**Republic Hydrometeorlogical Service of Serbia** 

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# ANNUAL BULLETIN FOR SERBIA THE YEAR 2023

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# CONTENT

Air temperature	2
Precipitation	6
Heat waves and cold waves	7
Monthly and seasonal overview of the climate characteristics and record values of temperature and precipitation in 2023	8
Appendix	

- ✤ 2023 the warmest year for Serbia since 1951 with the departure of the mean air temperature of 1.5°C compared to the 1990-2020 average; in Belgrade the warmest since 1888 with anomaly of 1.7°C
- **\*** Record-breaking mean, minimum and maximum air temperature
- Very rainy year in most of Serbia; the wettest for Sjenica with precipitation sums of 1087.5 mm
- ✤ In 2023, record low number of frost days at 9, and ice days at 11 main meteorological stations (MMS) in Serbia
- 2<sup>nd</sup> warmest and 6<sup>th</sup> wettest January for Serbia since 1951
- 3<sup>rd</sup> warmest September for Serbia since 1951; warmest September for Palic, Novi Sad, Zrenjanin, Kikinda, Loznica and Sremska Mitrovica
- 2<sup>nd</sup> warmest October for Serbia since 1951; warmest October for Novi Sad, Zrenjanin, Banatski Karlovac, Loznica, Valjevo, Kraljevo, Dimitrovgrad, Sjenica and Kopaonik, Zlatibor and Crni Vrh
- The wettest November for Serbia since 1951
- The 3<sup>rd</sup> warmest December for Serbia since 1951; warmest December for Negotin, Valjevo, Zajecar and Loznica, as well as Crni Vrh; absolute maximum December air temperature exceeded
- The 3<sup>rd</sup> warmest winter for Serbia since 1951, warmest for Cuprija, Banatski Karlovac, 2<sup>nd</sup> warmest for Belgrade, Sombor, Novi Sad, Zrenjanin, Kikinda, Kraljevo, Pozega, Sjenica, Nis, Zajecar, Dimitrovgrad, Vranje and Palic; in Novi Sad and Zajecar first snow without ice days; record low number of frost days in Sombor, Banatski Karlovac, Belgrade, Valjevo, Kragujevac, Smederevska Palanka, Pozega, Negotin and Palic
- The warmest autumn for Serbia since 1951; record-breaking number of summer days at 17 MMS in Serbia; record-breaking number of 12 tropical days in Novi Sad and 11 tropical days in Sombor

### Air temperature

In Serbia, the year 2023, with an average air temperature of  $12.5^{\circ}$ C is the warmest (*Figure 1*) in the period from 1951 up to date, and in Belgrade with an average air temperature of 14.8°C the warmest since the establishment of the meteorological station in 1888 (Appendix, Figure 1). Mean annual air temperature ranged from  $11.4^{\circ}$ C in Pozega to 14.8°C in Belgrade, and on the mountains from  $5.4^{\circ}$ C at Kopaonik to  $9.5^{\circ}$ C at Zlatibor (Appendix, Figure 4). Departure of the mean annual air temperature compared to the 1991-2020 base period ranged from  $1.1^{\circ}$ C in Zajecar and Veliko Gradiste to  $1.9^{\circ}$ C in Negotin (Appendix, Figure 5). Based on the percentile distribution<sup>1</sup>, 2023 was in the category of extremely warm across entire Serbia apart from Veliko Gradiste where it was in the warm category (Appendix, Figure 6).

<sup>&</sup>lt;sup>1</sup> 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



Rank of the warmest and coldest years in Serbia for the 1951-2023 period relative to the 1991-2020 base period

Figure 1. Rank of the warmest and coldest years for Serbia for the 1951-2023 period

In 2023, the highest daily air temperature of 39.0°C was measured in Dimitrovgrad and Nis on July 25 and August 4, respectively. The highest number of tropical days<sup>2</sup>, total of 64 days, was recorded in Leskovac. In most of Serbia, number of tropical days ranged from 37 to 60 days which is 3 to 18 days above the average compared to the 1991-2020 base period. Belgrade observed 57 tropical days which is 12 days above the average for the 1991-2020 base period.

