GLOBAL CLIMATE BULLETIN
n°210 – December 2016

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I. DESCRIPTION OF THE CLIMATE SYSTEM (OCTOBER 2016)

I.1. OCEANIC ANALYSIS

I.1.a Global analysis

In the Pacific ocean and around the Maritime Continent :

- Along the Equator: due to SST cooling on the Eastern part, the surface anomaly now extends from Peru coast to the dateline. In the nino3.4 box, the monthly anomaly mean is now just below -0.5°C, threshold of "La Niña". It now superimposes to sub-surface cold anomaly. West of the dateline, and around the Maritime Continent, there are still positive anomalies despite of a cooling trend in October.
- On North Pacific, the main elements of a positive PDO pattern are present. The NOAA PDO index remains negative (-0.9 source http://www.ncdc.noaa.gov/teleconnections/pdo/), we prefer to use http://research.jisao.washington.edu/pdo/PDO.latest.txt with +0.56 for October.

In the Indian Ocean :

- weakening of the Est (positive anomalies) - West (neutral) contrast ==> DMI remains positive, but less intense than in September. Significant warming on the Western part of the basin. Still negative anomalies South-West of Australia.

In the Atlantic:

- 3 main cooling areas: around Europe, South-East of Greenland, far offshore of Florida. The cold anomaly on North Atlantic (cold blob) is still the main anomaly of the October map.
- still positive anaomlies on tropical and equatorial Atlantic, up to the Carribean Sea.

In the Mediterranean:

- positive anomalies.

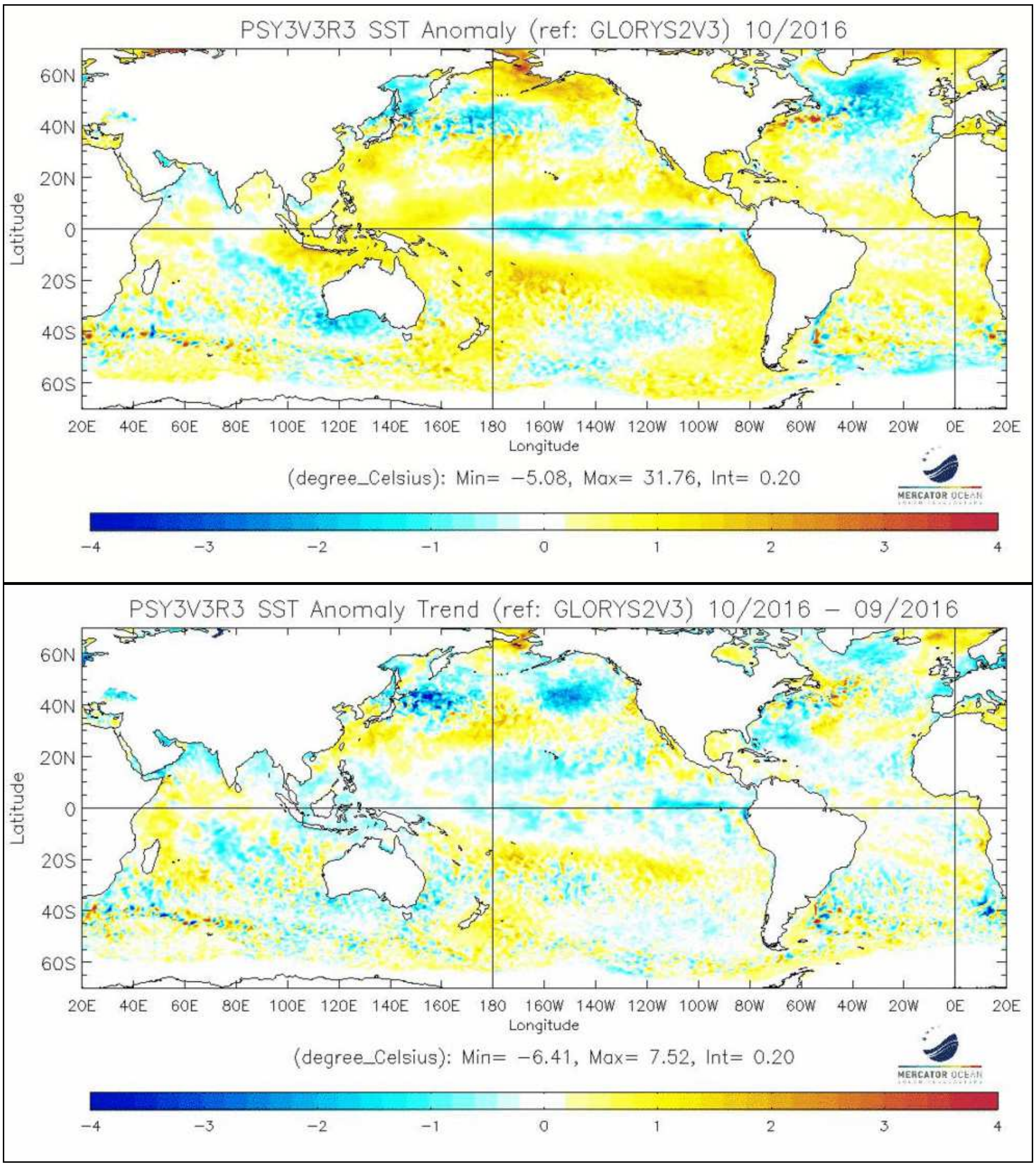

fig.I.1.1: top : SSTs Anomalies (°C) . Bottom : SST tendency (current – previous month), (reference Glorys 1992-2009). http://bcg.mercator-ocean.fr/

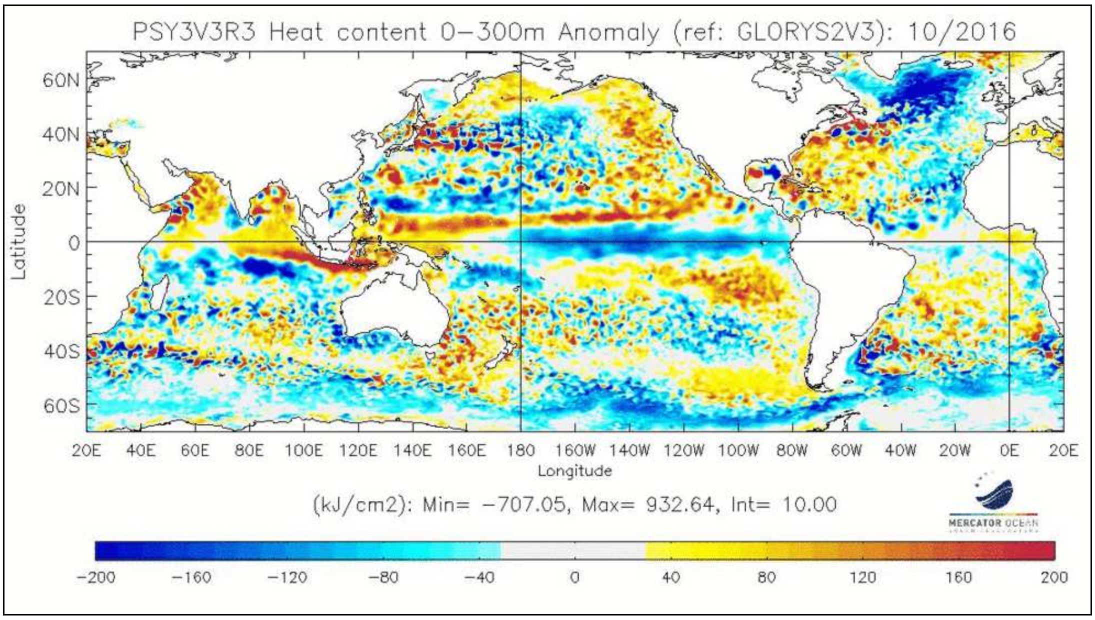

fig.I.1.2: map of Heat Content Anomalies (first 300m, kJ/cm2, reference Glorys 1992-2009)

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

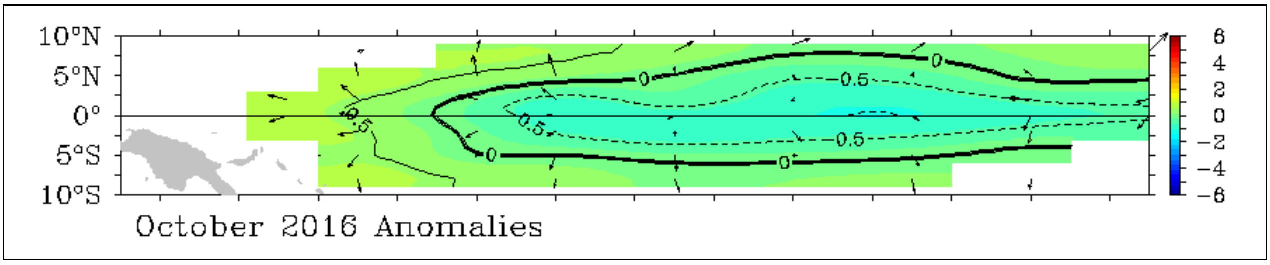

fig.I.1.3: SST Anomalies and Wind anomalies over the Equatorial Pacific from TAO/TRITON.

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

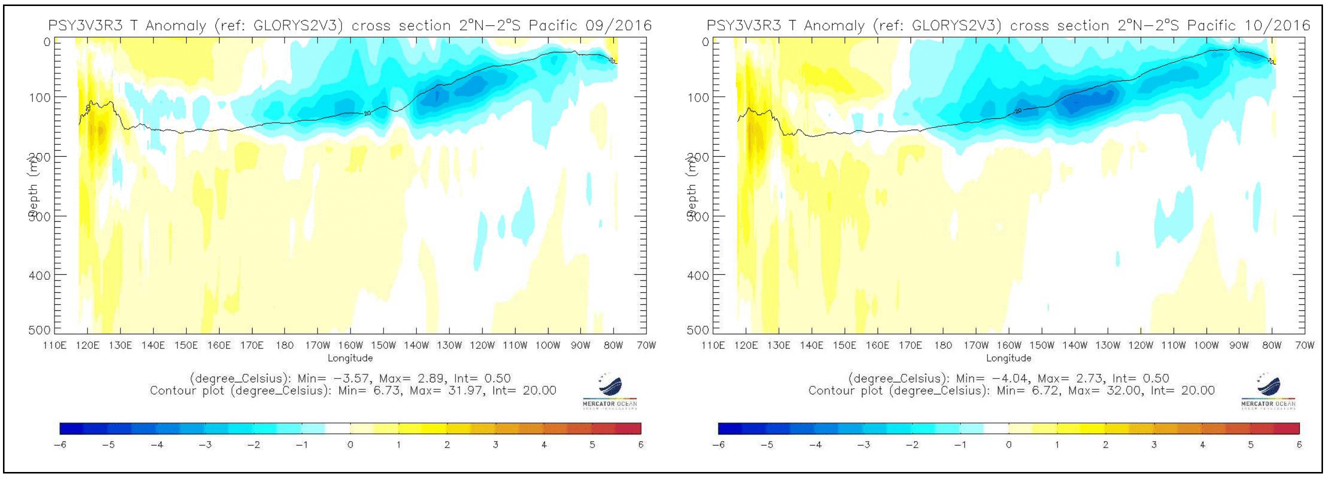

fig.I.1.4: Oceanic temperature anomaly in the first 500 meters in the Equatorial Pacific (previous and current month), http://bcg.mercator-ocean.fr

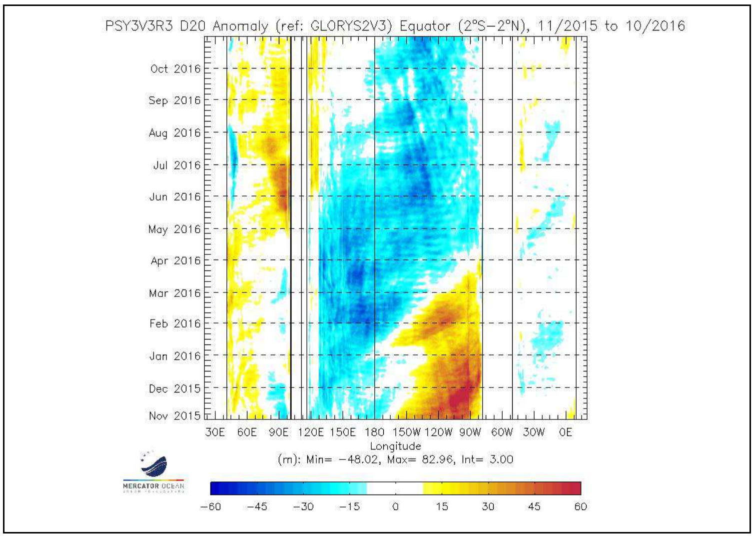

fig.I.1.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 6 month period http://bcg.mercator-ocean.fr/

I.1.b Sea surface temperature Near Europe

Arctic region and along eastern coast of Greenland: Anomalies increased compared to September.

West of Scandinavia SST increased in comparison to September. Colder-than-normal SST occurred in the central North Atlantic (an area from Iceland, Ireland and New Foundland). In contrast, warmer-than-normal SST near most of European west coast, also North Sea became warmer than normal. The SST in the Baltic Sea decreased in comparison to September. The high pressure over Scandinavia and northern Russia enhanced the south-westerly flow over the North Atlantic.

Still colder than normal at the west coast of Portugal.

The Mediterranean Sea was also warmer than normal except the Aegean, the Adriatic Sea and Black Sea.

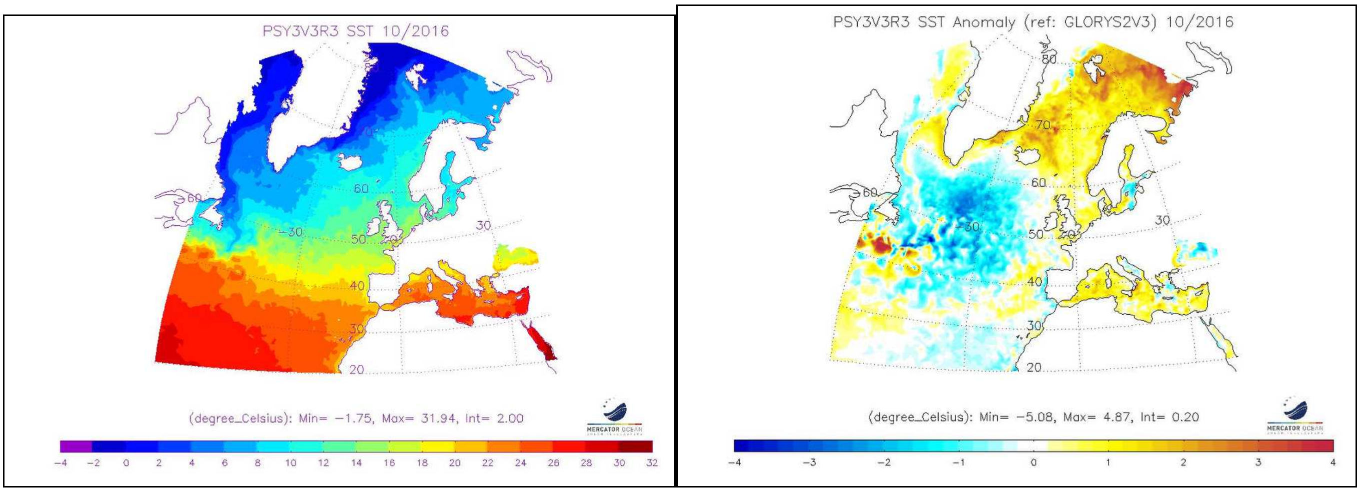

fig.I.1.6 : Mean sea surface temperature in the RA VI Region (Europe) and anomaly (reference Glorys 1992-2009). http://bcg.mercator-ocean.fr/

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) :

Anomaly field very similar to September one. Probably mainly due to MJO activity: active in phase 5 at the beginng of October (in phase 4 and 5 iSeptember). Still the main dipole :

- a negative pole (upward anomaly motion) centered on the Maritime Continent and spreading Northward and Southward.
- a positive anomaly (downward anomaly motion) on the Western part of Indian Ocean (linked to negative DMI)

Compared to September, diappearance of the downward anomaly motion pole on the Western part of Atlantic Ocean.

