Republic Hydrometeorological Service of Serbia
Kneza Viseslava 66
11000 Belgrade
Republic of Serbia

MONTHLY BULLETIN FOR SERBIA

JULY 2024

Belgrade, the 5th of August 2024

Division for Climate Monitoring and Climate Forecast
Department of National Center for Climate Change, Climate Model Development and Disaster Risk Assessment
web: http://www.hidmet.gov.rs
mail: office@hidmet.gov.rs

Contents

- ***Warmest July in Serbia since 1951***
- ***Record-breaking number of tropical days and tropical nights at most of the MMS***
- ***Heat wave***
- ***Record-breaking minimum air temperature in Vrsac***
- ***4th driest July for Kopaonik and 8th driest for Cuprija***
- ***Record-breaking daily precipitation maximum for Sremska Mitrovica***

AIR TEMPERATURE

Mean monthly air temperature

July 2024 ranks as the warmest for Serbia since 1951, with the mean air temperature of **24,9°C** for the period 1951-2024 and anomaly of +3,3°C compared to the 1991-2020 average (*Figure 1).* Since the record-keeping began, July 2024 is **the warmest or 2nd warmest** at nearly all main meteorological stations apart from Negotin and Vranje, where it ranks as 3rd, and 4th warmest for Zajecar (*Table 1*).

In appendix are graphs depicting 15 warmest years since the measurements for the stations began: Novi Sad, Cuprija, Crni Vrh, Belgrade, Smederevska Palanka, Loznica and Zlatibor.

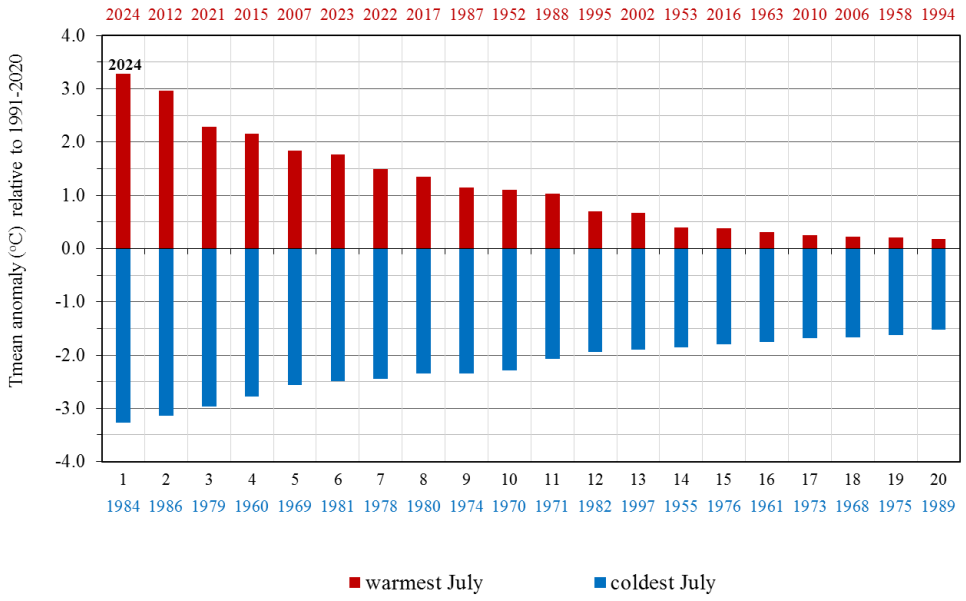


Figure 1. Rank of the warmest and coldest July in Serbia for the period from 1951 to 2024

Table 1. Ranking of July 2024 with mean air temperature, average and departure from the normal 1991-2020

STATION	historical period	Tmean (°C) -July 2024	1991-2020 base period for July	temperature anomaly (°C)	ranking for July 2024
NOVI SAD	1948-2023	26.9	22.5	4.4	1
CUPRIJA	1948-2023	26.6	22.3	4.3	1
CRNI VRH	1967-2023	21.5	17.5	4.1	1
BELGRADE	1888-2023	27.6	23.8	3.8	1
KIKINDA	1948-2023	26.7	22.8	3.8	1
PALIC	1945-2023	26.7	22.9	3.8	1
S.PALANKA	1939-2023	26.5	22.7	3.8	1
LOZNICA	1952-2023	26.2	22.5	3.7	1
ZRENJANIN	1946-2023	26.4	22.9	3.6	1
KRAGUJEVAC	1925-2023	26.1	22.6	3.5	1
SOMBOR	1942-2023	26.0	22.5	3.5	1
VALJEVO	1926-2023	25.9	22.6	3.4	1
ZLATIBOR	1950-2023	21.3	18.1	3.2	1
B.KARLOVAC	1986-2023	25.5	22.4	3.1	1
S.MITROVICA	1925-2023	25.1	22.1	3.0	1
V.GRADISTE	1926-2023	25.5	22.6	2.9	1
KOPAONIK	1950-2023	16.6	13.2	3.4	2
NIS	1925-2023	26.4	23.1	3.3	2
KRUSEVAC	1927-2023	25.8	22.4	3.3	2
KRALJEVO	1926-2023	25.6	22.4	3.2	2
DIMITROVGRAD	1945-2023	23.7	20.7	3.1	2
LESKOVAC	1948-2023	25.3	22.3	3.0	2
KURSUMLIJA	1952-2023	23.7	20.7	3.0	2
SJENICA	1946-2023	19.6	17.0	2.5	2
POZEGA	1952-2023	22.6	20.5	2.1	2
VARANJE	1926-2023	25.3	22.2	3.1	3
NEGOTIN	1927-2023	27.1	24.1	3.0	3
ZAJECAR	1929-2023	24.8	22.8	2.0	4

Mean July air temperature ranged from 22,6ºC in Pozega to 27,6ºC in Belgrade, and on the mountains from 16,6ºC at Kopaonik to 21,5ºC at Crni Vrh (*Figure 2*).

Departure of the mean monthly air temperature from the normal[1] for the 1991–2020 base period ranged from +2,0ºC in Zajecar to +4,4ºC in Novi Sad (*Figure 3*).

Mean air temperature, based on the percentile method[2], was in the category of extremely warm in most of the country, very warm in Pozega and Zajecar (*Figure 4).*

[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, 1991 to December 31, 2020

[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

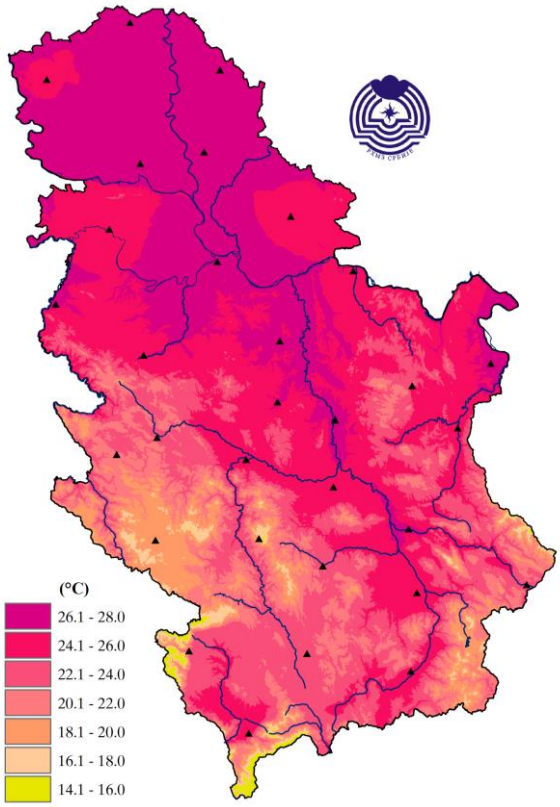


Figure 2. Spatial distribution of mean monthly air temperature (ºC)

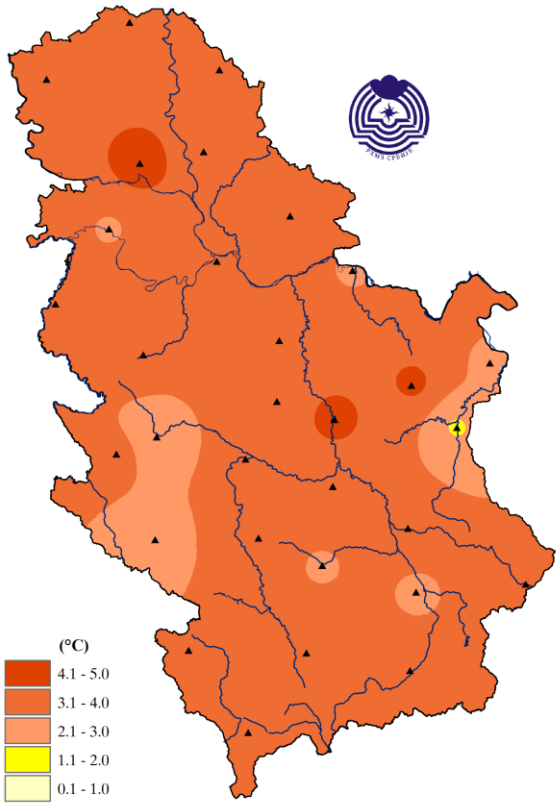


Figure 3. Spatial distribution of mean monthly air temperature anomaly (ºC)

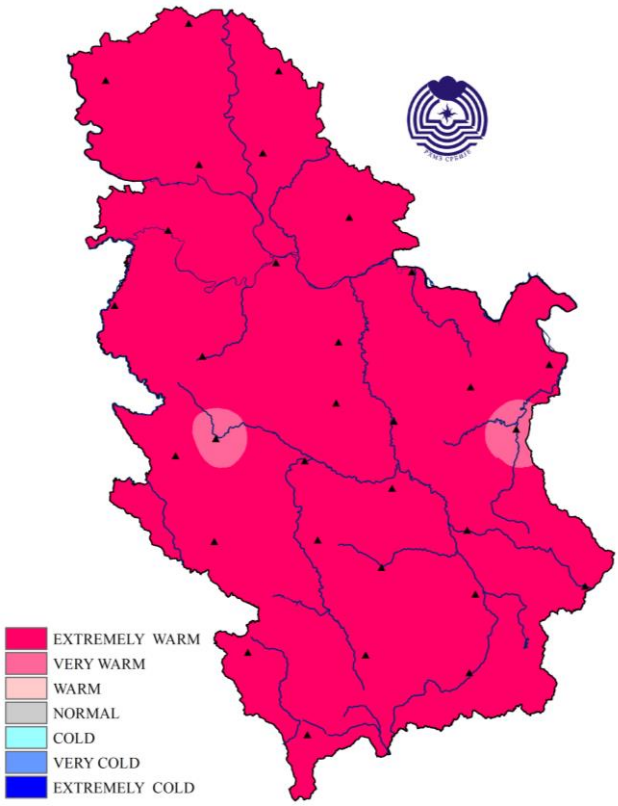


Figure 4. Spatial distribution of the mean monthly air temperature using percentile method

Mean daily air temperature in Belgrade, based on the percentile method, were in the categories of cold and very cold at the beginning of the month. Since the end of the first until the end of the second decade of July, mean daily air temperature was in the categories of very warm and extremely warm. At the end of the third decade, mean air temperature was again in the categories of very warm and extremely warm (*Figure 5*). Daily course of the mean daily air temperature and the accompanying percentiles for the stations Sombor, Novi Sad, Loznica, Negotin, Kragujevac, Zlatibor, Nis and Vranje are given in the Appendix.

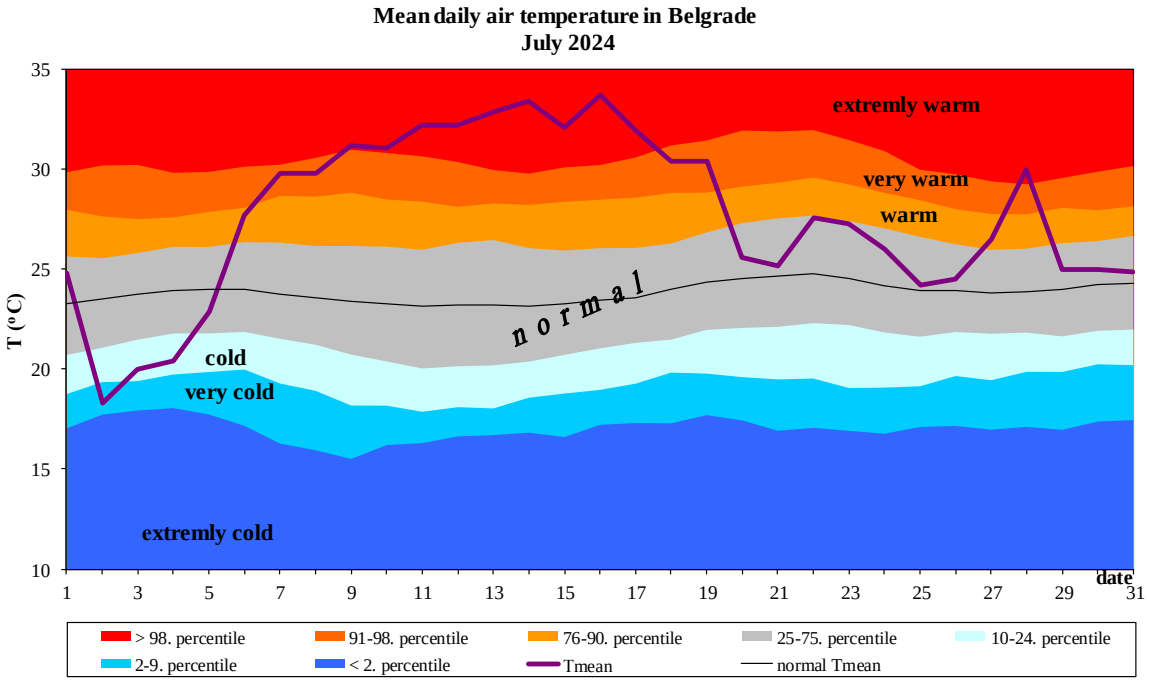


Figure 5. Daily course of the mean daily air temperature and accompanying percentiles for Belgrade

Maximum air temperature

Mean maximum July air temperature ranged from 31,5ºC in Pozega to 35,3ºC in Cupriji, whereas Belgrade observed 32,7°C. On the mountains, mean maximum July air temperature ranged from 21,4ºC at Kopaonik to 27,4ºC in Sjenica.

Based on the percentile method, mean maximum monthly air temperature was in the categories of extremely warm in most of the country, very warm in Kursumlija, Kraljevo, Pozega, Sjenica and Zlatibor.

The highest maximum daily air temperature of 41,8ºC was measured in Cuprija on July 17 while Belgrade observed 39,6ºC on July 16.

Summer days[3] were recorded in the entire country, ranging from 28 days in Belgrade and Pozega to 31 in Kikinda, Veliko Gradiste, Negotin and Zajecar. On the mountains, the number of summer days ranged from 6 at Kopaonik to 22 in Sjenica. The observed number of summer days was 2 to 4 days above July average in most of the country.

[3] Summer day refers to a day with maximum daily air temperature 25°C and above

Number of tropical days[4] ranged from 20 in Pozega to 27 in Negotin, Cuprija and Zajecar. On the mountains, the highest number of tropical days, total of 11 was observed in Sjenica, 8 at Crni Vrh, 7 at Zlatibor, whilst Kopaonik didn't observe any. In most of the country, the observed number of tropical days was 7 to 12 days above July average (*Figure 6*).

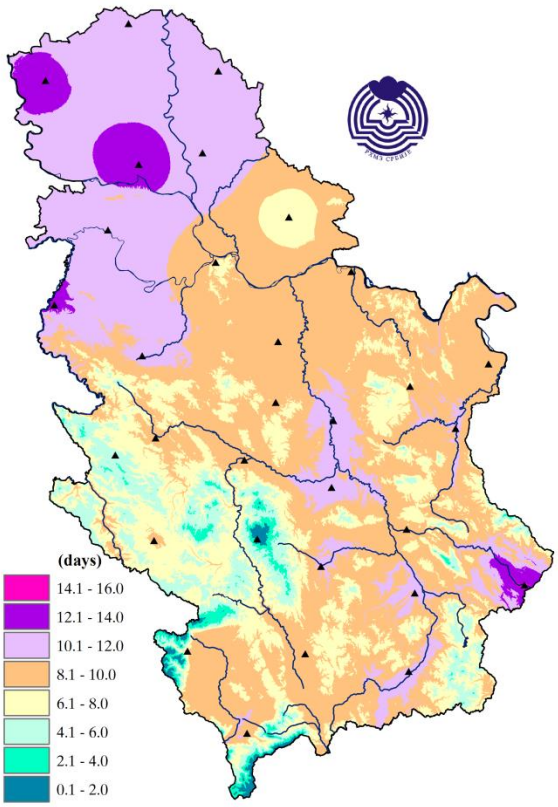


Figure 6. Deviation of the number of tropical days from the normal 1991-2020

At the majority of the main meteorological stations, in July 2024, there was **record-breaking number of tropical days in the history of record-keeping** (*Table 2*).

Table 2. 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

[4] Tropical day refers to a day with maximum daily air temperature 30°C and above

Heat wave[5] lasted from 8 to 20 July in most of the county, the longest lasting heat wave was registered in Krusevac from 7 to 20 July (*Table 3*). The highest maximum daily air temperature of 41,8°C was measured in Cuprija on July 17. In the period from 13 to 17 July, Cuprija observed air temperatures above 40°C every day, Nis on 13, 16 and 17 July, and Smederevska Palanka on 14 and 17 July (*Table 4*).

In the period from 12 to 17 July, departure of the maximum daily air temperature in most of the country was 10°C above the average for the 1991-2020 normal, and 12,8°C in Cuprija on July 16.

Table 3. Heat waves in Serbia

HEAT WAVES IN SERBIA - JULY 2024.

(relative to the 1991-2020 base period)

JULY

station/day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
PALIC							VW	EW	EW	EW	EW	EW	EW	EW	EW	EW	EW	VW	VW												
SOMBOR								VW	EW	EW	EW	EW	EW	EW	EW	EW	EW	VW	VW												
KIKINDA								VW	EW	EW	EW	EW	EW	EW	EW	EW	EW	VW	VW												
ZRENJANIN								VW	EW	EW	EW	EW	EW	EW	EW	EW	EW	VW	VW												
NOVI SAD							VW	VW	EW	EW	EW	EW	EW	EW	EW	EW	EW	VW	VW												
SR.MITROVICA										VW	VW	EW	EW	EW	EW	EW	VW	VW	VW												
BELGRADE								VW	VW	VW	VW	EW	EW	EW	EW	EW	EW														
LOZNICA								VW	VW	VW	EW	EW	EW	EW	EW	EW	VW														
VALJEVO									VW	VW	EW	EW	EW	EW	VW	EW	VW														
V.GRADISTE									VW	VW	EW	EW	EW	EW	EW	EW	EW	VW	VW												
SM.PALANKA								VW	VW	EW	EW	EW	EW	EW	EW	EW	EW	VW	VW												
KRAGUJEVAC								VW	VW	VW	EW	EW	EW	EW	EW	EW	EW	VW	VW	VW											
KRALJEVO								VW	VW	VW	EW	EW	EW	EW	EW	EW	EW	VW	VW												
POZEGA								VW	VW	VW	EW	EW	EW	EW	VW	EW	VW														
ZLATIBOR											VW	EW	EW	EW	VW	VW	VW														
CUPRIJA								VW	VW	EW	EW	EW	EW	EW	EW	EW	EW	EW	VW	VW											
KRUSEVAC							VW	VW	VW	VW	EW	EW	EW	EW	EW	EW	EW	EW	VW	VW											
NEGOTIN								VW	VW	VW	EW	EW	EW	EW	EW	EW	EW	EW	VW	VW											
ZAJECAR								VW	VW	VW	EW	EW	EW	EW	EW	EW	EW	VW	VW	VW											
CRNI VRH									VW	VW	EW	EW	EW	EW	EW	EW	EW	EW	VW	VW											
KOPAONIK										VW	EW	EW	EW	EW	EW	EW	EW	EW	VW	VW											
SJENICA											VW	VW	EW	EW	VW	VW	EW	VW													
NIS										VW	EW	EW	EW	EW	EW	EW	EW	EW	VW	EW											
VRANJE										VW	EW	EW	EW	EW	EW	EW	EW	EW	VW	VW											
DIMITROVGRAD											EW	EW	EW	EW	EW	EW	EW	EW	VW	EW											
LESKOVAC								VW	VW	VW	EW	EW	EW	EW	EW	EW	EW	EW	VW	EW											
KURSUMLIJA										VW	VW	EW	EW	EW	EW	EW	EW	VW	VW	VW											
B.KARLOVAC								VW	VW	EW	VW	EW	EW	EW	EW	EW	EW	VW	VW												

EW	EXTREMELY WARM
VW	VERY WARM

[5] Heat wave is, according to the percentile method, is a period during which maximum daily air temperature is in the very warm and extremely warm categories for 5 consecutive days or longer

