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CONTENT

Air temperature 2
Precipitation 6
Heat wave and cold wave 7
Monthly and seasonal overview of the climate characteristics and record values of temperatures and precipitation recorded in 2024 8
Appendix 17

- ***The year of 2024 – record warm at all main meteorological stations, warmest on record for Serbia with the departure of the mean air temperature of +2.3°C relative to the 1990-2020 average; warmest since 1888 for Belgrade with the anomaly of +2.7°C***
- ***The warmest winter, spring, summer, February, March, June, July and August 2024 for Serbia***
- ***Record mean, mean maximum and mean minimum annual air temperature for Serbia***
- ***On August 14, Sombor observed 40.6°C thereby exceeding previous absolute daily maximum air temperature***
- ***Record-breaking number of summer and tropical days at most stations (Cuprija 92 tropical days), days with the maximum daily air temperature of 35°C and above, tropical nights; minimum number of frost and ice days as well as days with severe frost***
- ***Belgrade recorded 67 tropical nights which is 41 night above the average, thereby breaking the previous record of 57 nights from 2012***
- ***Heat waves were recorded throughout most of the year; 4 heat waves were registered in June, July and August with the maximum daily air temperature mostly above 35°C***
- ***In most of Serbia, annual precipitation sums were within the average***
- ***Absolute lowest snow depth cover of 2 cm was measured in Negotin on January 10 and 11.***
- ***On Palic, Crni Vrh and Vranje, minimum number of days with snow cover***

Air temperature

The year of 2024, with the mean air temperature of 13.3ºC, was the warmest (Figure 1) **in Serbia in the period from 1951 up to day, and warmest for Belgrade, with the mean air temperature of 15.9ºC, since the record-keeping in 1888 began** (Appendix, Figure 1). **Record warm 2024 was also at all main meteorological stations** (Table 1).

Mean annual air temperature ranged from 12.1ºC in Pozega up to 15.9ºC in Belgrade, and on the mountains from 6.4ºC at Kopaonik to 10.5ºC at Zlatibor (Appendix, Figure 4). Departure of the mean annual air temperature for the 1991-2020 base period ranged from +1.8ºC in Zajecar to +2.7ºC in Belgrade (Appendix, Figure 5), with the anomaly of **+2.3ºC in the entire Serbia.** Based on the percentile method[1] 2024 was in the category of extremely warm across entire Serbia (Appendix, Figure 6).

[1] 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

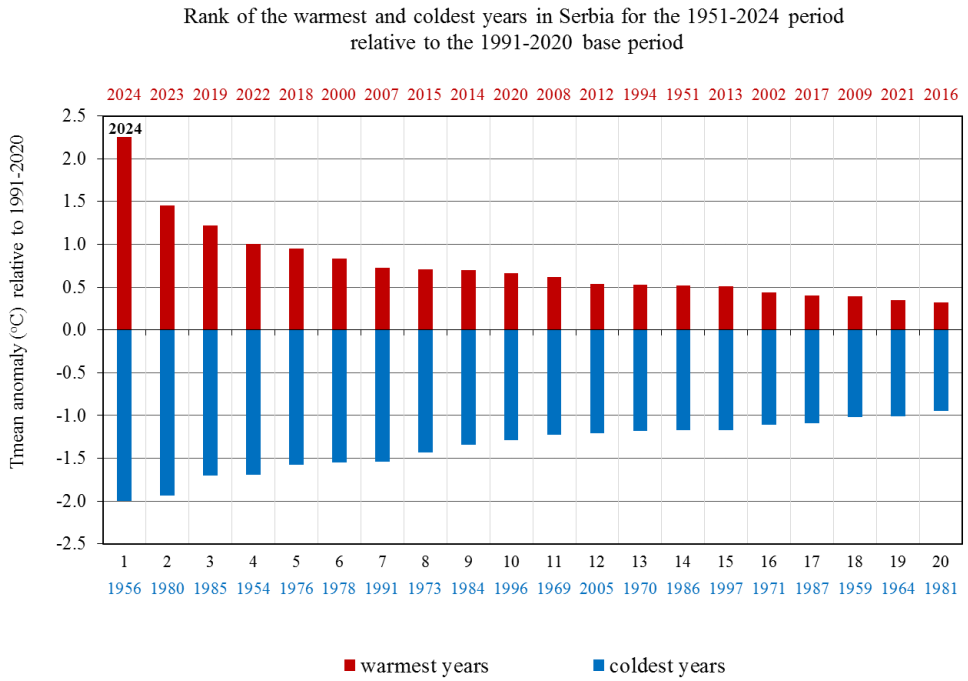

Figure 1. Rank of the warmest and coldest years for Serbia for the 1951-2024 period

Table 1. Rank of the 2024, mean air temperature, average and anomaly for 1991-2020 period

STATION	historical period	Tmean (°C) 2024	reference period 1991-2020	anomaly (°C)	rank of the 2024
PALIC	1945-2023	14.2	11.8	2.5	1
SOMBOR	1942-2023	14.1	11.7	2.4	1
NOVI SAD	1948-2023	14.8	11.9	2.9	1
YRENJANIN	1946-2023	14.5	12.1	2.3	1
KIKINDA	1948-2023	14.4	11.9	2.5	1
B. KARLOVAC	1986-2023	14.3	12.0	2.3	1
LOYNICA	1952-2023	14.7	12.2	2.5	1
S. MITROVICA	1925-2023	14.0	11.8	2.2	1
VALJEVO	1927-2023	14.4	12.0	2.4	1
BELGRADE	1888-2023	15.9	13.2	2.7	1
KRAGUJEVAC	1925-2023	14.4	12.1	2.3	1
S. PALANKA	1939-2023	14.4	12.1	2.3	1
V. GRADISTE	1926-2023	14.0	11.8	2.1	1
C. VRH	1967-2023	9.7	7.2	2.5	1
NEGOTIN	1928-2023	14.7	12.4	2.3	1
ZLATIBOR	1951-2023	10.5	8.3	2.2	1
SJENICA	1947-2023	9.1	7.2	1.9	1
POZEGA	1952-2023	12.1	10.1	1.9	1
KRALJEVO	1927-2023	14.3	11.9	2.4	1
KOPAONIK	1950-2023	6.4	4.1	2.2	1
KURSUMLIJA	1952-2023	13.0	10.8	2.2	1
KRUSEVAC	1930-2023	14.2	11.9	2.3	1
CUPRIJA	1948-2023	14.4	11.7	2.7	1
NIS	1925-2023	14.6	12.4	2.2	1
LESKOVAC	1948-2023	13.4	11.6	1.9	1
ZAJECAR	1930-2023	13.1	11.4	1.8	1
DIMITROVGRAD	1945-2023	12.4	10.4	2.0	1
VRANJE	1926-2023	13.6	11.6	2.0	1

In 2024, the highest daily air temperature of 41.8ºC was measured in Cuprija on July 17.

On August 14, Sombor observed record-breaking air temperature of 40.6°C (the previous record of 40.3°C was set on July 20, 2007). Record-breaking number of tropical days[2] was recorded in most of Serbia**. The highest number of tropical days, total of 92 days, was recorded in Cuprija.** In most of Serbia, number of tropical days ranged from 69 to 90 days which is 30 to 50 tropical days above the average for the 1991-2020 base period. Belgrade observed 79 tropical days which is 34 days above the average for the 1991-2020 base period.

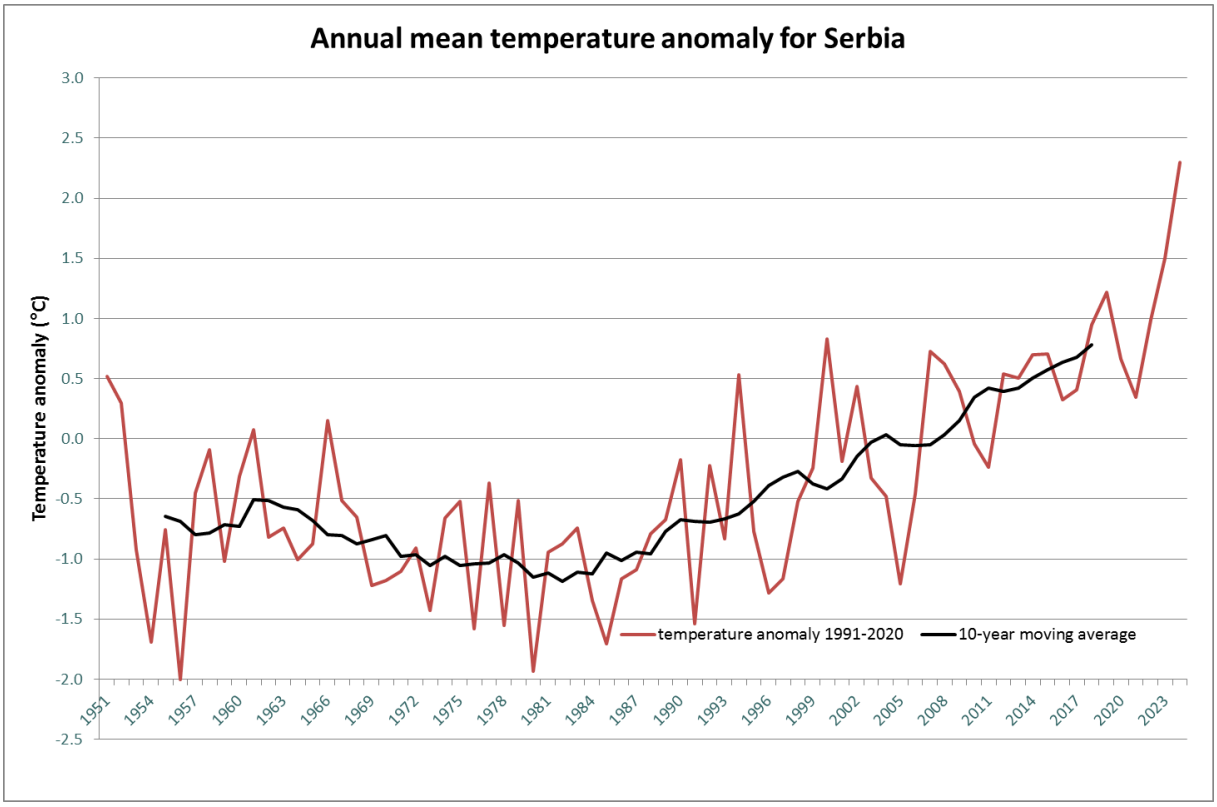

Figure 2. Trend of the mean annual air temperature anomaly for Serbia, 1951-2024 period

Record-breaking number of tropical nights[3] was recorded in most of Serbia. Belgrade recorded 67 tropical nights which is 41 days above the average thereby breaking the previous record of 57 nights from 2012. Novi Sad and Loznica recorded 39 tropical nights, Palic recorded 38, Banatski Karlovac 32, and elsewhere 30 tropical nights were registered. Tropical nights were not recorded in parts of western and southern Serbia.

The lowest daily air temperature of –20.0ºC was measured in Sjenica on January 22. Days with severe frost were recorded on the mountains, ranging from 4 days at Crni Vrh to 16 days in Sjenica, elsewhere 4 days. Days with severe frost were not recorded in Belgrade, northern and parts of western, central and southern Serbia.

