



WMO RA I



WMO RA VI  
RCC-Network



# **MEDITERRANEAN CLIMATE OUTLOOK FORUM MEDCOF-9 Meeting**

## **MONITORING SUMMARY MEDCOF-9**

**for October 2017**

**First Draft Version**

**Last update: 20 November 2017**

**Compiled by**

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**Météo France**

**Toulouse, France**

**WMO RA I North Africa RCC Tunisian Node**

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The following MedCOF monitoring summary is based on

- climate monitoring working reports from RA I NA RCC-CM, RA VI RCC-CM and RA VI RCC-LRF

## **1. Oceanic Analysis**

### **Over the Pacific ocean:**

- Since September, no significant SST evolution in the tropical Pacific. Niño 3.4 index:  $-0.4^{\circ}\text{C}$  ( $-0.5^{\circ}\text{C}$  in Sept.). Still a strong West-East gradient, consistent with a La Niña phase of ENSO.
- In the subsurface, the only significant evolution concerns the western part of the basin, with an intensification of the warm reservoir (west of  $150^{\circ}\text{W}$ ).
- Noisy PDO+ pattern, the main element is the persistence of a warm anomaly all along the Northern tropics.

### **Over the Maritime Continent:**

- No significant evolution : slightly above normal SSTs

### **Over the Indian Ocean :**

- In the northern hemisphere, generally warm anomalies. The IOD is still slightly positive, due to a weak gradient.
- In the southern hemisphere, persisting SST gradient (enhanced in October) between a still cold eastern basin and a warm western basin.

### **Over the Atlantic:**

- Little evolution in the tropics. Still warm anomalies in the Gulf of Guinea up to the coasts of Senegal; and in the Caribbean Sea and Gulf of Mexico.
- over Northern Atlantic, persisting North-South gradient, the cold blob is still present (confirmed by the subsurface)

### **Over the Mediterranean:**

- Anomaly gradient between the West (warmer than normal) and the East (cooler than normal).

### **Over the Black Sea**

- strong cooling compared to September, negative anomalies

### **Over the European Arctic Sea**

- very warm for the season, high positive anomalies

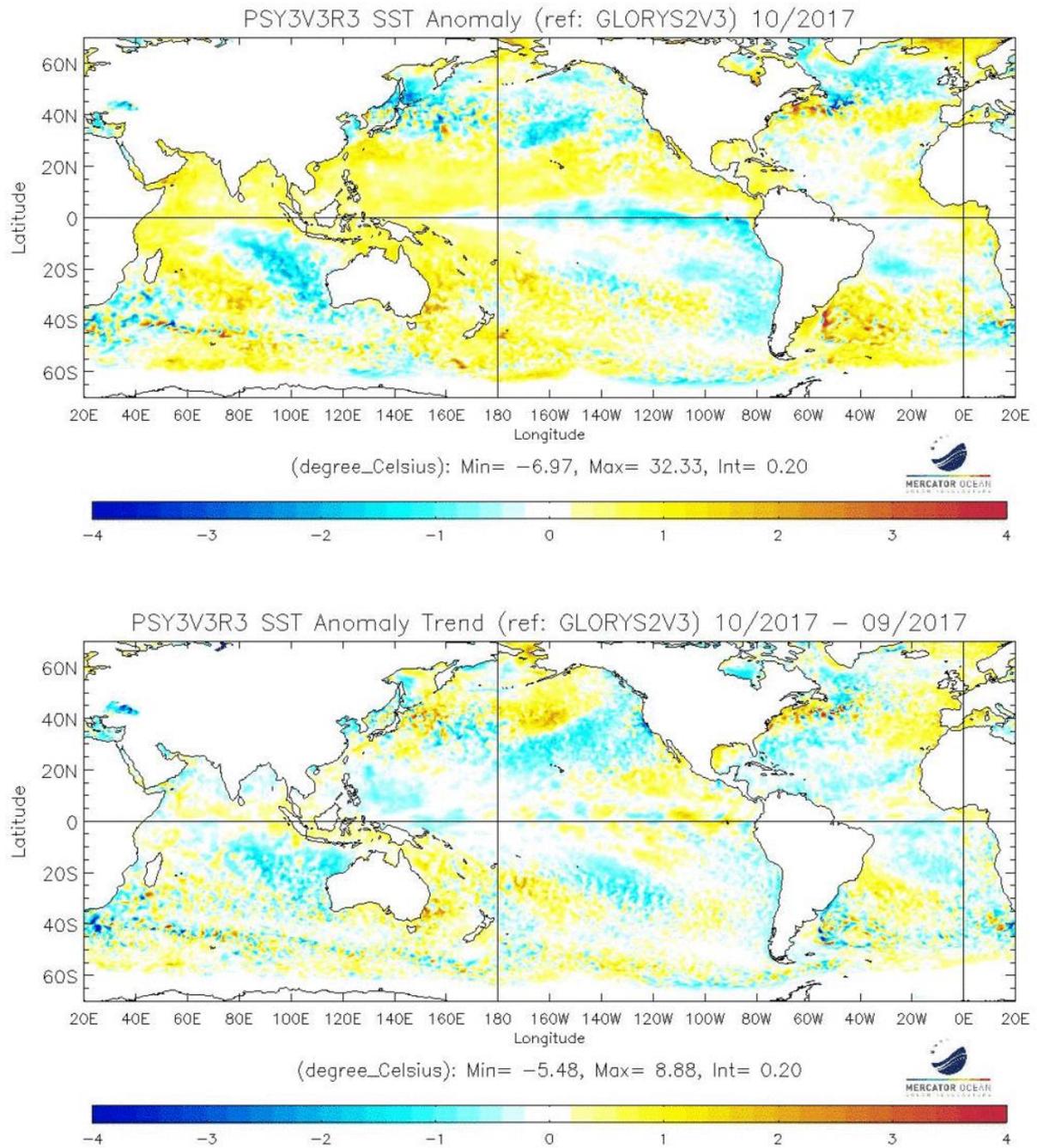


Figure 1: top: SST Anomalies (°C). Bottom: SST tendency (current – previous month), (reference Glorys 1992-2013).

