GLOBAL CLIMATE BULLETIN

n°215 – May 2017

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I. DESCRIPTION OF THE CLIMATE SYSTEM (March 2017)

I.1.Oceanic analysis

Over the Pacific ocean :

- No significant tendency over the equatorial rail during march, except ashore of North-Western Peru and South-Equator where strong positive SST and subsurface anomalies persisted (up to +4℃ above normal, see figure I.1. 1). These anomalies have been conductive for strong velocity potential anomalies which were associated with torrential rain over these regions. Nevertheless, these SST anomalies have been confined to the Niño 1+2 zone which means we are not in the presence of a new El Niño event. The Peruvian ENFEN service rather mentions a coastal event ("El Niño costero" see http://www.senamhi.gob.pe/load/file/02204SENA-75.pdf). Its intensity decreased however at the end of the month, following the strengthening of the Easter Island high (which enhaces trade winds and coastal upwelling). Towards the end of the month these positive started to decrease and this trend continued during the first half of April.
- Over Northern Pacific, sharp contrast between negative anomalies over mid-latitudes, and positive anomalies over the tropical area. This seems to be strongly related to the prevailing atmospheric circulation during march 2017 (see figure I.2.3) over the the Pacific basin. PDO index has been close to zero.

Over the Maritime Continent :

- slightly warmer than normal with no significant tendency since February

Over the Indian Ocean :

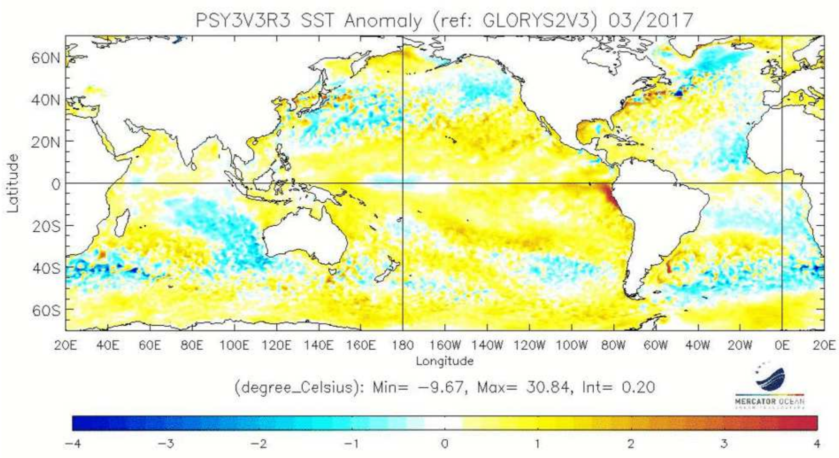
- In the southern part (south of 10S), strong contrast between east (cold) and west (warm). More to the north the DMI is still close to 0.

Over the Atlantic:

- The equatorial rail remains warmer than normal, without any clear tendency since February.
- cold SST anomalies persisted along the Mauritanian and Senegalian, but the cooling tendency has come to an end. Elsewhere over the North Atlantic : slight cooling to the west, but SST anomalies remain positive there. East half of the basin sligthly cooler than normal.

Over the Mediterranean:

- SSTs warmer than normal, following a warm trend due to atmospheric conditions.



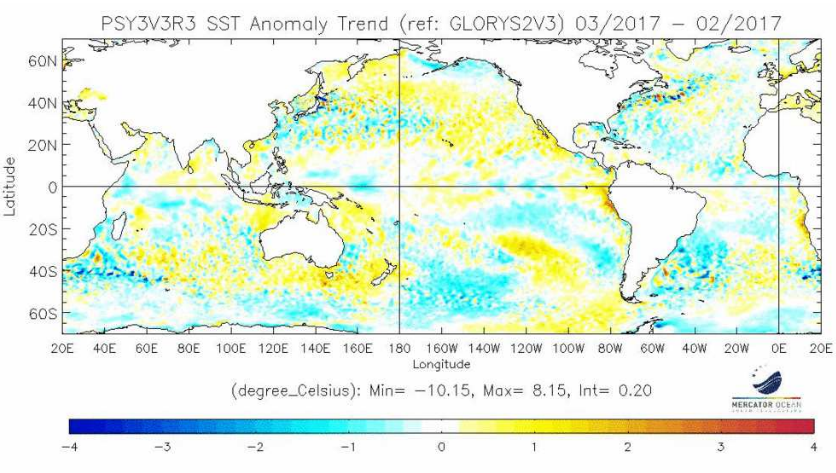


fig.I.1.1: top : SST Anomalies (℃) . Bottom : SST tendency (current – previous month), (reference Glorys 1992-2013).

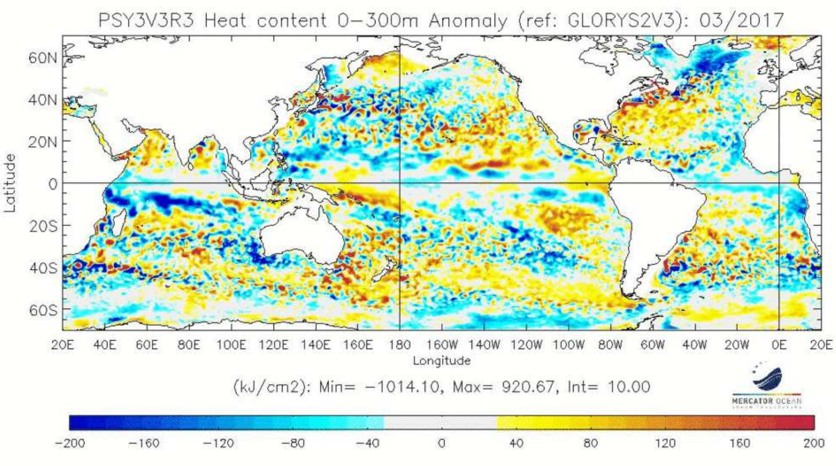


fig.I.1.2: map of Heat Content Anomalies (first 300m, kJ/cm2, reference Glorys 1992-2013)

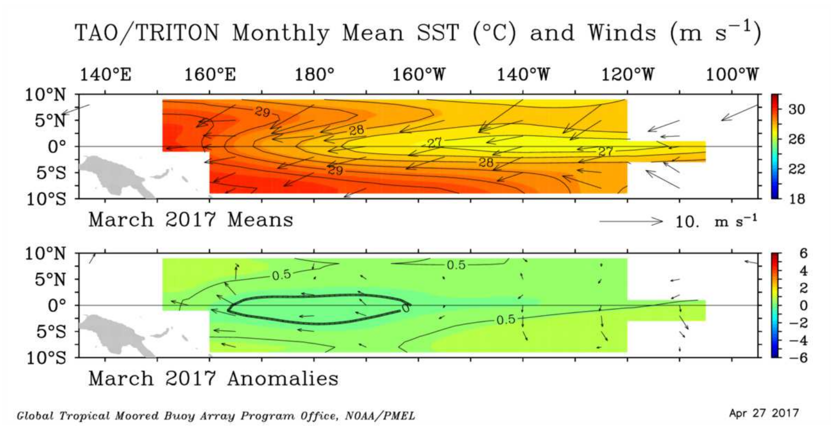


fig.I.1.3: SST Anomalies and Wind anomalies over the Equatorial Pacific from TAO/TRITON.http://www.pmel.noaa.gov /tao/drupal/assorted_plots/images/sst_wind_mon.png

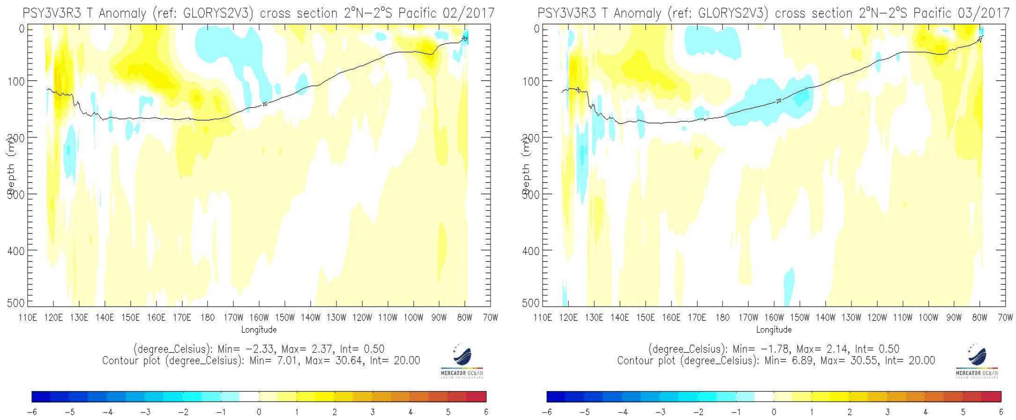


fig.I.1.4: Oceanic temperature anomaly in the first 500 meters in the Equatorial Pacific (previous and current month)

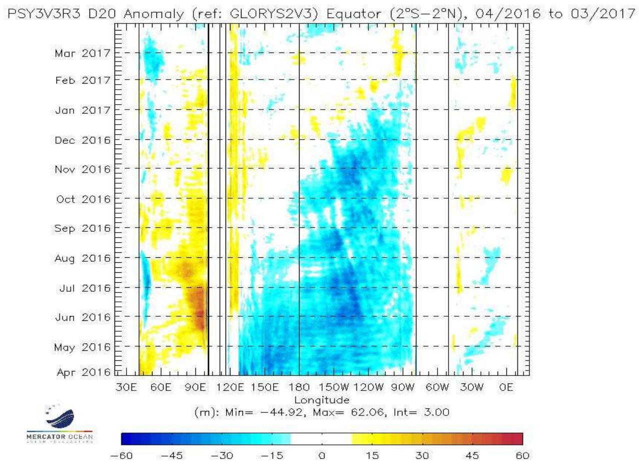


fig.I.1.5: Hovmüller diagram of Thermocline Depth Anomalies (m) (depth of the 20℃ isotherm) along the equator for all oceanic basins over a 6 month period

Sea surface temperature near Europe :

Arctic Sea (north of Iceland), North Sea and Baltic Sea still warmer than normal, no significant change compared to February. Northern Baltic Sea still frozen.

The cold blob south of Greenland/Iceland, too, did not change.

Near the Golf of Biscay and Iberia, SST were around normal, again no significant change.

The Mediterranean and the Black Sea were warmer than normal. Anomalies increased slightly, mainly due to atmospheric warming.

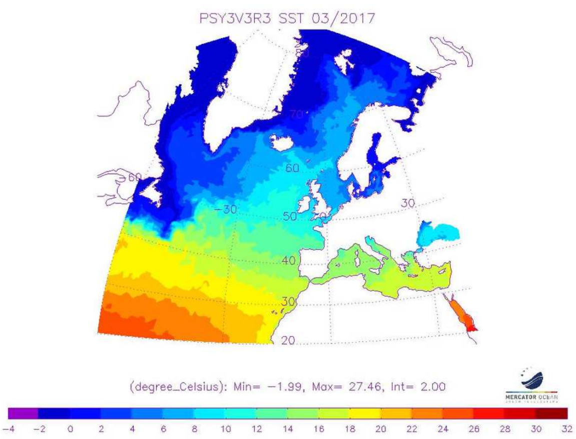


fig.I.1.6 : Mean sea surface temperature in the RA VI Region (Europe) and anomaly (reference Glorys 1992-2013).

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) :

A strong positive anomaly has emerged in March over the Maritime Continent and over Australia. The MJO activity partly explain this anomaly but its weak intensity (see figure I.2.1.b) does not match with the strong velocity signal. Besides, the DMI has been close to zero. The strong positive anomaly that extended from Amazon to Africa in February has notably retracted over north-western Latin America (cf heavy rainfall over these regions in March). Negative anomalies have developed over Africa, the western Indian Ocean basin and over tropical Atlantic.

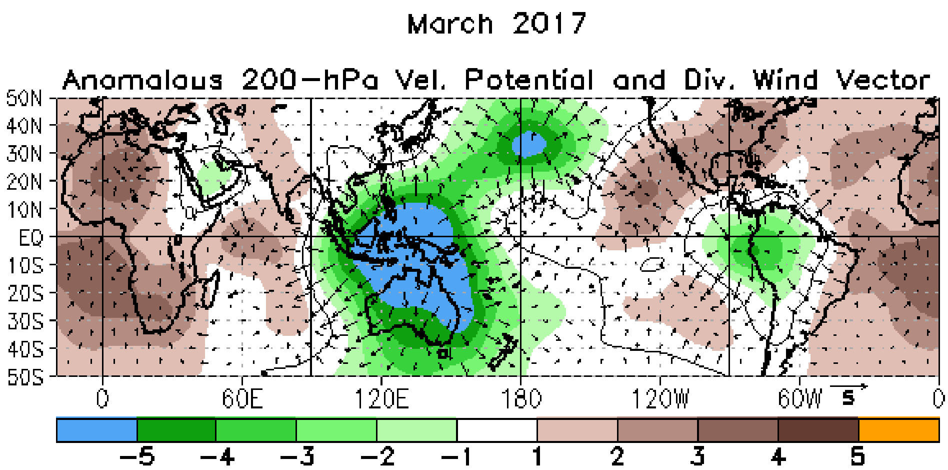


fig.I.2.1.a: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly). http://www.cpc.ncep.noaa.gov/products /CDB/Tropics/figt24.shtml

SOI :

Slightly positive in March, consistent with a neutral phase of ENSO (+5.1 in standardized form ; see the Bureau Of Meteorology bulletin)

MJO (fig. I.2.1.b)

The enhanced activity of the MJO in February, has sharply decreased in March (see below) while moving towards the Maritime Continent. This is not very consistent with the strong positive vertical velocities observed during March. MJO might not be the only predictor for this configuration (see § I.2.b)

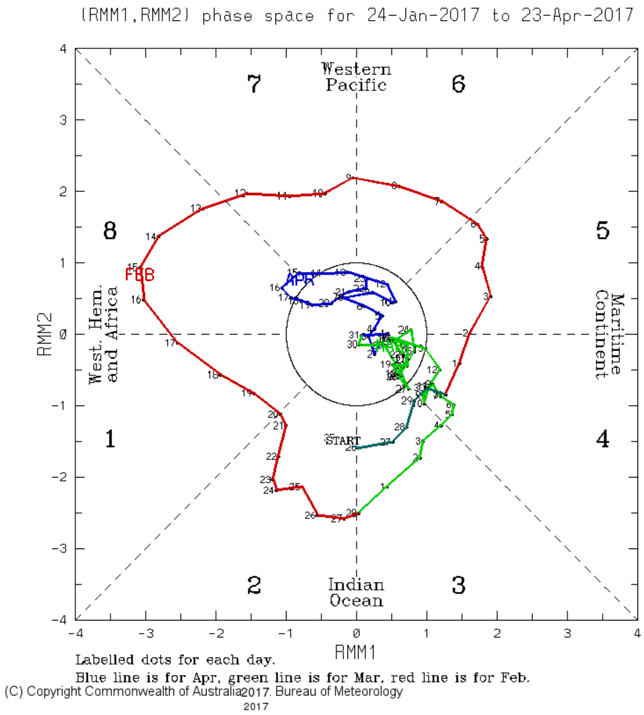


fig.I.2.1.b: indices MJO http://www.bom.gov.au/climate/mjo/

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

Over the Pacific, anticyclonic anomaly extending from Philippines to the Rocky Mountains, and cyclonic anomaly more to the North. Zonal flow enhanced, in connection with the strong SST anomalies gradients (figure I.1.1).

