Fourteenth Session of
SOUTH EAST EUROPEAN CLIMATE OUTLOOK FORUM

SEECOF-14 MEETING

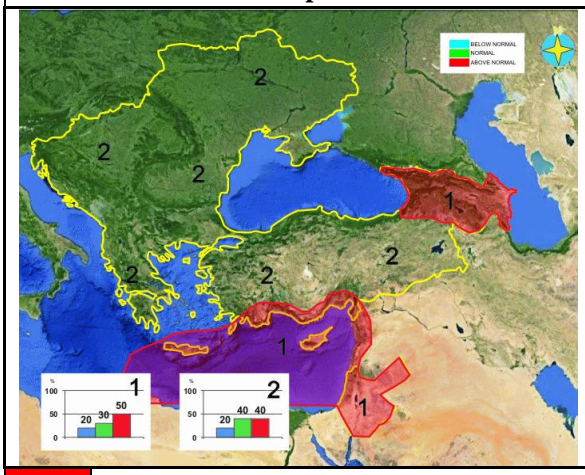
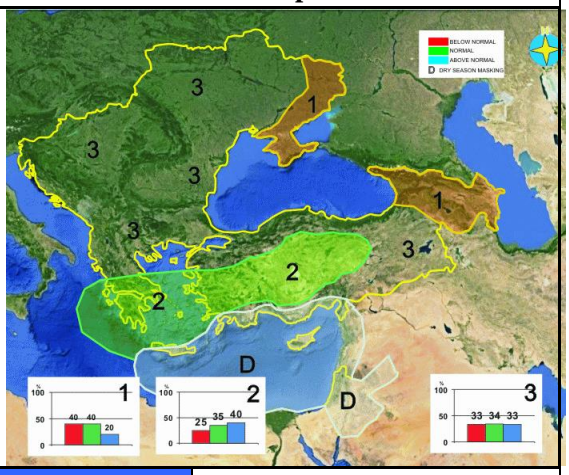
ANALYSIS AND VERIFICATION OF SEECOF-13 CLIMATE OUTLOOK FOR 2015 SUMMER SEASON FOR SOUTH-EAST EUROPE (SEE)

CLIMATE OUTLOOK FOR 2015 SUMMER SEASON FOR SEE REGION

As stated in the SEECOF-13 Consensus Statement on the Seasonal Climate Outlook for the 2015 Summer Season over South-East Europe (document: http://www.seevccc.rs/SEECOF/SEECOF-13/STEP3/Consensus%20Statement%20SEECOF-13.pdf
in the whole SEECOF region there was more likelihood for above-average temperature. The probability for above-average temperature conditions was decreasing from the north-northwest to the southeast of the SEECOF region. Thus, there was a higher probability for temperature to exceed the average in the eastern and central Mediterranean with belonging coasts, in the South Caucasus region, Israel and Jordan (zone 1 in Figure 1), than in other parts of the SEECOF region (zone 2 in Figure 1).

Uncertainties in regional predictions were higher for precipitation than for temperature. In the South Caucasus region and eastern parts of Ukraine summer season precipitation totals were likely to be near- or below- average (zone 1 in Figure 2), while there was slightly higher probability for the occurrence of above-average conditions in the mountainous region of Turkey, southern part of the Aegean Sea with belonging coast, as well as in the south of Greece (zone 2 in Figure 2). In the rest of the SEECOF region (zone 3 in Figure 2) the uncertainty was high: probabilities for below-, near-, or above- average conditions were approximately equal. It had to be emphasized that it might have been possible that some parts, especially mountainous ones, might locally have near- or above- normal summer season totals, due to the episodes of enhanced convection with high intensity rainfall. Along the northern and eastern coasts of the eastern Mediterranean, in Israel and Jordan, due to dry season masking, it was not possible to forecast summer season precipitation.

The Climate Outlook for the 2014 Summer Season for the SEECOF region is presented in Figure 1.