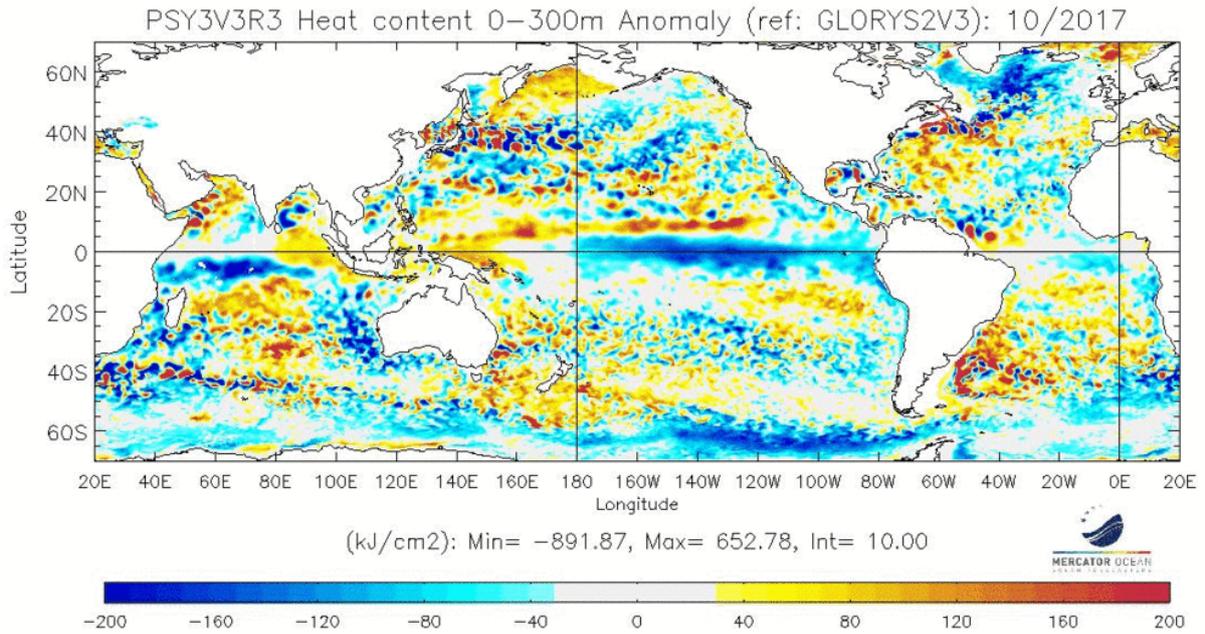
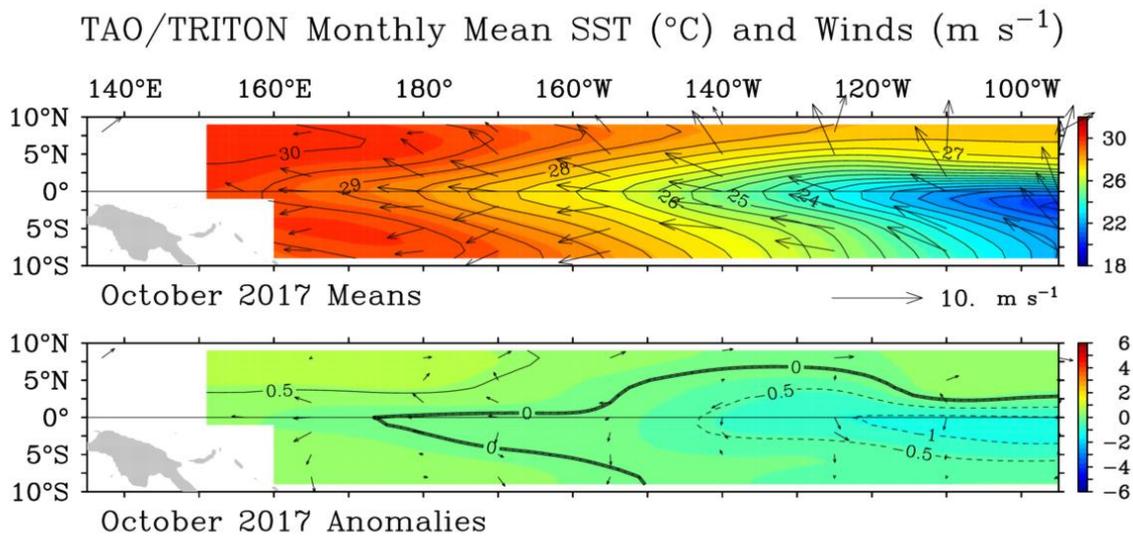


Figure 2: map of Heat Content Anomalies (first 300m, kJ/cm<sup>2</sup>, reference Glorys 1992-2013)

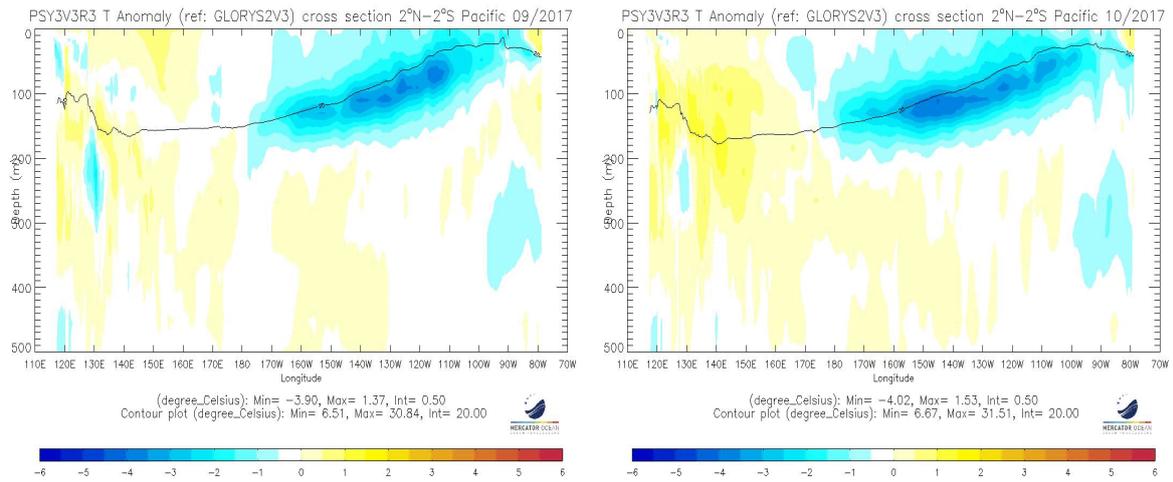


Global Tropical Moored Buoy Array Program Office, NOAA/PMEL

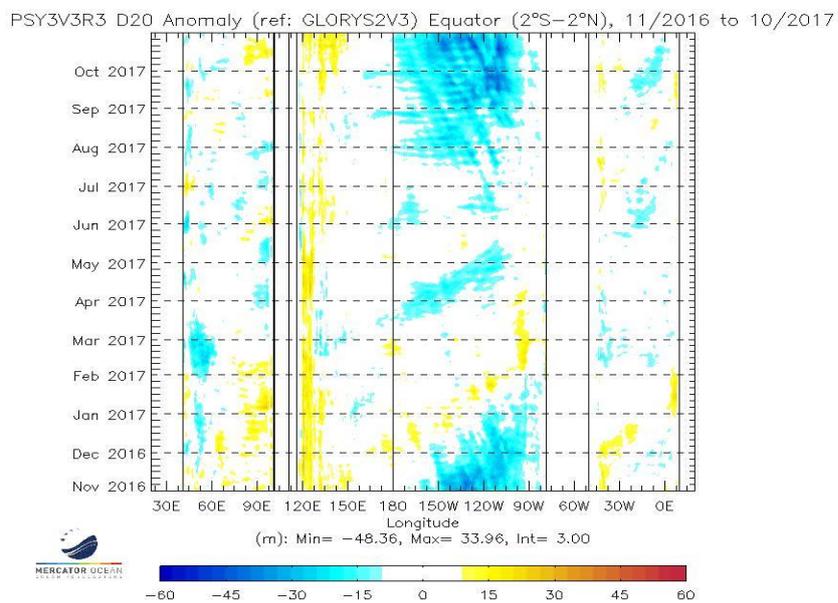
Nov 20 2017

Figure 3: SST Anomalies and Wind anomalies over the Equatorial Pacific from TAO/TRITON.

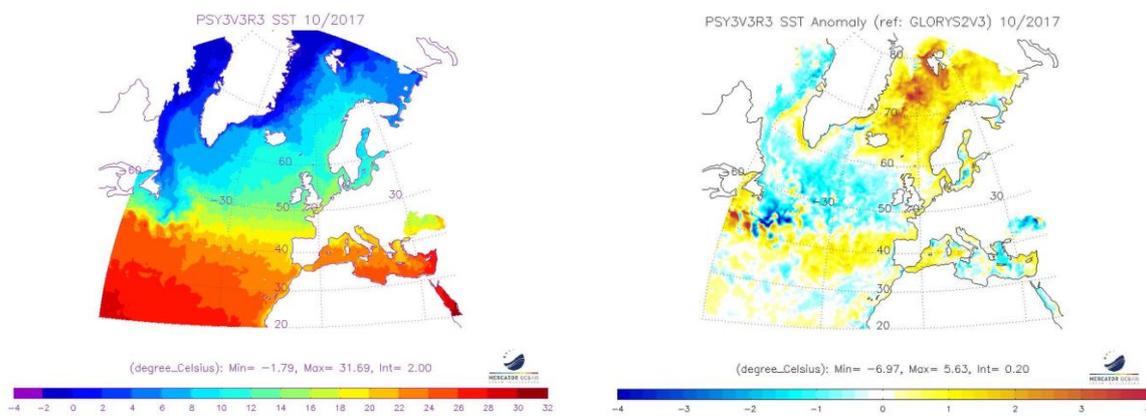
[http://www.pmel.noaa.gov/tao/drupal/assorted\\_plots/images/sst\\_wind\\_mon.png](http://www.pmel.noaa.gov/tao/drupal/assorted_plots/images/sst_wind_mon.png)



**Figure 4: Oceanic temperature anomaly in the first 500 meters in the Equatorial Pacific (previous and current month).**



**Figure 5: Hovmöller diagram of Thermocline Depth Anomalies (m) (depth of the 20°C isotherm) along the equator for all oceanic basins over a 6 month period.**



**Figure 6: Mean sea surface temperature near Europe and North Africa and anomaly (reference Glorys 1992-2013).**

## 2. Atmospheric Circulation Analysis

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

- since August downward motion anomalies over the eastern part of the tropical Pacific, consistent with the SST anomalies (a hint of some ocean-atmosphere coupling) and upward motion anomalies over the Maritime Continent, especially to the east. This is consistent with La Niña impact.
- Over the Indian Basin, West-East anomaly dipole, despite a quite neutral DMI. So this dipole is probably due to the La Niña influence.
- Over the Atlantic, large downward anomaly.