<sup>&</sup>lt;sup>2</sup> Tropical day is defined as the day with the maximum daily air temperature of 30 °C and more



Figure 2. Trend of the mean annual air temperature anomaly for Serbia, 1951-2023 period

There were 34 tropical nights<sup>3</sup> in Belgrade which is 8 nights above the average. The number of tropical nights was the following: Palic -21, Loznica -18, Negotin -16, Novi Sad -15, Zrenjanin and Kikinda -14, Sombor and Valjevo -12, elsewhere less than 8. Tropical nights were not recorded in parts of western and southern Serbia.

In 2023, the lowest daily air temperature of  $-22.7^{\circ}$ C was measured in Sjenica on February 9. On the mountains, number of days with severe frost ranged from 6 days at Zlatibor and Crni Vrh to 15 days at Kopaonik. Sjenica recorded 13, while the remainder of Serbia saw up to 3 days with severe frost. Belgrade, northern and parts of western, eastern and central Serbia didn't see any days with severe frost.

Record low number of ice days<sup>4</sup> was registered at 11 MMS, ranging from 1 to 3 days in most of Serbia, and in the upland from 16 in Sjenica to 51 days at Kopaonik. Number of ice days was 8 to 19 days below the average.

Number of frost days<sup>5</sup> ranged from 18 in Belgrade to 84 in Pozega, and in the upland from 90 at Zlatibor to 142 at Kopaonik. Number of frost days ranged from 13 to 35 days below the average, reaching up to 45 days on the mountains. At 9 MMS, there was a record low number of frost days.

<sup>&</sup>lt;sup>3</sup> Tropical night is defined as the night with the minimum daily air temperature of 20 °C and more

 $<sup>^4</sup>$  Ice day is defined as the day with the maximum daily air temperature below 0  $^\circ\mathrm{C}$ 

<sup>&</sup>lt;sup>5</sup> Frost day is defined as the day with the minimum daily air temperature below 0 °C

Distribution of the annual mean minimum and mean maximum air temperatures and their accompanying terciles in Serbia for the 1981-2023 period are shown in Figure 3. In terms of minimum and maximum air temperature, 2023 ranks as the warmest on record.



Mean maximum air temperature (°C)

Figure 3. Mean minimum and mean maximum air temperature and their accompanying terciles for Serbia for the 1981-2023 period



Figure 4. Daily mean air temperature anomaly from the normal 1991-2020 for Belgrade

## **Precipitation**

In most of Serbia, annual precipitation sum was above the average, in the categories of rainy and very rainy, in Sjenica in the category of extremely rainy (Appendix, Figure 9). Annual precipitation sums ranged from 663.7 mm in Novi Sad to 963.9 mm in Loznica, and on the mountains from 943.0 mm at Crni Vrh to 1276.3 mm at Kopaonik (Appendix, Figure 7). Percentage of the precipitation sums compared to the 1991-2020 normal ranged from 98% in Novi Sad to 144% in Krusevac (Appendix, Figure 8). The year 2023 was the wettest for Sjenica with precipitation totals of 1087.5 mm (Appendix, Figure 3). The highest daily precipitation sum of 78.8 mm was recorded in Banatski Karlovac on August 16.

Number of rainy days, with precipitation sum of 0.1 mm and above ranged from 130 in Vranje to 168 in Cuprija, and in the upland from 147 at Crni Vrh to 179 at Kopaonik.

Number of days with precipitation of 20 mm and above ranged from 4 in Sombor to 18 in Krusevac, and on the mountains from 10 at Crni Vrh to 15 in Sjenica. Zrenjanin and Loznica recorded 2 days with precipitation sums of 50 mm and above, whereas one day was registered in Belgrade, Bantski Karlovac, Valjevo, Veliko Gradiste, Kursumlija, Krusevac, Cuprija, Vranje, Zlatibor and Kopaonik.

Number of days with snow cover ranged from 2 in Negotin and Veliko Gradiste to 17 in Pozega, Dimitrovgrad and Vranje, and in the upland from 70 in Sjenica to 149 at Kopaonik. The highest snow cover depth of 115 was measured at Kopaonik on February 6. In the lowland, the highest snow cover depth of 38 cm was measured in Vranje on November 26.