From center to East of the equatorial Pacific, still a week positive anomaly (downward anomaly motion), consistent with La Nina.

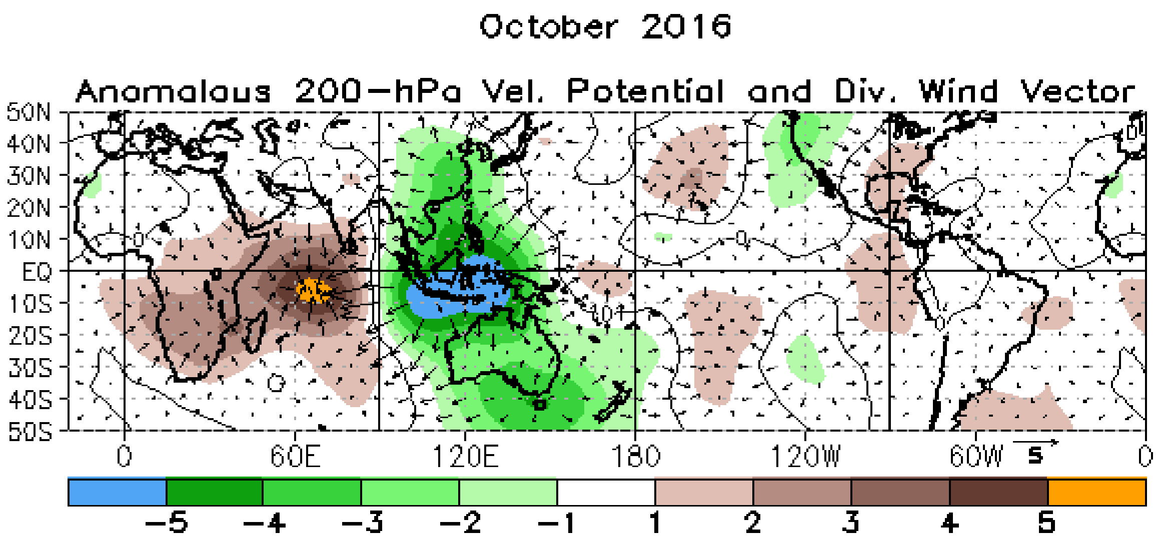

fig.I.2.1: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).

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

MJO (fig. I.2.1.b)

Significant activity during the first days in phase 5 (Indian Ocean/West Pacific dipole), consistent with velocity potential anomaly field

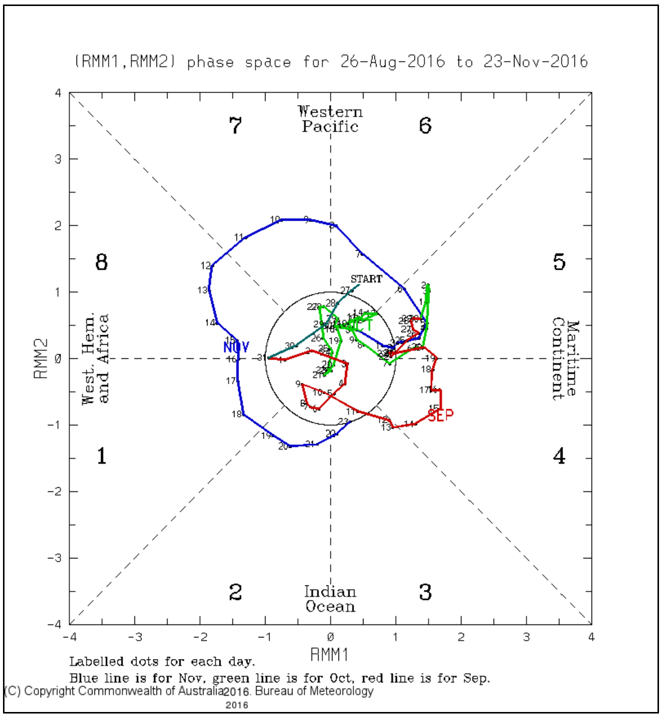

fig.I.2.b: MJO index http://cawcr.gov.au/staff/mwheeler/maproom/RMM/phase.Last90days.gif

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

- Over West Indian Ocean, cyclonic anomaly dipole on both sides of the equator. likely a response to the persistent downward motion anomaly. However this teleconnexion seems to be trapped in the inter-tropical band.
- the negative VP anomaly over the Maritime Continent could explain the cyclonic anomaly on Western Australia, with perhaps a propagation South-Estward. However, no teleconnexion visible in the Northern hemisphere

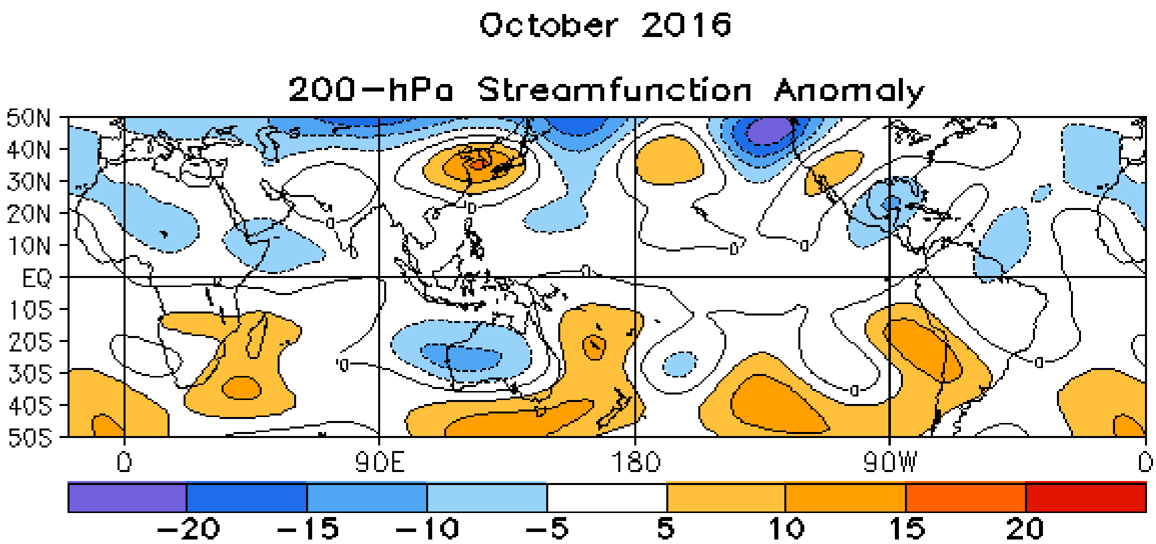

fig.I.2.2: Stream Function Anomalies at 200 hPa.

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 North of Scandinavia, spreading Westward up to Iceland and Scotland, and Eastward on Northern Siberia. Dominant mode over Europe : Scandinavian Blocking. NAO index is still positive at +1 (source NOAA (ftp://ftp.cpc.ncep.noaa.gov/wd52dg/data/indices/tele_index.nh), this may surprise looking at the anomaly map...
- Over the Southern Hemisphere, alternate positive and negative anomalies over mid-latitudes

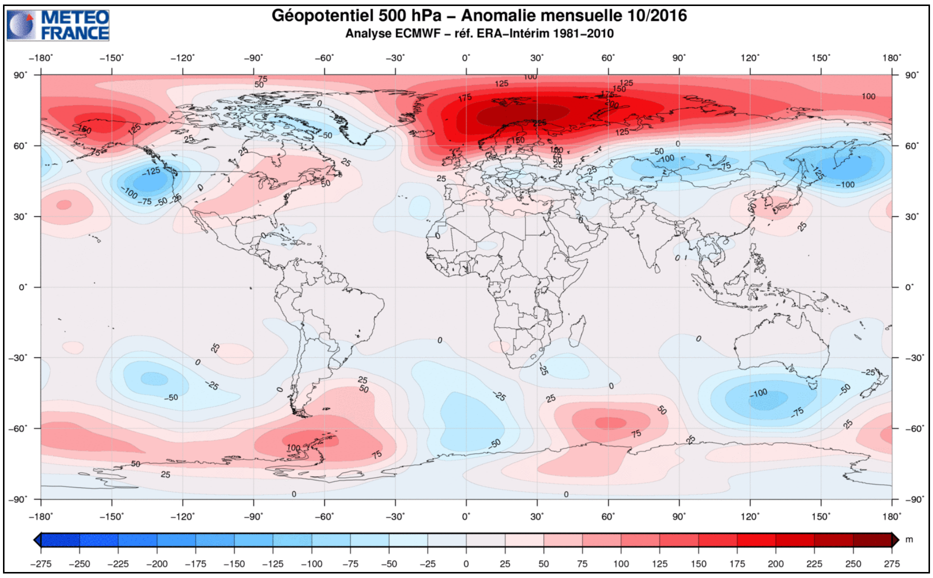

fig.I.2.3: Anomalies of Geopotential height at 500hPa (Meteo-France)

MONTH	NAO	EA	WP	EP-NP	PNA	TNH	EATL/WRUS	SCAND	POLEUR
OCT 16	1.0	0.4	0.5	-0.8	1.5	---	-1.3	1.1	-2.9
SEP 16	0.7	3.5	-1.8	-1.4	0.1	---	0.1	-1.0	-1.3
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

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

Both centres of action, the Islandic low and Azores high were shifted to the west. A second high pressure area centred in north-western Russia at the border to Finland (above 1030 hPa) ranged from Scandinavia up to southern European Russia. The positive anomalies of more +14 hPa covered an area from Scotland over Scandinavia and the Siberian coast.

The Azores high with a core pressure of more than 1020 hPa showed anomalies below -2 hPa while southern Europe showed anomalies around zero.

The European circulation could be explained by a North Atlantic Oscillation (NAO) index of 0.96 and mainly by the Polar/Eurasia Pattern (POL) index of -2.94. The Arctic Oscillation (AO) with an idex value of -1.9 had also a significant influence.

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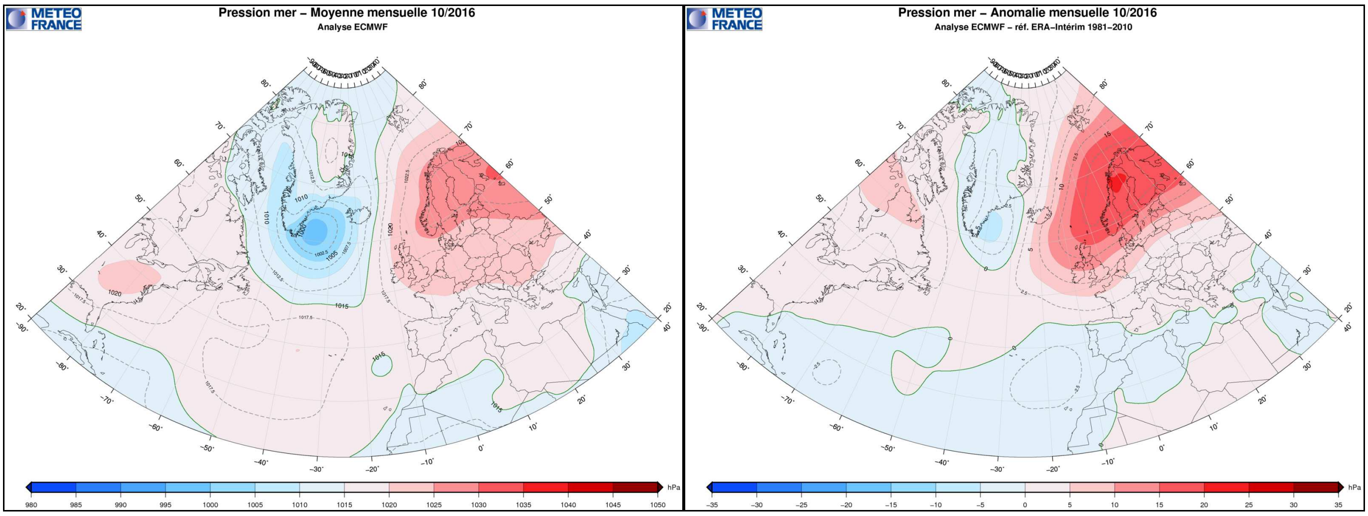


fig.I.2.4: Mean sea level pressure in the RA VI Region (Europe) (left) and 1981-2010 anomalies (right).

Circulation indices: NAO and AO

The NAO was in a positive phase during most of the month. The intense negative phase from 22 to 25 October reflects the situation when low pressure was established over the Azores.

Just at the beginning of October the AO index changed from positive to negative phase and remained negative during the whole month due to the high pressure over northern Europe.

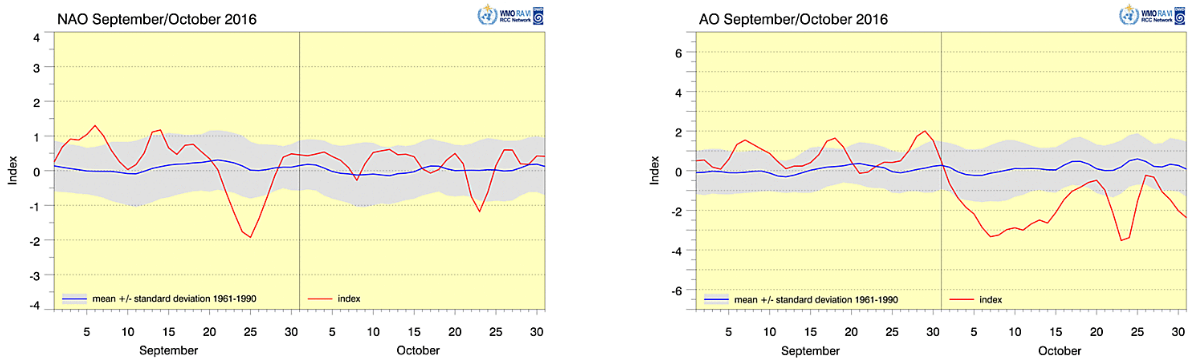


fig.I.2.5: North Atlantic Oscillation (NAO, left) and Arctic Oscillation (AO, right) indices with 1961-1990 mean standard deviation (shading). http://www.dwd.de/rcc-cm , data from NOAA CPC: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml

I.2.b Precipitation

- Consistent with 200mb velocity potential anomalies, and in keeping with September, much wetter than normal conditions prevailed over Indonesia extending toward south-eastern China
- significant deficit almost all over South America
- Over Europe: consitently with Z500 anomaly map, mostly dry except for Northern and Western Europe, mainly wet on Northern and Eastern Mediterranean.

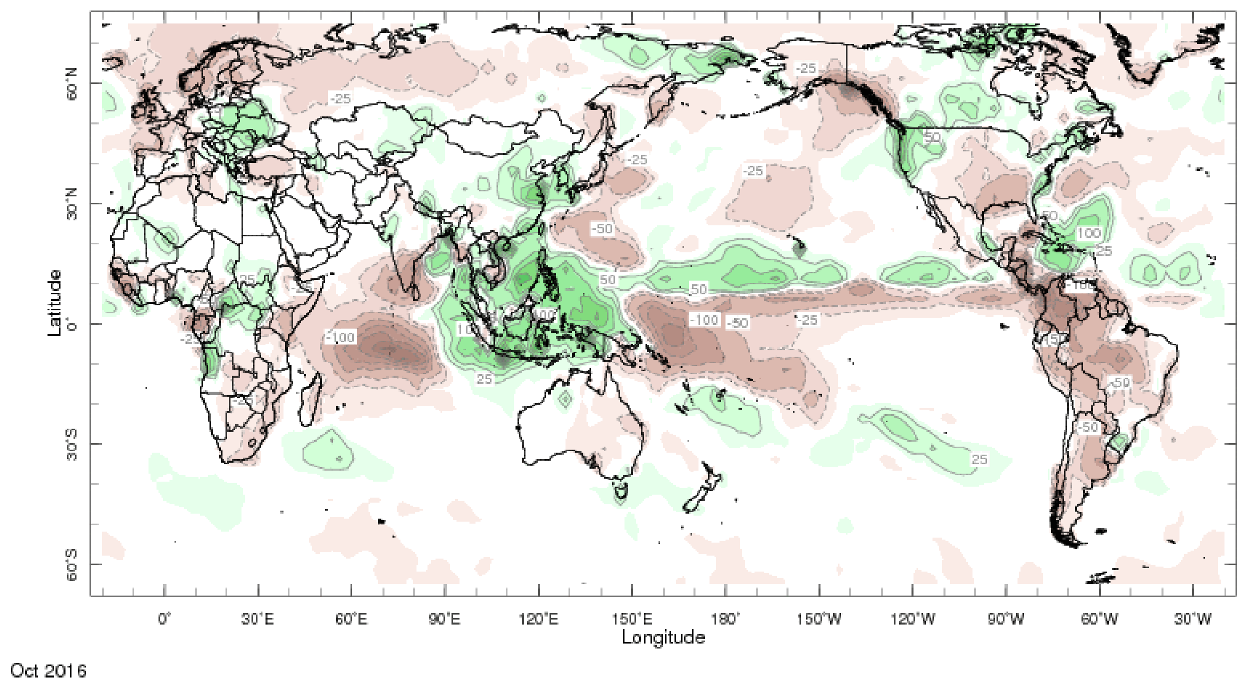


fig.I.2.6: Rainfall Anomalies (mm) (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.
http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/Anomaly.html

Precipitation anomalies in Europe:

Precipitation in October occurred in mostly every part of the RA VI region. In eastern Europe the amount was extremely high with up to 3 to 6 times (in Moldova) the normal values although the absolute amount was not that high. In Belarus about 3 to 4.5 (138 mm - 225 mm) of the month normal precipitation was registered. Those areas under high pressure influence had a deficit of precipitation, some of them only 20% of the long term mean like in Sweden.

