

## Second Session of the MEDITERRANEAN CLIMATE OUTLOOK FORUM MEDCOF-2 MEETING

### ANALYSIS AND VERIFICATION OF THE MEDCOF-1 CLIMATE OUTLOOK FOR THE 2013-14 WINTER SEASON FOR THE MEDITERRANEAN REGION (MED)

#### 1. MedCOF-1 Climate outlook for the 2013-14 winter season:

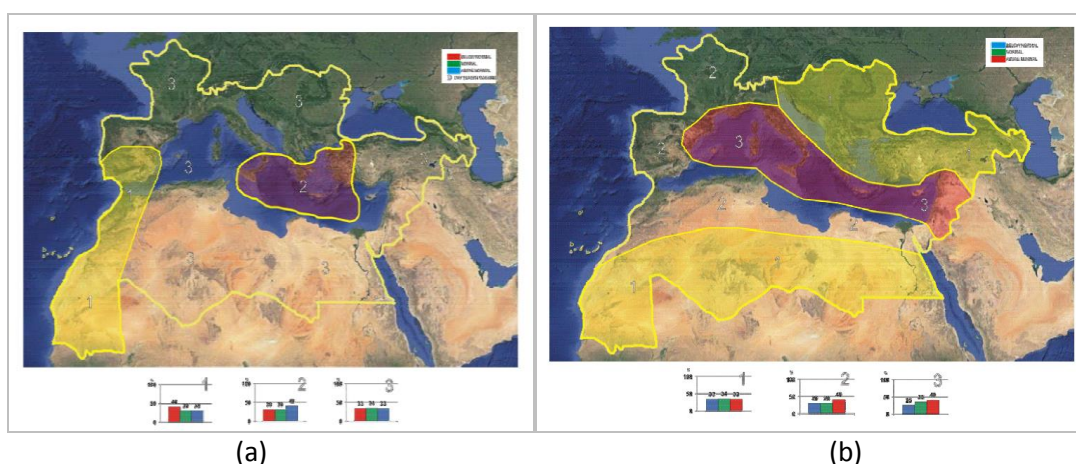


Figure 1: Graphical presentation of the climate outlook for the 2013-14 winter season for the Mediterranean region  
(a) Precipitation Outlook; (b) Temperature Outlook

#### Temperature:

As stated in the MedCOF-1 Consensus Statement for the Seasonal Climate Outlook for the 2013-14 winter season for the Mediterranean region, uncertainty for the temperature prediction is high in almost all the MedCOF region. A weak tendency is noticeable for the upper tercile in the western part of the domain, North African coasts and most of the Mediterranean Sea (regions 2 and 3 in figure 1 (b)). Most of the Balkan Peninsula, Turkey, South Caucasus region and Sahara show no clear signal and climatology is therefore assigned for the three categories (region 1 in figure 1 (b)).

## Precipitation:

Uncertainty in precipitation predictions is large. There is no preference for any climate defined categories in most of the MedCOF domain (region 3 in figure 1 (a)). There is a slightly higher probability (40%) that the amount of precipitation will be exceeded in the central Mediterranean region (region 2 in figure 1(a)). The southern part of the Iberian Peninsula and the Atlantic Facade of the African region show some slight tendency for the dry tercile (region 1 in figure 1(a)).