[2] Tropical day is defined as the day with the maximum daily air temperature of 30°C and more
[3] Tropical night is defined as the night with the minimum daily air temperature of 20°C and more

Number of ice days[4] ranged from 1 in Kraljevo to 7 in Kikinda, Belgrade recorded 3, which is 10 days below the average. On the mountain, number of ice days ranged from 10 in Sjenica to 42 at Kopaonik. **Crni Vrh recorded 28 ice days which is the least number of ice days ever recorded at this station thereby breaking the previous record of 39 days set in 2020.**

Number of frost days[5] ranged from 25 days in Belgrade to 79 days in Pozega, and on the mountains from 84 at Zlatibor to 133 at Kopaonik. Number of frost days was from 15 to 30 days below the average in most of Serbia. **Kopaonik recorded record low number of frost days, total of 133 days, thereby besting the previous record of 136 days set in 2014.**

Figure 3 shows distribution of mean minimum and mean maximum air temperatures and their accompanying terciles for the period 1981-2024. **Based on the minimum and maximum air temperature 2024 was the warmest.**

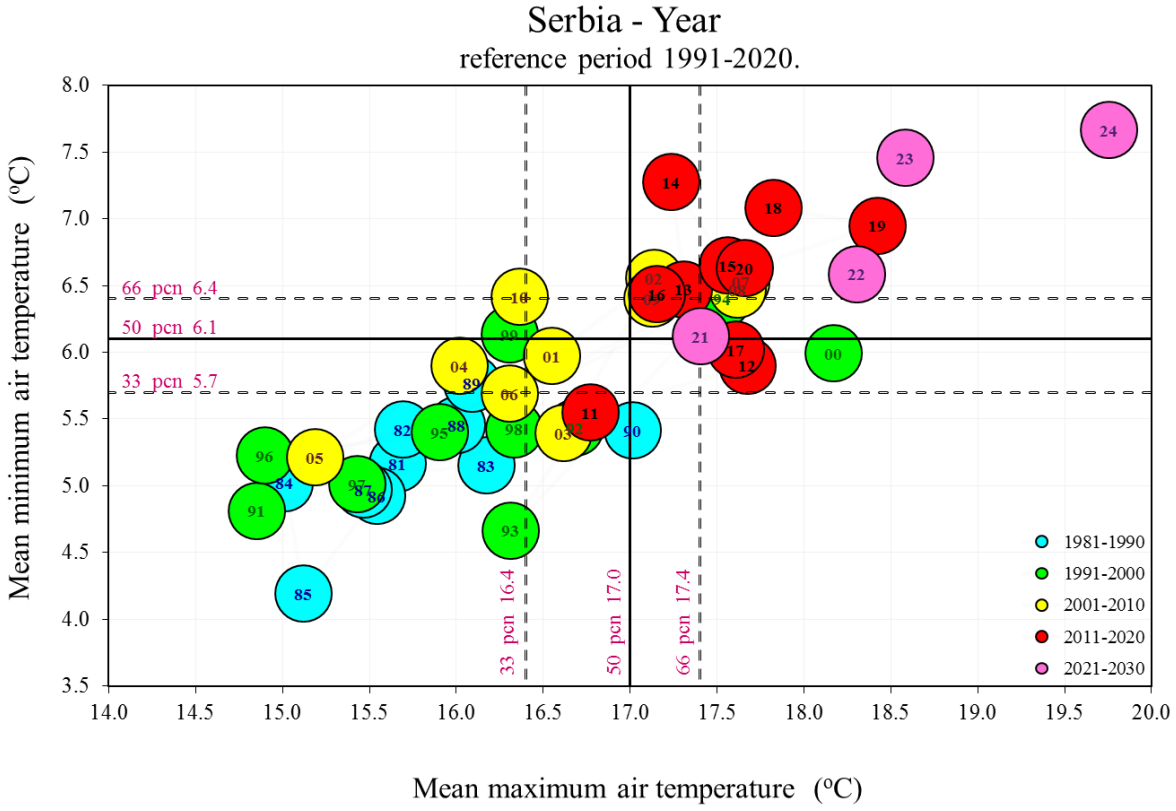

Figure 3. Mean minimum and mean maximum air temperature and their accompanying terciles for Serbia for the 1981-2024 period

[4] Ice day is defined as the day with the maximum daily air temperature below 0°C
[5] Frost day is defined as the day with the minimum daily air temperature below 0°C

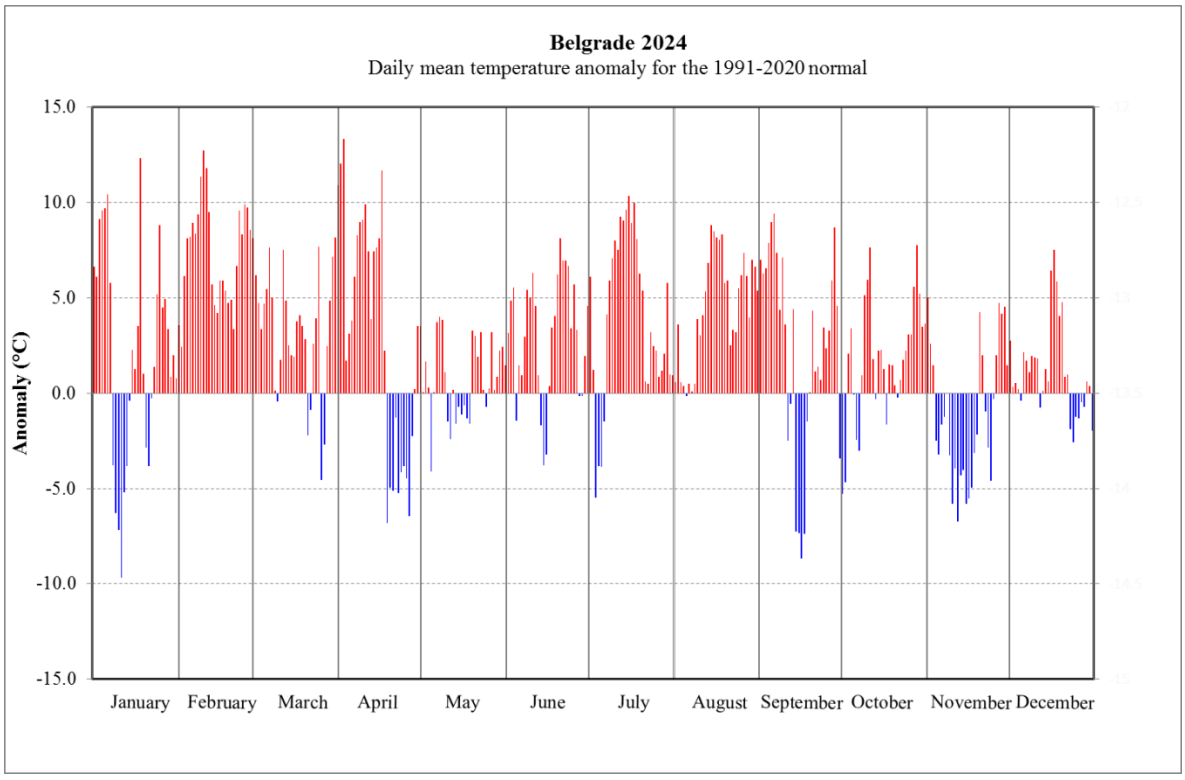

Figure 4. Daily mean air temperature anomaly from the normal 1991-2020 for Belgrade

Precipitation

Annual precipitation sums were within the average in most of Serbia, in dry category on Palic, Banatski Karlovac, Loznica, Valjevo, Veliko Gradiste, Negotin, Cuprija and Kopaonik, very dry category at Crni Vrh, rainy only in Vranje (Appendix, Figure 12). Annual precipitation sums ranged from 439.8 mm on Palic to 778.2 mm in Loznica, and on the mountains from 589.4 mm at Crni Vrh to 930.2 mm at Zlatibor (Appendix, Figure 7). Precipitation sums compared to the normal 1991-2020 ranged from 74% on Palic and Crni Vrh to 120% in Vranje (Appendix, Figure 8). The highest daily precipitation sum of 82.5 mm was measured in Belgrade on June 28.

Number of rainy days, with the precipitation sums 0.1 mm and above, ranged from 100 in Banatski Karlovac to 130 in Valjevo, and in the upland from, 137 days at Zlatibor to 154 days at Kopaonik.

Number of days with precipitation sums of 20 mm and above ranged from 3 on Palic, Kikinda, Smederevska Palanka, Veliko Gradiste, Cuprija and Dimitrovgrad up to 13 in Loznica, and on the mountains from 7 at Crni Vrh to 12 days at Zlatibor.

Number of days with snow cover ranged from 1 on Palic to 24 in Pozega and Valjevo, and in the upland from 65 days in Sjenica to 134 days at Kopaonik. **Record low number of days with snow cover was recorded on Palic, Crni Vrh and Vranje.** The highest snow depth of 63 cm was recorded at Crni Vrh on December 26. In the lowland, the highest snow depth of 25 cm was registered in Valjevo on January 20. On January 9, 10 and 11, the **absolute lowest snow depth of 2 cm was measured in Negotin.**

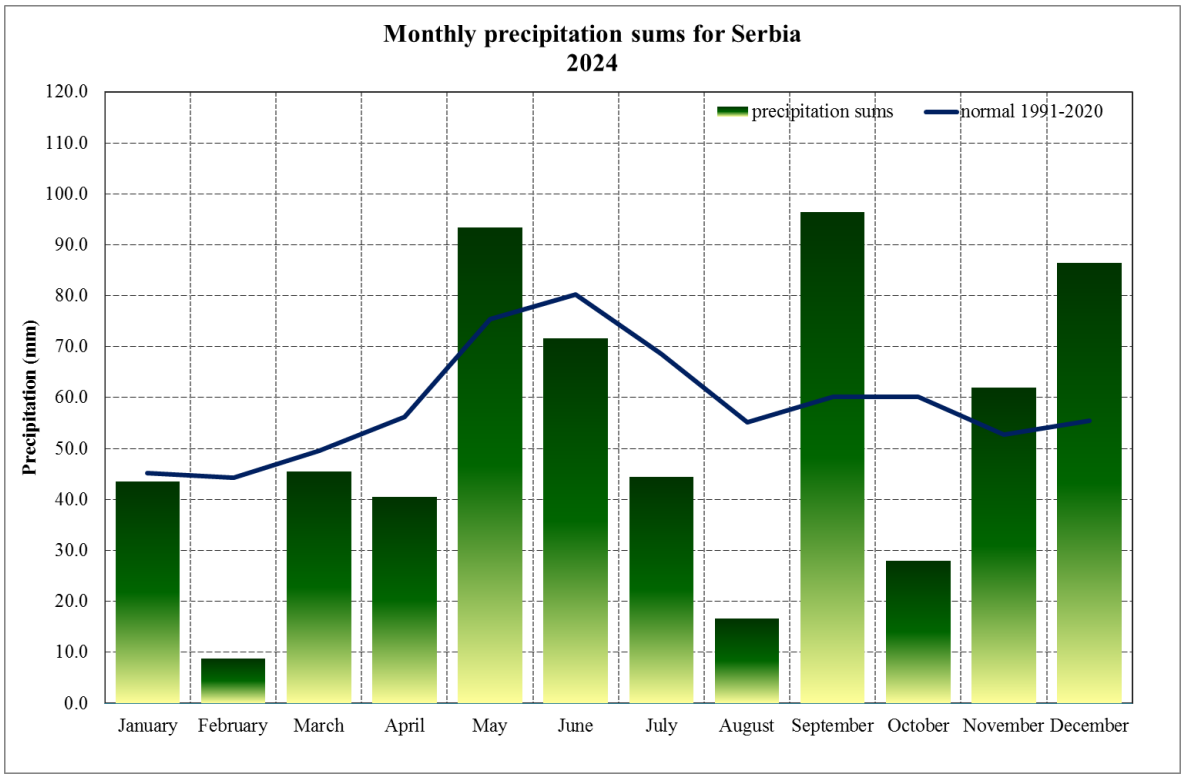

Figure 5. Monthly precipitation sums for Serbia (mean monthly sum per station)

Heat wave and cold wave

During winter 2023/2024, most of Serbia saw 2 heat waves[6]. The first heat wave lasted from December 24 to January 6, and the second from February 3 to 12, as well as in Valjevo from February February 22 to 28, in Pozega from February 23 to 27, Sombor from February 15 to 20, and Palic from February 16 to 20. Cold wave[7] was registered only in Sremska Mitrovica in the period from January 9 to 14.

During spring, there were 2 heat waves. The first one lasting from March 27 to April 2 affecting the entire country apart from mountainous parts of western Serbia. The second heat wave was recorded in the period from April 5 to 16, initially in all of Serbia, and subsequently most of the country.

There were 5 heat waves during summer 2024. The onset of the first heat wave was recorded in Cuprija, Negotin, Zajecar, Vranje, Dimitrovgrad and Leskovac at the end of the first and beginning of the second decade of June. The second heat wave was registered at the end of the second and beginning of the third decade of June in most of the country. The third heat wave was recorded in most of the country

The third heat wave was recorded in most of the country, lasting from July 8 to 20. In Krusevac it lasted longest, total of 14 days. In all of Serbia, the forth heat wave was registered from August 10 to 19, and the fifth heat wave began in Sombor on August 23, on Palic on

[6] Heat wave, based on the percentile method, is defined as the period during which the maximum daily temperature falls under the category of very warm and extremely warm for 5 consecutive days and longer

[7] 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 5 consecutive days and longer

August 24, in Zrenjanin and Novi Sad on August 28, in Loznica on August 29, in parts of northern and certain parts of central and eastern Serbia from August 31. Heat waves, recorded mid-July and mid-August were very intense, with anomaly of 10°C compared to the 1991-2020 normal.