Table 4. The maximum daily air temperatures during heat wave

MAXIMUM DAILY AIR TEMPERATURE DURING HEAT WAVE JULY														
station/day	7	8	9	10	11	12	13	14	15	16	17	18	19	20
PALIC	34.1	35.9	37.2	37.4	37.1	37.0	38.4	37.5	38.4	38.4	38.4	34.0	34.7	
SOMBOR		35.4	36.6	37.5	38.2	38.3	38.5	36.6	36.5	38.6	37.4	36.2	36.1	
KIKINDA		35.4	36.6	36.7	37.5	38.0	38.2	38.5	38.8	39.5	38.7	35.6	35.4	
ZRENJANIN		35.5	36.6	37.0	37.2	38.1	37.7	37.4	37.6	39.5	38.0	36.9	37.1	
NOVI SAD	34.7	35.9	36.7	37.4	37.6	38.1	38.9	37.6	37.6	39.7	38.2	36.2	36.6	
SR.MITROVICA				34.8	35.6	36.2	37.0	36.6	36.1	37.6	36.0	34.6	35.2	
BELGRADE		35.1	35.5	36.3	36.8	38.1	37.7	38.0	36.8	39.6	37.1			
LOZNICA		34.5	35.0	35.8	36.7	37.4	37.2	36.4	36.2	38.5	36.0			
VALJEVO			35.4	36.3	37.1	38.2	37.0	37.0	35.1	38.1	35.3			
V.GRADISTE			35.4	36.1	36.7	37.0	38.0	39.6	39.1	39.4	39.5	37.2	37.2	
SM.PALANKA		36.2	37.0	37.8	38.4	38.8	39.7	40.5	39.5	39.9	40.3	36.2	36.8	
KRAGUJEVAC		36.0	36.0	36.7	37.6	38.5	38.8	39.7	38.8	39.6	39.5	36.0	36.2	37.0
KRALJEVO		34.6	35.2	35.8	36.6	37.5	38.4	38.8	38.2	38.9	39.1	36.2	36.0	
POZEGA		33.8	33.9	34.7	35.4	36.4	36.6	37.3	34.9	37.2	34.8			
ZLATIBOR					30.0	31.0	31.4	32.2	29.0	30.8	29.6			
CUPRIJA		36.5	37.4	38.2	38.6	39.1	40.1	41.0	40.5	41.2	41.8	39.1	38.0	37.9
KRUSEVAC	35.0	35.6	35.8	36.6	37.3	37.9	38.9	39.1	38.9	39.5	39.6	38.0	37.8	37.6
NEGOTIN		35.9	36.9	36.7	37.4	37.4	38.1	39.4	39.2	39.2	39.3	39.0	36.6	36.8
ZAJECAR		35.3	35.4	36.0	36.7	37.0	38.0	39.0	38.2	38.5	38.8	37.5	36.2	36.0
CRNI VRH			28.4	29.2	29.6	29.6	30.7	32.8	31.9	31.1	32.0	31.3	30.3	30.2
KOPAONIK				23.2	24.5	24.5	25.5	26.5	25.4	26.4	25.1	24.4	24.3	24.0
SJENICA					30.2	30.8	32.2	33.2	31.0	31.5	32.5	29.7		
NIS				36.7	37.7	38.3	40.0	39.5	39.0	40.6	40.0	39.6	38.1	39.6
VRANJE				35.2	36.1	36.6	37.3	37.4	37.2	38.1	37.4	37.4	36.6	36.6
DIMITROVGRAD					35.7	35.9	36.2	37.4	37.5	36.7	38.4	37.2	35.6	37.2
LESKOVAC		35.4	35.8	36.4	37.7	38.4	38.7	39.4	38.8	39.4	39.7	38.2	38.0	39.2
KURSUMLIJA				35.3	35.8	37.0	37.7	38.0	37.3	38.0	38.3	34.5	35.5	37.6
B.KARLOVAC		34.5	36.2	36.2	35.5	35.6	37.6	38.7	37.8	37.8	38.4	35.5	35.5	

Table 5. Departure of the maximum daily air temperature from the 1991-2020 average during heat wave

DEPARTURE OF MAXIMUM DAILY AIR TEMPERATURE FROM THE NORMAL 1991-2020 DURING HEAT WAVE JULY														
station / day	7	8	9	10	11	12	13	14	15	16	17	18	19	20
PALIC	5.7	7.4	9.4	9.1	8.5	9.6	10.3	9.0	10.8	10.3	9.6	5.1	6.0	
SOMBOR		6.5	8.5	8.9	9.0	10.6	10.0	7.5	8.7	10.0	8.3	6.7	6.9	
KIKINDA		6.3	8.4	8.1	8.4	10.0	9.6	9.5	10.8	11.0	9.5	6.2	6.2	
ZRENJANIN		6.2	8.3	8.7	8.3	10.3	9.2	8.5	9.7	11.2	8.9	7.4	7.9	
NOVI SAD	6.2	7.1	8.9	9.3	8.9	10.7	10.8	9.0	10.0	11.7	9.5	6.9	7.7	
SR.MITROVICA				6.5	6.5	8.4	8.6	7.9	8.5	9.5	7.1	5.2	5.9	
BELGRADE		5.7	7.0	7.6	7.7	9.9	9.1	8.7	8.4	11.2	7.8			
LOZNICA		5.6	7.3	7.5	8.0	9.6	9.0	7.7	8.7	10.3	7.1			
VALJEVO			7.8	8.1	8.5	10.4	8.9	8.4	7.8	10.2	6.7			
V.GRADISTE			6.5	7.1	7.6	8.2	9.2	10.1	10.0	10.6	9.9	7.4	7.2	
SM.PALANKA		6.7	8.2	9.1	9.1	10.2	10.9	11.0	11.0	11.5	11.2	6.6	7.2	
KRAGUJEVAC		6.4	7.5	8.0	8.6	10.2	10.2	10.3	10.5	11.5	10.4	6.6	6.7	6.4
KRALJEVO		5.4	7.0	7.6	8.0	9.1	10.0	10.1	10.4	11.3	10.3	7.1	6.9	
POZEGA		5.6	6.7	7.2	7.5	9.0	9.3	9.4	8.1	10.3	6.9			
ZLATIBOR					7.0	7.9	8.6	8.9	6.4	8.8	6.4			
CUPRIJA		6.4	8.4	9.0	9.2	10.4	11.0	11.1	11.6	12.8	12.1	8.8	8.0	6.5
KRUSEVAC	5.2	5.9	7.2	8.0	8.3	9.5	10.4	9.8	10.5	11.6	10.4	8.6	8.3	6.7
NEGOTIN		5.5	7.1	6.8	7.5	7.8	8.7	9.5	9.5	9.6	9.3	8.8	6.0	5.1
ZAJECAR		4.8	5.8	6.3	7.1	7.4	9.0	9.4	8.5	8.9	8.8	7.3	5.5	4.7
CRNI VRH			6.8	7.7	8.0	8.2	9.6	11.0	10.2	10.0	10.2	9.1	7.5	6.4
KOPAONIK				6.3	7.4	7.7	8.9	9.6	8.4	10.3	8.1	7.2	6.8	5.9
SJENICA					6.5	7.0	9.0	9.9	7.8	9.4	9.0	5.8		
NIS				7.0	7.9	8.4	10.3	9.4	9.7	11.9	9.8	9.2	7.3	7.9
VRANJE				6.8	7.3	7.7	8.6	8.6	8.6	10.3	8.5	8.3	7.0	6.3
DIMITROVGRAD					7.4	7.9	8.4	9.4	10.0	9.6	10.5	9.0	6.9	7.7
LESKOVAC		5.3	6.7	7.2	8.2	9.1	9.5	10.0	9.9	10.9	10.2	8.4	7.8	8.1
KURSUMLIJA				7.4	7.9	8.9	9.7	9.7	9.8	11.1	10.4	6.0	6.8	8.1
B.KARLOVAC		5.4	8.0	7.7	6.7	7.6	9.0	9.4	9.5	9.4	9.3	6.1	6.1	

Figure 7 shows daily course of the maximum daily air temperature and the accompanying percentiles for Belgrade in July 2024 and for the stations Sombor, Novi Sad, Loznica, Negotin, Kragujevac, Zlatibor, Nis and Vranje are given in the Appendix.

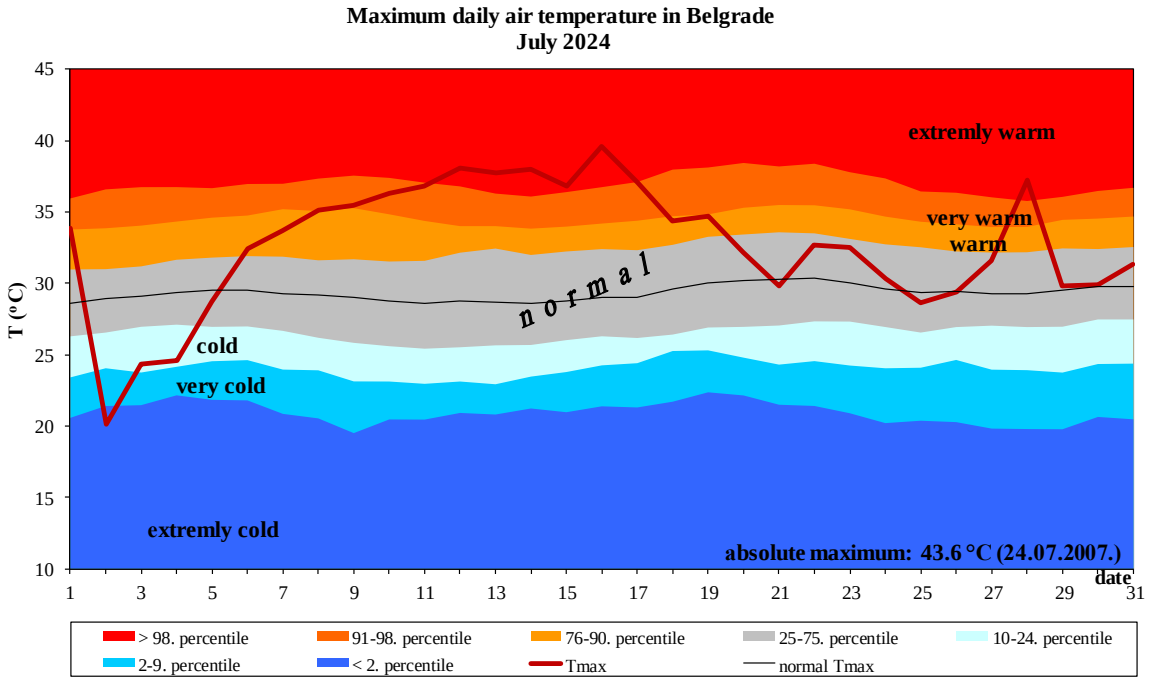


Figure 7. Daily course of the maximum daily air temperature and accompanying percentiles for Belgrade

Minimum air temperature

Mean minimum air temperature in July ranged from 14,8ºC in Dimitrovgrad to 21,7ºC in Belgrade. On the mountains, mean minimum air temperature ranged from 11,5ºC in Sjenica to 17,0ºC at Crni Vrh.

Based on the percentile method, mean minimum air temperature was in the extremely warm category in most of the country, very warm in Negotin, Kursumlija and Dimitrovgrad, warm in Leskovac and Vranje, and normal in Zajecar.

The lowest minimum daily air temperature of 4,0ºC was measured on July 31 in Sjenica. On the same day, in the lowland, the lowest daily air temperature of 8,5ºC was measured in Veliko Gradiste, whereas on July 3, Belgrade observed the lowest monhtly air temperature of 15,3ºC. **Record-breaking minimum air temperature** of **31,2°C** was observed in Vrsac on July 14.

Tropical nights[6] were recorded in most of the country. There weren't any tropical nights in Pozega, Leskovac, Dimitrovgrad and Vranje while the highest number of tropical nights, total of 20, were recorded in Belgrade. Higher number of tropical nights was recorded in the north of the country, while **July record for maximum number of tropical nights was broken** at 15 meteorological stations (*Table 6).* In the upland, 9 tropical nights were recorded at Crni Vrh and 5 at Zlatibor. The recorded number of tropical nights was 10 to 16 above the July average in the north of the country (*Figure 8*).

[6] Tropical night refers to a day with minimum daily air temperature 20°C and above

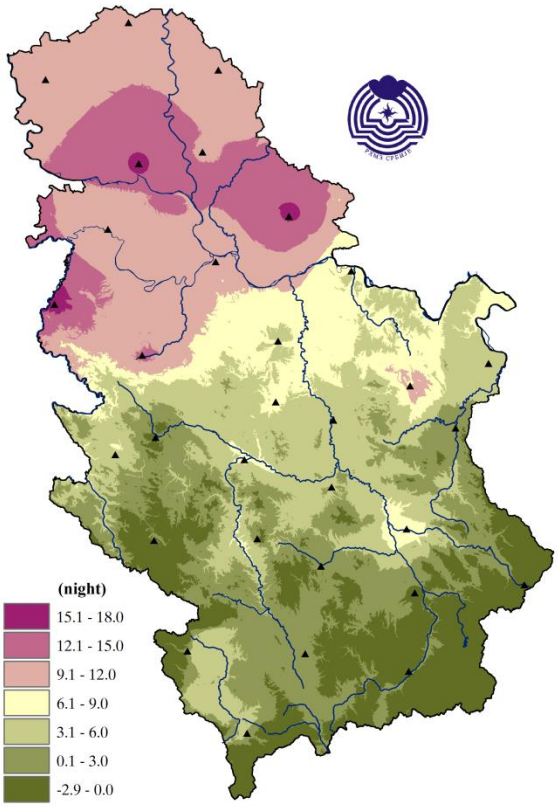


Figure 8. Deviation of the number of tropical nights from the normal 1991-2020

Table 6. Record-breaking number of tropical nights for July

MMS stations	Number of tropical nights July 2024	The previous record of tropical nights	Year of the previous record
LOZNICA	**18**	9	2021
NOVI SAD	**17**	11	2021
B.KARLOVAC	**17**	7	1987/2021
PALIC	**16**	11	2015
ZRENjANIN	**15**	9	2017/2021
VALjEVO	**15**	9	2021
KIKINDA	**13**	9	2010/2012/2015/2021
SOMBOR	**12**	6	2022/2023
S.MITROVICA	**11**	6	2021
KRAGUJEVAC	**8**	5	2021/2023
V.GRADISTE	**8**	7	1928/2021
KRALjEVO	**7**	5	2015/2023
CUPRIJA	**6**	5	1988/2012/2021/2023
ZLATIBOR	**5**	3	1987/2000/2007/2023
KURSUMLIJA	**2**	1	1977/1987/2007/2012

Figure 9 shows assessment of the minimum and maximum air temperature in Serbia for July based on the tercile distribution relative to the 1991-2020 base period. It can be noted that the mean maximum and minimum air temperature were significantly above the upper tercile threshold (**the highest** in the series 1981-2024).

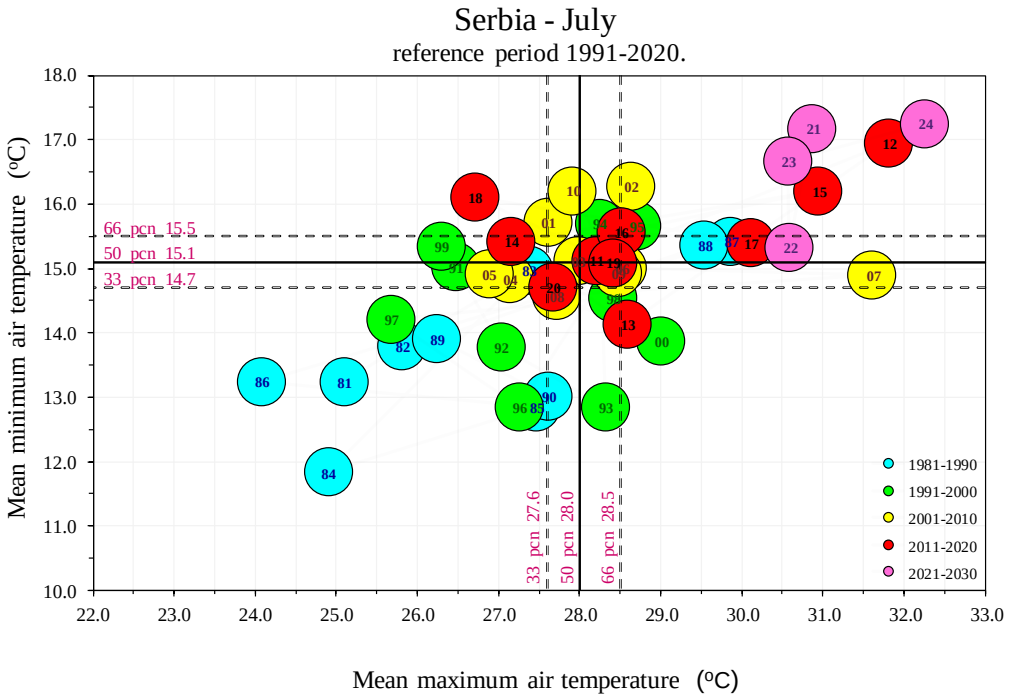


Figure 9. Assessment of minimum and maximum air temperature for Serbia with the accompanying terciles in relation to the 1991-2020 base period

Figure 10 shows daily course of the minimum daily air temperature and the accompanying percentiles for Belgrade in July 2024, and for the stations Sombor, Novi Sad, Loznica, Negotin, Kragujevac, Zlatibor, Nis and Vranje are given in the Appendix.

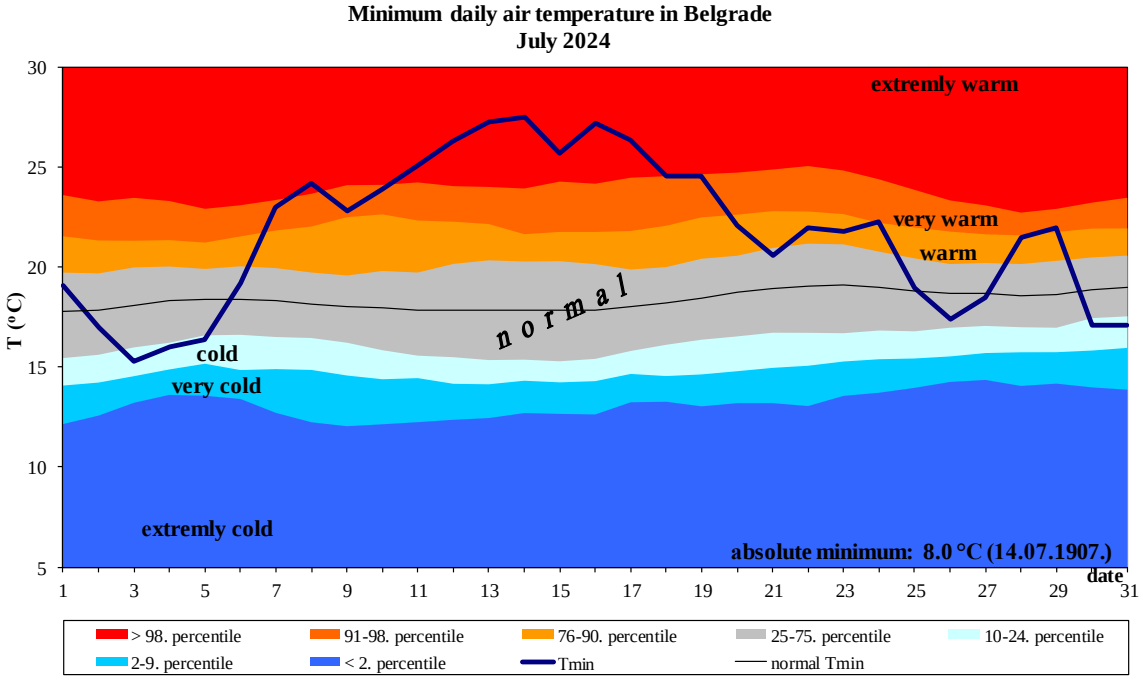


Figure 10. Daily course of the minimum daily air temperature and accompanying percentiles for Belgrade

PRECIPITATION

In most of Serbia July was marked by dry conditions. At Kopaonik, it ranks as the **5th driest**, and 8th driest for Cuprija (*Figures 11* and *12*).

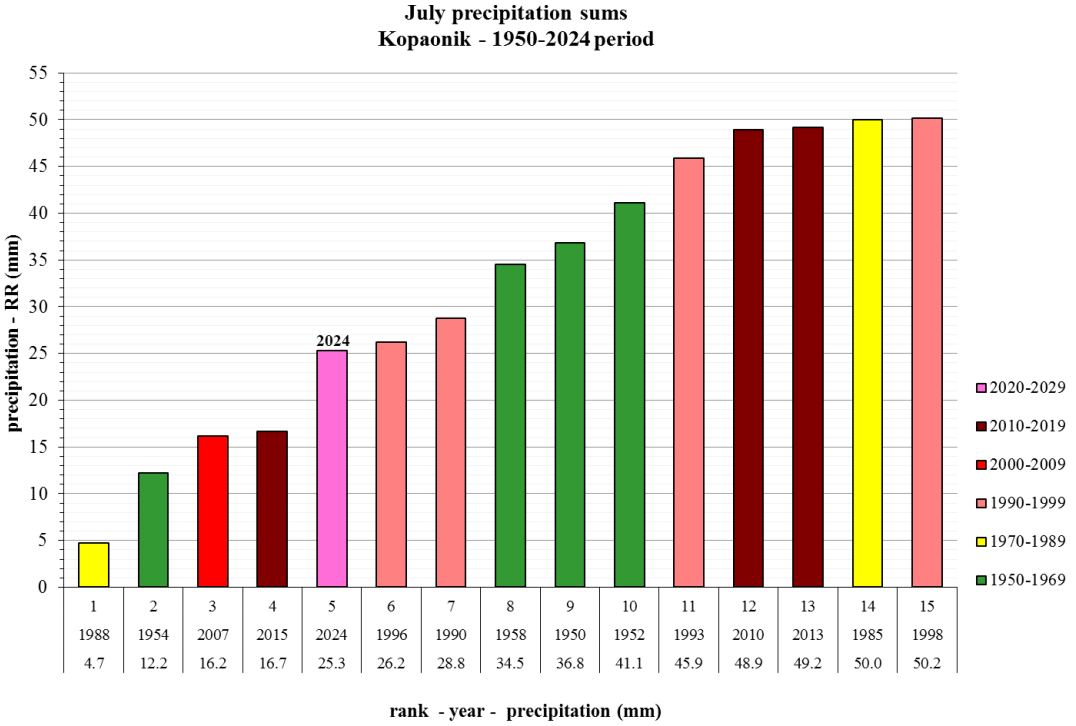


Figure 11. Rank of the lowesst precipitation on Kopaonik

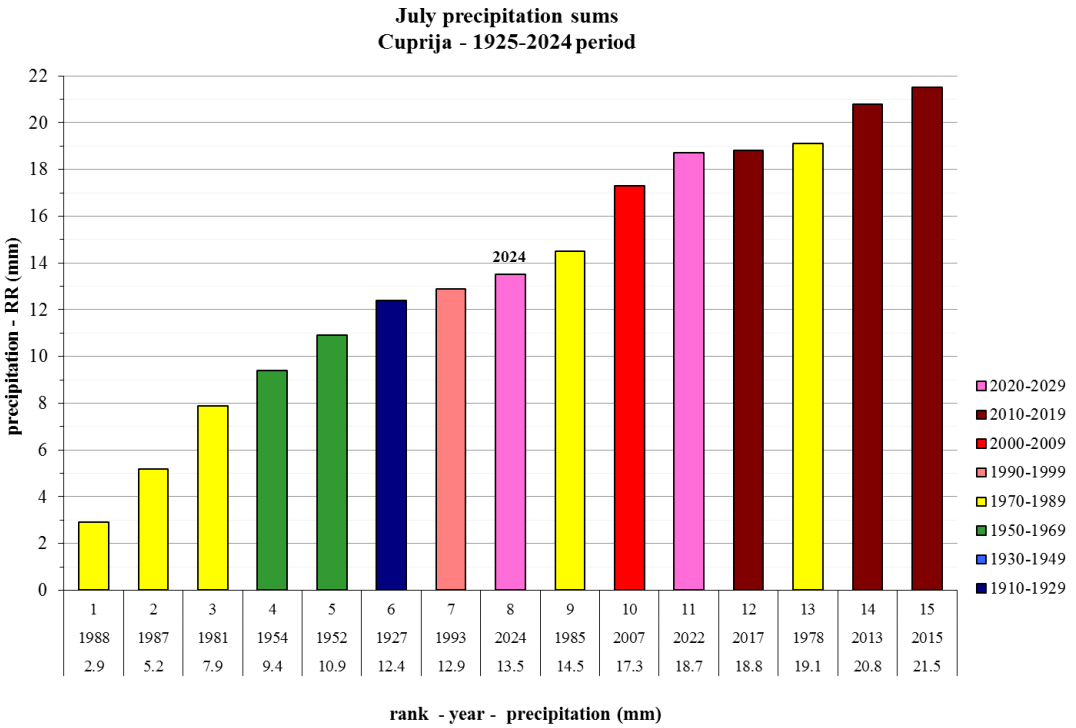


Figure 12. Rank of the lowesst precipitation in Cuprija

July precipitation sums ranged from 13,1 mm in Vranje to 98,5 mm in Požega, whereas Belgrade received 77,7 mm of precipitation (*Figure 13*).

