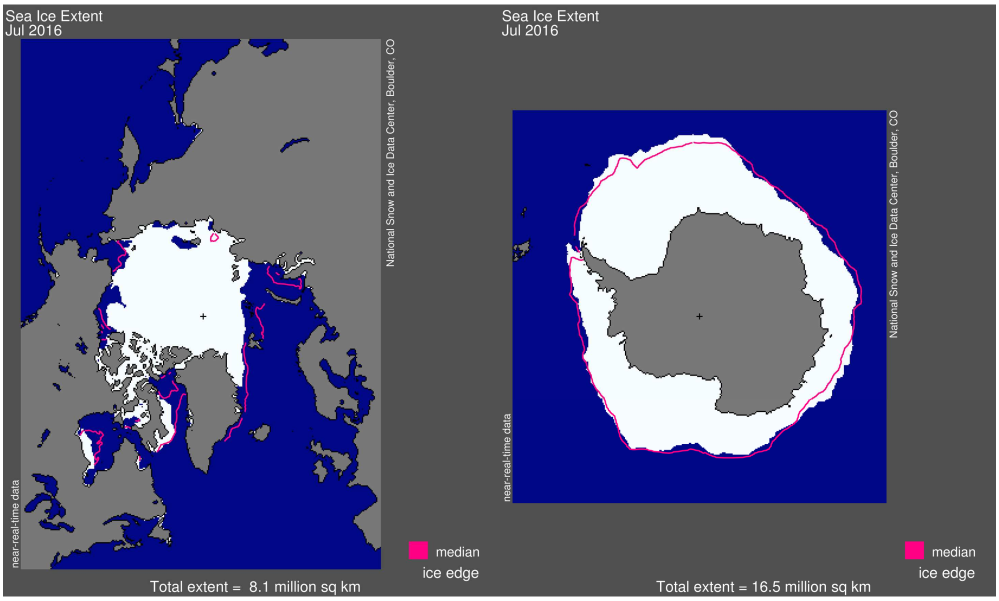


fig.I.2.11: Sea-Ice extension in Arctic (left), and in Antarctic (right). The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

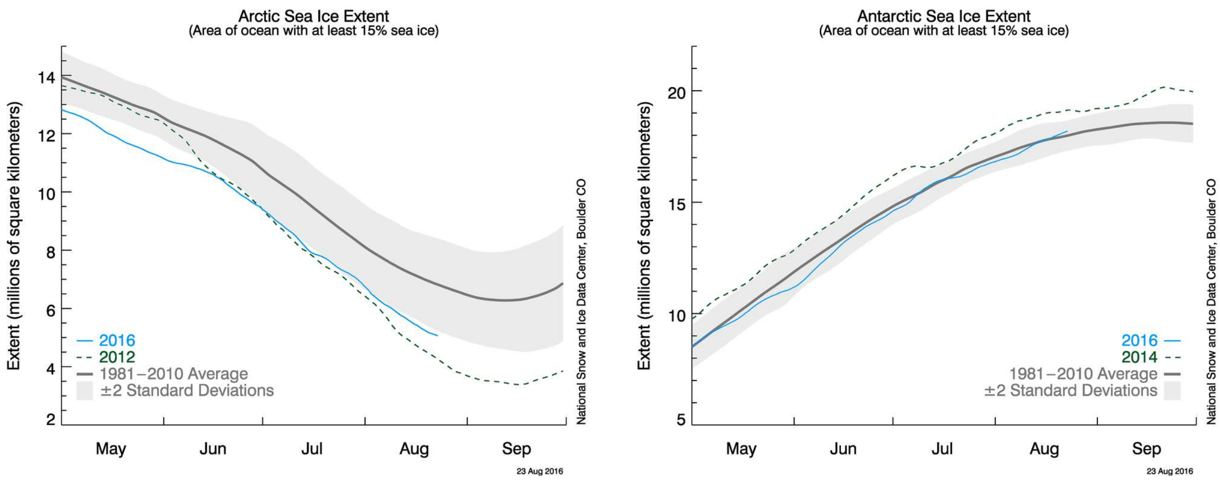


fig. I.2.12 : Sea-Ice extension evolution from NSIDC.

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: Along the equator, models provide a westward negative SST anomaly from America coast to beyond the International Date Line. ECMWF model provides a less cold scenario (average anomalies above -0.5°C) then MF and NCEP models (average between -1 and -2°C). Positives SST anomalies should remain both sides of previous area to the tropics. In northern hemisphere, PDO structure should remains stable. Few change forecasted also in southern hemisphere with still a cold anomaly in the center and warm anomalies around.
- Indian Ocean: the current cooling of SST should continue. Models are in good agreement, even if ECMWF suggests a less cold anomaly along African Coast. The west part of the basin remains negative anomalies (between 0 and -0.5°C in the MF model WITO box) while in the east, SST should gradually decline in the next three months (about +0.3°C in November in MF model SETIO box). negative IOD index.
- Maritime continent: currently positive anomaly should remain especially between Java Island and Australia where it is very strong.
- Atlantic Ocean: models have similar structure even if throughout the tropics the anomalies are weakly positive in ECMWF and the MetOffice models, neutral with MF and locally weakly negative with NCEP. In the northern hemisphere : still a positive anomaly in the western basin. The cold anomaly in the center of North-Atlantic should remain but seems to gradually deconstruct (except with MF model). Eastern part near normal. In the southern hemisphere : warmer than normal between 15 and 40°S.

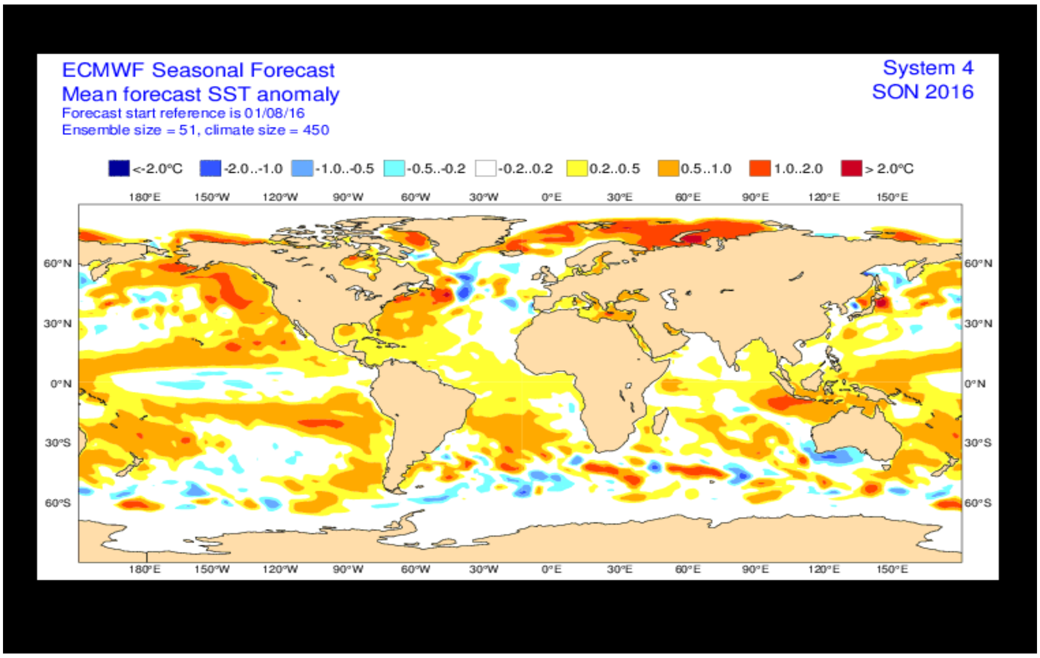


fig.II.1.1: SST anomaly forecast from ECMWF

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

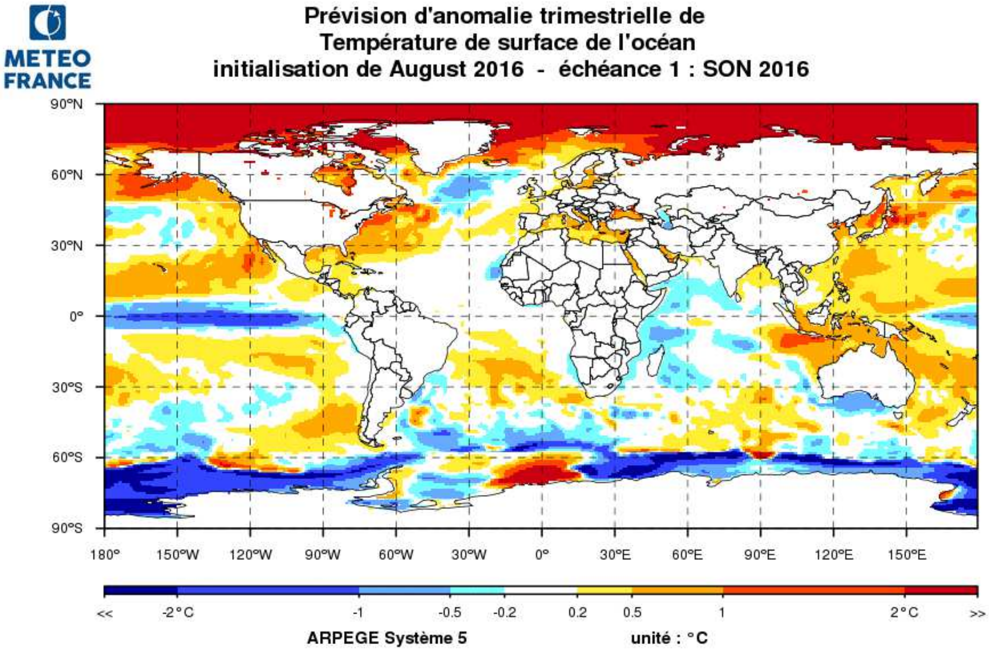


fig.II.1.2: SST Anomaly forecast from Meteo-France (recalibrated with respect of observation).

http://elaboration.seasonal.meteo.fr

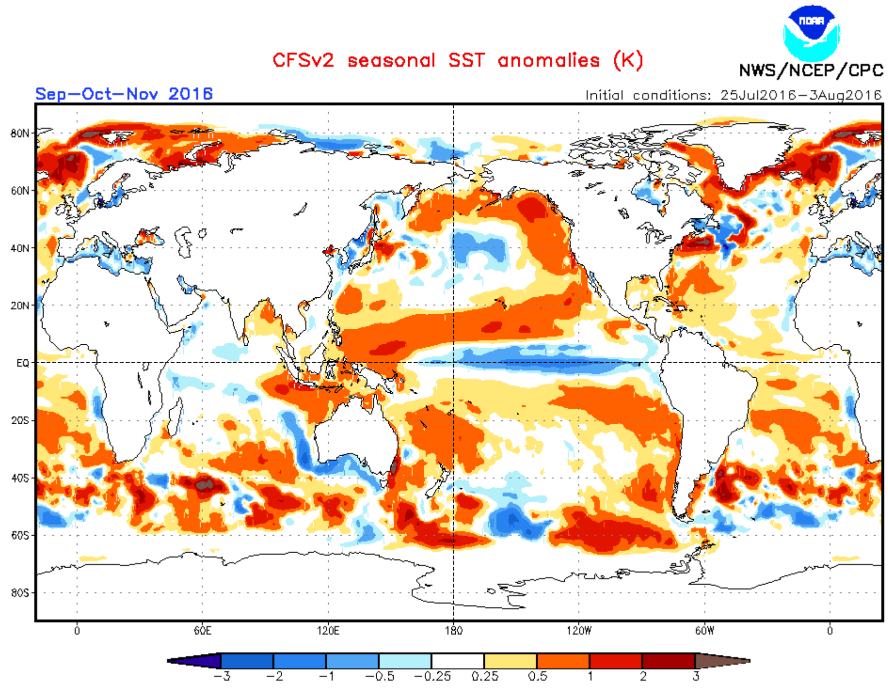


fig.II.1.3: SST anomaly forecast from NCEP.