There were 2 heat waves during autumn. The first heat wave affected most of the country at the end of August lasting until September 8, at some places until September 9. The second heat wave was recorded only in Negotin from October 28 to November 2. The longest lasting heat waves were registered in Sombor and Palic, 17 and 16 days, respectively. In Sombor, from August 23 to September 8, and on Palic from August 24 to September 8. Elsewhere, heat waves lasted on average 9 days. In November, there were 2 cold waves. The first was recorded in most of the country from November 4 to 11, and the second was registered in Leskovac from November 22 to 26.

Monthly and seasonal overview of the climate characteristics and record values of temperatures and precipitation recorded in 2024

January – warm and averagely rainy January in Serbia. Heat wave at the beginning of the month across most of the country. Cold wave in Sremska Mitrovica from 9 to 14 January. Record-breaking daily precipitation sum in Kraljevo. 8th wettest January for Sremska Mitrovica.

February – The **warmest** February in Serbia since record-keeping began and the driest since 1951. Record low number of ice days at Crni Vrh. Record low number of frost days in Sombor, Novi Sad, Kikinda, Loznica, Palic, Crni Vrh and Zlatibor. Heat wave from 3 to 11 February in most of the country. The driest February since the record-keeping began in Cuprija and Smederevska Palanka. Record low number of days with snow cover at Crni Vrh and Zlatibor.

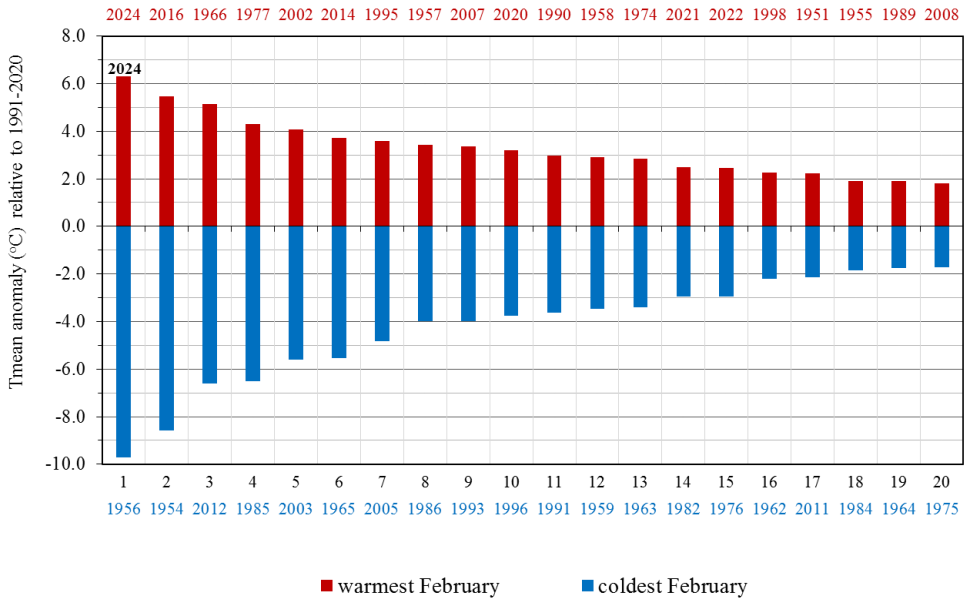

Figure 6. Rank of the warmest and coldest February in Serbia for the period from 1951 to 2024

March – The **warmest** for Serbia. Absolute maximum daily air temperature was surpassed in Sombor, Banatski Karlovac, Negotin and Crni Vrh. The lowest number of ice days at Kopaonik since record-keeping began. One tropical day was recorded in Cuprija for the second time in the record-keeping history. The lowest number of frost days on Zlatibor since the record-keeping began. Record low snow cover at Kopaonik and Crni Vrh since record-keeping began. The lowest number of days with snow cover on Zlatibor and Sjenica since record-keeping began.

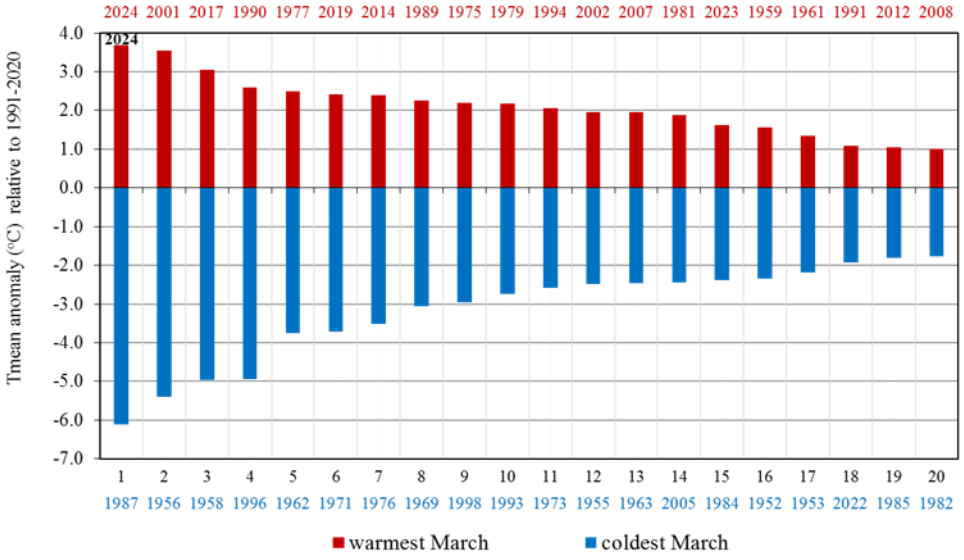

Figure 7. Rank of the warmest and coldest March in Serbia for the period from 1951 to 2024

April – 4th warmest April for Serbia since 1951. Record-breaking number of summer days for Belgrade and Smederevska Palanka. 2 heat waves in most of Serbia. 8th driest April for Novi Sad and Valjevo.

May – Averagely warm May in Serbia. Precipitation sums around and slightly above May average. 6th wettest May for Sremska Mitrovica and 7th wettest for Vranje.

June – The **warmest** June in Serbia since 1951. Absolute daily maximum air temperature exceeded in Sjenica. Record-breaking number of summer and tropical days at most stations. Record-breaking number of tropical nights on Palic, Sombor, Novi Sad, Banatski Karlovac and Belgrade. 2 heat waves.

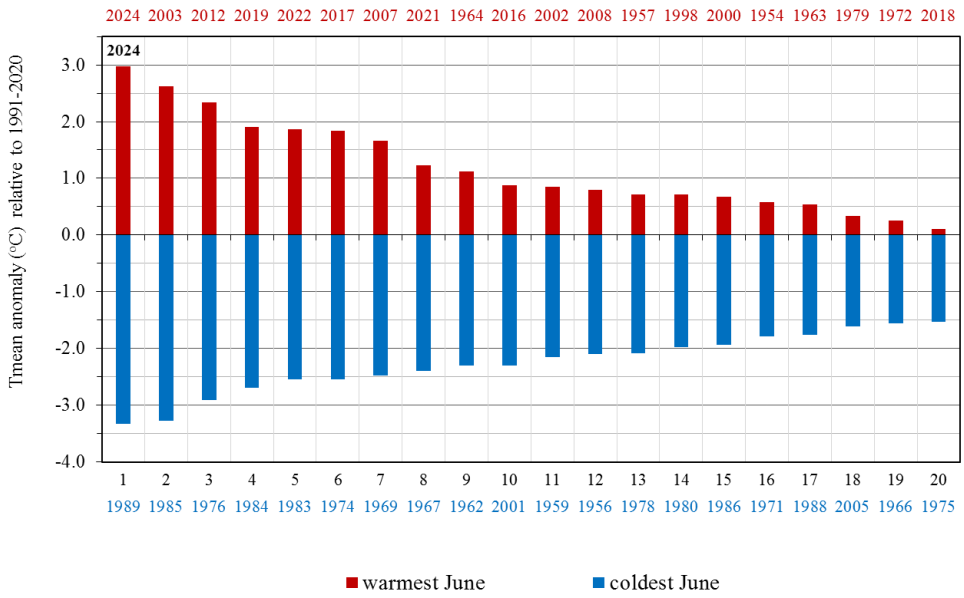

Figure 8. Rank of the warmest and coldest June in Serbia for the period from 1951 to 2024

Table 2. Record-breaking number of summer and tropical days for June

MMS stations	Number of summer days June 2024	The previous record of sumer days	Year of the previous record	Number of tropical days June 2024	The previous record of tropical days	Year of the previous record
NOVI SAD	-	-	-	**20**	18	2003
KIKINDA	-	-	-	**17**	16	2012/2019
KRAGUJEVAC	**29**	28	2003/2023	-	-	-
CRNI VRH	**14**	9	2000/2003	-	-	-
SJENICA	**18**	17	2012	-	-	-
KRALjEVO	-	-	-	**17**	16	2012
KOPAONIK	**3**	2	2021	-	-	-
KURSUMLIJA	**29**	28	2003/2012	**19**	17	2012
CUPRIJA	**30**	29	2012/2022	-	-	-
LESKOVAC	-	-	-	**21**	20	2012
ZAJECAR	**30**	29	2003/2012	**21**	18	2012
DIMITROVGRAD	**29**	27	2003/2012	**20**	15	2012
VRANjE	**29**	28	1937/2012	**19**	16	1927/2012

July – The **warmest** July in Serbia since 1951. Record-breaking number of tropical days and tropical nights at most stations. Heat wave. Record high minimum air temperature in Vrsac, 4th driest July for Kopaonik and 8th driest in Cuprija. Absolute daily precipitation maximum surpassed in Sremska Mitrovica.

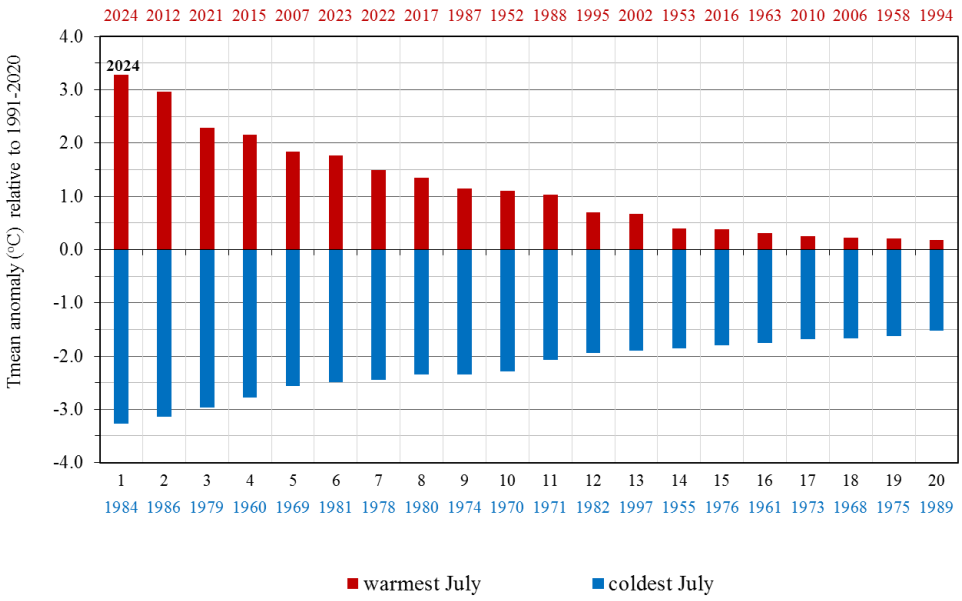

Figure 9. Rank of the warmest and coldest July in Serbia for the period from 1951 to 2024

Table 3. Record-breaking number of summer and tropical days for July

MMS stations	Number of tropical days July 2024	The previous record of tropical days	Year of the previous record
CUPRIJA	**27**	25	2023
ZAJECAR	**27**	26	2012
SOMBOR	**26**	22	2022/2023
NOVI SAD	**26**	22	1952/2012/ 2015/2023
NIS	**26**	25	1952/1995/ 2007/2012
DIMITROVGRAD	**26**	24	1946/2012
ZRENjANIN	**25**	23	1952
LOZNICA	**25**	21	2012/2015
KRUSEVAC	**25**	24	2007
SM. PALANKA	**24**	22	2007/2012/ 2015/2021
PALIC	**23**	21	2023

August – The **warmest** August in Serbia since 1951. The warmest August in most of Serbia since record-keeping began, in Belgrade since 1887. Record values of maximum daily air temperature for August in Sombor, Novi Sad, Kikinda, Kragujevac and Vranje. Record number of summer days at Crni Vrh, tropical days in most of Serbia, and tropical nights in the northern, western and central regions. There were two heat waves. The 6th driest August for Serbia since 1951. The 2nd driest August since record-keeping began in Novi Sad, Banatski Karlovac, Sremska Mitrovica, Belgrade, Veliko Gradiste, Kraljevo and Palic, and the 3rd driest for Zrenjanin and Smederevska Palanka.