2015 Summer Temperature Outlook	2015 Summer Precipitation Outlook
	

	Above Normal		Above Normal
	Normal		Normal
	Below Normal		Below Normal

Figure 1. Graphical presentation of the Climate Outlook for the 2015 Summer Season for the SEECOF region

SHORT ANALYSIS OF 2015 SUMMER SEASON FOR SEE REGION

Analyses of the summer season temperature and precipitation anomalies are based on:

- operational products of the European Climate System Monitoring – ECSM (the ECSM system is a technical platform of the DWD, WMO RA VI RCC Node on Climate Monitoring:

  http://www.dwd.de/EN/climate_environment/climatemonitoring/europa/europa_node.html),
- seasonal bulletin on climate in the WMO Region VI for the summer of 2015 (ECSM, DWD, WMO RA VI RCC Node on Climate Monitoring: http://www.seevccc.rs/SEECOF/SEECOF-14/Pre-COF/RCC_CM_Bulletin_Summer_2015.pdf),
- climate monitoring products of the South East European Virtual Climate Change Center – SEEVCCC (Member of the WMO RA VI Pilot RCC Node on Climate Monitoring), http://www.seevccc.rs/imgsrc/clim_mon/201508/, and
- national climate monitoring reports of the following SEECOF-14 participating countries: Armenia, Bulgaria, Bosnia and Herzegovina (the Federation of Bosnia and Herzegovina), Croatia, Cyprus, Georgia, Greece, Israel, Montenegro, the former Yugoslav Republic of Macedonia, the Republic of Moldova, Serbia, Turkey and Ukraine (documents available on: http://www.seevccc.rs/SEECOF/SEECOF-14/Pre-COF/).

In almost the whole of the SEECOF region the summer season temperatures were above normal, with the exception of the Eastern Mediterranean, the Former Yugoslav Republic of Macedonia and most of Turkey (except the southeastern parts of Turkey). It was an extremely warm summer that ranked from the 2nd to 4th warmest in the last 30 years in the Pannonian Plain, Western Balkans and the Carpathian region.

The summer season temperatures in the lowlands of most of the SEECOF area mostly ranged between 18ºC and 23ºC; along the coasts of the Mediterranean, Ionian and Aegean Seas, as well as in the southern parts of the Balkans and Turkey, in most of Israel, in the northwestern and southern parts of Jordan, temperatures were between 25ºC and 28ºC, in some locations in western Jordan and in the far south of Turkey the average reaching even 33ºC. On the other hand, at some higher elevations in the central parts of the Balkan Peninsula the summer season temperatures were below 13°C. The summer season temperatures are presented in Figure 2 (left panel).

In most of the SEECOF region anomalies ranged between 1ºC and 2ºC above normal; in the South Caucasus region, central Ukraine and most of the Balkan Peninsula, along the coasts of the Adriatic and Ionian Seas, the eastern coasts of the Black Sea, they were between 2ºC and 3ºC above normal, while in eastern Ukraine, the northern parts of the Carpathian region, the western part of the Pannonia Plain, the western and central Balkans, and in some parts in Azerbaijan they reached 4ºC above normal. The exception occurred in the western and central Turkey, the southern parts of Greece and the Aegean Sea where anomalies ranged between -1ºC and 1ºC.

In most of the SEECOF region the conditions in June were above normal, except in the south and southeast of the Balkans, in the Eastern Mediterranean, Israel, Jordan, along the coasts of the Aegean Sea and the southwestern coasts of the Black Sea, where the conditions were normal. On the other hand, in the western and central part of Turkey the conditions were below normal.

Just like June, July was warmer than normal in most of the SEECOF region, with the highest positive anomalies reaching more than 4ºC in the western and central parts of the Balkan Peninsula, along the coasts of the Adriatic Sea, and in Azerbaijan. During July 2015, there was an advection of the African hot air, so that several heat waves crossed Europe and spread from the Iberian Peninsula to the north and east. During several days the temperature in southern Europe reached over 40ºC, which made July 2015 one of the warmest Julys in many countries of the SEECOF region. For example, in Serbia it was the second warmest July since 1950, while in Bulgaria and in Ukraine it was the fourth warmest in the last 30 years. In some cities in Ukraine the previous absolute maximum temperatures were reached (Kyiv, L'viv, Kirovgrad and Kharkov), while new maximum temperature records were registered in Athalassa (Cyprus), measuring 40.5ºC (4ºC departure of the normal values of maximum air temperature), and in Split (the coast of the central Adriatic). On the other hand, in most of Turkey the conditions were near normal.