Precipitation totals compared to the normal for the 1991-2020 base period ranged from 22% in Cuprija to 138% in Sremska Mitrovica (*Figure 14*).

Based on the percentile method, precipitation sums were in the categories of normal and dry in most of the country, very dry at Kopaonik and Dimitrovgrad, and extremely dry in Cuprija. July precipitation sums were in the rainy category in Sremska Mitrovica and Pozega (*Figure 15*).

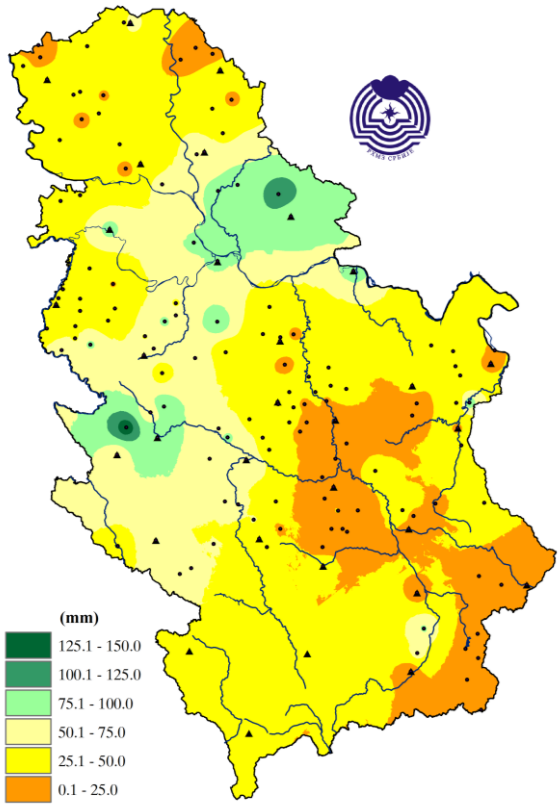


Figure 13. Spatial distribution of the monthly precipitation sums (mm) according to data from 28 major meteorological, 21 climatological and 99 rain gauge stations

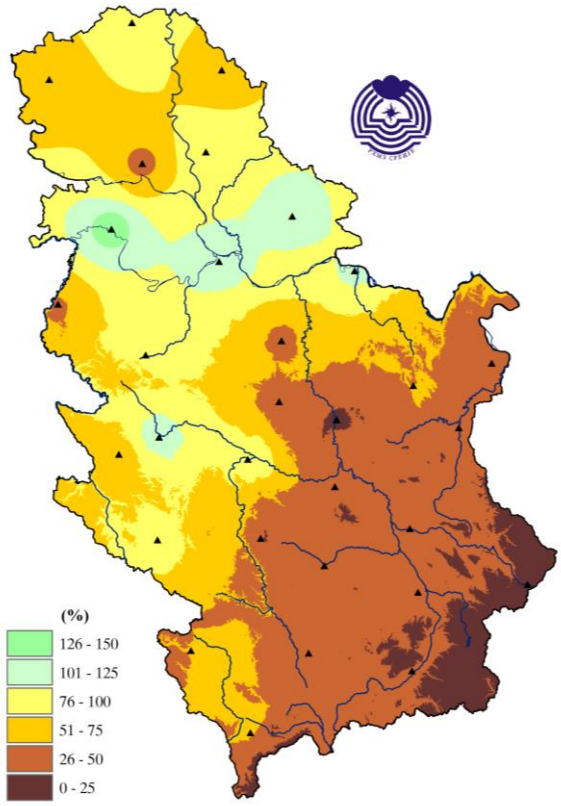


Figure 14. Spatial distribution of the monthly precipitation sums in the percentages of normal for the 1991–2020 base period

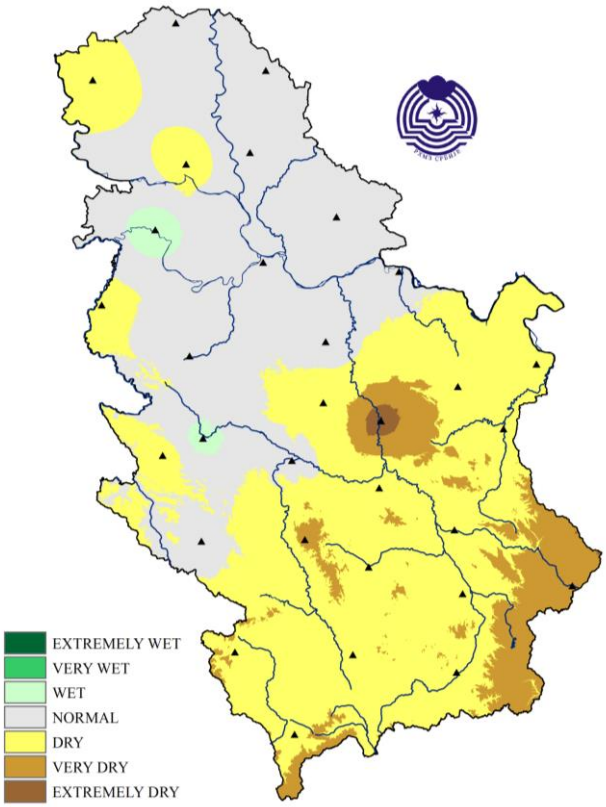


Figure 15. Monthly precipitation sums according to the percentile method

The highest daily precipitation sum of 78,8 mm was recorded in Sremska Mitrovica on July 2 thereby breaking the previous record of 72,6 mm set on July 7, 1953 which was hitherto the **absolute July daily precipitation maximum**. On July 2, Belgrade observed the highest daily precipitation sum of 47,0 mm.

Number of days with precipitation in July ranged from 2 in Kragujevac to 9 in Sjenica (*Figure 16*). The observed number of days with precipitation was 2 to 8 days below the July average (*Figure 17*).

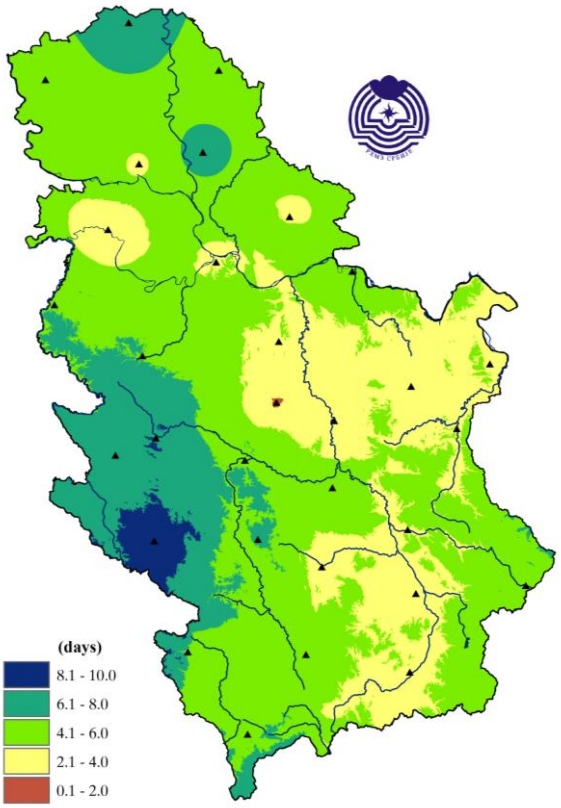


Figure 16. Spatial distribution of number of days with precipitation

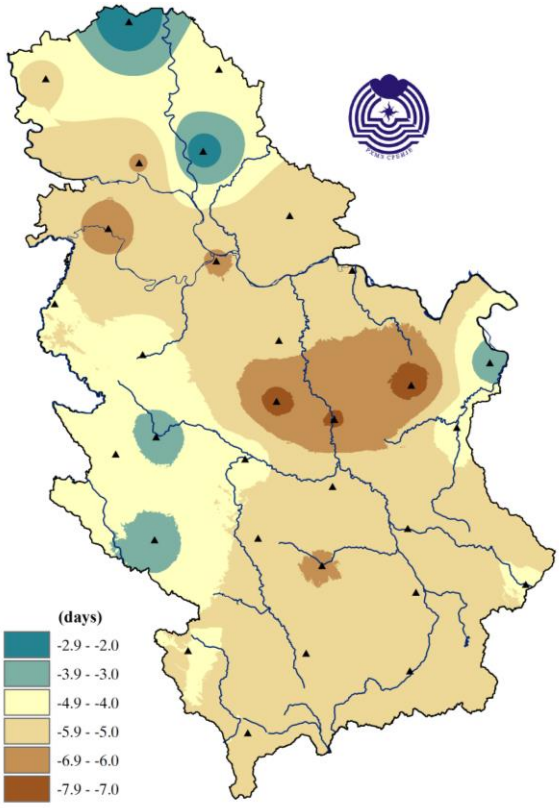


Figure 17. Spatial distribution of deviation of number of days with precipitation

Figure 18 shows assessment of air temperature and precipitation sums for Serbia for July based on the tercile distribution relative to the 1991 – 2020 base period. It can be noted that July 2024 was significantly above the upper tercile threshold (**the highest** since 1981) and precipitation sums at the lower tercile threshold.

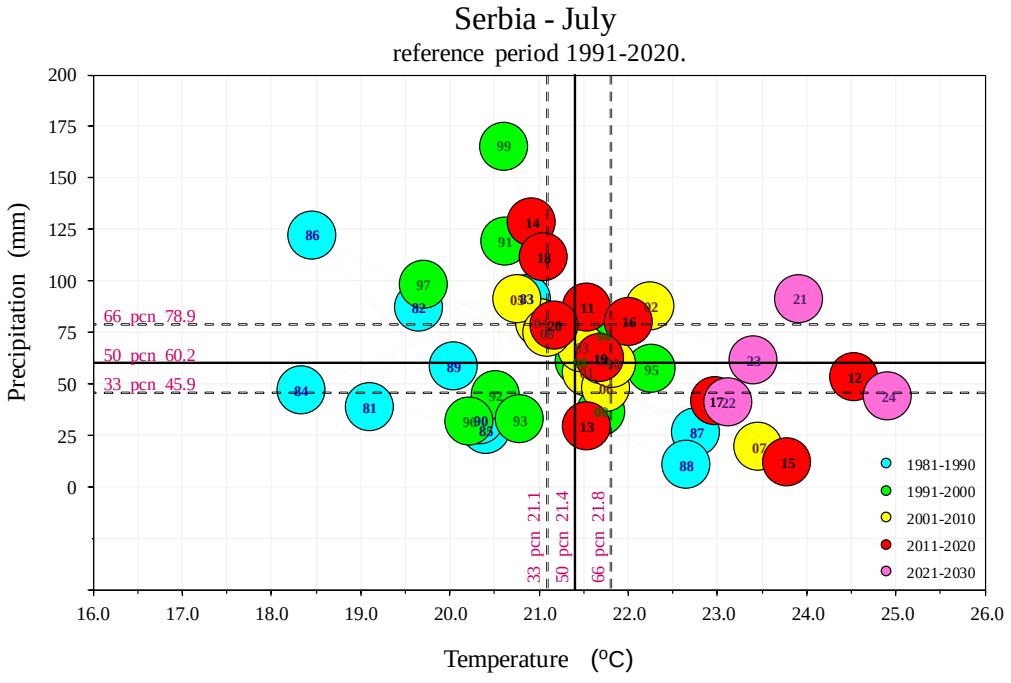


Figure 18. Assessment of air temperature and precipitation for Serbia with the accompanying terciles in relation to the 1991-2020 base period

Figure 19 show daily and cumulative precipitations sums with averaged normal 1991-2020 for July in Belgrade, and for the stations Sombor, Novi Sad, Loznica, Negotin, Kragujevac, Zlatibor, Nis and Vranje precipitation sums are given in Appendix.

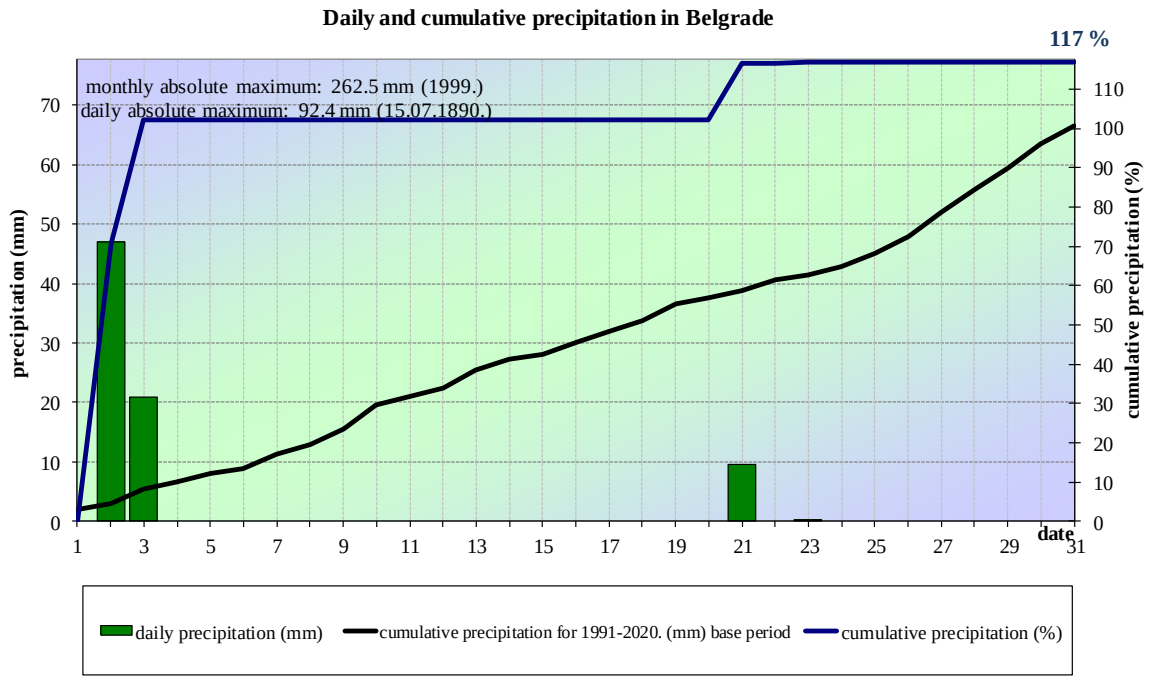


Figure 19. Daily and cumulative precipitation in Belgrade

CLOUD COVER, BRIGHT AND CLOUDY DAYS

Mean July cloud cover in Serbia was 1 to 2 days below the average, ranging from 2/10 to 3/10. Figures 20, 21 and 22 show average daily cloud cover for Belgrade, Kopaonik and Leskovac. **Record-breaking mean minimum July cloud cover** was registered at Crni Vrh. In July 2024, Crni Vrh recorded mean cloud cover of 1,8/10 thereby besting the previous minimum of 2,1/10 set in July 2007.

Number of bright days[7] ranged from 11 in Sombor to 23 in Leskovac. Belgrade observed 21 bright days. The observed number of bright days was from 5 to 10 days above the July average in most of the country. **Record-breaking number of bright days**, total of 22 days, was registered at Crni Vrh, besting the previous record of 20 days set in July 2007.

Cloudy days[8] were nor recorded in Sombor, Sremska Mitrovica, Belgrade and Dimitrovgrad, whereas the highest number of cloudy days, total of 3 days, was recorded at Kopaonik and Kursumlija. Number of cloudy days was 2 to 4 days below July average in most of the country.

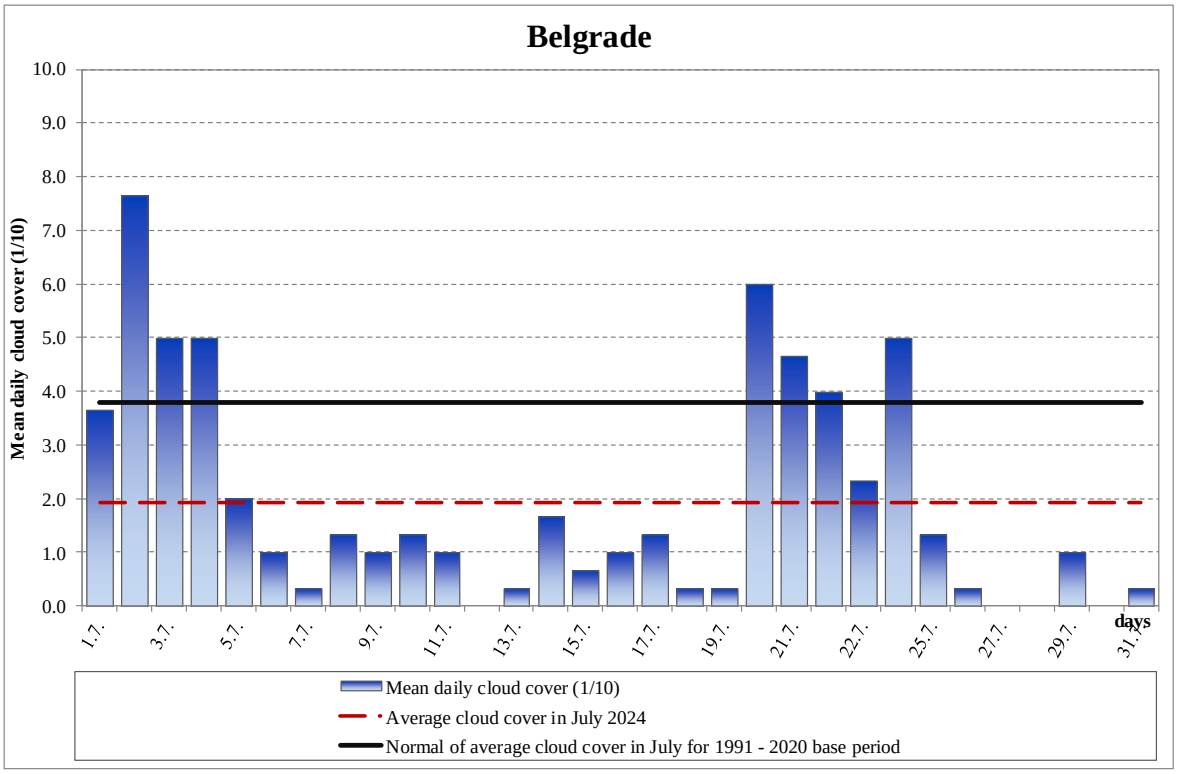


Figure 20. Mean daily cloud cover in Belgrade

[7] Bright day refers to a day with cloud cover less than 2/10
[8] Cloudy day refers to a day with cloud cover over 8/10