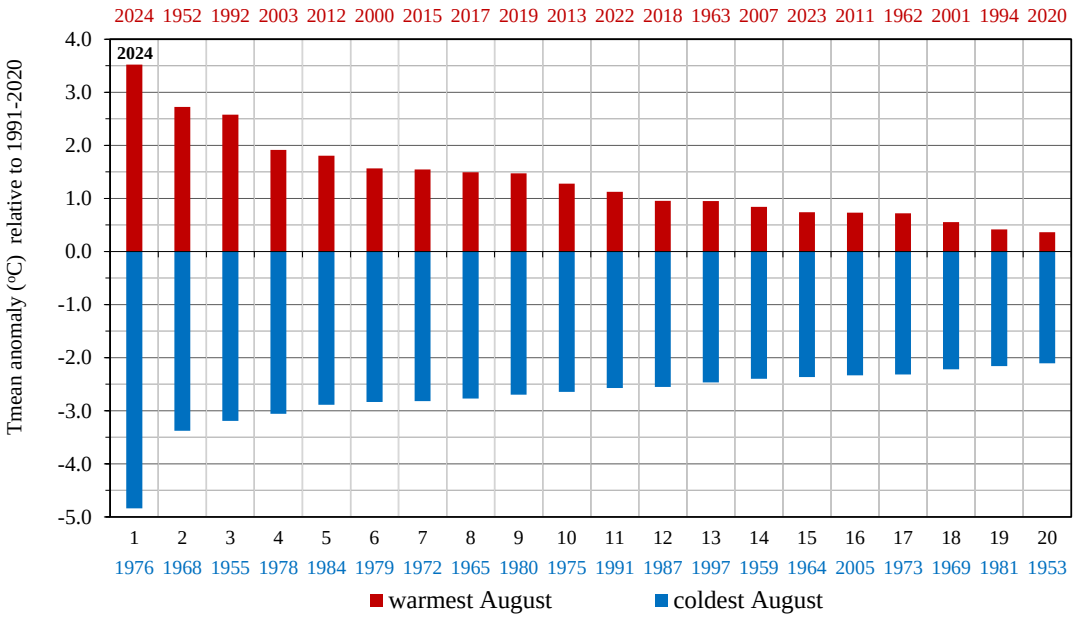

Figure 10. Rank of the warmest and coldest August in Serbia for the 1951-2024 period

Table 4. Ranking of August 2024 with the mean air temperature, normal and anomaly

STATION	Period of observations	Ta (°C) August 2024	Normal for August 1991-2020	Ta anomaly (°C)	Rank no. of 2024 (descending Ta)
PALIC	1945-2023	27.0	22.5	4.5	1
SOMBOR	1942-2023	26.7	22.0	4.6	1
NOVI SAD	1948-2023	27.5	22.4	5.1	1
ZRENJANIN	1943-2023	26.8	22.7	4.1	1
KIKINDA	1948-2023	26.8	22.6	4.2	1
B. KARLOVAC	1986-2023	26.1	22.3	3.8	1
LOZNICA	1952-2023	26.3	22.2	4.1	1
S. MITROVICA	1925-2023	25.9	21.9	4.1	1
VALJEVO	1926-2023	26.0	22.3	3.7	1
BEOGRAD	1887-2023	28.4	23.8	4.6	1
KRAGUJEVAC	1925-2023	25.9	22.3	3.6	1
S. PALANKA	1939-2023	26.4	22.4	4.0	1
V. GRADISTE	1926-2023	26.0	22.2	3.8	1
C. VRH	1967-2023	22.1	17.8	4.4	1
NEGOTIN	1927-2023	26.8	23.7	3.1	3
ZLATIBOR	1950-2023	21.7	18.3	3.4	1
SJENICA	1946-2023	19.1	16.8	2.3	2
POZEGA	1952-2023	22.4	20.1	2.3	1
KRALJEVO	1926-2023	26.0	22.3	3.7	1
KOPAONIK	1950-2023	17.0	13.6	3.4	1
KURSUMLIJA	1952-2023	23.2	20.5	2.7	3
KRUSEVAC	1927-2023	25.8	22.2	3.6	2
CUPRIJA	1948-2023	26.2	22.1	4.0	1
NIS	1925-2023	26.0	23.1	2.9	3
LESKOVAC	1948-2023	24.3	22.0	2.3	2
ZAJECAR	1929-2023	24.6	22.1	2.5	4
DIMITROVGRAD	1945-2023	23.1	20.5	2.6	3
VRANJE	1926-2023	24.7	22.3	2.4	4

September – The 8th wettest and 10th warmest September for Serbia since 1951. Absolute maximum daily air temperature was surpassed in Sombor on September 3. The highest ever recorded number of days with temperature of 35°C and above was registered in northern

Serbia. The heat wave was recorded in the first decade of September. Record-breaking number of tropical nights at 5 stations. The 3rd wettest September for Novi Sad, 4th for Crni Vrh and Kursumlija. September maximum daily precipitation sum was surpassed in Kursumlija on September 11. Zrenjanin observed record-breaking number of days with precipitation sums of 20 mm and above.

Table 5. Record-breaking number of days with air temperature of 35ºC and above

MMS	number of days Tmax≥35ºC September 2024	previous record Tmax≥35ºC	year of Tmax≥35ºC
PALIC	**2**	1	2008/2015
SOMBOR	**4**	2	2008/2015
NOVI SAD	**4**	3	2015
ZRENjANIN	**4**	3	2015
KIKINDA	**4**	3	2015
B.KARLOVAC	**4**	3	2015
LOZNICA	**5**	3	1987/2015
S.MITROVICA	**4**	3	2015

October – Warm (14th warmest) and dry (20th driest) for most of Serbia. 6th warmest for Kopanik, 7th warmest for Sjenica and Pozega. 3rd driest for Crni Vrh. Heat wave at the end of the month in Negotin.

November – Cold and averagely rainy November in most of Serbia. 7th coldest for Banatski Karlovac. Cold wave at most places from 4 to 11 November. Snow cover at the beginning of the second decade of November across most of Serbia.

December – Warm in most of Serbia and 7th wettest. 4th warmest for Negotin. 2nd wettest for Zajecar, Kraljevo and Krusevac, 4th wettest for Crni Vrh, 5th wettest for Loznica and Zlatibor, and 6th wettest for Kragujevac.

Winter 2023/2024 – The warmest winter since 1951 and dry in most of Serbia. Record-breaking mean, mean maximum and mean minimum winter air temperature in most of Serbia. Absolute winter maximum air temperature was exceeded in Valjevo on December 2, reaching 25.6°C. One summer day was recorded in Valjevo, Kragujevac and Kraljevo. Most of Serbia saw 2 heat waves. Record low number of ice days at Crni Vrh, Zlatibor and Sjenica. Record low number of frost days at Crni Vrh and Kopaonik. Record low number of days with snow cover was registered in Kursumlija. The 3rd driest winter for Zajecar, 4th driest for Negotin, 5th driest for Kraljevo and Crni Vrh. Record-breaking hours of insolation during winter were recorded in Kikinda, Krusevac and Kraljevo.

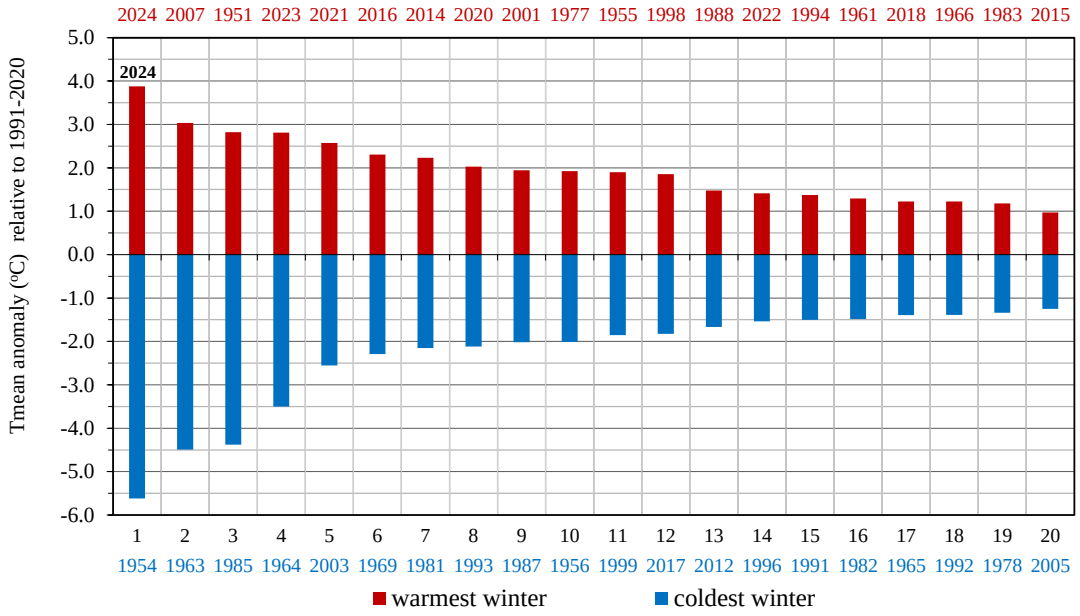

Figure 11. Rank of twenty warmest and coldest winter seasons in Serbia for the 1951-2024 period

Табела 6. Record breaking mean (Ta), mean maximum (Tamax) and mean minimum (Tamin) winter air temperatures

STATION	period of observations	Ta (°C) WINTER 2024	previous Ta maximum	year of Ta maximum	Tamax (°C) WINTER 2024	previous Tamax maximum	year of Tamax maximum	Tamin (°C) WINTER 2024	previous Tamin maximum	year of Tamin maximum
PALIC	1946-2023	5.0	4.3	2007	9.6	8.2	2007	1.0	-	-
SOMBOR	1942-2023	5.2	4.9	2007	10.3	9.4	2007	1.1	-	-
NOVI SAD	1949-2023	5.9	4.9	2007	11.0	9.4	2007	1.7	1.3	2007
ZRENJANIN	1944-2023	5.7	5.0	2007	10.5	8.9	2007	1.7	1.6	2007
KIKINDA	1949-2023.	5.6	4.5	2007	10.1	8.5	2023	1.6	1.1	2007
B. KARLOVAC	1986-2023	5.5	4.6	2023	10.6	8.8	2023	1.7	1.4	2007
LOZNICA	1953-2023	6.5	5.8	2007	12.1	10.9	2007	2.1	1.9	2007
S. MITROVICA	1926-2023	5.0	4.6	2007	10.7	9.5	2007	0.7	-	-
VALJEVO	1927-2023	6.0	5.2	2007	12.4	11.1	2007	1.0	0.9	1951
BEOGRAD	1888-2023	7.4	6.4	2007	11.8	10.0	2007	3.9	3.4	2007
KRAGUJEVAC	1926-2023	6.2	5.3	2007	12.2	10.5	2007	1.5	1.4	1951
S. PALANKA	1940-2023	5.8	5.3	2007	11.4	10.2	2007	1.2	-	-
V. GRADISTE	1927-2023	4.9	4.2	2007	10.1	8.8	2007	0.6	-	-
CRNI VRH	1967-2023	1.6	1.0	2007	5.1	4.2	2007	-1.1	-1.6	2007
NEGOTIN	1928-2023	5.7	5.6	2007	10.8	10.1	2007	1.2	-	-
ZLATIBOR	1951-2023	2.8	2.3	2014	6.8	-	-	-0.4	-1.0	2014
SJENICA	1947-2023	1.6	1.5	1951	7.5	6.7	2016	-3.2	-	-
POZEGA	1953-2023	3.4	2.7	2007	10.2	7.9	2007	-1.4	-	-
KRALJEVO	1927-2023	5.9	4.6	2007	11.5	9.4	2007	1.1	0.9	1951
KOPAONIK	1950-2023	-1.1	-	-	2.5	-	-	-4.1	-	-
KURSUMLIJA	1953-2023	5.0	3.9	2007	11.4	9.8	2007	0.0	-0.2	1955
KRUSEVAC	1931-2023	5.6	4.9	1951	11.7	9.7	2023	0.6	-	-
CUPRIJA	1949-2023	5.8	4.5	2023	11.7	9.7	2007	1.2	0.9	1951
NIS	1926-2023	5.9	5.4	1951	11.5	10.8	1951	1.3	-	-
LESKOVAC	1949-2023	4.7	-	-	11.1	10.3	1951	-0.2	-	-
ZAJECAR	1930-2023	4.6	4.6	2007	11.2	10.7	2007	-0.9	-	-
DIMITROVGRAD	1946-2023	4.0	-	-	10.1	9.2	2023	-0.8	-	-
VRANJE	1927-2023	4.7	-	-	10.3	9.2	2023	-0.1	-	-

Spring 2024. – **The warmest** spring in Serbia since 1951. The warmest spring since record-keeping began for Sombor, Novi Sad, Zrenjanin, Kikinda, Banatski Karlovac, Loznica, Sremska Mitrovica, Valjevo, Belgrade, Negotin, Pozega, Kursumlija, Cuprija, Palic and Zlatibor. A record low number of frost days in Smederevska Palanka, Sjenica, Pozega, Kursumlija and Crni Vrh. A record low number of ice days at Kopaonik. A record low number of days with snow cover at Zlatibor, Kopaonik and Sjenica. The record low snow depth since the record-keeping began was registered at Zlatibor, Kopaonik and Sjenica. Record low snow depth since the record-keeping began was registered at Crni Vrh and Kopaonik.