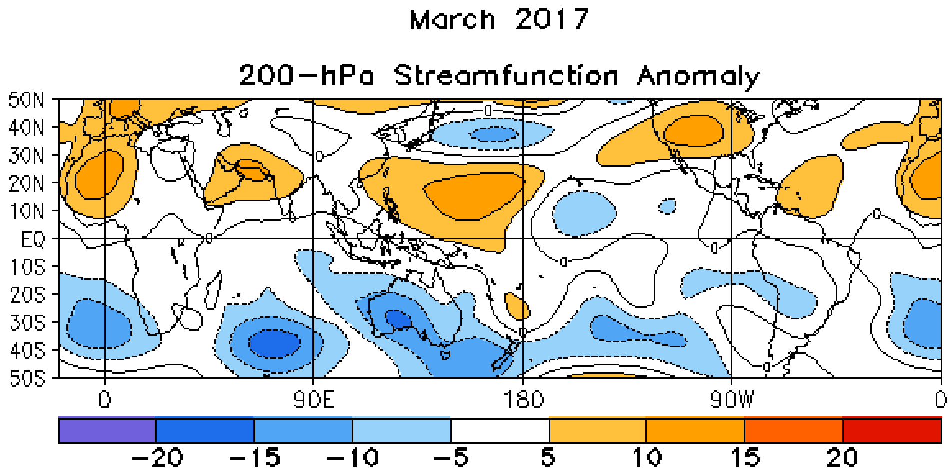


fig.I.2.2: Stream Function Anomalies at 200 hPa. http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml

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

"West Pacific" has been the most active mode in the northern hemisphere in March, with strong positive anomalies over Siberia towards Alaska, and negative anomalies extending from eastern China to Japan and central Pacific. This pattern influenced temperature and precipitation over Russia and western United States during March 2017 (see below). For Europe and the northern Atlantic Ocean, there was no dominant flow or weather regime, although extremely mild conditions prevailed.

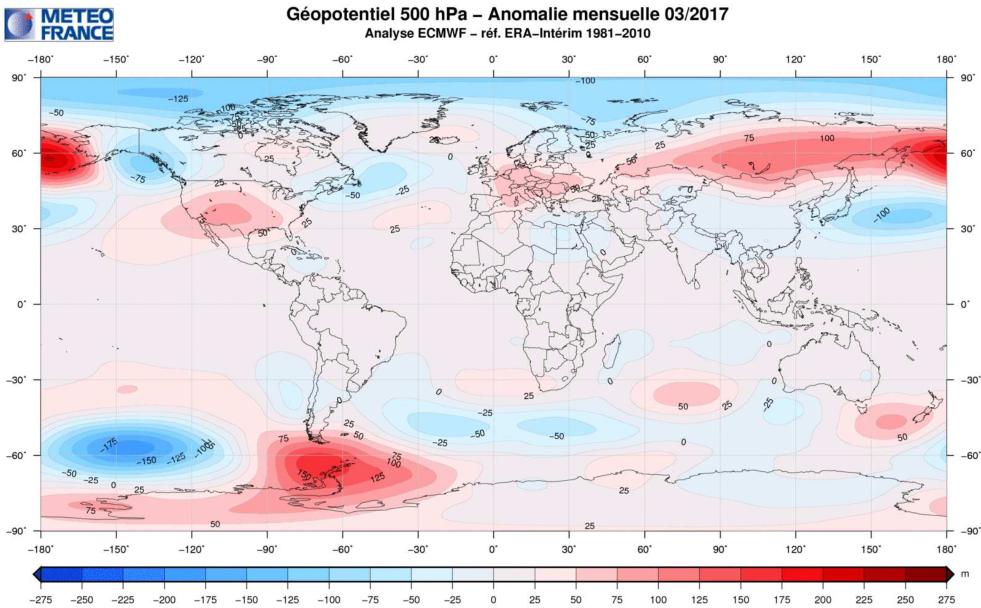


fig.I.2.3: Anomalies of Geopotential height at 500hPa (Meteo-France)

MONTH	NAO	EA	WP	EP-NP	PNA	TNH	EATL/WRUS	SCAND	POLEUR
MAR 17	0.4	1.0	-2.1	-1.0	-0.0	---	-1.0	-1.0	0.7
FEB 17	0.7	0.6	-0.1	0.2	-0.1	-0.1	1.1	0.7	-0.4
JAN 17	0.1	-1.2	0.6	0.4	-0.3	-0.3	0.6	0.2	1.0
DEC 16	0.4	0.9	1.0	---	-0.7	0.9	1.5	-1.2	-1.1
NOV 16	-0.3	-0.4	1.0	-1.4	1.4	---	-0.9	-0.1	-2.8
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 10 months :
http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/table3.shtml

Sea level pressure and circulation types over Europe

Both the Icelandic Low and the Azores High were slightly more intense than normal resulting in a stronger-than-normal zonal flow over the North Atlantic and positive indices of NAO (+0.4) and EA (+1.0). This flow had a southwesterly component over the eastern North Atlantic, which is rather typical for EA. Much of cyclonic activity was concentrated on northern parts of Europe, whereas Central and Southern Europe were anticyclonic on average. However, while the mean SLP distribution rather looks like a NAO+ pattern, the most frequent circulation type was Scandinavian blocking (13 days) compared to 8 days with NAO+. Nevertheless, cyclonic disturbances over Scandinavia were sufficient for a switch of the SCAND pattern to a negative phase (-1.0), while the polar vortex strengthened (POLEUR switched to positive phase to +0.7, AO also positive and intensified to +1.4). Other weather types also occurred, even NAO-situations. March 2017 therefore was a quite changeable month in terms of weather types. According to

Hess/Brezowsky weather type classification, around half of the days were anticyclonic for Central Europe, the other half were either westerly cyclonic types or trough over Western or Central Europe. Since anticyclonic conditions were also strong over Russia, an intense negative EATL/WRUS pattern (-1.0) was still established, persistent from previous month and with high blocking potential.

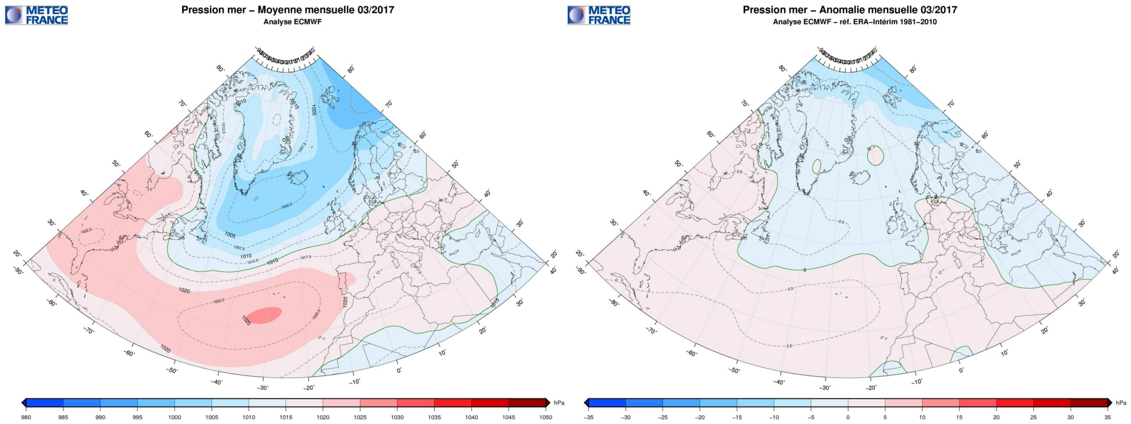


fig.I.2.4: Mean sea level pressure in the RA VI Region (Europe) (top) and 1981-2010 anomalies (bottom).

Circulation indices: NAO and AO

NAO had a clear positive phase during more than two weeks in the middle of the month with a peak around 17-18 March, then gradually weakening. This was just the time when a strong, but short cyclonic westerly phase was established over Central Europe. AO had a peak of positive phase a few days earlier, but the same gradual decrease afterwards like NAO. This shows that this circulation change (and maybe others too) were initiated on a hemispheric scale.

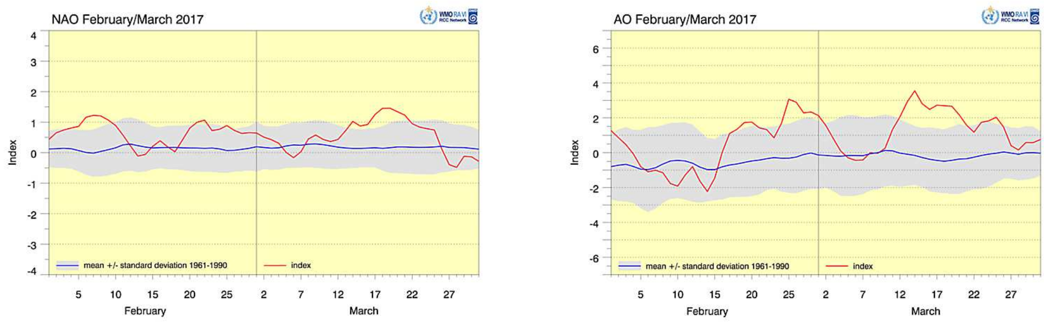


fig.I.2.5: North Atlantic Oscillation (NAO, left) and Arctic Oscillation (AO, right) indices with 1961-1990 mean standard deviation (shading). http://www.dwd.de/rcc-cm , data from NOAA CPC: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml

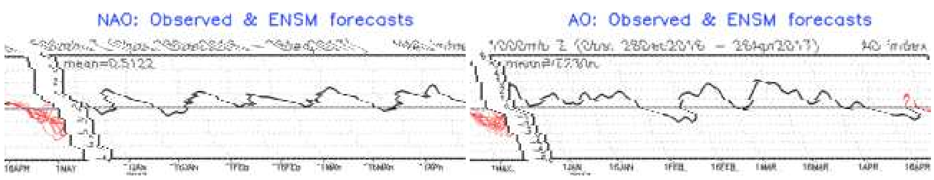


fig. I.2.5a: North Atlantic Oscillation (NAO, left) and Arctic Oscillation (AO, right) indices for the last 4 months and forecasts for the following weeks. Source: NOAA CPC, http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml

I.2.b Precipitation

In connection with the velocity potential anomalies mentioned above, the Maritime continent received above-normal precipitation during March, which could be explained by the remnants of the moderate La Niña event of the end of 2016; combined with a slight MJO activity. As already mentioned, torrential rain drenched the north-western coast of Peru as well as some coastal areas of Equator. Another strong positive anomaly is found over the western coast of the USA (northern California towards the Canadian border) consistent with the enhanced "atmospheric river" -zonal flow) that has been prevailing for the whole winter over the northern Pacific Basin (record rainfall last winter over California after several years of severe drought). Dry across Amazon; wet over the western Indian Ocean basin, bringing some relief to the severe drought there as well.

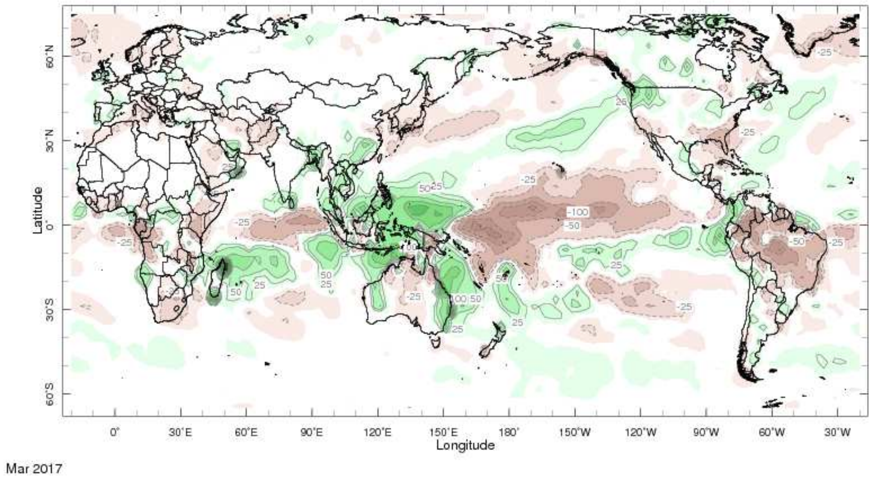


fig.I.2.6: Rainfall Anomalies (mm) (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall. http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/Anomaly.html

Precipitation anomalies in Europe:

Precipitation anomalies over Europe look very patchy this month, which was the result of impact from many different weather types. Many areas, particularly in Central Europe, Scandinavia and Russia had near-normal precipitation because impacts of different weather types compensated each other. For the remaining anomalies, some regional impact of patterns can be identified, e.g. wet areas over northwestern Europe and dry areas over Italy / central Mediterranean due to NAO+, dry areas over Greenland/Iceland due to NAO-, wet areas over parts of western Europe due to trough over western Europe and Scandinavian Blocking. A few local drought areas were to be found, such as in Italy / northwest Balkans and in the eastern Ukraine.

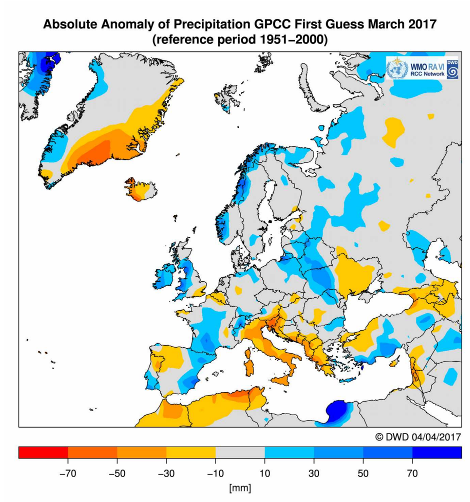


fig.I.2.7.a : Absolute anomaly (1951-2000 reference) of precipitation in the RA VI Region (Europe), data from GPCC (Global Precipitation Climatology Centre), http://www.dwd.de/rcc-cm.