## 2. Analysis of the 2013-14 winter season:

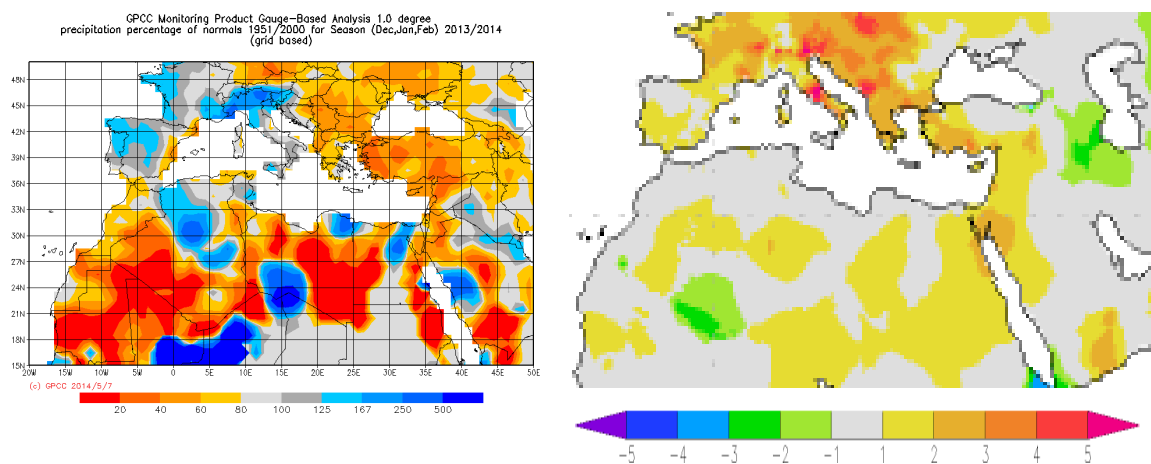


Figure 2: Left: Precipitation percentage of the 1951-2000 average for winter 2013/14. Source: GPCC, <http://kunden.dwd.de/GPCC/Visualizer> .

Right: temperature anomalies (1981-2010 reference) for winter 2013/14. Source: KNMI, data from NOAA NCDC, [http://www.knmi.nl/klimatologie/seasonal\\_overview\\_world\\_weather/index.cgi?var=t2m\\_ghcncams\\_w&mon1=DJF&year1=2014&anomalie=ja&kort=nee&expert=nee&type=kaartwereld](http://www.knmi.nl/klimatologie/seasonal_overview_world_weather/index.cgi?var=t2m_ghcncams_w&mon1=DJF&year1=2014&anomalie=ja&kort=nee&expert=nee&type=kaartwereld)

PRECIPITATION DJF 2014 (ECA&D data)  
(reference period 1981-2010)

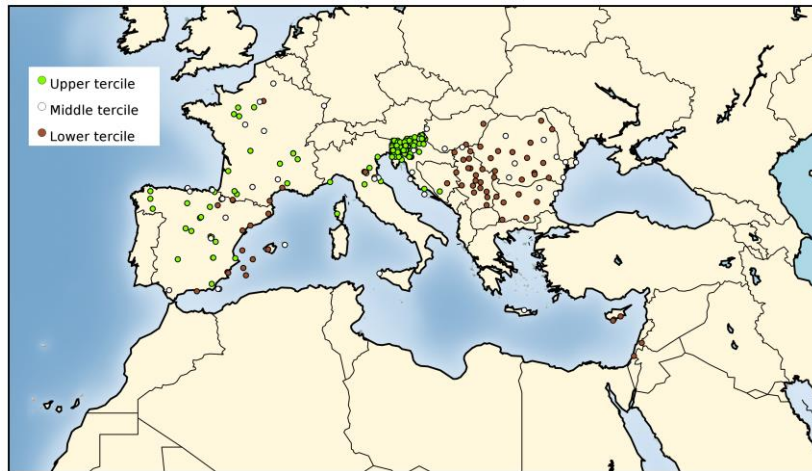


Figure 3: Precipitation for winter 2013/14 expressed in terciles [reference period 1981-2010] (Source: AEMET using ECA&D data)

TEMPERATURE DJF 2014 (ECA&D data)  
(reference period 1981-2010)