In August, above normal mean air temperature conditions persisted in most of the SEECOF region and were accompanied with several heat waves, while in some regions in the central and southeastern parts of Turkey the conditions were near normal. Very high positive anomalies of more than 4ºC occurred in eastern Ukraine and in the northern part of the Carpathian region, while at some stations in the continental part of Cyprus they were even higher, above 5ºC. Heat waves occurred during the first 15 days and at the end of August

2015. The highest maximum during August was recorded over the inland station Athalassa, reaching 42.5ºC (the normal is 36.9ºC).

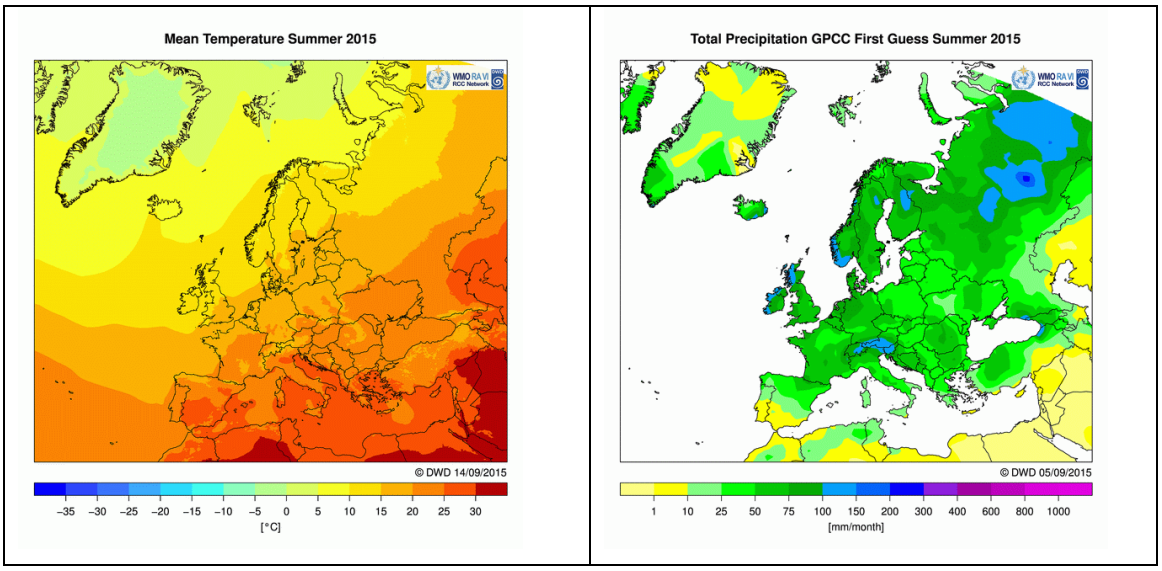


Figure 2. Summer season 2015 – observed temperatures (left panel) and observed precipitation in mm per month (right panel). Source: http://www.dwd.de/EN/climate_environment/climatemonitoring/climatemonitoring_node;

The summer precipitation totals were increasing from the southeast to the north and northwest of the SEECOF region, ranging from less than 10 mm in the Eastern Mediterranean, in Israel, Jordan, the far southern parts of Turkey and along the western coasts of the Caspian Sea and its inland, up to 100 mm along the Dinaric Alps, in the Carpathian region, the continental part of Bulgaria, central Ukraine, the central parts of Turkey, along the eastern coasts of the Black Sea, while they were even much higher on the local level.