Figure 6. Monthly precipitation sums for Serbia (mean monthly sum per station)

### Heat waves and cold waves

In winter 2022/2023, there were 3 heat waves<sup>6</sup>. The first one lasted from 7 to 11 December in the southern areas. The second heat wave was recorded across the entire country, apart from Pozega and Vranje, lasting from December 29 to January 3. Nevertheless, the onset of the heat wave in Sombor and Palic was observed on December 23, lasting throughout January 8 in some northern and eastern areas. The third heat wave affected certain parts of northern and western Serbia in the period from 16 to 24 February. Cold wave<sup>7</sup> was recorded only at Kopaonik in the period from 5 to 9 February.

Serbia experienced 2 heat waves during summer. The first lasted from 15 to 19 July affecting Palic, Kopaonik, Sremska Mitrovica and Dimitrovgrad. The second heat wave was recorded in Sombor in the period from 21 to 28 August and in Negotin from 22 to 28 August.

There were 4 heat waves during autumn. The first heat wave lasted from 7 to 13 September mostly in the north, the second lasted from 17 to 23 September in parts of northern and western Serbia, and the third from 26 to 30 September also in the northern parts of the country, and the fourth affected most of the country from 20 to 25 October. The longest lasting heat wave was recorded in Dimitrovgrad from 20 to 31 October.

<sup>&</sup>lt;sup>6</sup> Heat wave, based on the percentile method, is defined as the period during which the maximum daily air temperature falls under the very warm and extremely warm category for five consecutive days and longer

<sup>&</sup>lt;sup>7</sup> Cold wave, based on the percentile method, is defined as the period during which the minimum daily air temperature falls under the very cold and extremely cold category for five consecutive days and longer

# Monthly and seasonal overview of the climate characteristics and record values of temperature and precipitation in 2023

**January** – The 2<sup>nd</sup> warmest and 6<sup>th</sup> wettest January for Serbia. Absolute daily maximum air temperature exceeded in Veliko Gradiste and Crni Vrh. Heat wave recorded at the beginning of the month across most of the country. Maximum of the mean minimum air temperature exceeded at 13 MMS. The lowest number of frost days since the record-keeping began at 12 MMS. Record low number of days with severe frost recorded in January at Kopaonik. The wettest January for Sjenica, 2<sup>nd</sup> wettest for Kopaonik. The absolute daily maximum precipitation sum exceeded at Kopaonik. The lowest number of days with snow cover exceeded at Kopaonik.



Figure 6. Rank of the warmest and coldest January for Serbia

**February** – Averagely warm and averagely wet February for Serbia. Heat wave at the end of the month in Palic, Sombor, Novi Sad, Sremska Mitrovica, Valjevo and Loznica. Absolute daily maximum precipitation sum exceeded at Zlatibor.

March – Warm and averagely rainy March for Serbia.

**April** – Very cold (the 13<sup>th</sup> coldest) and the 6<sup>th</sup> wettest April for Serbia. The 4<sup>th</sup> coldest April for Banatski Karlovac, 8<sup>th</sup> coldest for Crni Vrh, 9<sup>th</sup> coldest for Sjenica. The 2<sup>nd</sup> wettest April for Kopaonik, 3<sup>rd</sup> wettest for Zlatibor, 7<sup>th</sup> wettest for Banatski Karlovac, 9<sup>th</sup> wettest for Negotin. Maximum snow cover depth exceeded in Belgrade and Smederevska Palanka. Number of days with snow cover exceeded in Zrenjanin and Krusevac. Maximum number of cloudy days exceeded at Zlatibor. Minimum number of insolation hours surpassed at Kopaonik.

**May** – Rainy May in parts of western and northern Serbia and averagely warm in most of the country. The 2<sup>nd</sup> wettest May for Loznica, 7<sup>th</sup> wettest for Novi Sad, 8<sup>th</sup> wettest for Zrenjanin. Maximum number of days with precipitation exceeded in Banatski Karlovac. Maximum number of days with fog exceeded at Zlatibor.