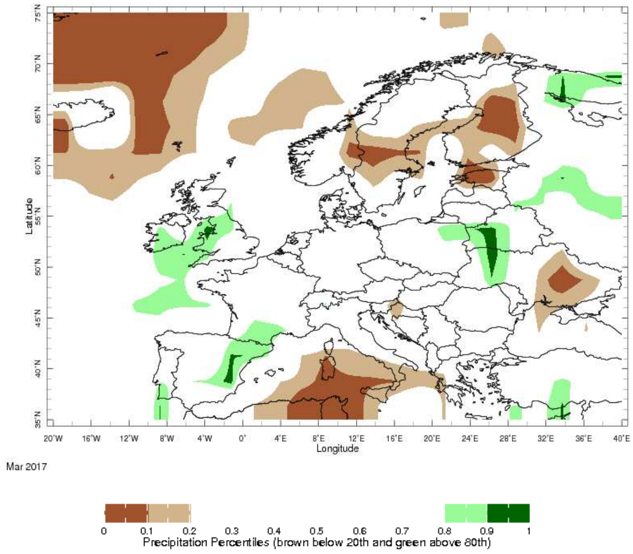


fig.I.2.7.b : Percentiles of precipitation, 1981-2010 reference. Data from NOAA Climate Prediction Center, http://iridl.ldeo.columbia.edu/maproom/Global/Precipitation/Percentiles.html

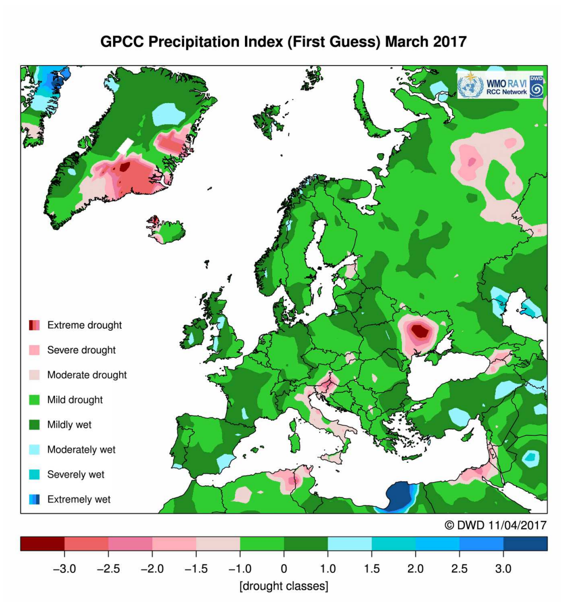


fig. I.2.8: GPCC Precipitation Index, http://www.dwd.de/rcc-cm .

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	+ 7.6 mm	- 0.027

Southern Europe	- 6.8 mm	- 0.249

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

A very warm month worldwide (2nd warmest after the "El Niño fueled" March 2016, according to NOAA). Very strong positive departures from normal over Eurasia, with several European countries recording their warmest March on record. Anomalies up to 15℃ for mean temperatures were recorded over northern Siberia !! Only Alaska and western Canada have recorded significantly colder than normal conditions during this month, in connection with the negative "West Pacific" mode.

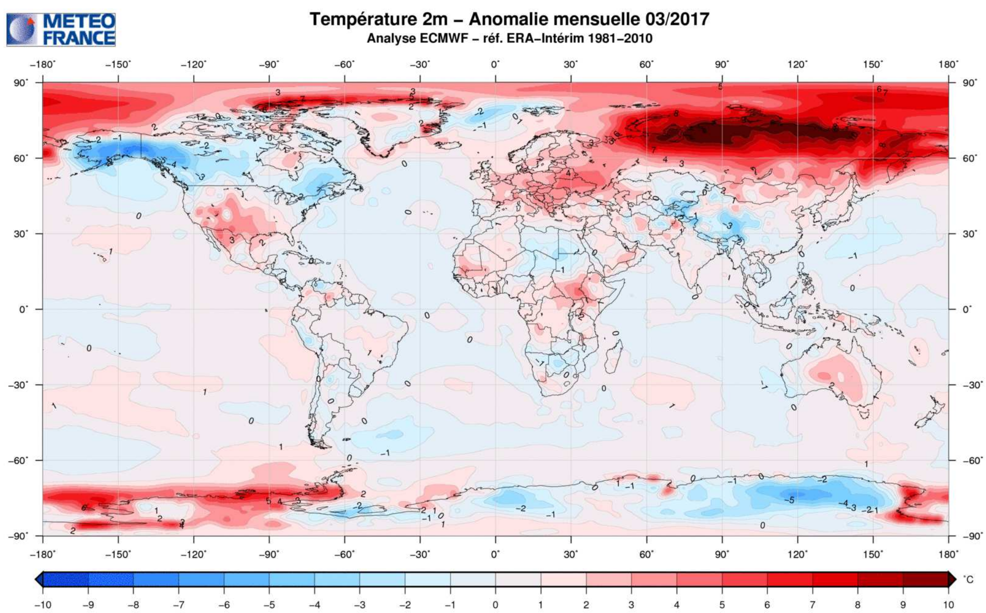


fig.I.2.9: Temperature Anomalies (℃) (Meteo-France)

Temperature anomalies in Europe:

Europe, too, had a very warm month of March, especially in the east, whereas colder anomalies were to be found over the North Atlantic and westernmost parts of Europe. Warmest days (and highest anomalies) were at the end of the month (30/31 March), when very warm subtropical air moved east of a North Atlantic trough to Europe, so this circulation type had probably the largest contribution to the warmth. But also the westerly types brought some warm air advection, and the high pressure situations caused especially high daily maximum temperatures for that season. Parts of Scandinavia and the Mediterranean region had near-normal temperatures due to compensation of different weather types.

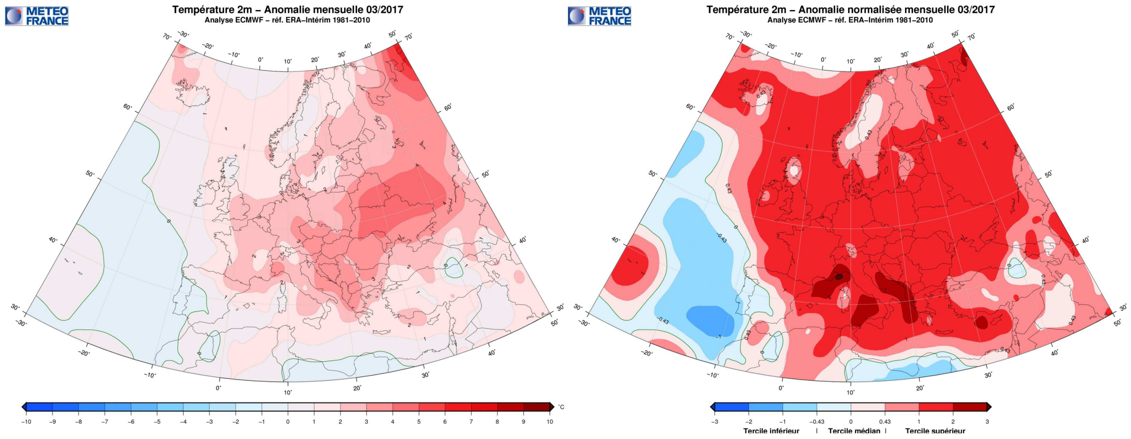


fig.I.2.10: Left graph: Absolute anomaly of temperature in the RA VI Region (Europe). Right graph: Standardized temperature anomalies

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	+ 2.7 ℃
Southern Europe	+ 2.4 ℃

I.2.d Sea ice

Record levels of low sea ice extent continue to be recorded in both the Arctic and the Antarctic.

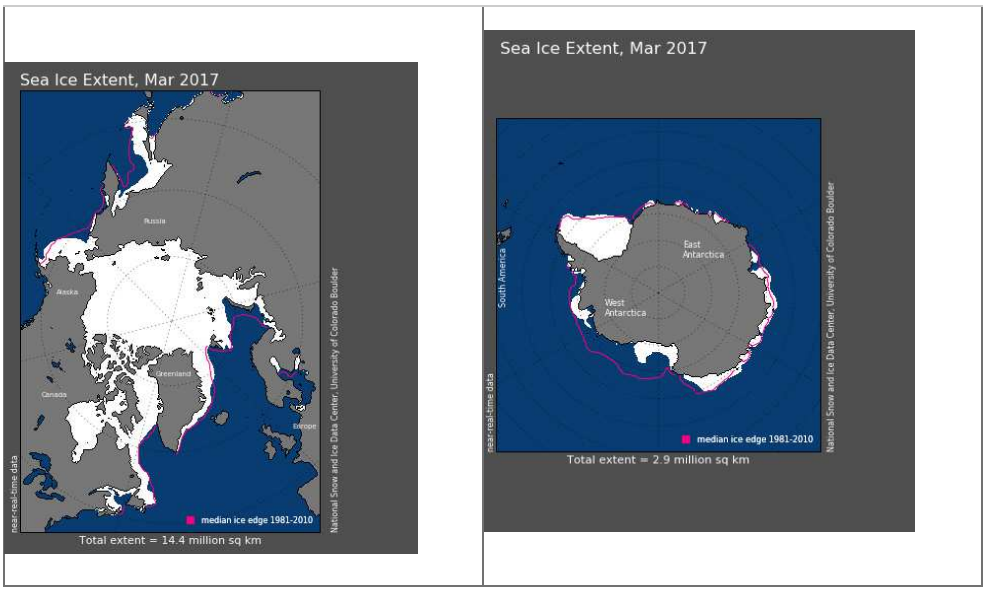


fig.I.2.11: Sea-Ice extension in Arctic (left), and in Antarctic (right). The pink line indicates the averaged extension (for the 1979-2000 period). http://nsidc.org/data/seaice_index/

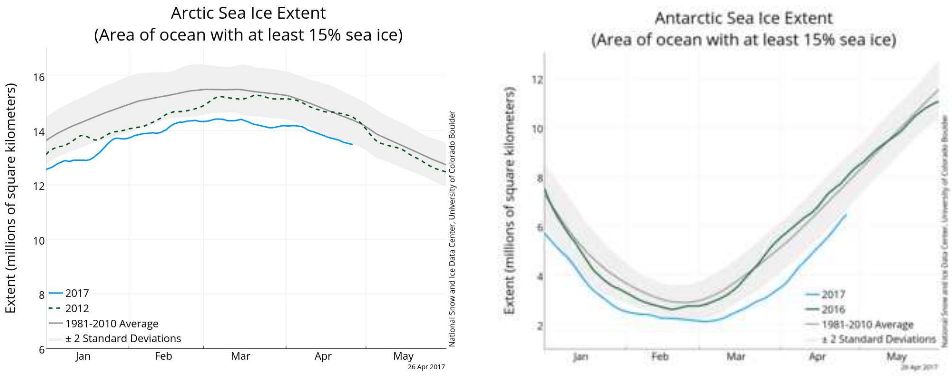
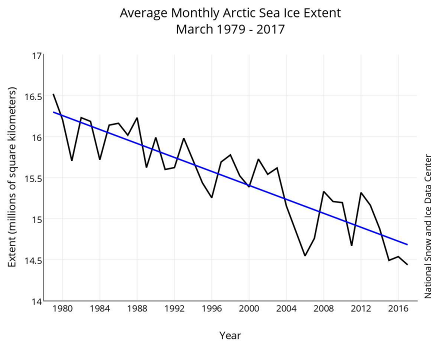


fig. I.2.12 : Sea-Ice extension evolution from NSIDC. https://nsidc.org/data/seaice_index/images/daily_images /N_stddev_timeseries.png



II. SEASONAL FORECAST FROM DYNAMICAL MODELS

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 warmer than normal conditions for the tropical Pacific as a whole, especially along the equatorial trail, except for the strong anomalies offshore the western coast of Peru (coastal El Niño) which are forecast to decrease (which is already the case in April). Models predict the continuation of the strong meridional SST gradient in northern Pacific around 25/30°N from south of Japan to the western coast of the USA, which could account for an enhanced storm track there.
- Indian Ocean: models forecast the switch toward a positive IOD (figure II.1.7), with warmer SSTs over the western basin and cooler SSTs over the Maritime Continent. Cold anomalies should persist off the western Australia coast, while warm anomalies would remain over from Mozambique to Madagascar.
- Atlantic Ocean:
  - Over North Atlantic, persistence of the "cold blob" negative anomaly. The models still predict a fairly strong positive anomaly from the Gulf of Mexico to Bermuda and Newfoundland, that extends itself up to the Azores.
  - Most of the models stand for a neutral intertropical band, except for the area off the coasts of Mauritania, Senegal, and Guinea were negative anomalies should persist. There is no agreement regarding the gulf of Guinea with the european and UK models predicting warm anomalies, which do not appear with the other Eurosip models.
- Mediterranean Sea : Except for ARPEGE, the majority of the models predict warmer than normal SSTs over the whole basin.