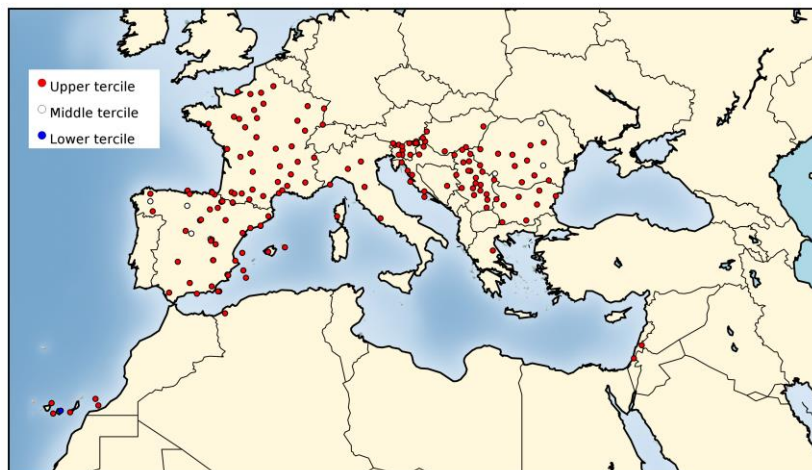


Figure 4: Mean temperature for winter 2013/14 expressed in terciles [reference period 1981-2010] (Source: AEMET using ECA&D data)

Analysis of the winter season temperature and precipitation anomalies are based on seasonal bulletins on climate in the WMO region I and VI for the winter of 2013-14 (WMO RA I RCC Node on Climate Monitoring: [http://www.meteo.tn/htmlen/donnees/Winter\\_2014.pdf](http://www.meteo.tn/htmlen/donnees/Winter_2014.pdf) ; WMO RA VI RCC Offenbach Node on Climate Monitoring: <http://www.dwd.de/rcc-cm>) and national reports from MedCOF participants.

#### Temperature:

##### Europe and Middle East (RA VI):

Winter 2013/2014 was warmer than normal in Western Europe, most of the Mediterranean Sea region and the Balkan Peninsula. Colder than normal were only an area in the eastern South Caucasus region and a few places in eastern Turkey.

Seasonal mean temperatures in the European MedCOF region ranged between less than -10°C in the highlands of eastern Turkey and more than 15°C in the eastern Mediterranean. Anomalies (1981-2010 reference) were mostly between +1 and +3°C. In some places near the Alps and on the western Balkan Peninsula they were even more than +4°C. On the other hand, anomalies were below +1°C particularly in parts of Spain, parts of the islands in the western Mediterranean, the eastern Balkan Peninsula, eastern Turkey and the South Caucasus region. Lowest anomalies occurred in Azerbaijan with less than -2°C.

The warm anomalies were partly exceptional. It was the warmest winter in most of Montenegro since 1951, the second warmest in France (since 1900) and in Italy (since 1800), and the third warmest in Serbia (since 1951). Some countries on the Balkan Peninsula (e.g. Croatia, Serbia, Bosnia and Herzegovina, Montenegro, Macedonia) classified winter 2013/14 as very warm or extremely warm either in the whole country or at least in some regions. Some heat waves occurred, but without any dangerous impact reported. Daily maxima on 17-19 February 2014 up to above 23-25°C were reached, so the accumulated snow in the mountains was below normal at the end of that winter. Also Italy had a significant warm spell in February with a highest daily maximum of 26°C.

Most of the region was warmer than normal during all three months. Several countries reported each month as one of the 10 warmest months in their long time-series either for the whole country or for regions or at least for stations. Spain had a colder-than-normal December, but particularly January and also February were warmer than normal, so the winter anomalies were low in Spain, but still positive. Especially January was also extremely warm

in Slovenia (the warmest on record in places), for others (e.g. Serbia) February was the most extremely warm month.

A cold depression occurred on 10-13 December 2013 in the eastern Mediterranean, Turkey and South Caucasus region. It caused local gusts, frost and snowfall even in lower elevations and resulted in damage on agriculture, forestry and transportation. However, this relatively short event was overcompensated by warm January and February months in 2014.

The cold anomaly in the South Caucasus was due to a very cold December. In the Ararat Valley in Armenia, it was the coldest December since 1901. A long frost period, which continued also in the first half of January, caused considerable damage to agriculture (especially fruit trees) in this region. Also Turkey experienced a cold December in most of the country, so most of the country had normal winter averages.

#### North Africa (RA I):

The winter of 2013-2014 was warmer than normal in most regions of North Africa. Winter season mean temperature ranged between 8°C in Djefla in the north east of Algeria and 21°C in Asswan in the southeast of Egypt.