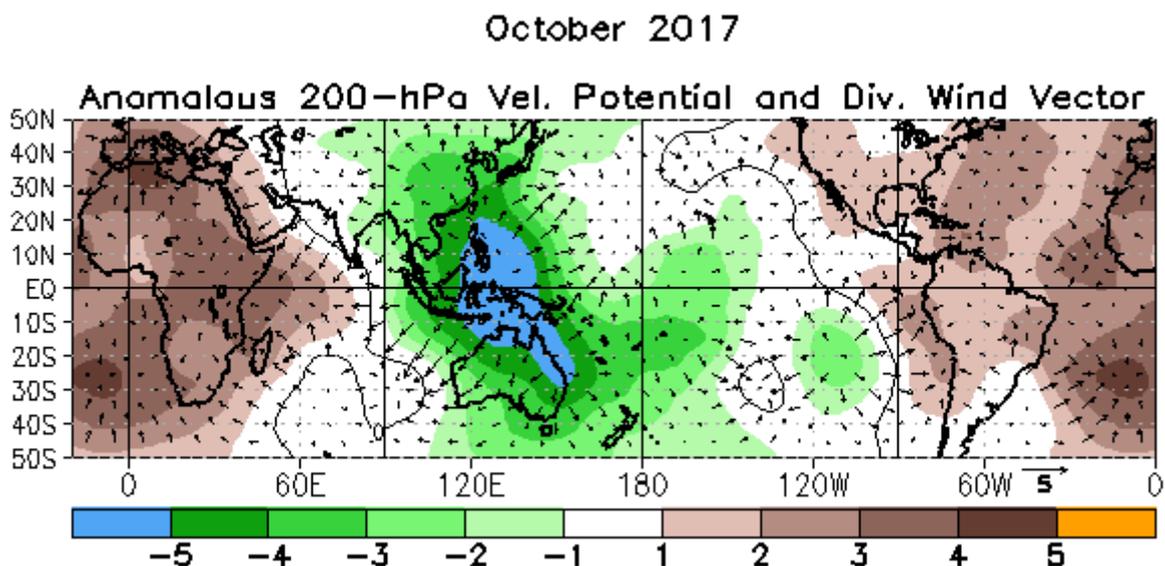


Figure 7: Velocity Potential Anomalies at 200 hPa and associated divergent circulation anomaly. Green (brown) indicates a divergence-upward anomaly (convergence-downward anomaly).  
<http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml>

SOI:

- still a positive SOI in October (+0.9), stronger than in September (+0.6). See NOAA Standardized SOI: <https://www.ncdc.noaa.gov/teleconnections/enso/indicators/soi/> .

MJO (Fig. 8)

- Strong MJO activity in October. This explains the strong contrasts observed on the Velocity Potential anomaly map. But disappearing in November.

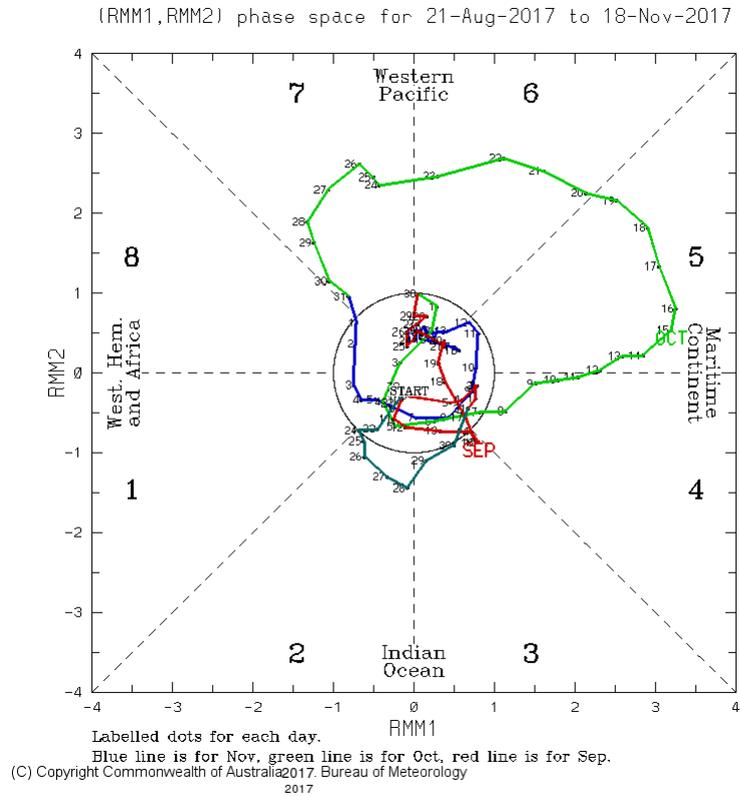


Figure 8: MJO indices. <http://www.bom.gov.au/climate/mjo/>

Stream Function anomalies in the high troposphere (Fig. 9 – insight into teleconnection patterns tropically forced):

- Contrary to the previous months, significant anomalies in the inter-tropical band.
- On the Eastern Pacific, cyclonic anomalies on both sides of the equator (cyclonic means negative stream function anomalies in the northern hemisphere, but positive in the southern hemisphere).
- Close to the Indian basin, anticyclonic anomalies around 20°N and S.
- No clear teleconnection toward mid-latitudes: the PNA- pattern could potentially be associated with La Nina pattern.

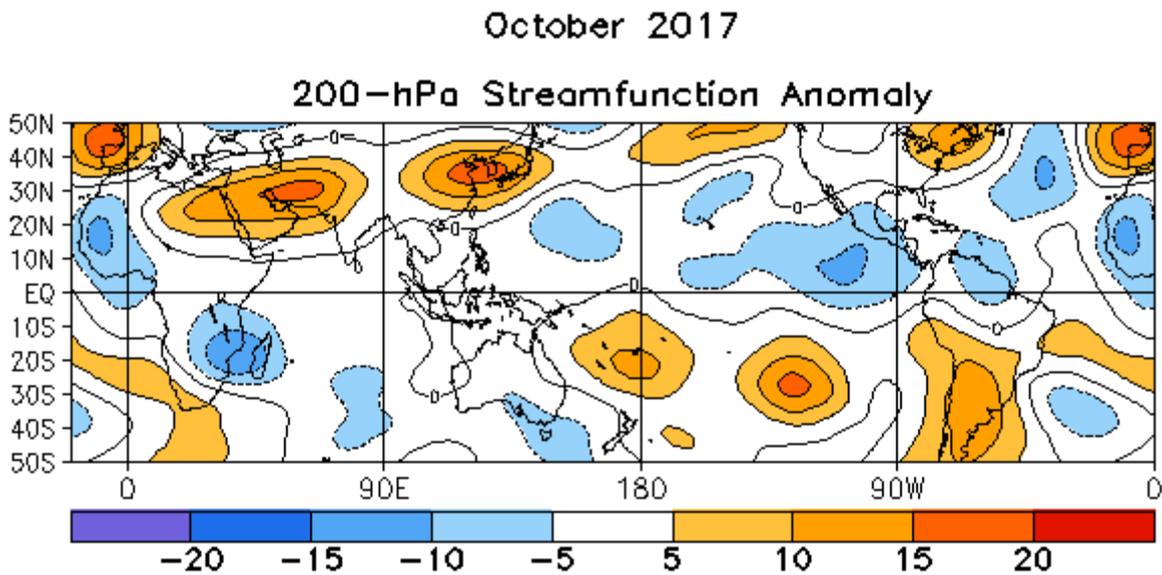


Figure 9: Stream Function Anomalies at 200 hPa. <http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml>