In the Mediterranean some heavy showers with extreme precipitation of 356.7 mm/48h occurred locally in southern France. In Montenegro locally also heavy rain was registered with a monthly total of up to 344 mm at station Cetinju.

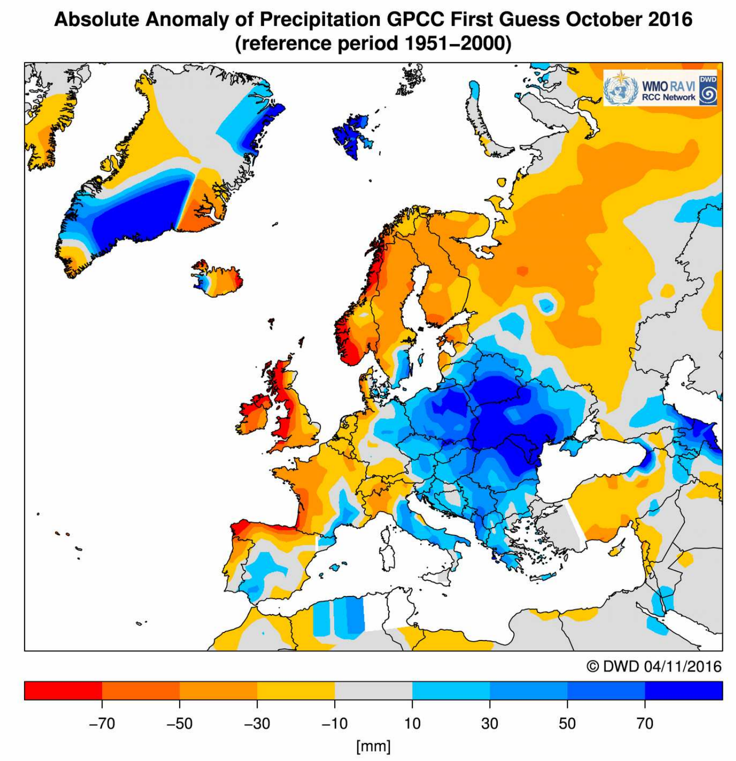


fig.I.2.7: Absolute anomaly (1951-2000 reference) of precipitation in the RA VI Region (Europe), data from GPCC (Global Precipitation Climatology Centre), http://www.dwd.de/rcc-cm.

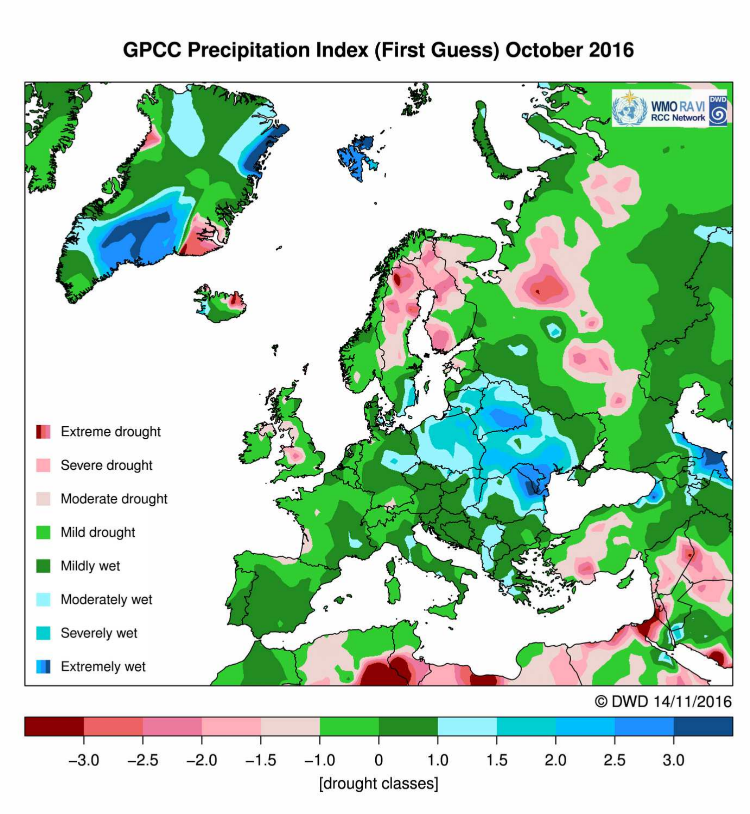


fig. I.2.8: GPCP Precipitation Index http://www.dwd.de/rcc-cm .

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	-19 mm	-0.02
Southern Europe	0.6 mm	0.25

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

- strong positive anomaly North of 60°N
- conversely, negative anomalies over the 45-60°N band, especially over South Russia, but also over Europe and Canada.
- positive anomaly all over the Mediterranean

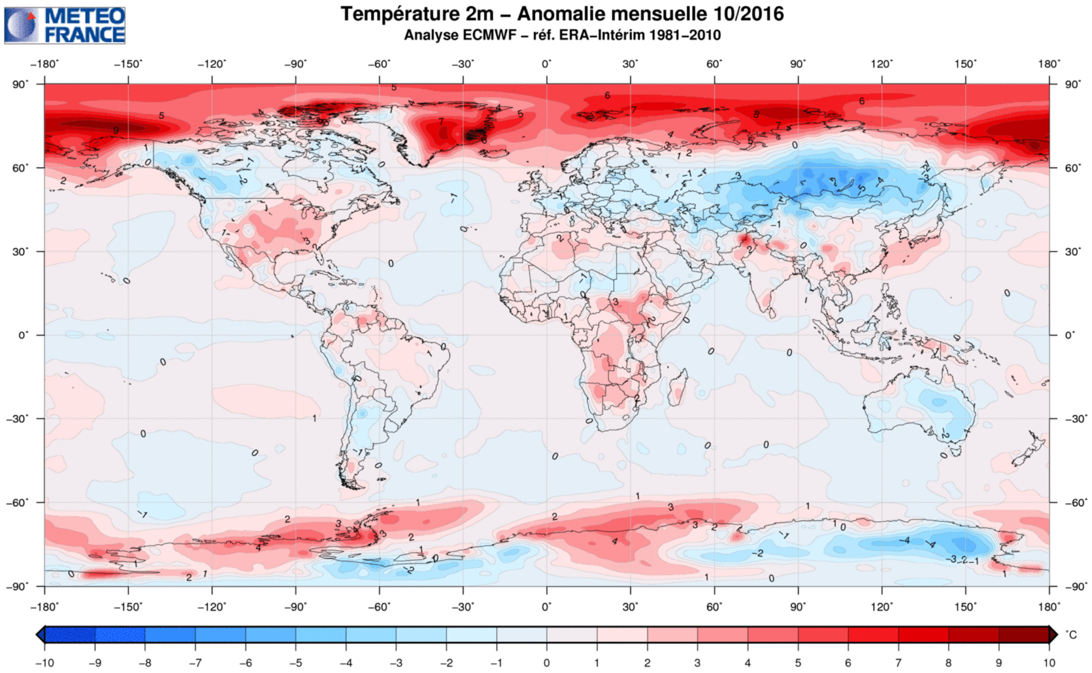


fig.I.2.9: Temperature Anomalies (°C) (Meteo-France)

Temperature anomalies in Europe:

In October 2016 temperature anomalies over a great part of Europe were negative with a minimum below -2°C in the Baltic States. The highest temperature anomalies above +6°C were located over the Arctic. For example at station Jan Mayen the monthly mean temperature was 5.9°C (5.8°C above the reference period) and therefore a new record (breaking the last record from 1938 with 4.2°C). Svalbard lufthavn (Norway) reported a monthly mean temperature of 3.2°C (an anomaly of 8.7°C and 1.8°C over the last record from 2000). In Svalbard lufthavn it was the first time that an maximum temperature of more than 10°C (10.1°C on the 7th of October) was registered in October. Several other Norwegian stations measured monthly mean anomalies between +6°C and +9°C.

The Mediterranean also showed positive monthly mean temperature anomalies with several maxima above +3°C, one over Spain, one over Sicily and one over southern Turkey at the border to Syria.

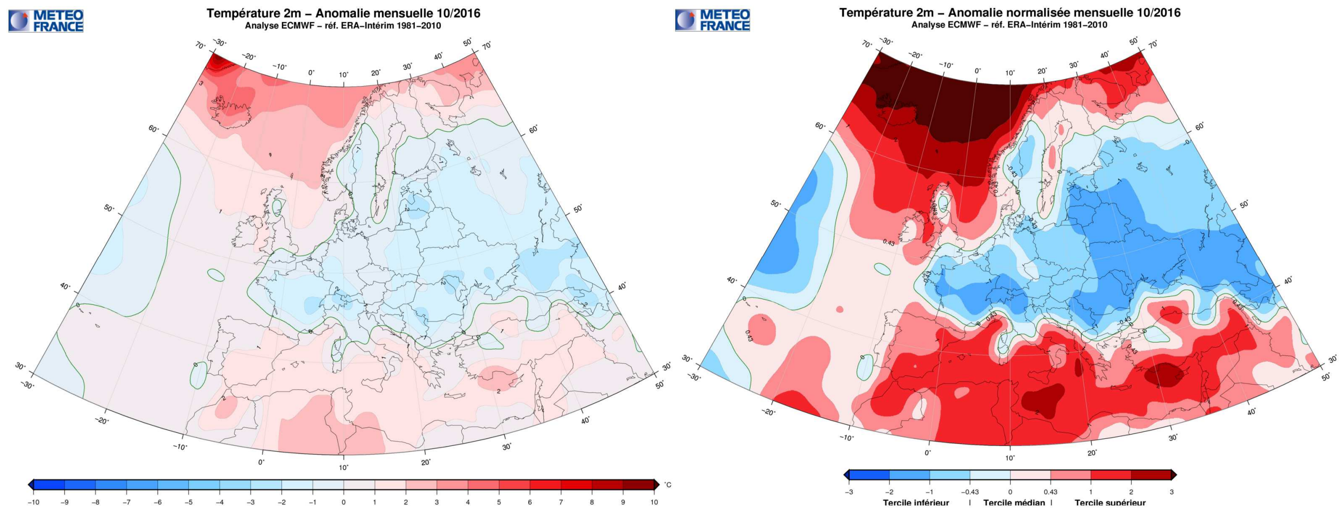


fig.I.2.10: Left graph: Absolute anomaly of temperature in the RA VI Region (Europe). Right graph: Standardized temperature anomalies

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	-0.3 °C
Southern Europe	+0.6 °C

I.2.d Sea ice

<u>In the Arctic</u> (fig. 1.2.11 and 1.2.12 - left) : new low level record (less than 2012).
<u>In the Antarctic</u> (fig. 1.2.11 and 1.2.12 - right) : very important deficit, less than -2sd.

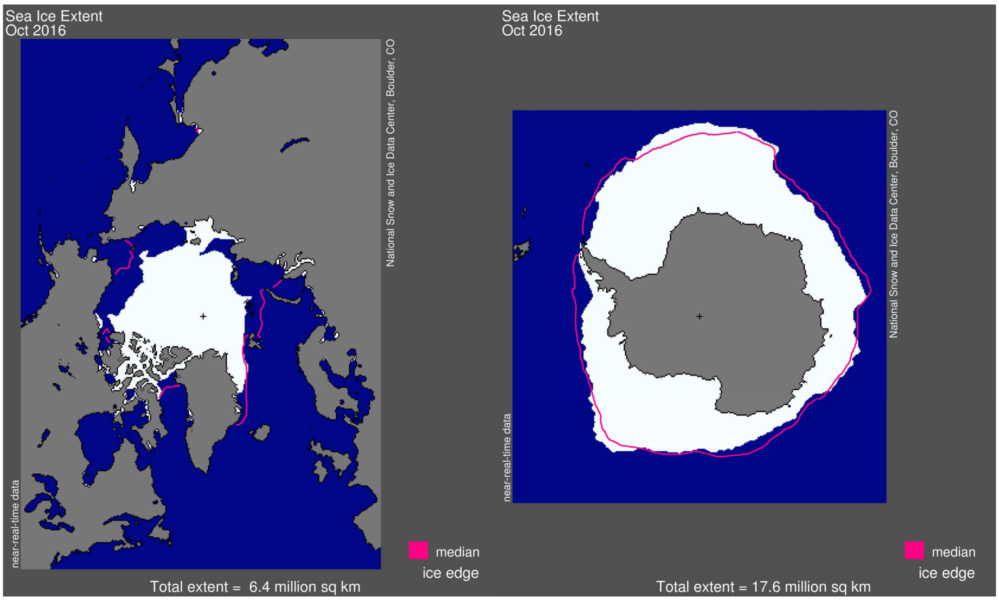


fig.I.2.11: Sea-Ice extension in Arctic (left), and in Antarctic (right). The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

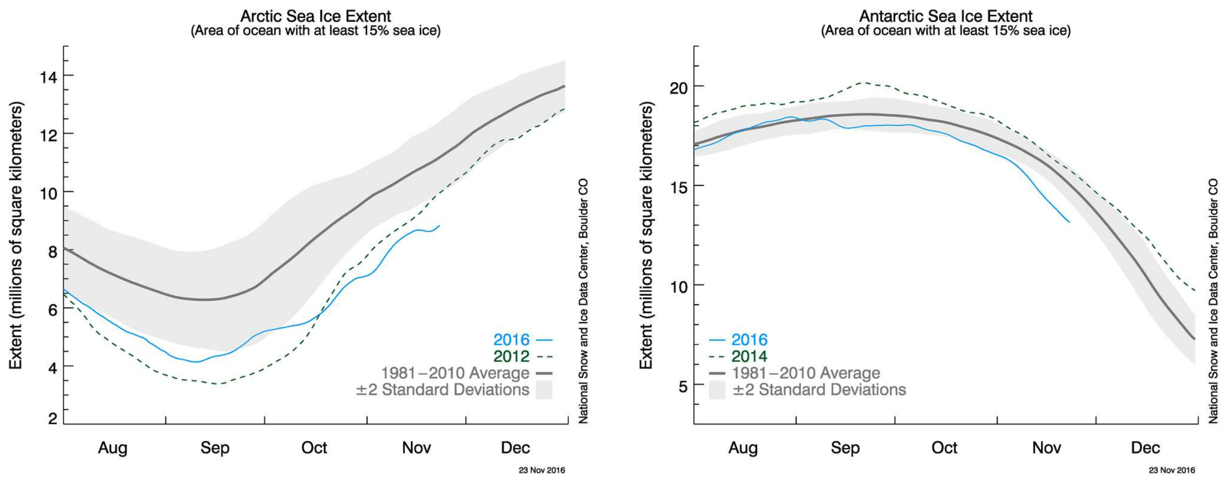


fig. I.2.12 : Sea-Ice extension evolution from NSIDC.