**June** – The 9<sup>th</sup> wettest June for Serbia with air temperature within the average. The wettest June for Kursumlija and Sjenica. The maximum number of cloudy days exceeded in Sjenica, Dimitrovgrad and Kursumlija. The minimum number of insolation hours exceeded in Loznica, Zajecar and Crni Vrh.



Figure 7. The highest precipitation in Kursumlija

**July** – The 5<sup>th</sup> warmest July for Serbia with precipitation sums within the average. The number of tropical days exceeded on Palic, Banatski Karlovac and Cuprija. Heat wave recorded on Palic, Kopaonik, Sremska Mitrovica and Dimitrovgrad. The 8<sup>th</sup> driest July in Dimitrovgrad. Extremely strong wind gusts, particularly in the mid-month.

**August** – Averagely warm and rainy August in most of Serbia. The 8<sup>th</sup> warmest August for Crni Vrh. Hitherto, maximum number of tropical nigh exceeded on Palic and Loznica. The 3<sup>rd</sup> wettest August for Veliko Gradiste, 5<sup>th</sup> wettest for Banatski Karlovac, 9<sup>th</sup> wettest for Zrenjanin. The 6<sup>th</sup> driest August for Sremska Mitrovica. Absolute daily maximum of precipitation sum exceeded in Banatski Karlovac.

**September** – The 3<sup>rd</sup> warmest September for Serbia. The warmest September for Palic, Novi Sad, Zrenjanin, Kikinda, Loznica and Sremska Mitrovica. Number of summer days exceeded at 9 MMS. Number of tropical days exceeded in Sombor and Novi Sad. There were 3 heat waves. The 5<sup>th</sup> wettest September for Negotin, 7<sup>th</sup> wettest for Kikinda. The 7<sup>th</sup> driest September for Vranje and Crni Vrh. September daily maximum precipitation sum exceeded in Zrenjanin.



Anomaly of mean September temperature relative to 1991-2020 base period Novi Sad - 1948-2023 period

ranking - year - Tmean anomaly (°C) relative to 1991-2020 - Tmean

Figure 8. Rank of the warmest September in Novi Sad

**October** – The 2<sup>nd</sup> warmest October for Serbia since 1951. The warmest October for Novi Sad, Zrenjanin, Banatski Karlovac, Loznica, Valjevo, Kraljevo, Dimitrovgrad, Sjenica, Kopaonik, Zlatibor and Crni Vrh. Record-breaking 19 summer days in Loznica. One tropical day was registered in Belgrade, Loznica, Valjevo, Kraljevo, Krusevac, Nis, Leskovac, Zajecar and Dimitrovgrad. Tropical night was recorded in Valjevo and for the first time in Kikinda. Record- high daily minimum and maximum air temperatures, particularly during the last decade of October. The 7<sup>th</sup> driest October for Serbia, 2<sup>nd</sup> driest for Kraljevo, 3<sup>rd</sup> driest for Nis and Pozega.



Figure 9. Rank of the warmest and coldest October in Serbia

**November** – The wettest November for Serbia since 1951. The wettest November for Kraljevo, Cuprija, Zajecar, Dimitrovgrad, Kopaonik, Zlatibor and Crni Vrh. Record-breaking number of rainy days in November for Kragujevac, Veliko Gradiste, Leskovac, Dimitrovgrad and Vranje. Record snow cover depth of 38 cm measured in Vranje on November 26.



Figure 10. Rank of the wettest and driest November for Serbia for the period from 1951 to 2023

**December** – The 3<sup>rd</sup> warmest December for Serbia since 1951. The warmest December for Negotin, Valjevo, Zajecar, Loznica and Crni Vrh. Hitherto absolute December maximum air temperature exceeded at 13 MMS. Record-breaking maximum daily air temperature in December are measured at the beginning and end of the month at the majority of MMS. Summer day in December was recorded in Valjevo, Kragujevac and Kraljevo for the first time since record-keeping began. One heat wave at the end of the month.