Geopotential height at 500 hPa (Fig. 10 – insight into mid-latitude general circulation):

- Northern Atlantic and Europe: strong anomaly dipole between western and eastern Europe. No strong teleconnection patterns (Table 1).
- Pacific-America: further strong positive anomalies over SE Canada and Gulf of Alaska. Quite intense wave pattern. Further amplification in first half of November

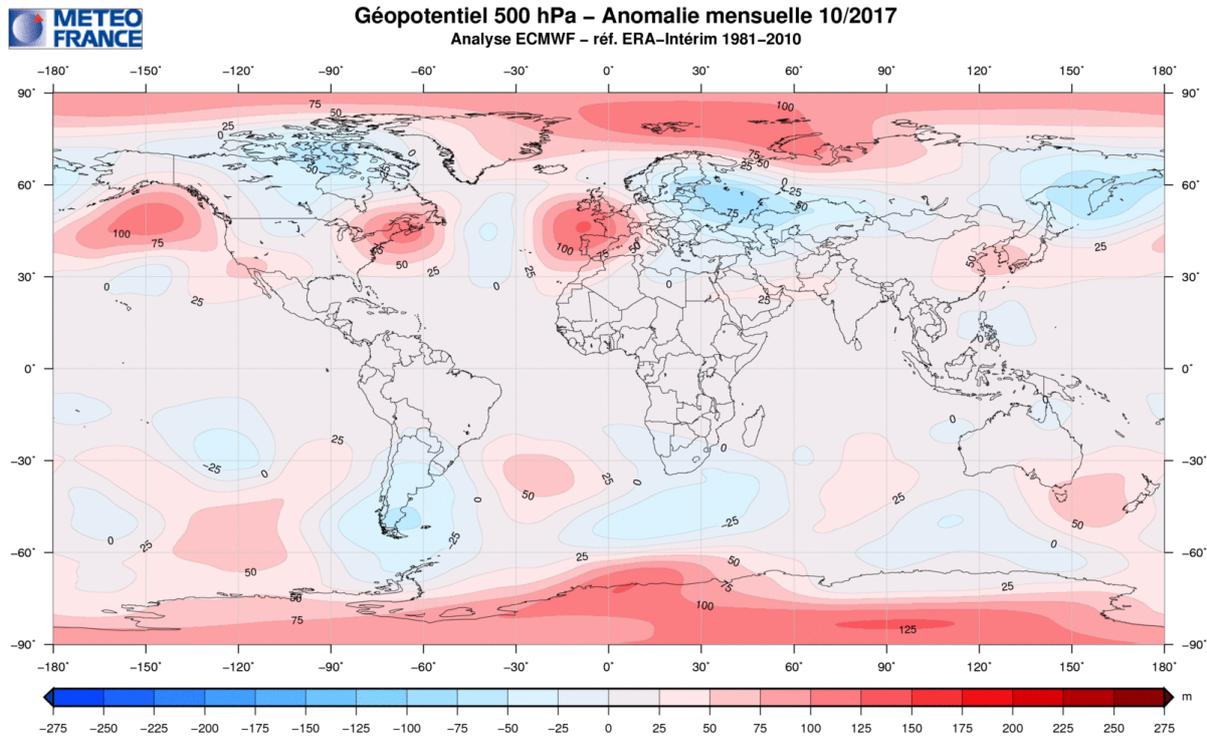


Figure 10: Anomalies of Geopotential height at 500hPa (Météo-France)

MONTH	NAO	EA	WP	EP-NP	PNA	TNH	EATL/WRUS	SCAND	POLEUR
OCT 17	0.7	0.6	0.7	-0.6	-0.3	---	-0.0	0.3	-1.2
SEP 17	-0.5	1.6	-1.2	-0.5	-0.3	---	-2.5	0.5	-1.7
AUG 17	-1.5	2.0	-1.4	-1.6	0.2	---	-2.9	-1.6	1.8
JUL 17	1.3	1.8	0.5	0.0	1.3	---	-0.6	0.0	-0.1
JUN 17	0.4	2.0	-0.8	0.5	1.2	---	0.3	-1.4	-0.1
MAY 17	-1.7	0.5	0.7	-0.7	-0.2	---	1.5	0.9	0.5
APR 17	1.7	-0.6	-0.4	1.0	0.1	---	0.7	-1.5	-1.4
MAR 17	0.4	1.0	-2.1	-1.0	-0.0	---	-1.0	-1.0	0.7

Table 1: 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

High pressure dominated over much of Europe, the Mediterranean and North Africa, particularly in western parts. Less anticyclonic / cyclonic in the east.

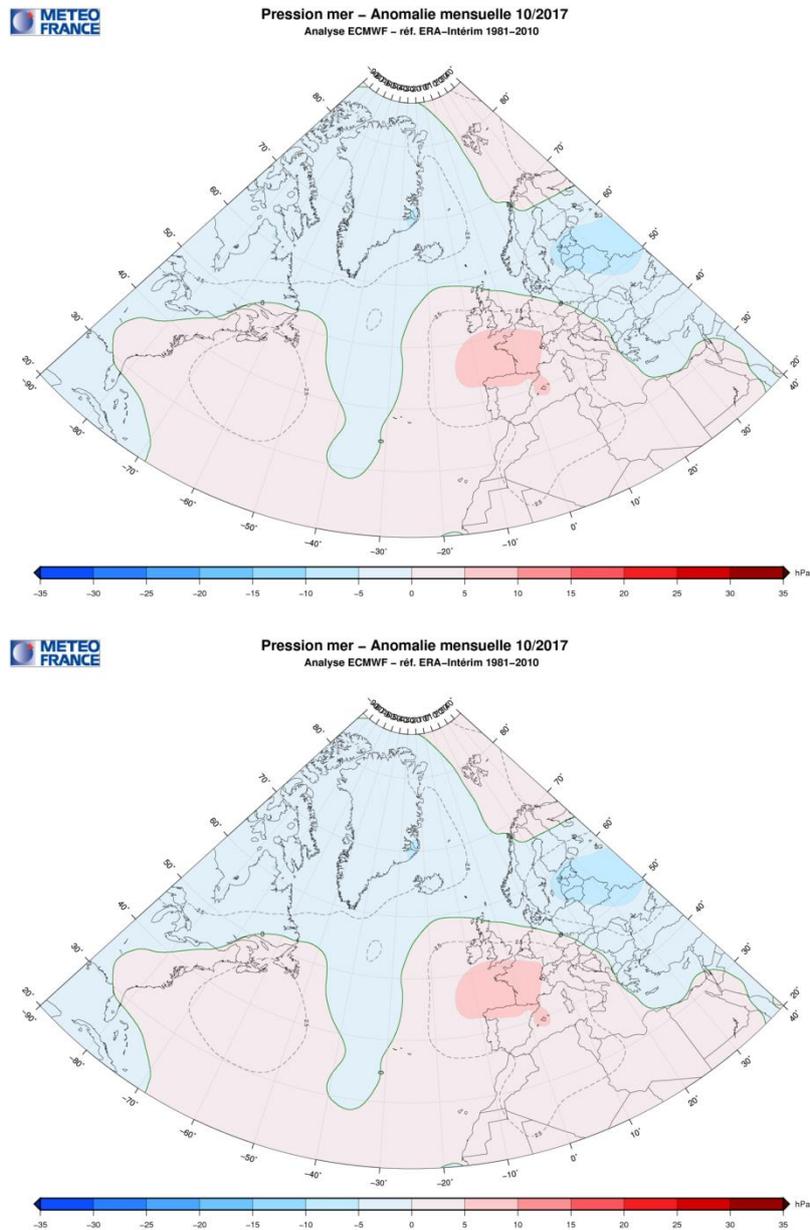


Figure 11: Mean sea level pressure over the North Atlantic, Europe and North Africa (top) and 1981-2010 anomalies (bottom) (Météo France)

## Circulation indices: NAO and AO

NAO was in a positive phase during the first half of the month (Fig. 12), but switched to a negative phase in the second half, but mainly with little intensity. The AO phase was also positive in the first half, but became neutral in the second half.

