

Republic Hydrometeorological Service of Serbia

Kneza Viseslava 66
11000 Belgrade
Republic of Serbia



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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

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- ❖ *Very cold (ranks as the 13th coldest) and 6th wettest April for Serbia*
- ❖ *April ranks as the 4th coldest April for Banatski Karlovac, 8th coldest for Crni Vrh and 9th coldest for Sjenica*
- ❖ *April ranks as the 2nd wettest for Kopaonik, 3rd wettest for Zlatibor, 7th wettest for Banatski Karlovac, and 9th wettest for Negotin*
- ❖ *Belgrade and Smederevska Palanka observed record-breaking snow depth*
- ❖ *Zrenjanin and Krusevac observed record-breaking number of days with snow cover*
- ❖ *At Zlatibor, maximum number of cloudy days was exceeded*
- ❖ *At Kopaonik, minimum number of insolation hours was surpassed*

AIR TEMPERATURE

Mean monthly air temperature

Mean April air temperature ranged from 8,7°C in Dimitrovgrad to 11,5°C in Negotin and on the mountains from 0,2°C at Kopaonik to 5,3°C at Zlatibor. Belgrade observed mean April air temperature of 11,2°C (*Figure 1*).

Departure of the mean monthly air temperature from the normal¹ for the 1991-2020 base period ranged from -2,5°C in Banatski Karlovac, Sjenica and Zlatibor to -1,3°C in Negotin (*Figure 2*).

Mean April air temperature, based on the percentile method², was in the very cold category in most of the country and cold category in Valjevo and Negotin (*Figure 3*).

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

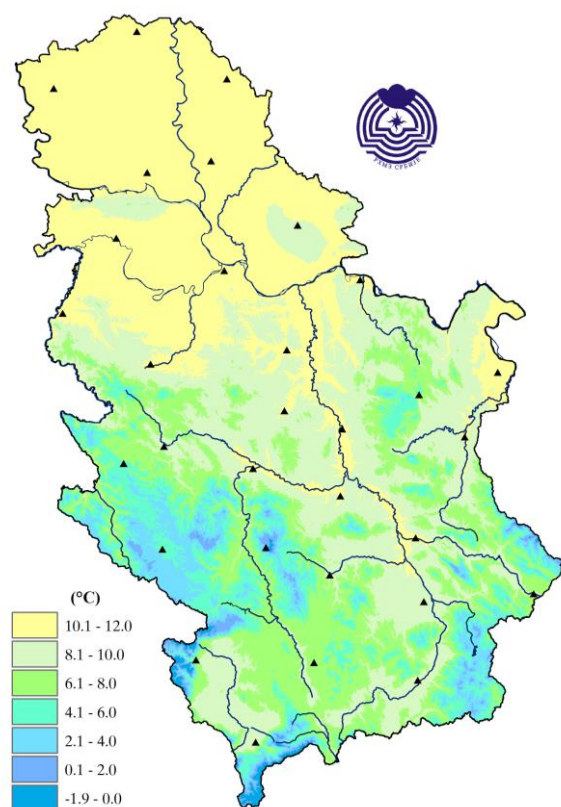


Figure 1. Spatial distribution of mean monthly air temperature (°C)

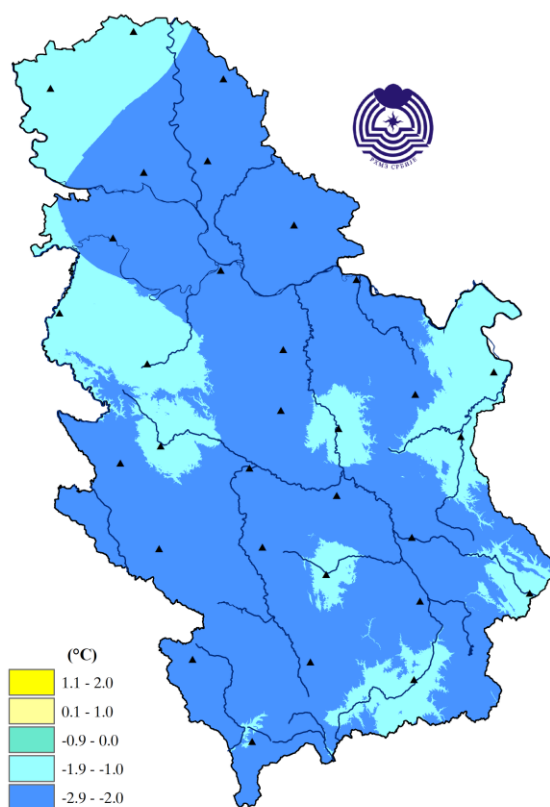


Figure 2. Spatial distribution of mean monthly air temperature anomaly (°C)