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

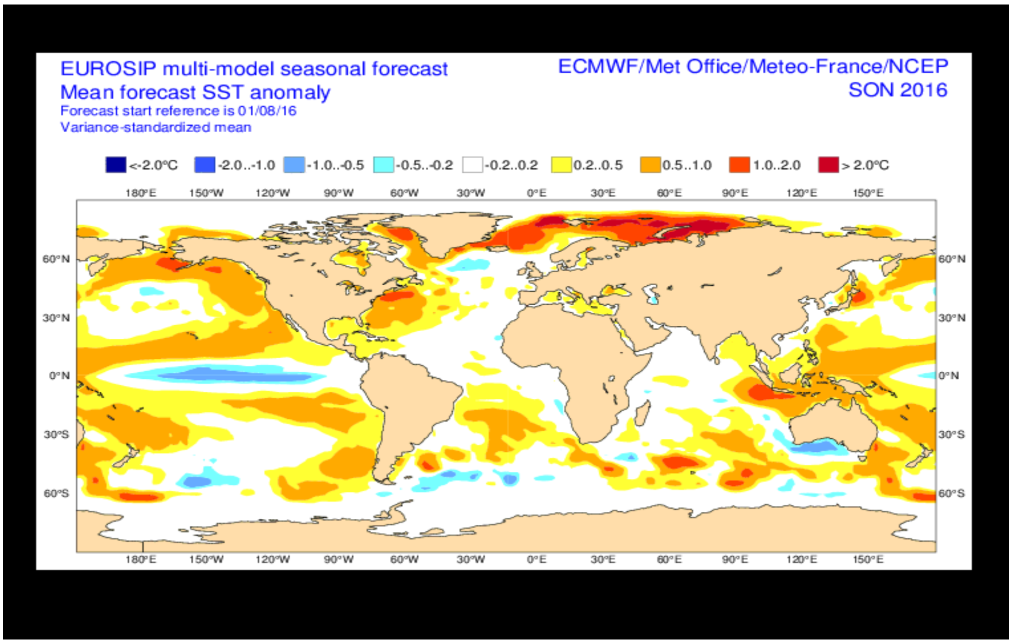


fig.II.1.4: SST Forecasted anomaly from Euro-SIP

II.1.b ENSO forecast :

Forecast Phase: *weak La Niña or neutral.*

EUROSIP Models and IDI synthesis are consistent to a weak *La Niña* situation with a slightly greater than 50% probability. Staying in a neutral phase is however a quite likely scenario (about 40%). This forecast is consistent with the positive PDO situation which generally reduces *La Niña* episodes. (cf http://www.nature.com/articles/srep06651#f4).

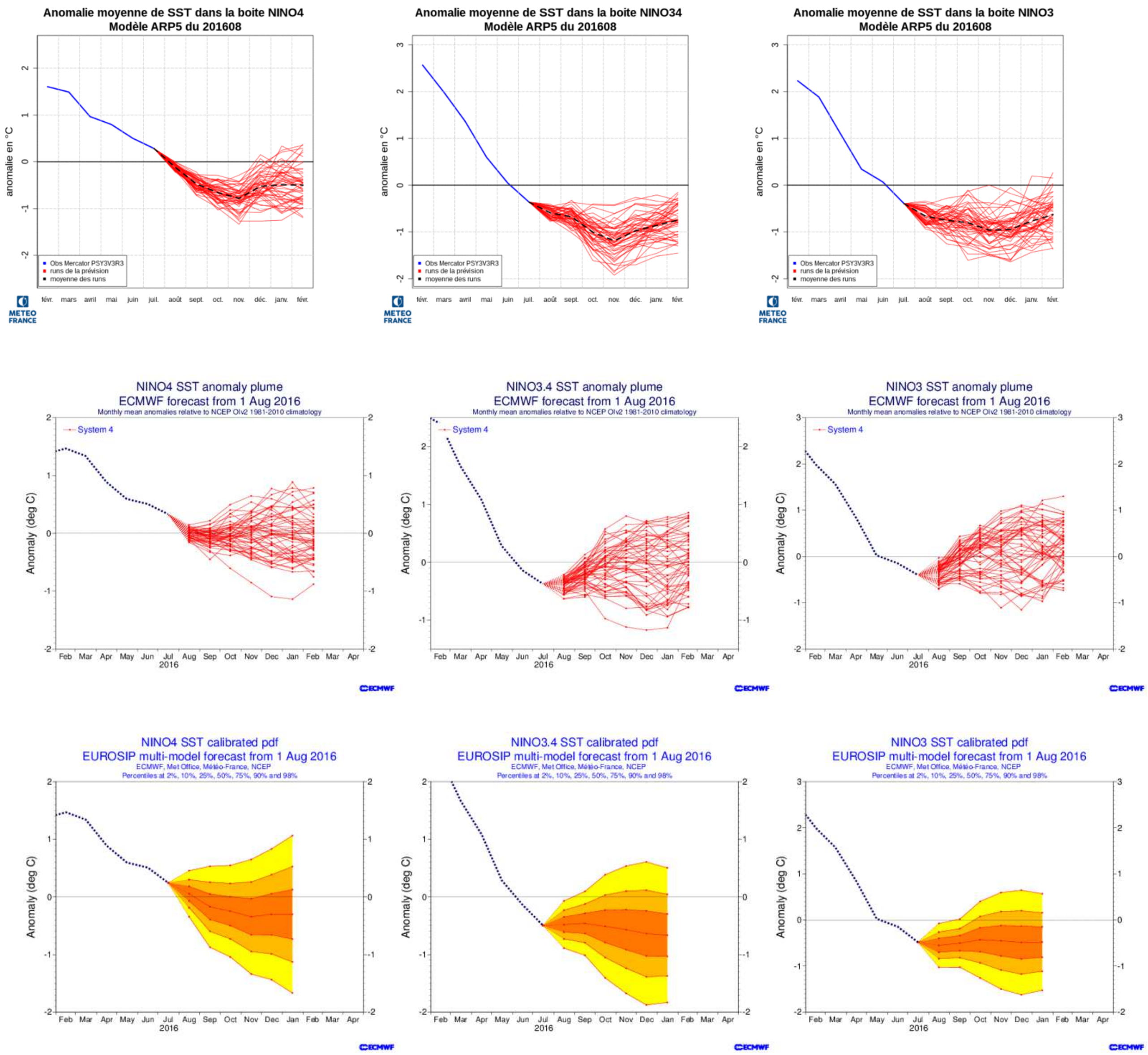


fig.II.1.5: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members - and EuroSIP (bottom) – recalibrated distributions - (http://elaboration.seasonal.meteo.fr , http://www.ecmwf.int/)

II.1.c Atlantic ocean forecasts

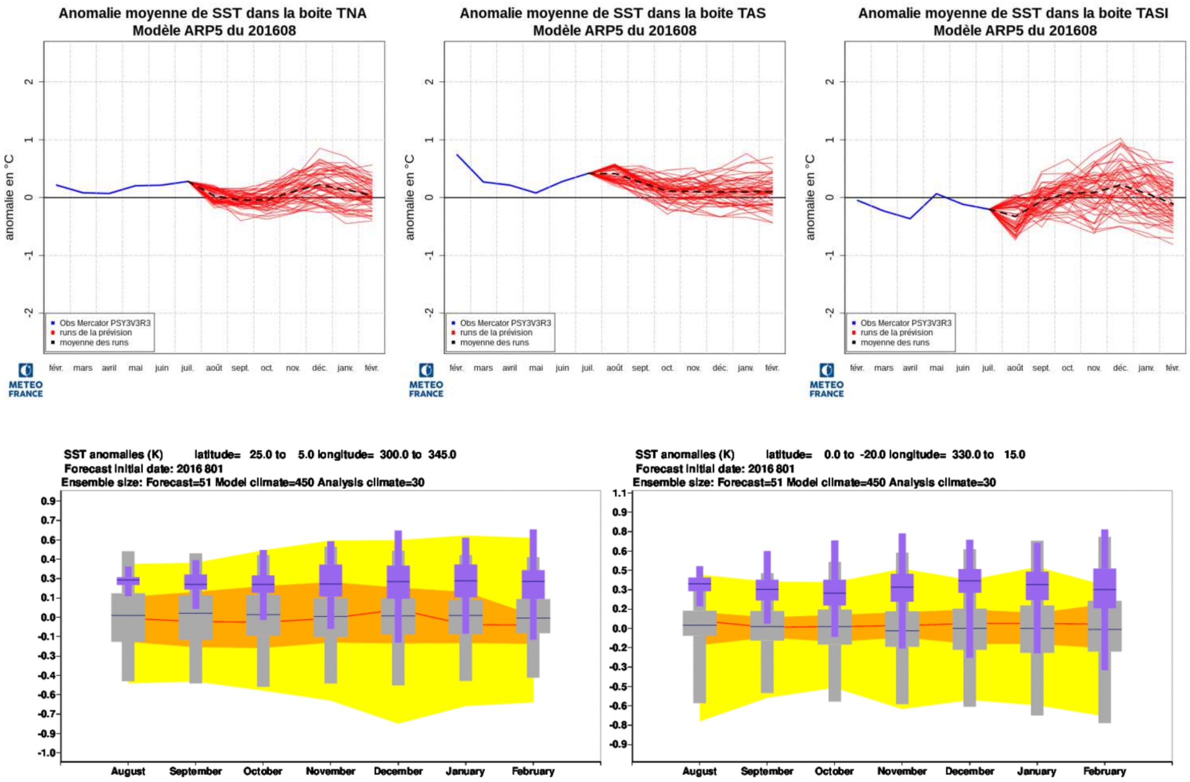
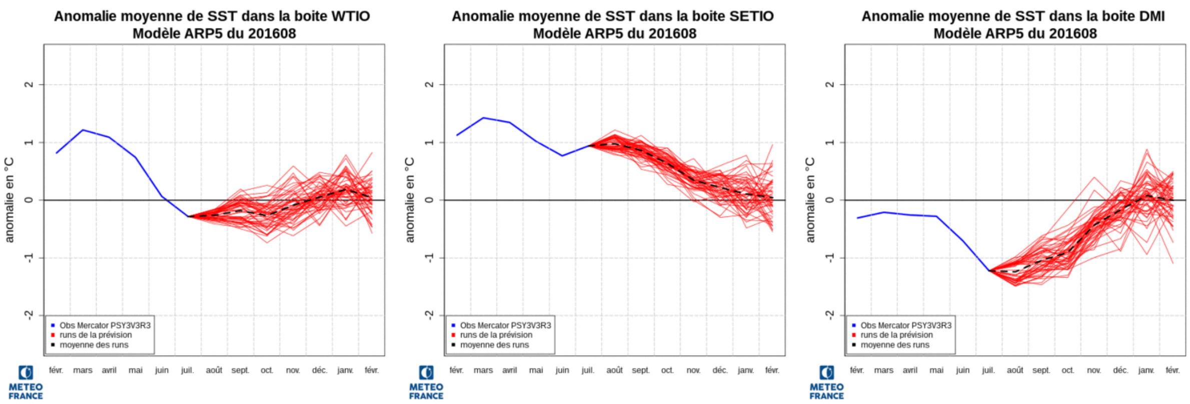
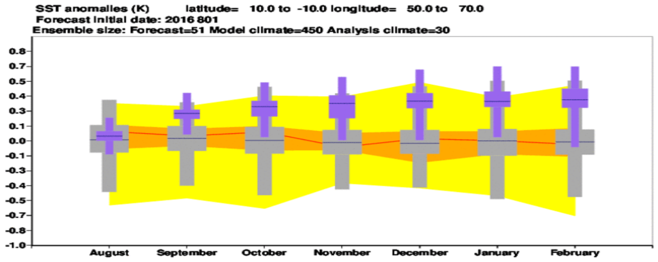