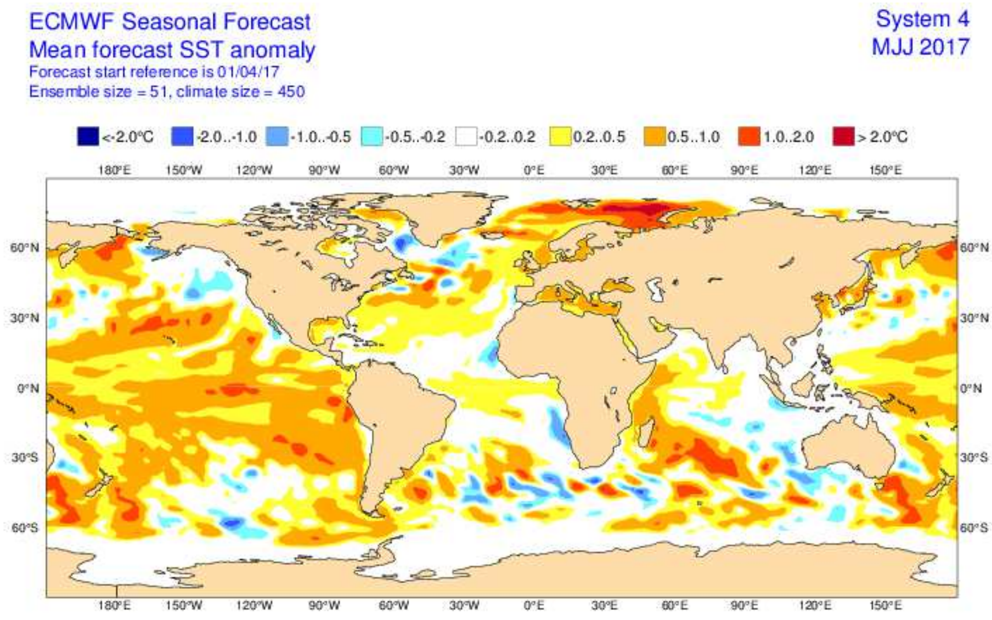


fig.II.1.1: SST anomaly forecast from ECMWF http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast /seasonal_range_forecast/group/

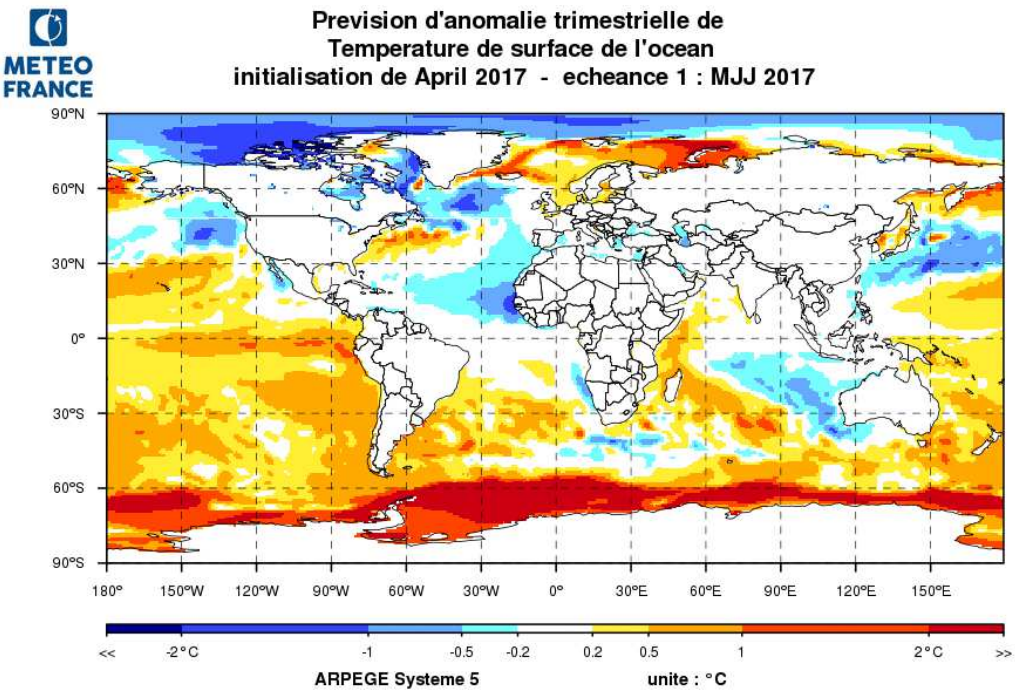


fig.II.1.2: SST Anomaly forecast from Meteo-France (recalibrated with respect of observation). http://seasonal.meteo.fr

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

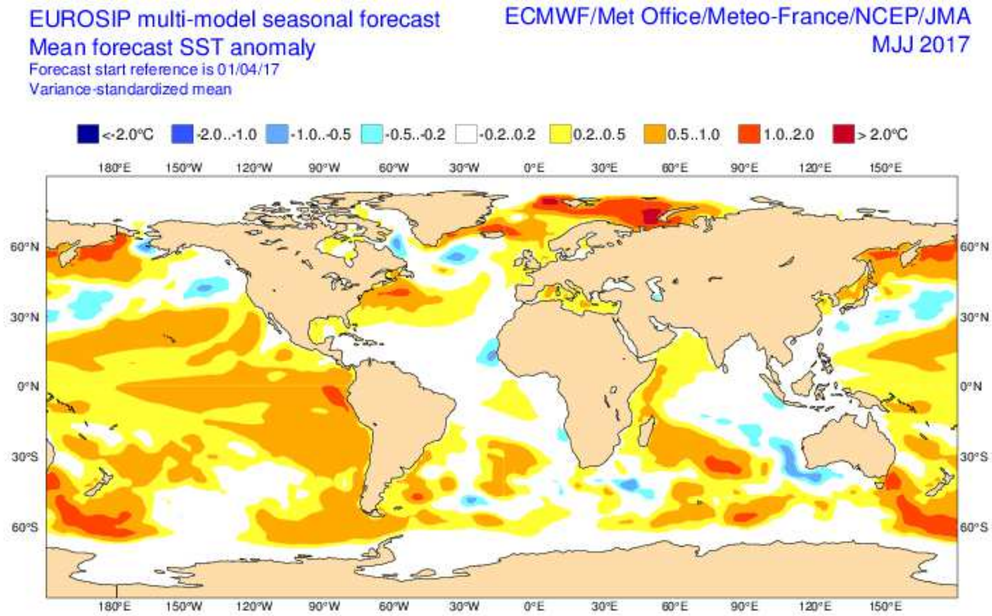


fig.II.1.4: SST Forecasted anomaly from Euro-SIP

II.1.b ENSO forecast :

Forecast Phase: Neutral evolving towards (weak) Niño?

In Niño boxes, SST anomalies will grow during the next three months but should remain within the neutral range. In late July though, El Niño threshold (+0.5℃) could be re ached in the Niño 3.4 box according to the Eurosip panel (see below). But as you may notice from this graph the uncertainty rapidly grows in this box after the month of June which is known to be a traditional "predictability barrier" of the tropical Pacific SSTs. WMO stands for a 55/60 % chance of a renewed (weak) El Niño during the second half of 2017, the second most likely scenario being the persistence of neutral conditions. The return of a La Niña is now highly unlikely, and the "coastal El Niño" should completely disappear during the month of may.

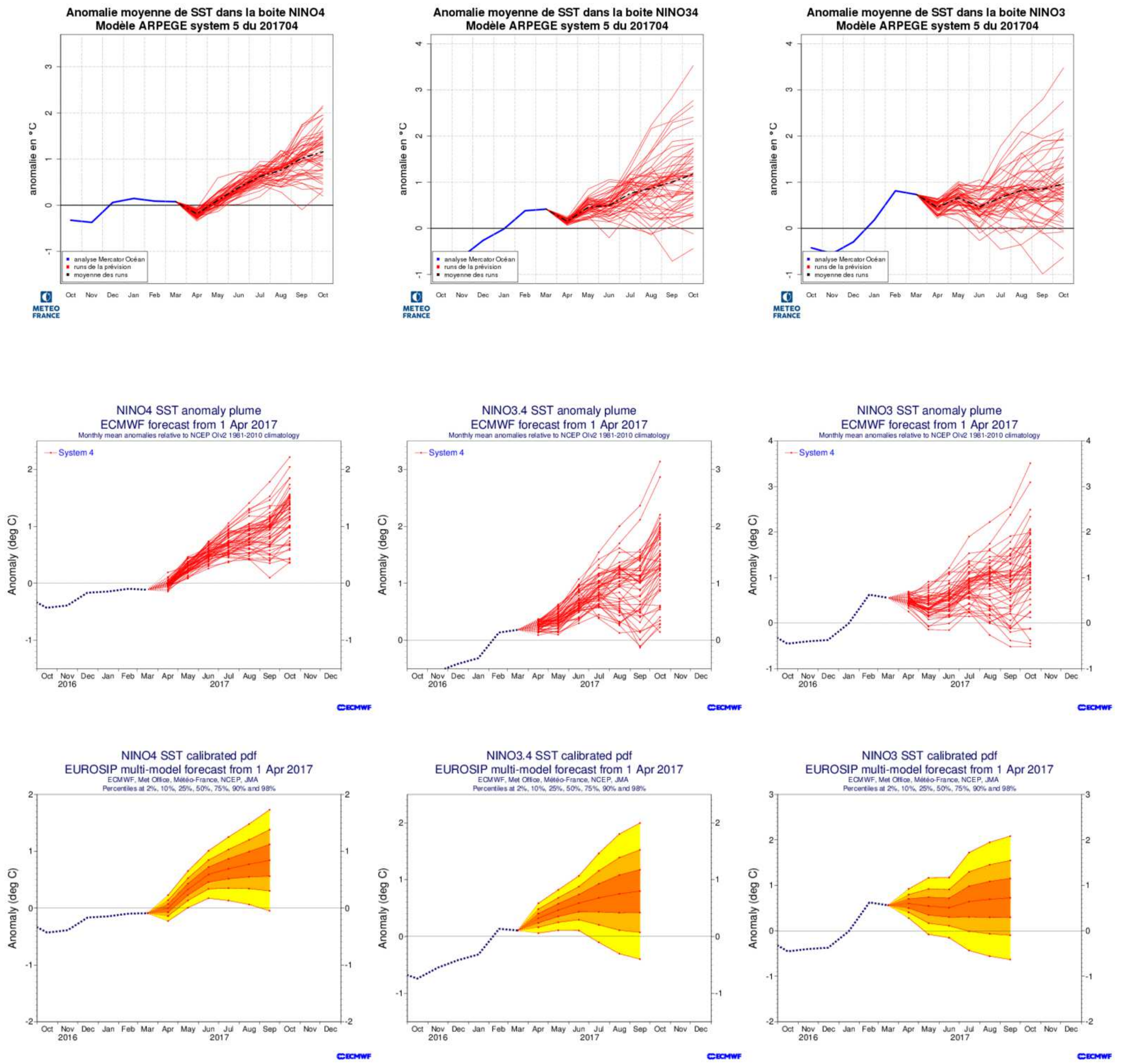
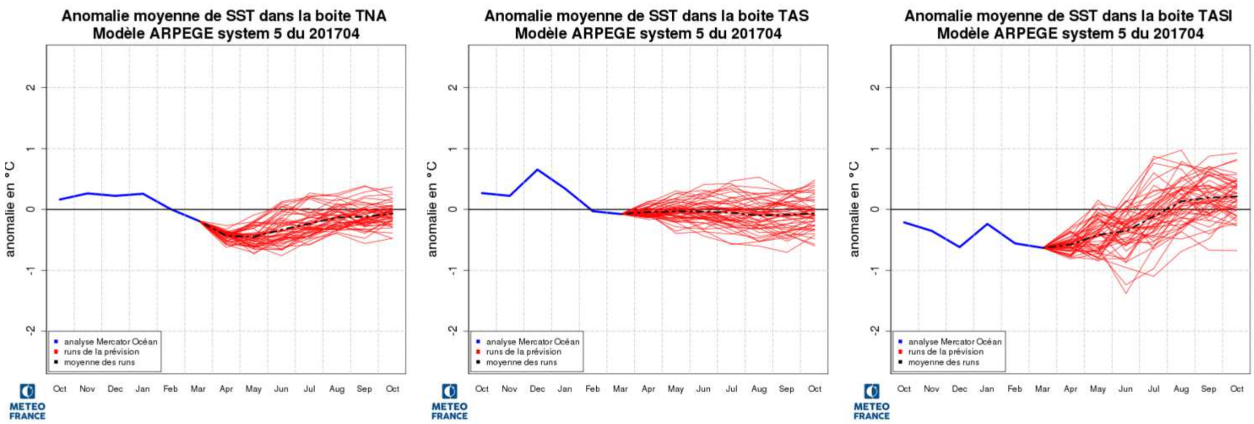


fig.II.1.5: SST anomaly forecasts in the Niño boxes from Météo-France (top) and ECMWF (middle) - monthly mean for individual members - and EUROSIP (bottom) – recalibrated distributions - (http://seasonal.meteo.fr , http://www.ecmwf.int/)

<u>I.1.c Atlantic ocean forecasts</u>



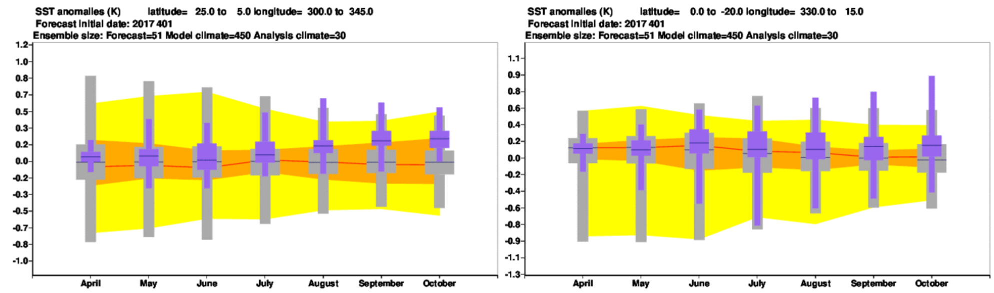


fig.II.1.6: SSTs anomaly forecasts in the Atlantic Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