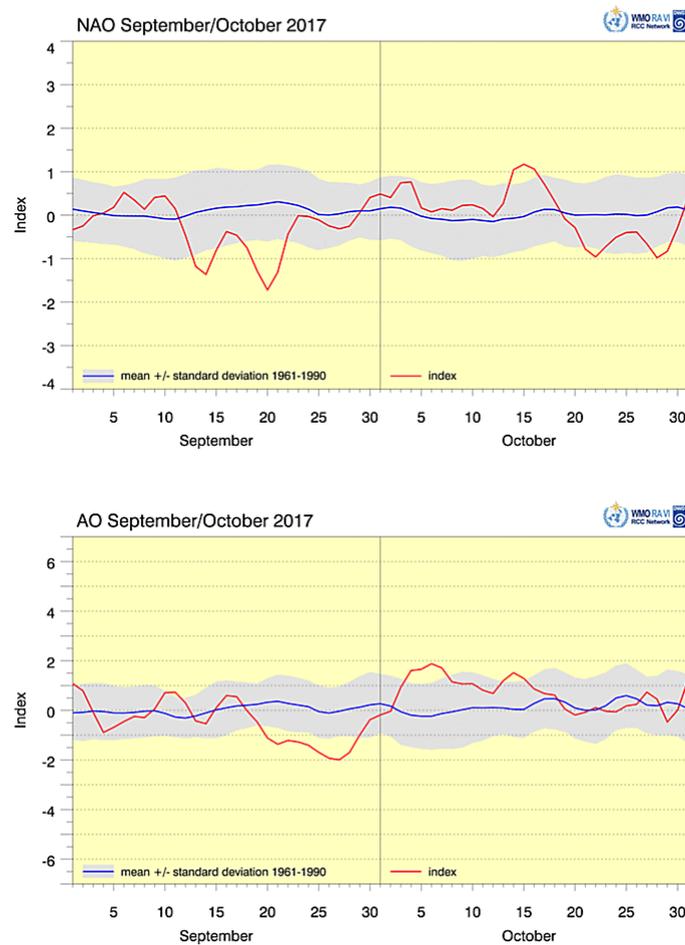


Figure 12: North Atlantic Oscillation (NAO, left) and Arctic Oscillation (AO, right) indices with 1961-1990 mean standard deviation (shading). <http://www.dwd.de/rcc-cm> , data from NOAA CPC: [http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily\\_ao\\_index/teleconnections.shtml](http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml)

## Weather types

The most frequent weather type in October 2017 according to Météo France classification was Atlantic ridge. Also the Blocking type had a relatively high frequency but with decreasing tendency (Fig. 13).

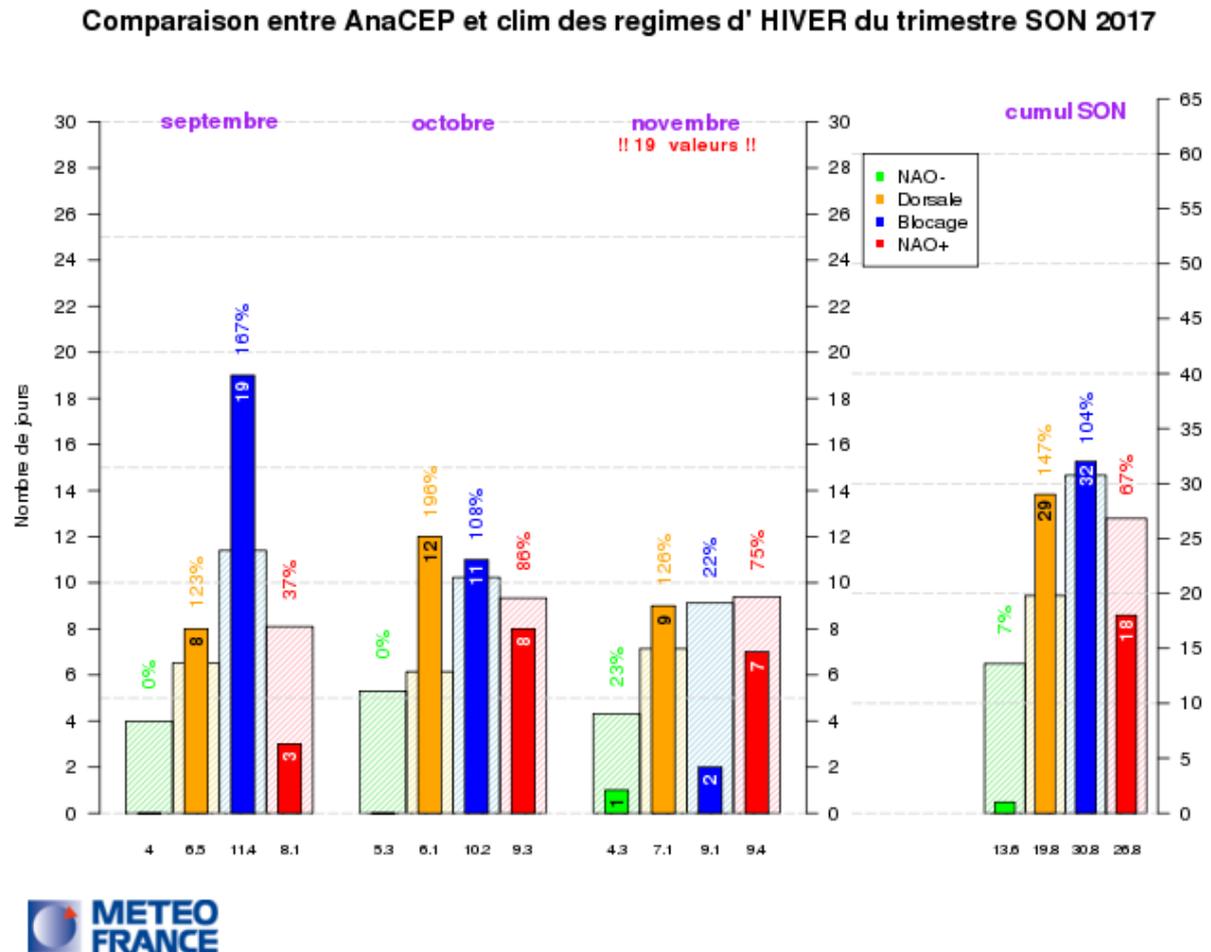


Figure 12: Distribution of weather types of Météo France classification: NAO-, Atlantic ridge (Dorsale), Blocking (Blocage), NAO+. Source: Météo France, <http://seasonal.meteo.fr/fr/content/suivi-clim-regimes-trim>

**Summary of Circulation Analysis for the MedCOF domain:**

There is a clear tendency for La Nina development since late summer 2017. A teleconnection to Europe/Mediterranean is possible, but not clear to detect. An intense wave structure can be found in the northern middle latitudes, propagating from the North Pacific to Western Europe. An anticyclonic pattern dominated particularly over the western parts of the domain with decreasing influence in eastern parts. NAO and AO had only minor influence.