fig.II.1.6: SSTs anomaly forecasts in the Atlantic Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

II.1.d Indian ocean forecasts





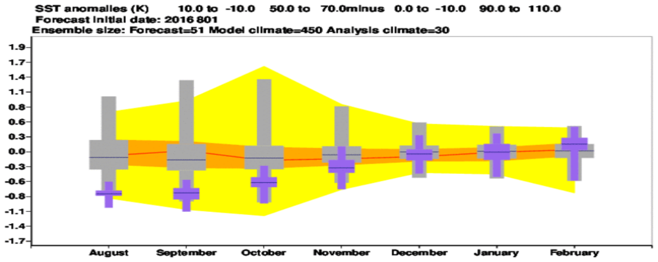


fig.II.1.7: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

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. Upward motion area over Maritime Continent, Australia and Eastern Indian Ocean. Downward motion area over Africa en Western Indian Ocean. MF model extend this area to Europe and Atlantic unlike JMA model. Consistent negative IOD structure. Weak dipole over Pacific Ocean, with a small downward motion anomaly westward and a weak upward motion anomaly over the half eastern part, extended to Atlantic and Europe in JMA model.

Stream Function anomaly : in consistency with velocity potential in the inter tropical belt : cyclonic structures over Indian Ocean and anticyclonic over Atlantic. No visible teleconnections to mid and high latitudes of north hemisphere.

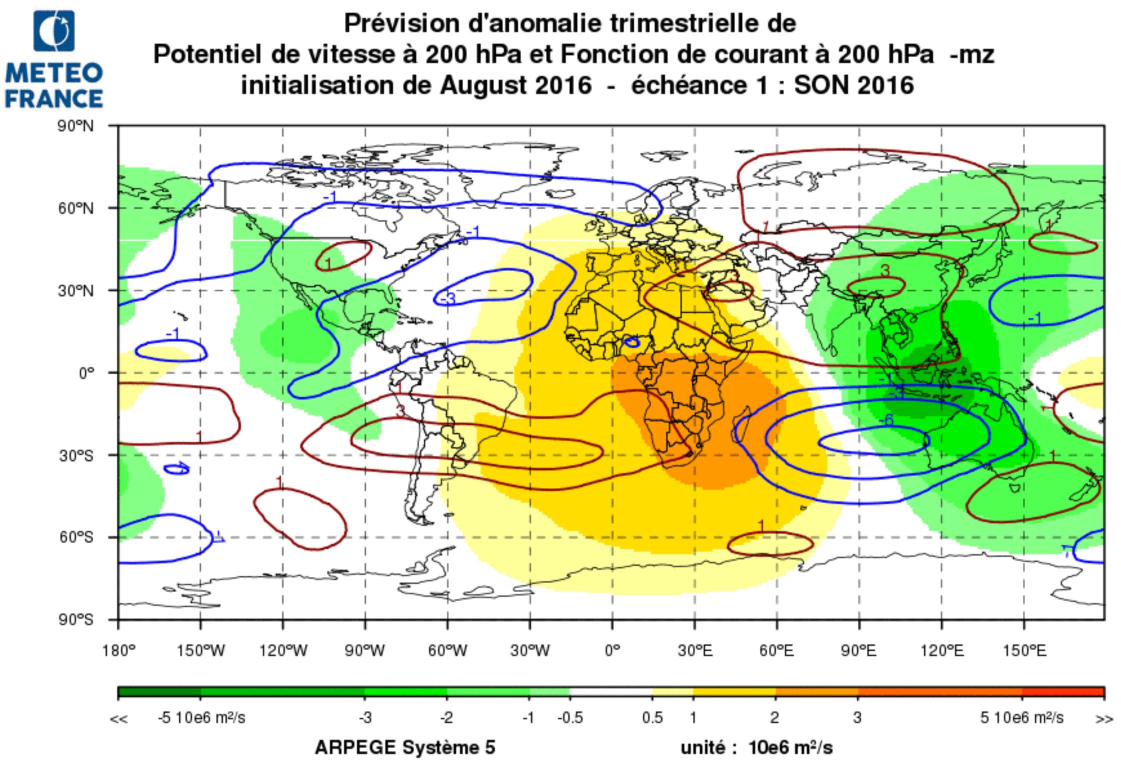


fig.II.2.1bis: Velocity Potential anomaly field χ (shaded area – green negative anomaly and yellow positive anomaly) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa by Météo-France ARPEGE-S5.

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) :

The models diverge significantly on Europe. MF provides a positive anomaly over the south of Europe and the Mediterranean and a negative one over the Scandinavia while ECMWF provides a negative anomaly over the near Atlantic and an other one over Eastern Europe. There is no element of choice between these two options.

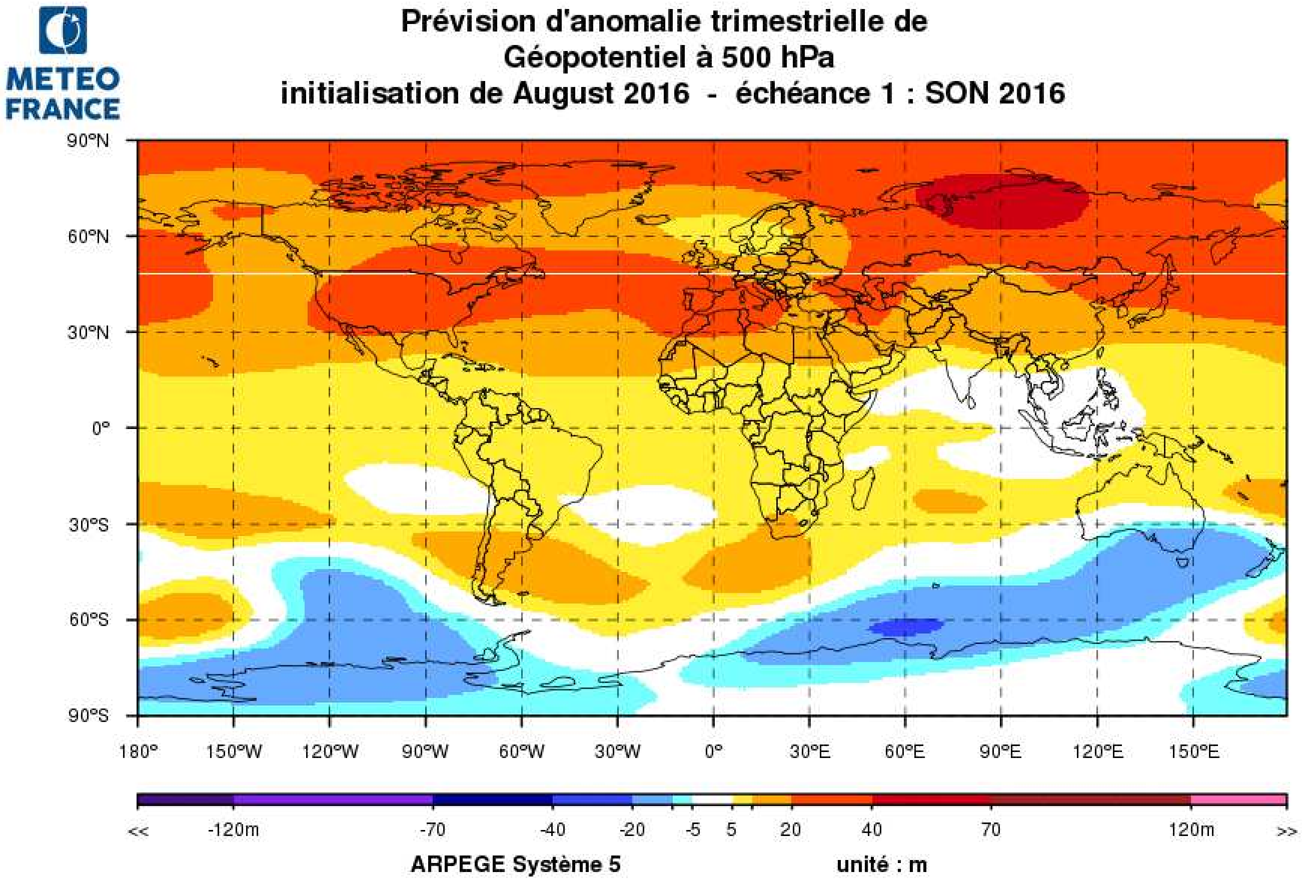
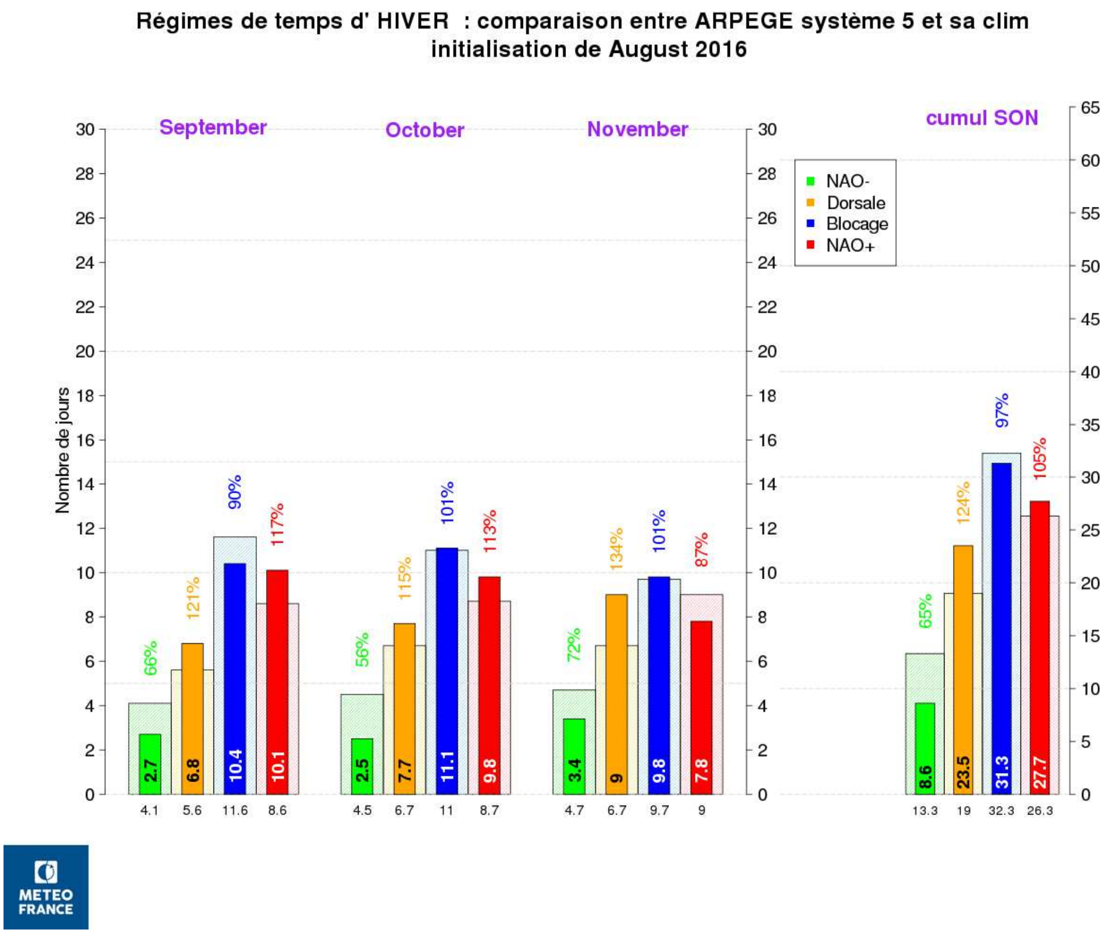