Precipitation anomalies were very diverse within the SEECOF area. It was drier than normal (<75% of the long-term average) in the eastern and north-western part of the South Caucasus, in most of Ukraine, in the Pannonia Plain, in the western and central Balkans, in Cyprus, Israel and in some parts in the southeast of Turkey. It was normally wet in the central part of the South Caucasian region, some parts in the east of Turkey, along the coasts of the Black Sea, southern coasts of Turkey, some parts in central Ukraine, along the coasts of the Adriatic and Ionian Seas, as well as in the Eastern Balkans, while in the rest of the SEECOF region it was wetter than normal (>125% of the long-term average), with some locations in central Turkey, some islands in the Aegean Sea and in Jordan experiencing considerably wetter conditions. The summer season precipitation anomalies are presented in Figure 3 (right panel).
During June in central Ukraine, some parts in the east and south of Ukraine, the continental part of Bulgaria and the southern and southeastern part of the Balkan Peninsula, it was wetter than normal, while in western and central Turkey, along the southeast coasts of Cyprus, as well as in southern Greece it was considerably wetter. High positive anomalies of more than 70 mm occurred, peaking over central Turkey. In the western Balkans, the northern and eastern part of the Carpathian region and the eastern part of the Caucasian region it was dry, while in Israel, Cyprus, along the western coasts of the Caspian Sea with its hinterland and in the Pannonia Plain it was considerably dry, with the deficits reaching up to 75 mm. In the rest of the SEECOF region the monthly June totals were within normal values.

On 13 June, due to a deep local convection, the northern surrounding areas of Tbilisi, in the upper basin of the Vere River, received extremely heavy precipitation of 49 mm during 3 hours. That event caused a water level rise of 3.4–4 m in the river basin and a landslide, triggering a flash flood in the centre of Tbilisi. It resulted in at least 20 fatalities, huge damages of the houses and infrastructure and the destruction of the Zoo.

From 25 to 27 June in the northern, central, southern and eastern parts of Ukraine (the Chernigiv, Symu, Kirovograd, Polatavam, Dniepropetrovs'k, Kharkov, Mykolayiv, Kherson, Zaporizhzhia, Donets'k and Crimea regions) from 15 to 80 mm of precipitation fell in 5–12 hours. The rainfall was accompanied by thunderstorms and increased wind speeds of up to 15–20 m/s. A squally wind of 25 m/s occurred in the Kharkiv region and a tornado in Dniepropetrovs'k. Unfavourable weather conditions caused a disruption of power, telecommunication, utility and transport services.

July was drier than normal in most of the SEECOF region, while locally some parts in the central Balkans, Ukraine, Turkey, Cyprus and the central and western part of the South Caucasus were considerably drier, with a relative anomaly below 20% (total sum less than 25 mm). At certain stations, especially in Ararat valleys and foothills there was no precipitation. In central Ukraine and in most of Israel and Jordan, the total July sums were within normal values, while in the south of Ukraine, along the coasts of the Caspian Sea and locally in the north of Israel and in the south of Turkey it was wetter than normal.

August was considerably drier than normal in Ukraine, Moldova, Cyprus, some parts in the northwest and south of Turkey, some parts of the western and central Balkans and in the west of the Pannonia Plain. On the other hand, it was wetter than normal in the south and southeast of the Balkan Peninsula, the western part of the Pannonia Plain, the South Caucasus region, most of Turkey and in northern Jordan. In the rest of the SEECOF region it was near normal.

On August 3rd, due to intensive convective activity, flash floods hit the northwestern parts of the Former Yugoslav Republic of Macedonia, causing damages and human casualties; however, no extreme precipitation amounts were observed. In August, a flood also occurred in Artvin Hopa, Turkey, as a result of heavy rain, causing the loss of eight lives, injuring 17 people, and affecting transportation.

During July and August, on the Balkan Peninsula, due to a long period of dry and hot weather, in Bulgaria additionally enhanced by moderate north-easterly winds, there was a busy wild fire season. For example, in Montenegro, in the area of Podgorica, a thousand forest fires were registered during July and August, but with no bigger material losses.

The same phenomenon, with high temperatures and the lack of precipitation, resulted in the extremely low water levels of the rivers in Ukraine. The decrease of water levels occurred in June and lasted throughout the summer.