I.1.d Indian ocean forecasts

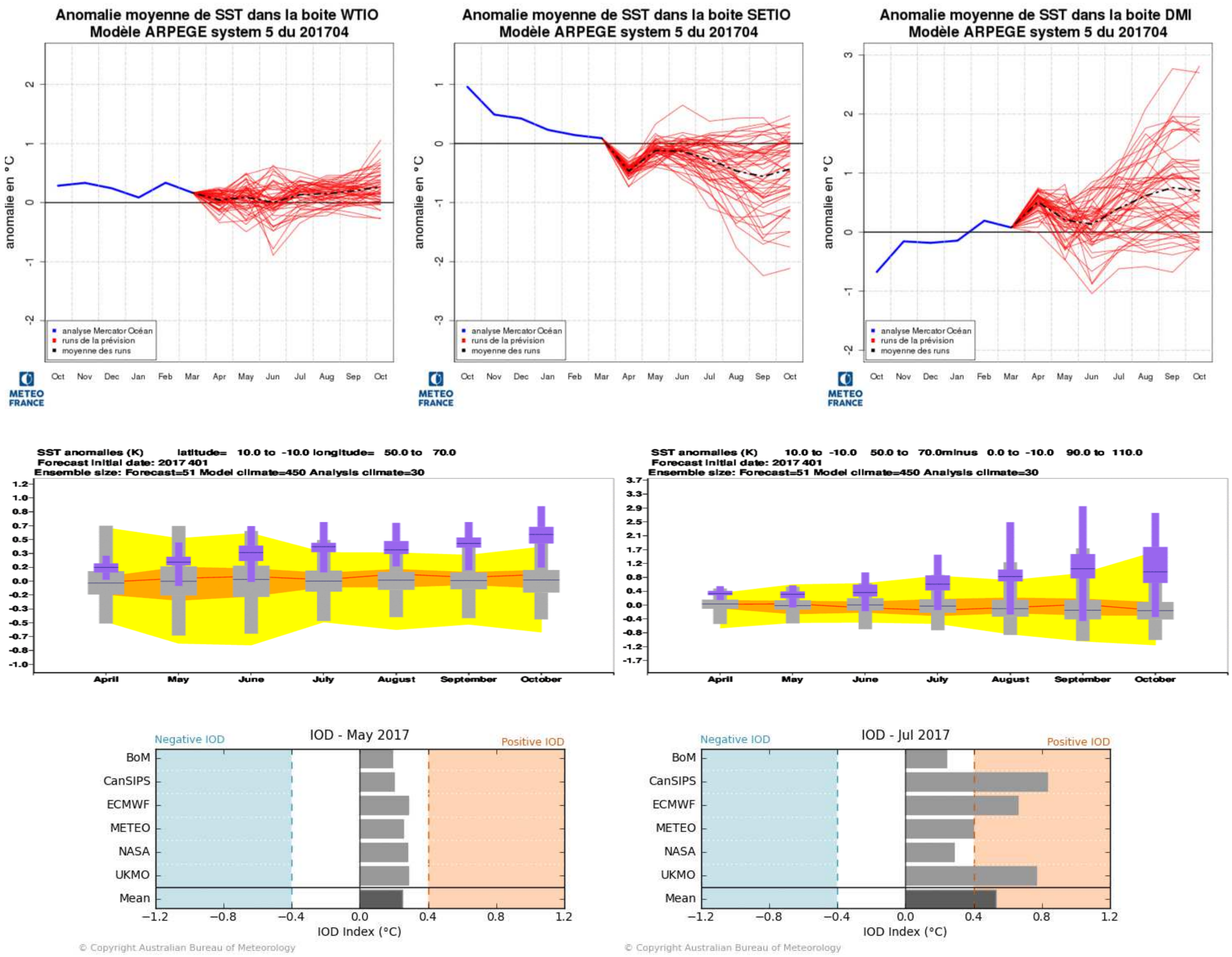


fig.II.1.7: SST anomaly forecasts in the Indian Ocean boxes from Météo-France and ECMWF, plumes / climagrams correspond to ensemble members and monthly means.

II.2. GENERAL CIRCULATION FORECAST

II.2.a Velocity potential anomaly field and Stream Function anomaly field

- Velocity potential : good agreement between models regarding the patterns of velocity anomalies while the intensity of the signals may vary from one model to another : large subsidence anomaly forecast over the Indian Ocean (particularly over the south-eastern part, off the coast of Australia where colder than normal SSTs are forecast), and even larger ascending anomaly forecast over the Pacific Ocean, extending towards Latin America, western USA and east of the Maritime continent. A smaller area of subsidence is forecast to the west of Senegal / Guinea (consistent with forecast SSTs cold anomalies).

- Stream Function : Rather good pattern consistency but few teleconnections with mid-latitudes, which is often the case during NH summer.

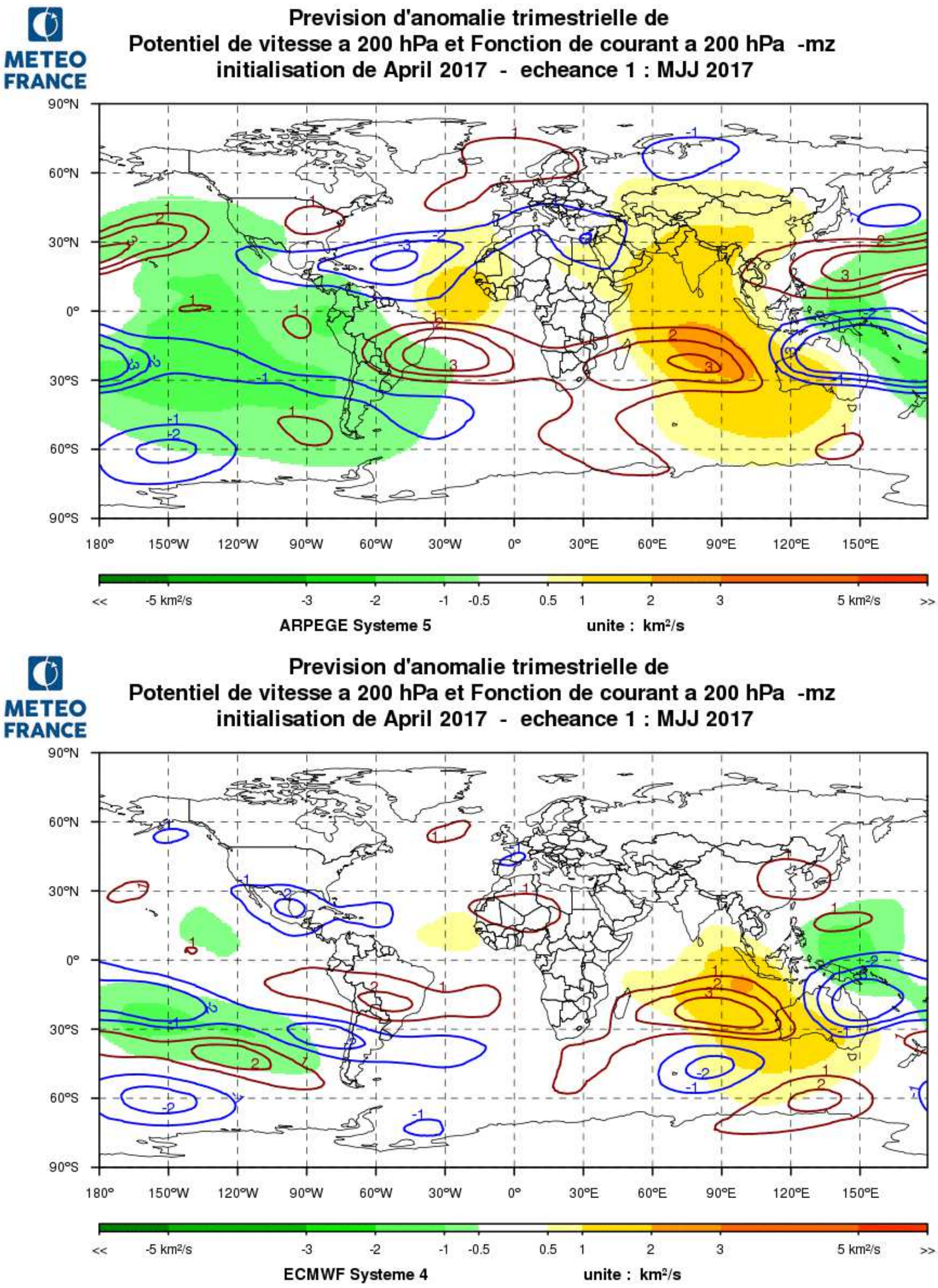
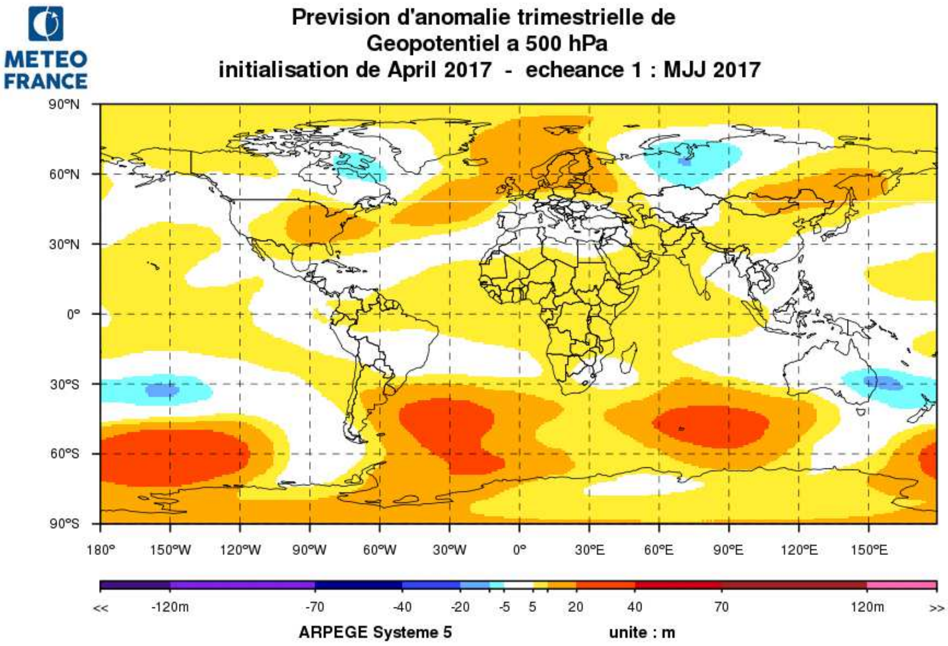


fig.II.2.1: Velocity Potential anomaly field χ (shaded area – green negative anomaly and pink positive anomaly), associated Divergent Circulation anomaly (arrows) and Stream Function anomaly ψ (isolines – red positive and blue negative) at 200 hPa by Météo-France (top) and ECMWF (bottom).

II.2.b Geopotential height anomalies

For Europe and Northern Atlantic, both ARPEGE and ECMWF suggest anticyclonic anomalies over high latitude (from Iceland to Scandinavia) and weak cyclonic anomalies over the Mediterranean basin. If so, the polar vortex would be even weaker than what is usually observed for this May - July period, and the blocking regime could prevail for the three months. Most of the GPCs models suggest a quite similar pattern (see figure II.2.3). This model "quasi-consensus" is not very frequent. However, given the poor skill of seasonal models for this area in summer it should not be fully trusted.



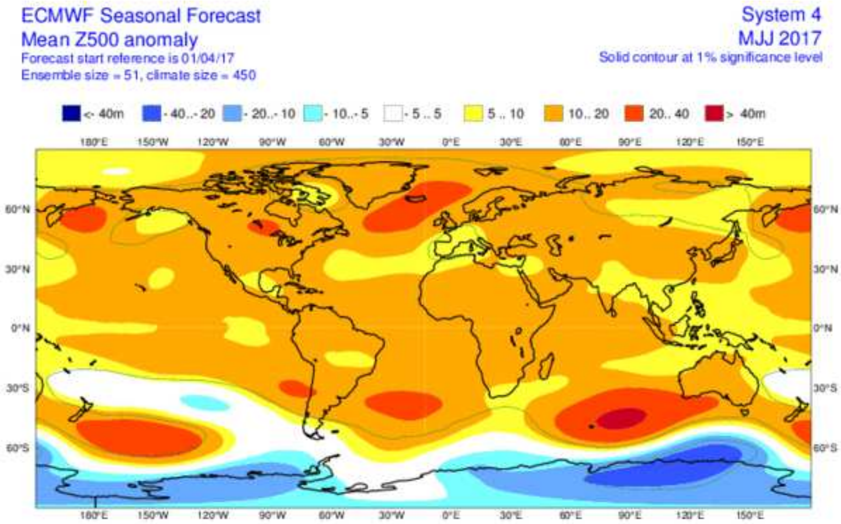


fig.II.2.2: Anomalies of Geopotential Height at 500 hPa from Météo-France and ECMWF. http://www.ecmwf.int/products /forecasts/d/charts/seasonal/forecast

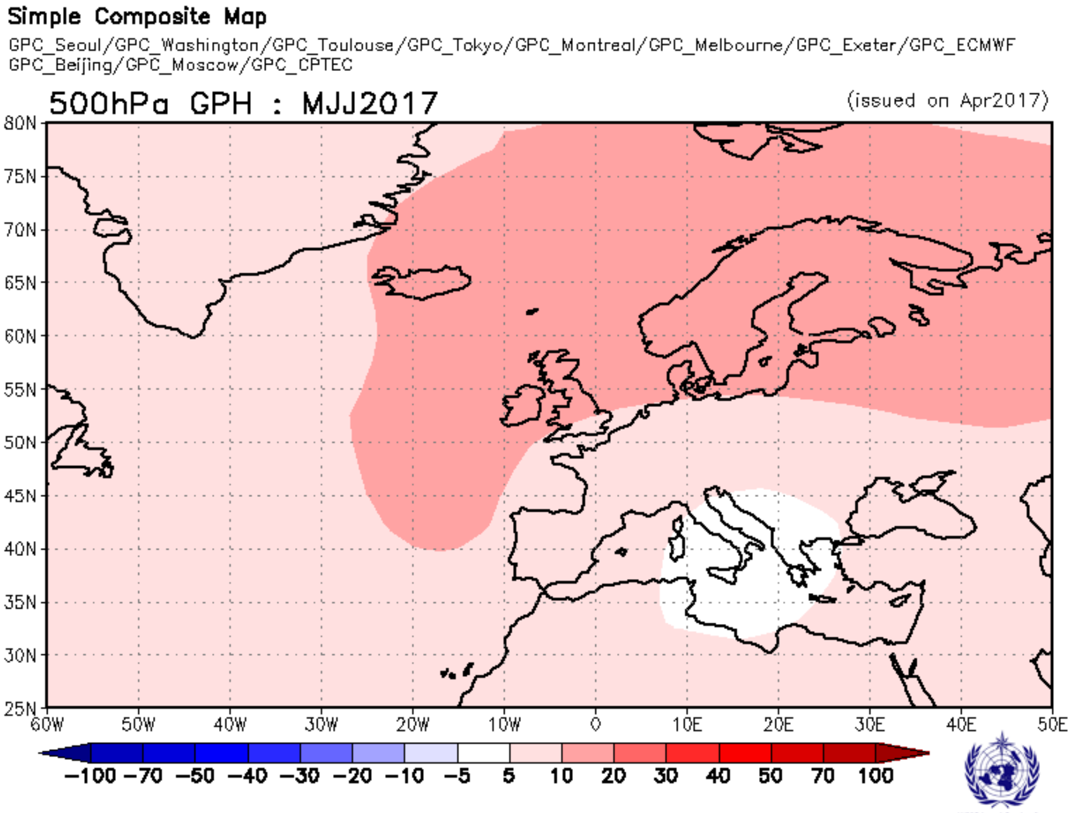


figure II.2.3 : Anomaly of 500 hPa geopotential height averaged over the 12 GPCs models : www.wmolc.org

II.2.c. weather regimes

ARPEGE (MF model) gives no useful information on the most likely weather regime for the next three months : it sticks to its climatology.