### 3. Temperature anomalies

#### Global

October 2017 was one of the warmest October months on record globally. A significant contribution came from the polar regions, but also several areas on all continents had high positive anomalies, though there were also some negative ones (Fig. 14). The following are especially remarkable:

- over western Europe, large positive anomaly, close to classical impact of EA mode (cf <http://seasonal.meteo.fr/fr/content/suivi-clim-modes-impacts> )
- over the rest of the Eurasian continent, large negative anomaly, probably related (at least partly) to the early snow cover over Siberia.
- over North America, strong positive anomalies avec Alaska and Eastern Canada. At the contrary , negative anomaly (significant) over the Western part of US

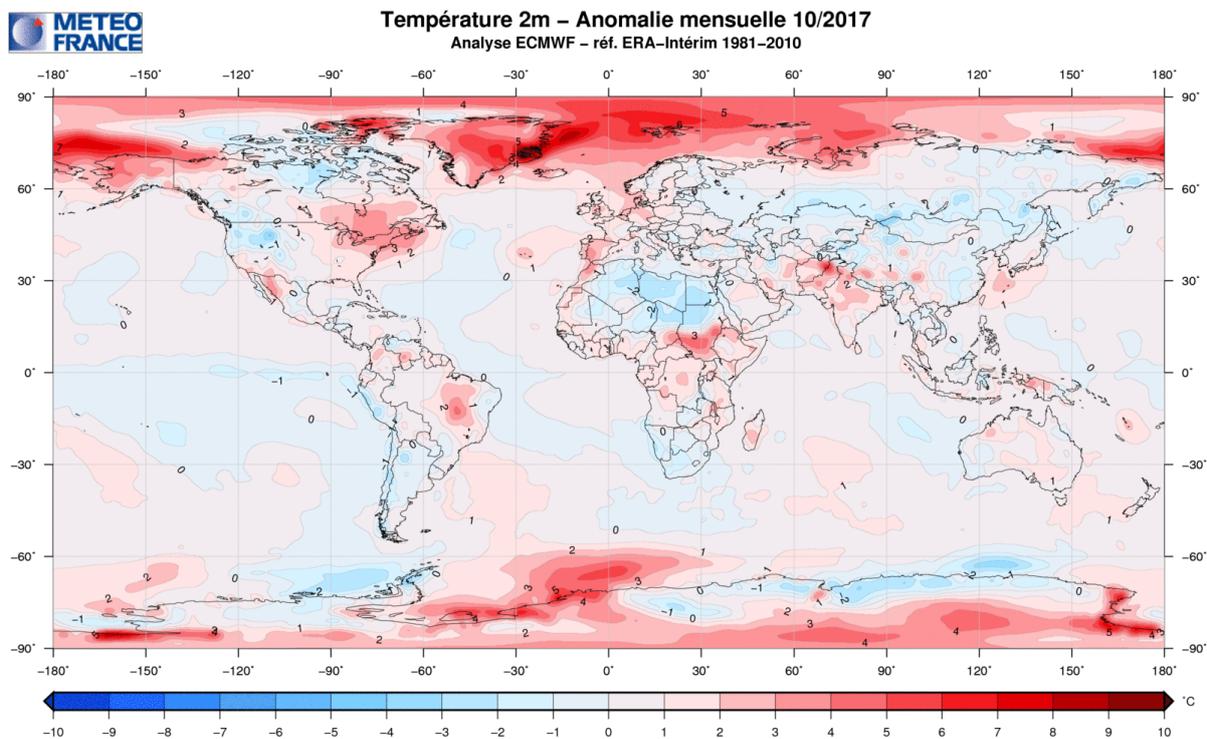


Figure 14: Temperature Anomalies (°C) (Meteo-France)

## Europe / RA VI

Monthly mean temperature in the lowlands in October 2017 ranged from around 7°C in the northern Ukraine to around 23°C in the Middle East (Fig. 15).

Anomalies (1981-2010 reference) were above normal and mostly in the upper tercile particularly in Iberia and much of France. In the rest of the domain mean temperatures were mainly around normal, but locally well above or below. Highest anomalies were recorded in Spain (above +3°C for 1981-2010 reference, above +4°C for 1961-1990), due to most intense high pressure influence.

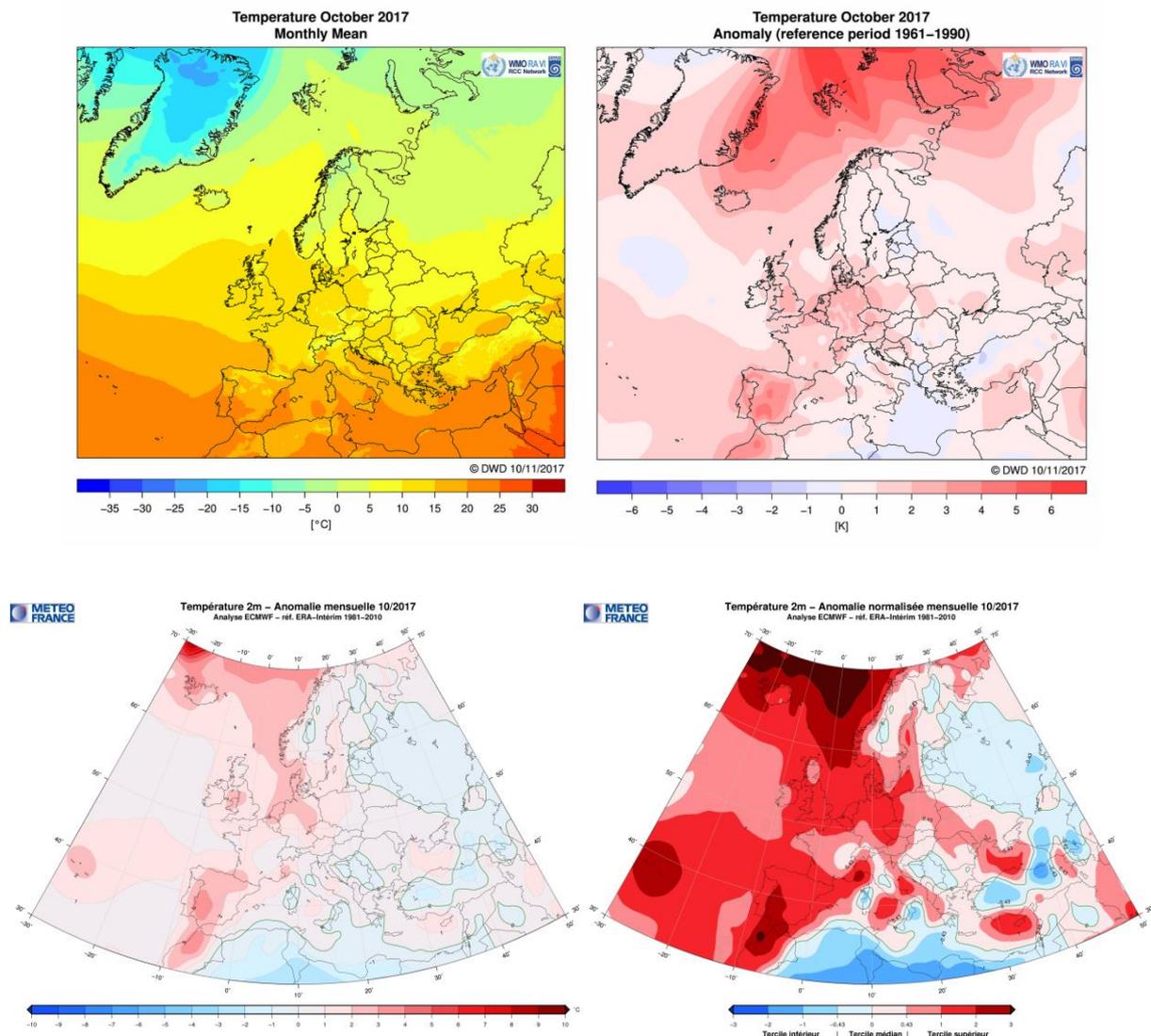


Figure 15: Mean temperature (upper left) and anomalies (1961-1990 reference, upper right) in °C in the RA VI Region (Europe) interpolated from CLIMAT station data, for October 2017. Source: DWD, [http://www.dwd.de/DE/leistungen/rcccm/int/rcccm\\_int\\_ttt.html?nn=490674](http://www.dwd.de/DE/leistungen/rcccm/int/rcccm_int_ttt.html?nn=490674).

