MEDITERRANEAN CLIMATE OUTLOOK FORUM
MEDCOF-5 MEETING

ANALYSIS AND VERIFICATION OF THE MEDCOF-4 CLIMATE OUTLOOK FOR THE 2015 SUMMER SEASON FOR THE MEDITERRANEAN REGION (MED)

Last update: 22 November 2015

Compiled by

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The following MedCOF verification report is based on

- the outcome of the consensus forecast of MedCOF 4,
- climate monitoring results of RA I NA RCC and RA VI RCC networks,
- the analysis and verification report of SEECOF-13 CLIMATE OUTLOOK for 2015 summer season for southeast Europe (SEE)
- national verification reports received from NMHSs or posted in RCOF forums of MedCOF, SEECOF or PRESANORD.

1. MedCOF-4 Climate outlook for the 2015 summer season

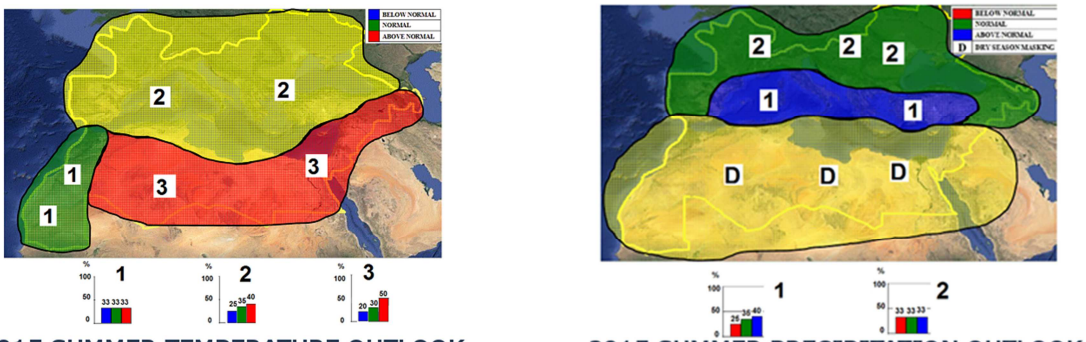


Figure 1: Graphical presentation of the climate outlook for the 2015 summer season for the Mediterranean region (a) Temperature Outlook; (b) Precipitation Outlook

Temperature

As stated in the MedCOF-04 consensus statement for the seasonal climate outlook for 2015 summer season for the Mediterranean region, a N-S or NW-SE gradient for temperature anomaly is predicted. There is a tendency for the upper tercile over almost the entire domain (Region 2 and 3 in figure 1 (a)). It's more marked over the southern part of the domain with 50% probability for the above-normal tercile, 30% for the normal tercile and 20% for the below-normal tercile (Region 3 in figure 1 (a)) and a little bit lower for the northern part (40,35,25%, respectively, Region 2). The Atlantic facade of North African regions shows no preference for any climate defined categories (Region 1 in figure 1 (a)).
This means for verification that an above-normal scenario is assumed for the whole MedCOF region except western North Africa where climatology is assumed.

Precipitation

Precipitation in the whole Mediterranean domain shows no clear scenario. The main signal refers to a slightly enhanced probability of "above normal" precipitations over the Mediterranean Sea and some parts of the south of Europe and most of Turkey with 40% probability for the above-normal tercile, 35% for the normal tercile and 25% for the below-normal tercile (Region 1 in figure 1 (b)).

Uncertainty in precipitation predictions is very marked. There is no preference for any climate defined categories in the remaining regions of MedCOF domain. Region 2 covering all remaining European parts of the MedCOF area, South Caucasus and eastern Turkey has no privileged scenario, so climatology is assumed. Region D which includes whole North Africa, the southern parts of the eastern Mediterranean and the Middle East was classified as dry region without defining scenarios and hence without verification.

2. Analysis of the 2015 summer season

Analysis of the summer season temperature and precipitation anomalies are based on seasonal bulletins on climate in the WMO region I and VI for the summer of 2015 (WMO RA I RCC Node on Climate Monitoring: http://www.meteo.tn/htmlen/donnees/climatemonitoring.php; WMO RA VI RCC Node on Climate Monitoring: http://www.dwd.de/rcc-cm), contributions from Regional Climate Outlook Forums for Southeastern Europe (SEECOF, http://www.seevccc.rs/?p=1489) and North Africa (PRESANORD, http://nwp.gov.eg/index.php/rcof/presanord) and national reports from MedCOF participants.