fig.II.2.2: Anomalies of Geopotential Height at 500 hPa from Météo-France and ECMWF.
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip


Régimes de temps d' HIVER : comparaison entre ARPEGE système 5 et sa clim
initialisation de August 2016
September
October
November
cumul SON
Nombre de jours
NAO-
Dorsale
Blocage
NAO+
66% 121% 90% 117%
2.7 6.8 10.4 10.1
4.1 5.6 11.6 8.6
56% 115% 101% 113%
2.5 7.7 11.1 9.8
4.5 6.7 11 8.7
72% 134% 101% 87%
3.4 9 9.8 7.8
4.7 6.7 9.7 9
65% 124% 97% 105%
8.6 23.5 31.3 27.7
13.3 19 32.3 26.3
METEO FRANCE

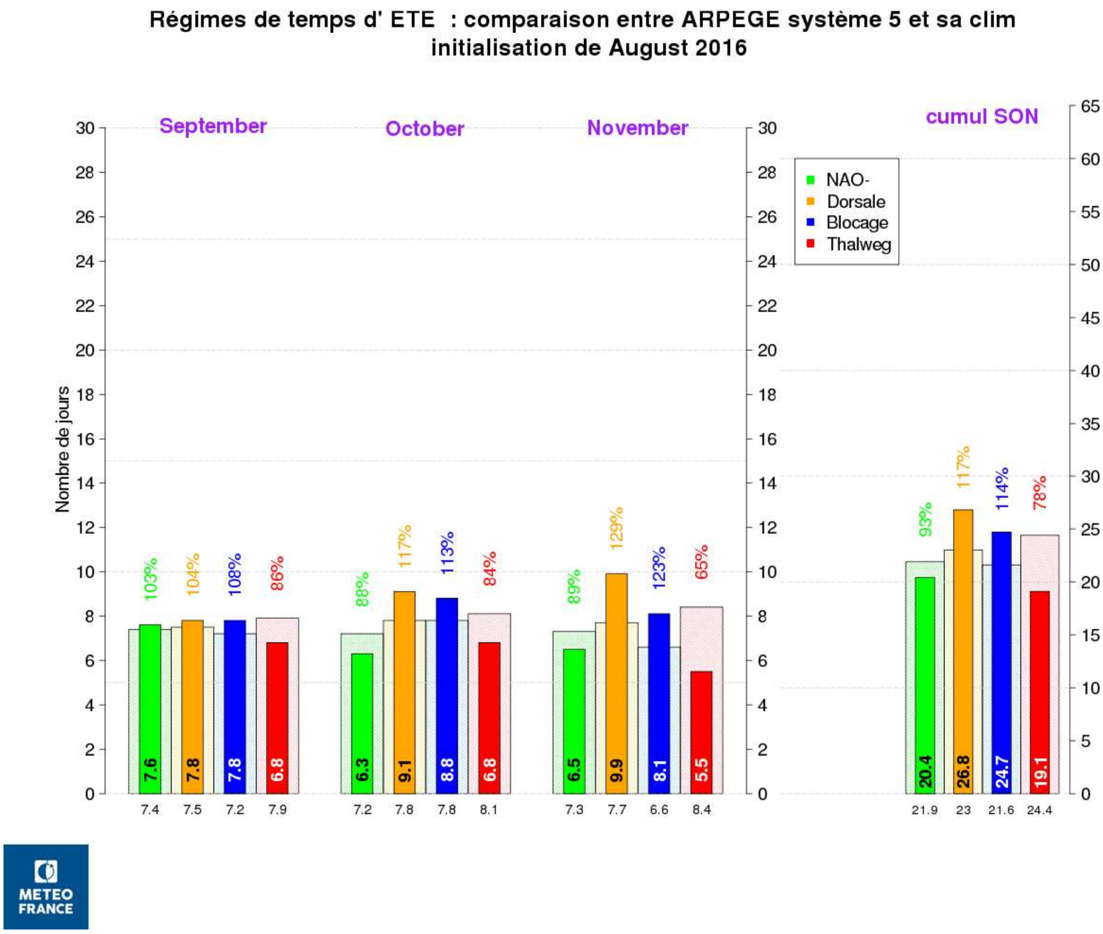

Régimes de temps d' ETE : comparaison entre ARPEGE système 5 et sa clim
initialisation de August 2016
September
October
November
cumul SON
Nombre de jours
NAO-
Dorsale
Blocage
Thalweg
103% 104% 108% 86%
7.6 7.8 7.8 6.8
7.4 7.5 7.2 7.9
88% 117% 113% 84%
6.3 9.1 8.8 6.8
7.2 7.8 7.8 8.1
89% 129% 123% 65%
6.5 9.9 8.1 5.5
7.3 7.7 6.6 8.4
93% 117% 114% 78%
20.4 26.8 24.7 19.1
21.9 23 21.6 24.4
METEO FRANCE

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.

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

Positive anomalies dominate in the forecast across the globe. The exceptions are Australia, in a large southern part, where abnormal cold temperatures for next 3 months are very likely. For Argentina, continuing past month, no dominant scenario. In maritime areas, temperatures are linked with SST. Above normal temperature are very likely in equatorial Pacific area linked with La Niña and in North Atlantic (Few inhabitants!). Everywhere else upper tercile is the more likely.

Over Europe, warm scenario is the more likely with a north-south gradient. The probability is higher in the Mediterranean and weaker in Northern Europe.

II.3.a ECMWF

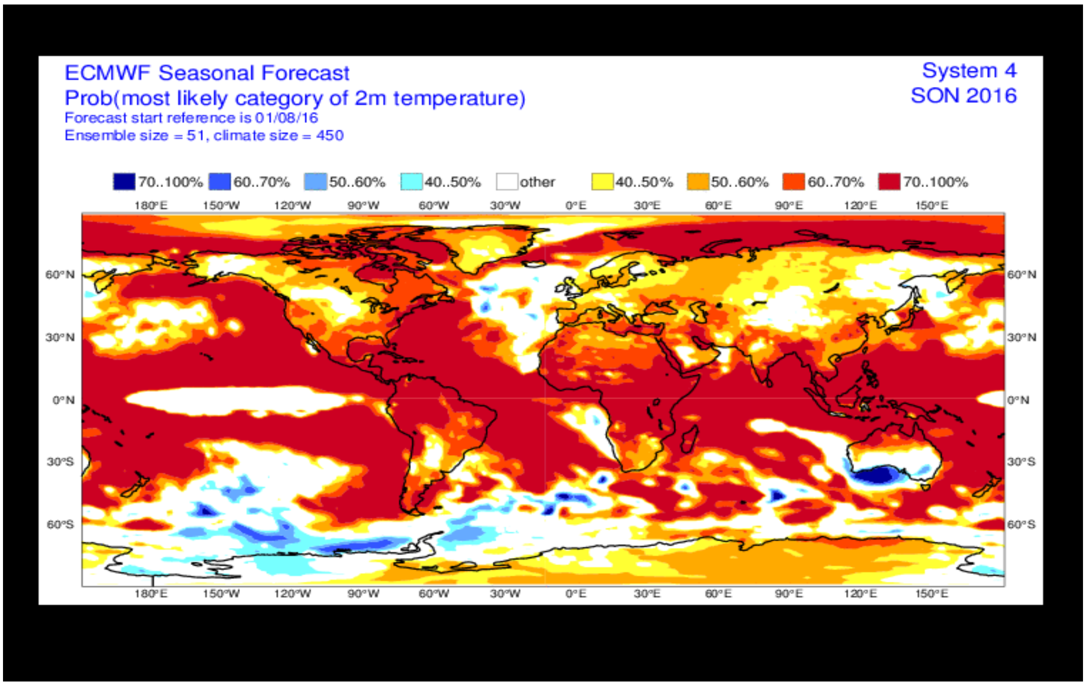


fig.II.3.1: Most likely category probability of T2m from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/