In most of the North African region, anomalies ranged between +1°C and +2°C. Seasonal temperature was above normal in the north of Algeria, the north of Tunisia, the north of Libya, the east of Morocco and the north of Egypt. Anomalies were even higher with values up to +3°C above normal. This was registered in the center of Algeria, the south of Tunisia, and the south of Egypt.

The exception occurred in the southern region of Libya with an anomaly of 0°C below normal 1981-2010.

#### Precipitation:

##### Europe and Middle East (RA VI):

Winter 2013/2014 was wetter than normal (more than 125% of the normal) in western France and most of the Iberian Peninsula (except the east) under Atlantic influence. Wetter than normal was also the southern Alpine region (locally more than 250% up to 400%), and parts of the Adriatic coast, the northern Italian Peninsula and western Sicily, and partly the northwestern Balkan Peninsula. The very high anomalies in Western Europe and the Southern Alps were due to frequent cyclonic activity with heavy rains particularly in January and February. Some regions in western and southern France reported their wettest winter since 1959. The cyclones caused stormy conditions near the Atlantic starting already end of December; high waves and storm surges at the Atlantic coasts caused significant damage and fatalities. Large amounts of snow fell along the Southern Alps. Two heavy convective precipitation events occurred in Italy (Rome and Veneto region) between January 31 and

February 6, some new records of daily precipitation totals were recorded. At the same time, Slovenia experienced a severe freezing rain / black ice period, causing high damage on forests, electricity infrastructure and traffic, including at least one fatality. For both critical regions (western Europe and southern Alpine region), the WMO RA VI RCC-CM issued a climate watch advisory.

Drier than normal were the Levante coast in eastern Spain, much of southern Italy, most parts of the Balkan Peninsula, the South Caucasus region, Turkey, Cyprus and parts of the Middle East. Less than 60% of the normal fell in large parts of these areas; some places in Serbia and Montenegro, the western half of Turkey and the Middle East received even less than 40%. Most of Serbia and northeastern Montenegro was classified as very dry, some few places in eastern Croatia and western Serbia even as extremely dry. It was the driest winter in Cyprus since 1901 and the third driest in Serbia since 1951. Due to the warm and dry weather on most of the Balkan Peninsula, the number of days with snow cover in the lowlands was below average (e.g. in Serbia). Israel reported that the period from mid December 2013 to end of February 2014 was the driest for more than 70 years resulting in high economic damage on winter crops. Armenia reported drought in February in some regions, but some heavy snowfall in December and January, causing roads to be closed for traffic.

On the Balkan Peninsula, particularly December 2013 contributed to the dry winter, especially in the west. It was the driest December in Bosnia and Herzegovina (since 1881) and in the southern coastal region of Montenegro. In Bulgaria, there were some wildfires at the end of December, which was quite unusual. However, also February was very dry on most of the Balkan Peninsula (except the northwest), in some parts (e.g. Serbia and most southern areas) also January, while in others (e.g. Montenegro) the dry period was interrupted by the heavy precipitation coming from a central Mediterranean cyclone.

In spite of the mostly dry winter, there were a number of heavy rain and heavy snowfall events in Turkey during all three winter months, which had some damage on transport and agriculture. Georgia reported local record snow depths of more than 2m especially during a cold depression event in mid-December (see Temperature section).

#### North Africa (RA I):

The winter of 2013-2014 was drier than normal in most regions of north Africa especially in the south of Algeria, Libya and Egypt. Libya reported drought events in January and February.

The extreme north of Africa had normal winter precipitation totals. Exceptions occurred in the extreme north of Algeria and the center of Tunisia which are considered wetter than normal with a maximum percentage of 130% of the normal in the center of Tunisia.

### **3. Verification of the MedCOF-1 climate outlook for the 2013-14 winter season:**

Temperature:

Europe and Middle East (RA VI):

The warmest percentile was predicted with 40% probability for the western parts of the European domain and the Mediterranean. In fact, at least some of these areas, especially in France and in Italy, reported high positive seasonal anomalies and France had even its second warmest winter. This means that the MedCOF-1 outlook was generally successful for the regions 2 and 3 in Europe.