2.1. Temperature

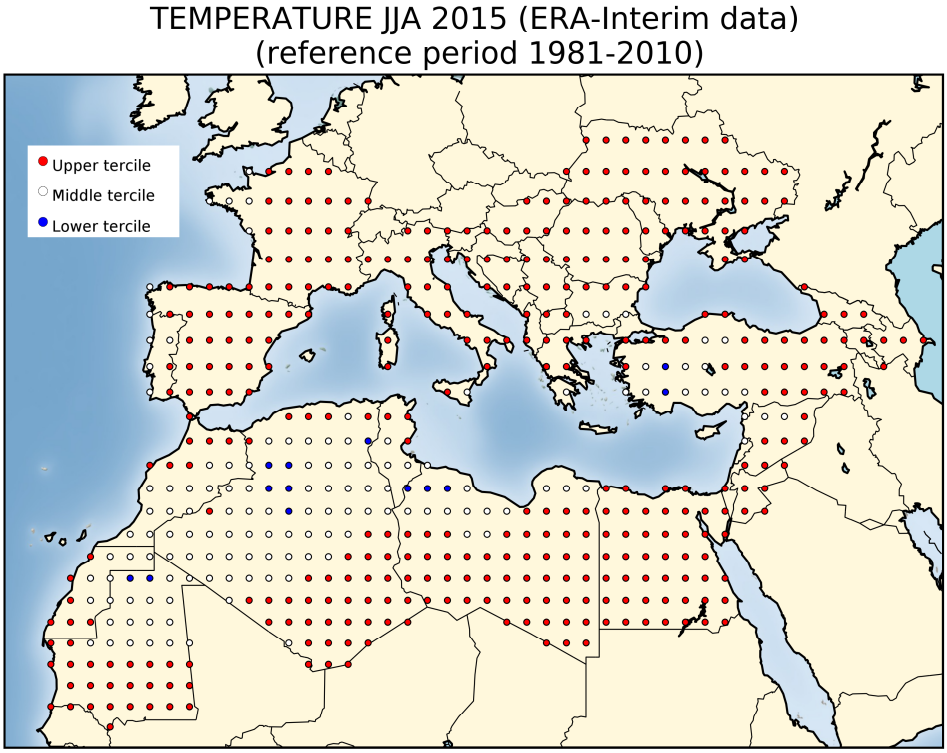
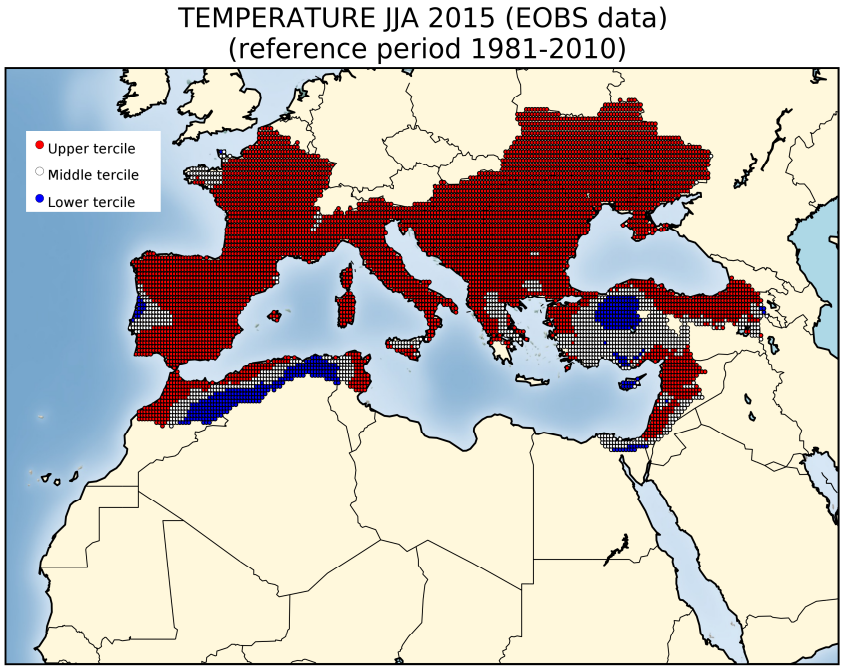


Figure 2: Terciles of surface air summer 2015 temperatures based on interpolated ERA-INTERIM grid data, 1981-2010 reference. Source: AEMET, data reference: **http://old.ecmwf.int/publications/library/do/references/show?id=90276**

Europe and Middle East (RA VI)

Tercile analysis of both gridded E-OBS and ERA-INTERIM data and individual ECA&D station data (Fig. 2 and 3) shows that summer 2015 temperatures were in the upper tercile in almost the whole RA VI MedCOF region. Only some places in Portugal, France, southern Italy, eastern Balkan Peninsula, Turkey and in the Middle East were in the middle tercile and just very few places in Portugal, Turkey and Cyprus were in the lower tercile, with slight differences between these data sets.

Temperature 1981-2010 and 1961-1990 anomalies are positive for summer 2015 within almost the whole MedCOF RA VI area. They are highest in the northeast (Ukraine, Hungary, Romania) with more than +2.5°C. Seasonal mean temperatures exceeded the 98th percentile and were among the three warmest on record in some places, e.g. in Montenegro, which were classified as extremely warm. Only a few small areas had negative anomalies, such as in northwestern France, southern Turkey and Cyprus, but not below -1°C. There were also partly high positive anomalies in the number of summer days (daily maximum temperature >25°C) and tropical nights (daily minimum <20°C).