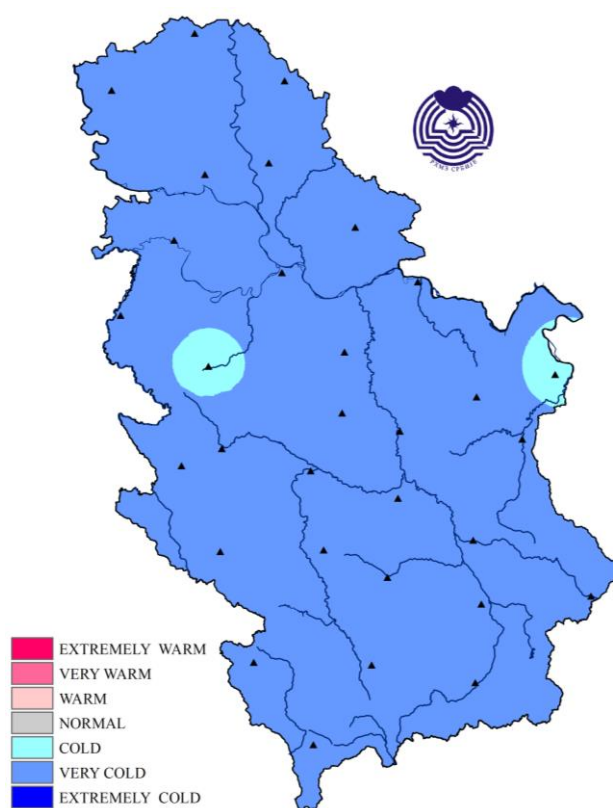


Figure 3. Spatial distribution of the mean monthly air temperature using percentile method

April 2023 ranks as the 4th coldest for Banatski Karlovac since 1986, 13th coldest for Serbia since 1951 (*Figure 4*), 8th coldest for Crni Vrh (1967-2022), and 9th coldest for Sjenica (1947-2022).

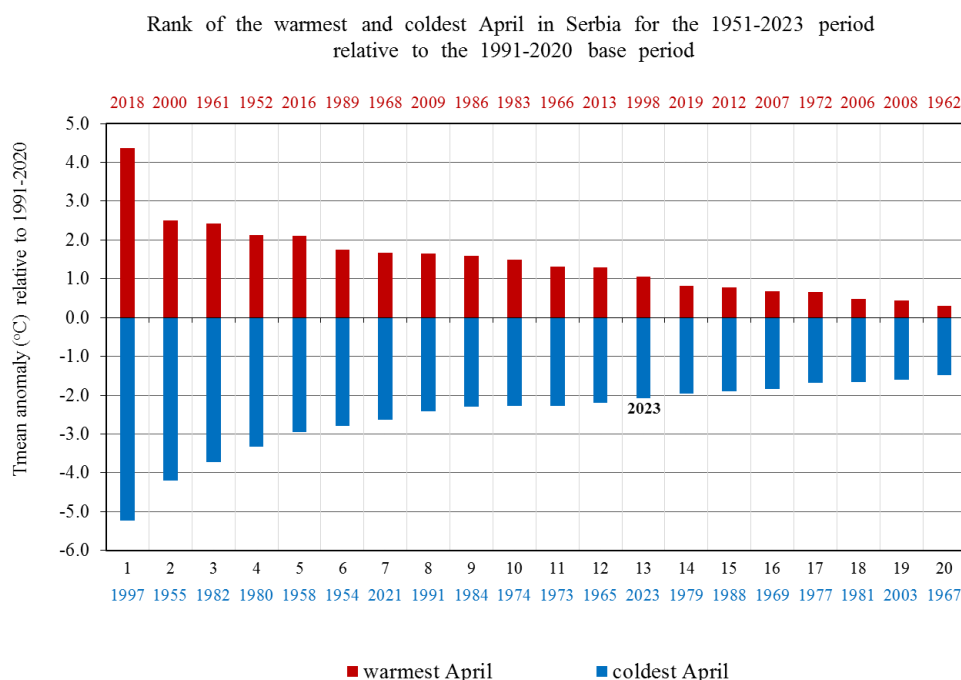


Figure 4. Rank of the warmest and coldest April for Serbia

Mean daily air temperature in Belgrade, based on the percentile method, was in the categories spanning from cold to extremely cold during most of the first decade of April, and at the end of the month in cold category. At the beginning of the second decade of April it was in the warm category (*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](#).