II.3.b Météo-France

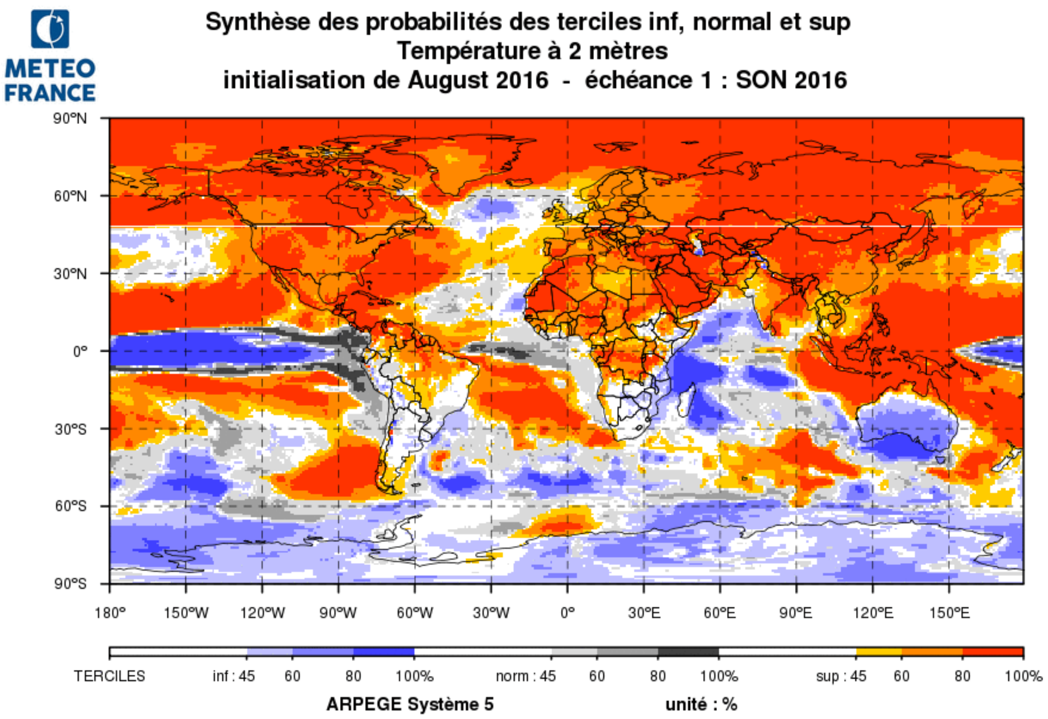


fig.II.3.2: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.3.c Japan Meteorological Agency (JMA)

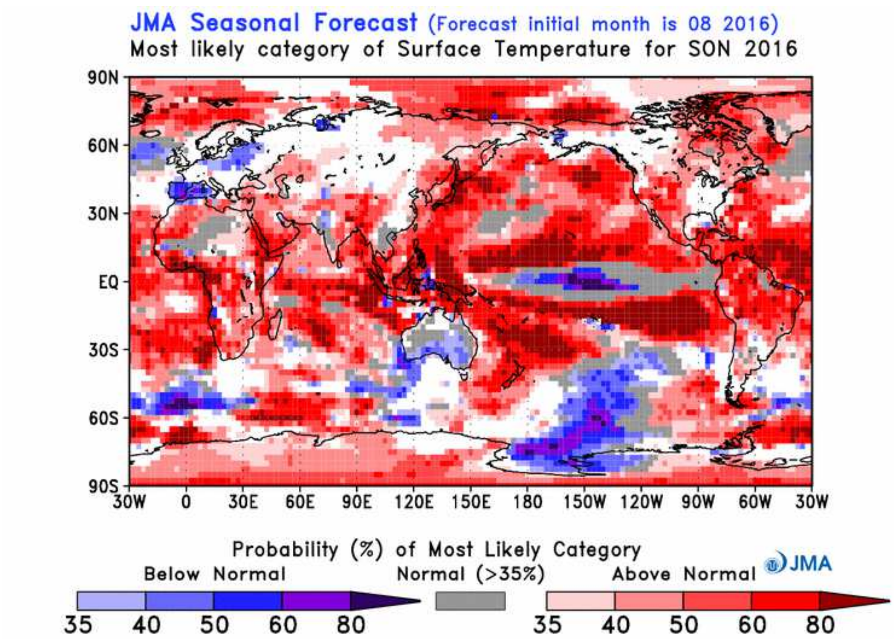


fig.II.3.3: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.php

II.3.d EUROSIP

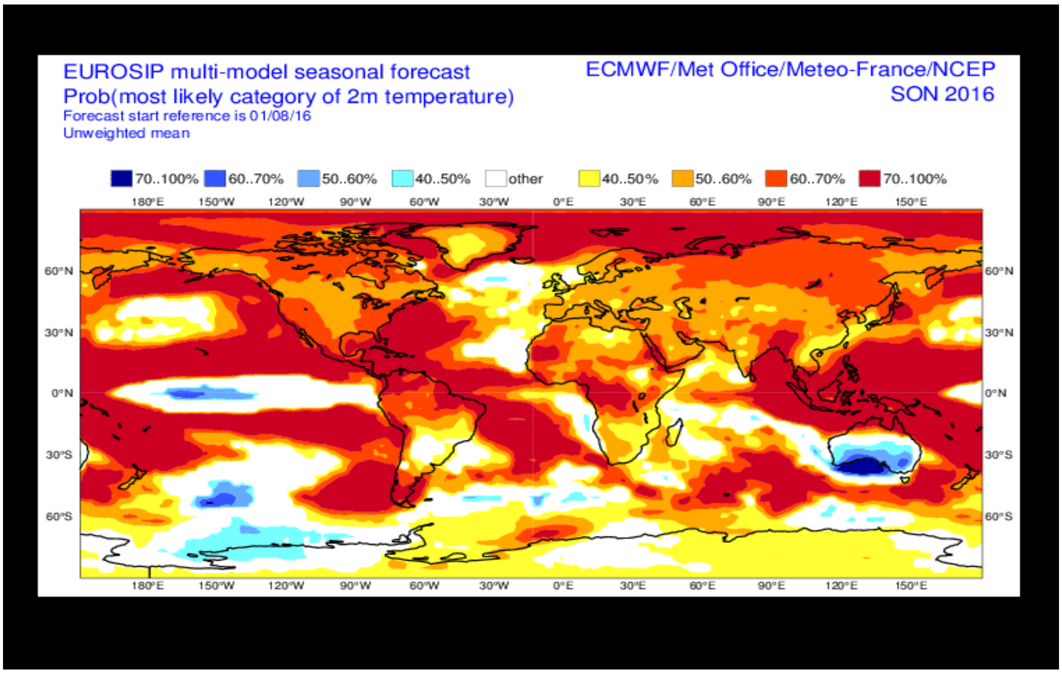


fig.II.3.4: Multi-Model Probabilistic forecasts for T2m from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).

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

II.4. IMPACT : PRECIPITATION FORECAST

In consistency with the weak La Niña situation, very likely dry anomaly along the equator in the Pacific Ocean, very likely wet anomaly both sides and over Maritime Continent and Australia. Dry anomaly over western Indian Ocean and Eastern Africa linked with cold SST and downward motion.

For Europe, few signal. The weak north-south gradient in EUROSIP with a dry probability in the Mediterranean and wet in Scandinavia is mainly due to MF Model which presents the strongest signal.

II.4.a ECMWF

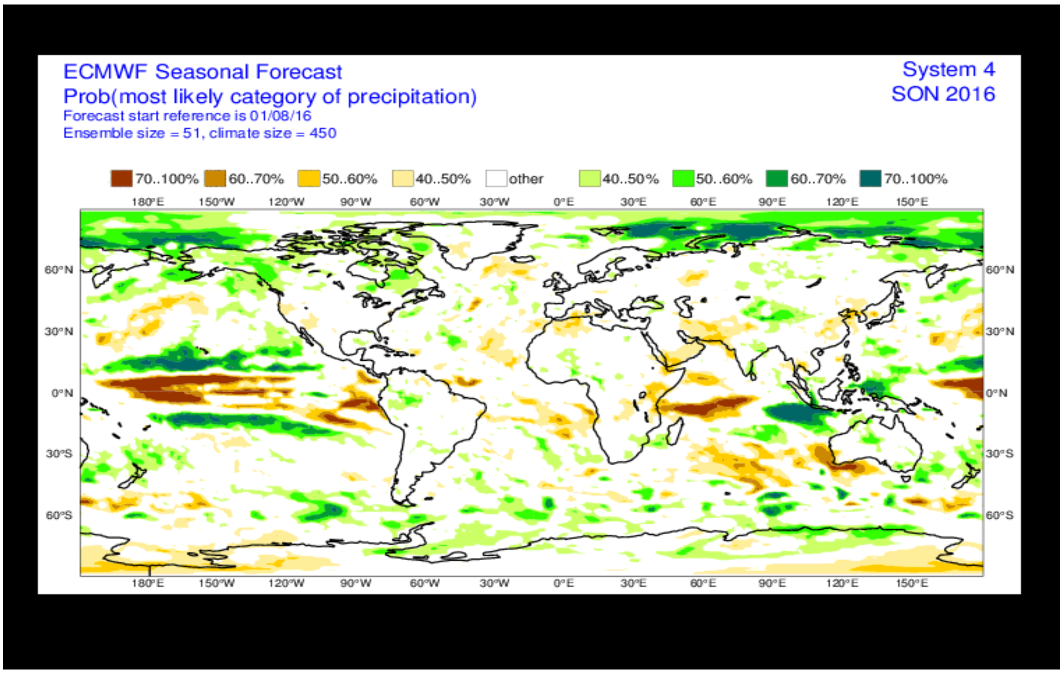


fig.II.4.1: Most likely category probability of rainfall from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/