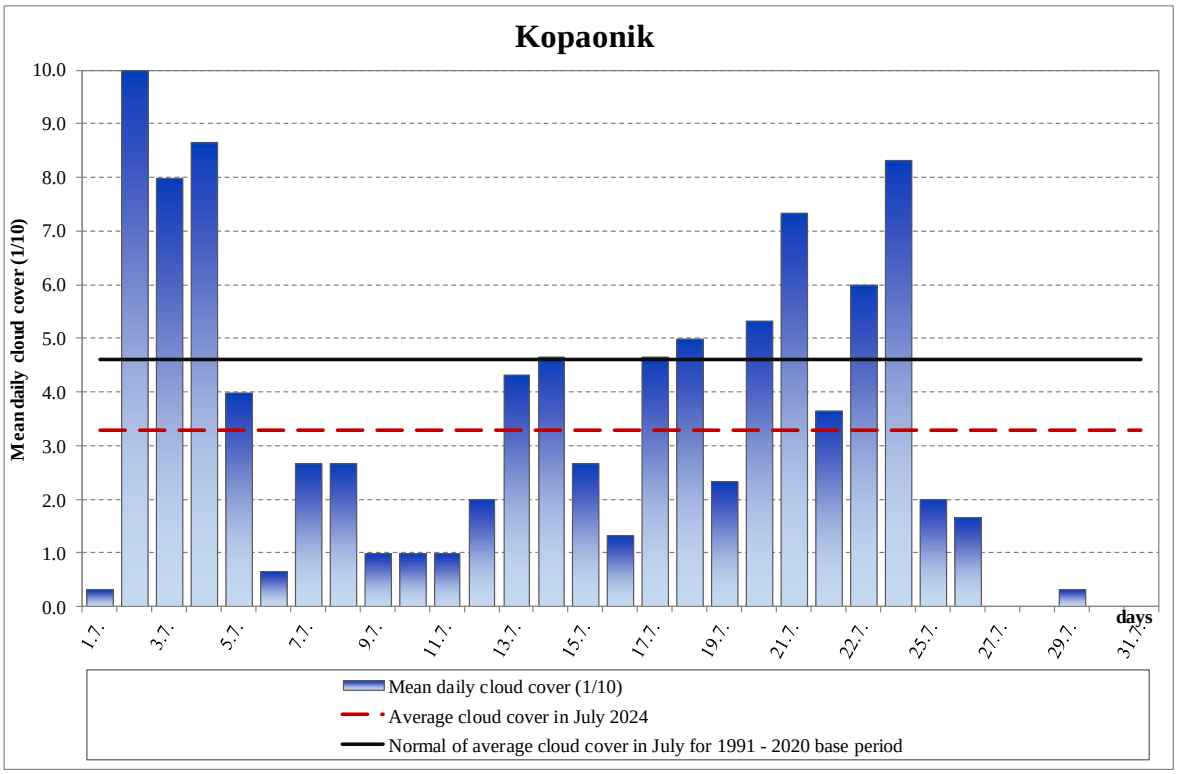


Figure 21. Mean daily cloud cover on Kopaonik

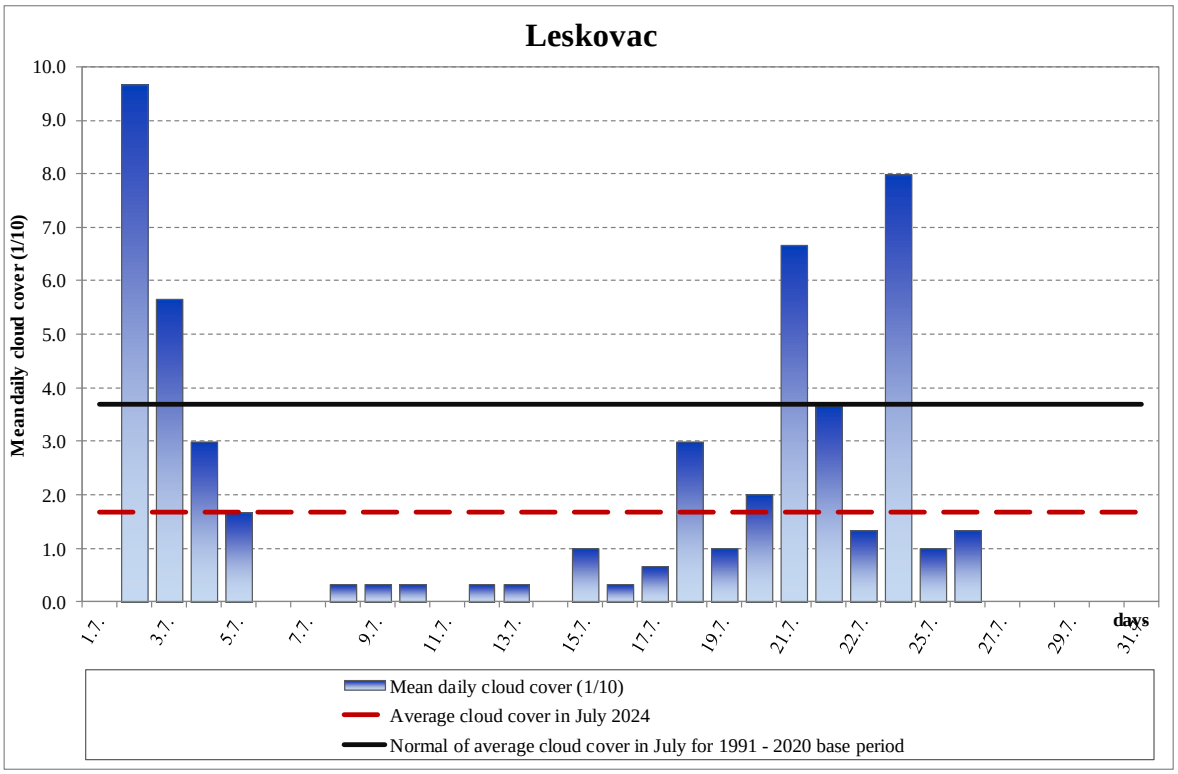


Figure 22. Mean daily cloud cover in Leskovac

SUNSHINE DURATION (INSOLATION)

July insolation ranged from 295,0 hours in Sjenica to 388,3 hours in Negotin (*Figure 23*). **Record-breaking** sunshine duration hours were registered in Negotin and Banatski Karlovac. Negotin recorded 388,3 hours thereby besting the previous record of 383,0 hours set in July 2015. Banatski Karlovac registered 364,4 hours thereby breaking the previous record of 364,0 set in July 2007.

July insolation ranged from 109% in Smederevska Palanka to 135% in Pozega compared to the normal for the 1991-2020 base period (*Figure 24*).

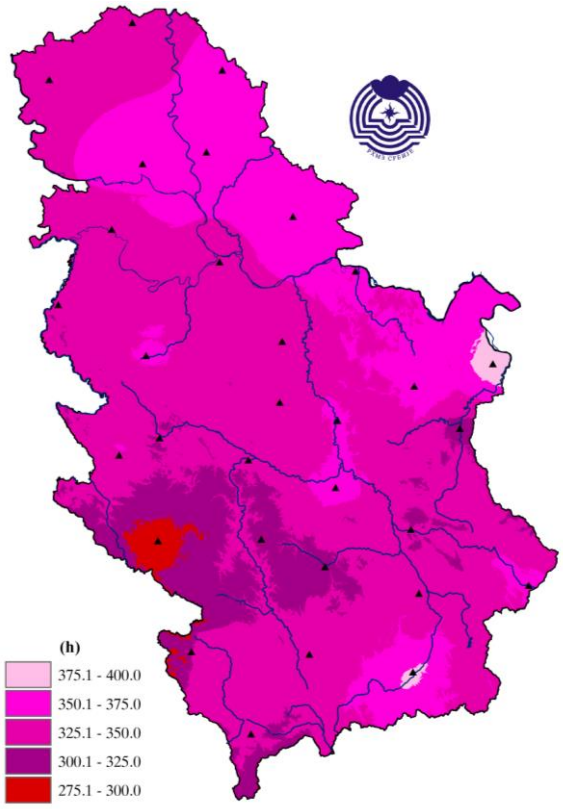


Figure 23. Insolation, expressed in hours

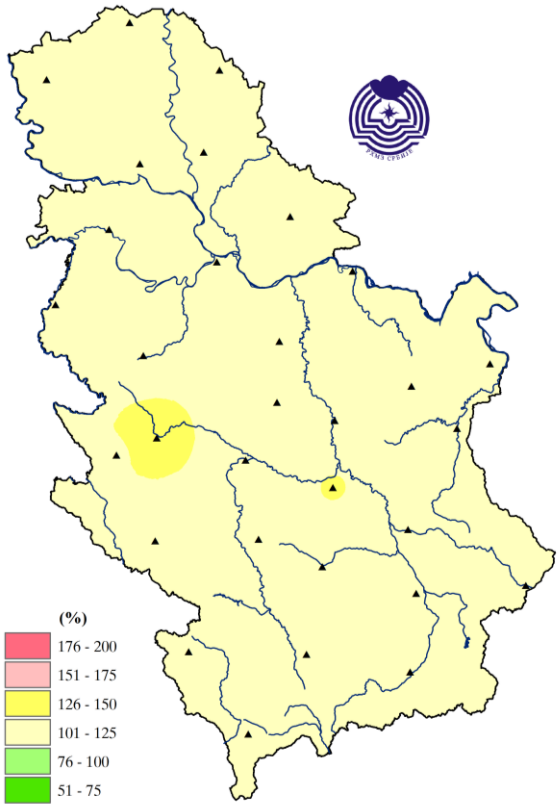


Figure 24. Insolation expressed in the percentages of normal

*** Note:** Climate analysis of meteorological elements was done based on the preliminary data obtained from 28 main meteorological stations

OVERVIEW OF THE SYNOPTIC SITUATION*

Exceptionally and persistently warm; most of the month was characaterized by heat ridge, and presence of tropical air mass from northwestern Africa and the Mediterranean; a few intense incursions of moist air, low pressure, and cold fronts from the northwest and southwest at the beginning of the month and at the start and middle of the third decade, locally heavy rain and extreme weather conditions.

On the second day of July, a significant weather change affected the entire country. There was occasional rain, local thunderstorms, heavy precipitation and severe weather conditions. It was more pronounced in the northern, western, southwestern, and central regions of the country. Initially, there was an incursion of moist air from the west and southwest, within a low pressure that developed in the Gulf of Genoa and moved towards the Adriatic and the Balkan Peninsula. Later, the passage of a cold front within a low pressure from the northwest, emanating from the central parts of the continent led to a brief cooling following locally intense precipitation.

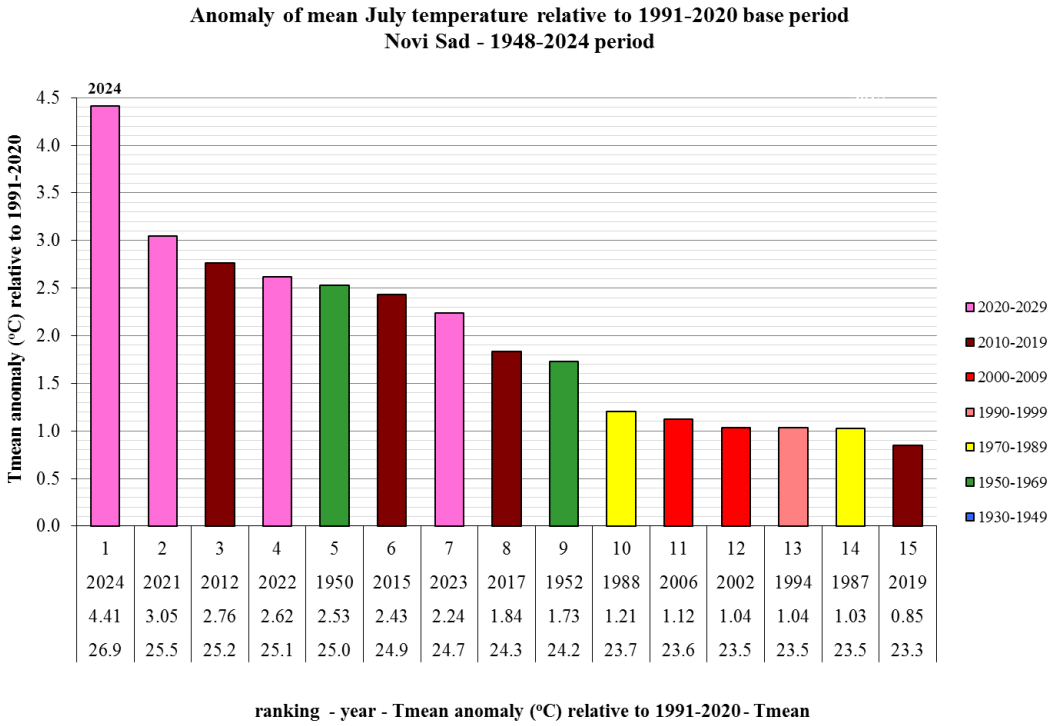
From the middle of the first decade, there was a rise in pressure from the southwest and west along with a gradual advection of warm air across the Mediterranean towards the Balkan Peninsula. This was followed by the strengthening of an anticyclone from the southwest across the Balkans towards the east and northeast, and the development of a new low pressure in the eastern Atlantic, near Iceland and the British Isles. Over our territory, an anticyclone and a heat ridge persisted along with extremely warm weather. At the beginning and middle of the second decade, from the west and southwest, after an intense influx of warm air, and due to the development of a low pressure from the east and southeast of the Mediterranean, as well as occasional strenghtening of low pressure first in north of the contentning and later in Western Europe resulted with exceptionally warm weather, but with instability in some areas and local thunderstorms.

Period at the beginning and middle of the third decade was marked by incursions from the northwest along with the transfer of a median wave deformation across the Balkans towards the Black Sea, and an upper-air depression that moved eastward from the western Mediterranean across the Apennine Peninsula. Subsequently, from the middle of the third decade until the end of the month, a ridge and anticyclone were established, and with minor temperature fluctuations, the weather remained warm and mostly clear.

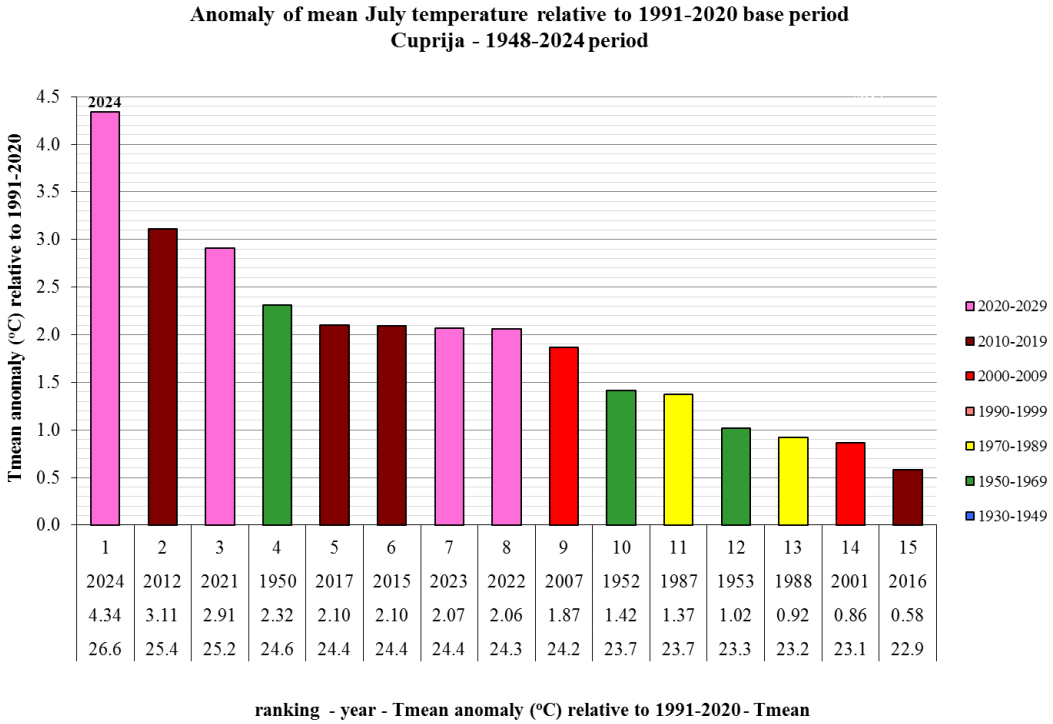
* National Center for Hydrometeorlogical Early Warning System

APPENDIX

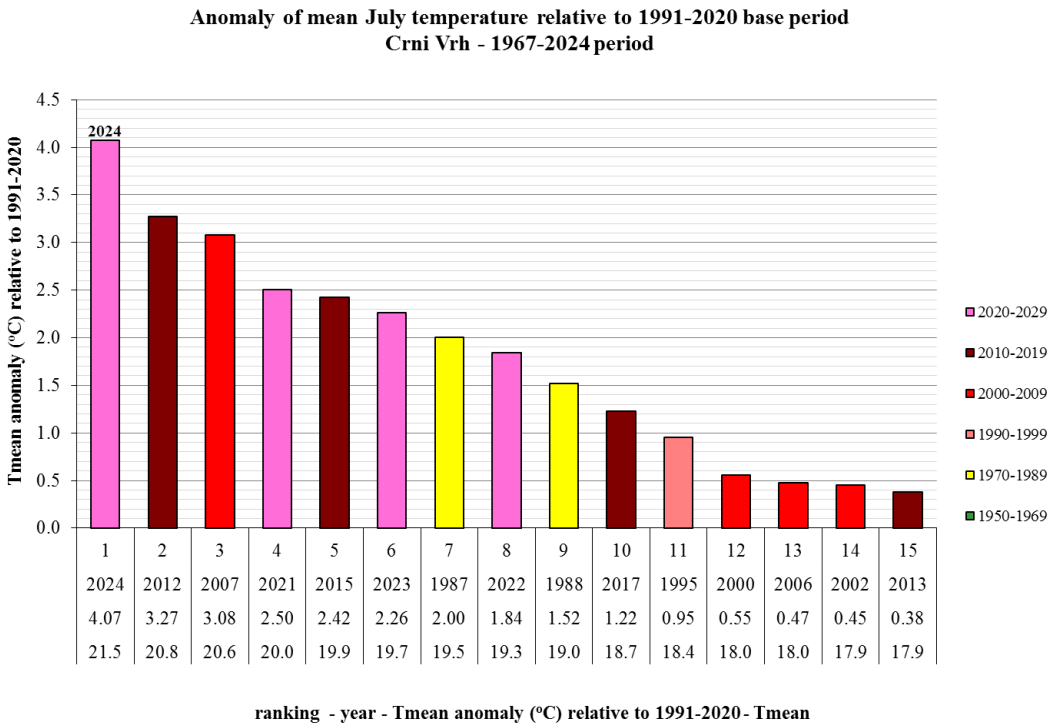
Ranks of the warmest July



Appendix 1. Rank of the warmest July in Novi Sad

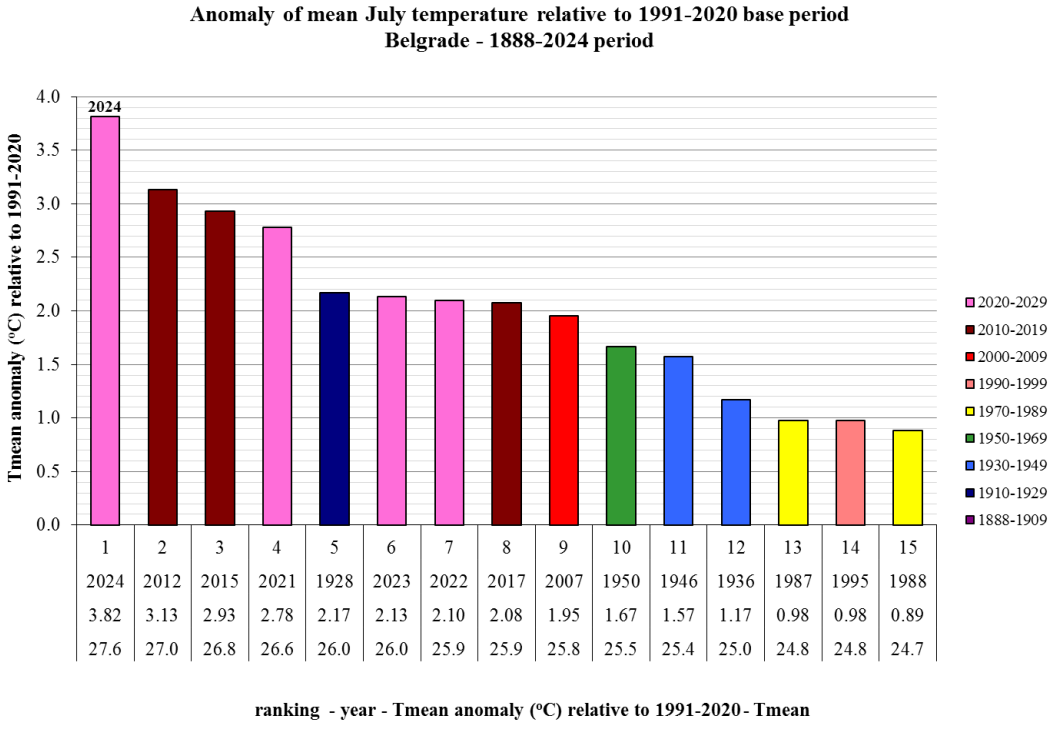


Appendix 2. Rank of the warmest July in Cuprija



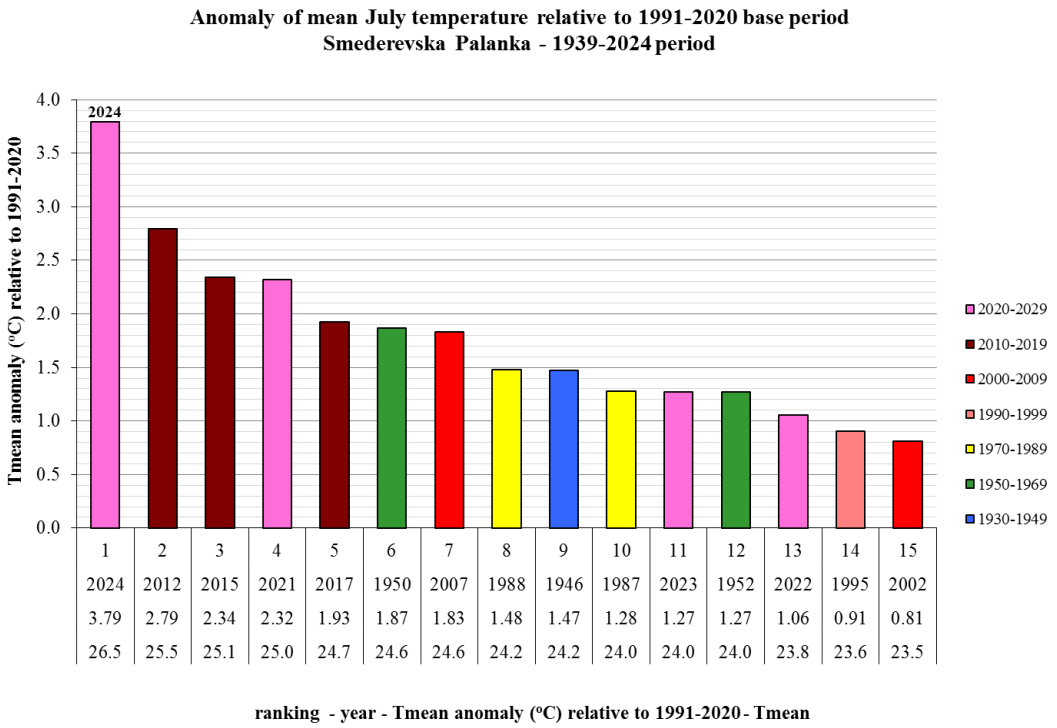
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2024	2012	2007	2021	2015	2023	1987	2022	1988	2017	1995	2000	2006	2002	2013
4.07	3.27	3.08	2.50	2.42	2.26	2.00	1.84	1.52	1.22	0.95	0.55	0.47	0.45	0.38
21.5	20.8	20.6	20.0	19.9	19.7	19.5	19.3	19.0	18.7	18.4	18.0	18.0	17.9	17.9