For region 1, which concerns the Balkan Peninsula, Turkey and South Caucasus within RA VI, climatology was predicted. The analysis shows quite extremely positive anomalies on the Balkan Peninsula, but also extremely negative anomalies in the eastern South Caucasus. This means that these extreme anomalies could not be resolved by the outlook.

North Africa (RA I):

The MedCOF-1 climate outlook for the 2013-2014 winter season concluded that the seasonal temperature over coasts of North Africa would be above normal with low probability. It was not possible to predict the winter season temperature in the south regions, i.e. the south of Algeria, the south of Morocco and most regions of Libya and Egypt due to the equal probabilities for below-, near-, or above-normal conditions. This indicates that the climate outlook for the winter season air temperature was not able to predict temperature anomalies registered for most north African regions.

Precipitation

Europe and Middle East (RA VI):

The MedCOF-1 outlook predicted a tendency for a dry anomaly in southern Spain. In fact, this dry anomaly occurred, but more in eastern Spain than in the south.

The outlook further tended to a wet anomaly over the central Mediterranean. This can only be verified for some western parts (e.g. western Sicily), while eastern parts of region 2 (Greece, western Turkey) were very dry in contrast.

Since uncertainty was high, climatology was assumed for the rest of the European part of the domain. Neither the extreme precipitation in Western Europe and the southern Alpine region nor the extremely dry conditions over the Balkan Peninsula and the eastern parts of the domain were predicted.

North Africa (RA I):

According to MedCOF-1, it was predicted that the winter season precipitation totals would be near or below average in the west of North Africa covering all of Morocco. This prediction turned out to be quite accurate. In the rest of the North African domain it was not possible to predict the summer season precipitation totals due to dry season masking.

#### **4. Users' perceptions of the MedCOF-1 outlook**

Users of seasonal forecasts were mainly the general public and the media, partly also the public and private sector (water management, energy, agriculture) and governmental authorities. Some countries disseminate forecasts on their websites, others do not provide them to users due to lack of predictability or skill.

Feedback from users was mostly rare. Israel reported that end users were not satisfied because there was no preferable scenario given and drought was not forecasted. In Armenia, users were dissatisfied because the cold wave in December/January was not forecasted.

## **Appendix A: Contributors to the Pre-COF of MEDCOF-1**

- Armenian State Hydrometeorological and Monitoring Service
- National Institute of Meteorology and Hydrology, Bulgaria
- Cyprus Department of Meteorology
- Deutscher Wetterdienst, Germany
- Hellenic National Meteorological Service, Division of Climatology, Greece
- Israel Meteorological Service
- Republic Hydrometeorological Institute, The Former Yugoslav Republic of Macedonia
- Institute of Hydrometeorology and Seismology, Montenegro
- National Meteorological Directorate, Morocco
- Republic Hydrometeorological Service of the Republic of Srpska, Bosnia and Herzegovina
- AEMET, Spain
- National Institute of Meteorology, Tunisia
- Turkish State Meteorological Service