The forecast Z500hPa teleconnection indices (not shown here) show an enhanced probability (with ARPEGE) of EA negative mode (which more or less resembles the "atlantic ridge" regime).

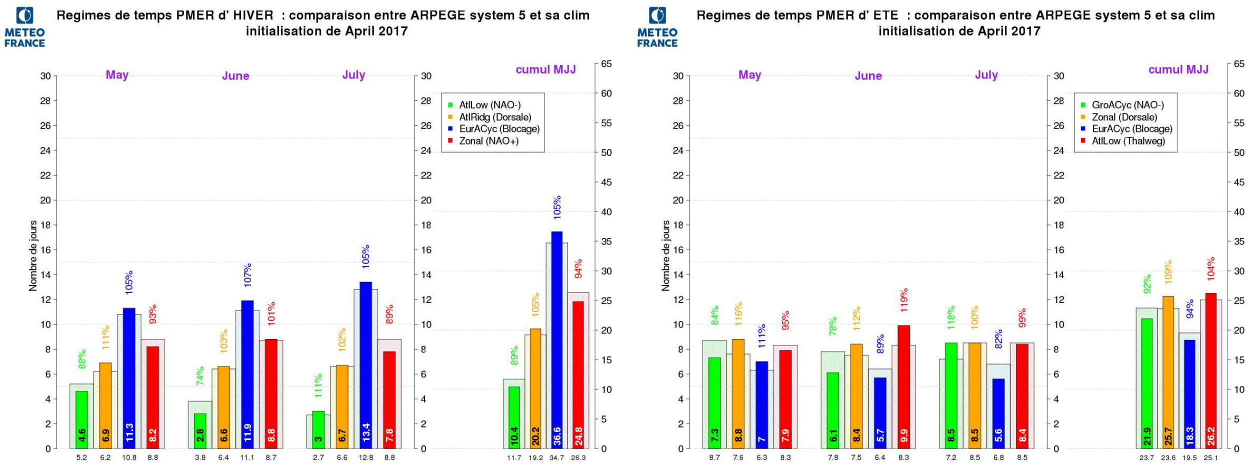


fig.II.2.3bis: North Atlantic Regime occurrence anomalies from Meteo-France ARPEGE-S5 : vertical bars represent the excitation frequency anomaly (in %) for each of the 4 regimes.

II.3. IMPACT: TEMPERATURE FORECASTS (figure II.3.1 to II.3.4)

Over continents, warm anomalies prevail, as usual, but high probabilities are confined over the tropical regions (Amazon, Caribbean, Africa north of the equator, Arabic Peninsula). No warm signal seen over Australia, Africa south of 20°S, Argentina (regions of the winter hemispher e), south-east Asia, and also over coastal West Africa, where conditions could be cooler than normal.
For Europe, the warm signal is not very strong on the Eurosip panel, especially from Spain to France. Warmer than normal conditions are more likely from the British Isles to Scandinavia (consistent with a blocking regime). Higher

probabilities also over the Mediterranean basin, not so consistent with 500 hPa geopotential anomalies.

II.3.a ECMWF

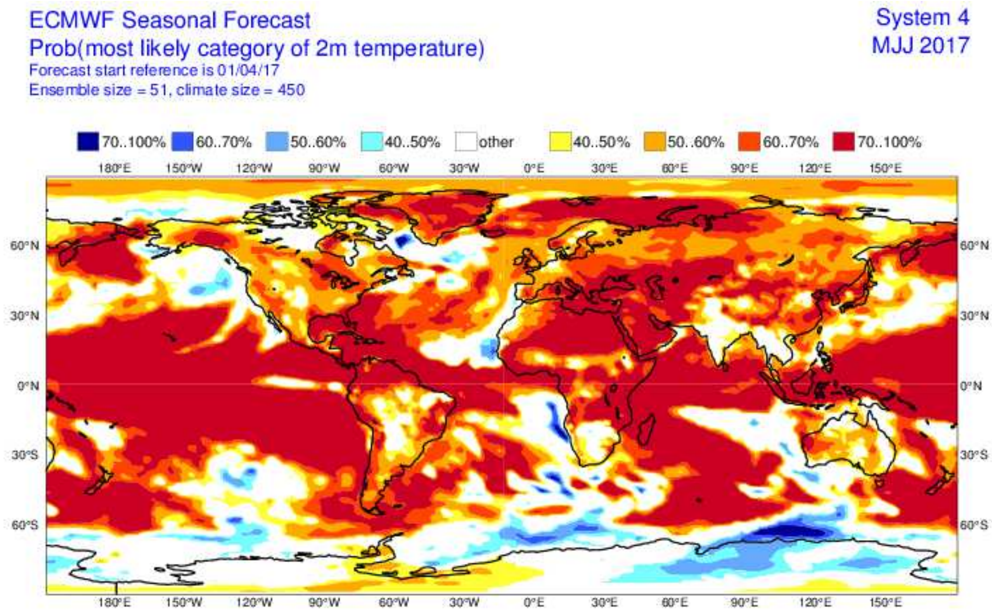


fig.II.3.1: Most likely category probability of T2m from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seaso...

II.3.b Météo-France

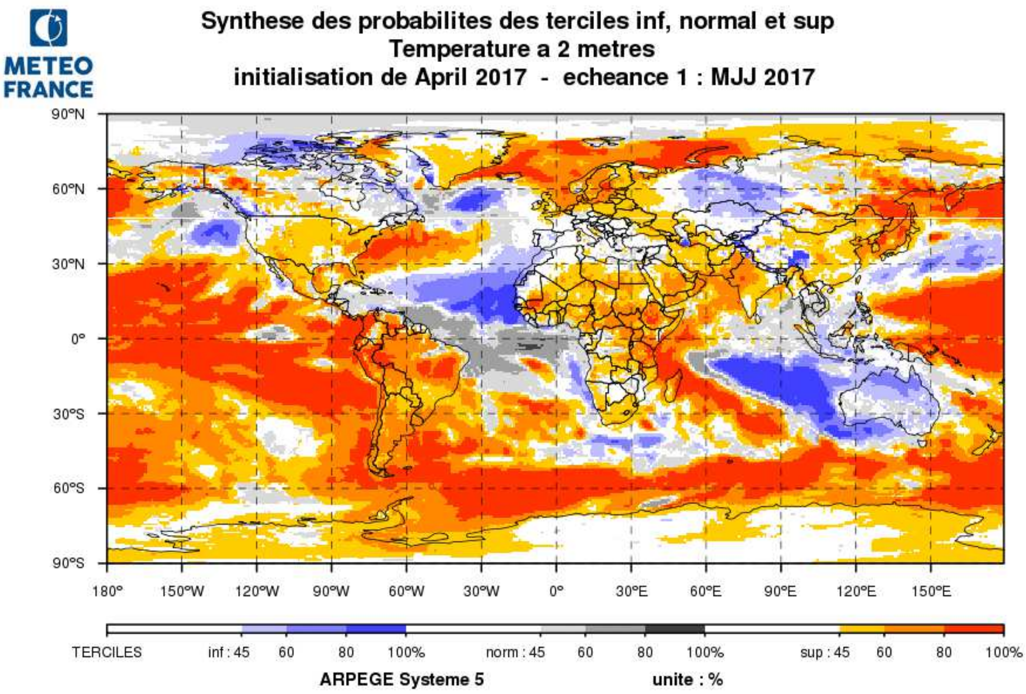


fig.II.3.2: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://seasonal.meteo.fr/

II.3.e Japan Meteorological Agency (JMA)

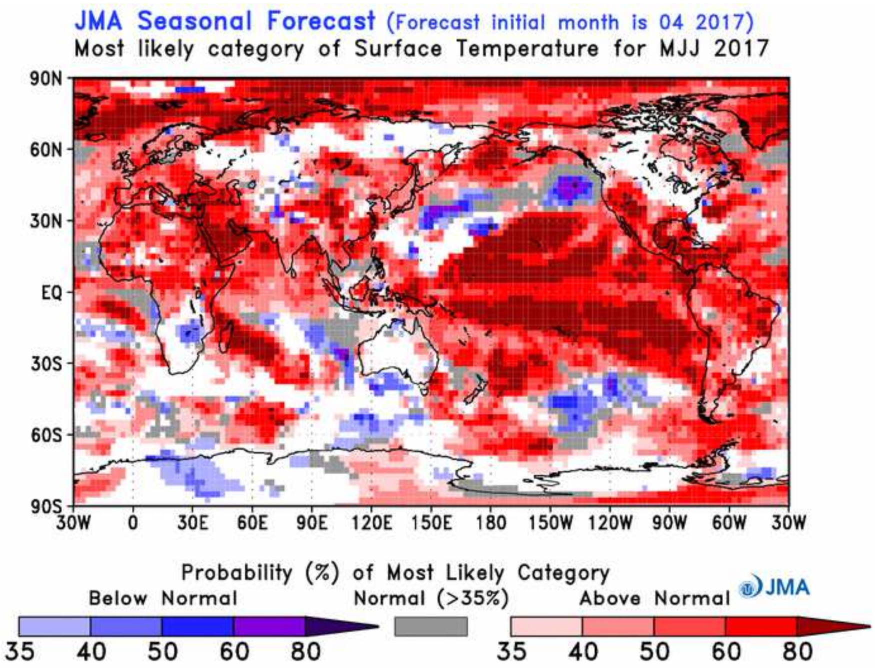


fig.II.3.3: Most likely category of T2m. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/3-mon/fcst/fcst_gl.php

II.3.g EUROSIP

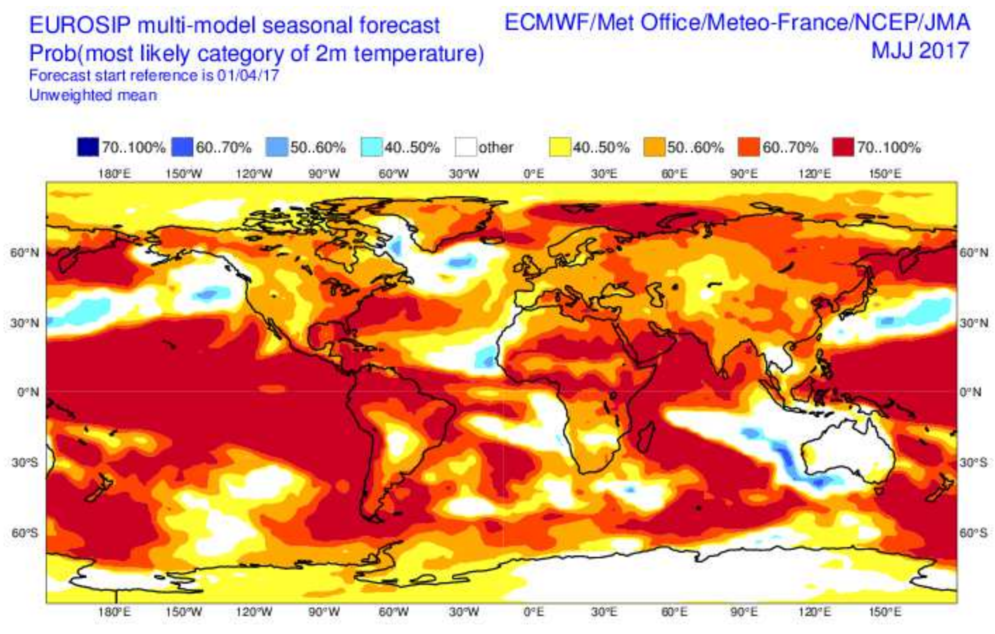


fig.II.3.4: Multi-Model Probabilistic forecasts for T2m from EuroSip (2 Categories, Below and Above normal – White zones correspond to No signal and Normal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast /eurosip/mmv2/param_euro/seasonal_charts_2tm/

II.4. IMPACT : PRECIPITATION FORECAST

Consistent with large-scale dynamics, drier than normal conditions are forecast over Australia and Indonesia, as well as over tropical north Atlantic up to the coastal areas of Guinea and Senegal, which could account for a later than usual

start of the monsoon there. Wetter than normal conditions (consistent with SST anomalies this time) are also forecast from the Mascarene Islands towards Mozambique, which could be good news since this region has been plagued by severe drought lately (Comoros archipelago in particular)
Over Europe, there is no clear signal, except over the eastern Med Basin where wetter than normal conditions could develop, in agreement with the 500 hPa geopotential height anomalies. These anomalies (mixture of Atlantic ridge and Scandinavian Blocking) would rather support drier than normal conditions from Portugal to the British Isles and Norway, although this signal does not clearly appear on the Eurosip map (figure II.4.7).