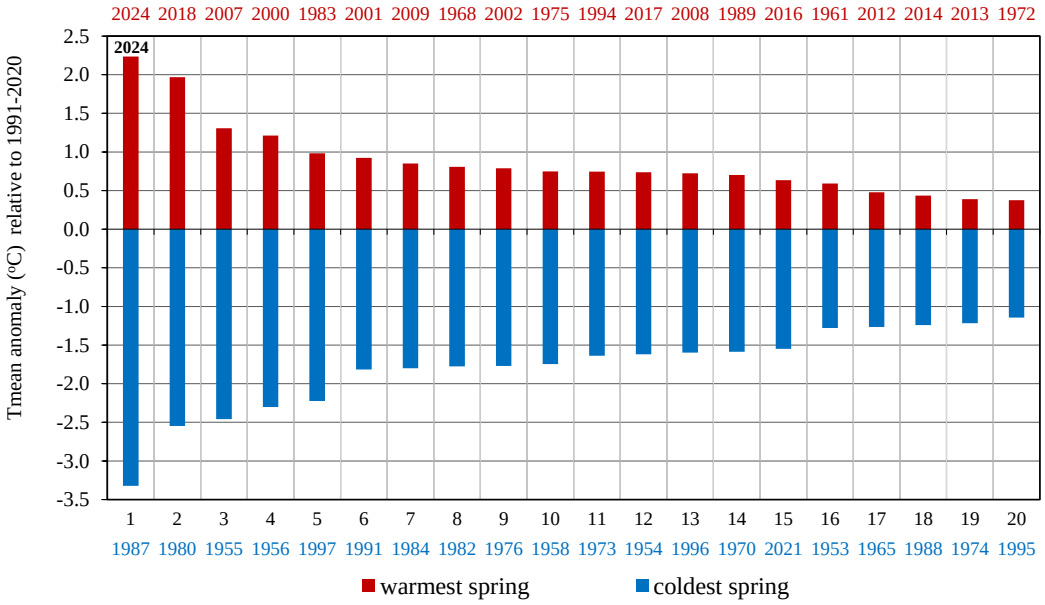

Figure 12. Rank of twenty warmest and coldest spring seasons in Serbia for the 1951-2024 period

Summer 2024 – The **warmest** summer in Serbia since 1951. **The warmest June, July and August.** In Sombor, the maximum seasonal air temperature was surpassed. In most of Serbia, minimum seasonal air temperatures were the highest since record-keeping began. Record-breaking minimum daily air temperature since measurements began was recorded in Vršac on July 13, reaching 30.6°C. In most of Serbia, record-breaking number of summer and tropical days, as well as tropical nights. Temperature Humidity Index (feel like temperature) was 23 days above 40°C and 83 days above 30°C. Five heatwaves, very intense in mid-July and mid-August. The 4th driest summer for Novi Sad and Kopaonik, 5th driest for Cuprija, and 6th driest for Crni Vrh.

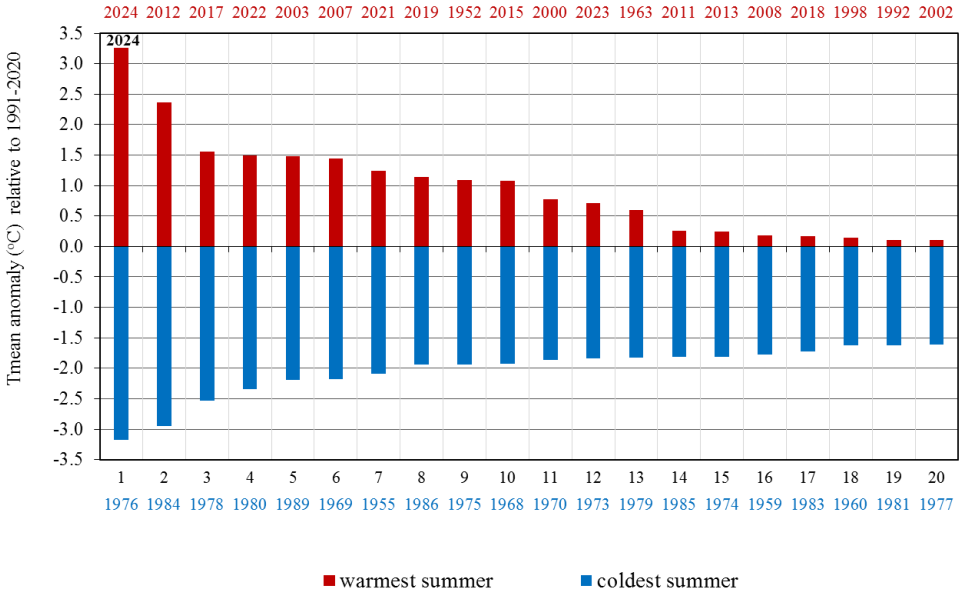

Figure 13. Rank of twenty warmest and coldest summers in Serbia for the 1951-2024 period

Table 7. Record-breaking minimum summer air temperatures

MMS station	2024		Previous record Tmin	Date of the previous record Tmin
	Tmin summer	Date Tmin		
PALIC	**11.4**	15.VI	11.3	11,18.VII 2022.
SOMBOR	**10.8**	15.VI	10.4	29.VIII/12,27.VIII/15.VI;18.VII 1946/2003/2022.
NOVI SAD	**12.3**	14. i 15.VI	11.7	12.VIII 2003.
ZRENjANIN	**11.4**	14.VI	10.8	2.VIII 2007.
KIKINDA	**11.9**	15.VI	11.5	1.VI 2007.
B.KARLOVAC	**11.0**	15.VI	10.7	2.VIII 2007.
VALjEVO	**11.6**	15.VI	izj.	2.VI/16.VI;12.VII 2019/2022.
KRAGUJEVAC	**10.6**	15.VI	10.5	3.VI 2002.
S.PALANKA	**10.0**	15.VI	9.6	12.VIII/16.VIII 2003/2019.
CRNI VRH	**8.6**	14.VI	8.0	12.VIII 2016.
ZLATIBOR	**8.8**	14.VI	8.1	12.VII 2022.
POZEGA	**9.0**	31.VII	izj.	6.VI/13.VIII 2004/2023.
KRALjEVO	**10.9**	15.VI	10.7	22.VI;15.VII 2003.
KOPAONIK	**5.4**	4.VII	3.4	12.VII 2007.
KURSUMLIJA	**9.2**	15.VI	8.6	15.VII 2003.
NIS	**10.9**	15.VI	10.5	19,20.VIII 1931.

Autumn 2023 – Averagely warm and averagely rainy autumn in Serbia. Palic and Sombor observed record-breaking autumn air temperature. At eight stations, in Vojvodina and northwestern Serbia, record-breaking number of days with the maximum daily air temperature of 35ºC and above. In Kursumlija, absolute daily precipitation maximum was surpassed.

Note: The climatological analysis of meteorological elements was conducted based on preliminary data from 28 main meteorological stations

Appendix

Table 1.

MEAN MONTHLY AND ANNUAL AIR TEMPERATURE (°C)													
station/month	January	February	March	April	May	June	July	August	September	October	November	December	Year
PALIC	2.3	9.1	10.6	14.3	18.7	23.8	26.7	27.0	18.8	12.5	4.5	2.4	14.2
SOMBOR	2.3	9.1	10.7	14.3	18.8	23.2	26.0	26.7	18.2	12.5	4.5	2.4	14.1
NOVI SAD	2.7	9.7	11.5	15.3	18.9	24.3	26.9	27.5	19.5	13.5	5.1	2.8	14.8
ZRENJANIN	2.5	9.5	10.9	15.0	18.7	24.1	26.4	26.8	19.1	13.2	4.4	2.7	14.5
KIKINDA	2.5	9.5	10.7	15.0	19.2	23.9	26.7	26.8	19.1	12.9	4.4	2.5	14.4
B.KARLOVAC	2.2	9.2	10.6	15.2	18.6	23.7	25.5	26.1	19.1	13.1	4.6	3.4	14.3
LOZNICA	3.2	9.9	11.9	14.9	18.1	23.4	26.2	26.3	19.2	14.0	5.8	3.2	14.7
S.MITROVICA	1.6	8.8	11.0	14.8	18.5	23.1	25.1	25.9	18.5	13.2	4.8	2.9	14.0
VALJEVO	2.5	9.3	11.6	14.5	17.9	23.7	25.9	26.0	18.8	13.6	5.6	3.3	14.4
BELGRADE	4.0	11.2	12.1	16.3	19.0	25.2	27.6	28.4	20.3	15.2	6.6	4.2	15.9
KRAGUJEVAC	3.0	9.3	11.0	14.6	17.4	23.8	26.1	25.9	18.9	13.2	5.5	3.8	14.4
S.PALANKA	2.7	9.2	10.9	14.4	17.5	23.9	26.5	26.4	19.3	13.3	5.3	3.4	14.4
V.GRADISTE	1.9	8.5	10.3	13.9	17.6	23.5	25.5	26.0	19.0	13.0	5.0	3.4	14.0
CRNI VRH	-1.5	4.1	4.5	10.0	11.1	19.3	21.5	22.1	14.6	9.6	1.5	-0.5	9.7
NEGOTIN	2.5	9.0	10.1	15.7	17.5	25.3	27.1	26.8	19.1	13.0	5.5	4.7	14.7
ZLATIBOR	-0.3	5.7	6.7	10.5	12.9	19.3	21.3	21.7	14.7	11.4	2.4	-0.5	10.5
SJENICA	-1.1	4.0	5.8	9.3	12.1	18.3	19.6	19.1	13.0	9.9	1.0	-1.6	9.1
POZEGA	0.3	6.8	9.3	12.6	15.7	21.6	22.6	22.4	16.7	11.8	3.3	1.6	12.1
KRALJEVO	2.6	9.4	11.3	14.6	17.3	23.5	25.6	26.0	19.0	13.8	5.2	3.4	14.3
KOPAONIK	-3.8	0.4	1.5	5.9	8.2	15.1	16.6	17.0	10.3	7.5	0.1	-2.3	6.4
KURSUMLIJA	2.5	7.7	9.7	12.9	15.7	22.5	23.7	23.2	17.2	12.4	4.5	3.5	13.0
KRUSEVAC	2.8	8.8	10.8	14.6	17.0	23.6	25.8	25.8	19.0	13.2	5.0	3.5	14.2
CUPRIJA	2.9	8.8	11.0	15.1	17.7	24.1	26.6	26.2	19.5	13.2	5.0	3.4	14.4
NIS	3.2	9.1	11.1	15.0	17.5	24.3	26.4	26.0	19.4	13.7	5.4	4.0	14.6
LESKOVAC	2.6	7.5	9.7	13.9	17.0	23.5	25.3	24.3	18.0	12.1	4.1	3.2	13.4
ZAJECAR	1.6	7.6	9.1	13.6	16.3	23.2	24.8	24.6	17.8	11.4	4.3	3.5	13.1
DIMITROVGRAD	1.4	6.8	8.6	12.7	14.9	22.5	23.7	23.1	16.9	11.5	4.3	2.8	12.4
VRANJE	2.0	7.8	9.8	14.5	16.5	23.5	25.3	24.7	18.0	12.9	5.1	3.2	13.6

exstremely cold | very cold | cold | normal | warm | very warm | extremely warm

Table 2.