| Country   | Seasonal temperature (DJF)  |   | Seasonal precipitation (DJF)   |  | High impacts events  |
|---|---|---|--|--|--|
|   | Observed  | MedCOF-1 climate outlook for temperature                      | Observed   | MedCOF-1 climate outlook for precipitation |  |
| Albania<br>Temperature(5)*<br>Precipitation(9)**    | Above normal  | No signal   | Below normal   | No signal                                  | No comment   |
| Algeria<br>(6) *                                    | Above normal in the center<br><br>Normal in the rest of the country | Above normal in the north<br><br>No clear signal in the south | Above normal in the extreme north<br><br>Normal to below normal in the rest of the country | No clear signal                            | No comment   |
| Armenia<br>(8)                                      | Normal Below normal in Ararat valley                                | No clear signal   | Below normal   | No clear signal                            | In the beginning of December, strong winds were observed with gusts up to 25 m/s.<br>On several days during December and January heavy Snow was observed with maximum rate of 36 mm on December in Bagratashen and 26 mm on January. Below normal temperature by 10°C to 12°C lasted 24 days in Ararat Valley from 20 December to 14 January.<br>On February, drought lasted in Ararat Valley, Sjuniq and Tavush for the entire month. |
| Azerbaijan<br>Temperature(5)*<br>Precipitation(9)** | Below normal  | No signal   | Below normal   | No signal                                  | No comment   |
| Bosnia and Herzegovina<br>(5)                       | Above normal  | No clear signal   | Below normal   | No clear signal                            | 2013-14 winter season was very warm to extremely warm with occurrence of some heat waves. This didn't have any dangerous impact.<br>December was the driest month on record, by 1881 up to now. Deficit of precipitation ranged from   |

|                    |                         |                                |  |                                |  |
|--------------------|-------------------------|--------------------------------|--|--------------------------------|--|
|                    |                         |                                |  |                                | 99.6% in Banja Luka to 78.1 in Rudo.   |
|                    |                         |                                |  |                                |  |
| Bulgaria<br>(1)    | Near or above<br>normal | No clear signal<br>(or normal) | Near or below<br>normal  | No clear signal<br>(or normal) | <p>Dry weather in December led to wild fire in the western part of the country.</p> <p>In the beginning of January, dry and foggy weather was observed. In its last week, the northeastern region experienced severe weather with snow blizzards registering snow depth of 30 to 80 cm. the accumulated snow in the mountains was, however, below normal.</p> <p>February was warm with maximum temperature ever measured of 25.2°C in Dermantsi.</p>  |
| Croatia<br>(5) (6) | Above normal            | No signal                      | Above normal<br>in the<br>northwest,<br>Mostly normal<br>elsewhere | No signal                      | No comment   |
| Cyprus<br>(2) (3)  | Above normal            | Above normal                   | Below normal   | Normal or No<br>clear signal   | <p>2013-14 winter was recorded as the worst winter since 1901 with total precipitation of 58 mm in December, 36.9mm in January and 41.5 in February.</p> <p>December registered a cold depression causing a gale force wind associated with low temperature and snowfall from the height of 250m and above. This resulted in a sequence of frost days.</p> <p>February and January were warm with temperature ranging from normal to above normal by 3°C.</p> <p>Agricultural sector was affected by these events. Trees in the north face of Troodos Range were damaged.</p> <p>Transportation was also affected since a lot of roads were closed for days due to the frozen snow</p> |

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| Egypt<br>(6) *                                    | Above normal  | Above normal<br>in the extreme<br>north<br><br>No clear signal<br>in the south   | Below normal  | No clear signal  | No comment  |
| France<br>Temperature (5)*<br>Precipitation (9)** | Above normal  | Above normal   | Above normal<br>in the west and<br>southeast,<br>elsewhere near<br>normal   | No clear signal  | Cyclones caused stormy conditions near the Atlantic starting already end of December; high waves and storm surges at the Atlantic coasts caused significant damage and fatalities.  |
| Georgia<br>(8)                                    | Normal  | Normal and no<br>clear signal  | Normal and<br>Below normal  | Normal and no<br>clear signal  | In the first part of December (from 1 <sup>th</sup> December till 16 <sup>th</sup> ) very cold air masses entered Georgia and it covered the entire western Georgia, especially Ajara's mountainous territories, and brought drop of air temperature and very heavy precipitation. In Khulo Snow depth was 110 cm on 9 <sup>th</sup> December, 200 cm on 11 <sup>th</sup> December and 218 cm on 15 <sup>th</sup> December. It was a record for this region. Such strong precipitation is a very rare phenomenon for Ajara, especially in December. |
| Greece<br>(4)                                     | Above normal<br>in the areas of<br>Ionian Sea,<br>west of<br>Peloponnese,<br>Crete.<br><br>Norma in the<br>rest of the<br>country | Above normal<br>in the areas of<br>Ionian Sea,<br>west of<br>Peloponnese,<br>Crete and the<br>southern part of<br>Aegean Sea<br><br>No clear signal<br>in the rest of the<br>country | Above normal<br>in the areas of<br>Ionian Sea,<br>Peloponnese<br><br>Below normal<br>in the area of<br>Aegean Sea | Above normal<br>in the areas of<br>Ionian Sea,<br>Peloponnese,<br>Attika, Crete<br>and the majority<br>of Aegean Sea<br><br>No clear signal<br>in the rest of the<br>country | No comment  |