II.4.a ECMWF

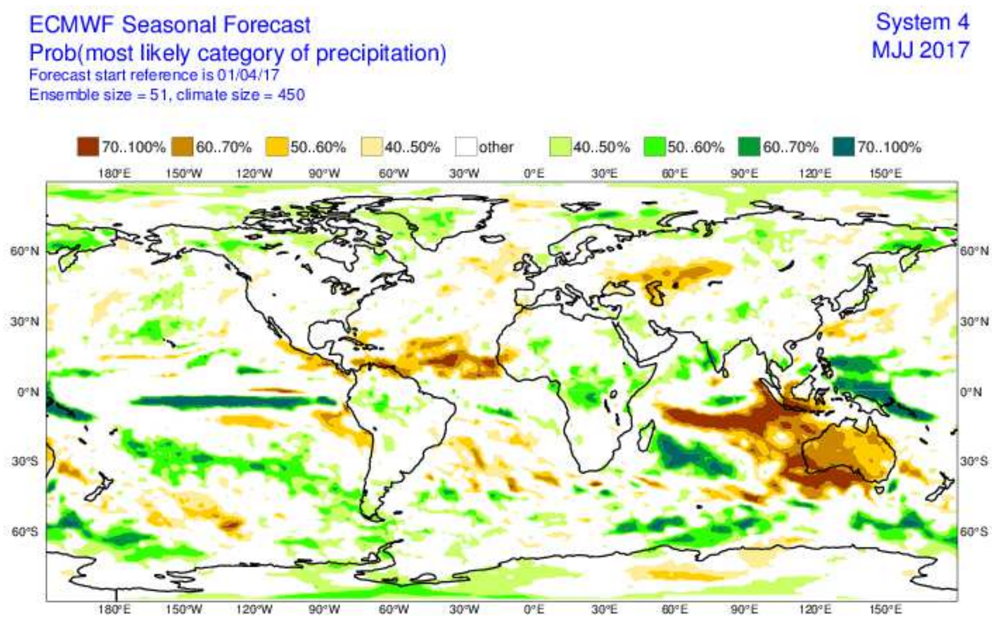


fig.II.4.1: Most likely category probability of rainfall from ECMWF. Categories are Above Normal, Below Normal and « other » category (Normal and No Signal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast /seasonal_range_forecast/group/

II.4.b Météo-France

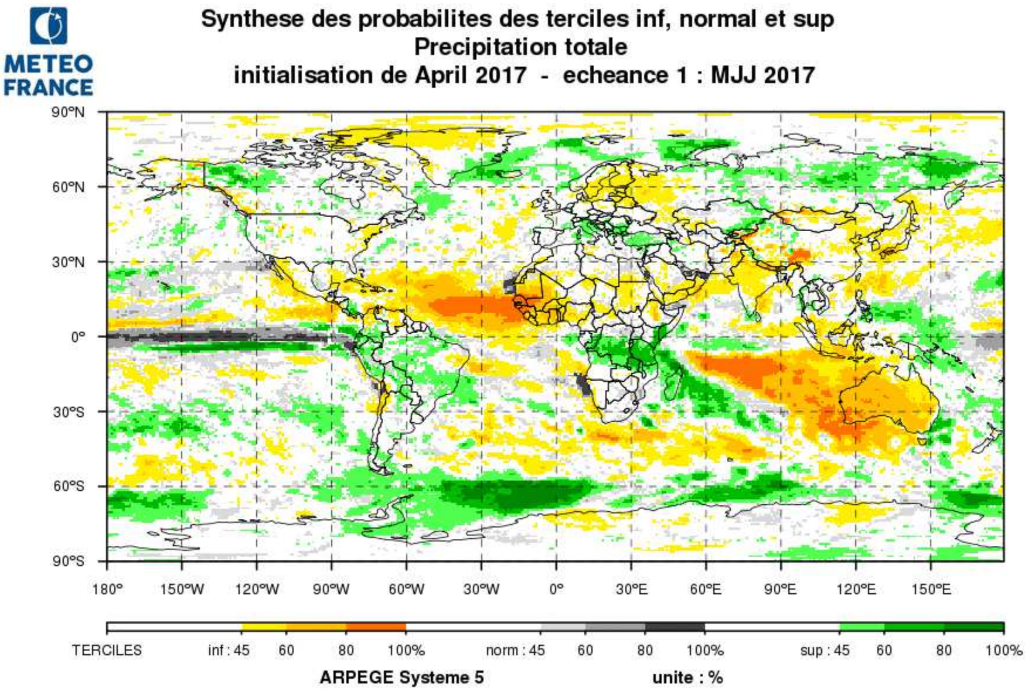


fig.II.4.2: Most likely category of Rainfall. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://seasonal.meteo.fr/

II.4.e Japan Meteorological Agency (JMA)

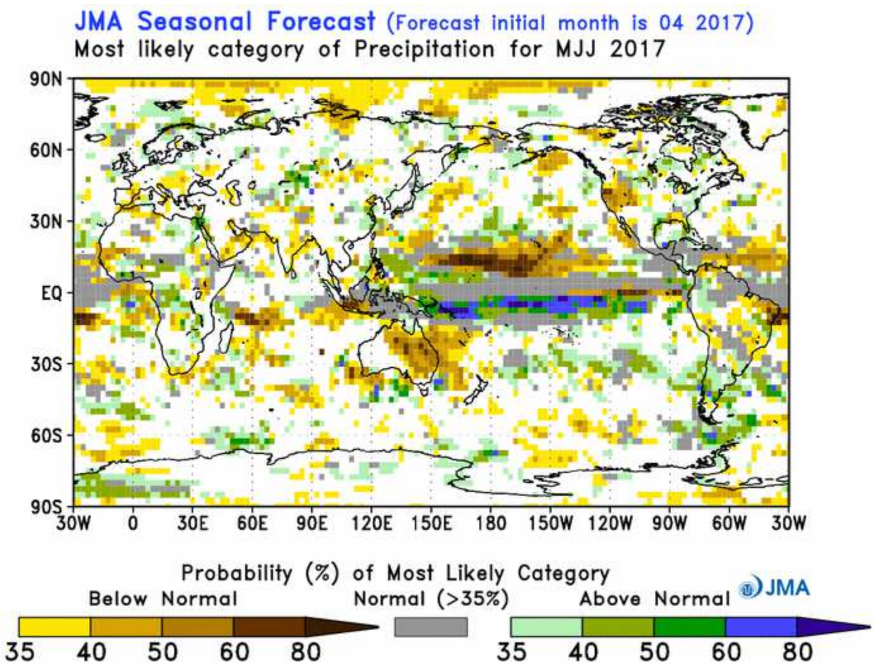


fig.II.4.5: Most likely category of Rainfall from JMA. Categories are Above, Below and Close to Normal. White zones correspond to No Signal. http://ds.data.jma.go.jp/tcc/tcc/products/model/probfcst/3-mon/fcst/fcst_gl.php

II.4.g EUROSIP

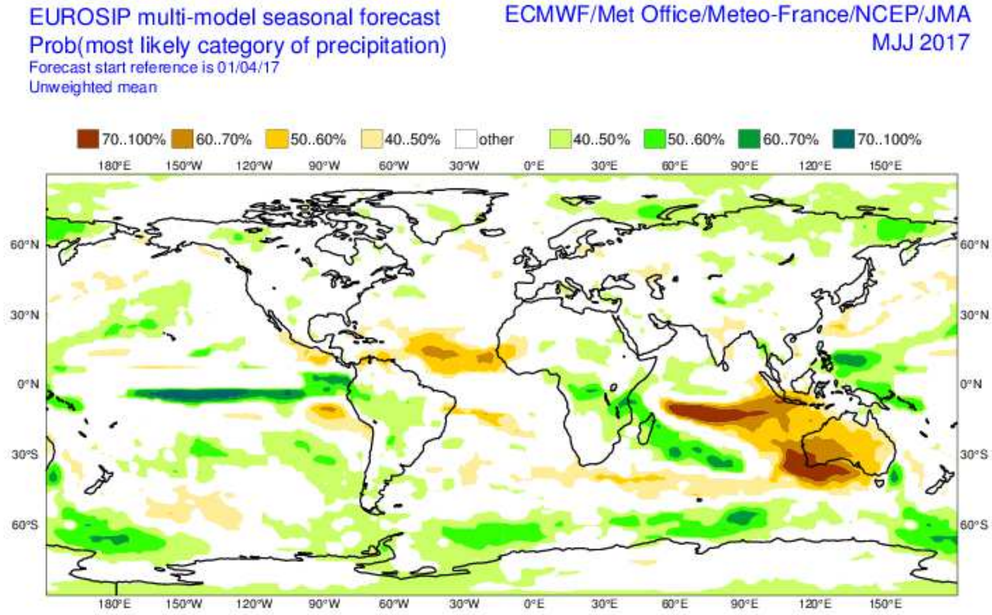


fig.II.4.7: Multi-Model Probabilistic forecasts for precipitation from EuroSip (2 Categories, Below and Above normal – White zones correspond to No signal). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip /mmv2/param_euro/seasonal_charts_2tm/

II.5. REGIONAL TEMPERATURES and PRECIPITATION

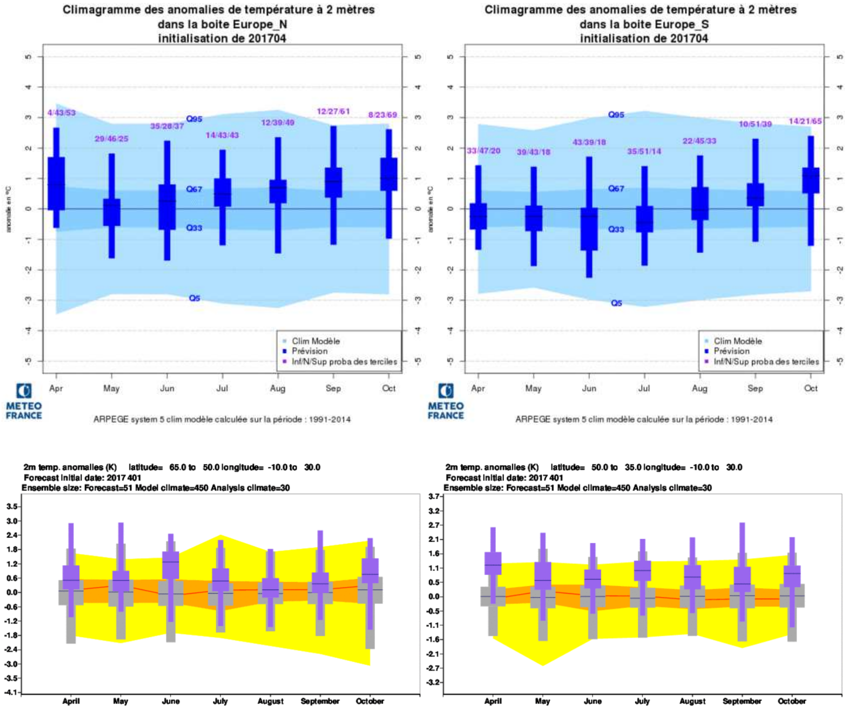


fig.II.5.1 : Climagrams for Temperature in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

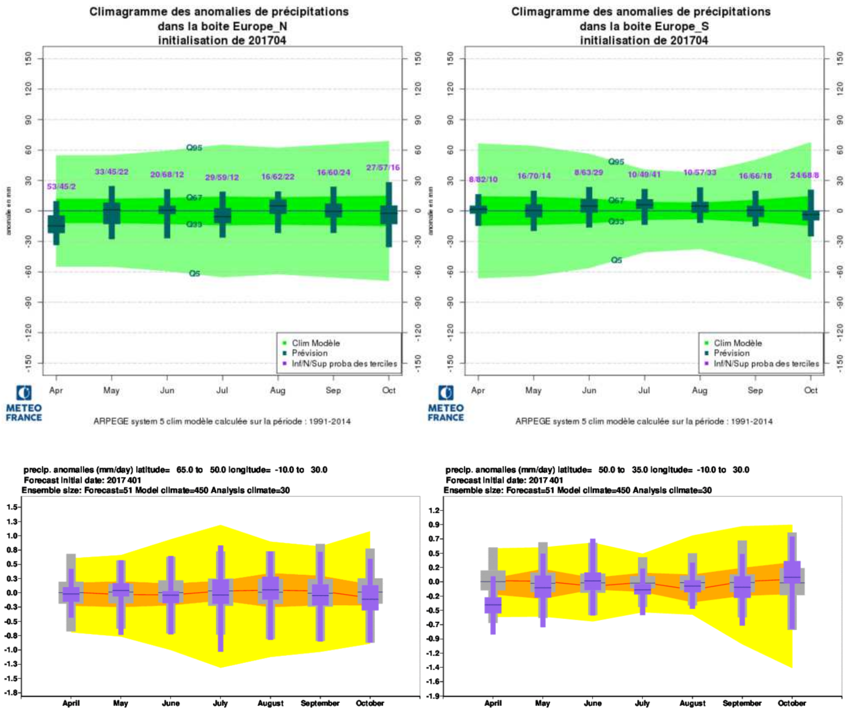


fig.II.5.2 : Climagrams for Rainfall in Northern Europe (left) and in Southern Europe (right) from Météo-France (top) and ECMWF (bottom).

II.7. "EXTREME" SCENARIOS

Warning : there is a cold bias in the 2m temperature Météo-France maps this month. This problem should be fixed in next month's bulletin. In the meantime we recommand not to use this product.

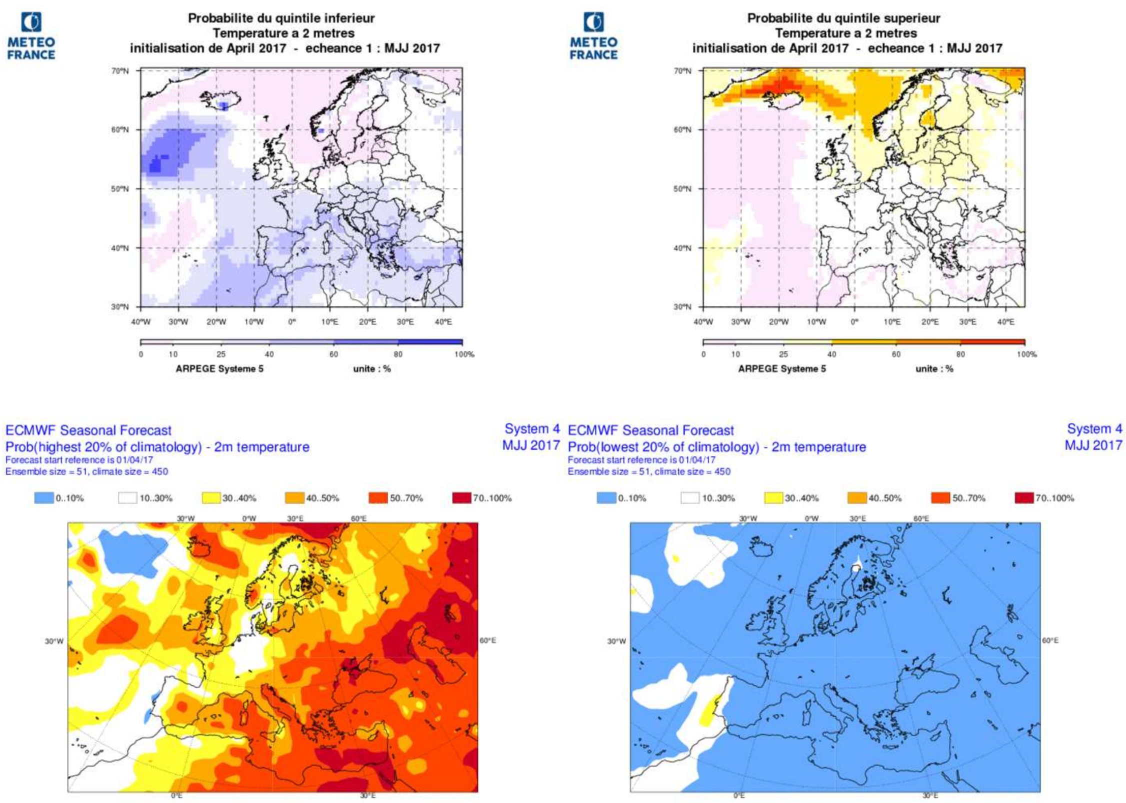


fig.II.7.1 : Top : Meteo-France T2m probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution). Bottom : ECMWF T2m probability of « extreme » below normal conditions (left - highest ~20%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