MONTHLY AND ANNUAL PRECIPITATION SUM (mm)													
station/month	January	February	March	April	May	June	July	August	September	October	November	December	Year
PALIC	23.0	6.8	23.1	18.0	46.8	58.4	60.7	2.9	72.2	30.0	40.6	57.3	439.8
SOMBOR	34.3	12.6	50.8	28.4	109.6	66.0	39.2	11.2	120.3	35.4	47.0	55.7	610.5
NOVI SAD	36.7	9.1	15.0	21.5	78.0	57.3	29.4	1.2	130.1	48.3	59.5	59.7	545.8
ZRENJANIN	39.5	6.6	27.2	30.7	89.8	42.4	53.5	2.4	109.8	33.6	52.1	47.7	535.3
KIKINDA	32.3	7.4	13.6	25.2	74.7	54.9	35.3	14.3	87.5	31.2	36.6	47.2	460.2
B.KARLOVAC	37.4	3.1	19.5	32.0	57.9	66.4	91.4	1.5	85.0	13.8	46.2	58.2	512.4
LOZNICA	41.4	5.9	42.2	29.8	124.0	92.7	39.3	13.8	124.6	51.5	81.7	131.3	778.2
S.MITROVICA	75.2	4.7	27.4	20.8	151.4	45.6	82.4	0.3	119.9	48.4	42.1	49.8	668
VALJEVO	63.1	5.3	23.0	21.0	69.5	120.7	62.2	13.0	93.6	20.5	68.8	106.9	667.6
BELGRADE	41.5	4.3	26.0	28.4	111.3	124.2	77.7	3.3	98.0	22.2	51.8	71.8	660.5
KRAGUJEVAC	39.4	4.2	24.2	37.7	107.4	86.1	28.8	38.7	105.8	15.9	53.7	101.4	643.3
S.PALANKA	63.6	3.4	35.5	33.9	67.9	71.9	31.0	3.3	94.5	25.6	56.1	85.9	572.6
V.GRADISTE	50.4	9.8	29.7	46.4	66.0	69.0	81.3	1.0	67.3	16.4	51.8	60.9	550
CRNI VRH	49.3	6.8	63.4	50.0	75.2	66.3	31.0	16.1	88.1	9.7	29.5	104.0	589.4
NEGOTIN	28.2	0.5	53.5	33.4	108.2	44.9	19.7	5.7	32.1	6.8	41.5	112.5	487
ZLATIBOR	80.3	17.7	74.6	59.2	133.5	69.6	59.2	51.0	136.6	44.0	75.1	129.4	930.2
SJENICA	36.0	19.9	64.7	41.4	101.5	64.8	67.6	47.8	88.4	32.7	71.7	72.5	709
POZEGA	54.9	8.3	54.6	50.2	131.7	63.7	98.5	10.5	88.9	40.9	57.3	77.1	736.6
KRALJEVO	39.2	14.7	47.7	63.4	102.6	81.1	73.9	4.3	112.6	16.6	68.3	127.1	751.5
KOPAONIK	67.1	23.6	91.8	77.9	96.2	80.3	25.3	24.0	168.5	39.9	111.1	109.7	915.4
KURSUMLIJA	27.2	7.3	45.6	66.4	62.3	70.9	33.3	23.8	124.8	32.7	78.5	97.7	670.5
KRUSEVAC	26.9	14.8	35.0	57.4	114.0	65.7	17.7	7.5	86.1	13.8	88.7	125.7	653.3
CUPRIJA	50.9	5.2	38.7	44.0	75.0	52.0	13.5	22.4	79.9	15.1	58.8	97.4	552.9
NIS	31.9	10.1	49.3	42.5	70.3	82.8	20.8	19.9	67.6	23.8	79.2	64.8	563
LESKOVAC	27.0	10.5	69.2	47.5	108.4	61.2	18.3	32.0	112.2	36.8	107.6	78.7	709.4
ZAJECAR	28.4	1.6	57.2	34.5	65.0	76.3	22.7	5.5	50.1	10.3	65.3	138.2	555.1
DIMITROVGRAD	34.7	12.4	86.2	47.1	102.3	93.8	15.2	28.4	52.1	32.0	67.8	72.2	644.2
VRANJE	58.6	11.0	84.2	43.9	115.3	77.3	13.1	60.3	102.5	33.1	48.4	79.0	726.7

extremely dry | very dry | dry | normal | wet | very wet | extremely wet

Table 3.

STATION	period of observations	Ta (°C) 2024	previous Ta maximum	year of Ta maximum	Tamax (°C) 2024	previous Tamax maximum	year of Tamax maximum	Tamin (°C) 2024	previous Tamin maximum	year of Tamin maximum
PALIC	1946-2024	14.2	13.4	2023	19.8	18.8	2023	8.8	8.5	2023
SOMBOR	1942-2024	14.1	13.3	2023	20.6	19.5	2023	8.4	8.1	2023
NOVI SAD	1949-2024	14.8	13.9	2023	20.8	19.6	2023	9.1	8.7	2023
ZRENJANIN	1944-2024	14.5	13.8	2023	20.5	19.5	2023	8.8	8.6	2014
KIKINDA	1949-2024	14.4	13.6	2023	20.3	19.2	2023	8.7	8.3	2023
B. KARLOVAC	1986-2024	14.3	13.4	2023	20.5	19.5	2000	9.0	8.5	2023
LOZNICA	1953-2024	14.7	14.0	2023	21.0	20.1	2023	9.4	9.1	2023
S. MITROVICA	1926-2024	14.0	13.3	2023	20.4	19.5	2023	8.4	8.0	2023
VALJEVO	1927-2024	14.4	13.6	2023	20.9	20.2	1927	8.6	8.4	2023
BEOGRAD	1888-2024	15.9	14.9	2023	21.0	20.0	2023	11.2	10.6	2023
KRAGUJEVAC	1926-2024	14.4	13.5	2023	21.1	19.7	2000	8.3	8.1	2023
S. PALANKA	1940-2024	14.4	13.3	2019	21.2	19.8	2023	8.1	7.9	2014
V. GRADISTE	1927-2024	14.0	13.3	2019	20.7	19.5	2019	8.0	7.9	2014
CRNI VRH	1967-2024	9.7	8.8	2023	14.1	12.9	2000	6.4	5.7	2023
NEGOTIN	1928-2024	14.7	14.0	2023	20.9	19.7	2023	8.9	-	-
ZLATIBOR	1951-2024	10.5	9.5	2023	15.3	14.6	2019	6.5	5.8	2023
SJENICA	1947-2024	9.1	8.5	2023	16.2	15.1	2023	3.0	-	-
POZEGA	1953-2024	12.1	11.4	2023	19.7	18.3	2019	6.4	-	-
KRALJEVO	1927-2024	14.3	13.4	2023	20.7	19.4	2023	8.2	8.1	2023
KOPAONIK	1950-2024	6.4	5.4	2023	10.7	9.4	2023	2.9	2.1	2023
KURSUMLIJA	1953-2024	13.0	12.3	2023	20.4	19.2	2023	6.7	-	-
KRUSEVAC	1931-2024	14.2	13.2	2023	21.1	19.8	2019	7.8	7.8	2023
CUPRIJA	1949-2024	14.4	13.5	2023	21.6	20.0	2023	8.0	8.0	2023
NIS	1926-2024	14.6	13.8	2023	21.3	20.2	1950	8.8	8.6	2023
LESKOVAC	1949-2024	13.4	12.8	2023	21.2	20.2	2019	6.9	-	-
ZAJECAR	1930-2024	13.1	12.5	2023	20.7	19.9	2022	6.3	-	-
DIMITROVGRAD	1946-2024	12.4	12.0	2023	20.1	19.2	2023	6.2	-	-
VRANJE	1927-2024	13.6	13.0	2023	20.4	19.4	2023	6.9	-	-

Table 4.

STATION	2024. number summer days Tmax>25°C	previous maximum num. s. days	year of maximum num. s. days	2024. number tropical days Tmax>30°C	previous maximum num. t. days	year of maximum num. t. days	2024. number days with Tmax>35°C	previous max. num. days with Tmaks>35°C	year of max. num. days with Tmaks>35°C	2024. number tropical nights Tmin>20°C	previous maximum num. t. nights	year of maximum num. t. nights
PALIC	130	128	2018	74	62	2012	28	16	2012	38	20	2023
SOMBOR	140	135	2018	84	77	2003	40	23	2012	26	12	2023
NOVI SAD	140	138	2018	88	71	2012	38	25	2015	39	18	2021
ZRENJANIN	143	tied	2018	83	78	2012	40	26	2015	30	24	2015/2017
KIKINDA	137	136	2018	79	68	2012	36	24	2015	29	19	2015
B. KARLOVAC	141	-	-	81	75	2012	32	25	2015	32	14	2021
LOZNICA	138	-	-	82	74	2012	33	23	2012	39	18	2023
S. MITROVICA	138	-	-	77	76	2012	29	22	2012	21	12	1946
VALJEVO	140	136	1927	78	73	2012	27	25	2017	30	18	2021
BEOGRAD	140	-	-	79	-	-	34	27	2017	67	57	2012
KRAGUJEVAC	137	135	2012	80	78	2012	36	25	2017	17	13	1946
S. PALANKA	139	tied	2018	84	79	2012	42	29	2017	18	9	1952/1988
V. GRADISTE	139	137	2018	86	78	2012	38	30	2015	19	13	1946
CRNI VRH	65	49	2012	18	14	2000	0	-	-	16	13	2007/2012
NEGOTIN	137	-	-	89	88	1928	39	28	2012	24	-	-
ZLATIBOR	70	-	-	18	-	-	0	-	-	7	5	2007/2021
SJENICA	78	-	-	25	-	-	0	-	-	0	-	-
POZEGA	124	-	-	69	67	2012	14	-	-	0	-	-
KRALJEVO	133	-	-	78	-	-	33	25	2012	19	7	2007/2012/2021
KOPAONIK	16	14	2007	0	-	-	0	-	-	0	-	-
KURSUMLIJA	123	-	-	79	-	-	26	tied	2012	2	tied	1969/2020
KRUSEVAC	141	-	-	86	83	2012	40	32	2012	9	6	1946/2007/2012
CUPRIJA	149	-	-	92	88	2012	48	33	2012	16	8	2017/2021/2023
NIS	142	-	-	86	-	-	40	38	1952	27	20	2012
LESKOVAC	140	-	-	90	-	-	41	33	2015	0	-	-
ZAJECAR	137	-	-	90	83	2012	34	26	2000	1	-	-
DIMITROVGRAD	126	-	-	85	75	2012	25	19	2012	0	-	-
VRANJE	135	tied	1938	81	80	2012	27	23	2015	0	-	-