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|--|---------------|--|---|---|--|
| Hungary<br>Temperature (5)*<br>Precipitation (9)** | Above normal  | No signal  | Mostly below<br>normal,<br>In the west<br>normal  | No signal   | No comment   |
| Israel<br>(5)                                      | Above normal  | Above normal                                     | Below normal  | No clear signal   | <p>During 10-14 December 2013, a cold wave occurred. Snow depth of 0.5m in Jerusalem and up to 1m in the surrounding mountains and record-breaking minimum temperature (since 1978) of -13.6°C in the Golan Heights were registered. The storm left 35000 houses without electricity for up to 4 days. A direct cost of 24 million Euros was spent for evacuations and for removal of snow and debris.</p> <p>The period from mid-December 2013 until the end of February 2014 was the driest since 70 years ago. The drought impact for the winter crop yields is estimated crudely by 70000 Euros.</p> |
| Italy<br>(5)                                       | Above normal. | Overall above normal, apart from Northern Italy. | Well above normal over Northern regions and over interior central regions. Above normal over Sicily, while below normal over most of Calabria and over central and Northern | Climatological expectations over most of Italy; Above normal over Sicily. | Two major severe precipitation events occurred in Italy between January 31st and February 6th.   |

|  |              |                 |  |                 |  |
|--|--------------|-----------------|--|-----------------|--|
|  |              |                 | Sardinia.<br>Normal<br>conditions<br>elsewhere.  |                 |  |
| Jordan<br>Temperature (5)*<br>Precipitation (9)**  | Above normal | Above normal    | Mostly below<br>normal,<br>In the east<br>normal | No signal       | No comment   |
| Lebanon<br>Temperature (5)*<br>Precipitation (9)** | Above normal | Above normal    | Below normal                                     | No signal       | No comment   |
| Libya<br>(5)                                       | Above normal | Above normal    | Below normal                                     | No clear signal | Moderate drought occurred over the country during the January 2014, while normal to mild drought occurred during the February 2014.<br>Flash floods or local floods events (defined locally as a daily rainfall exceeds of 90 <sup>th</sup> percentile of its climatological records) reported at the first day of December 2013 to strike some places of Tripolitania region in the west. |
| Macedonia<br>(5)                                   | Above normal | No clear signal | Below normal                                     | No clear signal | During winter 2013-14, Macedonia has registered 4 heat waves (6-14 January, 15-24 January, 7-13 February, 15-23 February).<br>Mean air temperature was above normal in a range between 1.8°C in Ohrid and 3°C in Lazaropole.   |
| Malta<br>Temperature (5)*<br>Precipitation (9)**   | Normal       | Above normal    | Normal   | Above normal    | No comment   |
| Moldova<br>Temperature (5)*<br>Precipitation (9)** | Normal       | No signal       | Below normal                                     | No signal       | No comment   |
| Montenegro<br>(6)                                  | Above normal | No clear signal | Normal in the<br>central parts<br>toward coastal | No clear signal | 2013-14 winter was the warmest in Montenegro.<br>Temperature was in category extreme warm (according to the percentile distribution). New  |