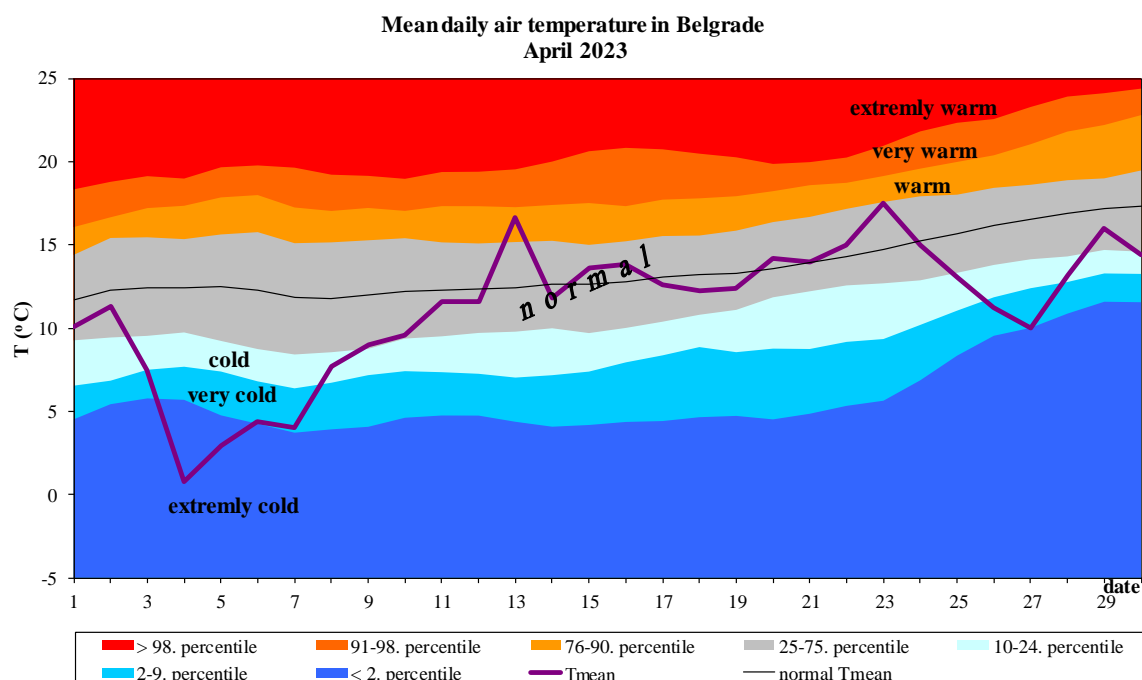


Figure 5. Daily course of the mean daily air temperature and accompanying percentiles for Belgrade

Maximum air temperature

Mean maximum air temperature in April ranged from 14,8°C in Kuršumlija to 16,7°C in Zajecar. Belgrade observed mean maximum air temperature of 16,2°C. On the mountains, mean maximum air temperature ranged from 3,6°C at Kopaonik to 9,6°C in Sjenica.

Based on the percentile method, mean maximum monthly air temperature was in the very cold category in most of the country and cold category in Dimitrovgrad.

The highest maximum daily air temperature of 24,0°C was measured in Valjevo on April 23. On the same day, Belgrade observed 23,1°C.

Number of ice days³ was the following: 6 days at Kopaonik, 3 days at Crni Vrh, 2 days at Zlatibor, 1 day in Sjenica.

During the first decade of April, exceptionally low maximum daily air temperatures were observed, in the period 4-5 April across most of country they were below the average relating to the minimum air temperature (*Figure 6*).