II.4.b Météo-France

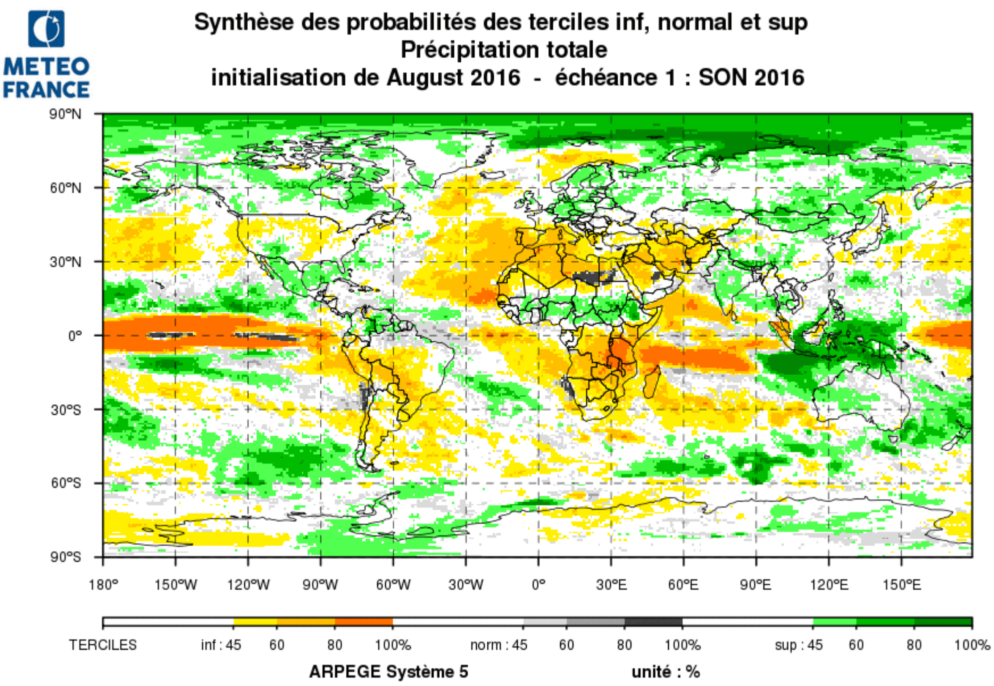


fig.II.4.2: Most likely category of Rainfall. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Japan Meteorological Agency (JMA)

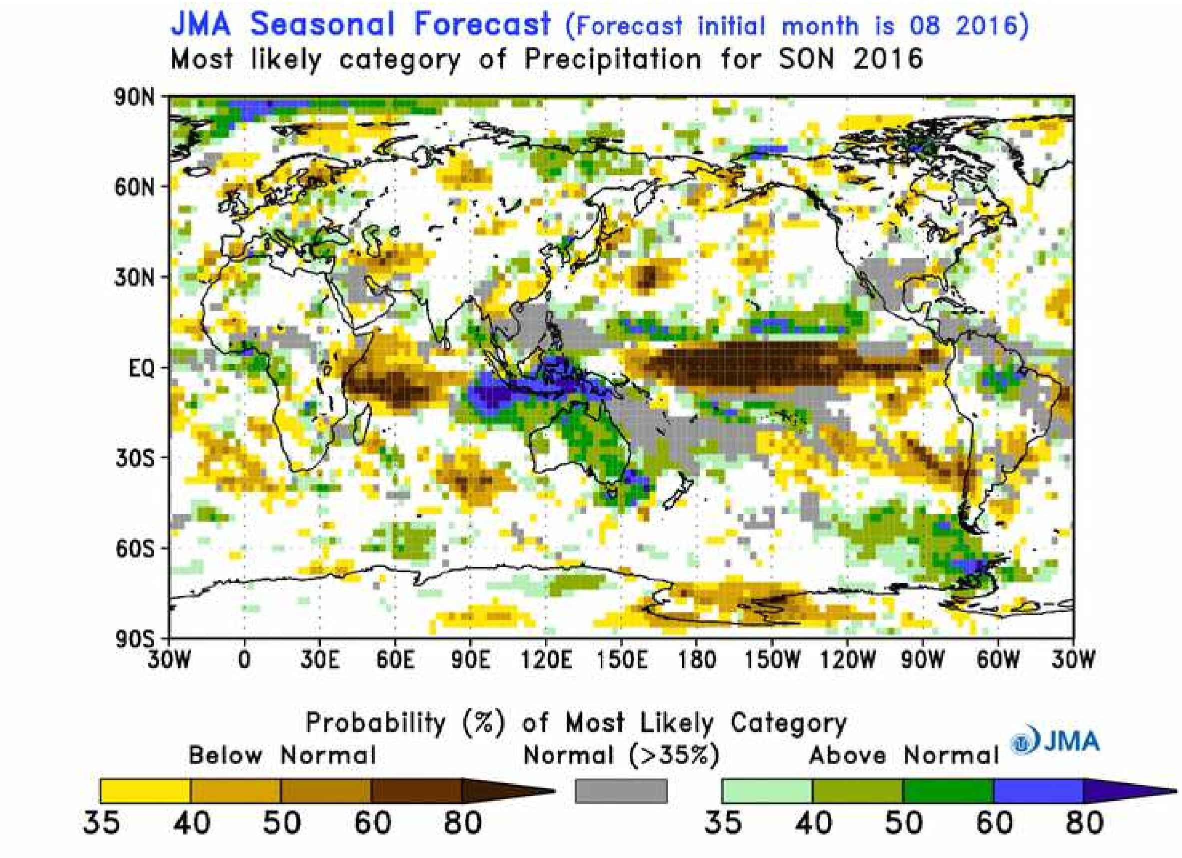


fig.II.4.5: Most likely category of Rainfall from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.php

II.4.d EUROSIP

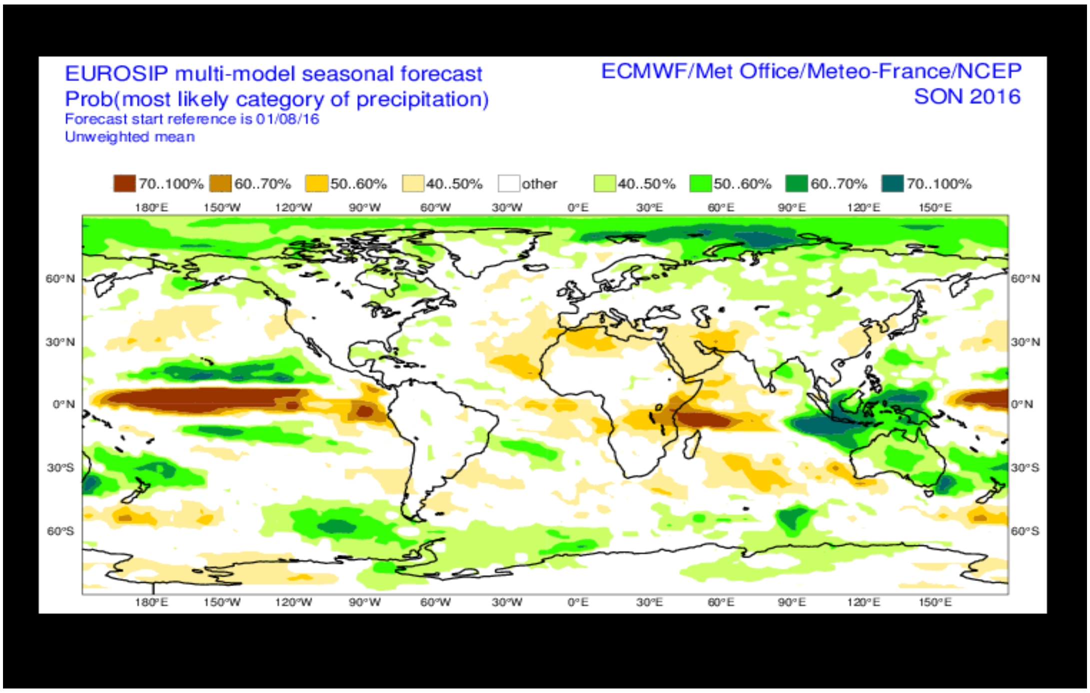
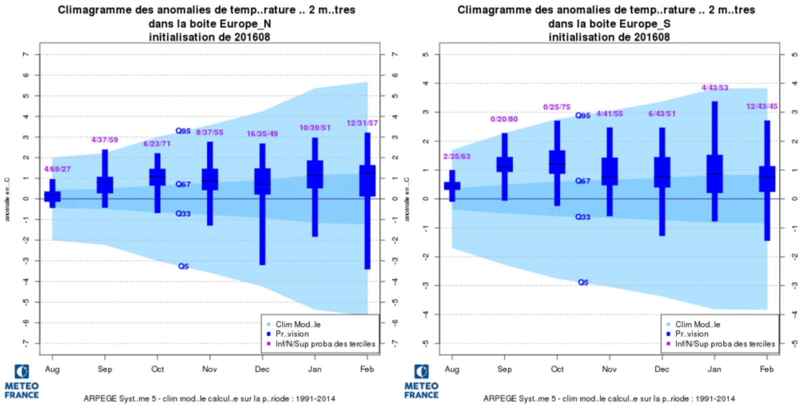


fig.II.4.7: Multi-Model Probabilistic forecasts for precipitation from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal).

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

II.5. REGIONAL TEMPERATURES AND PRECIPITATIONS



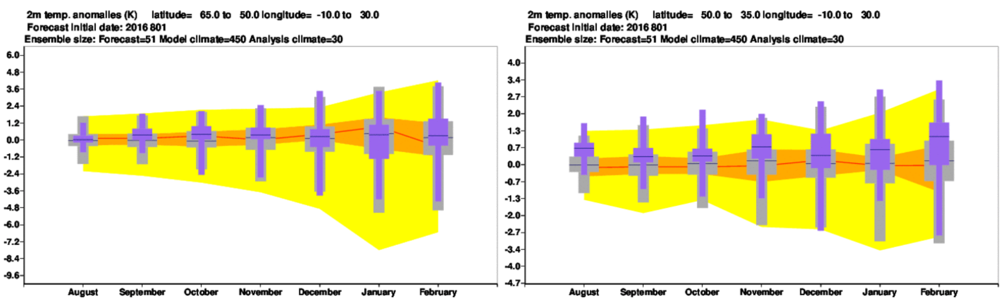


fig.II.5.1 : Climagrams for Temperature in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