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: Models in good agreement with persisting negative SST anomalies east of the dateline over the Equatorial Pacific. The intensity of anomalies is hard to interpret, due to the different hindcast periods (for instance 1981-2010 for ECMWF, 1991-2014 for Meteo-France ARPEGE-S5). Models also suggest a positive PDO. Positive anomalies should persist over tropical areas on both sides of the equator.
- Indian Ocean: DMI is forecasted to return to neutral or positive value (see fig II.1.7.), as a consequence to significant cooling over the eastern basin, while warming over the western basin, east of Africa. The negative anomalies surrounding south and west Australia should persist.
- Atlantic Ocean: for the northern part : persistence of the central cold blob, along with strong positive anomalies over the western basin, from the Caribbean to Newfoundland. Equatorial Atlantic should remain warmer than normal.

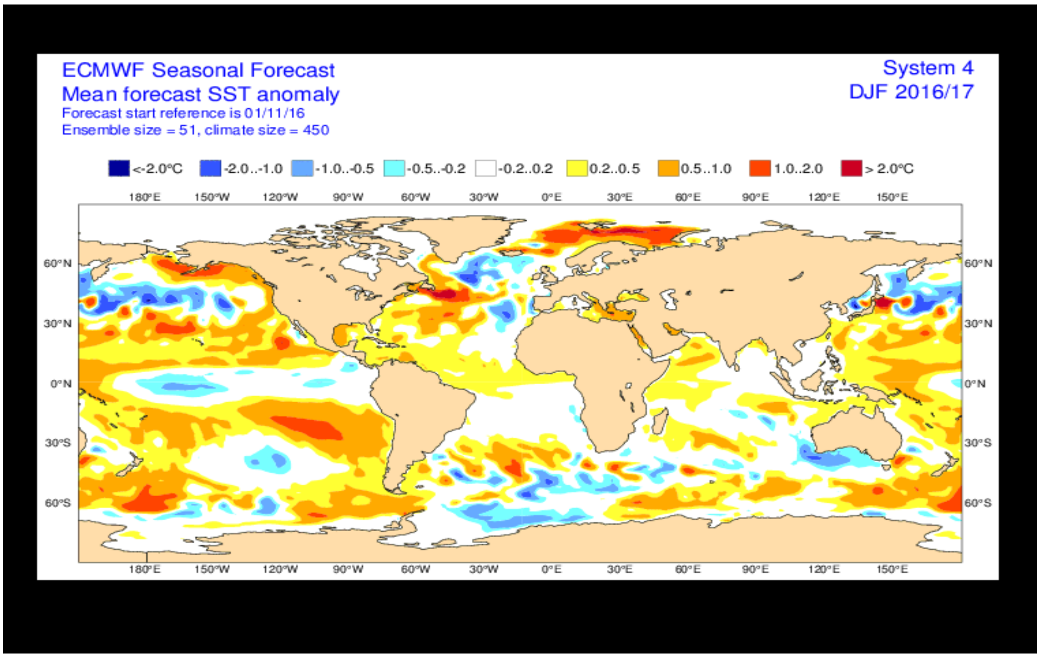


fig.II.1.1: SST anomaly forecast from ECMWF

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

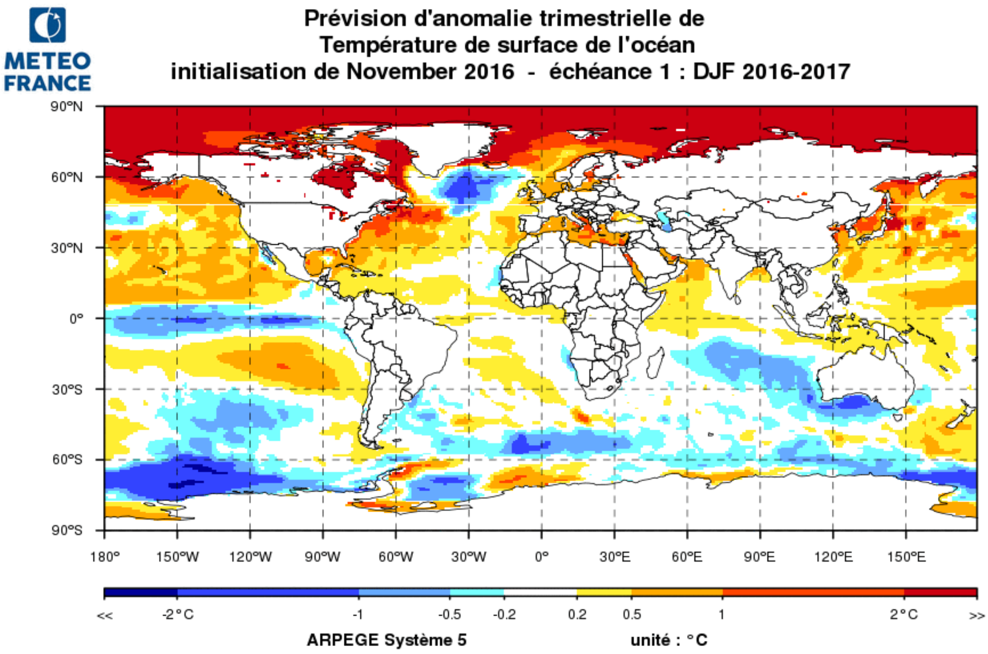


fig.II.1.2: SST Anomaly forecast from Meteo-France (recalibrated with respect of observation).

http://elaboration.seasonal.meteo.fr

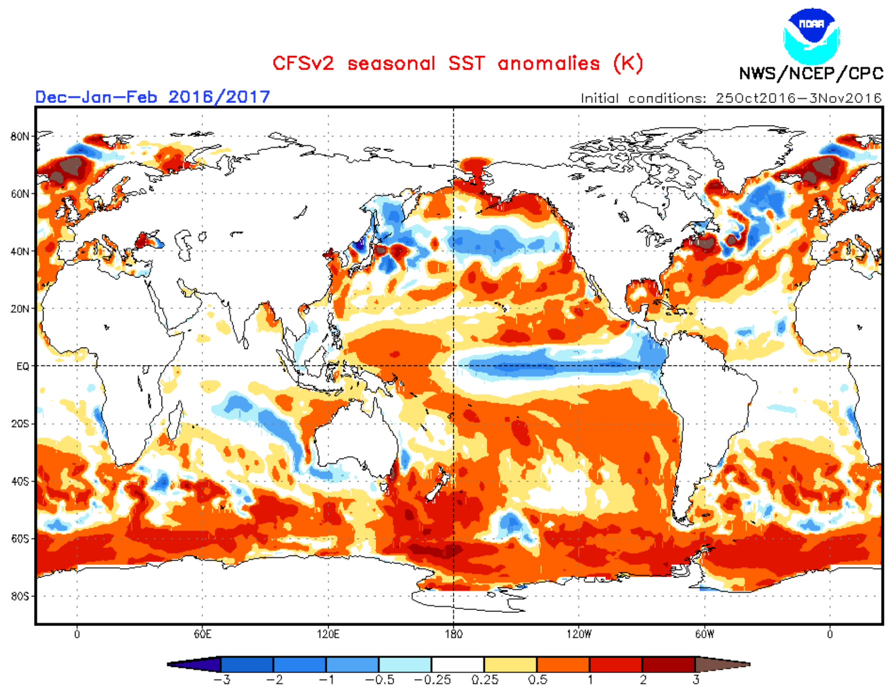


fig.II.1.3: SST anomaly forecast from NCEP.

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

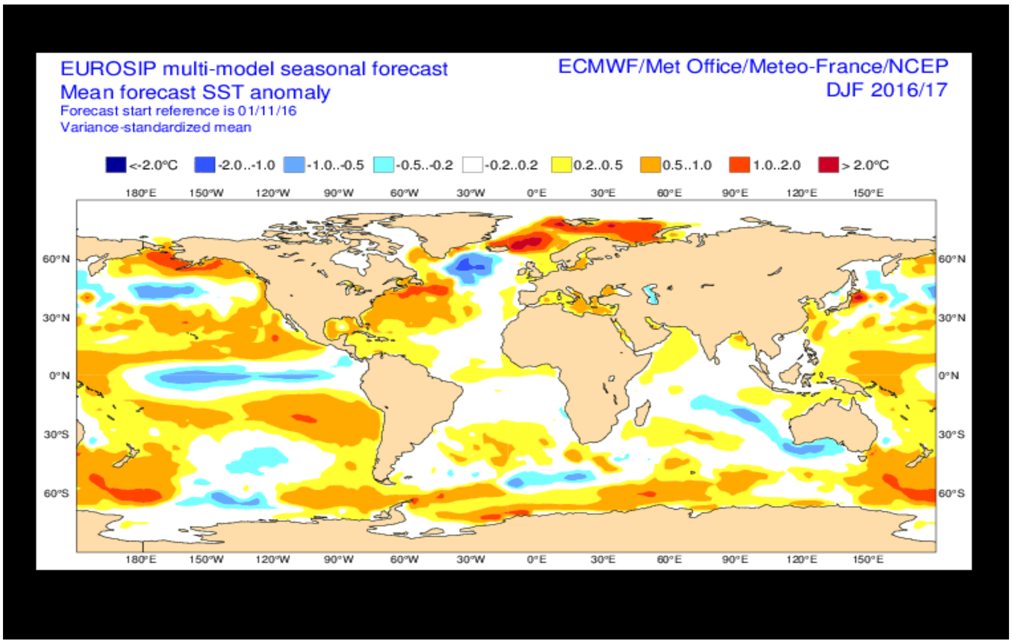


fig.II.1.4: SST Forecasted anomaly from Euro-SIP

II.1.b ENSO forecast :

Forecast Phase: *weak La Niña*

Previous forecasts are confirmed. The DJF trend suggest a progressive return to neutral conditions. This La Niña event should remain a weak event, and the atmospheric response should be weak (This forecast is consistent with the positive PDO situation which generally reduces *La Niña* episodes).

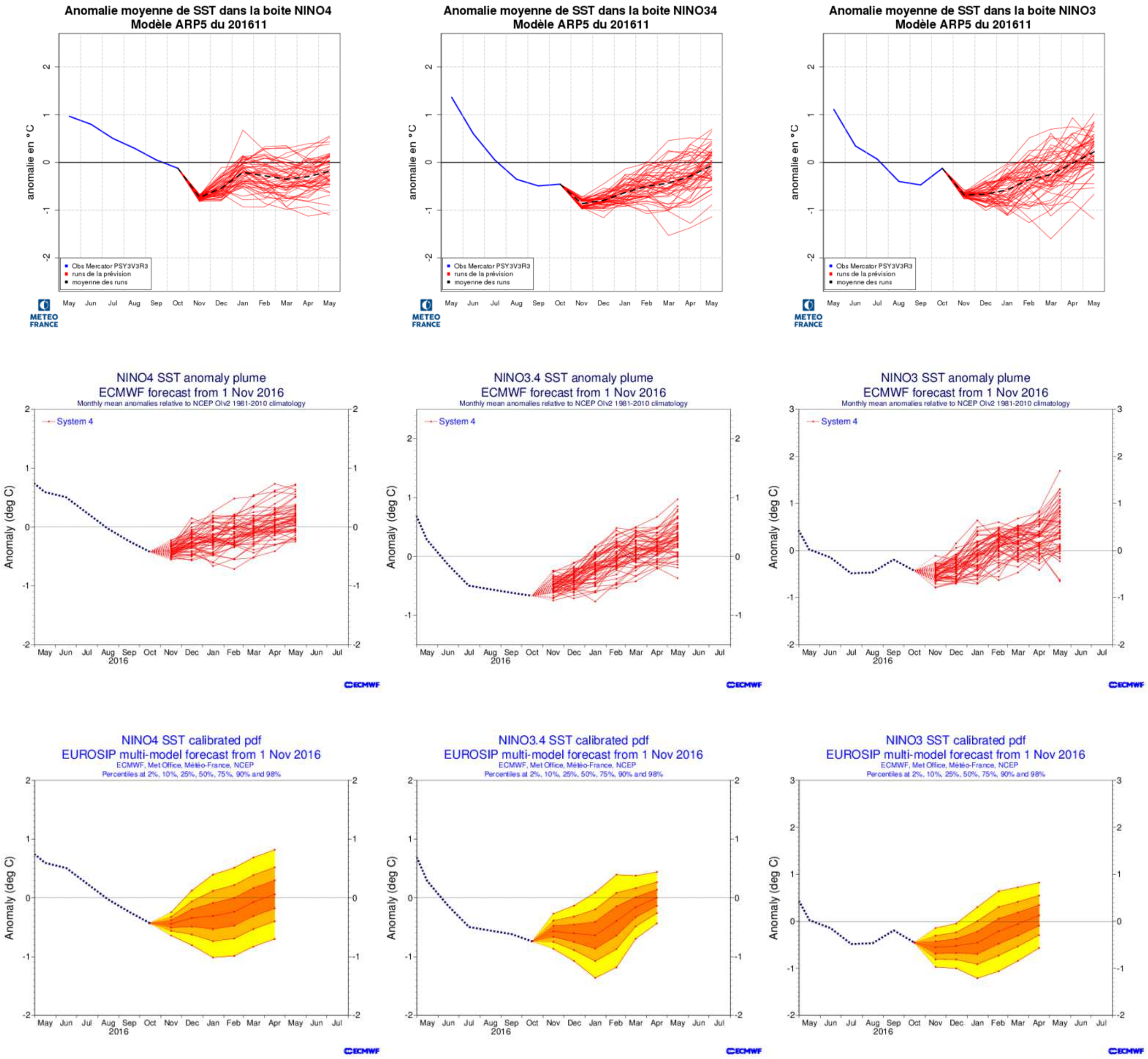


fig.II.1.5: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members - and EuroSIP (bottom) – recalibrated distributions - (http://elaboration.seasonal.meteo.fr , http://www.ecmwf.int/)

II.1.c Atlantic ocean forecasts

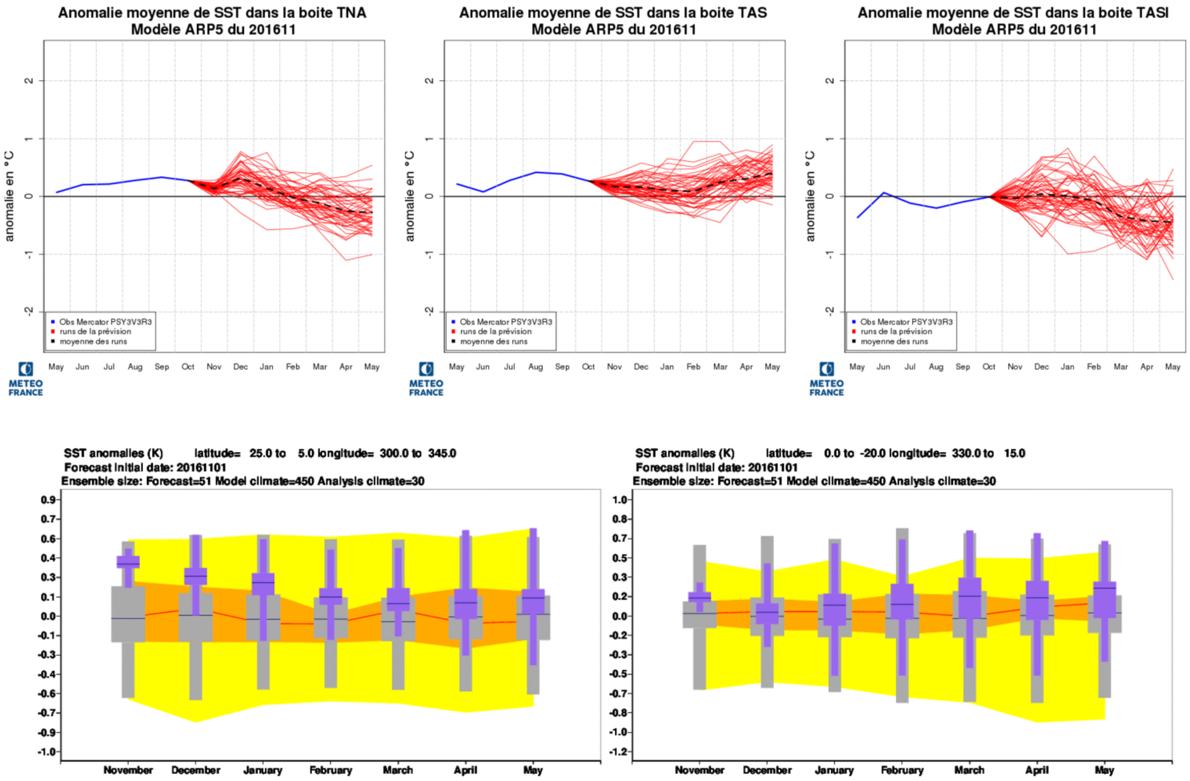
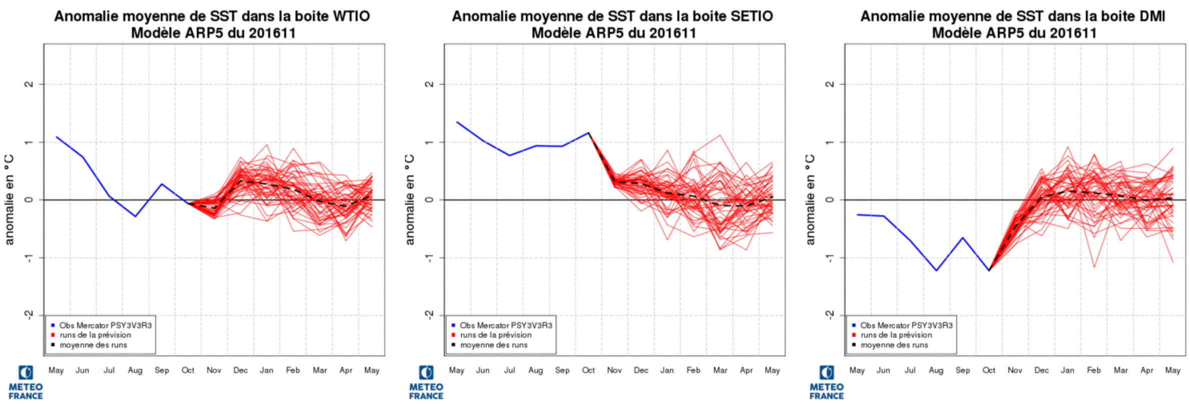


fig.II.1.6: SSTs anomaly forecasts in the Atlantic Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