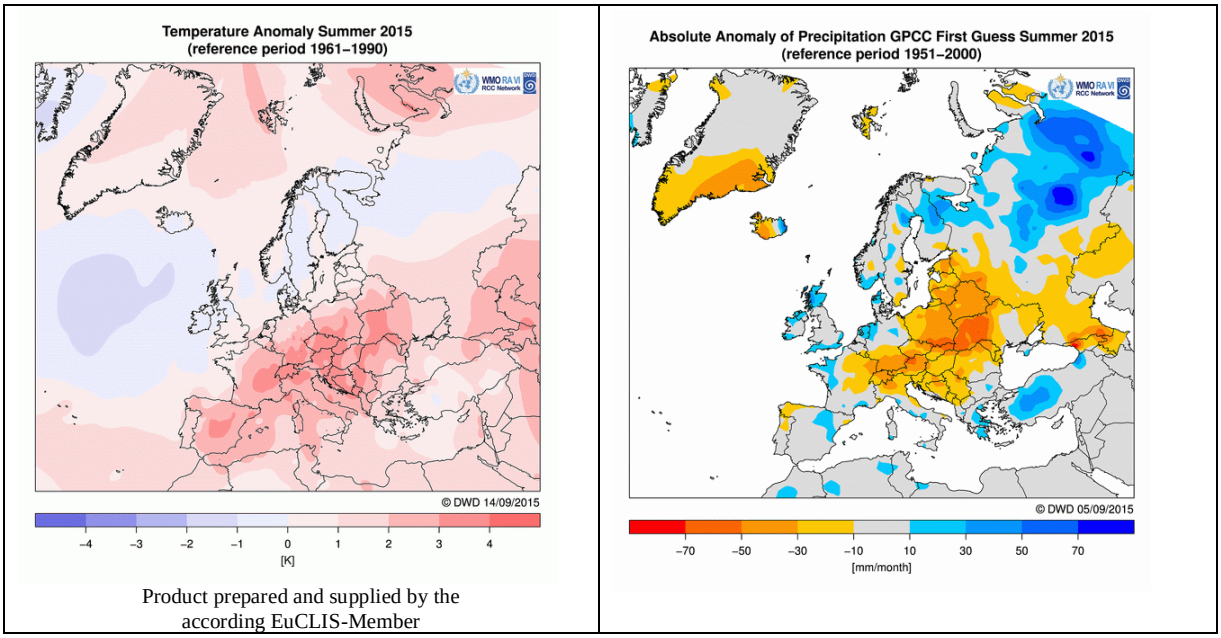


Figure 3. Summer season 2015 – observed temperature anomalies (left panel) and observed precipitation anomalies in mm per month (right panel). Source: http://www.dwd.de/EN/climate_environment/climatemonitoring/climatemonitoring_node;

VERIFICATION OF CLIMATE OUTLOOK FOR 2015 SUMMER SEASON

The SEECOF-13 Climate Outlook for the 2015 Summer Season concluded that in the whole SEECOF region there was more likelihood for the occurrence of above-average temperature. The probability for the above-average temperature conditions was decreasing from the north-northwest to the southeast of the SEECOF region. Consequently, there was a higher probability for the average temperature to be exceeded in the eastern and central Mediterranean with belonging coasts, in the South Caucasus region, in Israel and in Jordan, than in other parts of the SEECOF region. On the basis of the aforementioned regional, sub-regional and national climate monitoring products, it turned out that the monitored anomalies of the mean summer season air temperatures were above normal in most of the SEECOF region, which means that the climate outlook for the summer season air temperature was accurate. The summer season temperature prediction was wrong for western and central Turkey, the southern parts of Greece and the Aegean Sea, where the anomalies were within normal values.

According to the SEECOF-13 Outlook, it was predicted that the uncertainties in regional predictions would be higher for precipitation than for temperature. It was outlined that in most of the South Caucasus region and in the eastern part of Ukraine summer season precipitation totals were likely to be near- or below- average, while in the south of Greece, in central and western Turkey and in the Aegean Sea they would be near- or above- average, which has been observed afterwards. It was also emphasized that in the rest of the SEECOF region it was not possible to predict summer season precipitation totals due to the dry season masking effect, so that there were equal chances for below-, near-, or above-normal conditions. Those regions have thus not been taken into consideration for the verification of the summer season precipitation.