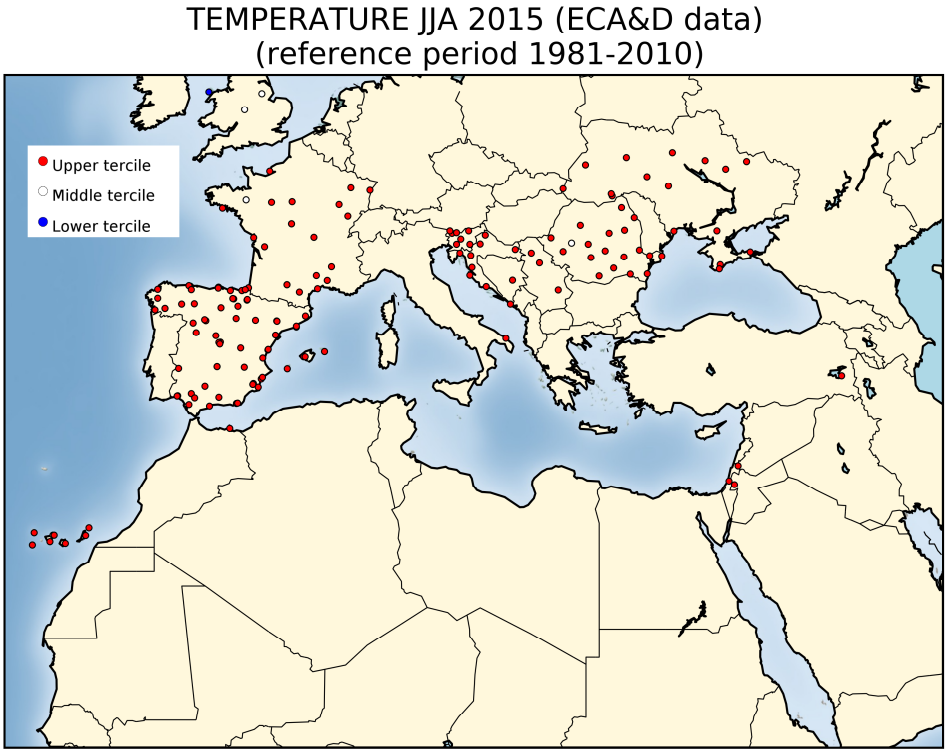


Figure 3: Terciles of surface air summer 2015 temperatures based on interpolated E-OBS grid data (upper graph) and individual station data (lower graph), 1981-2010 reference. Source: AEMET, data source: *http://www.ecad.eu/*

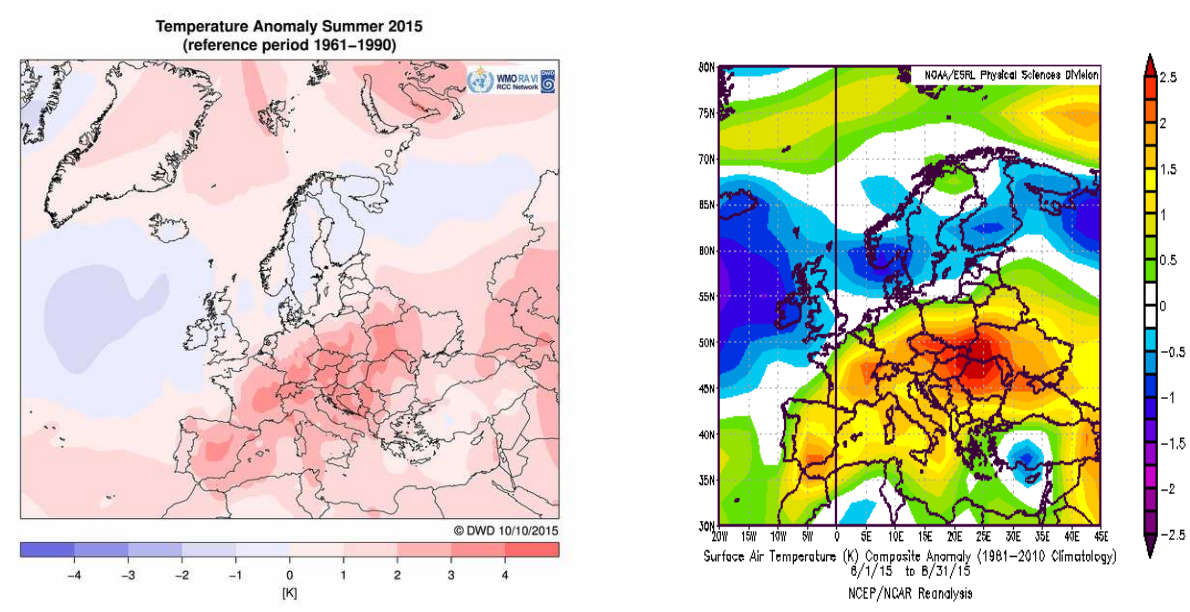


Figure 4: Surface air temperature anomalies for summer 2015. Left: Europe, 1961-1990 reference, source: WMO RAVI RCC, www.dwd.de/rcc-cm , right: Europe, 1981-2010 reference, source: NCEP/NCAR Reanalysis, http://www.esrl.noaa.gov/psd/data/composites/day/

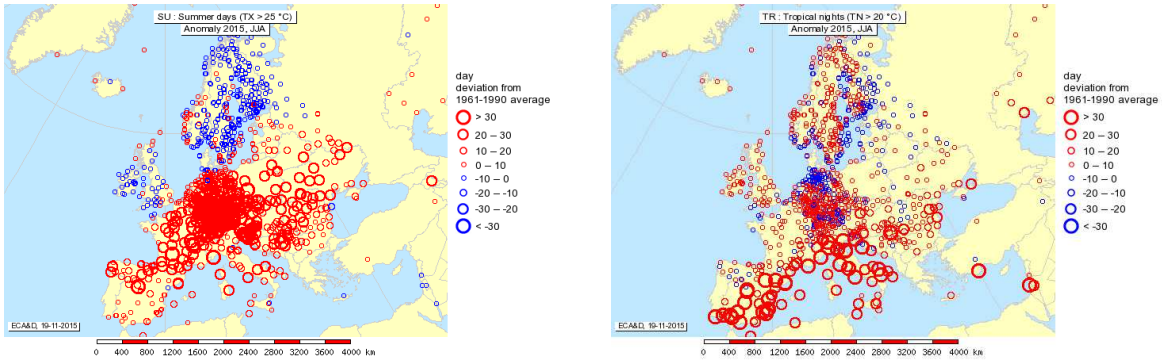


Figure 5: Anomalies of the number of summer days (left) and tropical nights (right) (1961-1990 reference) in summer 2015. Source: WMO RA VI RCC De Bilt Node on Climate Data, http://www.ecad.eu

North Africa (RA I)