Lower left: Absolute anomaly of temperature (1981-2010 reference), lower right: Standardized temperature anomalies, from ERA-Interim Reanalysis (Source: Météo France)

## North Africa

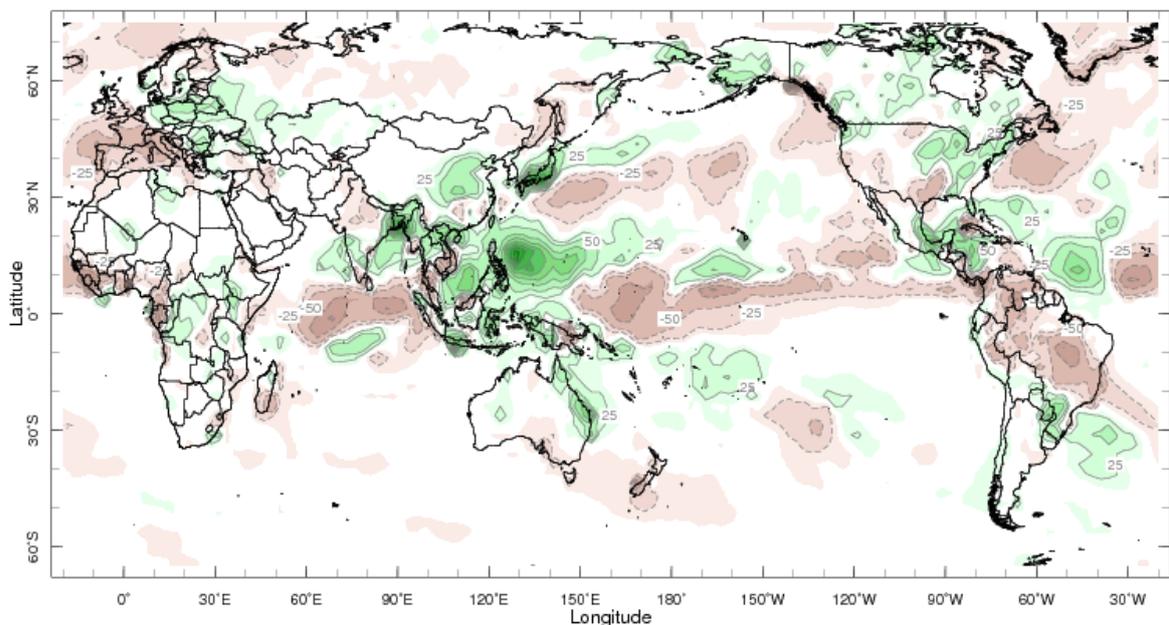
To be added.

Figure 16: Left: Mean temperature; Right: Absolute anomalies of temperature in the RAI-NA Region (North Africa)  
Data from NCDC (National Climate Data Centre NOAA – reference 1981-2010),  
<http://www.meteo.tn/htmlen/donnees/climatemonitoring.php>.

## 4. Precipitation anomalies

### Global

- In agreement with SST anomalies and velocity potential anomalies, above normal rainfall for the Maritime Continent (particularly over the east) and India, and below normal over the Equatorial Pacific.
- Drier than normal over West-Africa and for Amazonia where rainfall deficits have been persisting since April.
- Drier than normal for the Caribbean, wetter than normal over Central America.
- Over Europe, strong contrast between West/South-West (very dry) and East (very wet), consistent with Z500 anomalies.



Oct 2017

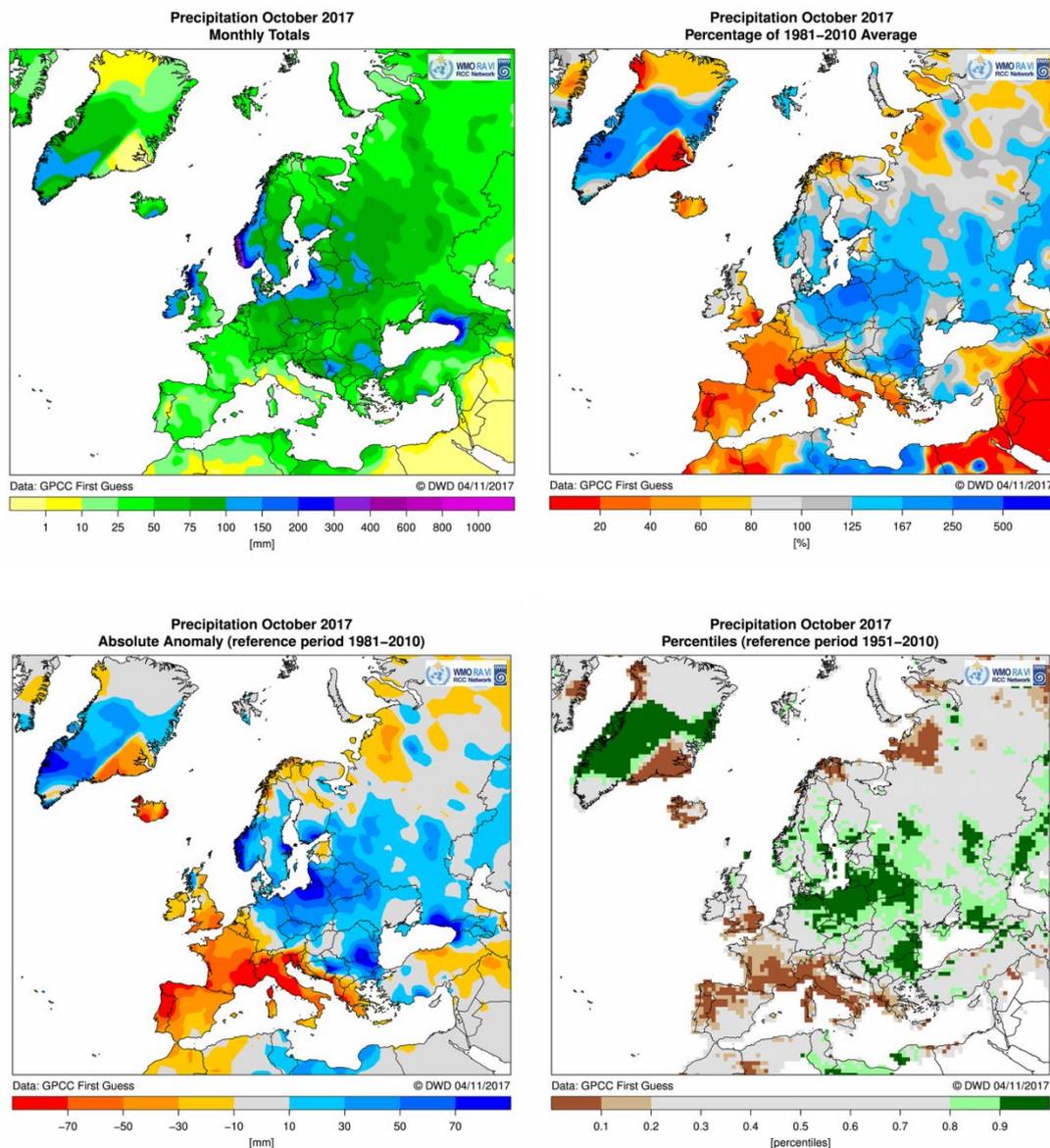
Figure 17: Rainfall Anomalies (mm) (departure to the 1979-2000 normal) – Green corresponds to above normal rainfall while brown indicates below normal rainfall.

<http://iridl.ldeo.columbia.edu/maproom/.Global/.Precipitation/Anomaly.html>

## Europe / RA VI

Some places in Iberia, southern France and Italy received very little precipitation, as well as the typically arid parts in the Middle East (Fig. 18). In the other parts of the domain there is a variety from 10mm in southern parts up to more than 200mm at the eastern Black Sea.

Compared to the 1981-2010 normal the dry places in Iberia, southeastern France, Italy and the Middle East received less than 20% of the normal precipitation. Apart from that the whole western part of the domain from Portugal to the west coast of the Balkans was drier than normal, partly below the 10<sup>th</sup> percentile, in line with high pressure influence. Eastern parts of the domain from eastern Croatia / Hungary to South Caucasus were wetter than normal, except central Turkey, almost the whole part of the Middle East and places at the Caspian Sea. Partly the totals were above the 90<sup>th</sup> percentile, especially in places close to the Black Sea and in the northern Ukraine.



**Figure 18: Monthly precipitation sum (upper left), percentage of normal (upper right), absolute anomalies (lower left), and percentiles for October 2017 (1981-2010 reference for means, percentages and anomalies, 1951-2010 for percentiles) in Europe. Data from GPCC (First Guess version). Source: DWD, [http://www.dwd.de/DE/leistungen/rccm/int/rccm\\_int\\_rrr.html?nn=16102](http://www.dwd.de/DE/leistungen/rccm/int/rccm_int_rrr.html?nn=16102)**

## North Africa

To be added.