II.1.d Indian ocean forecasts



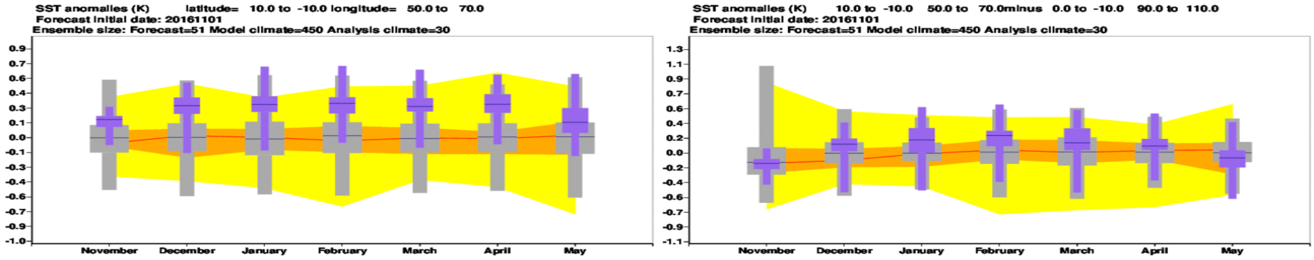


fig.II.1.7: SSTs anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

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 : major changes compared to October situation, even if we find again some anomaly poles. Over equatorial Pacific and Maritime Continent, the anomaly dipole is modified, and the downward motion anomaly is expected predominant. This is consistent with the persistence of "La Nina" and the weaking of positive anomalies around the maritime Continent. Over Indian Ocean, uncertainty on the persistence of the downward motion anomaly (present in ECMWF and JMA, not obvious in MF), despite of an unfavourable SST context. Perhaps is it a response to La Nina. And at last, the strongest anomaly is an upward motion anomaly, vast, which covers widely the inter-tropical Atlantic.

Stream Function anomaly : weak but consistent response with ECMWF, MF and JMA. On th one hand over North Pacific, with a negative PNA teleconnexion (typical of La Nina). On the other hand over Northern Atlantic with an anticylonic anomaly along the inter-tropical belt, followed (north of it) by a negative anomaly (cycnlonic anomaly over southern Europe). Such teleconnexions are also visible in the southern hemisphere.

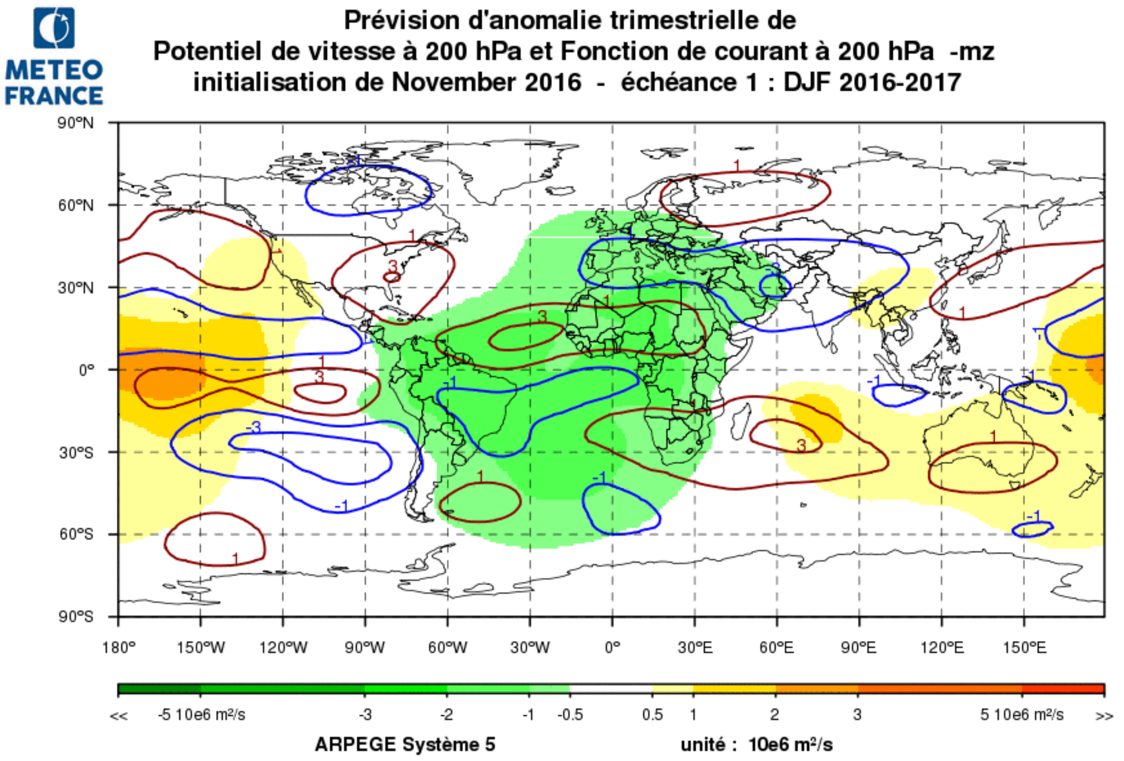


fig.II.2.1: Velocity Potential anomaly field χ (shaded area – green negative anomaly and yellow positive anomaly) and Stream Function anomaly ψ (isolines – red positive and blue negative in NH) at 200 hPa by Météo-France ARPEGE-S5.

II.2.b Northern hemisphere and Europe forecast

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

Agreement between MF, ECMWF and JMA over Artic region, with positive anomalies. This should disadvantage NAO+ circulation, with a weakened polar vortex. However over Northern Atlantic and Western Europe, models diverge. The teleconnexion from tropical Atlantic doesn't lead to a clear Z500 pattern. Over northen Atlantic, ECMWF seems to priviledge NAO-/EA- modes, MF is more dispersed (a mean signal slighty NAO+/EA+), and JMA privileges a EA+ pattern.

Looking at the 12 GPC Z500 outputs, a majority of models forecast a EA+ circulation pattern (and also SCAN+, less obvious).

Regarding the identified predictors of winter European regimes :

- below normal arctic sea ice is supposed to favour the negative NAO type
- Siberian snow-cover is more important than normal, so NAO- regimes are favoured
- positive SST anomalies over tropical Atlantic : NAO- regimes are favoured

Concerning regime occurrence frequencies (MF and ECMWF), the only convergence concerns an enhanced frequency of Scandinavian Blocking regimes.

To sum up for DJF : over Northern Atlantic, EA+ circulation is the most probable (majority of GPC models), NAO+ unlikely. And over the European continent, SCAN+ is the predominant. Looking at weather regime occurrences and statistical predictors, NAO- and Scandinavian blocking favoured.

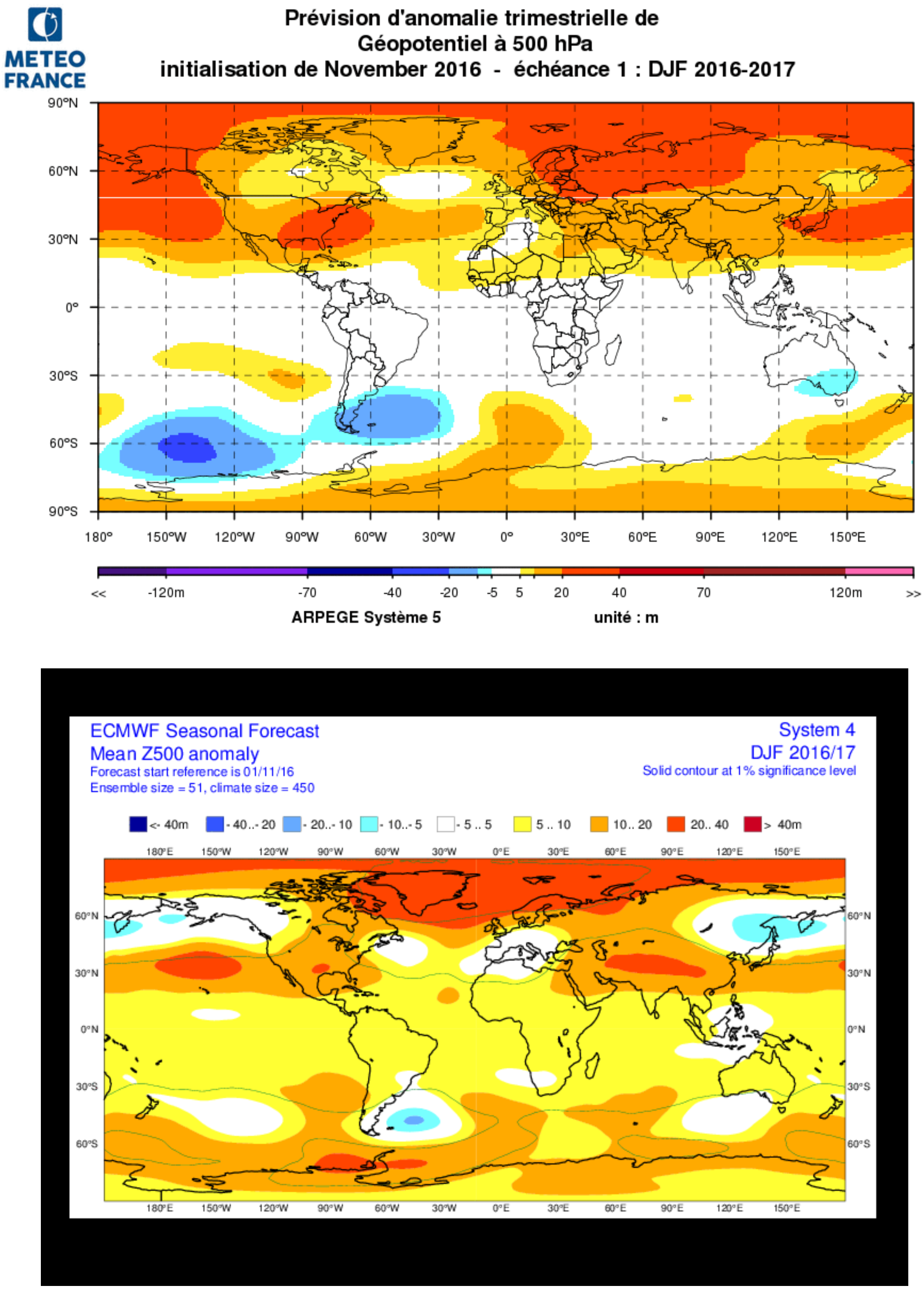
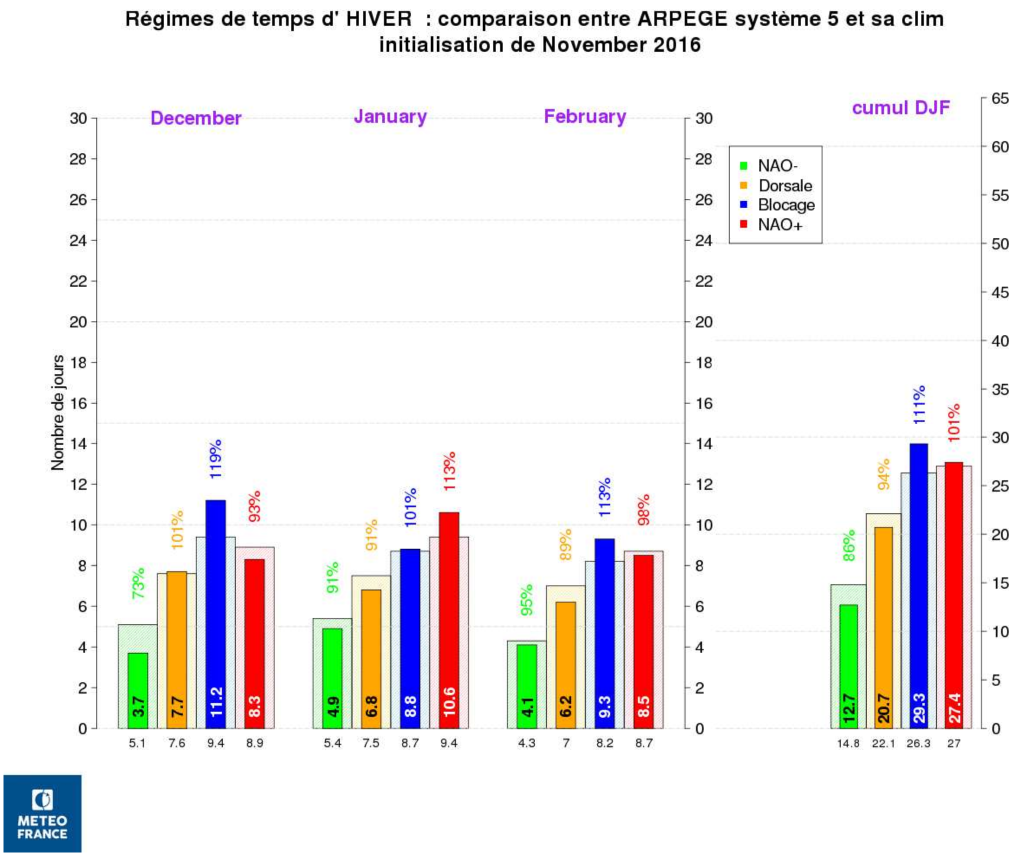


fig.II.2.2: Anomalies of Geopotential Height at 500 hPa from Météo-France (top) and ECMWF (bottom).