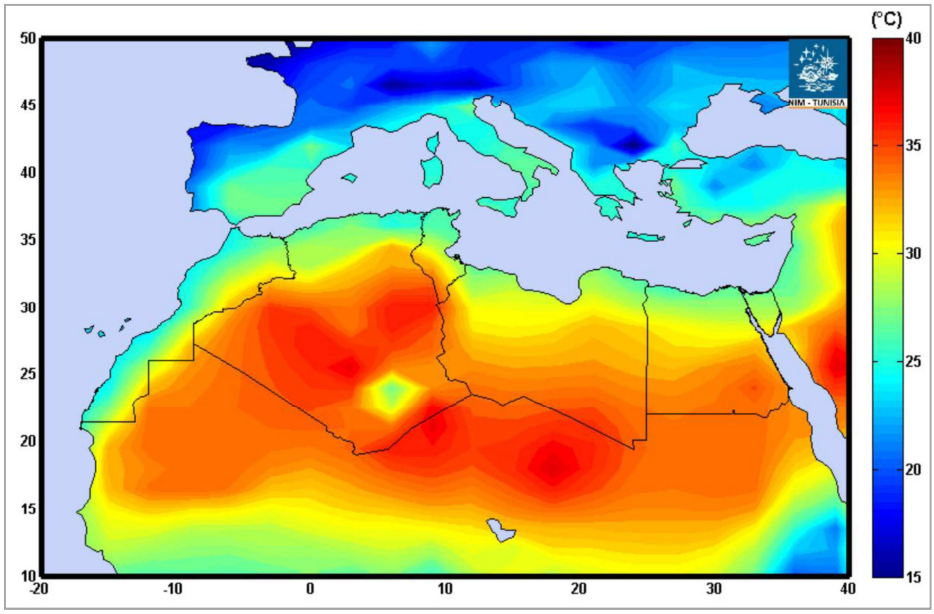


Figure 6: Mean temperature for summer season in North Africa (in °C)

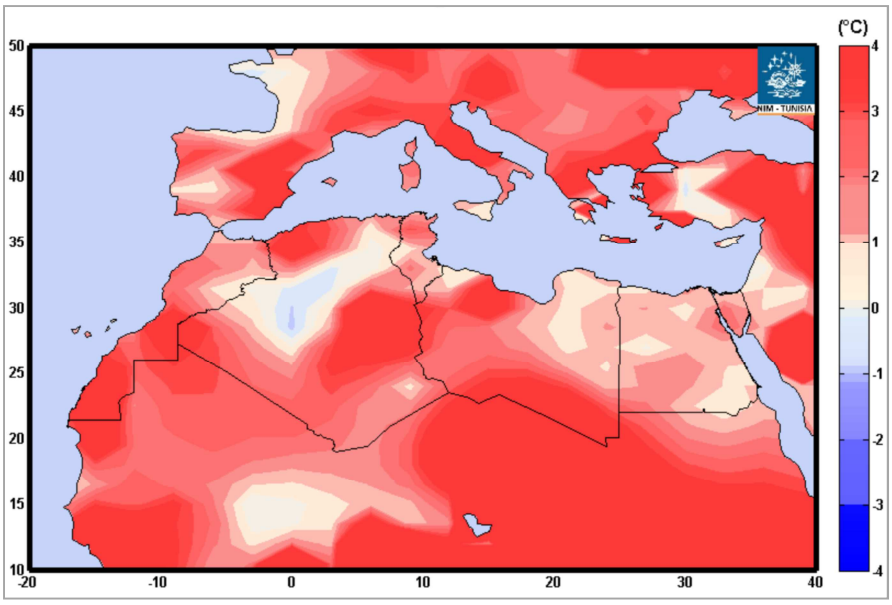


Figure 7: Temperature anomaly for summer season in North Africa (in °C), reference period 1981-2010

Summer 2015 was warmer than normal in almost all North Africa regions. At regional scale, mean temperature seasonal anomaly for summer 2015 was 1.14°C above the 1981-2010 normal average ranked as the fourth highest since 1980. It ranged between 25ºC in the north of Algeria and 37°C in the center of Algeria.

Positive anomalies are registered over almost all North African domains except the center of Algeria which registered below normal temperature. The highest anomalies are registered in the southern regions of North African domain, the north of Algeria, the north of Tunisia and the north-west of Libya. Elsewhere temperatures were near normal.

In Tunisia, the highest value of mean maximum temperature of 46.4°C was registered at Kairouan station.

In Algeria, canuculair temperatures were recorded in northern regions, especially during July.