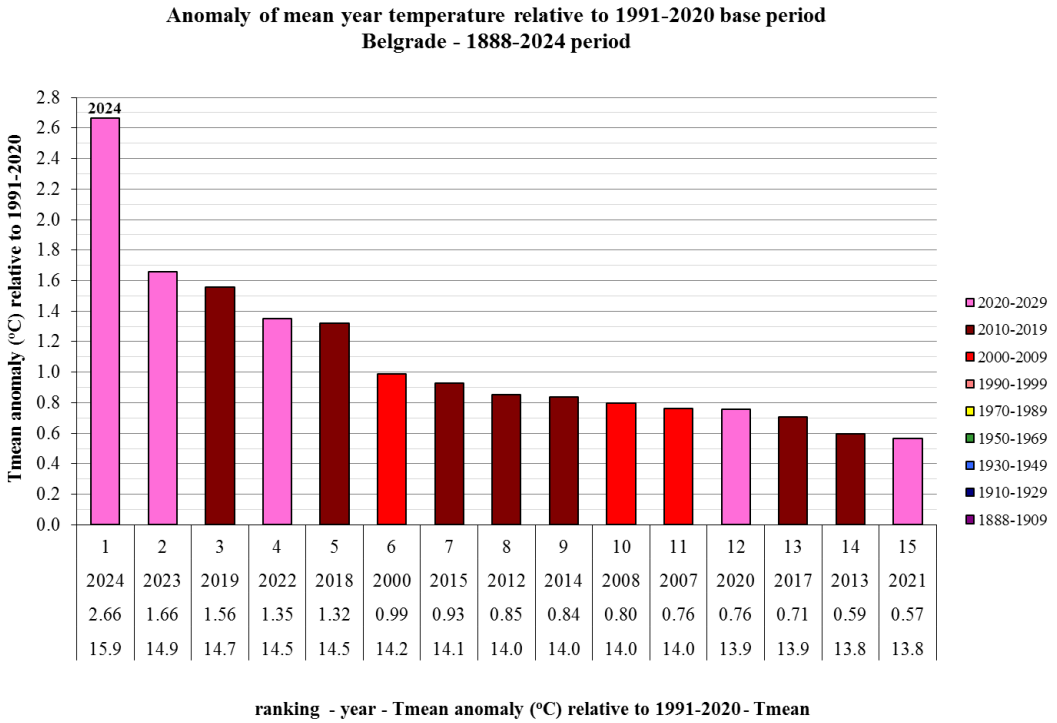

Figure 1. Rank of the warmest years in Belgrade

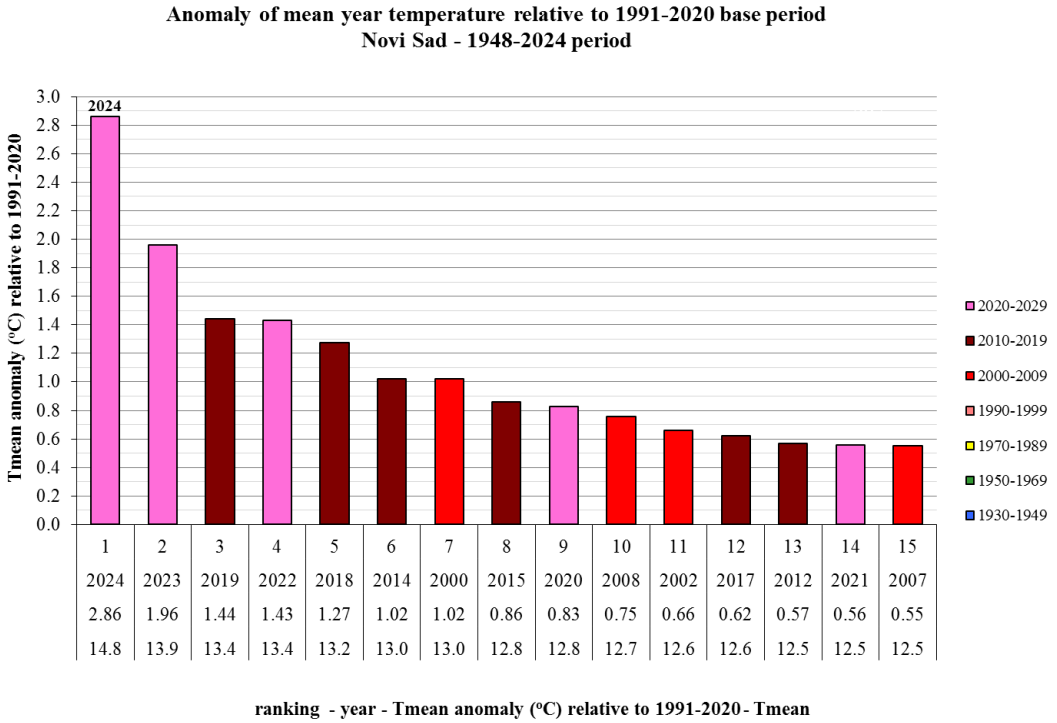

Figure 2. Rank of the warmest years in Novi Sad

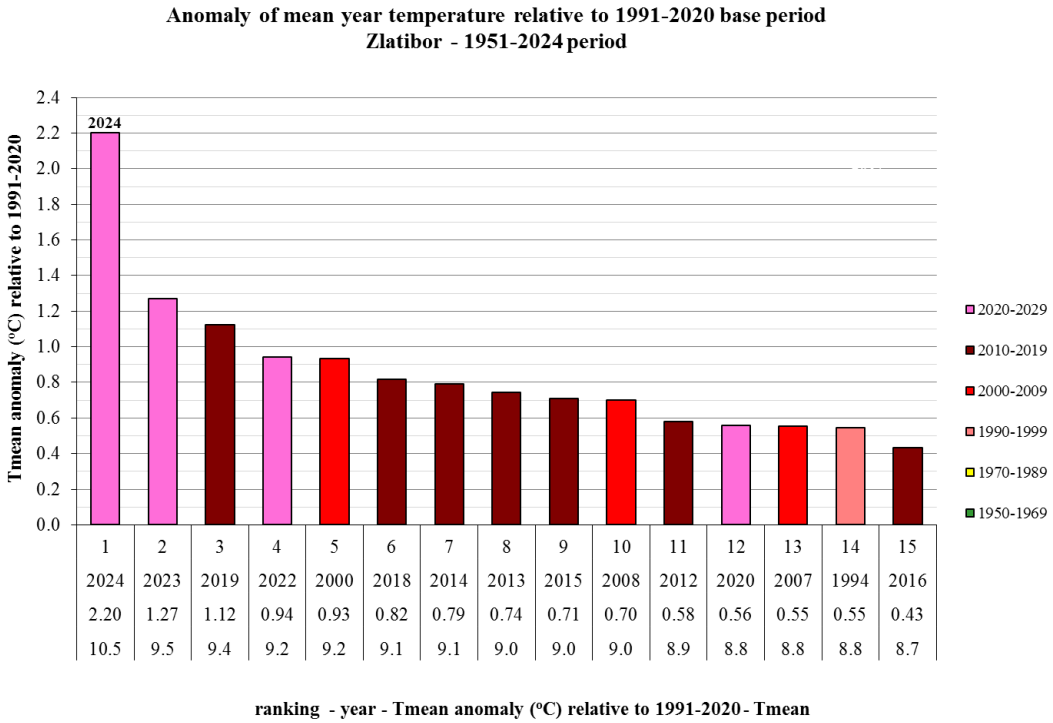

Figure 3. Rank of the warmest years on Zlatibor

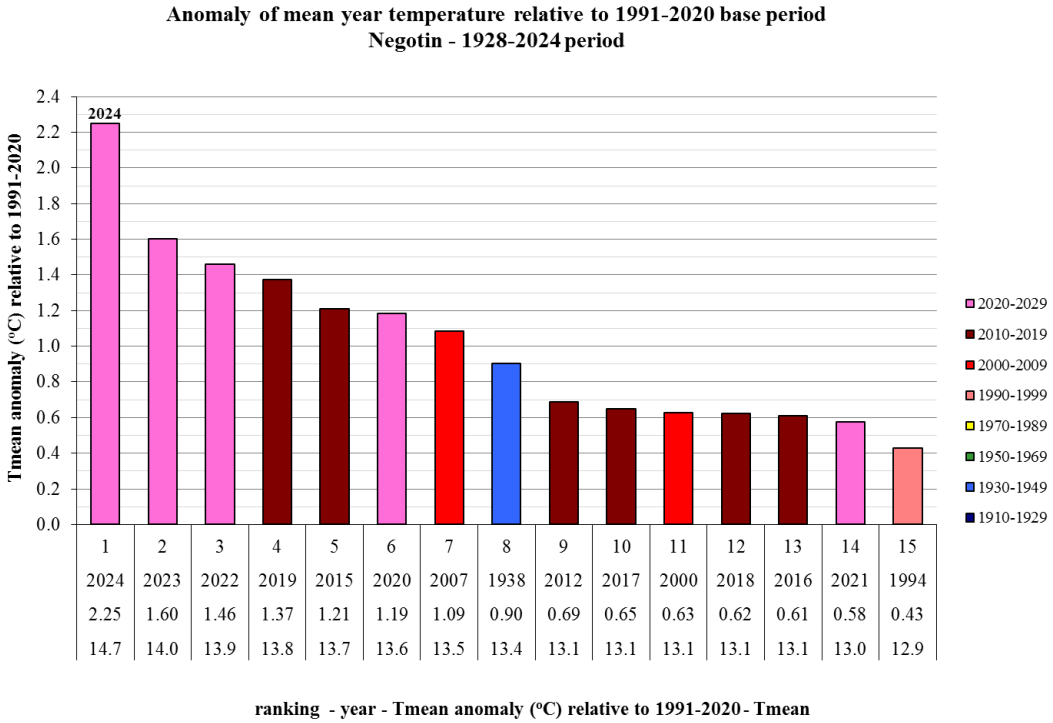

Figure 4. Rank of the warmest years in Negotin

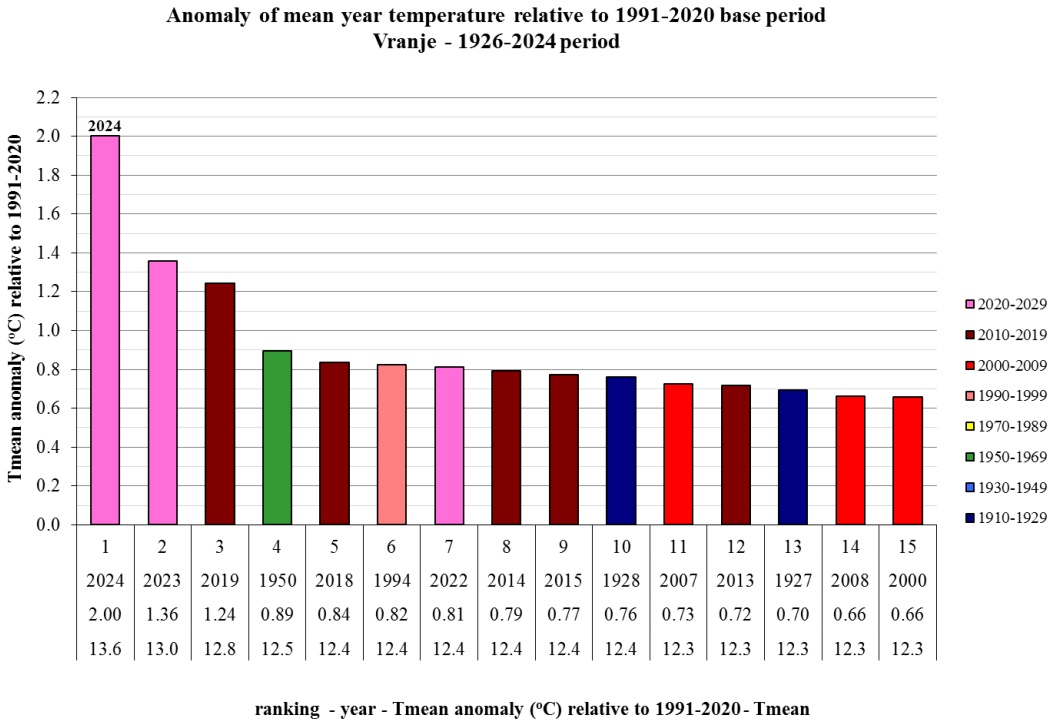

Figure 5. Rank of the warmest years in Vranje

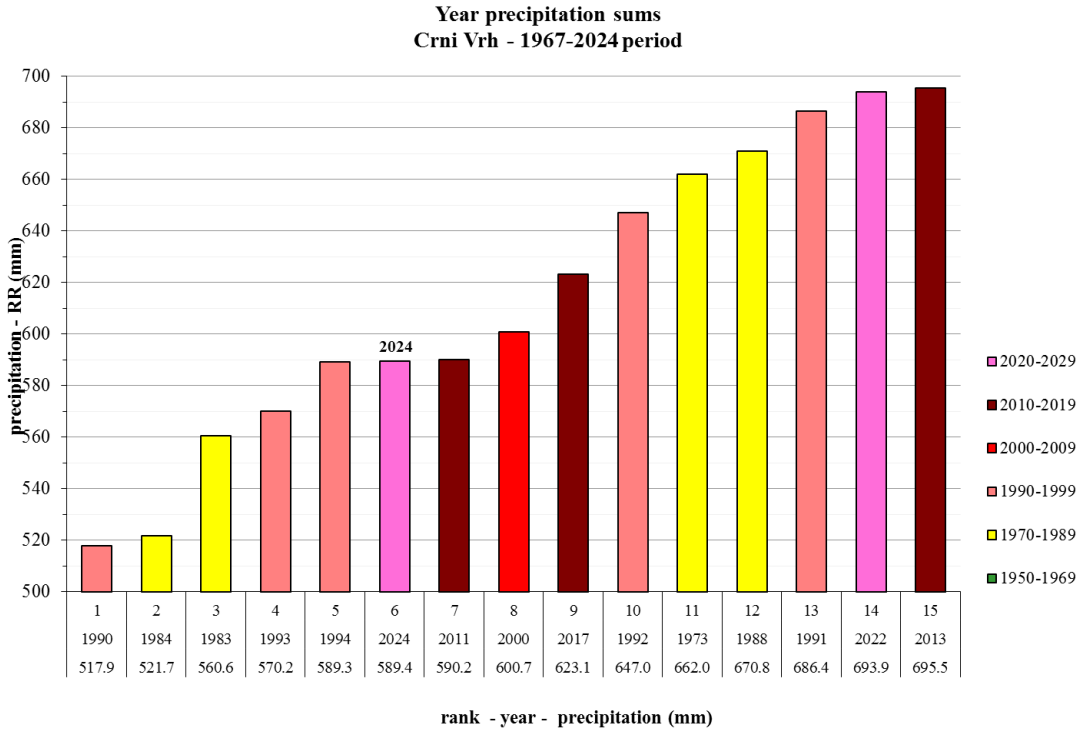

Figure 6. Rank of the driest years on Crni Vrh

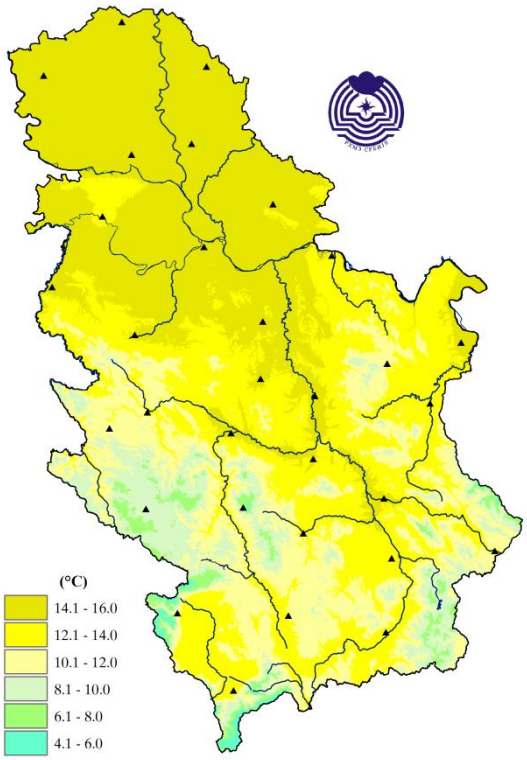

Figure 7. Spatial distribution of mean annual air temperature expressed in (°C)

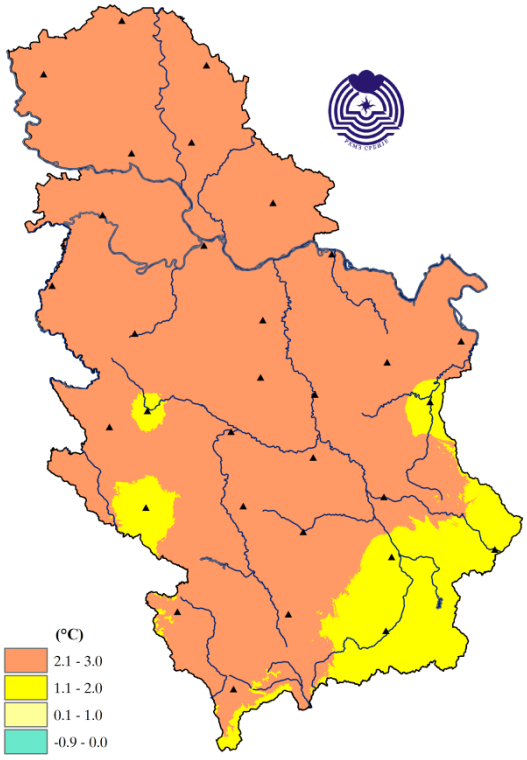

Figure 8. Spatial distribution of mean annual air temperature anomaly expressed in (°C)