Figure 19: Left: Total precipitation; Right: Absolute anomalies of precipitation in the RAI-NA Region (North Africa)  
Data from NCDC (National Climate Data Centre NOAA – reference 1981-2010)  
<http://www.meteo.tn/htmlen/donnees/climatemonitoring.php>

## 5. Sea ice

- In the Arctic, the ice extent remained well below the 1981-2010 normal
- For the Antarctic, the deficit remained also very high, with an annual maximum just above the 2016 record level. (Fig. 20-22).

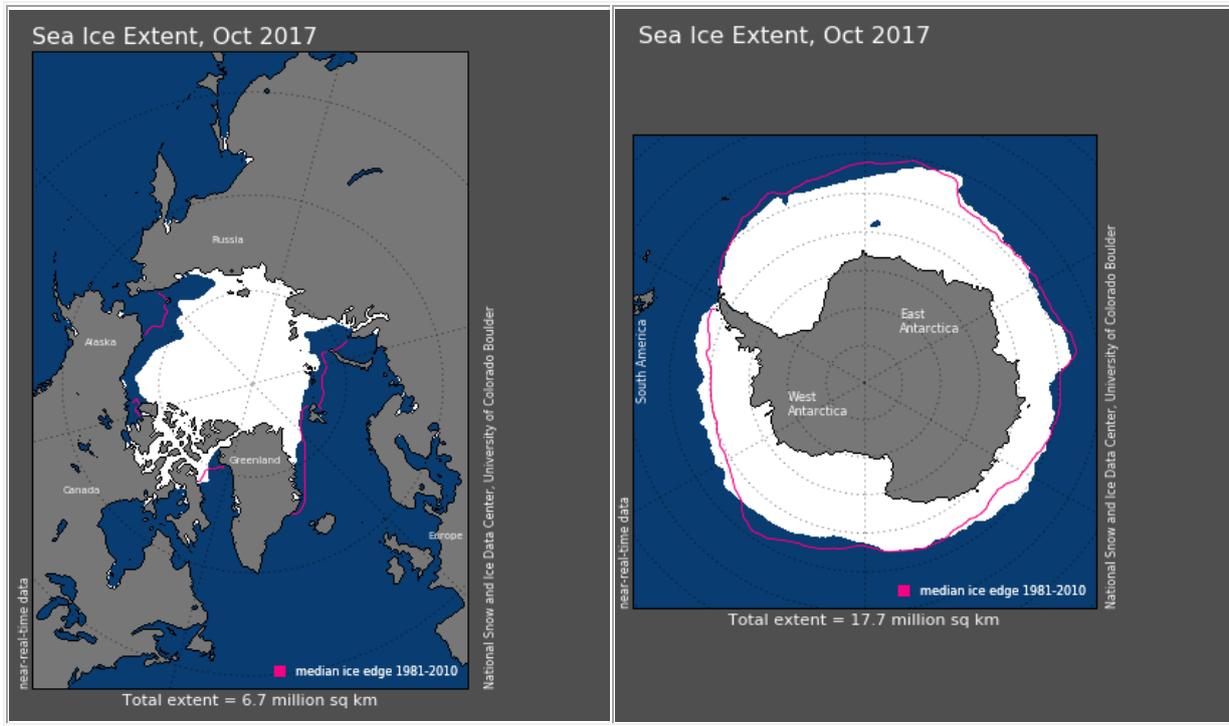


Figure 20: Sea-Ice extension in the Arctic (left) and in the Antarctic (right). The pink line indicates the averaged extension (for the 1979-2000 period). [http://nsidc.org/data/seaiice\\_index/](http://nsidc.org/data/seaiice_index/)

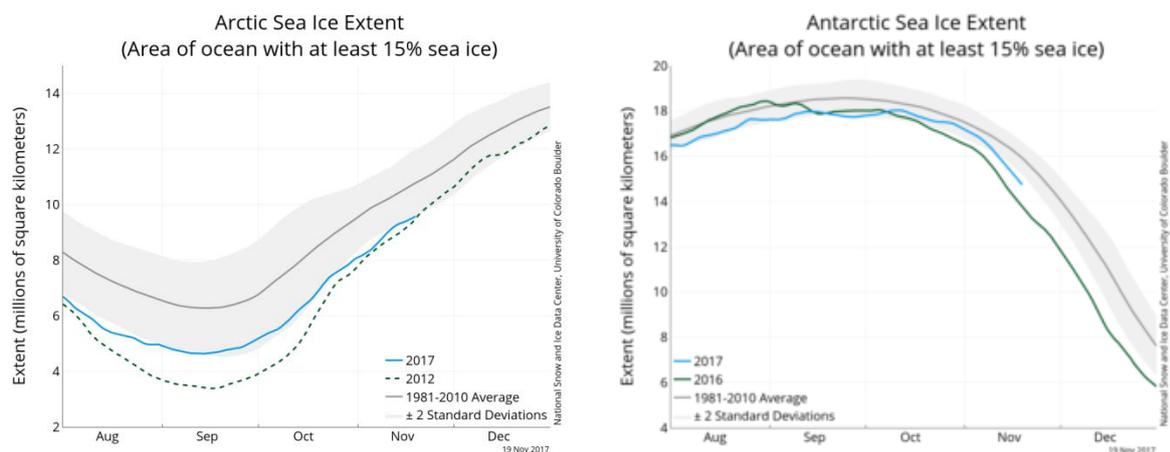
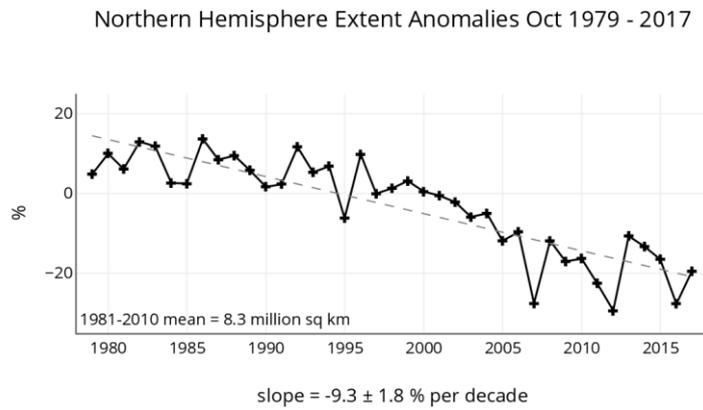
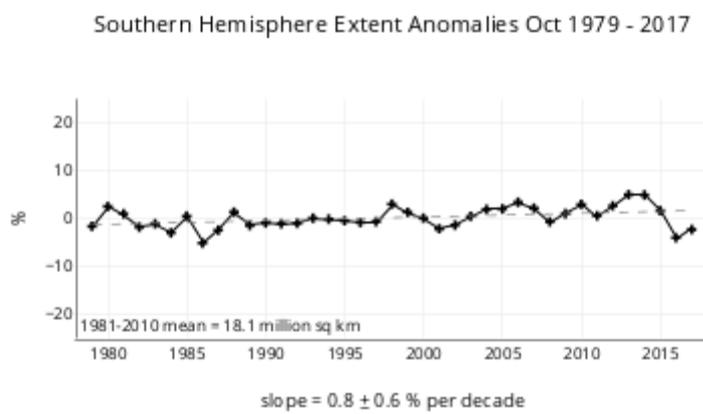


Figure 21: Sea-Ice extension evolution from NSIDC. [https://nsidc.org/data/seaiice\\_index/images/daily\\_images/N\\_stddev\\_timeseries.png](https://nsidc.org/data/seaiice_index/images/daily_images/N_stddev_timeseries.png)



National Snow and Ice Data Center, University of Colorado, Boulder



National Snow and Ice Data Center, University of Colorado, Boulder

Figure 22: Monthly Sea Ice Extent Anomaly Graph for the northern and southern hemisphere for the month of analysis ([http://nsidc.org/data/seaice\\_index/](http://nsidc.org/data/seaice_index/))

**References:**

Météo France Monthly Seasonal Forecast Bulletin and climate monitoring maps: <http://seasonal.meteo.fr/en>

WMO RA I RCC Node on Climate Monitoring Website with monitoring results: <http://www.meteo.tn/htmlen/donnees/climatemonitoring.php>

RA VI RCC Node on Climate Monitoring Website with monitoring results: <http://www.dwd.de/rcc-cm>

GPCC: <http://gpcc.dwd.de>