³ Ice day is defined as the day with maximum air temperature lower than 0°C

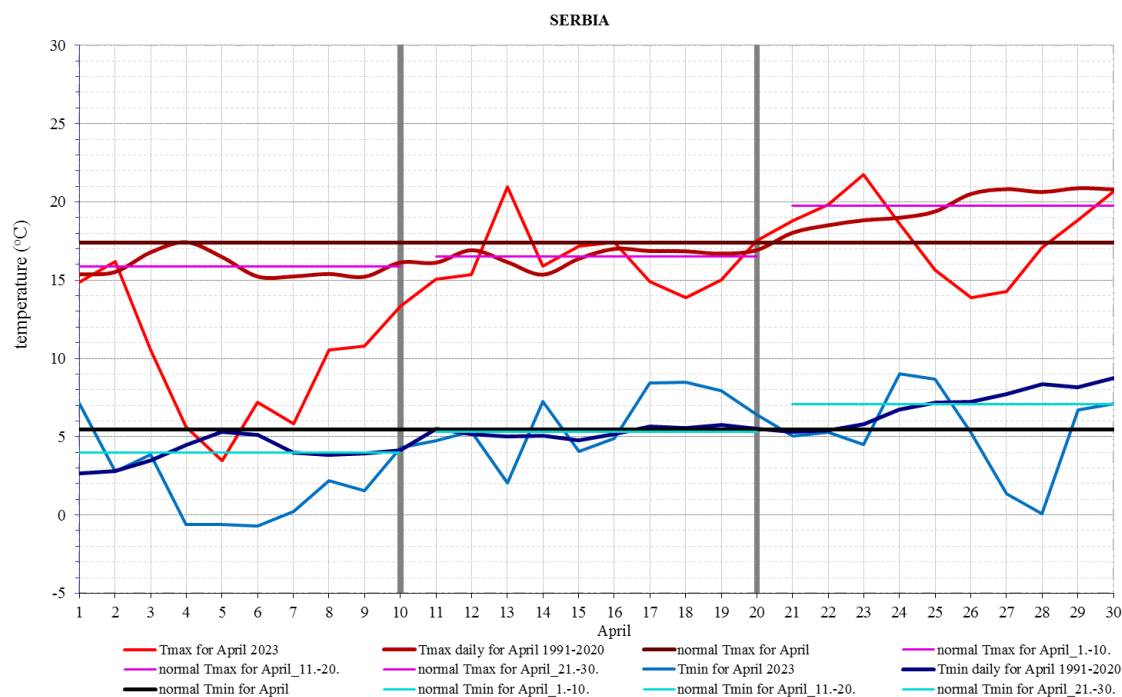


Figure 6. Daily course of the maximum and minimum air temperature in Serbia with their monthly and decadal averages

Figure 7 shows daily course of the maximum daily air temperature and the accompanying percentiles for Belgrade in April 2023 and for the stations Sombor, Novi Sad, Loznica, Negotin, Kragujevac, Zlatibor, Nis and Vranje are given in the [Appendix](#).

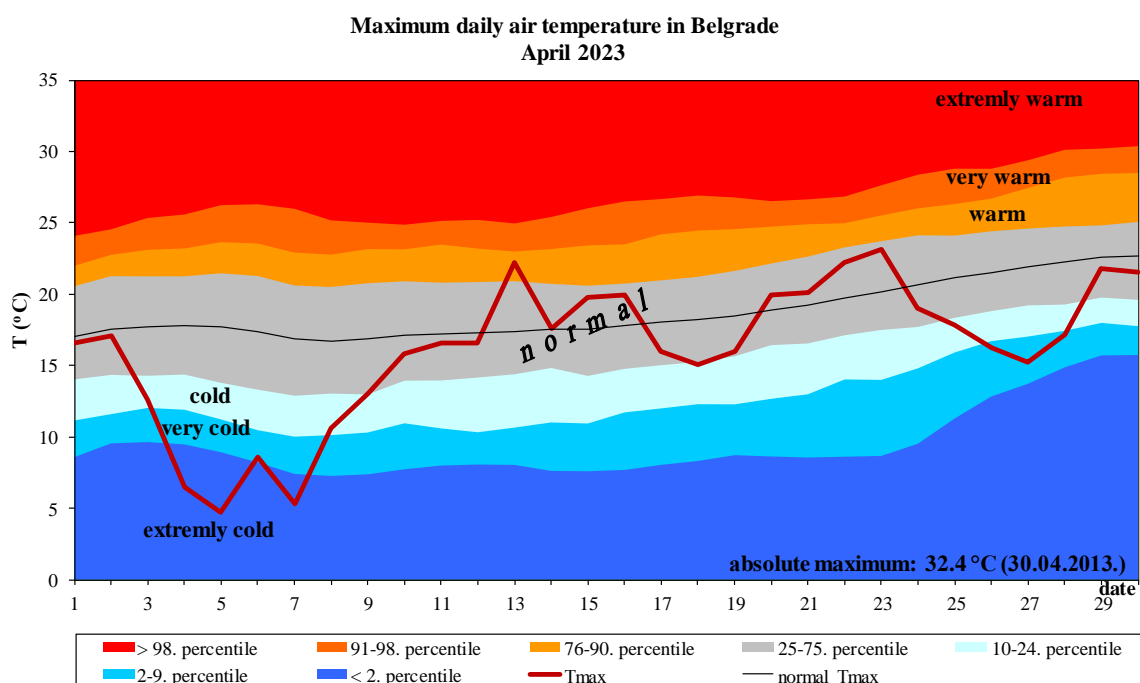


Figure 7. Daily course of the maximum daily air temperature and accompanying percentiles for Belgrade

Minimum air temperature

Mean minimum daily air temperature in April ranged from 3,3°C in Dimitrovgrad to 7,3°C in Belgrade. On the mountains, mean minimum air temperature ranged from -2,4°C at Kopaonik to 2,1°C at Zlatibor.