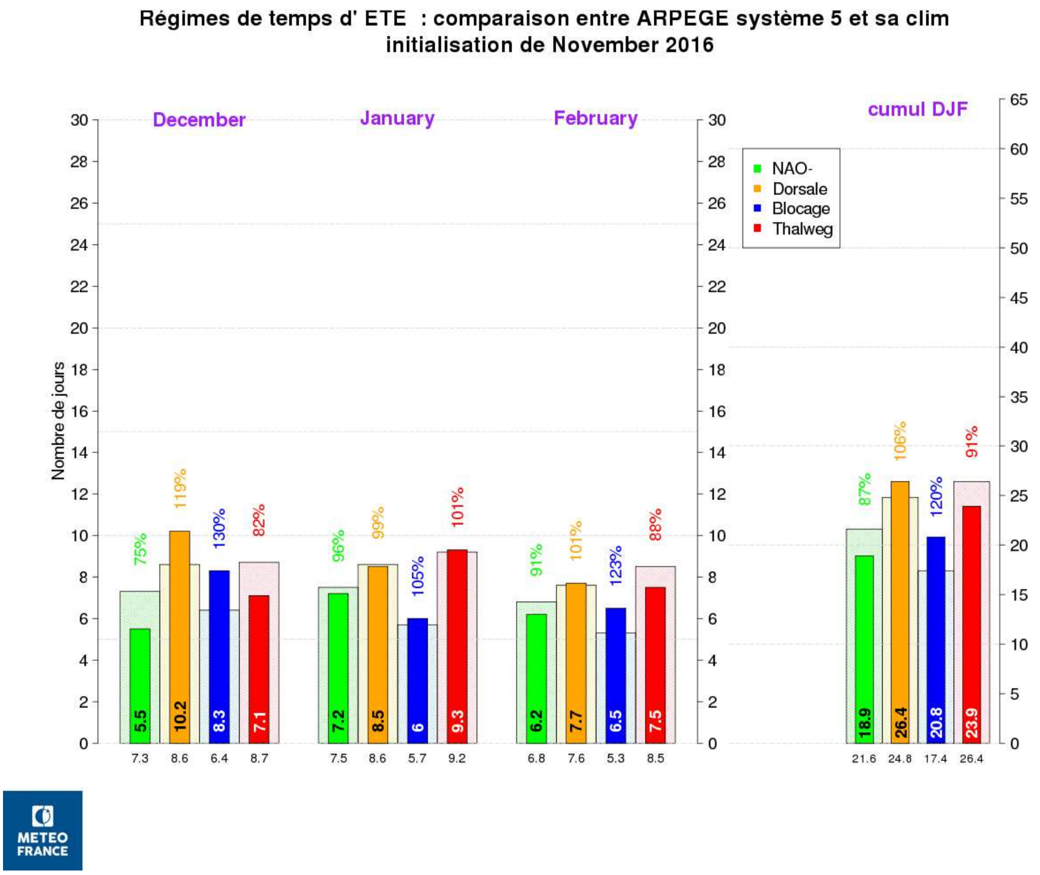


fig.II.2.3: North Atlantic Regime occurrence anomalies from Meteo-France ARPEGE-S5 : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes (winter regimes at the top, summer regimes at the bottom).

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

Positive anomalies dominate in the forecast across the globe.

- Inland : a few regions with high probability for "cold" temperature, like the very South part of Australia (probably due to negative SST anomalies observed and forecasted). To be quoted the "normal" forecast for the northern part of South America (Brazil, Amazonia), consistent with enhanced probabilities of precipitation.
- Europe : large spread of scenarios. Clear positive signal in EUROSIP over the Eastern Mediterrean Basin, consistent with the mean circulation (cf Z500 or STF200 ARPEGE and ECMWF, GPC Z500 composite). North of 45°N, models mainly forecast a "above normal" signal (40 to 50%), consitent with EA+. This warm signal is counterbalanced by enhanced probabilities of Blocking and NAO- regimes (which could lead to higher probability of cold episodes).

II.3.a ECMWF

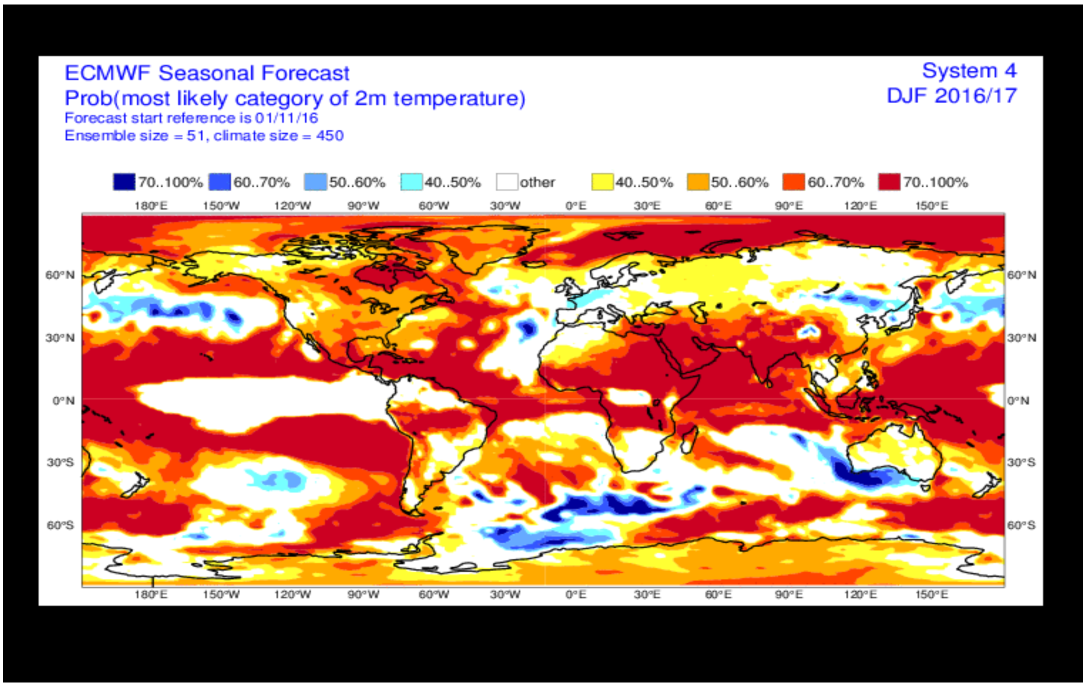


fig.II.3.1: Most likely category probability of T2m from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/

II.3.b Météo-France

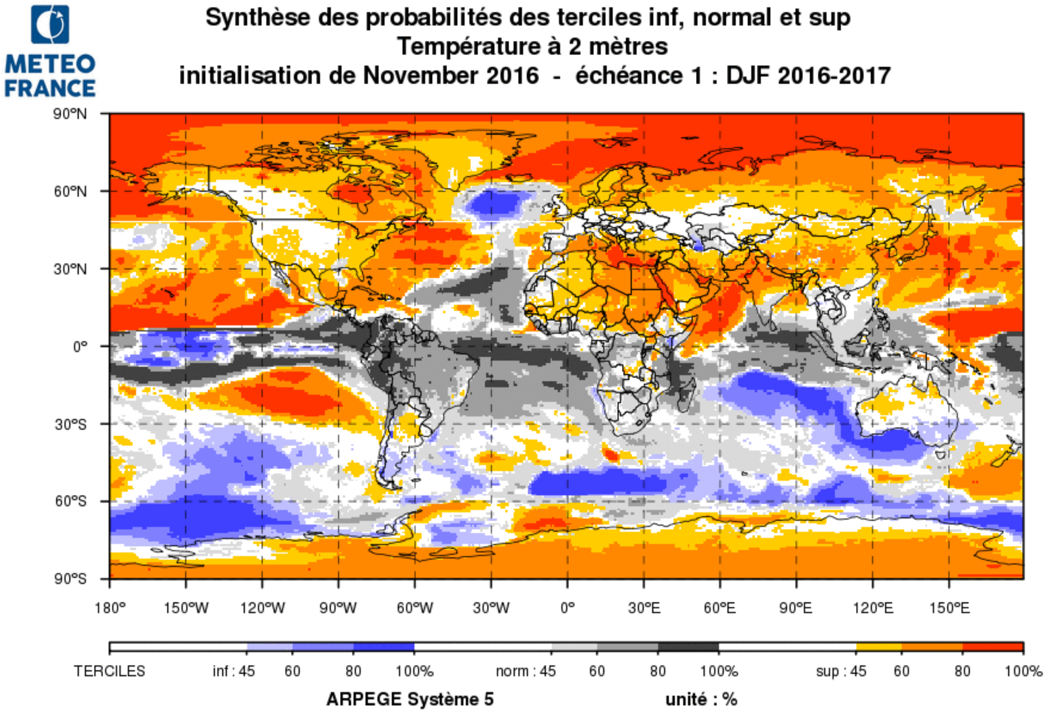


fig.II.3.2: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.3.c Japan Meteorological Agency (JMA)

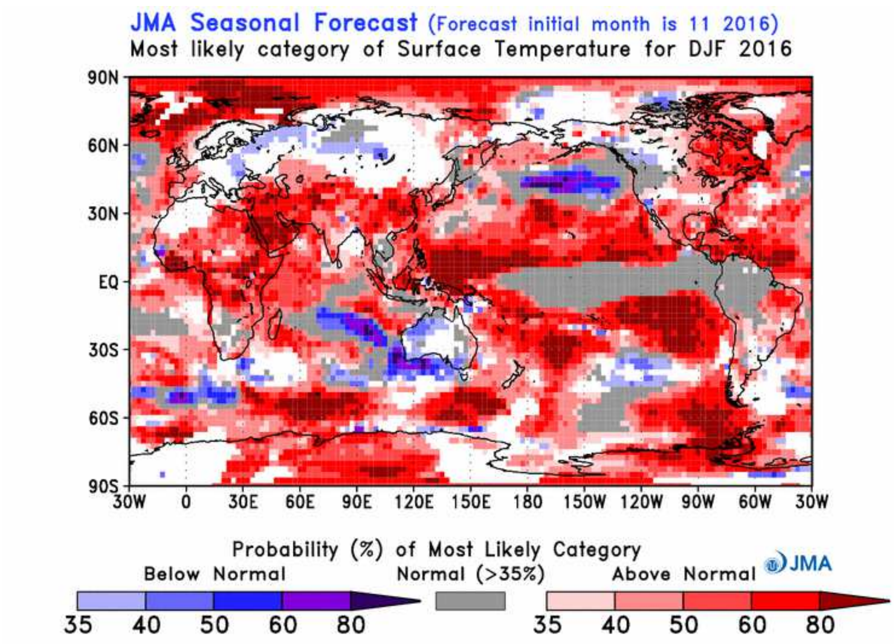


fig.II.3.3: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.php

II.3.d EUROSIP

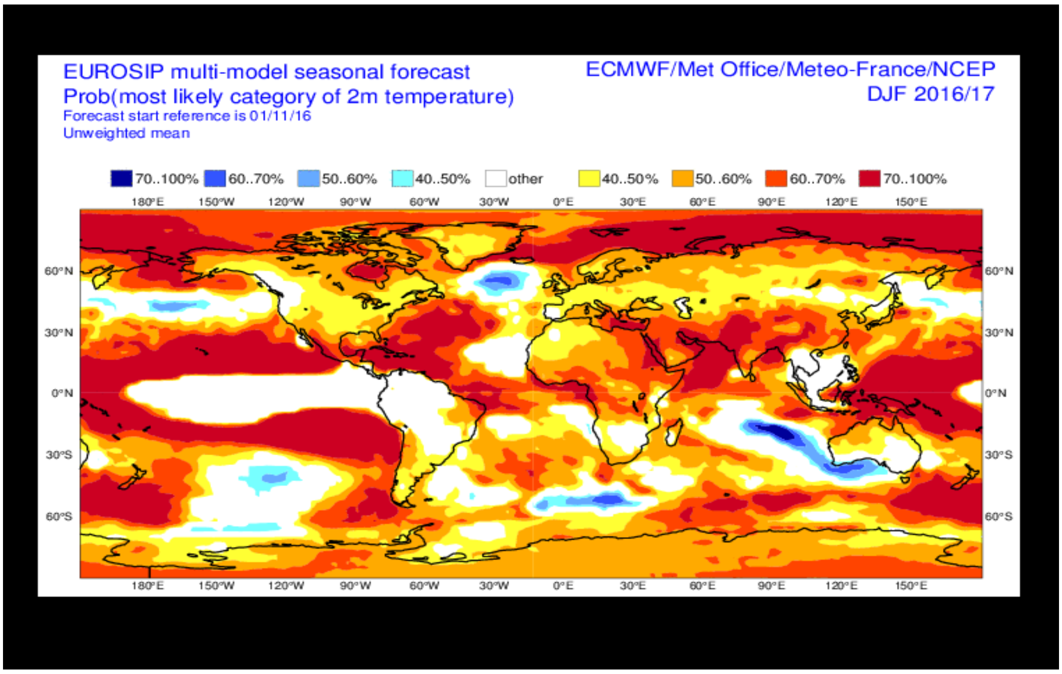


fig.II.3.4: Multi-Model Probabilistic forecasts for T2m from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal and Normal).

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 the North of South America. Over equatorial Atlantic and Carabean Sea, wet signal consistent with positive SST anomalies and upward motion anomalies (VP anomalies).

For Europe, few signal.

II.4.a ECMWF

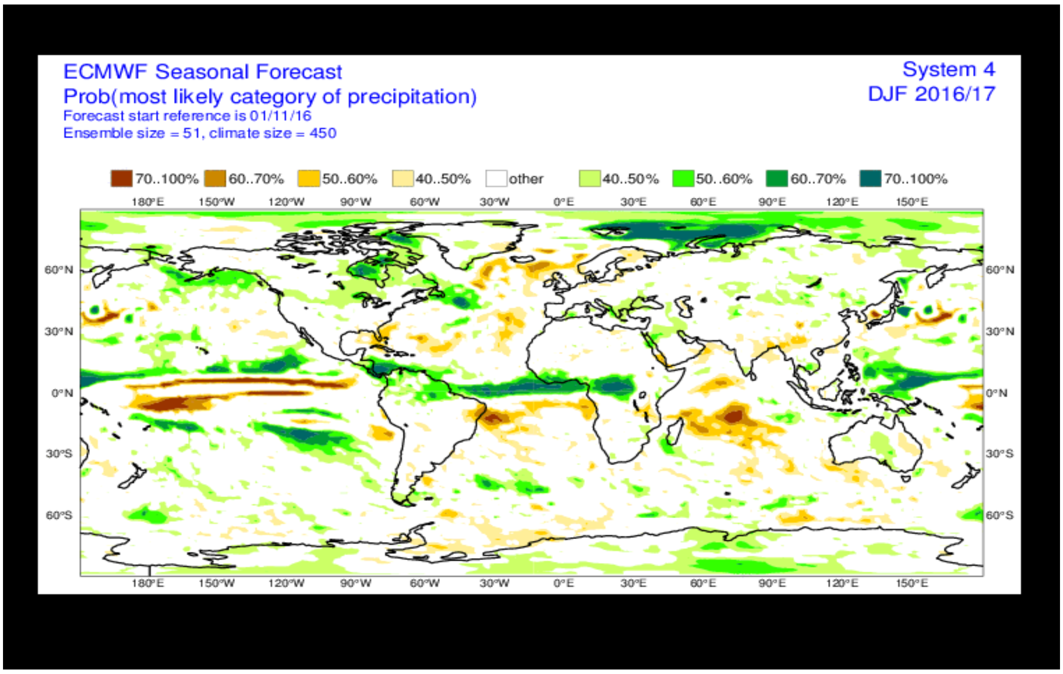


fig.II.4.1: Most likely category probability of rainfall from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/

II.4.b Météo-France

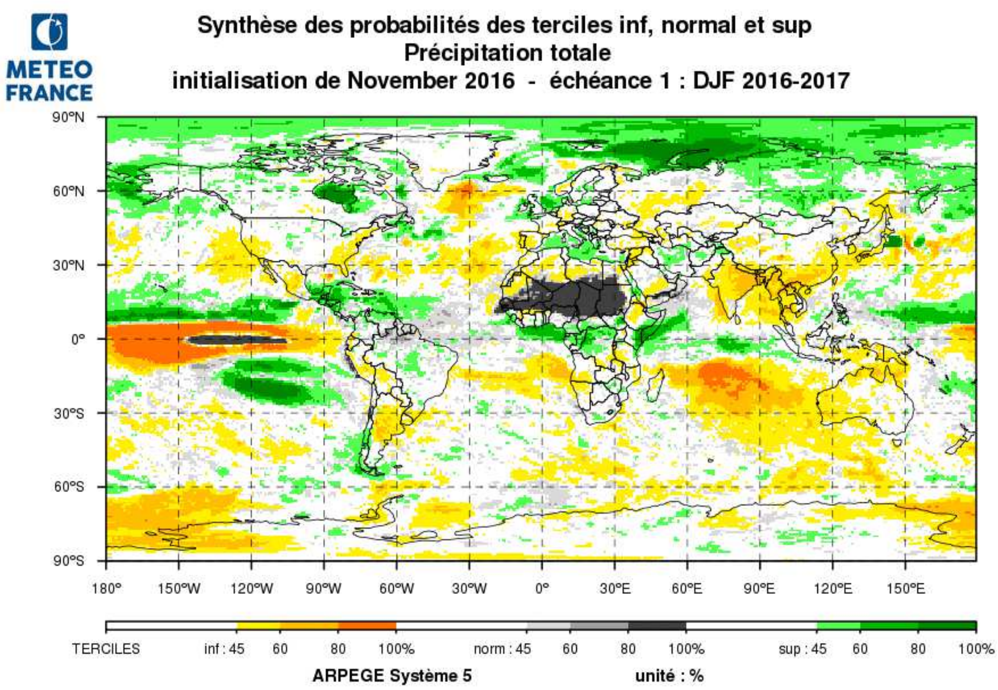


fig.II.4.2: Most likely category of Rainfall. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://elaboration.seasonal.meteo.fr/