Appendix 3. Rank of the warmest July on Crni Vrh

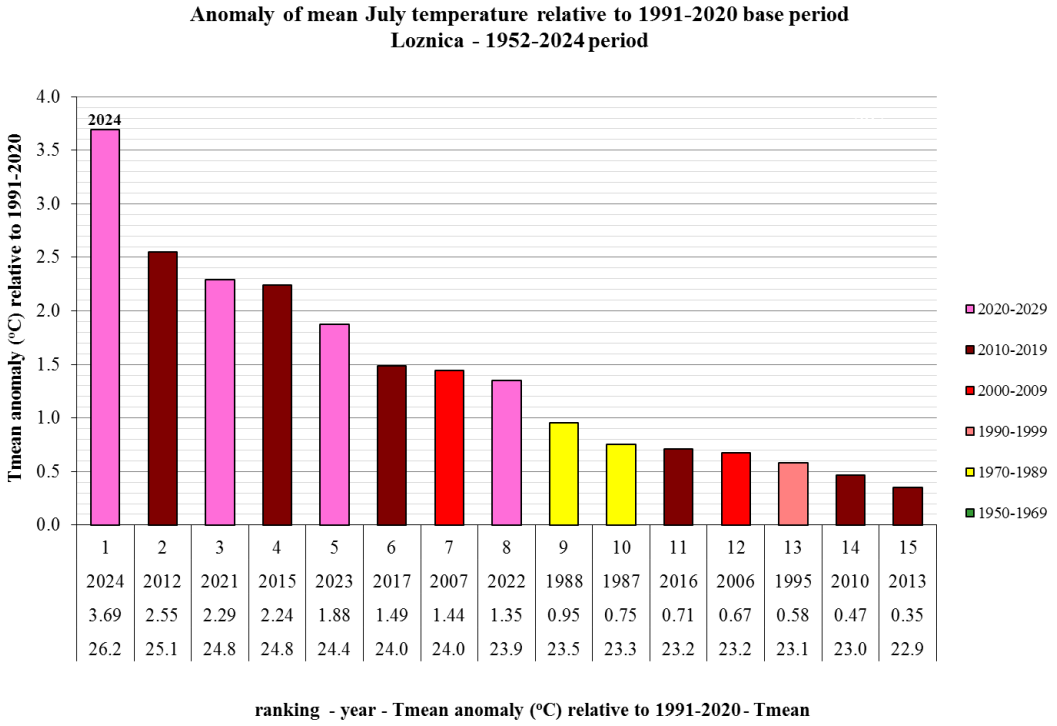


1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2024	2012	2015	2021	1928	2023	2022	2017	2007	1950	1946	1936	1987	1995	1988
3.82	3.13	2.93	2.78	2.17	2.13	2.10	2.08	1.95	1.67	1.57	1.17	0.98	0.98	0.89
27.6	27.0	26.8	26.6	26.0	26.0	25.9	25.9	25.8	25.5	25.4	25.0	24.8	24.8	24.7

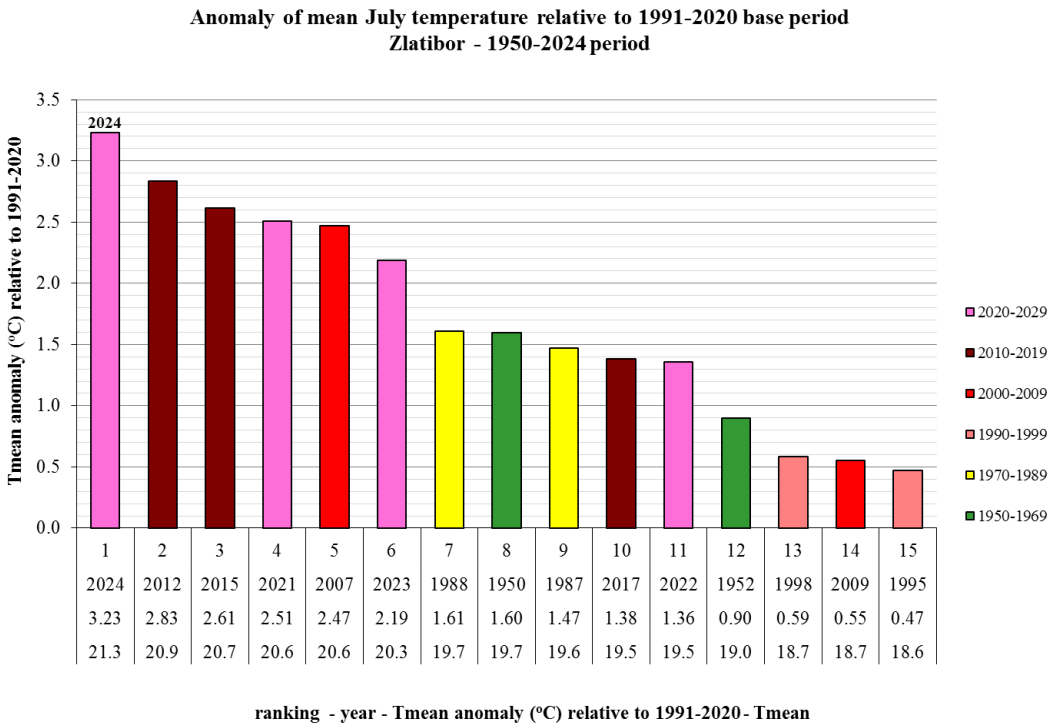
Appendix 4. Rank of the warmest July in Belgrade



Appendix 5. Rank of the warmest July in Smederevska Palanka

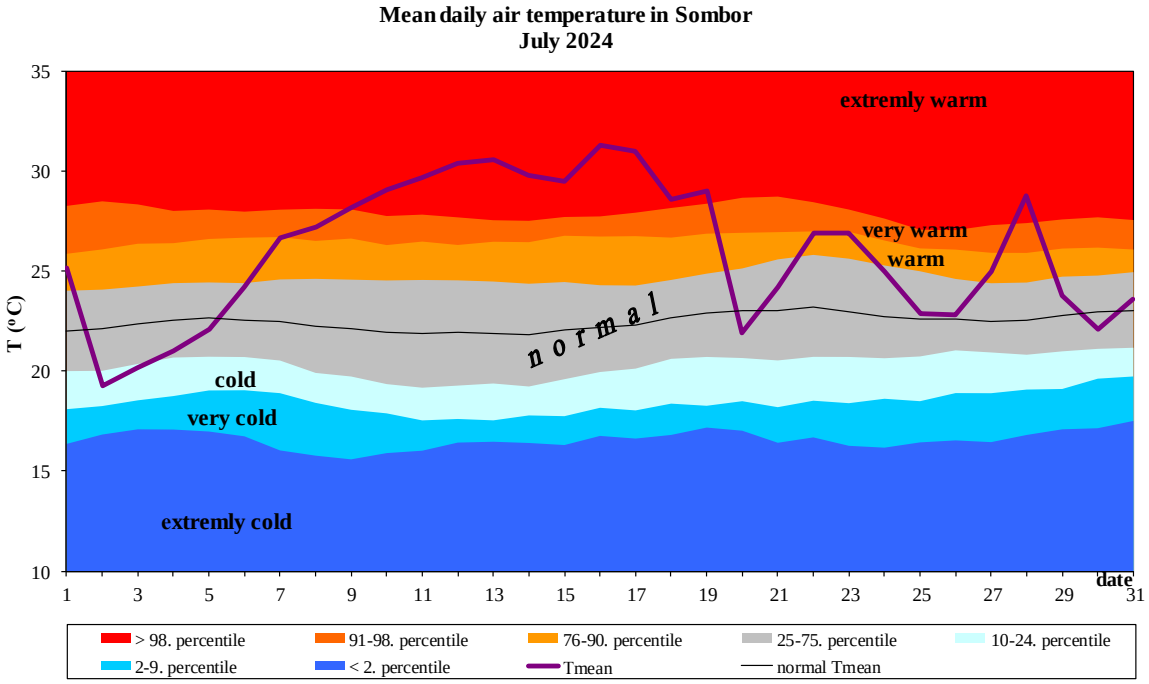


Appendix 6. Rank of the warmest July in Loznica

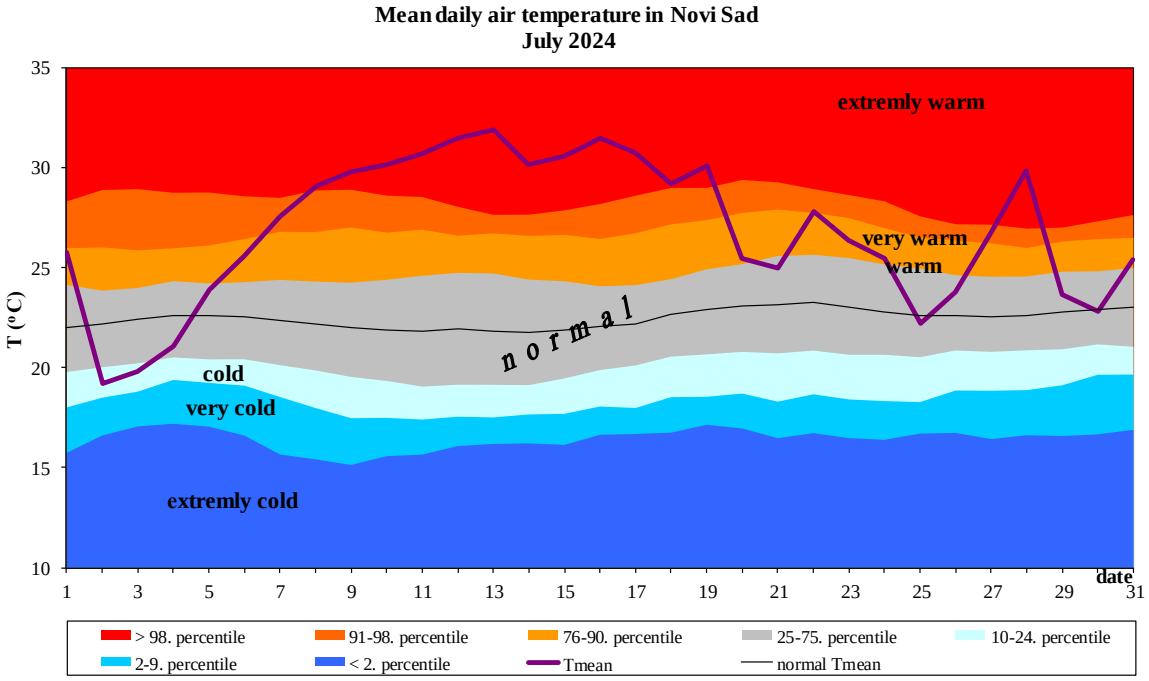


Appendix 7. Rank of the warmest July on Zlatibor

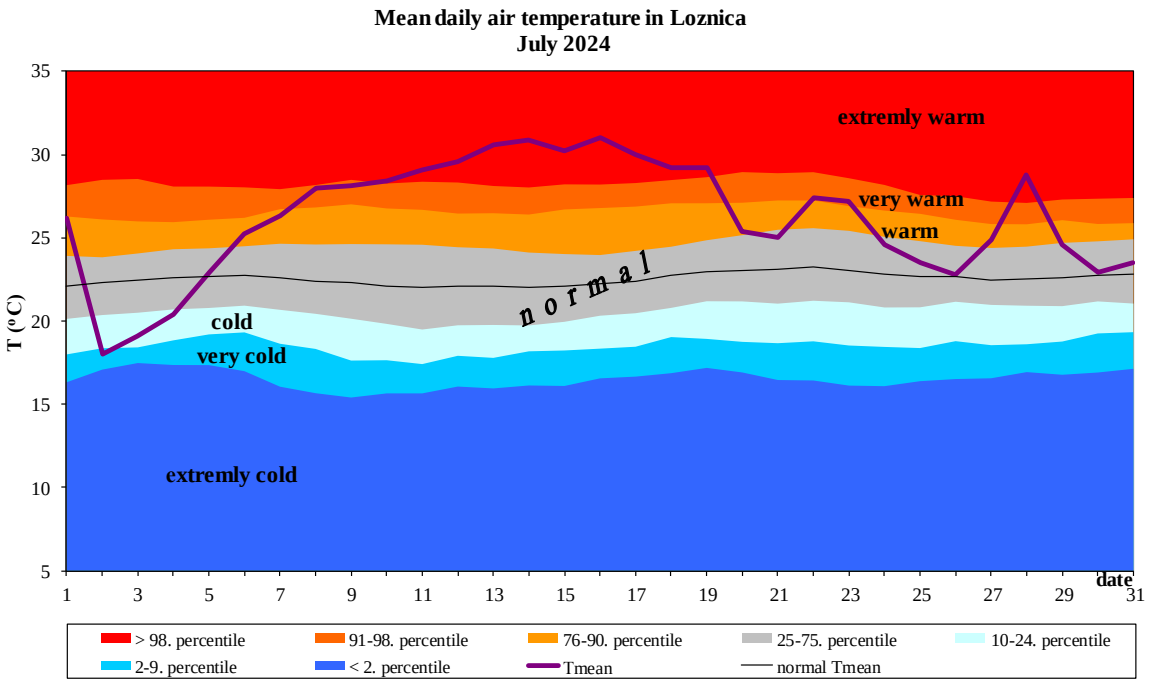
Mean air temperature



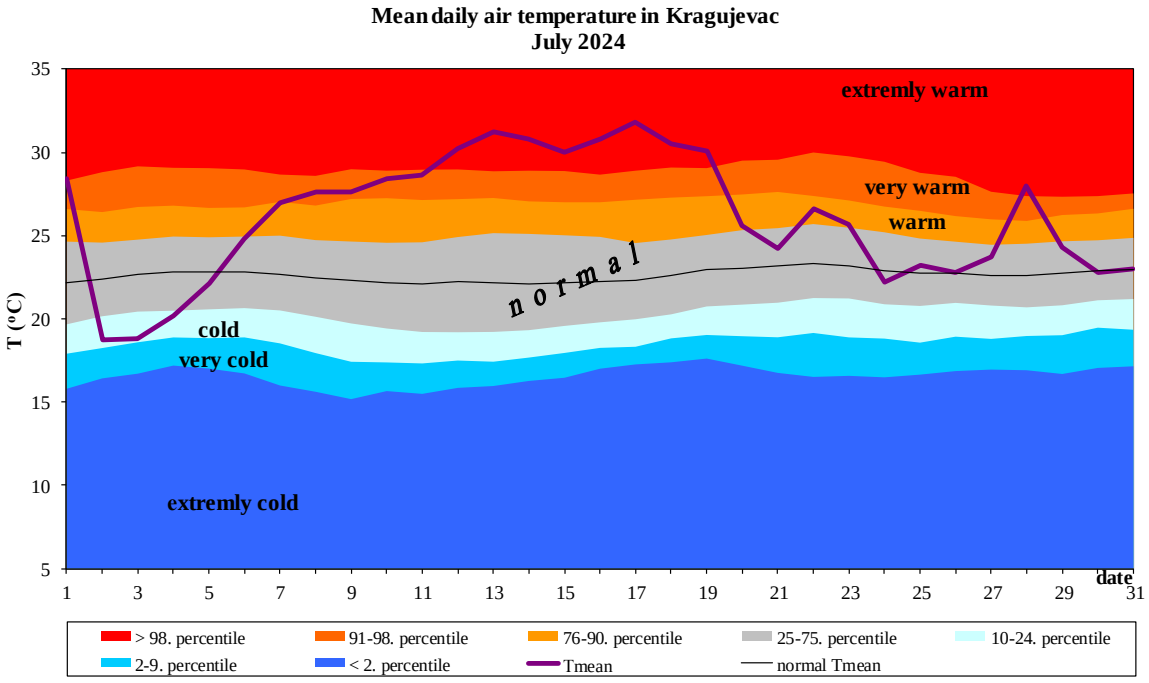
Appendix 8. Daily course of the mean daily air temperature and accompanying percentile for Sombor



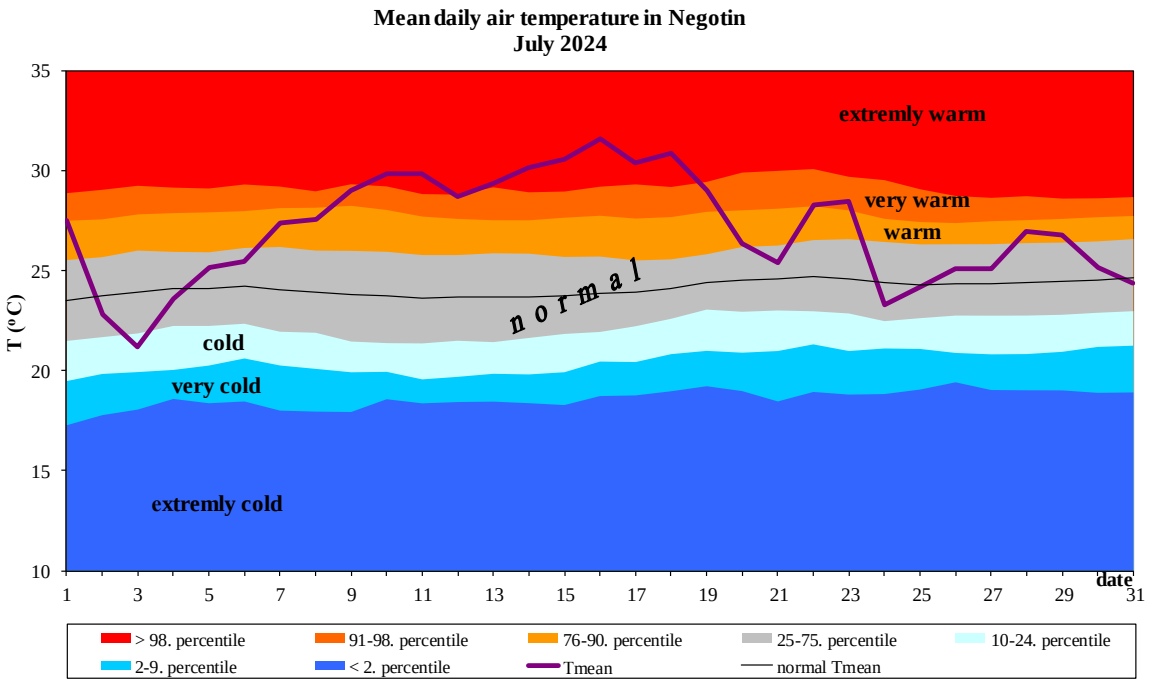
Appendix 9. Daily course of the mean daily air temperature and accompanying percentile for Novi Sad



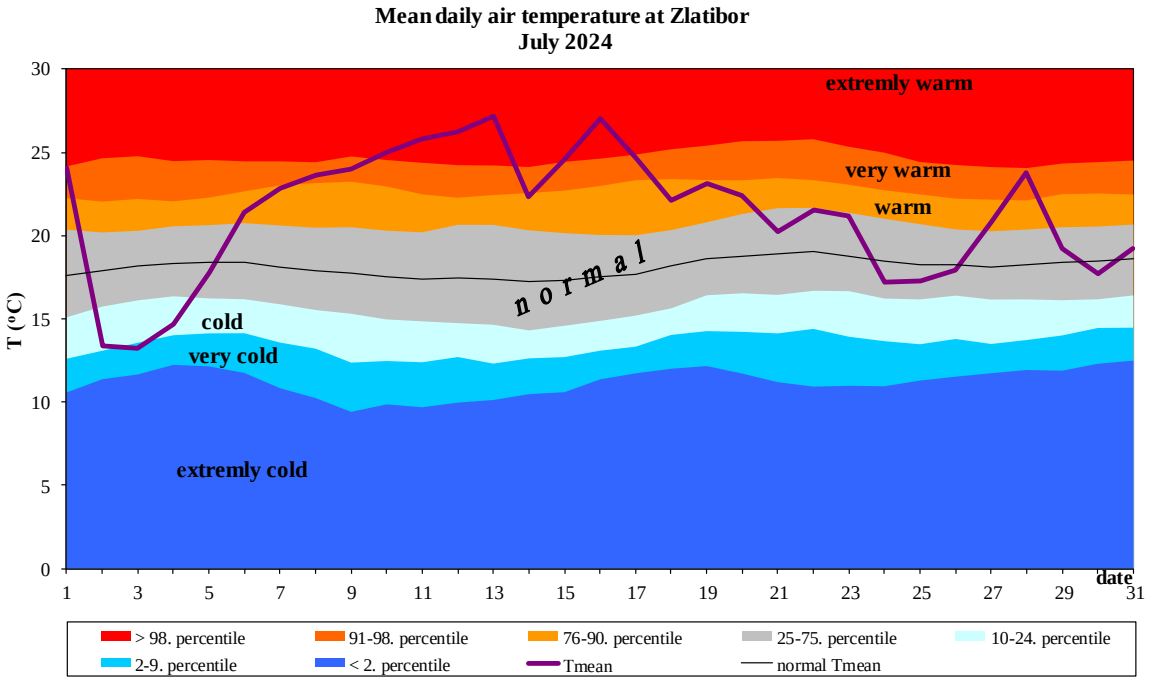
Appendix 10. Daily course of the mean daily air temperature and accompanying percentile for Loznica