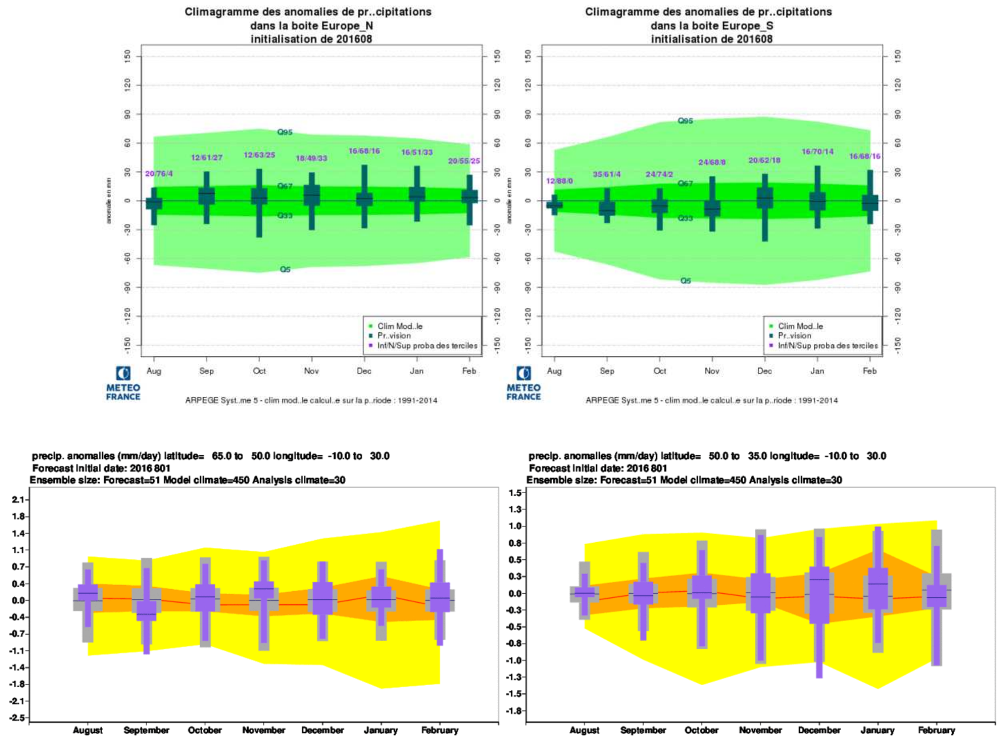
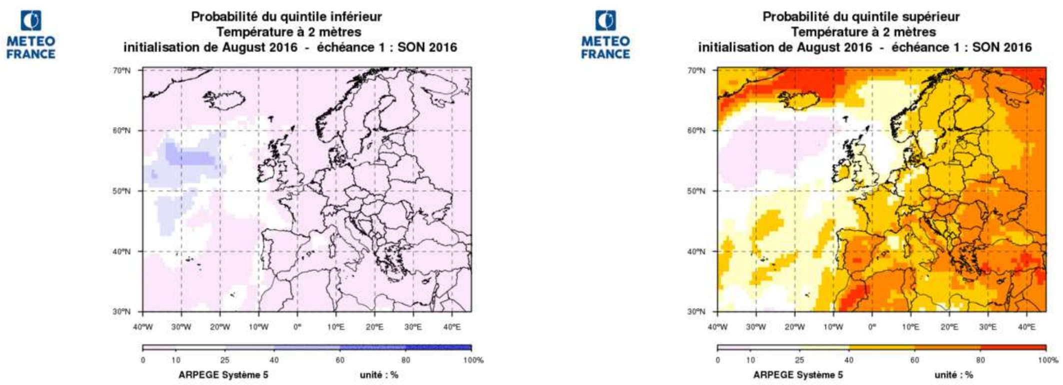


fig.II.5.2 : Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

II.6. MODEL'S CONSISTENCY

Not available

II.7. "EXTREME" SCENARIOS



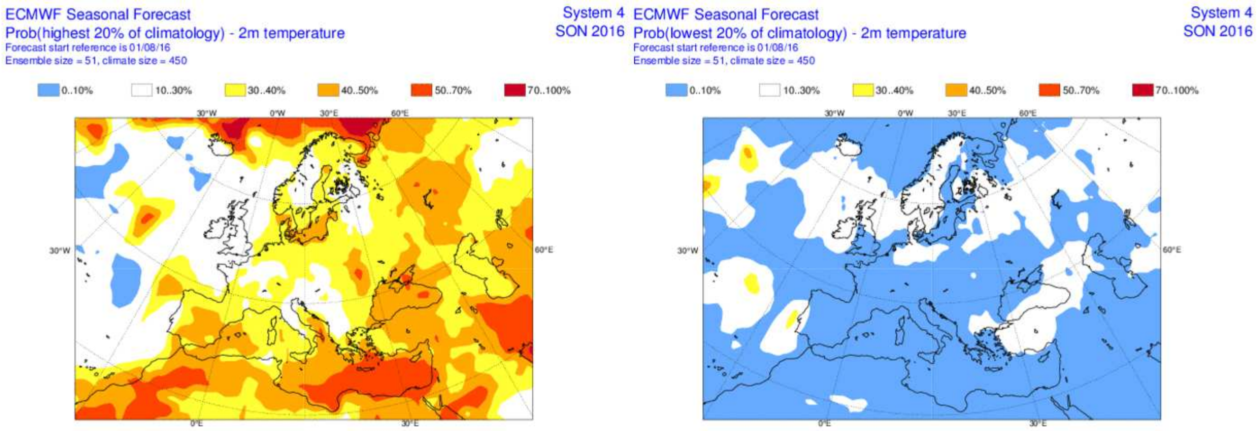


fig.II.7.1 : Top : Meteo-France T2m probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution). Bottom : ECMWF T2m probability of « extreme » below normal conditions (left - lowest ~20% of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

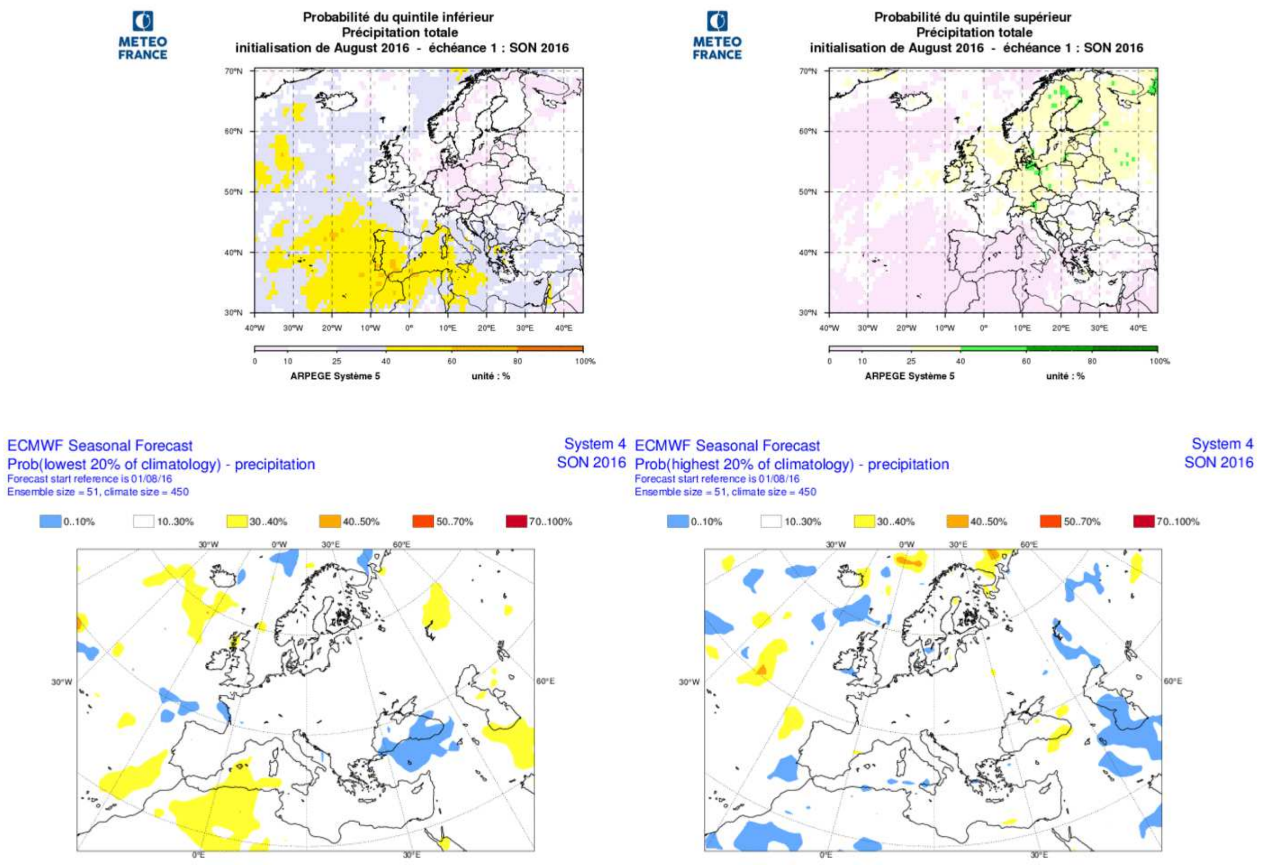
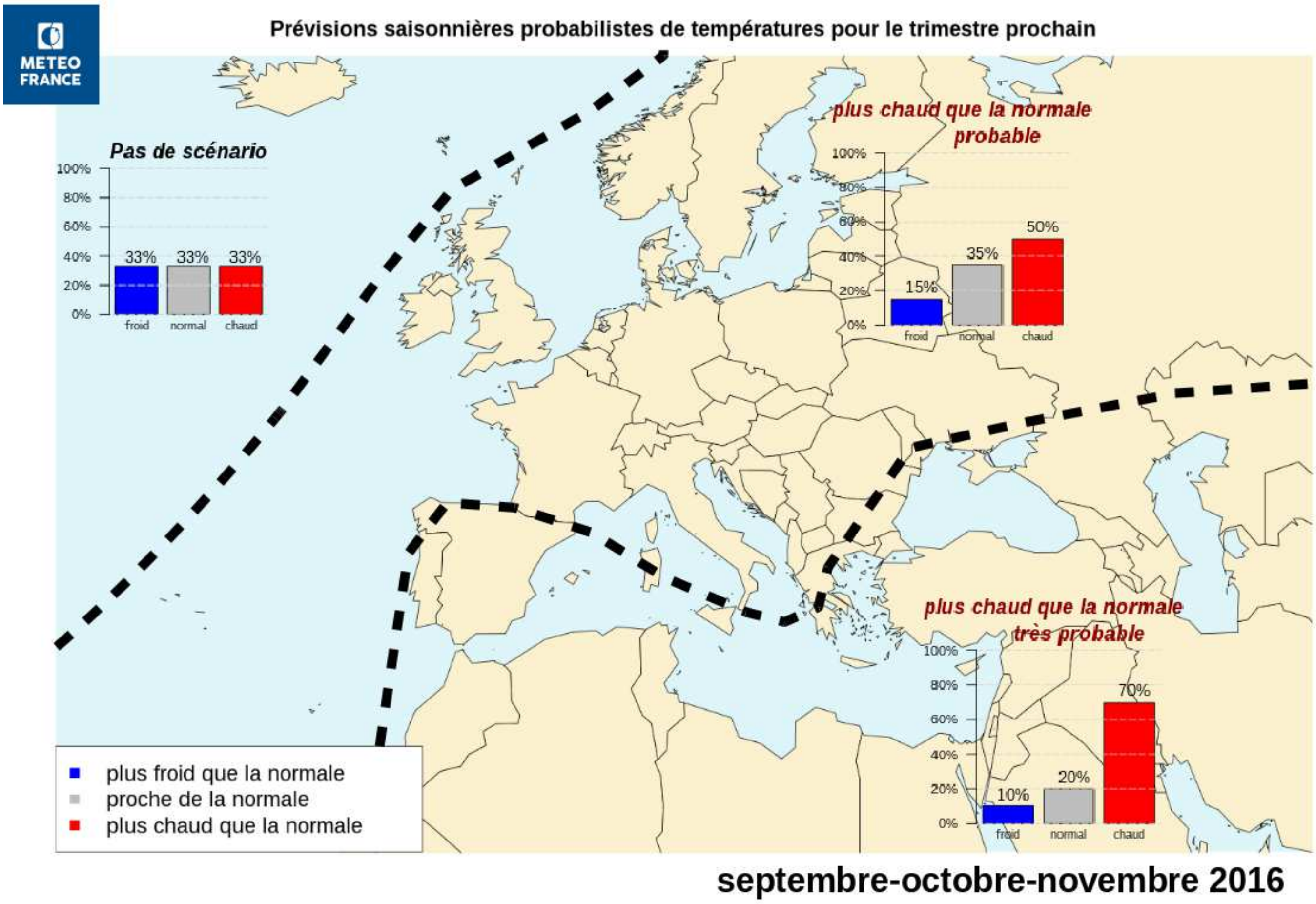


fig.II.7.2 : Top : Meteo-France rainfall probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution).
Bottom : ECMWF rainfall probability of « extreme » below normal conditions (left - lowest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

