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MONTHLY BULLETIN FOR SERBIA

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July 2016 was warm across most of Serbia, in Kraljevo and Valjevo very warm. The third wettest on record in Negotin, Leskovac and Vranje. Record-breaking daily precipitation sums were registered in Negotin, Zajecar and Vranje on July 16.

Overview of the synoptic situation

Most of July, Serbia was under the prevalence of northwesterly and westerly upper air circulation with the presence of increased geopotential height. Frontal systems within the spatial trough from northern Europe and northern Atlantic transferred further north from our territory toward east and northeast, and with its periphery influenced weather causing occasional thundershowers (around 3, 6 and 25 July), mostly in southwestern, western and central parts of Serbia.

In the middle of the month, due to the development of trough and cyclone with the accompanying frontal system in western Mediterranean and its transfer across our territory toward east, the period from July 16 to 18 was marked by cooling and overcast with rainfall.

Sunny and warm weather prevailed rest of the month, at times showers with thunderstorms were registered chiefly in the mountain regions.

Air temperature

Mean monthly air temperature

Mean air temperature in July ranged from 13.9ºC at Kopaonik up to 24.6ºC in Negotin (*Figure 1*).

Departure of the mean monthly air temperature from the normal[1] for the 1981–2010 base period was in a range from 0.1ºC in Zajecar up to 1.4ºC in Belgrade and Loznica (*Figure 2*).

Mean air temperature, based on the percentile method[2], was in the categories of warm and normal, and in Valjevo and Kraljevo in very warm category (*Figure 3*).

[1] Term ***normal*** refers to ***climatological standard normal***, that is, the average value of a particular climate element, calculated for the period from January 1, 1981 to December 31, 2010

[2] **n**th percentile of a variable refers to the value of the observed variable below which there is n percent of data previously arranged in an ascending order

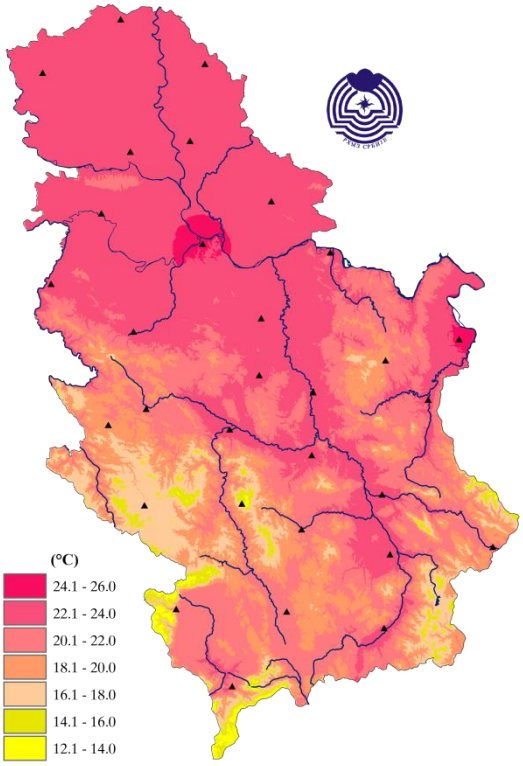


Figure 1. Spatial distribution of mean monthly air temperature (°C) during July 2016

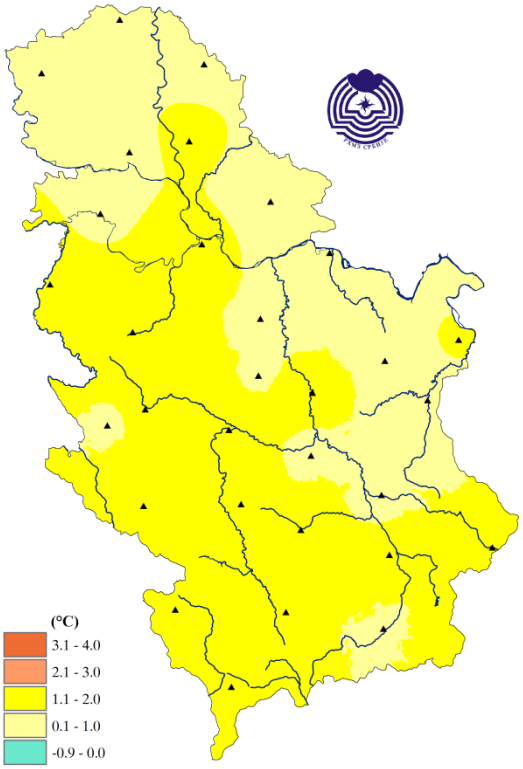


Figure 2. Spatial distribution of mean monthly air temperature anomaly (°C) during July 2016

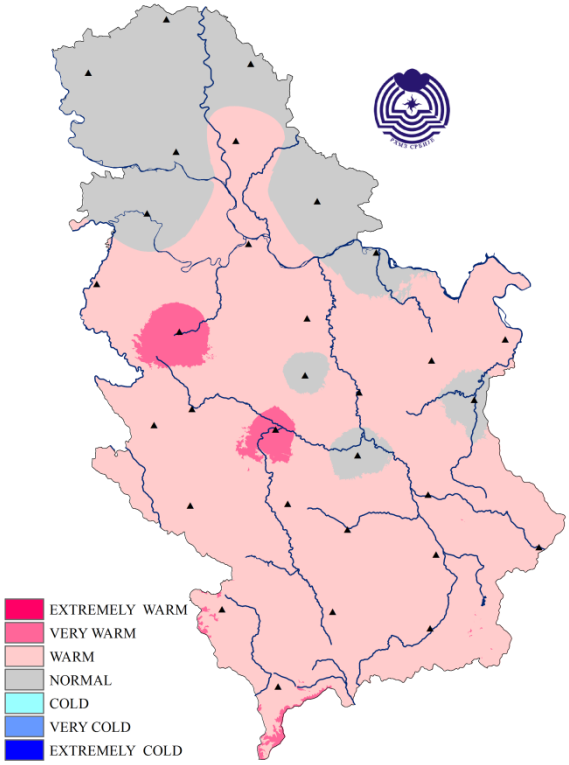


Figure 3. Spatial distribution of mean monthly air temperature according to the percentile method during July 2016

The mean daily air temperature in Belgrade, based on the percentile method, was within the average in the first decade, in the middle of the second decade it was in the extremely warm category, at the end of the period it was very cold, and in the third decade of July it was in the categories spanning from warm to extremely warm (*Figure 4*).