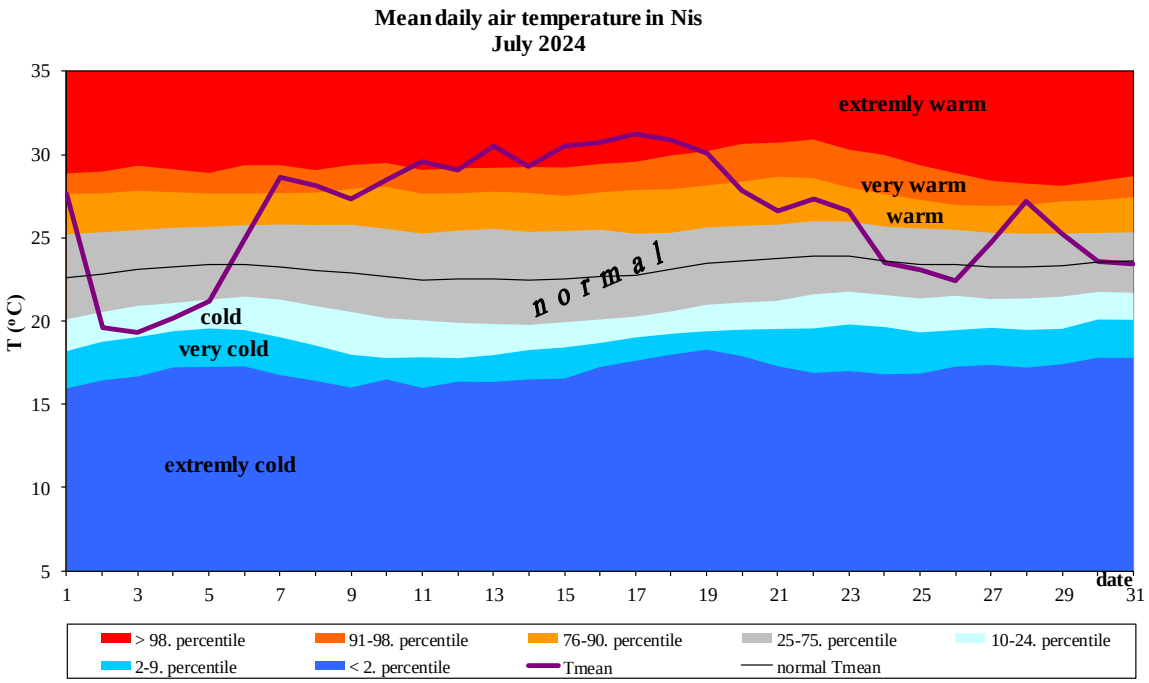
Appendix 11. Daily course of the mean daily air temperature and accompanying percentile for Kragujevac



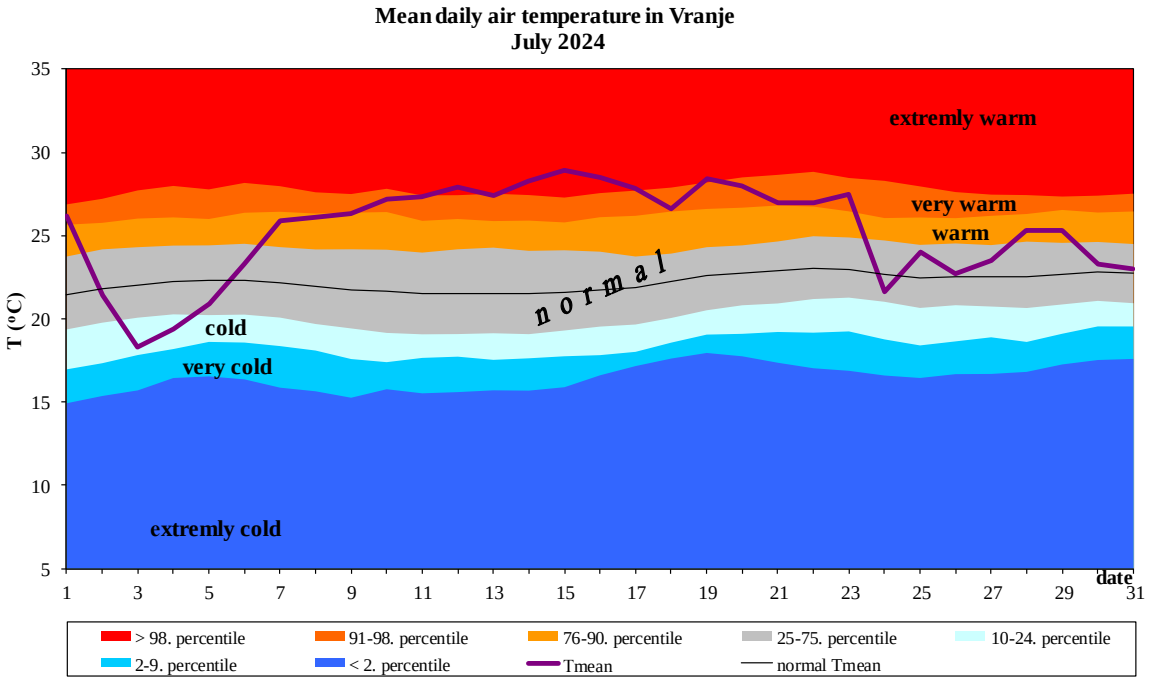
Appendix 12. Daily course of the mean daily air temperature and accompanying percentile for Negotin



Appendix 13. Daily course of the mean daily air temperature and accompanying percentile on Zlatiboru

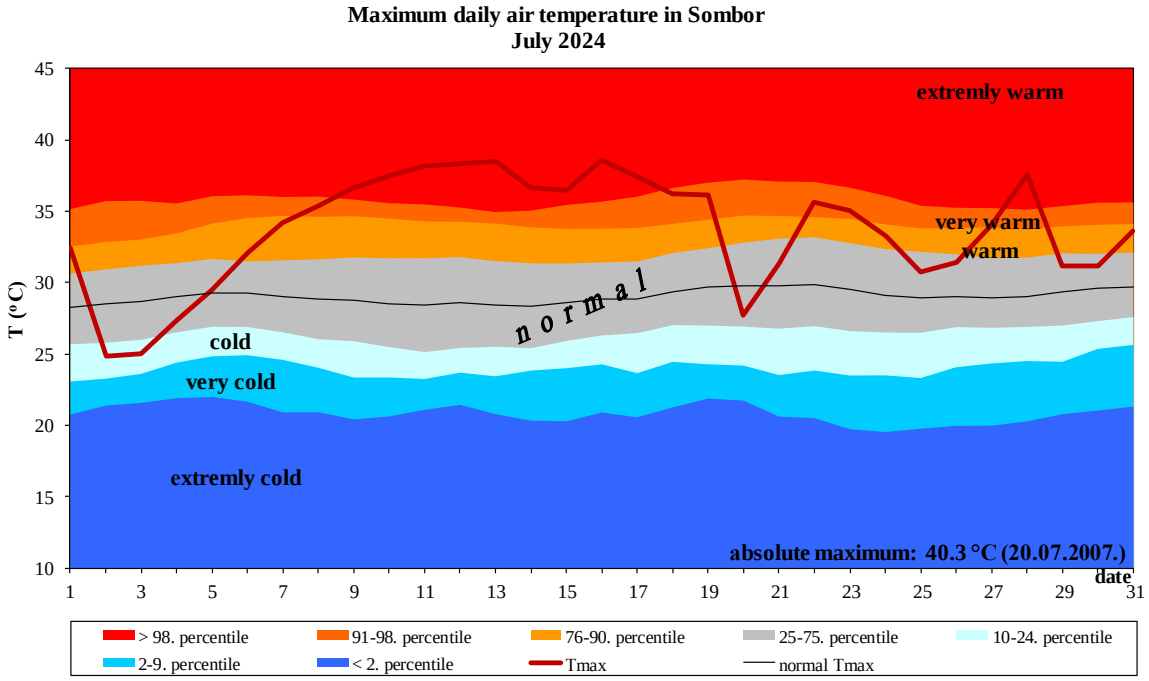


Appendix 14. Daily course of the mean daily air temperature and accompanying percentile for Nis

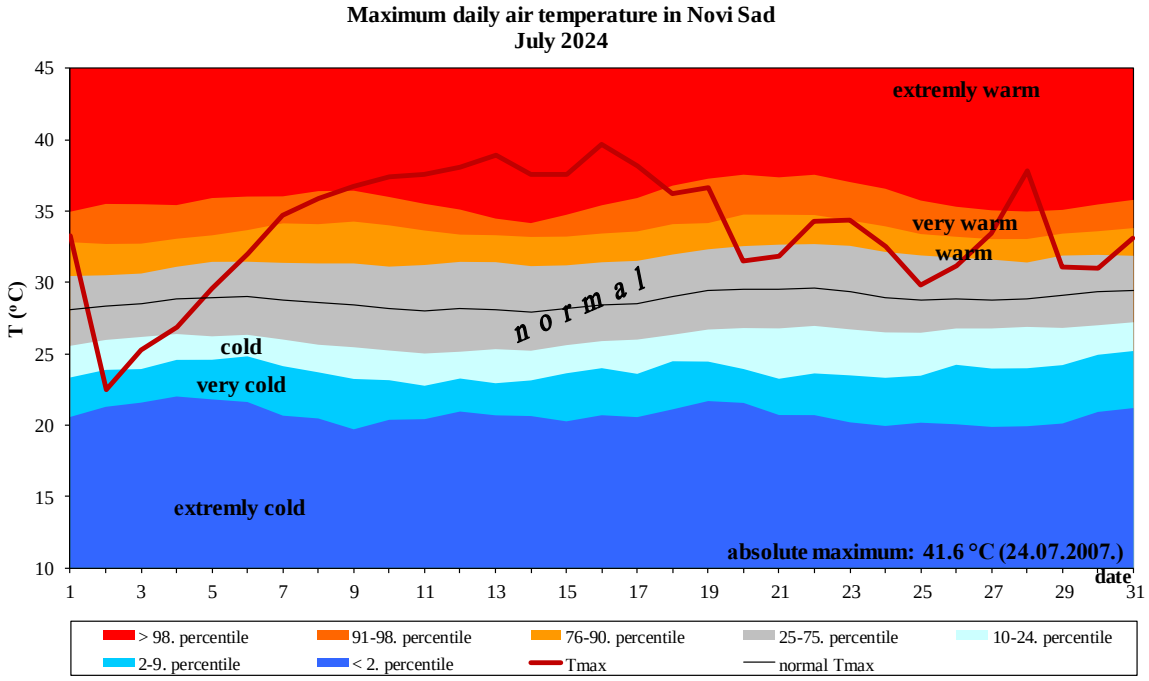


Appendix 15. Daily course of the mean daily air temperature and accompanying percentile for Vranje

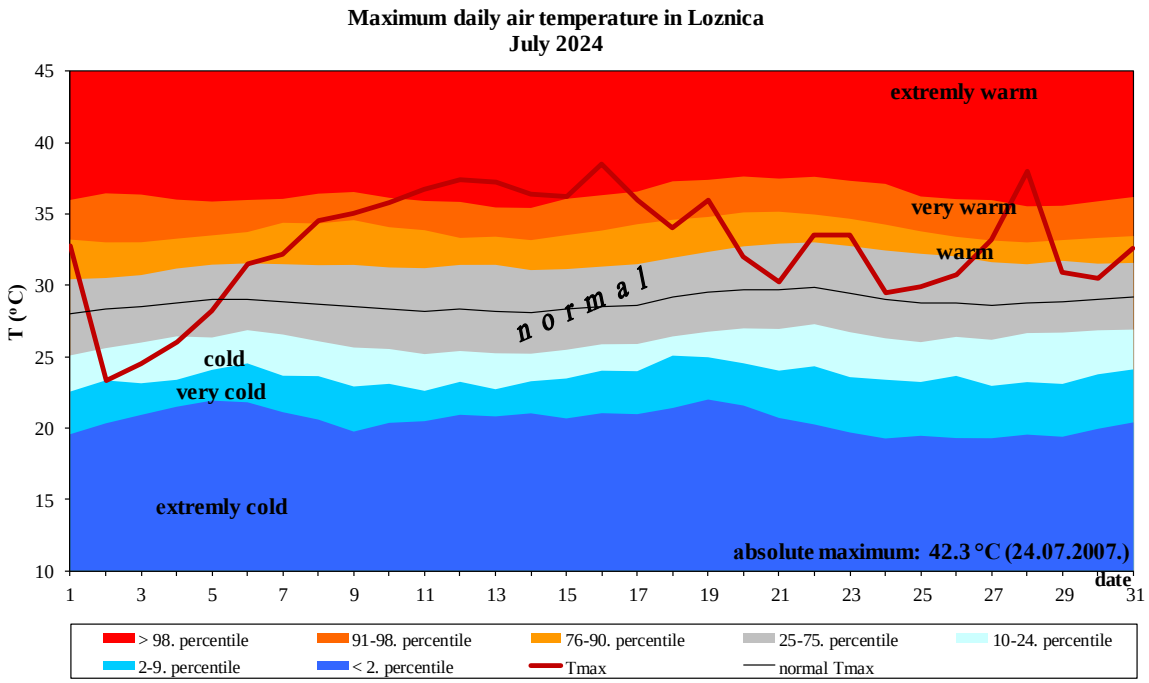
Maximum air temperature



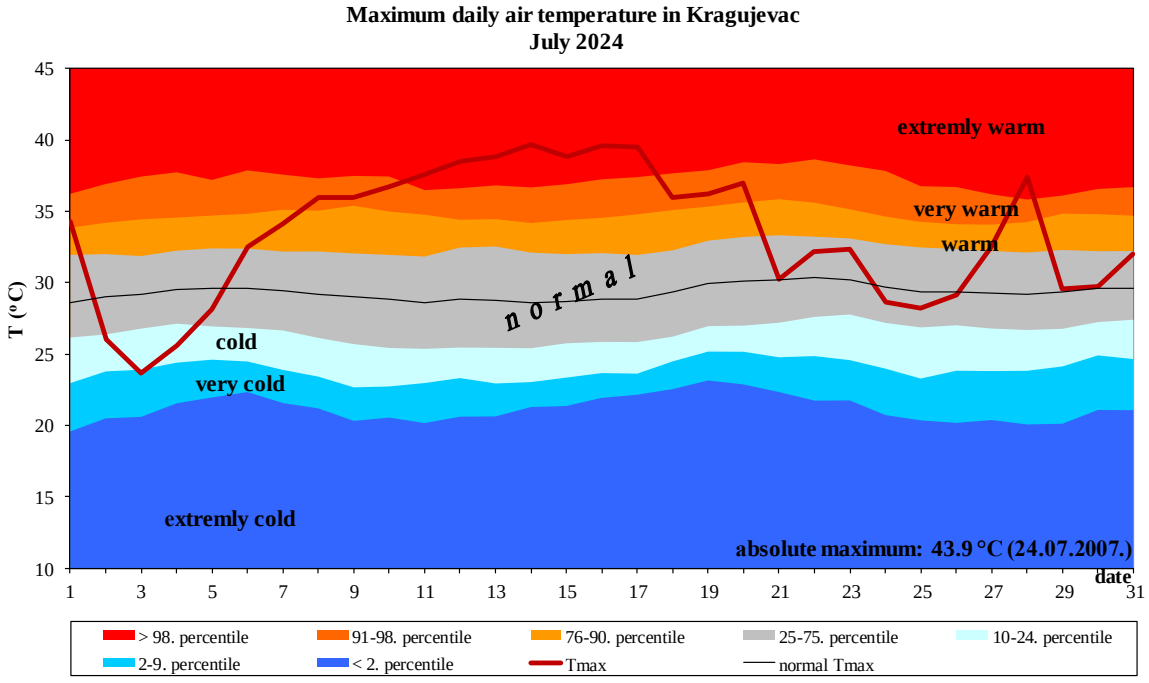
Appendix 16. Daily course of the maximum daily air temeperature and the accompanying percentile for Sombor



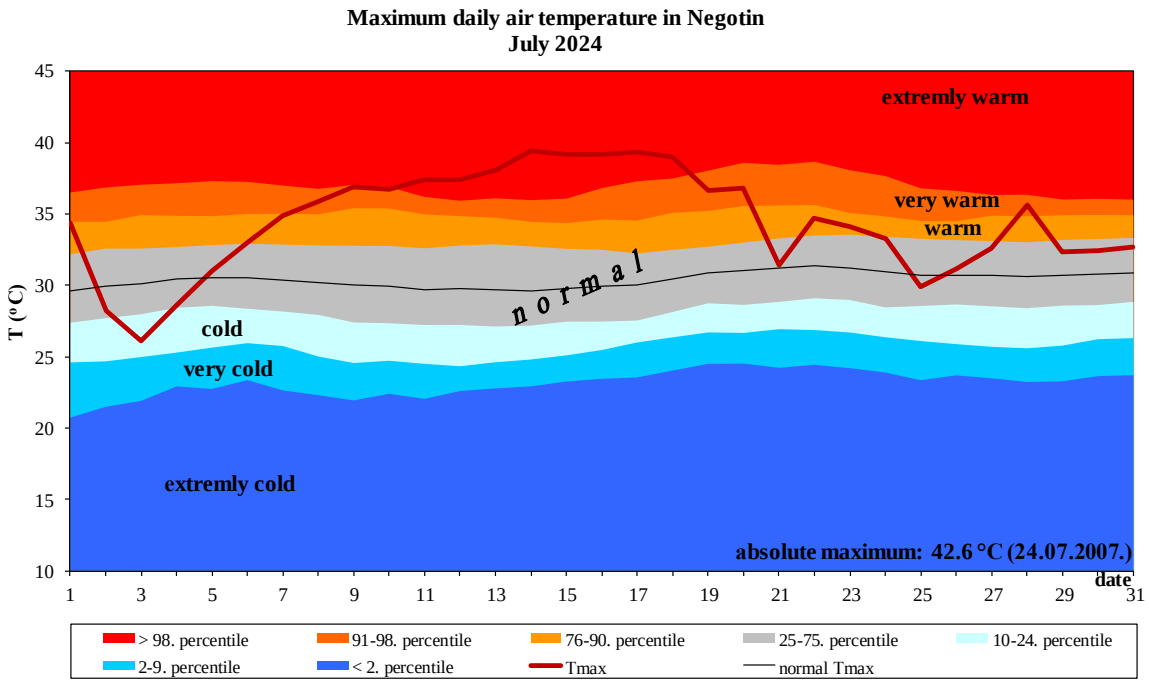
Appendix 17. Daily course of the maximum daily air temeperature and the accompanying percentile for Novi Sad



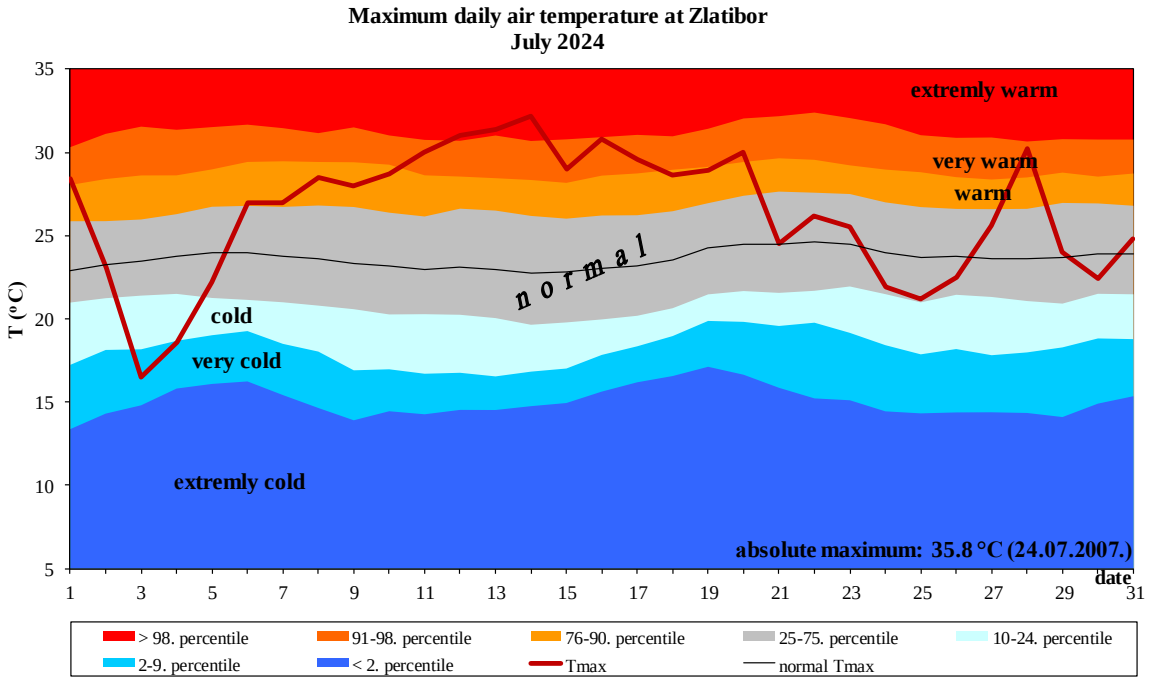
Appendix 18. Daily course of the maximum daily air temeperature and the accompanying percentile for Loznica



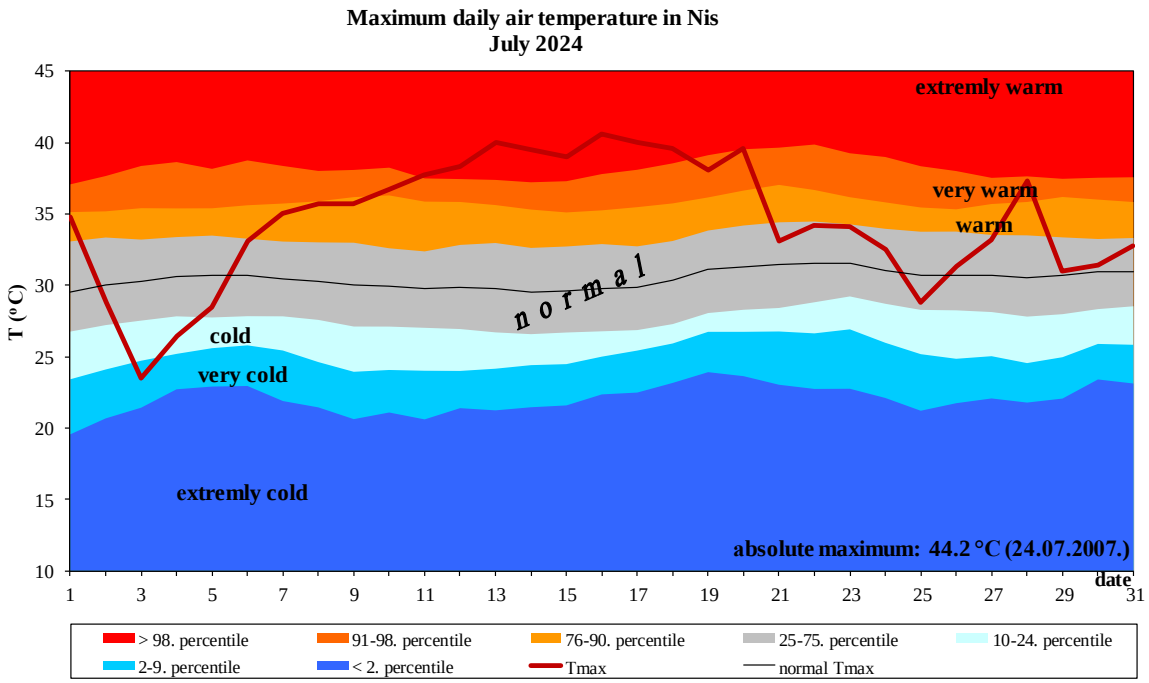
Appendix 19. Daily course of the maximum daily air temeperature and the accompanying percentile for Kragujevac