2.2. Precipitation

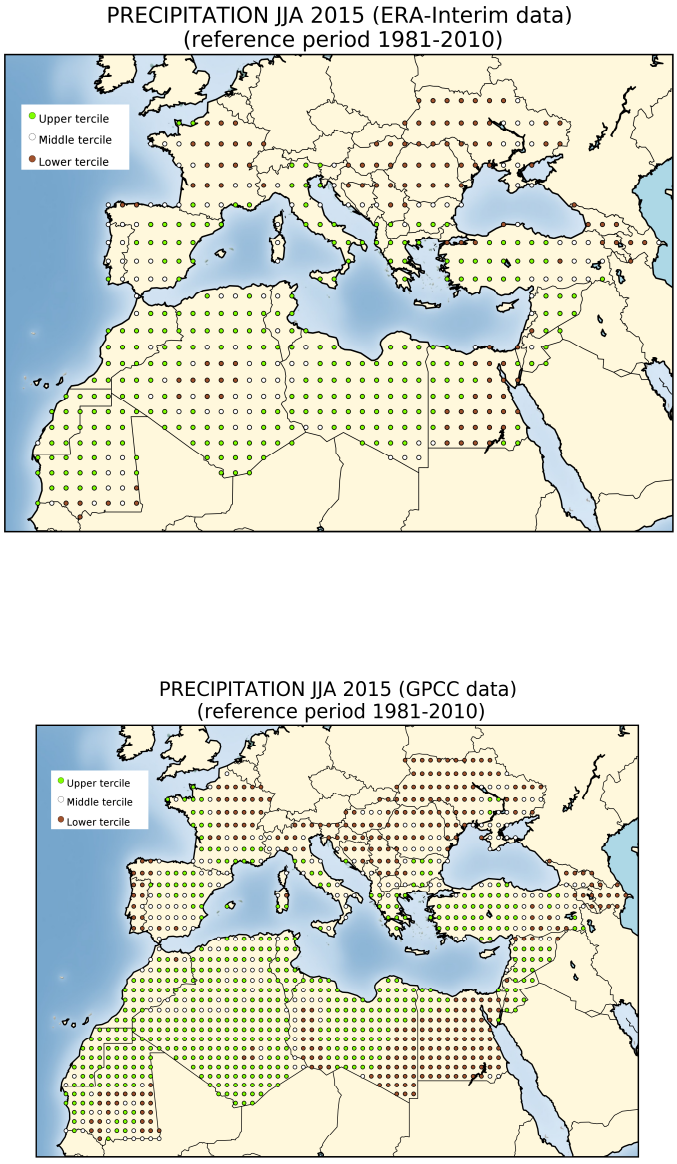


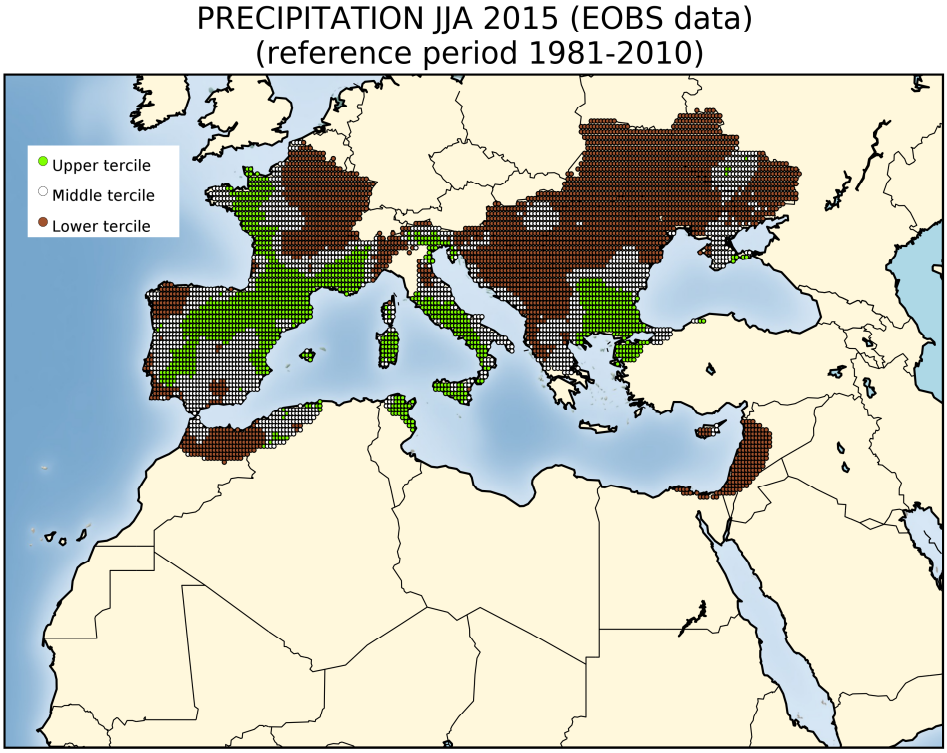
Figure 8: Terciles of surface air summer 2015 precipitation based on interpolated ERA-INTERIM (upper graph) and GPCC (lower graph) grid data, 1981-2010 reference. Source: AEMET, data reference:

ERA-INTERIM: **http://old.ecmwf.int/publications/library/do/references/show?id=90276**
GPCC: http://gpcc.dwd.de

Europe and Middle East (RA VI)

Precipitation was in the lower tercile especially in the north of the MedCOF region, particularly in most of France, Hungary, the northern Balkan Peninsula, Moldova, Ukraine and South Caucasus, and also in Portugal; in some other places of some of these countries precipitation was in the middle tercile and only locally in the upper tercile. Summer was wet with precipitation in the upper tercile mainly in areas closer to the Mediterranean Sea, especially in Spain, southern France, Italy, southern Balkan Peninsula, Turkey and Middle East due to some heavy precipitation events; some places were in the middle tercile, only locally in the lower tercile. The northwest and west coasts of France, too, were wet with precipitation in the upper tercile. The north-south gradient in terciles is more or less given by all data sets (ERA, E-OBS, GPCC, ECA&D), though with some slight differences.

Precipitation anomalies (Fig. 10) were below normal over most of Portugal, France, the Balkan Peninsula except the south and particularly over the northeast of the MedCOF region (western Ukraine, northern Romania, Moldavia). In the remaining parts of the MedCOF RA VI area, precipitation was normal to above normal. They were particularly high in eastern Spain, northern Italy, Greece and Turkey.