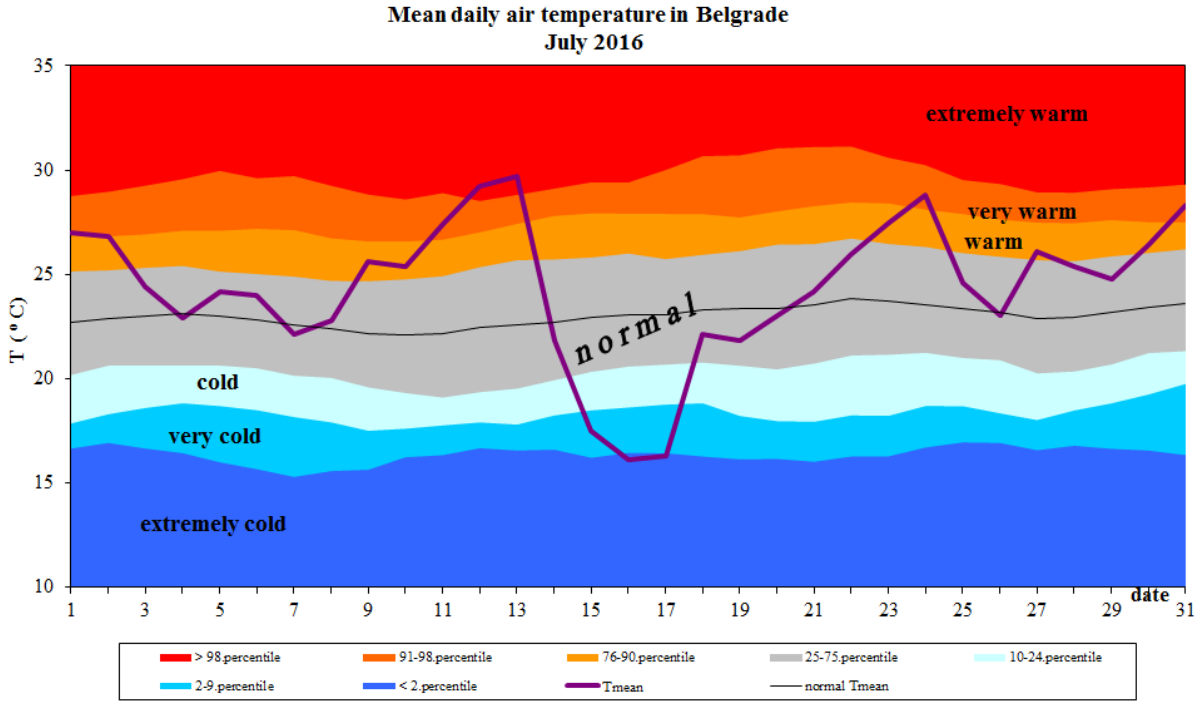


Figure 4. Monthly course of the mean daily air temperature in Belgrade in July 2016

Figure 5 shows the assessment of the air temperature and precipitation sums for Serbia in July based on the tercile distribution compared to the 1981-2010 base period. It can be noted that July 2016 with the air temperature and precipitation sums was on the upper tercile border.