II.4.c Japan Meteorological Agency (JMA)

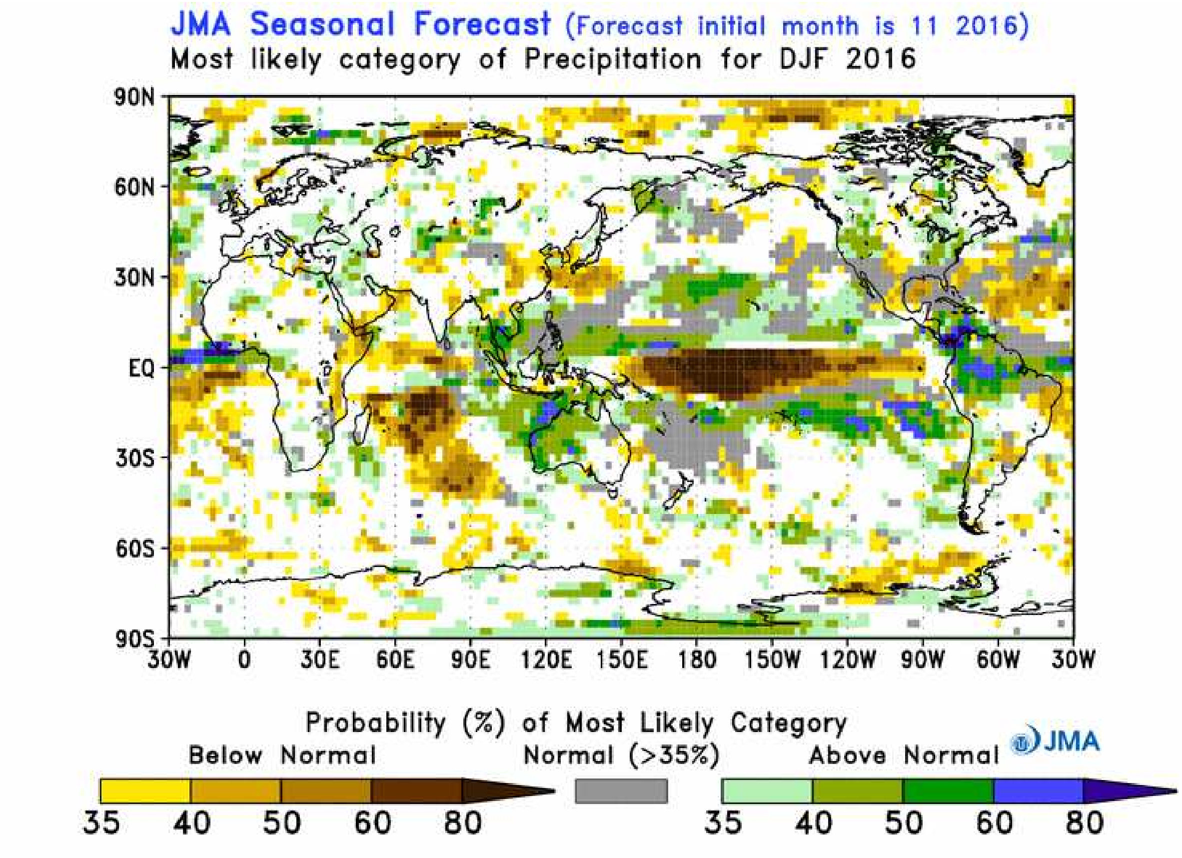


fig.II.4.5: Most likely category of Rainfall from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/4mE/fcst/fcst_gl.php

II.4.d EUROSIP

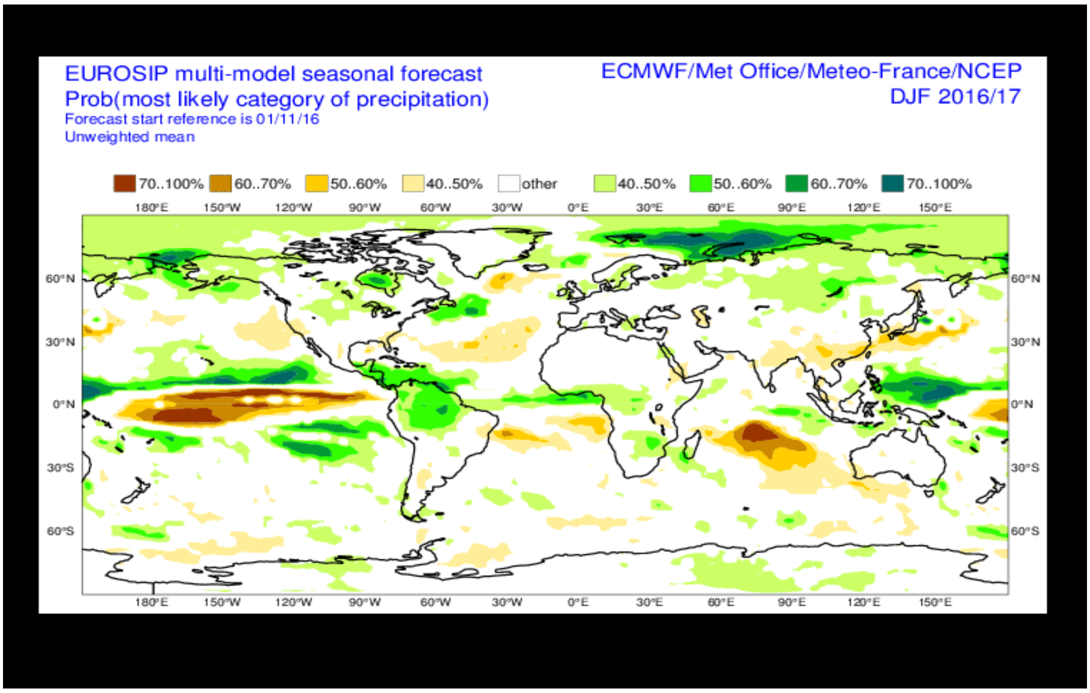
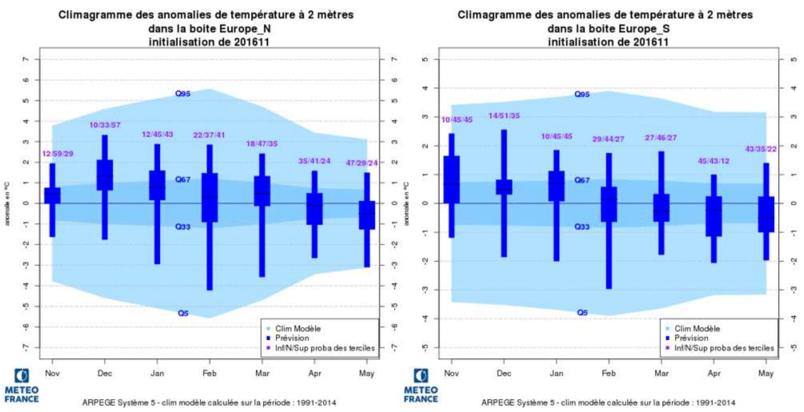


fig.II.4.7: Multi-Model Probabilistic forecasts for precipitation from EUROSIP (2 Categories, Below and Above normal – White zones correspond to No signal).

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

II.5. REGIONAL TEMPERATURES AND PRECIPITATIONS



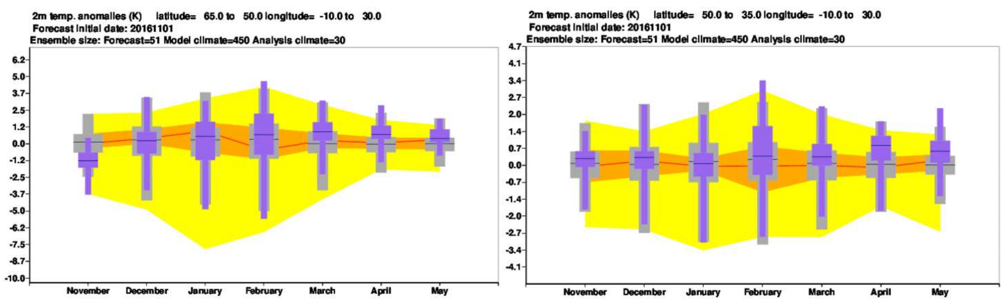


fig.II.5.1 : Climagrams for Temperature in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

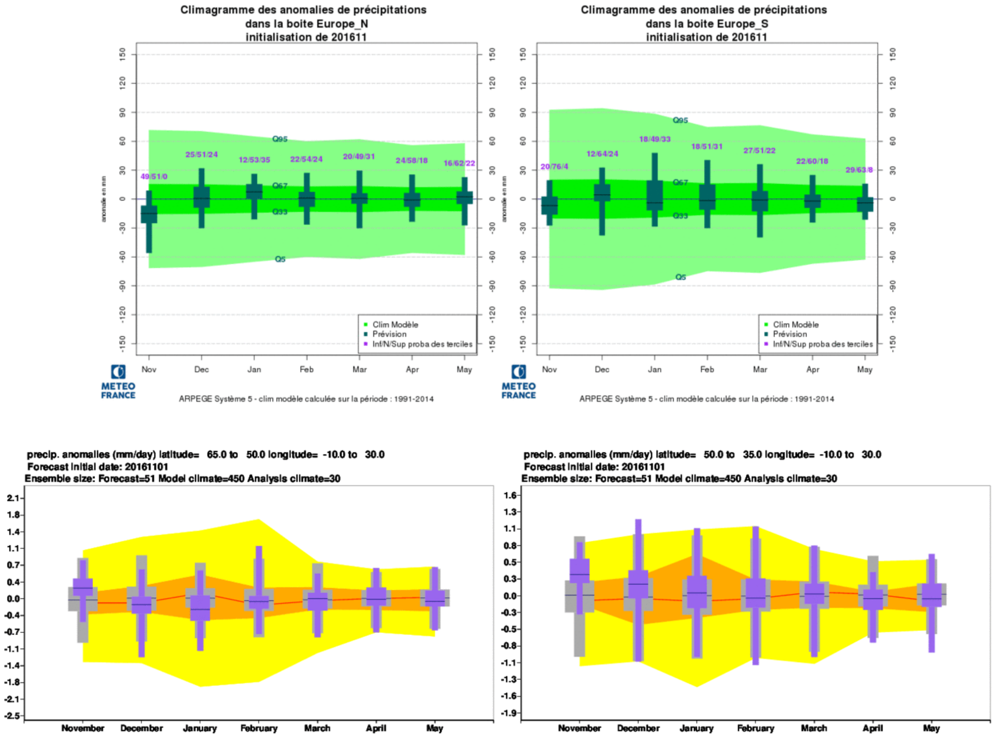
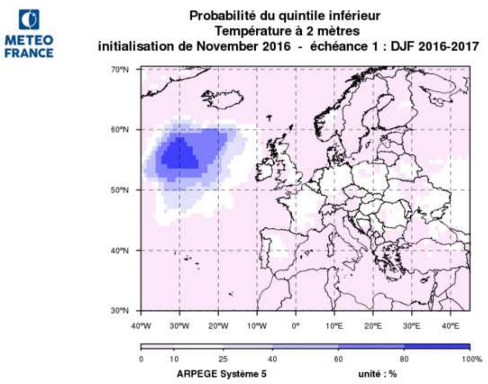


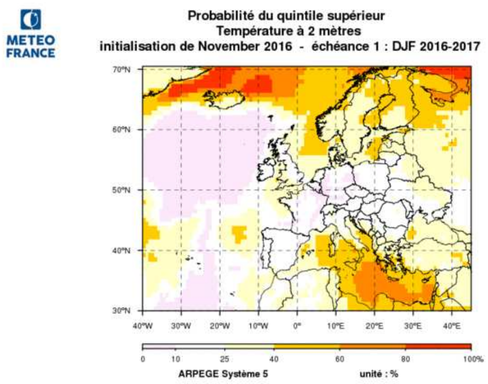
fig.II.5.2 : Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

II.6. MODEL'S CONSISTENCY

Not available

II.7. "EXTREME" SCENARIOS





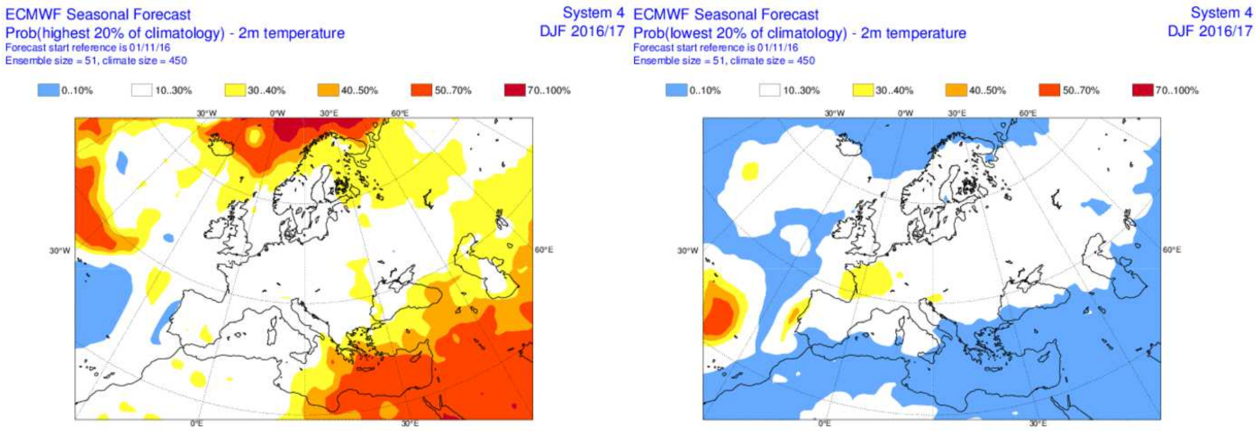


fig.II.7.1 : Top : Meteo-France T2m probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution). Bottom : ECMWF T2m probability of « extreme » below normal conditions (left - lowest ~20% of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