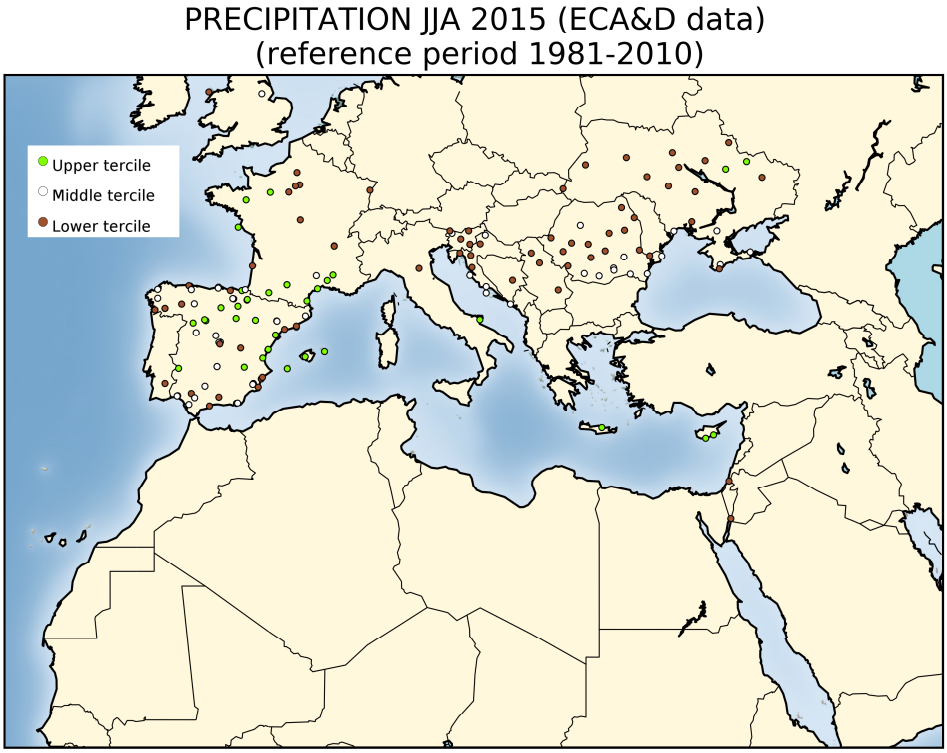


Figure 9: Terciles of summer 2015 precipitation based on interpolated E-OBS grid data (upper graph) and individual station data (lower graph), 1981-2010 reference. Source: AEMET, data source: *http://www.ecad.eu/*

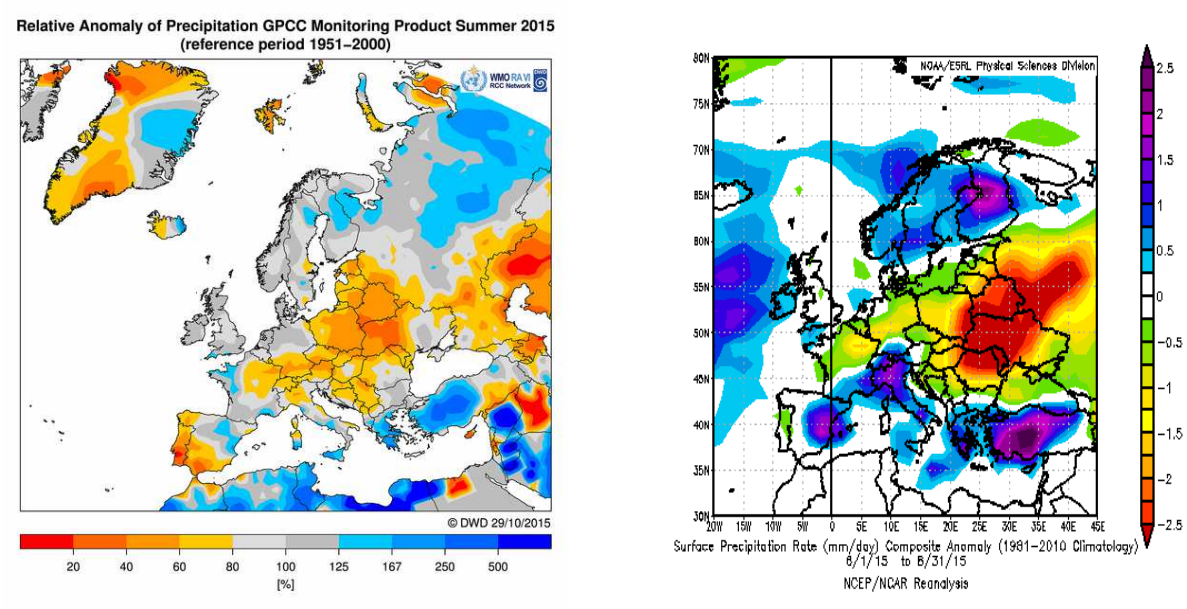


Figure 10: Precipitation anomalies for summer 2015 in Europe. Left: relative anomalies, 1951-2000 reference, source: WMO RAVI RCC, www.dwd.de/rcc-cm , data source: GPCC, http://gpcc.dwd.de ; right: absolute anomalies of precipitation rate, 1981-2010 reference, source: NCEP/NCAR Reanalysis, *http://www.esrl.noaa.gov/psd/data/composites/day/*

A more detailed analysis for south-eastern Europe, including high impact events, is given in the analysis and verification report of SEECOF-13 CLIMATE OUTLOOK for 2015 summer season for southeast Europe (SEE), provided by SEECOF-14: http://www.seevccc.rs

North Africa (RA I)