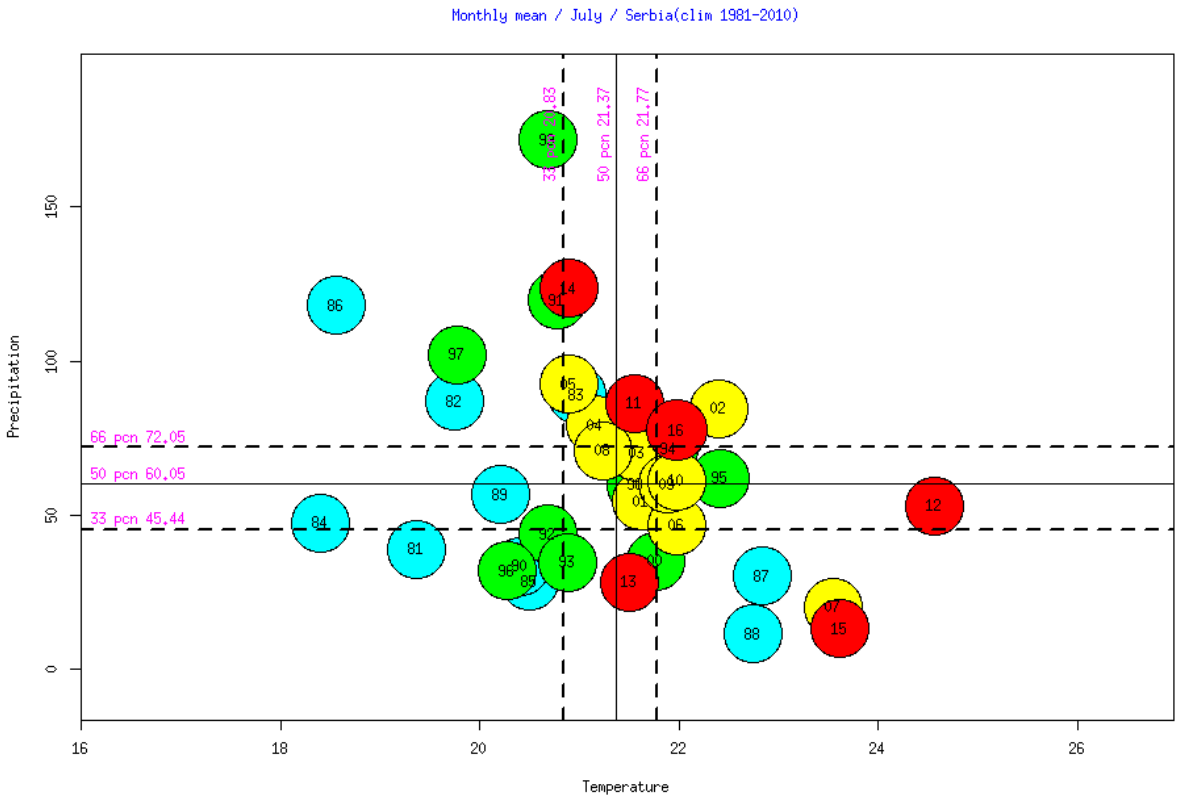


Figure 5. Assessment of the air temperature and precipitation sums for July in Serbia according to the accompanying terciles compared to the 1981-2010 base period

Maximum air temperature

The mean maximum air temperature in July ranged from 18.0ºC at Kopaonik to 30.8ºC in Negotin.

Based on the percentile method, mean monthly maximum air temperature in July was in the categories of normal and warm in Serbia.

The highest maximum daily air temperature of 38.0ºC was observed in Nis on July 14.

Summer days[3] were registered across the entire country aside from Kopaonik. The number of summer days in the mountain regions varied from 8 days at Crni Vrh to 17 days in Sjenica, and in the low-lying areas from 27 days in Kursumlija, Krusevac and Pozega to 30 days in Negotin, Zajecar and Leskovac, which is up to 6 days above the average number of summer days for the month of July.

[3] Summer day is defined as day with maximum daily air temperature above 25°C and higher

Tropical days[4] were registered across most of Serbia, aside from Kopaonik and Crni Vrh, one day in Zlatibor, two days in Sjenica, 12 days in Loznica to 20 days in Negotin. The observed number of tropical days was 2 to 6 days above the average number for the month of July.

Minimum air temperature

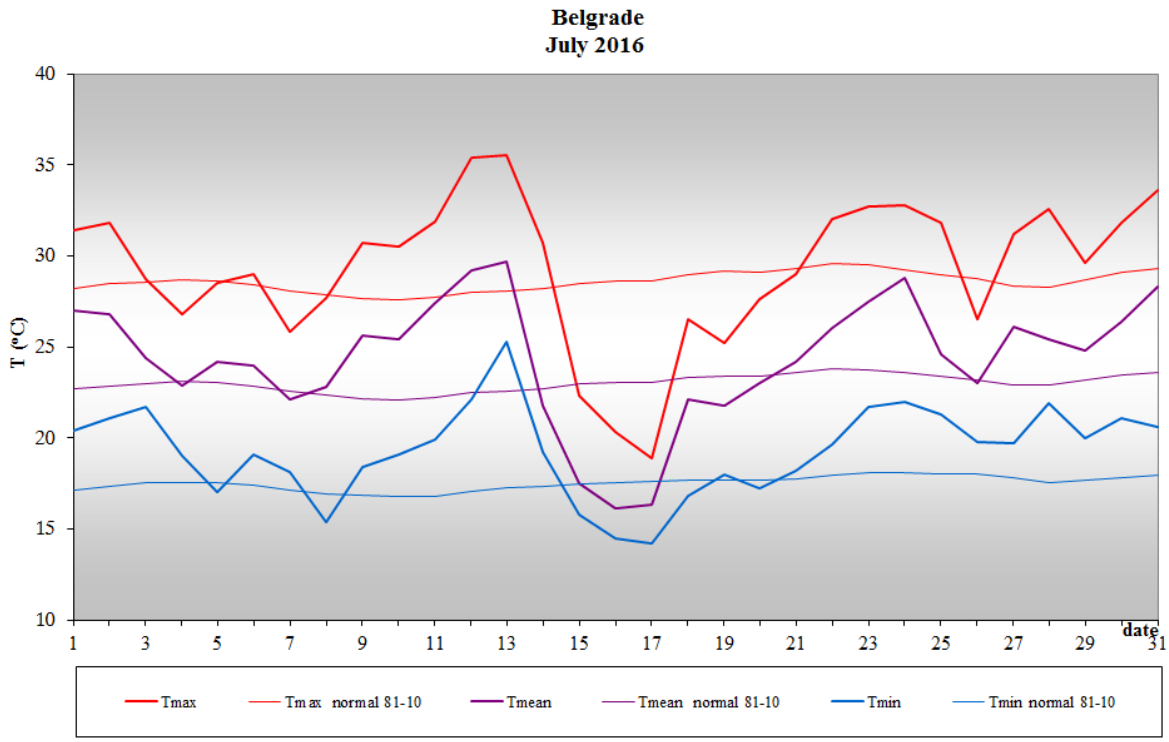
Mean minimum air temperature in July ranged from 9.5ºC at Kopaonik up to 19.3ºC in Belgrade.

Based on the percentile method, mean monthly minimum air temperature was in the categories of warm and very warm, and in Belgrade in the extremely warm category.

The lowest minimum daily air temperature of 5.1ºC was registered in Sjenica on July 8. In the low-lying areas, minimum daily air temperature of 8.0ºC was measured in Dimitrovgrad on July 8.

Tropical nights[5] were not registered either in the mountain regions or in Kragujevac, Pozega, Krusevac, Kursumlija, Vranje or Dimitrovgrad. The greatest number of tropical nights, total of 12, was registered in Belgrade.

Figure 6 depicts the monthly course of the mean, maximum and minimum daily air temperature for Belgrade in July.



[4] Tropical day is defined as the day with maximum daily air temperature of 30°C and higher

[5] Tropical night is defined as the day with minimum daily air temperature of 20°C and higher

PRECIPITATION

The registered amount of precipitation in July ranged from 29.1 mm in Kraljevo to 152.5 mm in Veliko Gradiste (*Figure 7*).