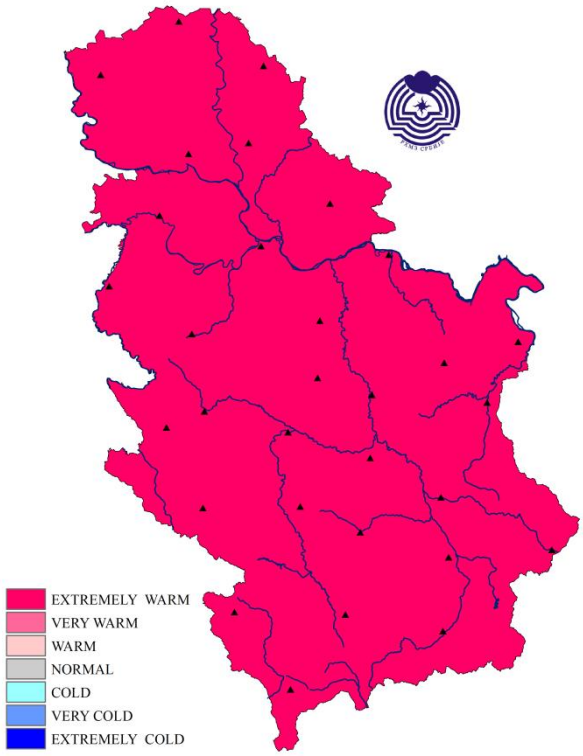

Figure 9. Spatial distribution of mean annual air temperature based on percentile method

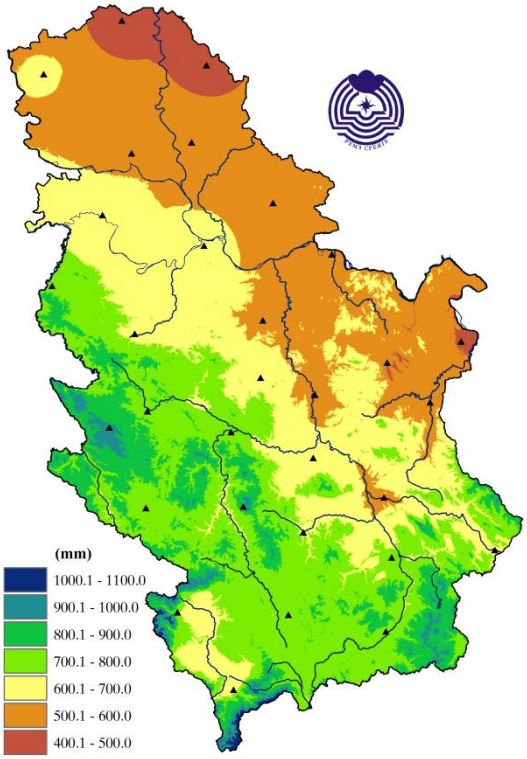

Figure 10. Spatial distribution of annual precipitation totals expressed in mm

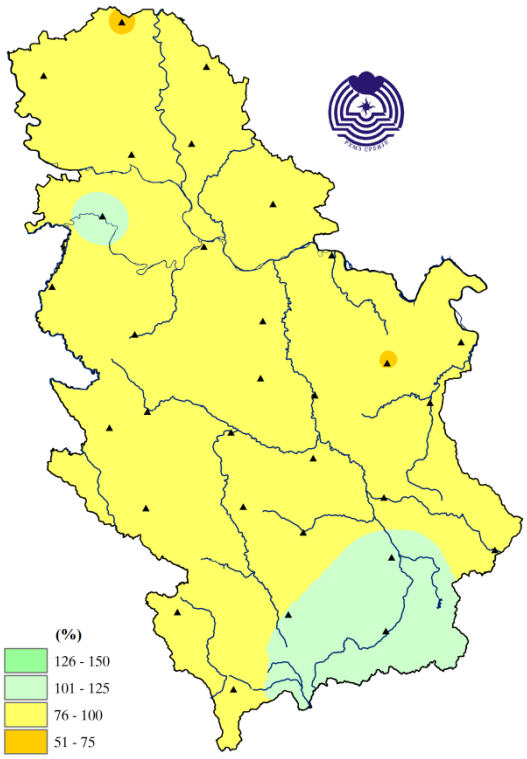

Figure 11. Spatial distribution of annual precipitation totals expressed in percentages of normal for the 1991-2020 base period

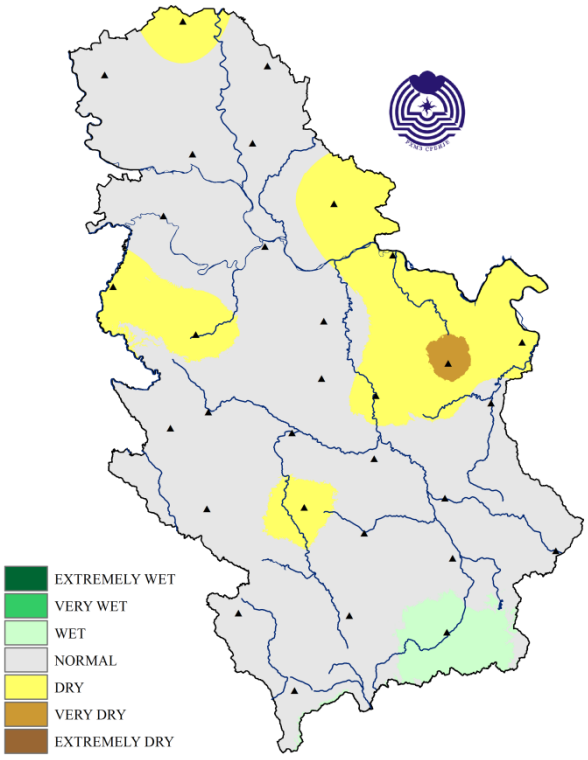

Figure 12. Spatial distribution on annual precipitation totals based on percentile method

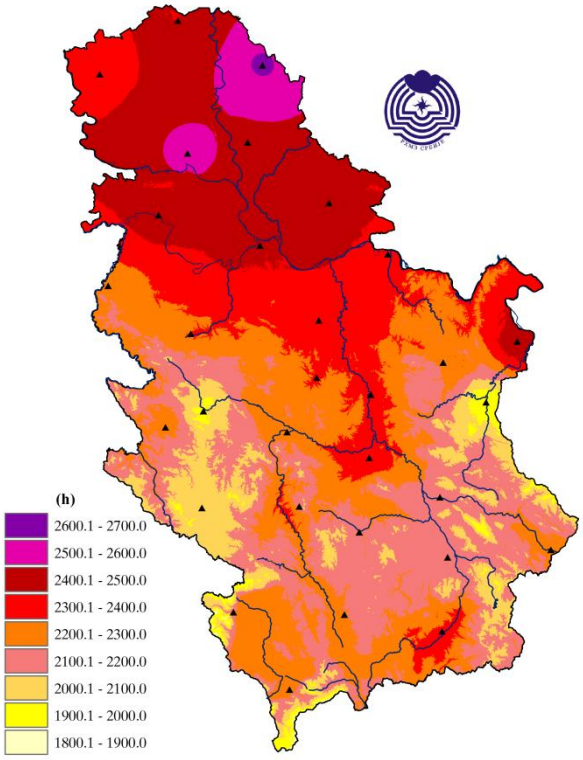

Figure 13. Insolation expressed in hours

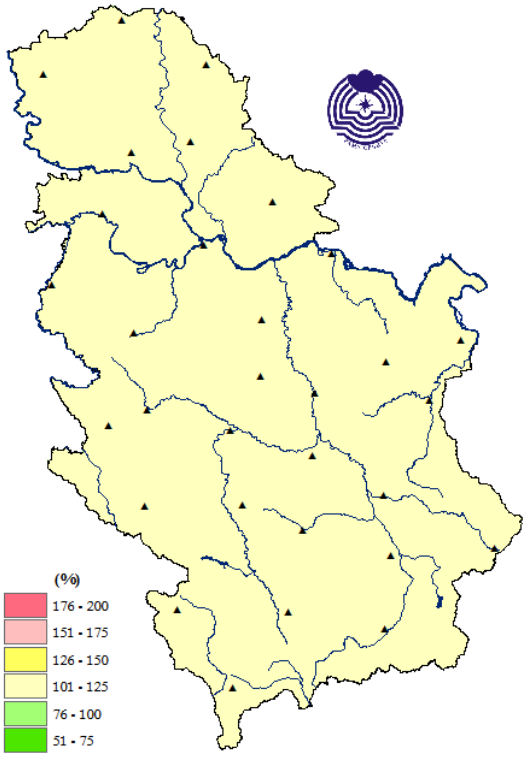

Figure 14. Insolation expressed in percentages of normal for the 1991-2020 base period