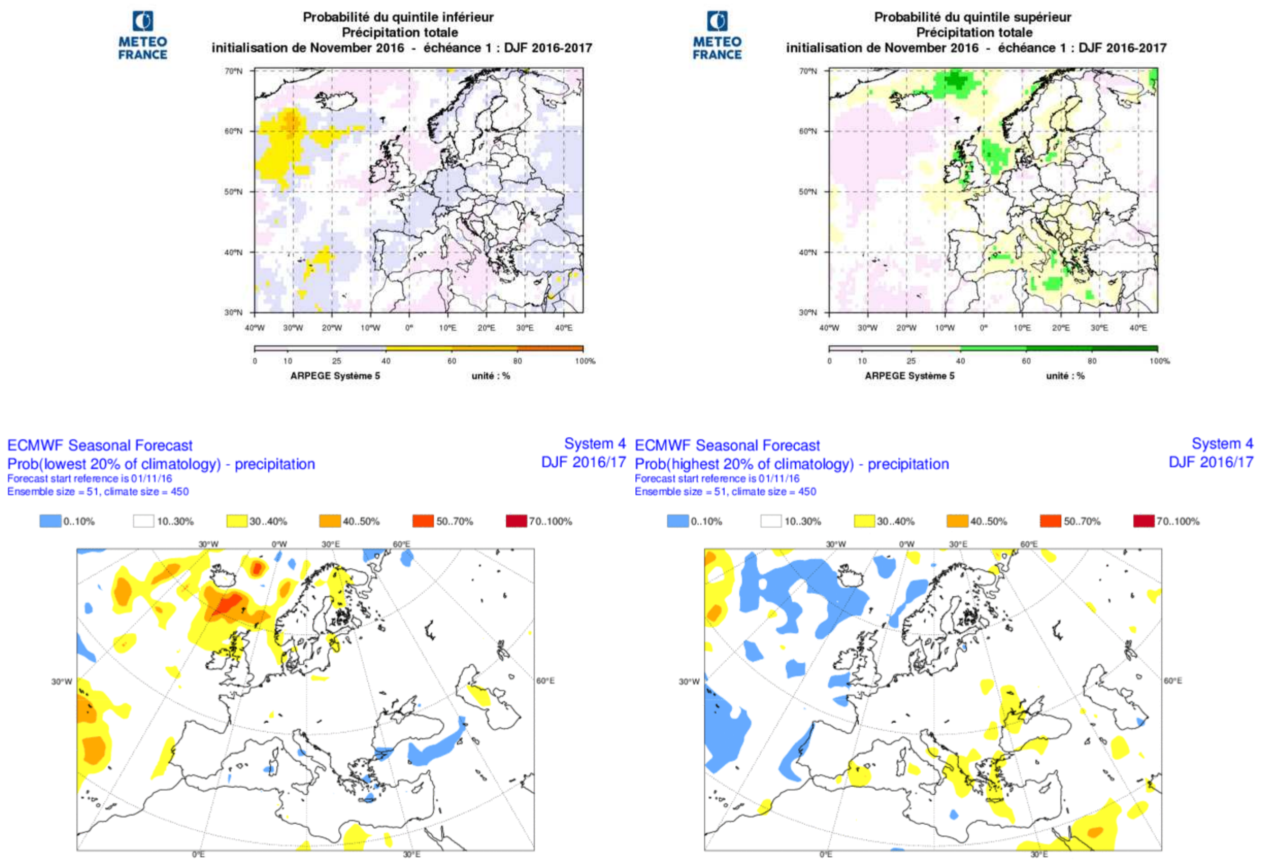
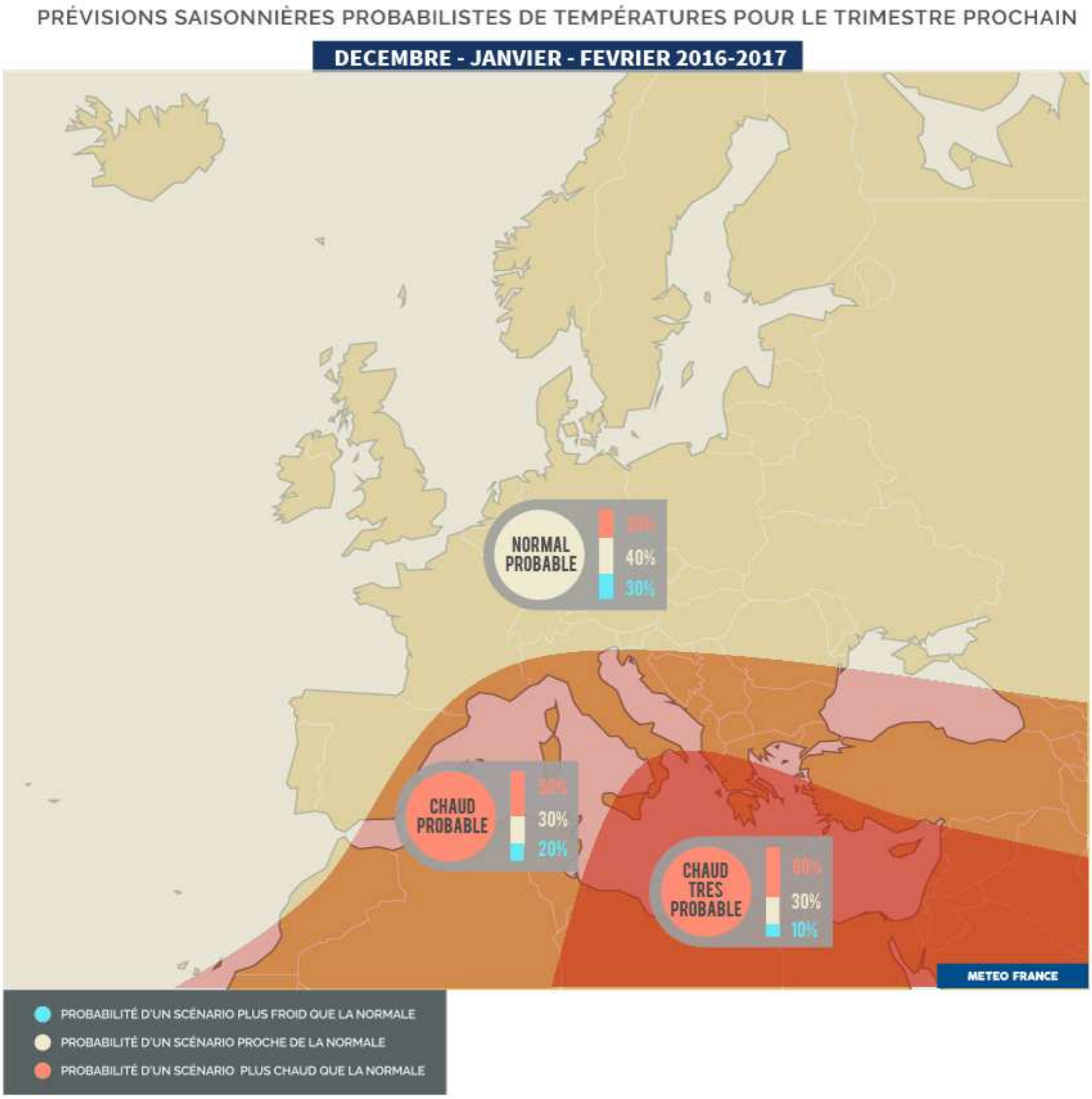


fig.II.7.2 : Top : Meteo-France rainfall probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution).
Bottom : ECMWF rainfall probability of « extreme » below normal conditions (left - lowest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

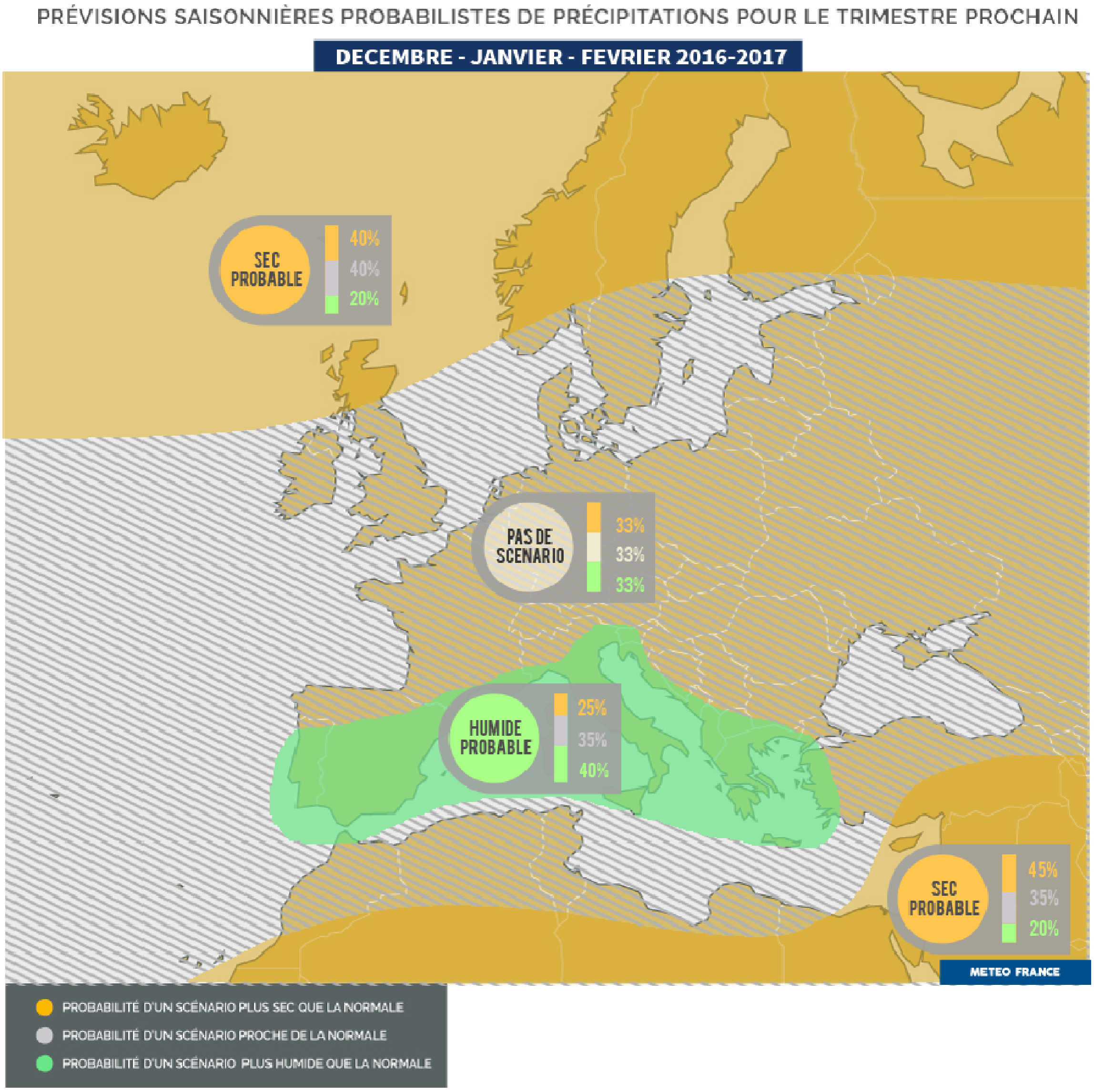
II.8. DISCUSSION AND SUMMARY

II.8.a Forecast over Europe

Temperatures: warmer than normal conditions likely for the Med. basin (especially in the Eastern part). Because of the high forecast spread, and taking into account other drivers (like Arctic Sea Ice extension or Snow extension in Siberia in October) that could lead to enhanced NAO- or Scandinavian Blocking regime occurrences, confidence in this "above scenario" is weak. These contradictory forcings lead to consider the "normal" sceanrio as the most probable, but with cautious (tercile probabilities : 30/40/30).



Precipitation: following the EA+ and SCAN+ circulation, enhanced probabilities of "above normal" over the Northern part of Medit. Basin. "Below normal" signal over Middle East.



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II.8.b Tropical cyclone activity

Slightly below normal activity over SW Indian Ocean, consistent with downward motion anomaly in VP200.

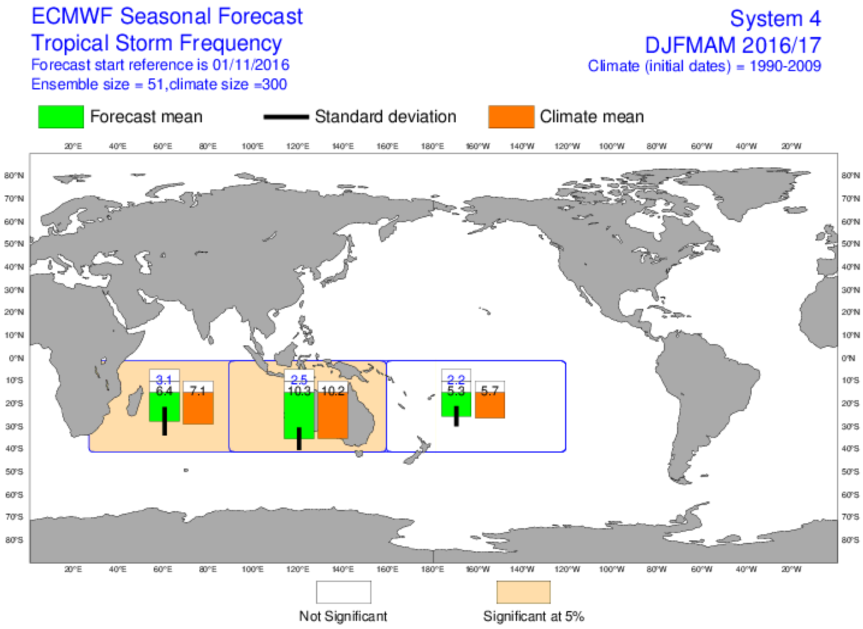


fig.II.8.1: Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF).

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.

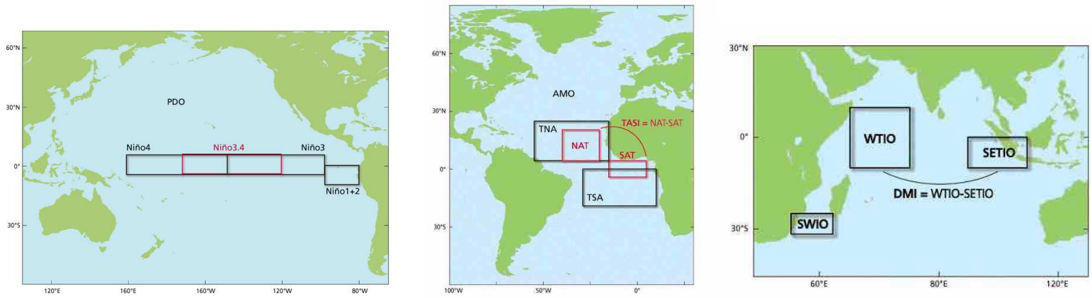
III.2. « NINO », SOI indices and Oceanic boxes

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).

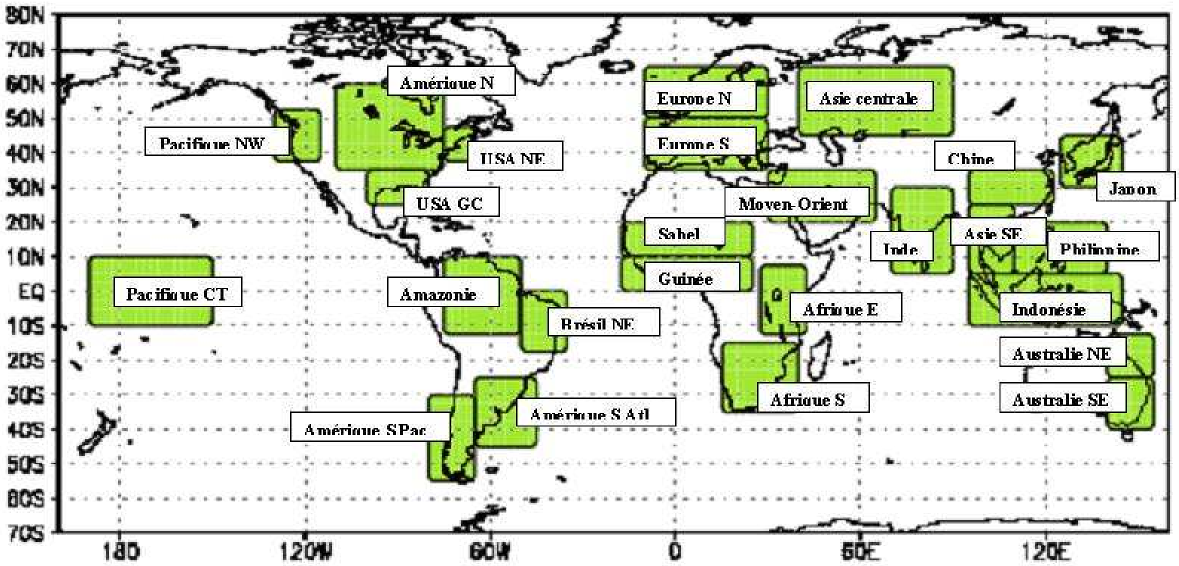
Associated to the oceanic « El Niño / La Niña » events, and taking into account the strong ocean/atmopshere coupling, the atmosphere shows also interanual variability associated to these events. It is monitored using the SOI (Southern Oscillation Index). This indice is calculated using standardized sea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