APPENDIX A: Contributors to the pre Pre-COF of SEECOF-14

- World Meteorological Organization
- Deutscher Wetterdienst, the Federal Republic of Germany
- South East European Virtual Climate Change Center hosted by the Republic Hydrometeorological Service of Serbia, the Republic of Serbia
- Royal Netherlands Meteorological Institute, the Netherlands
- Armenian State Hydrometeorological and Monitoring Service, the Republic of Armenia
- National Institute of Meteorology and Hydrology, the Republic of Bulgaria
- Meteorological and Hydrological Service, the Republic of Croatia
- Meteorological Service, the Republic of Cyprus
- Department of Hydrometeorology, the Republic of Georgia
- Hellenic National Meteorological Service, the Republic of Greece
- Republic Hydrometeorological Institute, the former Yugoslav Republic of Macedonia
- State Hydrometeorological Service, the Republic of Moldova
- Hydrological and Meteorological Service of Montenegro, the Republic of Montenegro
- Federal Hydrometeorological Service of the Federation of Bosnia and Herzegovina, the Federation of Bosnia and Herzegovina, Bosnia and Herzegovina
- Republic Hydrometeorological Service of Serbia, the Republic of Serbia
- Turkish State Meteorological Service, the Republic of Turkey
- Ukrainian Hidrometeorological center, Ukraine

APPENDIX B: **Analysis and verification of the SEECOF-13 climate outlook for the 2015 summer season:**
Verification summary based on the national reports and contributions of the participants of Pre-COF of the SEECOF-14 meeting

Country	Seasonal temperature (JJA)		Seasonal precipitation JJA		High Impact Events
	Observed	SEECOF-13 climate outlook for temperature	Observed	SEECOF-13 climate outlook for precipitation	
Armenia (1)	**Above normal**	**Above normal to normal**	Below normal to normal	**Below normal to normal**	During some (several) days in June, most areas of Armenia observed torrential rainfall, occasionally heavy, accompanied by thunderstorms, strong wind (wind speed of 15-18 m / s, gusts 20-23 m/ s) and hail. In village Chochkan (region of Lori) large hailstones, about 40 mm in diameter were registered on June 11th. Significant precipitation deficit (shortfall) was observed across most of the country. Stations in the central regions didn't record any rainfall in the period until August 23rd, whereas during the 3rd decade of the month, recorded amount of precipitation was very high at all stations across the country and the monthly sums were above the normal, reaching 100-500% of average values (Artashat – 1000%).
Federation of Bosnia and Herzegovina, Bosnia and Herzegovina (1)	**Above normal**	**Above normal to normal**	**Below normal**	**No clear signal**	The summer of 2015 was extremely warm. In Sarajevo it was the sixth warmest summer ever recorded. Two heat waves were registered. July was the hottest month of 2015. The largest anomalies during the summer were registered in that month. In Bihac and Bugojno it was the warmest July. Drought was observed in the first half of July.

Bulgaria (1)	**Above normal to normal**	**Above normal to normal**	**Near normal**	**No clear signal**	The month of July was the third hottest July in the last 10 years, after 2012 and 2007, and the fourth hottest in the last 30 years. However, there were no temperature records. There was a busy wild fire season at the end of July and the beginning of August due to a long period of dry and hot weather, enhanced by moderate north-easterly winds.
Croatia (1, **5**)	**Above norm**al	**Above normal to normal**	**Above normal** in the wider area of Knin and Dalmatian hinterland **Normal** along the central and southern Adriatic, in the NW part of the continental part and the southern part of mountainous Croatia **Below normal** in the eastern and central part of continental Croatia, in the mountainous part, Istra, the northern Adriatic and a part of the southern Adriatic islands	**No clear signal**	The summer of 2015 was extremely warm in entire Croatia. Five heat waves were observed. The first one was relatively short (10–14 June). Two heat waves were registered in July and two more in August; of those four, two were long lasting and intense – the one lasting from 13 to 22 July and the one lasting from 5 to 15 August. At the end of the second heat wave in July a forest fire was initiated by lightning and a large area of islands of Korcula and Peljesac were afected. Absolute maximum number of hot days (day with maximum temperature above 30°C) was exceeded in Split (central Adriatic). Hot days were observed during entire July. In all 3 months convective-related severe weather phenomena (thunderstorms, heavy rains, flash floods and waterspouts) were observed mostly all over Croatia. They were rare in June and July and much more common in August.