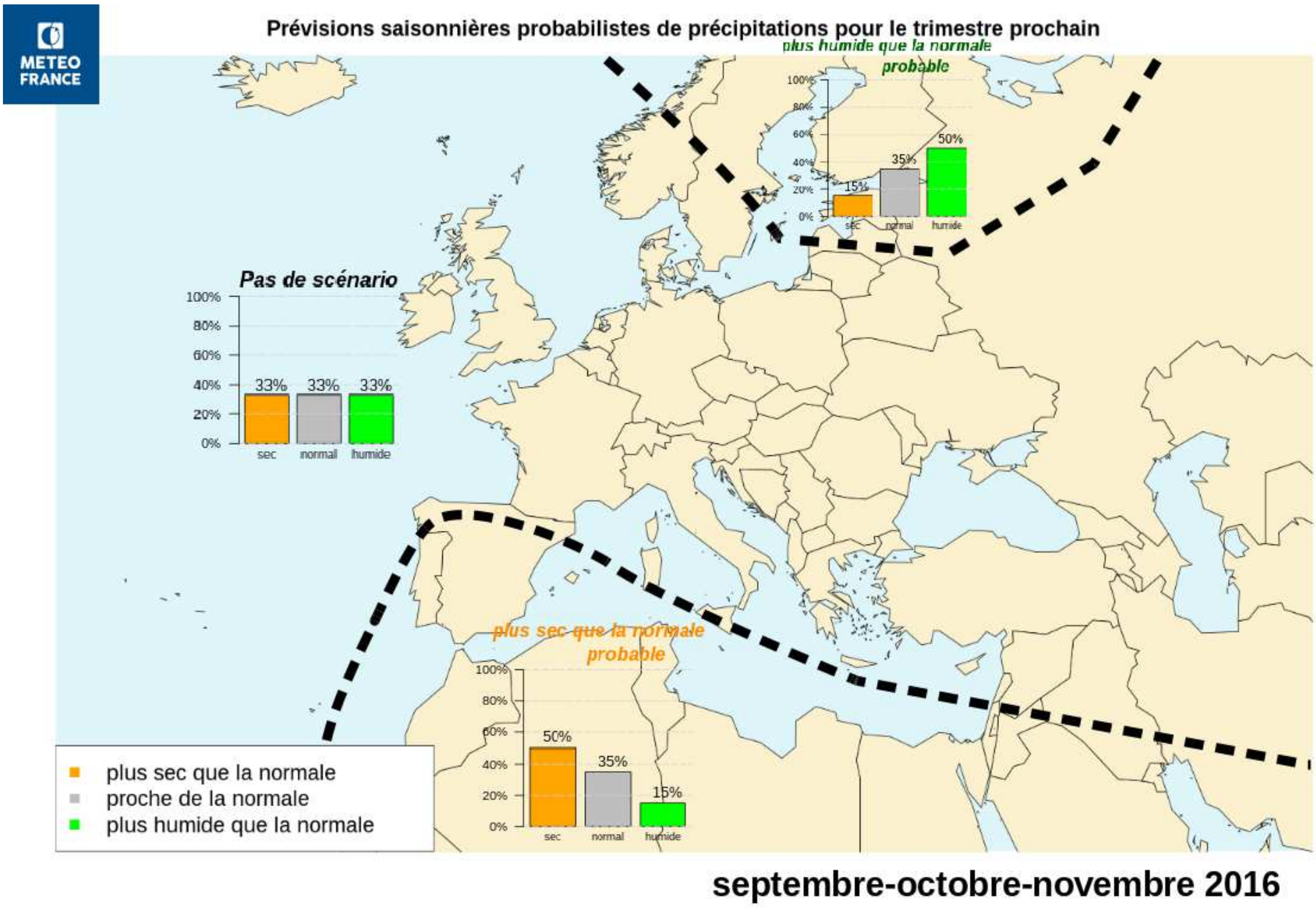
II.8. DISCUSSION AND SUMMARY

II.8.a Forecast over Europe

Temperatures: warmer than normal conditions likely for northern Europe and very likely in the Mediterranean area.



Precipitation: no scenario, except for the south of Iberian Peninsula region where a small dry signal seems to be emerging and for the Scandinavia with a small wet signal.



II.8.b Tropical cyclone activity

Slightly above normal activity over Northeast Pacific. Close to normal for north-western Pacific, and north-Atlantic. (see fig II.8.1 and NHC predictions)

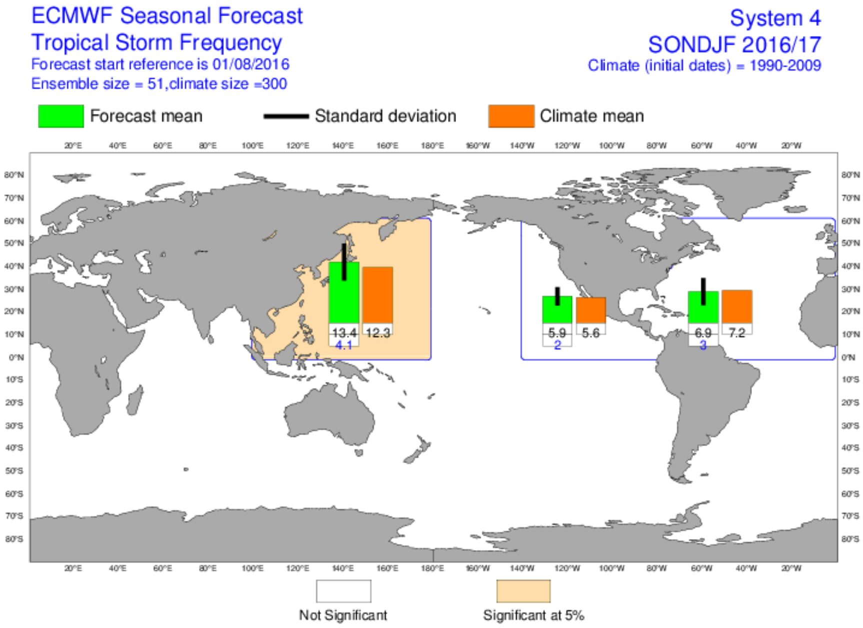


fig.II.8.1: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF).

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.

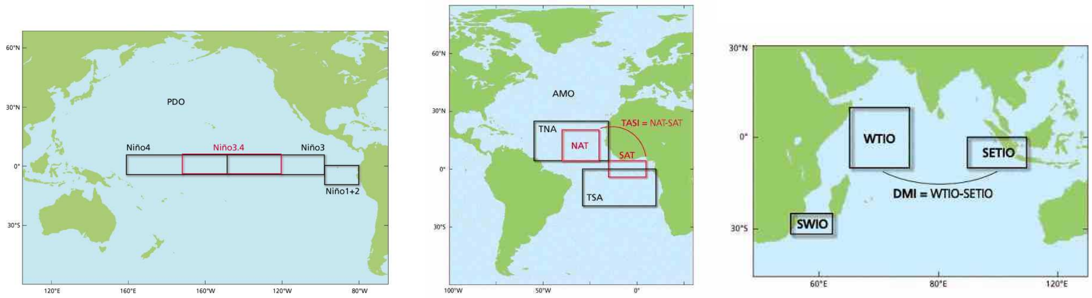
III.2. « NINO », SOI indices and Oceanic boxes

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).

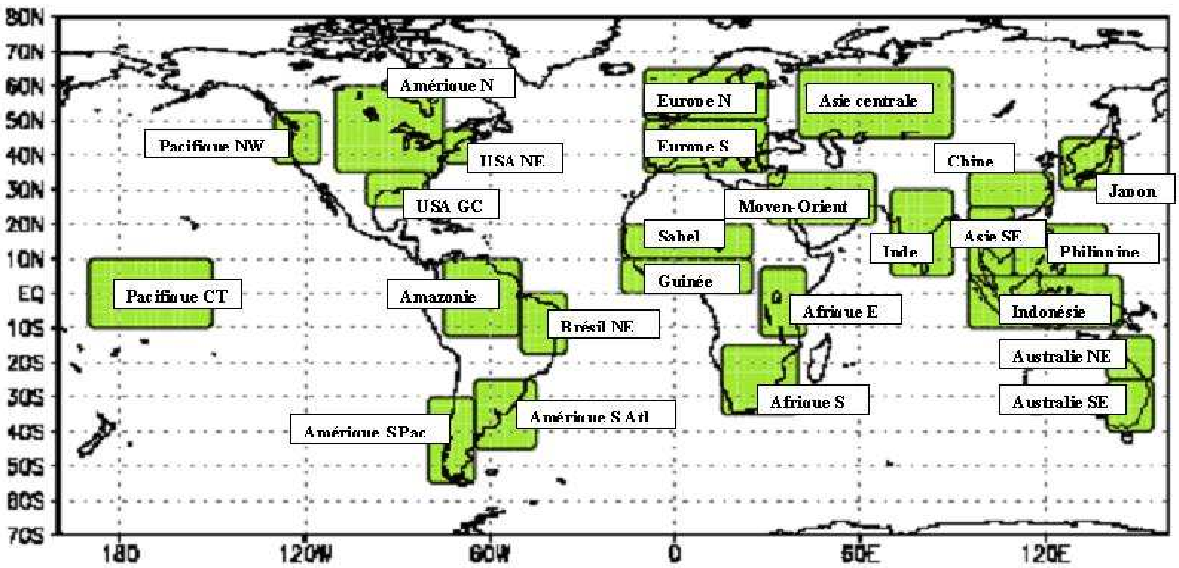
Associated to the oceanic « El Niño / La Niña » events, and taking into account the strong ocean/atmopshere coupling, the atmosphere shows also interanual variability associated to these events. It is monitored using the SOI (Southern Oscillation Index). This indice is calculated using standardized sea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

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