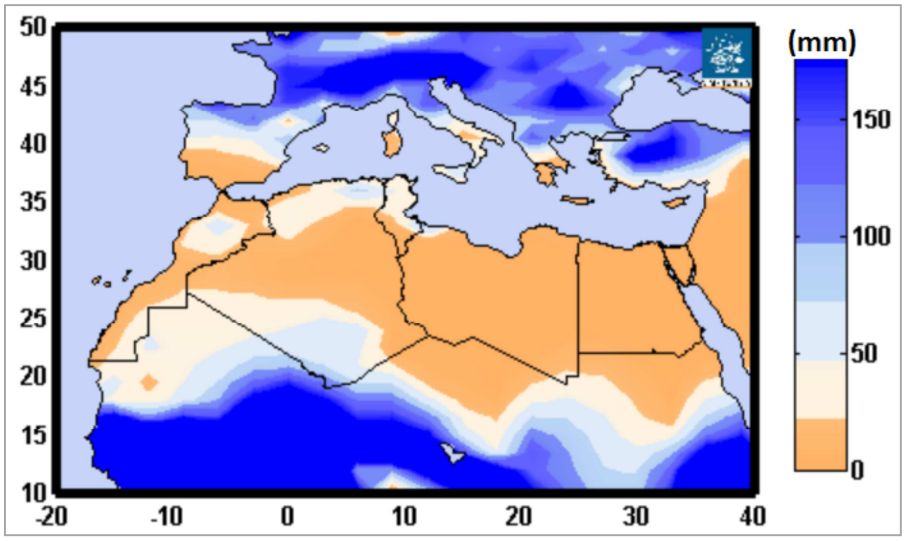


Figure 11: Total precipitation for summer season in North Africa (in mm)

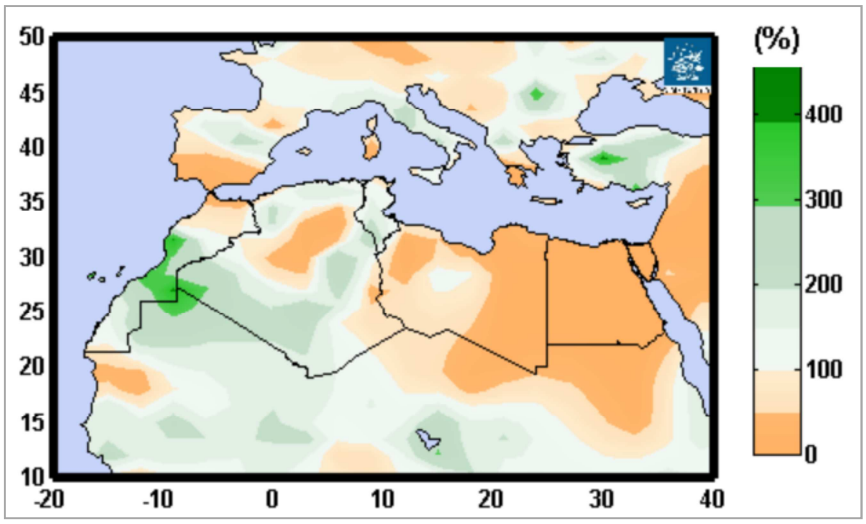


Figure 12: Precipitation anomaly for summer season in North Africa (in %) (Reference period 1981-2010)

Summer 2015 was drier than normal over Egypt, Libya, the center of Algeria and the extreme north of Morocco. Seasonal precipitation amounts were above normal especially in the center of Morocco, the south and north of Algeria, the center and the south of Tunisia. Elsewhere, precipitation was close to normal.

In Algeria, Rain and hail storm were recorded over the extreme south region.

In Libya, flood was registered on 6 August 2015 over North Eastern Mountains region.

3. Verification of the MedCOF-3 climate outlook for the 2014-15 winter season

3.1. Temperature

The MedCOF-4 climate outlook for the 2015 summer season favored the upper tercile over almost the entire domain with probability of 50% over the southern part of the domain and 40% probability over Mediterranean Sea and the entire RA VI part of the MedCOF region. The Atlantic facade of African regions shows no preference for any climate defined categories.

Europe/RA VI

The MedCOF outlook was correct for most of the area, except western France, Portugal, south Italy, southern Bulgaria, southern Greece, parts of Turkey, Cyprus, and the northern Middle East, which had mean temperatures around or locally below normal.

North Africa (RAI)

In fact, summer 2015 was warmer than normal in almost all North Africa. Positive anomalies are registered over almost all North African domains except the center of Algeria which registered below normal temperature.

This indicates that MedCOF-4 climate outlook for the summer season temperature has predicted the positive anomalies over almost all the domains except the Atlantic facade of African regions.

3.2. Precipitation

Europe/RA VI

MedCOF-4 climate outlook for the 2015 summer season favored an above-normal scenario for a region close to the Mediterranean Sea (Region 1) and no privileged scenario for the remaining parts of the RA VI MedCOF region (Region 2). This was mainly correct for Region 1, whereas Region 2 had mostly precipitation in the lower tercile and was drier than normal. A few parts of Region 2, however, were represented by one of the other two terciles.

North Africa (RAI)

MedCOF-4 climate outlook for the 2015 summer season didn’t favor any scenario for the entire region of North Africa (Dry masking). Summer 2015 was drier than normal over Egypt,

Libya, the center of Algeria and the extreme north of Morocco. Seasonal precipitation amounts were above normal especially in the center of Morocco, the south and north of Algeria, the center and south east of Tunisia. Elsewhere precipitation was near normal. MedCOF-4 precipitation prediction didn't give valuable information.

4. Users' perceptions of the MedCOF-3 outlook

No feedbacks were given by users in most cases.