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|---|--|--------------|--|---|--|
|   |  |              | region<br>Below normal<br>in the rest of<br>the country              |   | maximum records were registered with 1.5°C<br>above old records.<br>Drought in December has affected the whole<br>country with amount of precipitation from 2-35%<br>of normal.  |
| Morocco<br>(5) (7)                                  | Normal   | Above normal | Normal   | Below normal  | Precipitation amounts for winter 2013-14 are<br>classified the 9th among the last 26 years.<br>Temperatures for winter 2013-14 are classified the<br>11th among the last 26 years.   |
| Portugal<br>Temperature (5)*<br>Precipitation (9)** | Above normal   | Above normal | Above normal<br>in the north,<br>Normal in the<br>south              | No signal in the<br>north,<br>Below normal in<br>the south                                      | Cyclones caused stormy conditions near the<br>Atlantic starting already end of December; high<br>waves and storm surges at the Atlantic coasts<br>caused significant damage and fatalities.  |
| Romania<br>Temperature (5)*<br>Precipitation (9)**  | Mostly around<br>normal,<br>In the northwest<br>above normal | No signal    | Below normal   | No signal   | No comment   |
| Serbia<br>(4) (5) (6)                               | Above normal   | No signal    | Mostly below<br>normal,<br>in the north<br>normal                    | No signal   | 3 heat waves (end of December, first two decades<br>of January, mid-February)  |
| Slovenia<br>(5)                                     | Above normal   | No signal    | Above normal   | No signal   | From 30 <sup>th</sup> January till 7 <sup>th</sup> February 2014,<br>Slovenia had experienced severe freezing<br>rain/black ice episode. The ice was also more than<br>5 cm thick in some places.<br>The damage especially to the forests and electric<br>infrastructure was enormous.                     |
| Spain<br>(5)  | Normal to<br>above normal                                    | Above normal | Below normal<br>in eastern<br>Spain<br><br>Normal to<br>Above normal | No clear signal<br>in the northern<br>half of Spain<br><br>Below normal in<br>the southern half | The passage of successive low pressure systems<br>whose center were located very near the north<br>coast of Iberian Peninsula, leads to very stormy<br>conditions in north Spain in the last decade of<br>December and during the months of January and<br>February. Several storm events with very strong |

|  |   |              |   |  |   |
|--|---|--------------|---|--|---|
|  |   |              | in the rest of the country  |  | wind gusts affected Galicia and Cantabrian regions during winter season. In the coastal areas of north Spain there were very significant economic damages and several people dead due to the combined action of very strong winds, big waves and storm surges.  |
| Syria<br>Temperature (5)*<br>Precipitation (9)** | Above normal  | Above normal | Mostly below normal,<br>In the southeast normal                   | No signal  | No comment  |
| Tunisia<br>(5)                                   | Above normal  | Above normal | Below normal  | Below normal to normal   | There had been no significant events or breaking records.   |
| Turkey<br>(8)                                    | Above normal in north west, west and south coastline of Turkey<br><br>Normal in the rest of the country | Normal       | Below normal in all of the country except Konya, Artvin and Iğdir | Above normal in the eastern part of Turkey<br><br>No clear signal in the rest of the country | In December, heavy rain occurred, causing floods in Black Sea region. Highway, trees and houses were damaged. Heavy snow also occurred, damaging transportation in east part of Turkey.<br>In January, heavy snowfall affected the east part of the country with depth of 2 to 2.5 meters. Transportation was damaged and some avalanches occurred. Heavy rain, storm, tornado and floods damaged agricultural area, trees, transportation and settlements in the western and southern regions of Turkey.<br>In February, snowfall, heavy rain, storm and tornadoes affected the eastern parts of Turkey. The agricultural areas in Aegean region and Antalya were affected the most by hail and tornado. |

Note:

- (1) - Basic climatological period (1980-2009)
- (2) - Basic climatological period (1983-2010)
- (3) - Basic climatological period (1981-2007)
- (4) - Basic climatological period (1971-2000)
- (5) - Basic climatological period (1981-2010)
- (6) - Basic climatological period (1961-1990)
- (7) - Basic climatological period (1989-2013)
- (8) - No information about basic climatological period
- (9) – Basic climatological period (1951-2000)

\* Data source: The National Climatic Data Center (NCDC)

\*\*Data source: Global Precipitation Climatology Centre (GPCC)