Cyprus (5)	**Around normal**	**Above normal to normal**	**Below normal**	**Dry season masking**	**June** Temperature extremes were recorded at the Athalassa station, where the observed minimum of 14.0°C was by 5.1°C below the station's normal (19.1°C), or at the mountainous station of Prodromos where the extreme minimum of 7.6°C was by 7.4°C below the station's normal (15.0°C). Extreme episodes of thundery activity were recorded on 5, 10 and mainly 19 June, where at certain locations of the southeastern coasts, such as the Xilophagou and Frenaros stations, the accumulated precipitation was 1341% and 454% respectively. **July** Extreme highs (both maximum and minimum departing by more than 3°C of normal) were recorded during the second half of July. Note the 36.5°C highest maximum of the Athalassa station departing by almost 4°C from normal. Extreme minimums were also recorded; note the 18.1°C minimum of Athalassa departing by more than 4°C from the station's normal. During the period between 30 and 31 July episodes of thundery activity and isolated showers caused by thermal instability were recorded. In certain areas extreme accumulated precipitation was recorded, as suggested by the accumulation of the station Kellaki, a semi mountainous station in the southern part of the island, which recorded 11.6 mm of precipitation, slightly above 800% of normal. **August** During the periods from 2 to 5 and 16 to 17 August and on 30 August the temperature was diverted by 4°C above the normal maximum or minimum of the stations, which is characterized as an extreme maximum or minimum. The

					highest maximum was recorded at the inland station of Athalassa and it was 42.5°C, with the normal being 36.9°C. For a sequence of days EMMA warning for high temperature was issued.
Georgia (1)	**Above normal**	**Above normal to normal**	**Near normal to below normal**	**Below normal to normal**	The highest temperature of the season was observed in Kutalasi (42°C) in western Georgia on July 31 and in the east in Lagodekhi (41°C) on August 16. On June 13, due to the local deep convective processes in the northern surrounding areas of Tbilisi, in the upper basin of the Vere river, heavy rainfall of 49 mm during 3 hours was observed. That event caused a water level rise of 3.4–4 m in the river basin and a landslide, triggering a flash flood in the city center. It resulted in 20 fatalities, disappearance of 2 people, damages of the houses and infrastructure and the destruction of the Zoo.
Greece (2, **5**)	**Above normal**	**Above normal to normal**	**Above normal**	**No clear signal** in most of the country **Above normal** in the south of the country, in the central and southern Aegean Sea	The local maximums of more than 5 times the average summer rainfall amount could be spotted on the islands in the eastern Aegean Sea.
The former Yugoslav Republic of Macedonia (5)	**Slightly above normal**	**Above normal to normal**	**Below normal** in the northeastern parts of the country **Slightly above normal to normal** in the rest part of the country	**No clear signal**	**July** The minimum temperature of 26.8°C was recorded in Skopje, which has been the maximum value of minimum temperature since 1950. **August** The minimum temperature of 17.3°C was recorded in Berovo, which was the maximum value of minimum temperature since 1950. On 1 August an extreme precipitation sum of 95.0 mm was registered.

					On 3 August floods with damages and human casualties were evidenced in the northwestern part, but without extreme precipitation amounts.
Republic of Moldova (5)	**Above normal**	**Above normal**	**Below normal**	**Below Normal To Normal**	During the summer season on the territory of the country were reported thunderstorms, fog, hail with diameter of up to 10-15 mm (MS Briceni, AMP Vulcanesti) and strong wind up to 22m/s (June, MS Tiraspol). Also were recorded meteorological phenomena in the form of strong showers: on June 15th during 3 hours on AMP Drochia have fallen 51 mm of precipitations; on June 16th on MS Codru during 1 hour have fallen 31 mm; on June 25th on MS Falesti during 4 hours have fallen 52 mm; on July on MS Bravicea during 3 hours have fallen 50 mm of precipitations. The heavy rains fallen during June and in the first decade of July, isolated with hail have caused damage on crops and damage on national economy Abnormaly hot weather and significant precipitation deficit, which was observed in Moldova during the most of the summer, contributed to the soil and atmosphere drought. Hydrometeorological coefficient for June has averaged 0.7, which indicates the dry conditions, in July and August – 0.5, which corresponds to severe drought. Due to dry weather, reported in a major part of the summer period, and it had negative influence in forming corn, sunflower, sugar beet, vegetable crops, also in growth and development of other crops.
Montenegro (1,5)	**Above normal**	**Above normal to normal**	**Normal** in most of the country **Below normal**	**No clear signal**	**14 June –** Rozaje, the east of Montenegro – **hail** size of a nut hit agricultural crops and orchards, and affected macadam roads; it triggered several landslides and caused material losses.