Appendix A: Contributors to the Pre-COF of MEDCOF-5

Europe and Middle East (RA VI)

- National Meteorological and Hydrological Services of
- WMO RA VI RCC Offenbach Node on Climate Monitoring, Deutscher Wetterdienst, Germany

Country	Seasonal temperature (DJF)		Seasonal precipitation (DJF)		High impacts events
	Observed	MedCOF-4 climate outlook for temperature	Observed	MedCOF-4 climate outlook for precipitation	
Portugal (1) *	Normal in the west to above normal in the east	Above normal	Mostly below normal, locally in the east around normal	No privileged Scenario	
Spain (1)	Above normal	Above normal	Below normal in the south to above normal in the north	Mainly no privileged Scenario, in the east above normal	
France (1) *	Mainly above normal, in the west around normal	Above normal	In the west and south above normal, other parts below normal	Mainly no privileged Scenario, in the south above normal	
Italy (3)	Above normal, in the south locally around normal	Above normal	In the north below normal, other parts normal to above normal	Mainly above normal, in the north no privileged Scenario	
Slovenia (1)	Above normal	Above normal	Below normal	No privileged Scenario	

Hungary (1)*	Above normal	Above normal	Normal to above normal	No privileged Scenario	
Ukraine (1)	Above normal	Above normal	Mostly below normal, in the southeast locally above normal	No privileged Scenario	
Moldova (1)	Above normal	Above normal	Below normal	No privileged Scenario	
Romania (1)*	Above normal, locally around normal	Above normal	Below normal to normal	No privileged Scenario	
Serbia (1),(2),(3)	Above normal	Above normal	Below normal	No privileged Scenario	Some heat waves, especially in the second half of summer
Croatia (2)	Above normal	Above normal	Mostly below normal, at southern coasts above normal	No privileged Scenario, at southern coasts above normal	
Bosnia-Herzegovina (2)	Above normal	Above normal	Mostly below normal	No privileged Scenario	Summer 2015 year was extremely warm. In Sarajevo was the sixth warmest summer. Two heat waves registered. July 2015 was the hottest month of 2015 and the largest anomalies were registered in July. Bihac and Bugojno had the warmest July on record. Drought was in the first half of July.
Montenegro (2)	Above normal	Above normal	Normal except the north-northeast region with below-normal precipitation	No privileged scenario in the north, above normal in the south	3 heavy hail events from mid to end of July, damage on agriculture, roads, landslides, flooding; many forest fires in July/August.
Albania (1)*	Above normal	Above normal	Below normal in the north to above normal in the south	No privileged Scenario in the north, above normal in the south	

Macedonia (1)	Above normal	Above normal	Around normal	Above normal	
Bulgaria (2), (4)	Above normal, in the south around normal	Above normal	Below normal in the west, normal to above normal in the east	No privileged Scenario in the north, above normal in the south	
Greece (3)	Above normal, in the south around normal	Above normal	Above normal	Above normal	
Turkey	In the west mostly around normal, locally below normal, at the coasts and in the east above normal	Above normal	Mostly above normal, in the southeast locally below normal	Above normal in the west, no privileged Scenario in the east	
Georgia (2)	Above normal	Above normal	Below normal in the north, around normal in the south	no privileged Scenario	
Armenia (1)	Above normal	Above normal	Below normal	no privileged Scenario	
Azerbaijan (1)*	Above normal	Above normal	Below normal	no privileged Scenario	
Syria (1)*	In the north around normal, in the south above normal	Above normal	Above normal	Dry season masking	
Lebanon (1)*	around normal	Above normal	Around normal	Dry season masking	
Cyprus (1)	below normal	Above normal	Below normal	Dry season masking	Cold June, but hot July and August some thunderstorms
Israel (1)	Above normal	Above normal	Below normal	Dry season masking	

Jordan (1)*	Above normal	Above normal	Mostly above normal	Dry season masking	

Note:

(1) - Basic climatological period (1981-2010)
(2) - Basic climatological period (1961-1990)
(3) - Basic climatological period (1971-2000)
(4) – Basic climatological period (1980-2009)

* Data sources: E-OBS, NOAA NCDC, GPCC, ECA&D

North Africa (RA I)

Appendix A: Contributors to the MEDCOF-5

National Institute of Meteorology, Tunisia
Libyan National Meteorological Center, Libya
National Meteorological Directorate, Morocco

Country	Seasonal temperature (JJA)		Seasonal precipitation (JJA)		High impacts events
	Observed	MedCOF-4 climate outlook for temperature	Observed	MedCOF-4 climate outlook for precipitation	
Algeria	Above Normal over all Northern stations Normal over the Southern part	Above normal tercile	Above normal	Above normal in the extreme north-east Dry masking elsewhere	No comment
Egypt*	-	Above normal tercile	-	Dry masking	No comment
Libya	Above normal	Above normal tercile	Above normal	Dry masking	Tornado 160 km/h 7 August RR=30mm 6 August Flood 6 August

Morocco	Normal/ Above normal	No clear signal	-	Dry masking	No comment
Tunisia	Above normal in the north-east, center-east and south-west regions Below normal in the center-west and south-east regions.	Above normal tercile	Above normal in the south and the center regions Near normal elsewhere	Above normal tercile in the north Dry masking elsewhere	No comment

Note:
Basic climatological period (1981-2010)
* Not contribution

References:

MedCOF 4 Outlook: http://medcof.aemet.es/images/doc_events/medcof4/step3/docStep3/Consensus_Statement_MedCOF-4_final.pdf

SEECOF 13 Online Forum: http://www.seevccc.rs/?p=1489

PRESANORD: http://nwp.gov.eg/index.php/rcof/presanord

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

RA VI RCC-CM Website with monitoring results: http://www.dwd.de/rcc-cm

NOAA ESRL composite maps: http://www.esrl.noaa.gov/psd/data/composites/day/

NOAA NCEI percentile maps: http://www.ncdc.noaa.gov/temp-and-precip/global-maps/

IRI climate library: http://iridl.ldeo.columbia.edu/docfind/

ECA&D, E-OBS: http://www.ecad.eu

GPCC: http://gpcc.dwd.de