Precipitation totals compared to the normal for the 1981-2010 base period ranged from 38% in Kraljevo to 280% in Negotin (*Figure 8*).

Based on the percentile method, the precipitation sums were in the normal category across most of the country, rainy category in Zrenjanin and Curpija, very rainy in Sombor, Krusevac, Veliko Gradiste, Nis, Leskovac and Vranje, extremely rainy in Negotin, and dry category in Kraljevo (*Figure 9*).

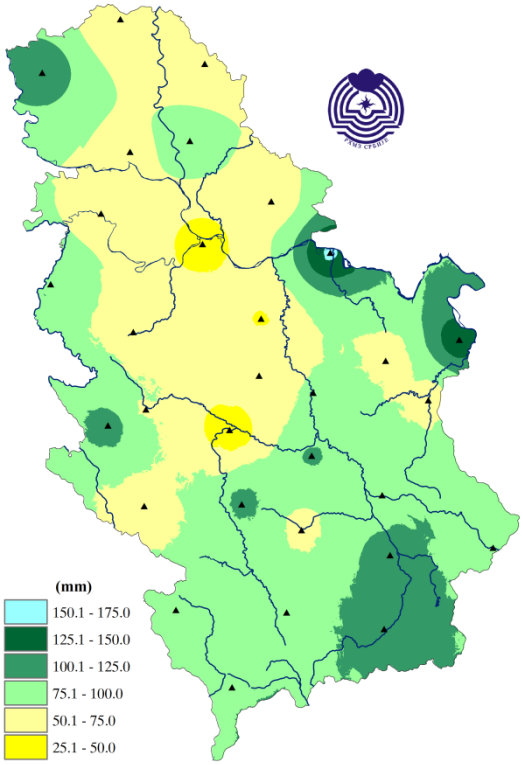


Figure 7. Spatial distribution of monthly precipitation sums (mm)

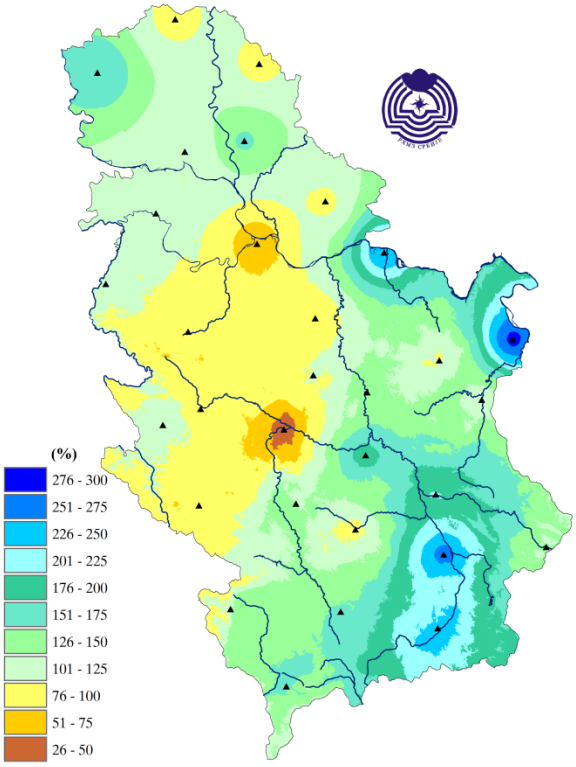


Figure 8. Spatial distribution of monthly precipitation sums in the percentages of normal for 1981-2010 base period

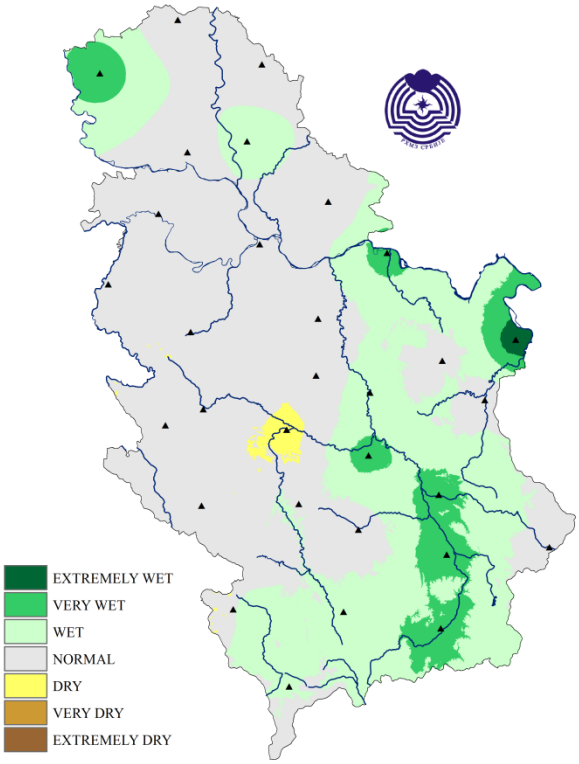


Figure 9. Monthly precipitation sums according to the percentile method

Figures 10, 11 and 12 show the rank of 20-year period with the highest July precipitation totals for Negotin, Vranje and Leskovac for the station operation. Displayed July sums rank as the third in the descending order out of 20 years for the above mentioned MMS stations.