**Winter 2022/2023** – The 3<sup>rd</sup> warmest winter for Serbia since 1951, the warmest for Cuprija and Banatski Karlovac, 2<sup>nd</sup> warmest for Belgrade since 1888, Sombor, Novi Sad, Zrenjanin, Kikinda, Kraljevo, Pozega, Sjenica, Nis, Zajecar, Dimitrovgrad, Vranje and Palic. In Novi Sad and Zajecar, the first without ice days. A record-low number of frost days in Sombor, Banatski Karlovac, Belgrade, Valjevo, Kragujevac, Smederevska Palanka, Pozega, Negotin and Palic. 8<sup>th</sup> wettest winter for Serbia since 1951, the wettest for Sjenica since 1926, 3<sup>rd</sup> wettest for Loznica since 1926. Record-breaking maximum daily precipitation sum in Veliko Gradiste and Kopaonik, day with precipitation exceeding 50 mm registered for the first time since winter record-keeping began. Record-low snow cover depth in Kraljevo and Kursumlija. Record-low number of days with snow cover at Kopaonik.



Figure 12. Rank of the wettest winters in Sjenica

**Spring 2023** – Rainy spring with air temperature within the average. The 3<sup>rd</sup> wettest spring for Loznica since 1925. In Novi Sad and Sremska Mitrovica, the lowest number of bright days during spring. Kopaonik observed record low number of sunshine duration hours.

**Summer 2023** – The 11<sup>th</sup> warmest summer for Serbia since 1951. The 3<sup>rd</sup> warmest summer for Serbia in terms of minimum air temperature. Exceeded maximum number of tropical nights in Palic and Sombor. Rainy summer in the east, parts of southwestern, central and southeastern Serbia. The 2<sup>nd</sup> wettest summer for Krusevac and Cuprija. Number of days with precipitation sums of 20 mm and above exceeded in Krusevac.

**Autumn 2023** – The warmest autumn for Serbia since 1951. Record-breaking number of summer days at 17 MMS in Serbia. Record-breaking number of tropical days in Novi Sad (12) and Sombor (11). Autumn daily maximum of precipitation sums exceeded in Zrenjanin. Record-breaking snow depth in Vranje.



Figure 13. Rank of the warmest and coldest autumn seasons for Serbia for the 1951-2023 period

**Note**: Climatological analysis of meteorological elements was conducted based on the provisionary data obtained from 28 main meteorological stations