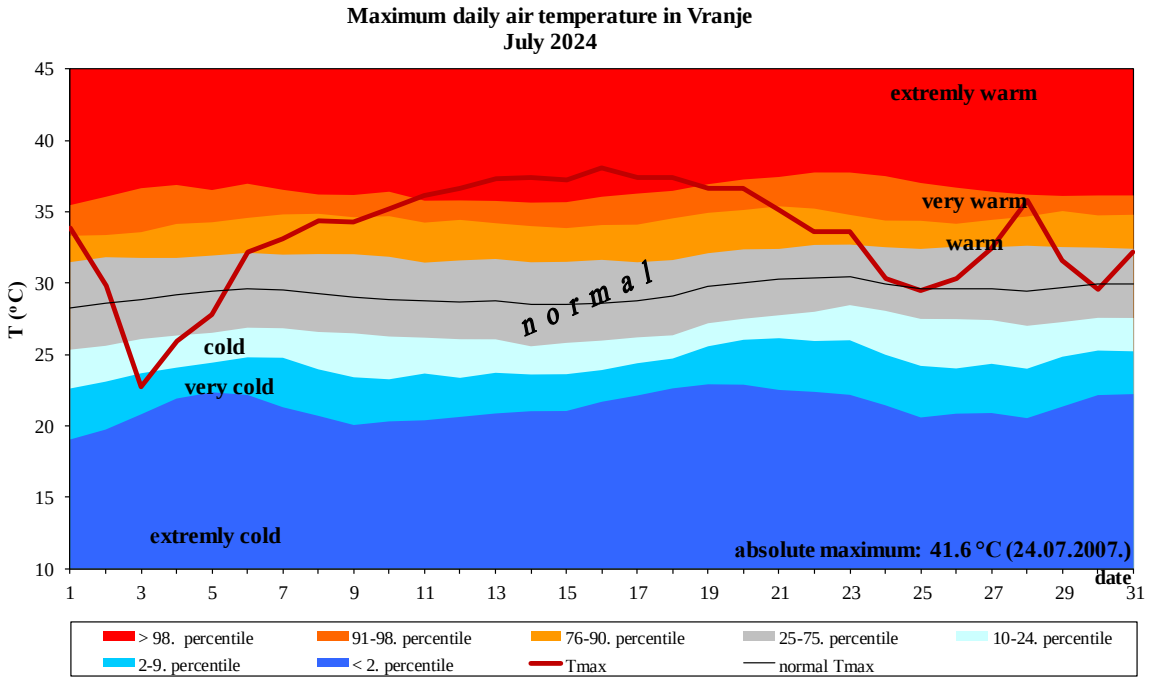
Appendix 20. Daily course of the maximum daily air temeperature and the accompanying percentile for Negotin



Appendix 21. Daily course of the maximum daily air temeperature and the accompanying percentile on Zlatibor

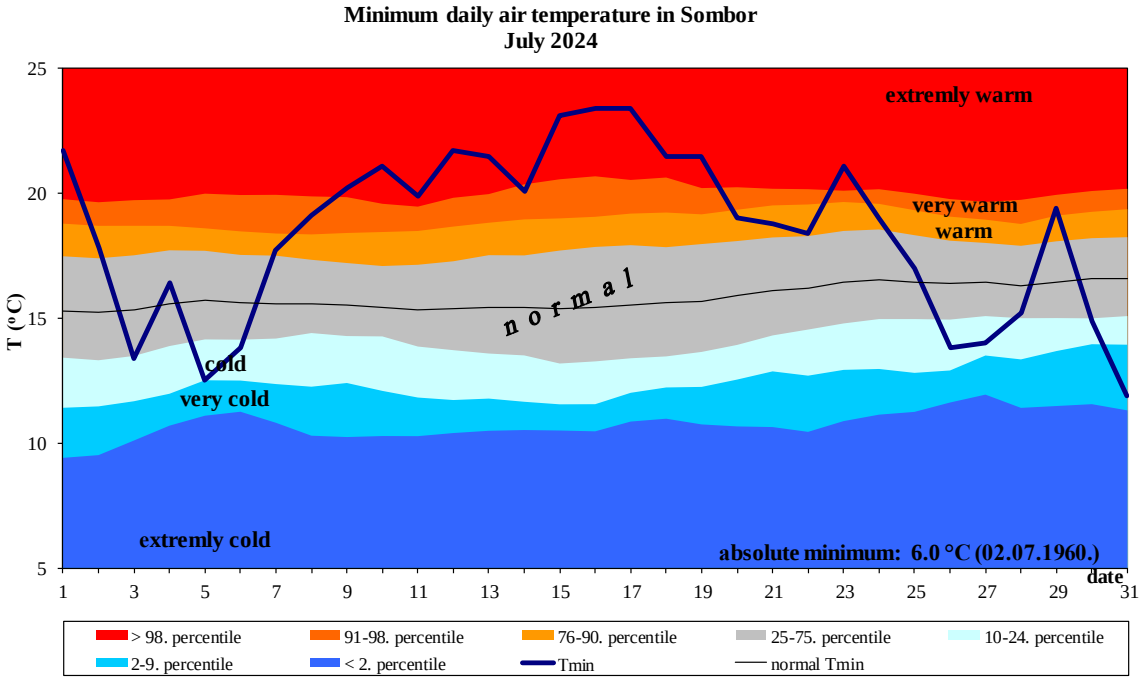


Appendix 22. Daily course of the maximum daily air temeperature and the accompanying percentile for Nis

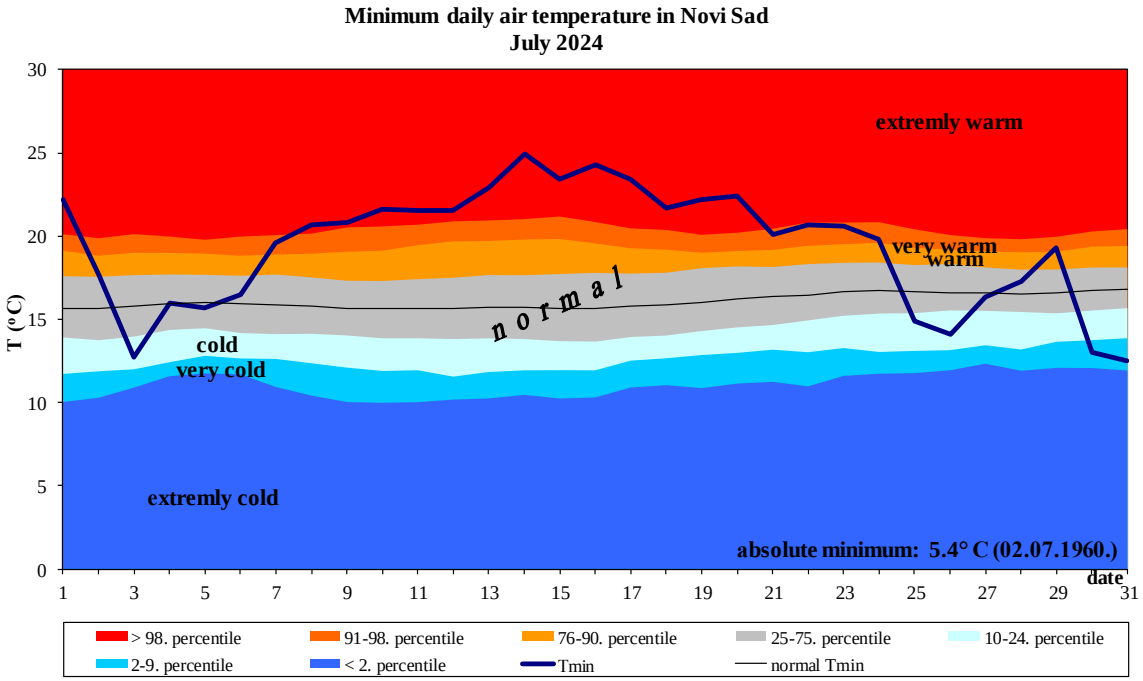


Appendix 23. Daily course of the maximum daily air temeperature and the accompanying percentile for Vranje

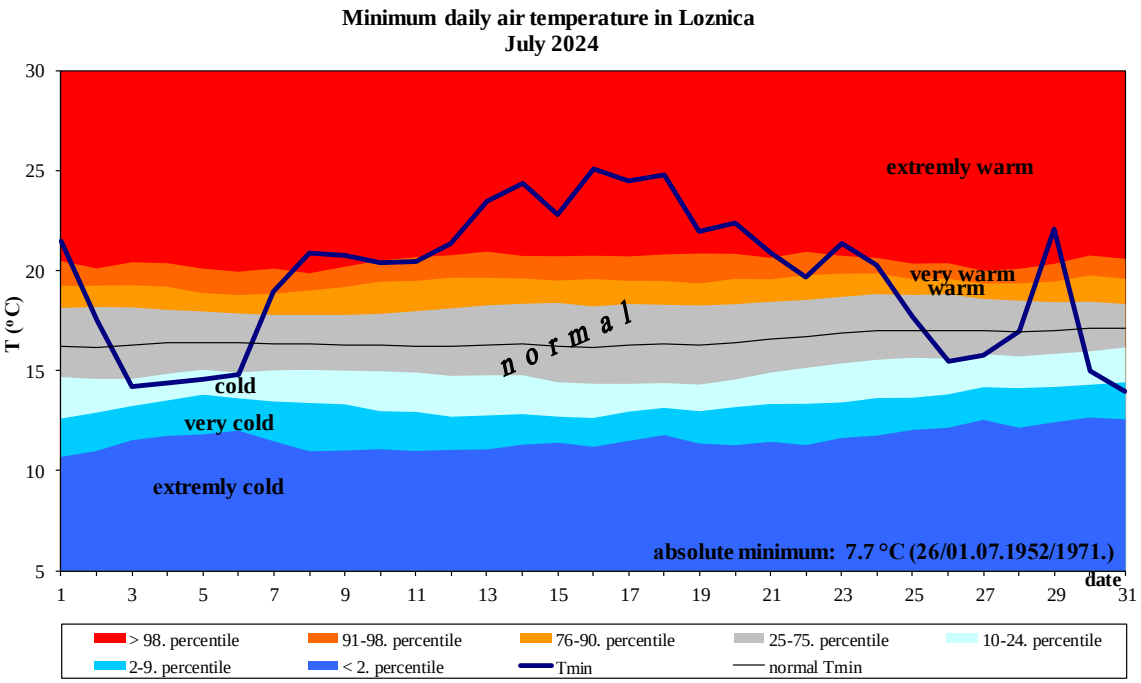
Minimum air temperature



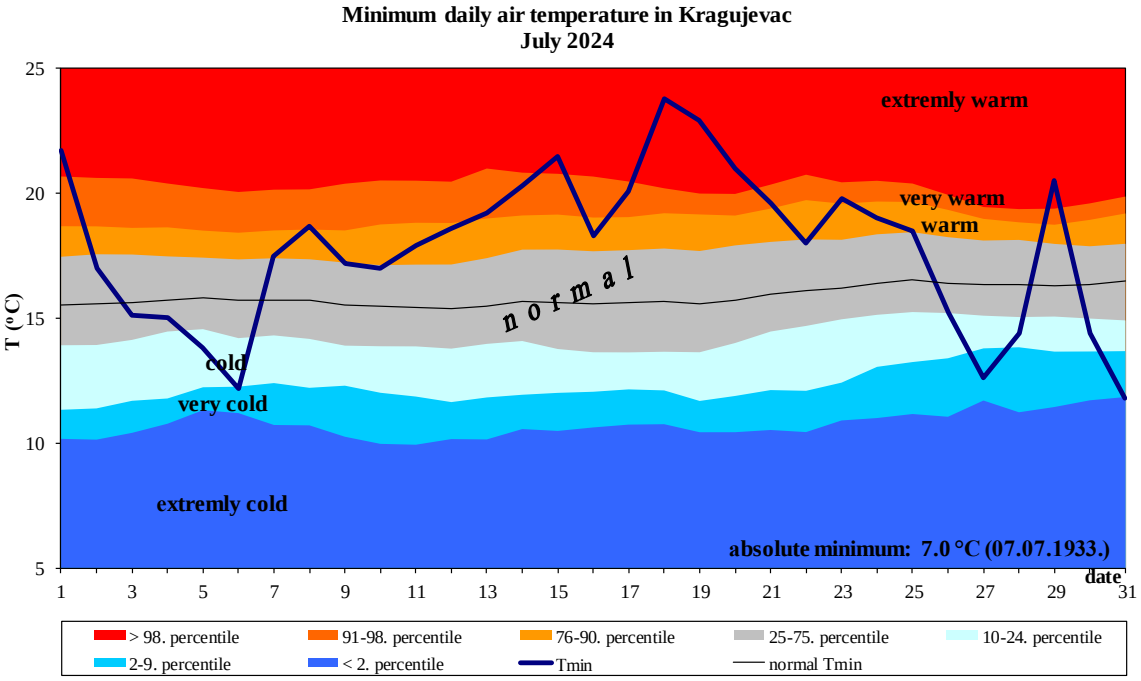
Appendix 24. Daily course of the minimum daily air temperature and the accompanying percentile for Sombor



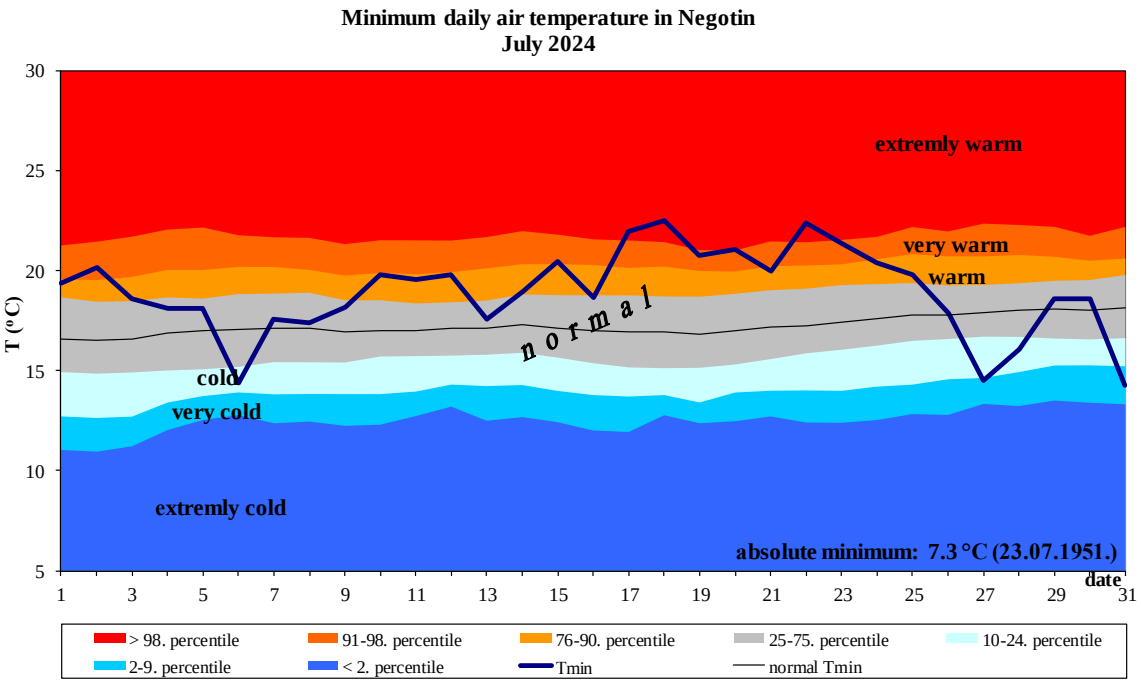
Appendix 25. Daily course of the minimum daily air temperature and the accompanying percentile for Novi Sad



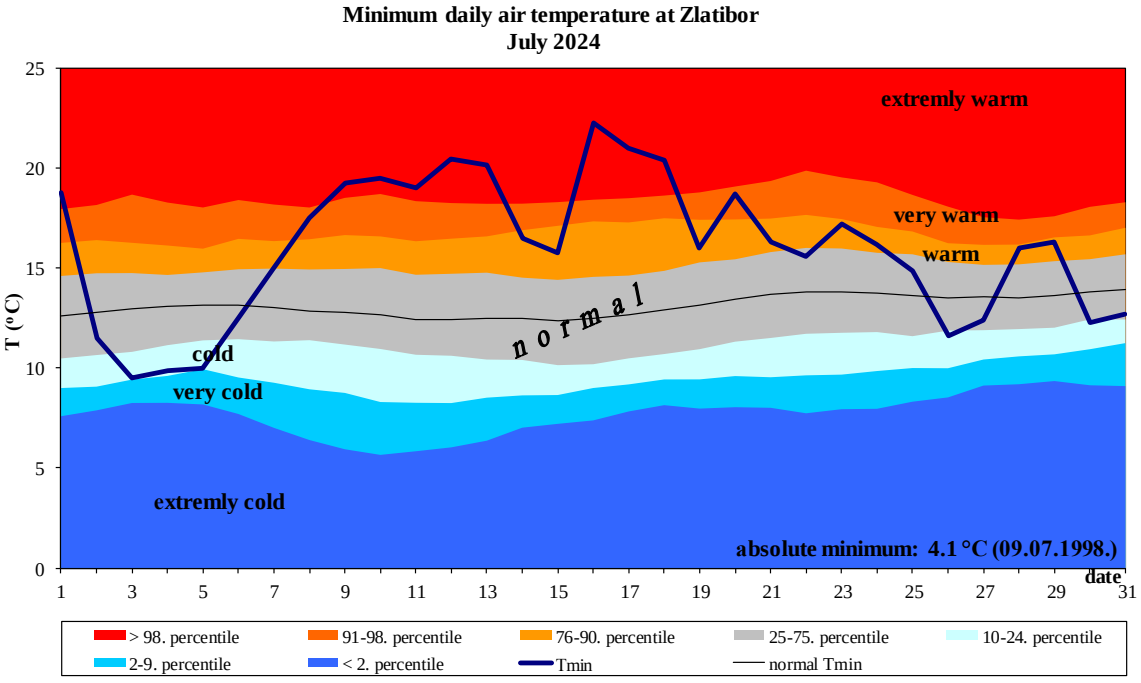
Appendix 26. Daily course of the minimum daily air temperature and the accompanying percentile for Loznica



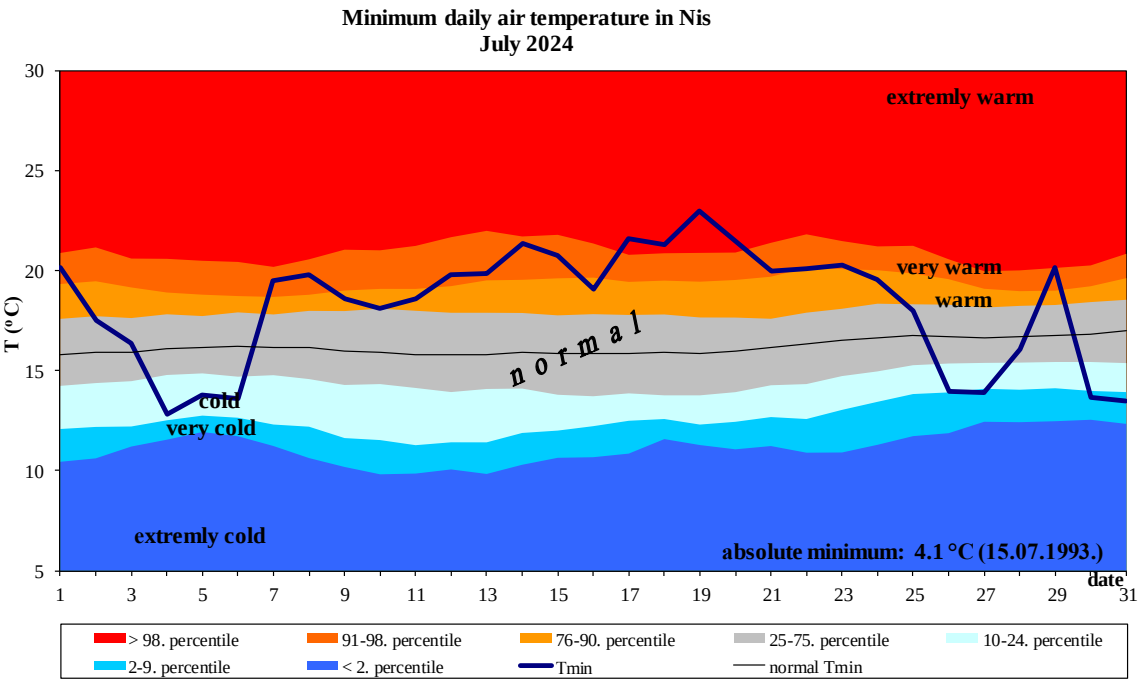
Appendix 27. Daily course of the minimum daily air temperature and the accompanying percentile for Kragujevac