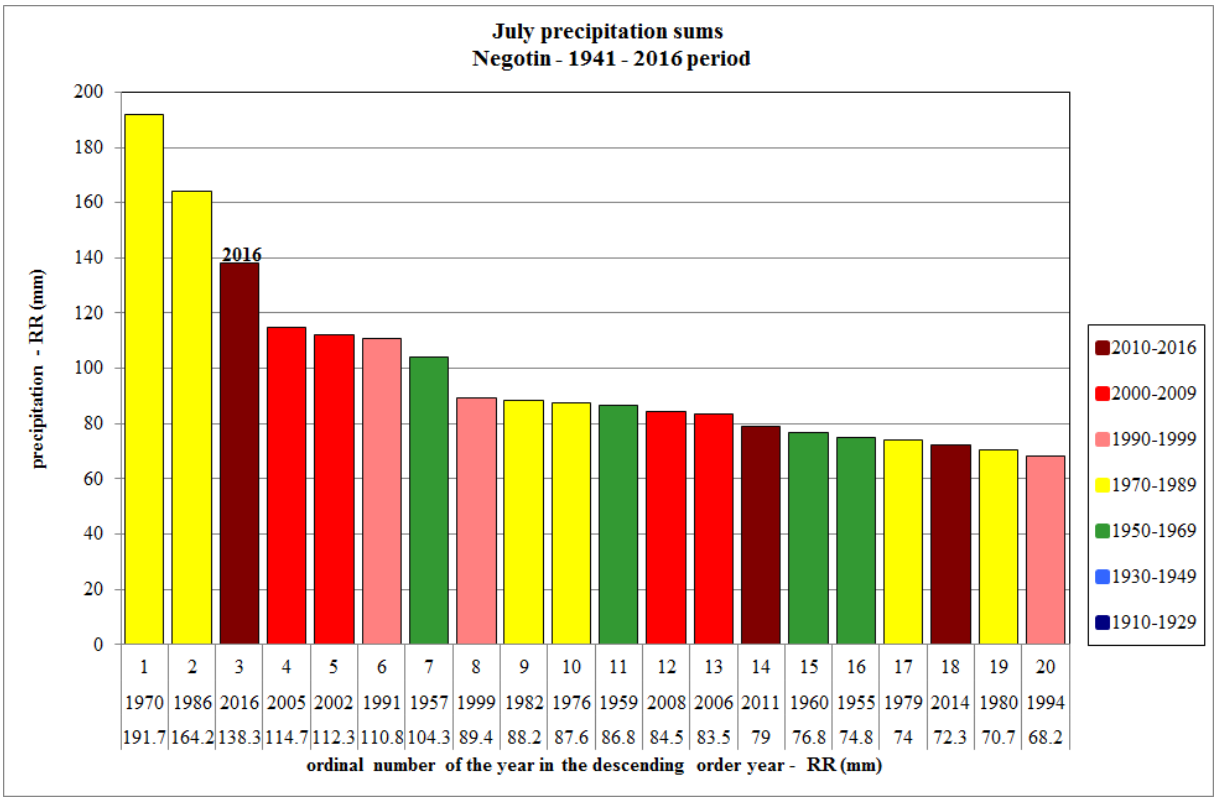


Figure 10. July precipitation totals for Negotin for the 1941-2016 period in the descending order (20 years out of observed set with the highest July precipitation sums)

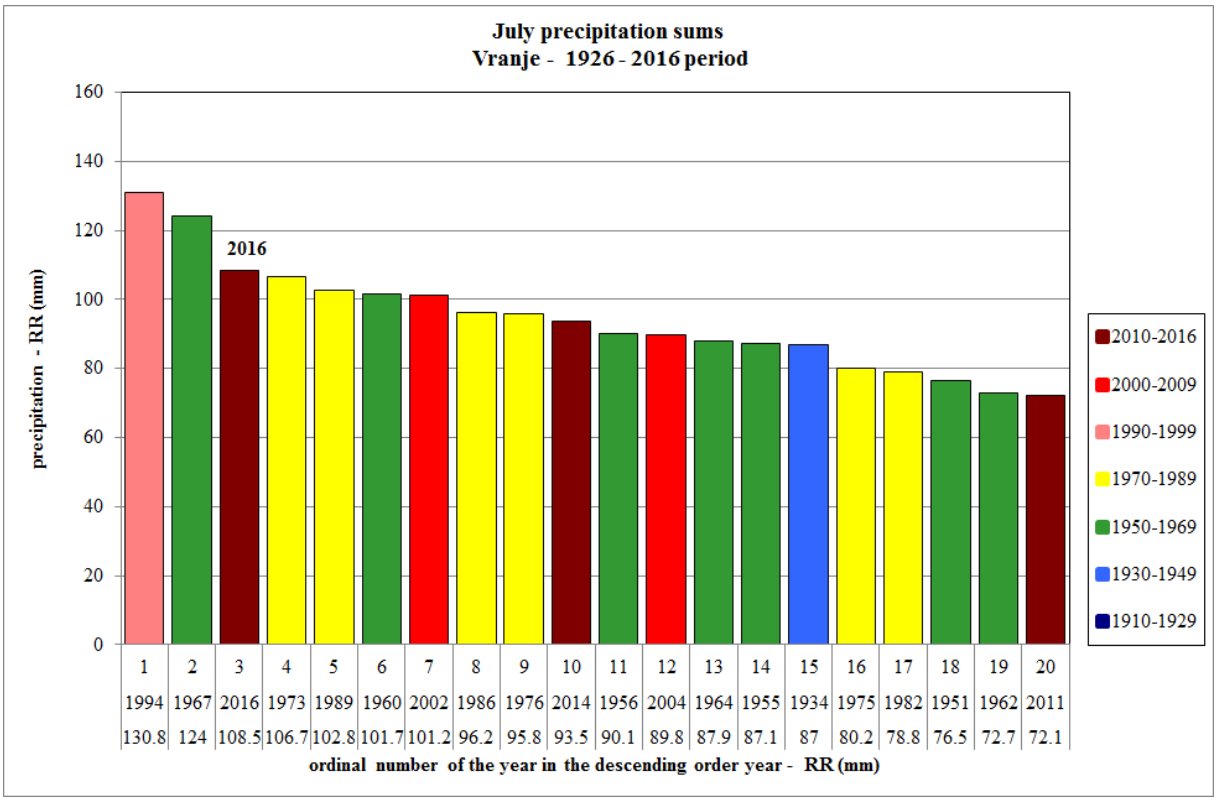


Figure 11. July precipitation totals for Vranje for the 1926-2016 period in the descending order (20 years out of observed set with the highest July precipitation sums)