# Appendix

## Table 1

station/month	January	February	March	April	May	June	July	August	September	October	November	December	Year
PALIC	4.6	3.3	8.4	10.5	17.2	21.1	24.9	23.8	20.8	15.4	7.4	3.7	13.4
SOMBOR	4.3	3.5	8.5	10.5	16.8	20.9	24.1	23.4	20.5	15.3	7.4	4.1	13.3
NOVI SAD	4.9	3.6	9.0	10.4	17.2	21.5	24.7	23.7	21.4	16.6	8.4	5.3	13.9
ZRENJANIN	5.2	3.6	9.0	10.3	17.3	21.1	24.5	23.8	21.1	16.3	8.2	5.0	13.8
KIKINDA	5.1	3.4	8.6	10.3	17.1	21.0	24.9	23.6	20.7	15.7	7.5	4.8	13.6
B.KARLOVAC	5.0	3.4	8.6	10.0	16.8	20.6	24.2	23.0	20.3	15.6	8.0	5.3	13.4
LOZNICA	5.0	4.1	9.4	10.8	16.5	20.8	24.4	23.4	20.7	16.8	9.3	6.3	14.0
S.MITROVICA	4.3	3.1	8.3	10.3	16.7	20.7	23.7	23.2	20.6	15.4	7.9	4.7	13.3
VALJEVO	4.5	3.9	8.7	10.5	16.5	20.5	24.4	23.1	20.5	16.1	8.5	6.4	13.6
BELGRADE	5.7	4.8	10.1	11.2	17.4	21.8	26.0	24.7	22.2	17.6	9.5	7.0	14.8
KRAGUJEVAC	5.1	3.9	9.0	10.1	16.2	20.1	24.1	22.8	20.0	16.0	8.9	6.3	13.5
S.PALANKA	5.1	3.5	8.4	10.1	16.2	20.2	24.0	22.6	19.9	15.5	8.4	5.6	13.3
V.GRADISTE	4.8	2.7	8.1	10.1	16.5	20.1	23.7	22.4	19.6	14.9	7.9	4.4	12.9
CRNI VRH	0.0	-1.3	3.2	4.6	10.5	14.9	19.7	19.3	16.3	12.5	3.5	2.1	8.8
NEGOTIN	5.0	4.9	8.7	11.5	16.8	21.3	25.8	24.5	20.7	15.2	8.3	5.8	14.0
ZLATIBOR	0.8	-0.3	4.5	5.3	12.0	15.5	20.3	18.9	16.6	13.1	5.1	3.0	9.5
SJENICA	0.8	-1.9	4.3	4.5	11.2	14.8	19.5	17.2	14.6	10.9	4.4	1.9	8.5
POZEGA	2.4	2.0	6.8	8.9	15.0	18.6	22.1	20.5	17.9	13.2	6.3	3.2	11.4
KRALJEVO	4.5	3.9	8.9	10.1	15.9	19.7	24.0	22.7	20.0	16.1	8.5	5.7	13.3
KOPAONIK	-2.0	-4.0	-0.1	0.2	7.3	11.4	16.0	14.2	11.9	8.5	0.9	0.0	5.4
KURSUMLIJA	3.8	2.9	7.6	9.0	14.7	18.6	22.9	21.2	18.4	14.7	8.4	4.9	12.3
KRUSEVAC	4.6	3.4	8.7	10.1	16.0	20.0	23.9	22.5	19.6	15.8	8.5	5.2	13.2
CUPRIJA	5.0	3.0	8.7	10.1	16.7	20.4	24.4	23.2	20.1	15.8	8.7	5.7	13.5
NIS	5.1	4.1	9.1	10.3	16.5	20.4	24.4	23.7	20.9	16.3	9.1	5.5	13.8
LESKOVAC	4.2	2.8	8.1	9.7	15.8	19.9	23.8	22.5	19.9	14.7	8.2	4.0	12.8
ZAJECAR	3.9	3.2	7.6	10.1	15.1	19.5	23.6	22.0	18.4	14.1	7.3	4.7	12.5
DIMITROVGRAD	4.2	2.4	7.0	8.7	14.3	18.7	22.9	21.8	18.8	14.5	6.9	3.7	12.0
VRANJE	3.9	3.3	8.0	9.7	15.7	19.7	24.1	23.1	20.9	15.4	7.5	4.3	13.0