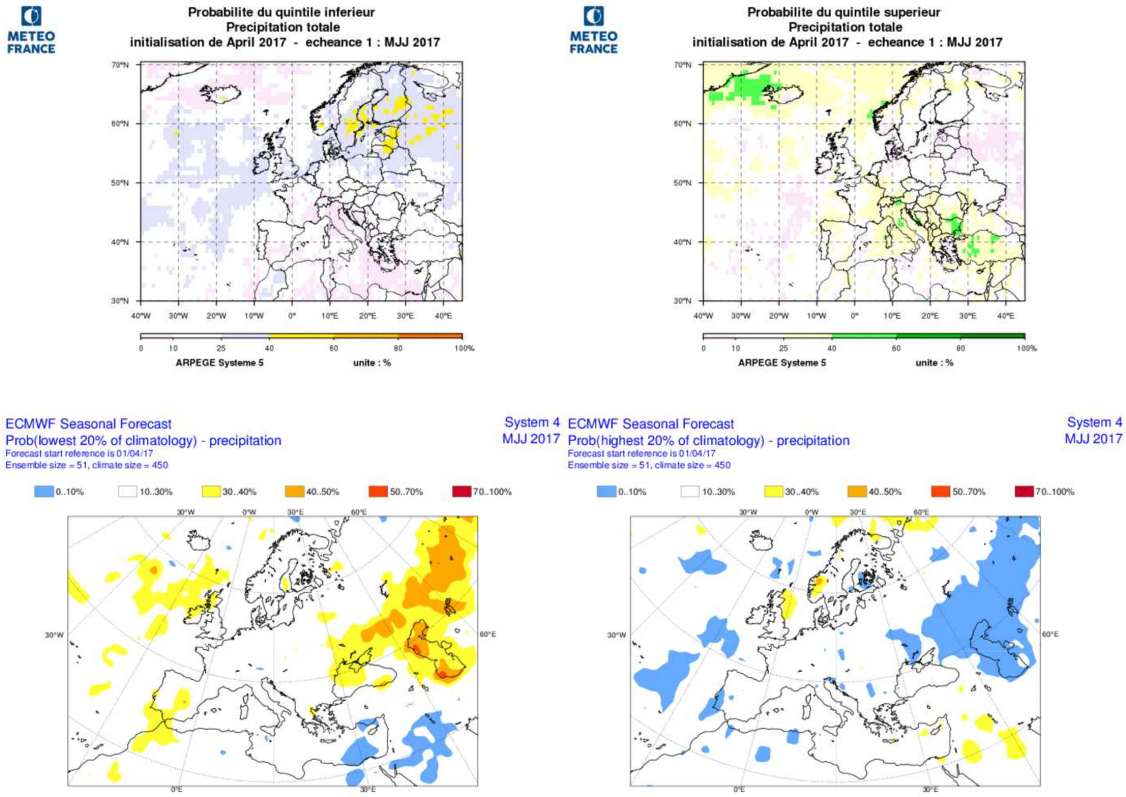
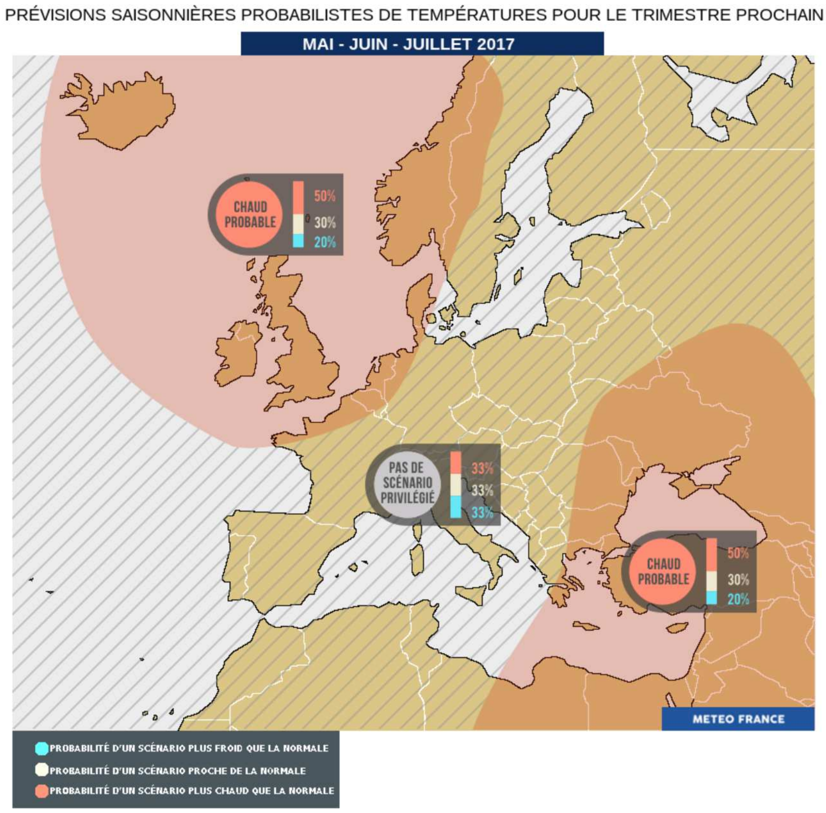


fig.II.7.2 : Top : Meteo-France rainfall probability of « extreme » below normal conditions (left - lowest ~15% of the distribution) and "extreme" above normal conditions (right - highest ~15% of the distribution).
Bottom : ECMWF rainfall probability of « extreme » below normal conditions (left - lowest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

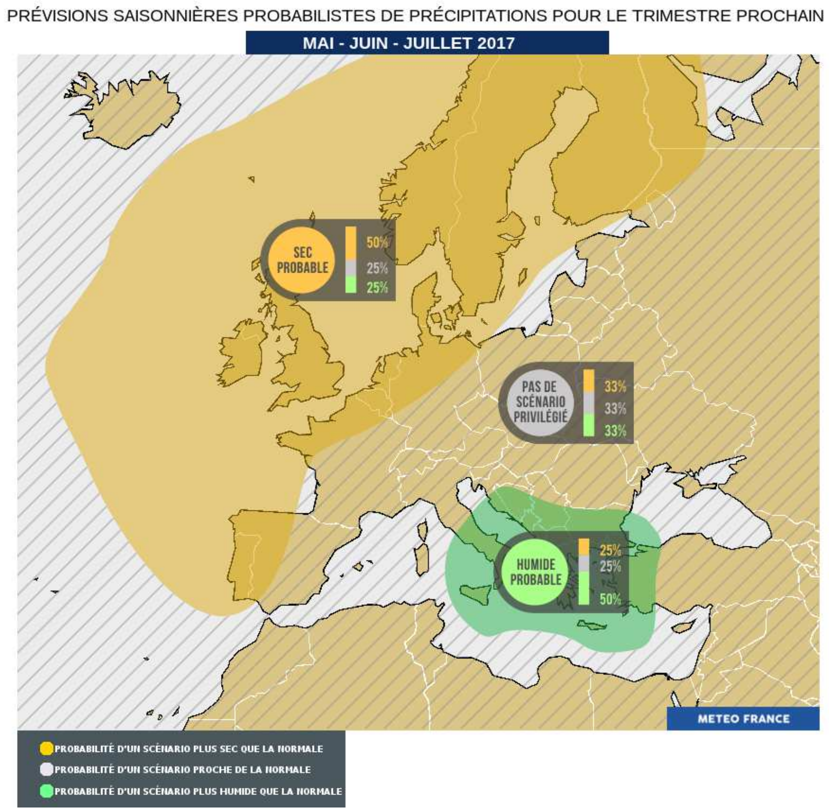
II.8. DISCUSSION AND SUMMARY

II.8.a Forecast over Europe

Temperatures: A mixture of Scandinavian Blocking / Atlantic Ridge pattern should prevail over Europe for the May - July period. This should result in warmer conditions than usual from the British Isles to Norway, Iceland, Belgium, the Netherlands, and Northern France (the eastern part of Northern Europe would be located on the "cool" side of the blocking pattern). South-Eastern Europe and Middle East, located on the warm side of the Eastern Mediterranean low, should also experience warmer than normal conditions. Elsewhere, no signal clearly emerge.



Precipitation: As for temperatures, the mixture of blogking/Atlantic ridge would go for a drier scenario over western and northern Europe, from Portugal to the British Isles, Northern France, the Netherlands, Northern Germany, and Scandinavia. Wetter than normal conditions should develop from south Italy to Greece, southern Balkans and western Turkey. Elsewhere, no signal can be found.



II.8.b Tropical cyclone activity

Above-normal activity expected over Northwest Pacific . Close to normal for the Eastern Pacific and below normal for North Atlantic.

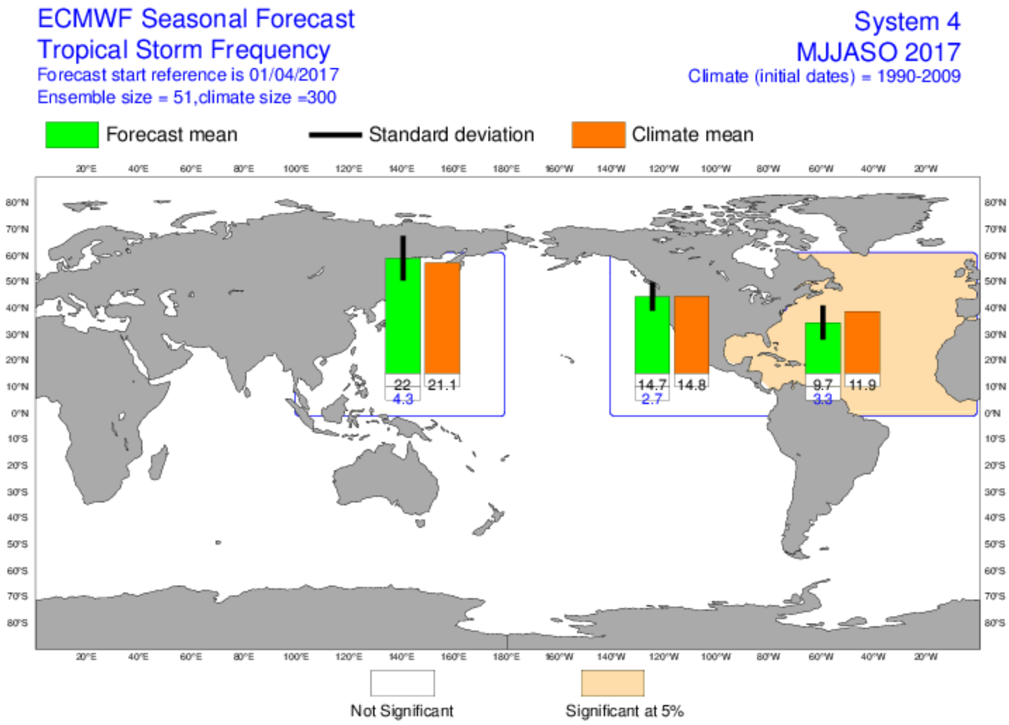


fig.II.8.1 : Seasonal forecast of the frequency of Tropical Cyclones from EUROSIP (Météo-France & ECMWF). http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/eurosip/mmtrop/trop_euro /eurosip_tropical_storm_frequency/

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 whe re the SST warming is developing first at the surface (especially for coastal events).

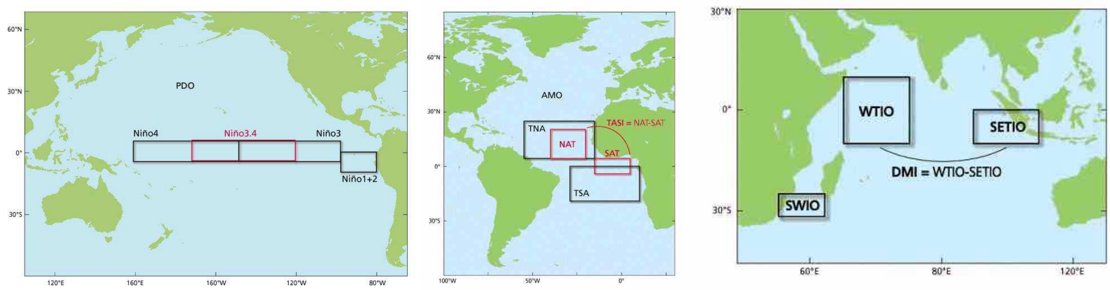
- Niño 3 : 5°S/5°N 90W-150W ; it is the region wher e the interanual variability of SST is the greatest.

- Niño 4 : 5°S/5°N 160E- 150W ; it is the region wh ere 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).

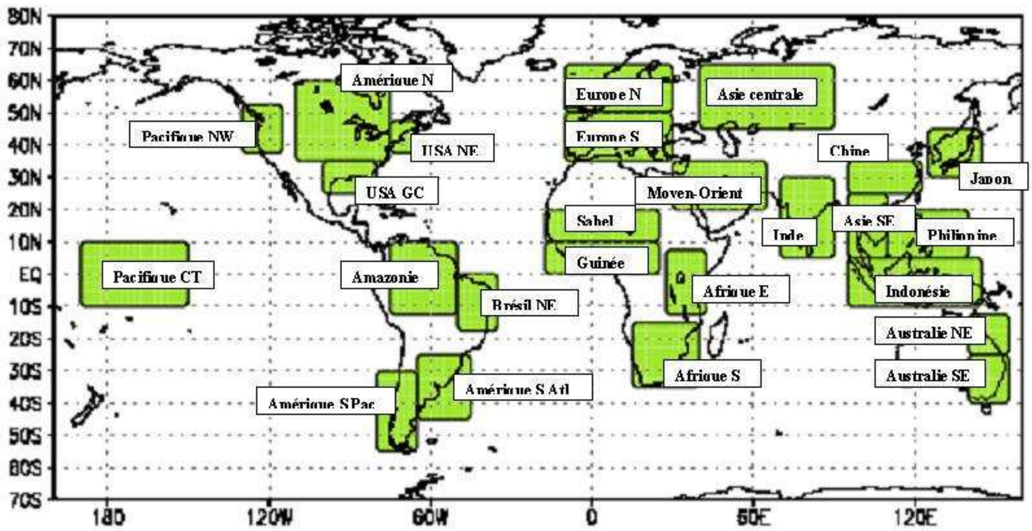
Associated to the oceanic « El Niño / La Niña » events, and taking into account the strong ocean/atmopshere coupling, the atmosphere shows also interanual variability associated to these events. It is monitored using the SOI (Southern Oscillation Index). This indice is calculated using standardized sea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