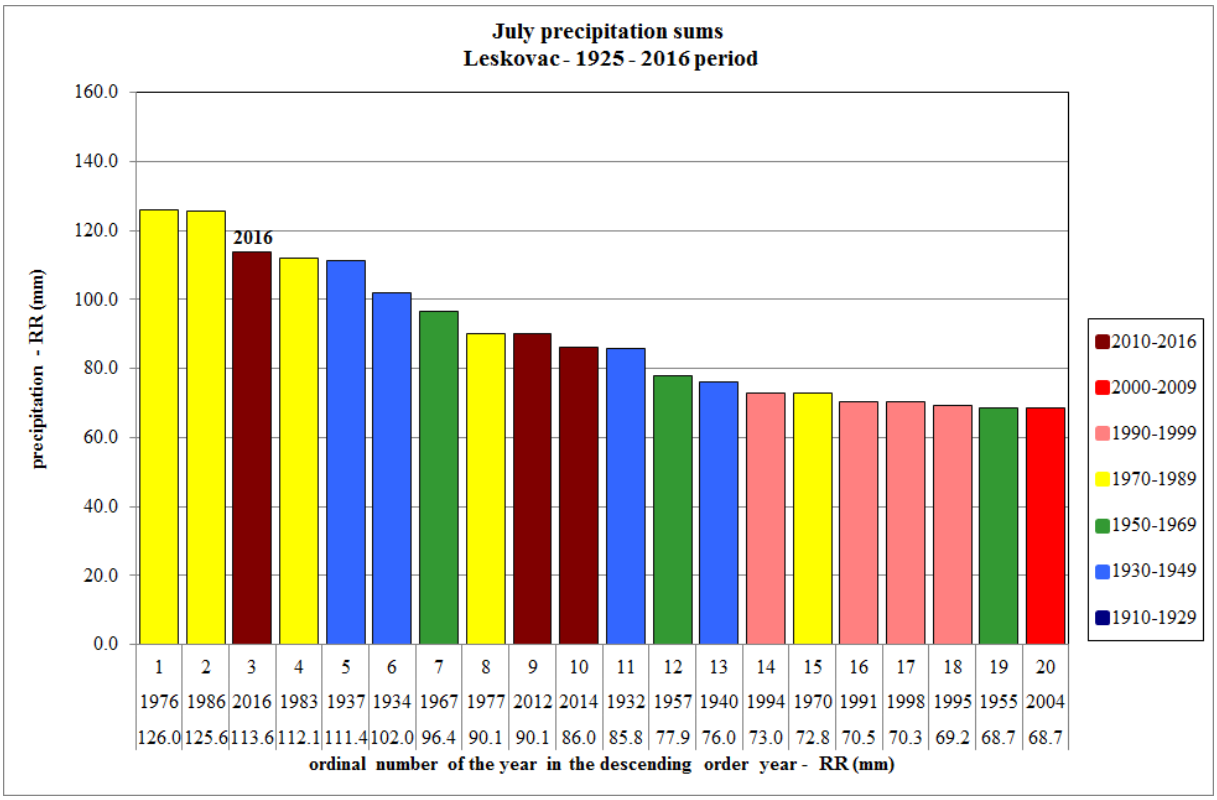


Figure 12. July precipitation totals for Leskovac for the 1925-2016 period in the descending order (20 years out of the observed set with the highest July precipitation sums)

The highest daily precipitation sum of 137.1 mm was registered in Negotin, on July 16, thereby breaking the previous record of 67 mm measured on July 5 in 1970. Similarly, on July 16, Zajecar observed record-breaking sum of 65.2mm. The previous record of 64mm was set on July 9, 1940. Furthermore, MMS Vranje observed 74.2mm of precipitation on July 16, thereby breaking the previous record of 61,1 mm registered on July 6, 1967.

The number of days with precipitation in July varied from 2 days in Zajecar and Smederevska Palanka to 11 days at Kopaonik. The registered number of days with precipitation in July was above the average in Vranje, whereas elsewhere, it was below the average number for the month of July.

Daily and cumulative precipitation sums for July for Belgrade, Negotin and Kopaonik are shown in Figures 13, 14 and 15.

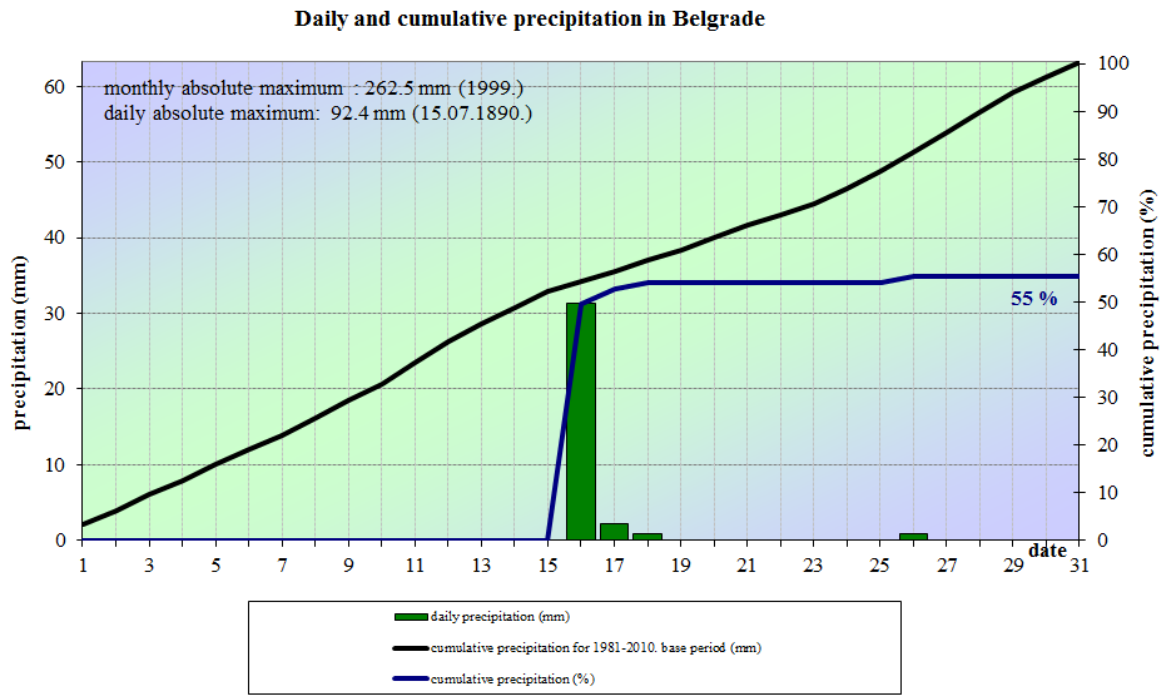


Figure 13.