			in the north-northeastern region of the country		 Photo: Nenad Zekić **25 July** – **strong wind followed by hail** had an impact on trees, crops and orchards in Mareza, a small area nearby Podgorica.  Source: Daily newspaper VIJESTI **27 July** – **heavy rainfall with hail** affected the villages in Rozaje in the east of Montenegro. Impacts: flooded houses, roads, yards, landslides that cut off the villages for 15 hours, damaged orchards and agricultural crops.  Photo: Aida Skorupan **July-August** – **forest fires** – in 30 days a 1000 forest fires occurred in Podgorica. They had an impact on scrubs and trees, some houses were endangered, but there were no bigger material losses.

					In Ulcinj (seaside) forest fires affected the orchards in the hinterland of the beach Kopakabana. In Dajbabe, the Dajbabe convent was endangered.
Serbia (1,**5**)	**Above normal**	**Above normal to normal**	**Below normal**	**No clear signal**	**The summer of 2015** was extremely warm; in Belgrade it was the second warmest on record. Three heat waves were observed. **July 2015** was the second warmest and the second driest July on record. In Zrenjanin, July 2015 was as warm as the warmest July of 2012. Two heat waves were recorded, with exceptionally high mean daily air temperature anomalies. July 2015 was the driest July on record at five principal meteorological stations.
Turkey (2)	**Above normal** in the southeastern part of the country **Normal** in most of the country	**Above normal** along the south coasts of the country **Above normal to normal** in most of the country	**Above normal** (significant in the western parts of the country)	**Above normal** in the central and western parts of Turkey and along the coasts of the Aegean Sea **No clear signal** in most of the territory	In **June**, heavy rain was observed in Istanbul, Duzce, Karabuk, Bolum Ankara, Kirkale and in some cities in the northwest of the country. As a result, the flooding occurred and traffic was affected. In addition to that, hail was observed in Ankara and Kayseri, damaging vehicles. In **July**, heavy rain was observed in the northwest, and transportation was badly affected. In **August**, in Artvin Hopa, a flood occurred as a result of heavy rain, causing the loss of 8 lives, injuring 17 people, and affecting transportation.
Ukraine (5)	**Above normal** in most of the country **Norma**l in some	**Above normal to normal**	**Below normal** in most of the country **Above normal** in some places in the southern,	**No clear signal** in most of the country **Below normal to normal**	During **July** and **August** the previous absolute maximum temperatures were reached in Kyiv, L'viv, Kirovgrad and, during July, in Kharkov. During the summer season, the extraordinary meteorological phenomena in the form of heavy and very heavy rain were observed:

	places in the southern, central and northern part of the country		central and northern part of the country	in the east and southeast of the country	On June 25–27 in the northern, central southern and eastern parts (Chernigiv, Symu, Kirovograd, Polatavam Dniepropetrovs'k, Kharkov, Mykolayiv, Kherson, Zaporizhzhia, Donets'k and Crimea regions) from 15 to 80 mm of precipitation fell in 5–12 hours. The rainfall was accompanied by thunderstorms and increased wind speeds of up to 15–20 m/s, with a squally wind of 25 m/s in the Kharkiv regions and a tornado in Dniepropetrovs'k. Unfavourable weather conditions caused a disruption of power, telecommunication, utility and traffic services. The low rainfall resulted in the extremely low water content in rivers. The low water levels occurred in June and lasted during the whole summer.

Note:
1 – Basic climatological period (1961-1990)
2 – Basic climatological period (1971-2000)
3 – Basic climatological period (1951-2000)
4 – Basic climatological period (1980-2009)
5 – Basic climatological period (1981-2010)
6 – No information about the basic climatological period