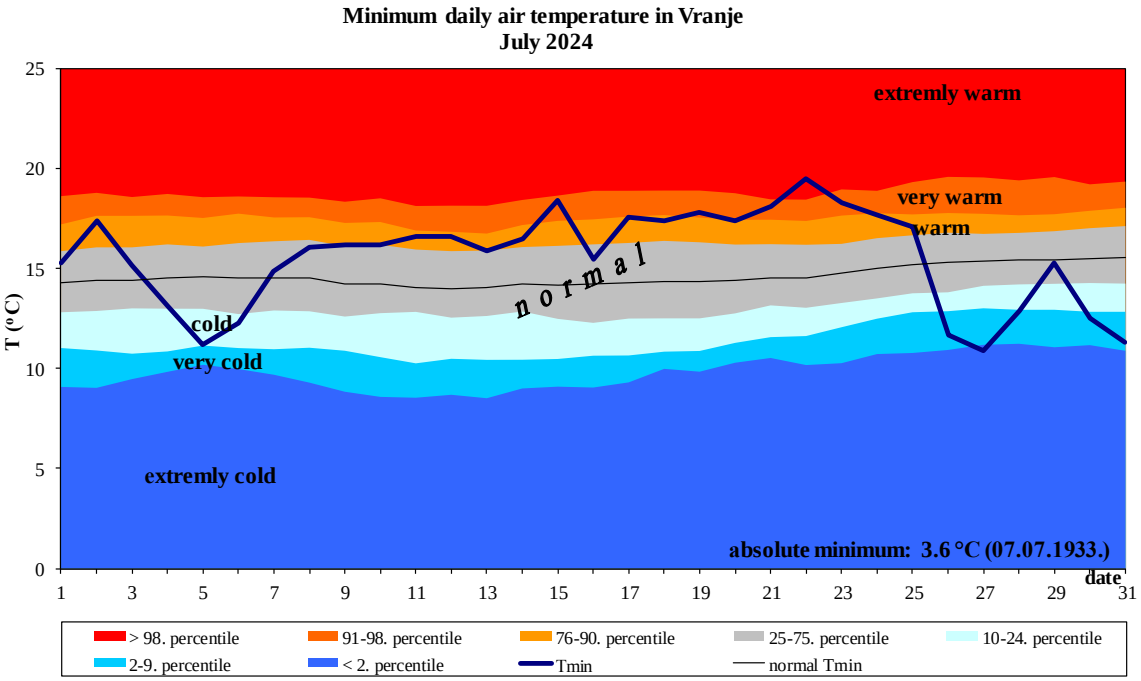
Appendix 28. Daily course of the minimum daily air temperature and the accompanying percentile for Negotin



Appendix 29. Daily course of the minimum daily air temperature and the accompanying percentile on Zlatibor

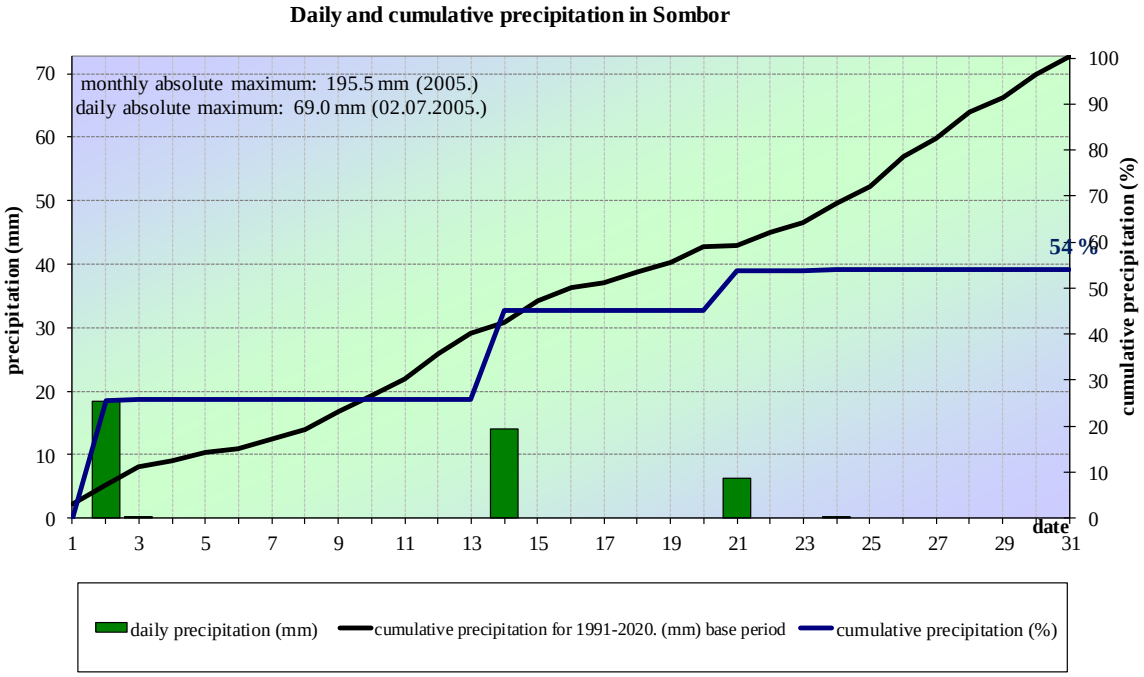


Appendix 30. Daily course of the minimum daily air temperature and the accompanying percentile for Nis

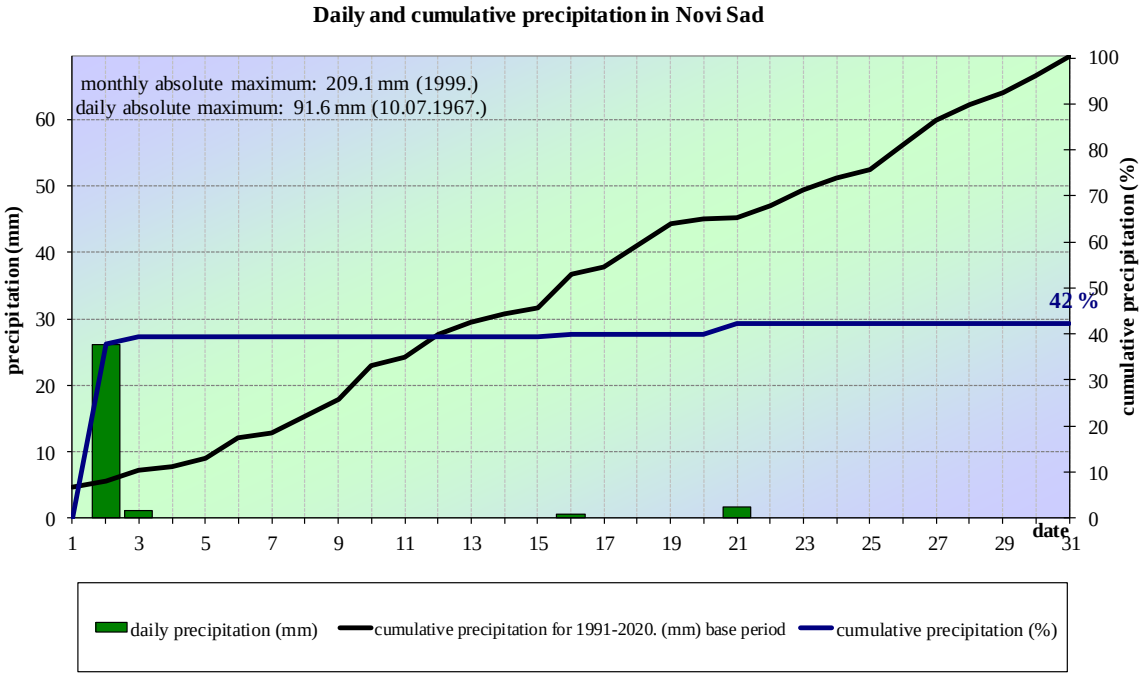


Appendix 31. Daily course of the minimum daily air temperature and the accompanying percentile for Vranje

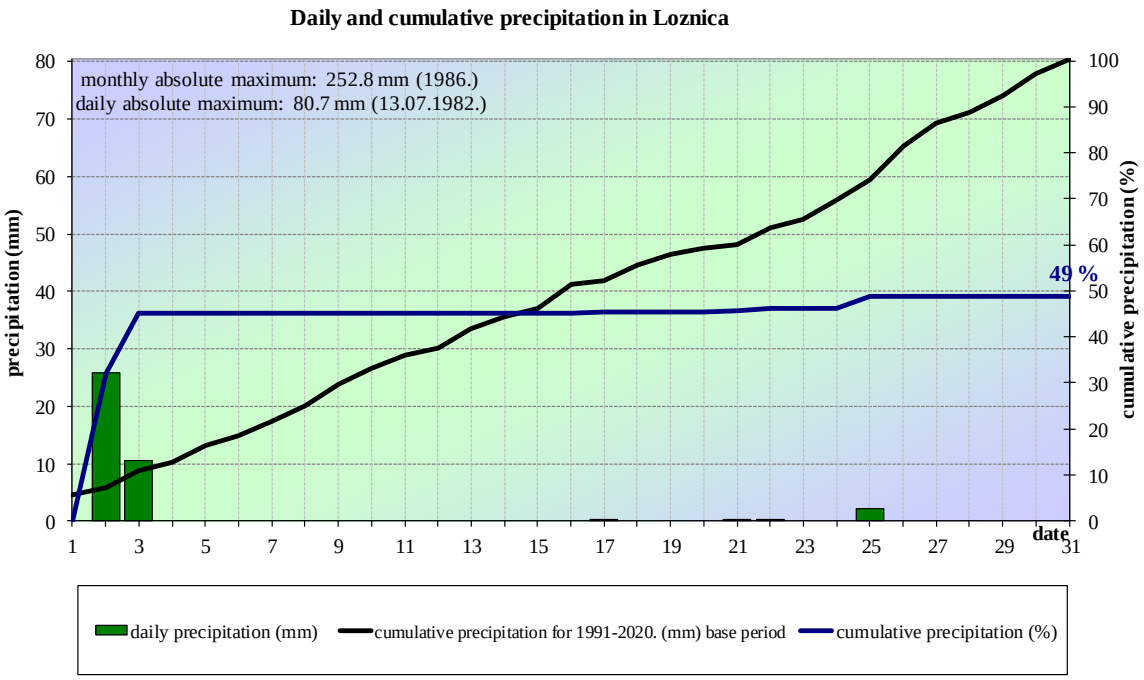
Precipitation



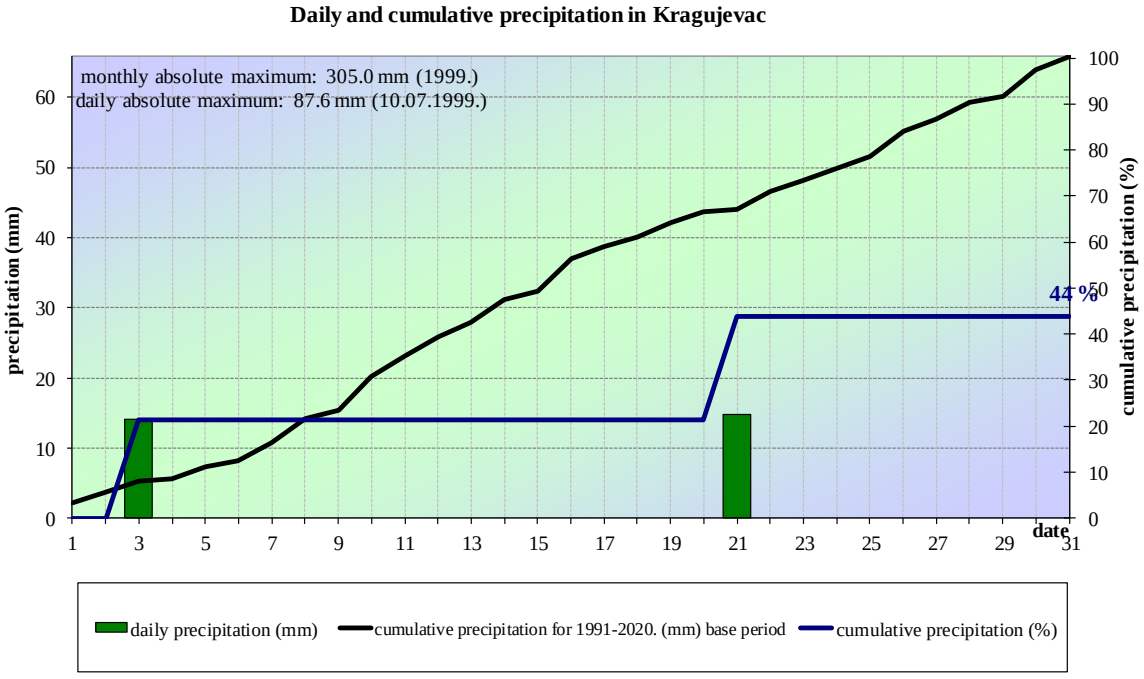
Appendix 32. Daily and cumulative precipitation sums for Sombor



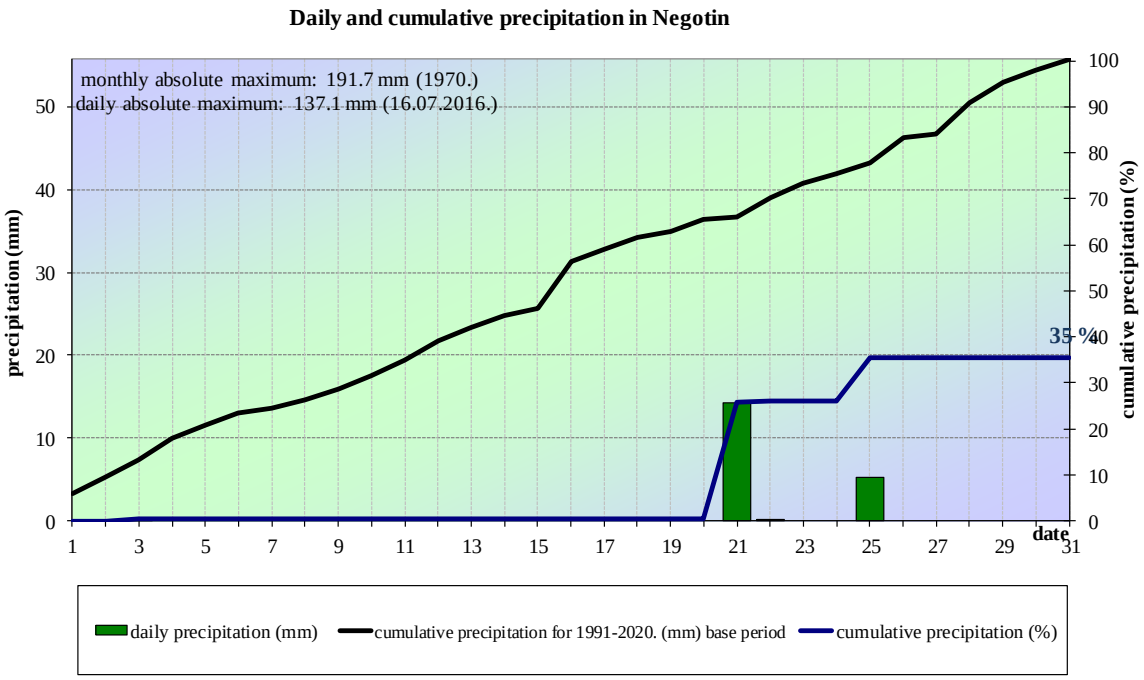
Appendix 33. Daily and cumulative precipitation sums for Novi Sad



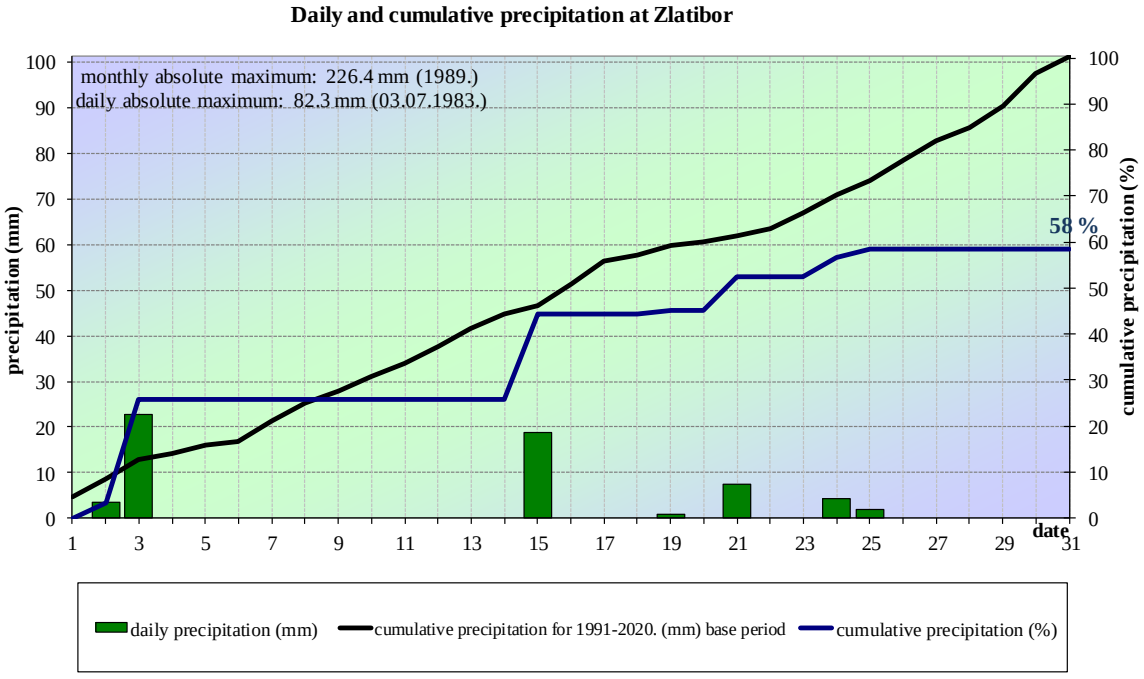
Appendix 34. Daily and cumulative precipitation sums for Loznica



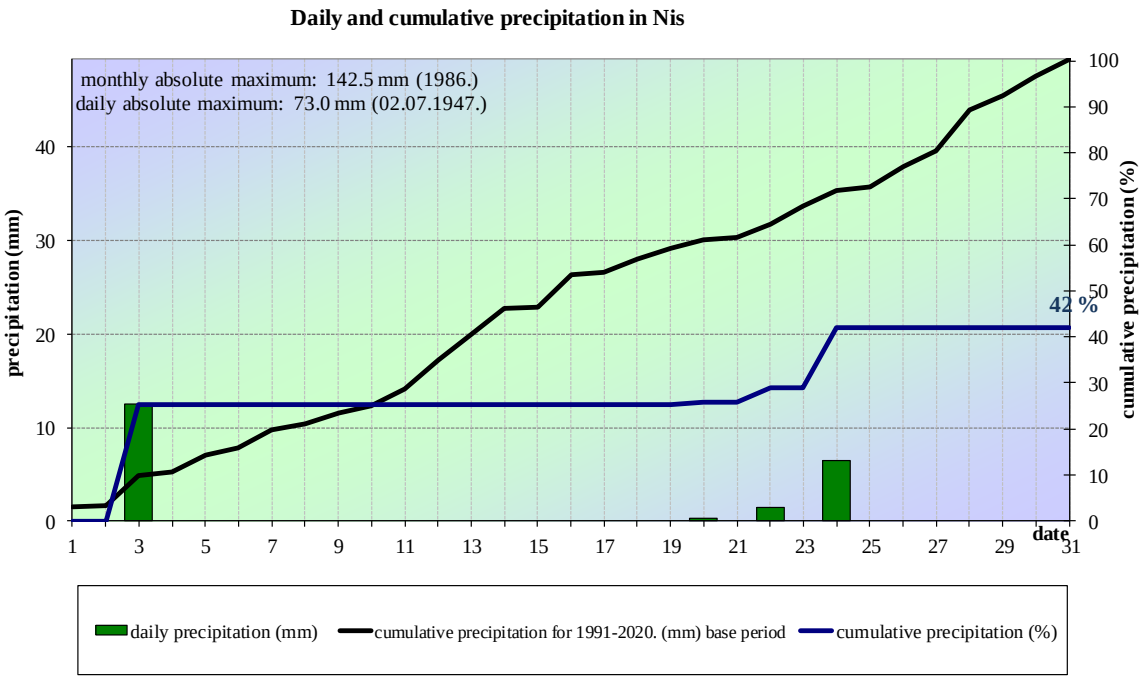
Appendix 35. Daily and cumulative precipitation sums for Kragujevac



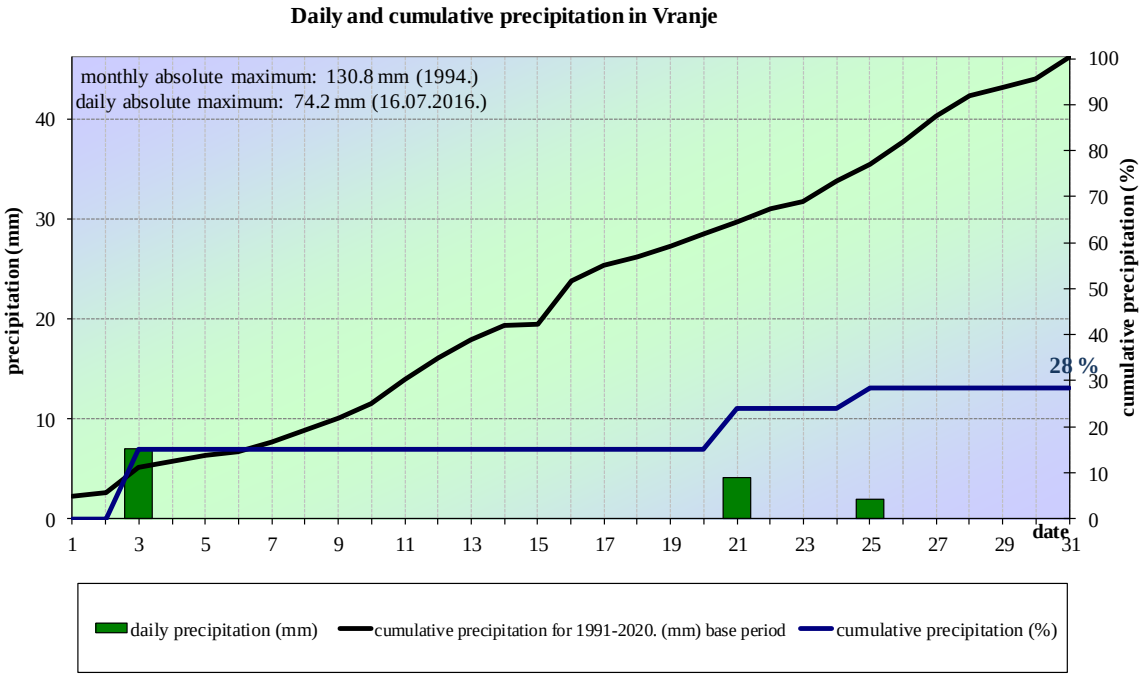
Appendix 36. Daily and cumulative precipitation sums for Negotin



Appendix 37. Daily and cumulative precipitation sums on Zlatibor



Appendix 38. Daily and cumulative precipitation sums for Nis



Appendix 39. Daily and cumulative precipitation sums for Vranje