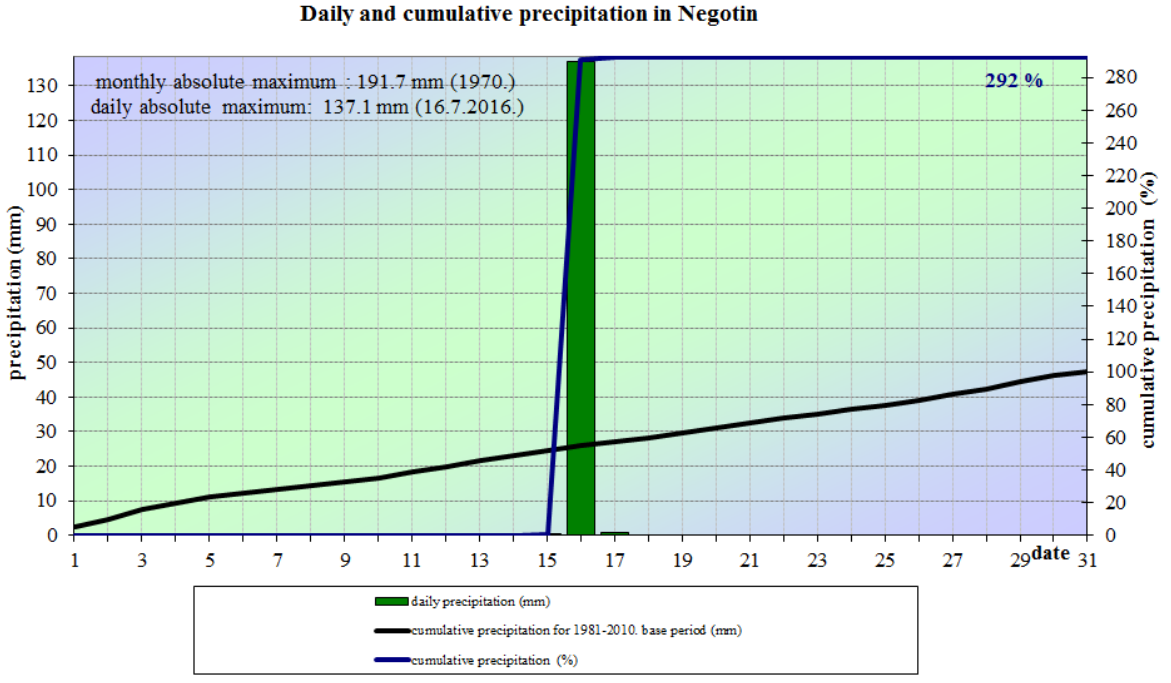


Figure 14.

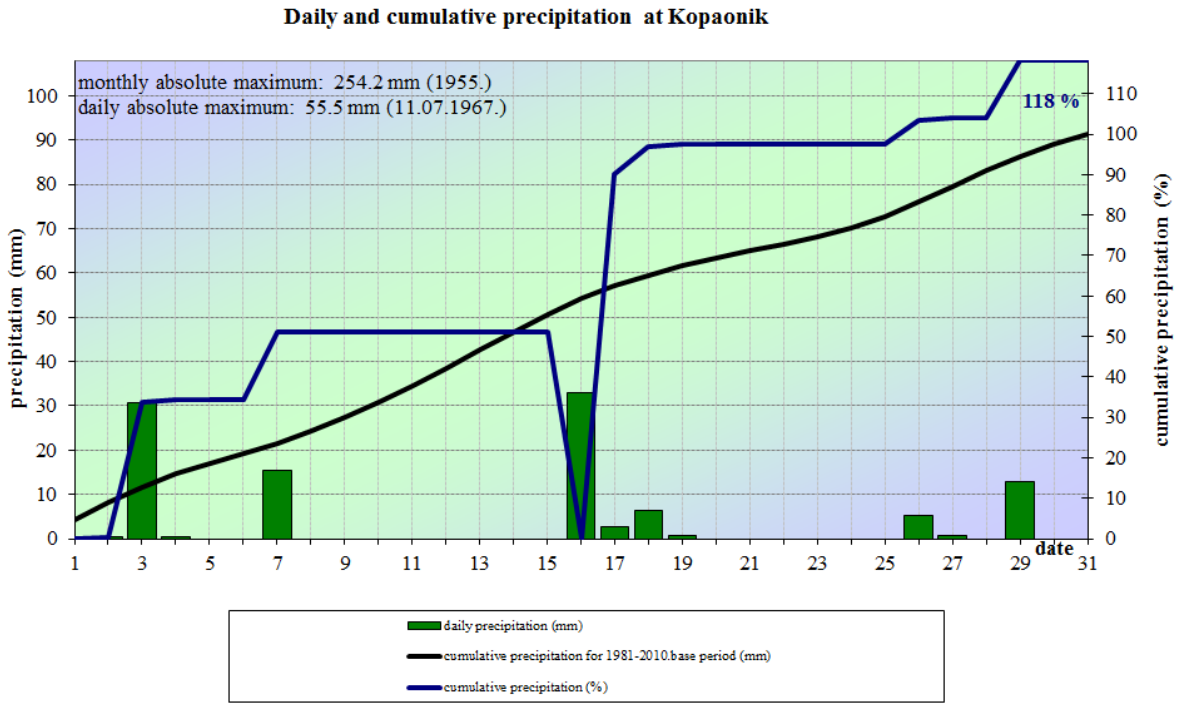


Figure 15.