enstremely						extremely
cold	very cold	cold	normal	warm	very warm	warm

## Table 2

station/month	January	February	March	April	May	June	July	August	September	October	November	December	Year
PALIC	42.8	24.8	22.2	36.9	73.2	135.8	47.2	75.4	47.6	19.6	110.8	65.2	701.5
SOMBOR	64.1	38.1	17.8	75.8	98.1	79.5	30.1	62.9	34.8	24.7	96.1	57	679
NOVI SAD	66.4	57.2	25.3	63.9	124.8	35.4	58.2	39.9	63.5	11.4	83.8	33.9	663.7
ZRENJANIN	68.8	48.9	22.3	46.1	137.4	55.9	51.9	101.8	79.8	10.1	82.3	36.9	742.2
KIKINDA	57.6	30.9	18.6	79.3	89.5	81.8	53.1	68.5	96.6	13.5	83.5	45	717.9
B.KARLOVAC	86.0	52.4	32.7	86.6	73.4	80.9	59.4	144.6	67.5	22.0	72.1	29.2	806.8
LOZNICA	103.2	74.6	58.0	72.6	249.2	57.0	45.2	38.5	50.9	14.9	146.1	53.7	963.9
S.MITROVICA	76.0	61.3	32.6	52.3	105.7	76.8	77.6	8.8	43.0	16.6	93.6	31.3	675.6
VALJEVO	82.4	73.3	55.7	76.6	124.8	141.1	93.5	25.6	79.5	13.4	152.4	31.8	950.1
BELGRADE	79.3	62.9	37.6	79.0	92.8	75.6	46.8	87.7	71.2	13.0	110.3	33.3	789.5
KRAGUJEVAC	59.3	28.7	45.6	64.2	67.5	118.8	71.0	57.3	27.7	8.6	136.5	22.8	708
S.PALANKA	78.9	33.0	46.2	76.9	43.9	92.1	97.1	80.8	23.3	14.4	106.6	28.3	721.5
V.GRADISTE	75.6	49.1	41.7	86.8	32.1	132.7	82.0	167.4	43.3	24.4	128.0	40.2	903.3
CRNI VRH	78.2	38.9	42.3	93.1	88.8	224.8	53.0	70.9	16.8	22.7	184.8	28.7	943
NEGOTIN	77.3	15.8	27.2	99.8	67.9	129.0	89.5	35.5	107.7	9.4	146.3	20.5	825.9
ZLATIBOR	106.9	91.5	55.5	150.7	101.3	215.0	87.7	32.4	63.9	27.1	197.3	58.6	1187.9
SJENICA	156.0	44.0	55.4	62.2	86.0	198.9	55.6	71.0	58.8	30.6	207.6	61.4	1087.5
POZEGA	76.6	52.6	46.7	59.3	91.6	143.1	90.2	23.6	56.2	5.9	138.6	29.8	814.2
KRALJEVO	73.6	25.1	47.7	75.8	125.0	132.5	74.3	56.9	42.9	3.9	152.7	27	837.4
KOPAONIK	155.6	70.1	75.4	153.2	125.2	153.1	60.3	61.5	74.8	19.0	229.1	99	1276.3
KURSUMLIJA	112.6	15.9	45.0	72.2	72.0	239.8	32.5	56.8	57.5	4.8	120.4	56.2	885.7
KRUSEVAC	81.3	12.0	50.0	89.6	67.9	172.6	151.6	91.5	33.1	3.9	166.5	33.4	953.4
CUPRIJA	80.2	40.3	53.1	90.5	62.3	209.1	34.3	86.2	31.3	4.1	159.1	28.4	878.9
NIS	72.8	22.9	65.2	42.4	59.6	99.7	59.7	76.6	41.9	1.1	167.6	46.6	756.1
LESKOVAC	53.1	23.9	75.4	68.0	61.5	104.1	62.7	45.1	31.1	7.2	130.5	53.1	715.7
ZAJECAR	70.7	13.4	29.8	62.4	48.3	81.8	42.5	88.6	27.9	21.3	177.4	21.5	685.6
DIMITROVGRAD	75.9	27.7	57.3	71.0	109.1	170.0	7.3	47.1	22.1	2.9	149.3	43.9	783.6
VRANJE	56.4	38.4	71.4	58.5	83.4	69.8	14.1	66.6	8.3	18.7	144.1	46.1	675.8
extremely													extremelv
drv		very d	ry	d	lry		normal		wet		very wet		wet



#### Anomaly of mean year temperature relative to 1991-2020 base period Belgrade - 1888-2023 period

ranking - year - Tmean anomaly (°C) relative to 1991-2020 - Tmean

#### Figure 1. Rank of the warmest years in Belgrade



Anomaly of mean year temperature relative to 1991-2020 base period Valjevo - 1927-2023 period

ranking - year - Tmean anomaly (°C) relative to 1991-2020 - Tmean

Figure 2. Rank of the warmest years in Valjevo

Year precipitation sums Sjenica - 1925-2023 period



rank - year - precipitation (mm) Figure 3. Rank of the wettest years in Sjenica



Figure 4. Spatial distribution of mean annual air temperature expressed in (°C)



Figure 5. Spatial distribution of mean annual air temperature anomaly expressed in (°C)



Figure 6. Spatial distribution of mean annual air temperature based on percentile method



Figure 7. Spatial distribution of annual precipitation totals expressed in mm



Figure 8. Spatial distribution of annual precipitation totals expressed in percentages of normal for the 1991-2020 base period



Figure 9. Spatial distribution on annual precipitation totals based on percentile method



Figure 10. Insolation expressed in hours



Figure 11. Insolation expressed in percentages of normal for the 1991-2020 base period