The average number of thunderstorm days in the low-lying areas in Serbia ranged from 5 days in Kragujevac up to 8 days in Leskovac and Dimitrovgrad (*Figure 16*).

The highest positive deviation of the number of thunderstorm days from the average in July, total of 3 days, was observed in Sjenica (*Figure 17*).

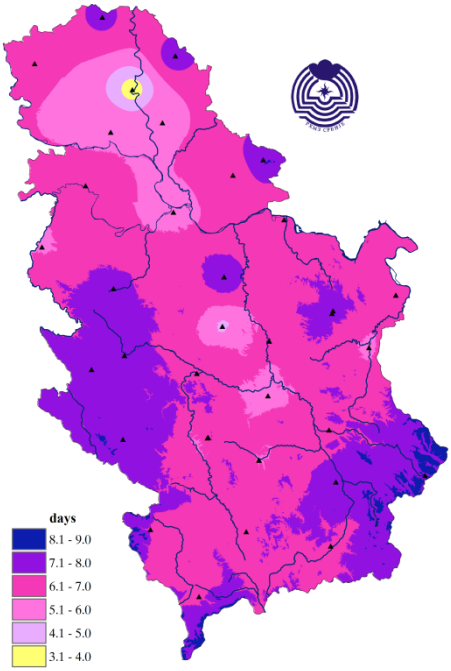


Figure 16. The average number of thunderstorm days in Serbia

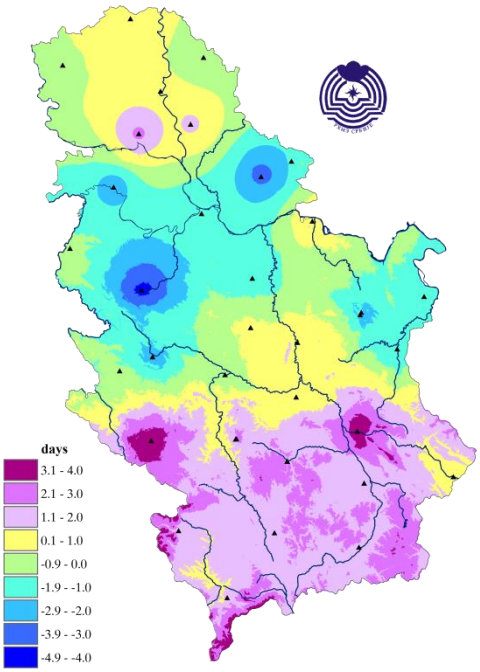


Figure 17. The departure of the number of thunderstorm days in Serbia in July compared to the normal for the 1981-2010 period.

SUNSHINE DURATION (INSOLATION)

Sunshine duration in July ranged from 245.9 hours in Sjenica up to 352.0 hours in Negotin (*Figure 18*).

July insolation was in a range from 93% in Sjenica up to 118% in Pozega compared to the normal for the 1981-2010 base period (*Figure 19*).

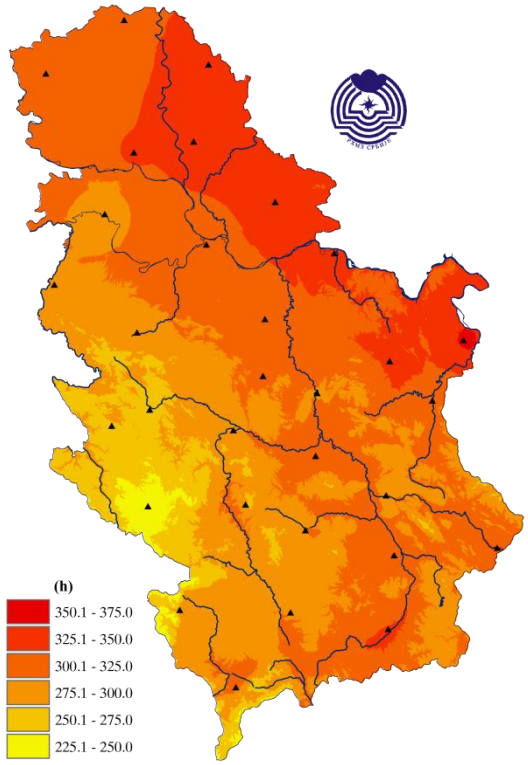


Figure 18. Insolation during July 2016, expressed in hours

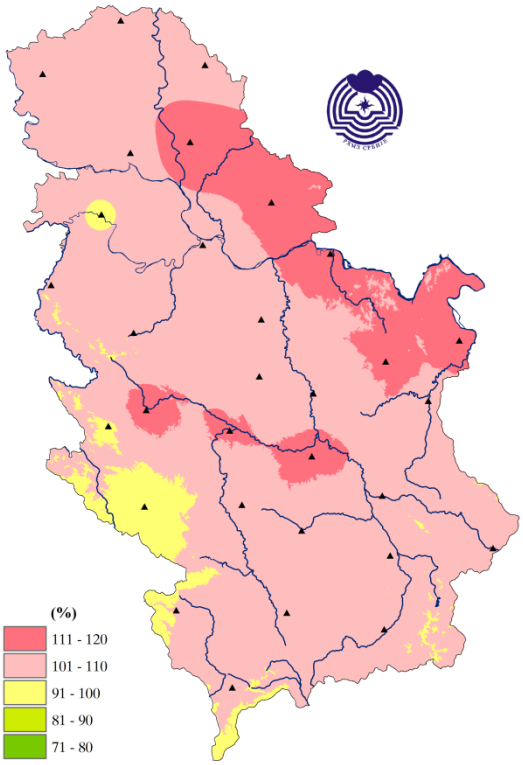


Figure 19. Insolation during July 2016, expressed in the percentages of normal