Based on the percentile method, mean minimum monthly air temperature was in the cold and normal categories, and very cold in Belgrade.

The lowest minimum daily air temperature of -9,9°C was measured on April 7 at Kopaonik. As for the lowland, the lowest daily air temperature of -2,8°C was measured on Palic and -0,1°C in Belgrade, April 6 and 5, respectively.

Frost days⁴ were recorded across the entire country apart from Negotin and Nis. On the mountains, number of frost days ranged from 7 at Zlatibor and Crni Vrh to 22 days at Kopaonik. In the lowland, 1 to 2 frost days were recorded in most of the country, 3 days in Kragujevac, Smederevska Palanka, Cuprija and Vranje, 6 days in Pozega and Dimitrovgrad, 7 days in Kursumlija. The observed number of frost days was above the April average in most of Serbia.

Figure 8 shows assessment of the minimum and maximum air temperature in Serbia for April based on the tercile distribution relative to the 1991-2020 base period. It can be noted that the mean minimum air temperature was below the lower tercile and mean maximum air temperature significantly below the boundary of lower tercile.

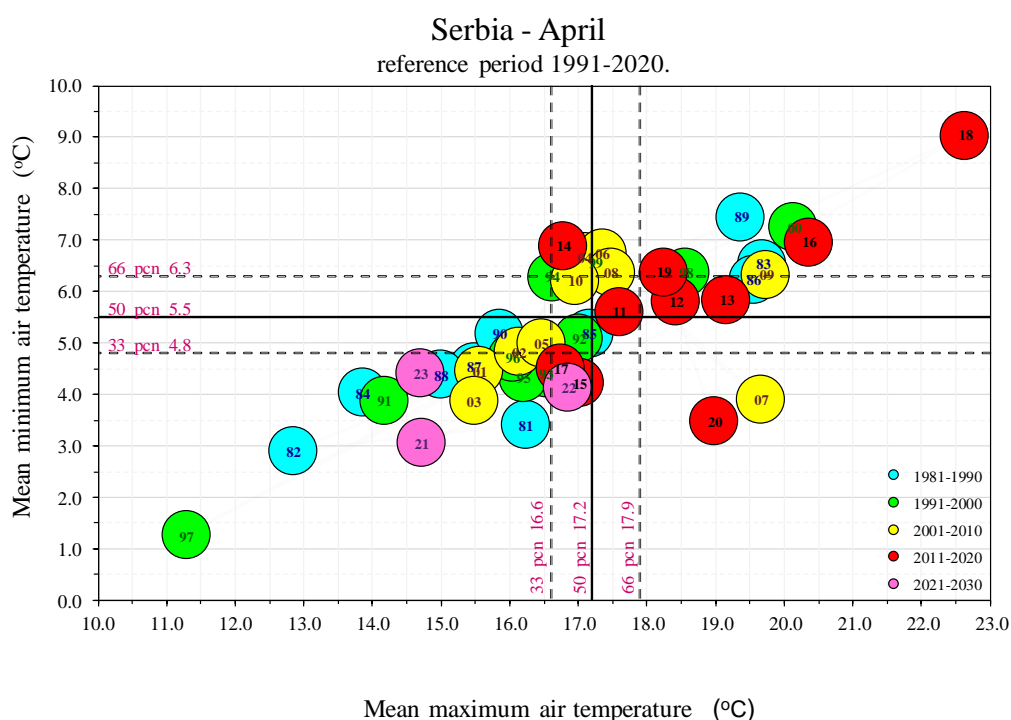


Figure 8. Assessment of minimum and maximum air temperature for Serbia with the accompanying terciles in relation to the 1991-2020 base period

⁴ Frost day is defined as the day with minimum air temperature lower than 0°C

Figure 9 shows daily course of the minimum daily air temperature and the accompanying percentiles for Belgrade in April 2023, and for the stations Sombor, Novi Sad, Loznica, Negotin, Kragujevac, Zlatibor, Nis and Vranje are given in the [Appendix](#).

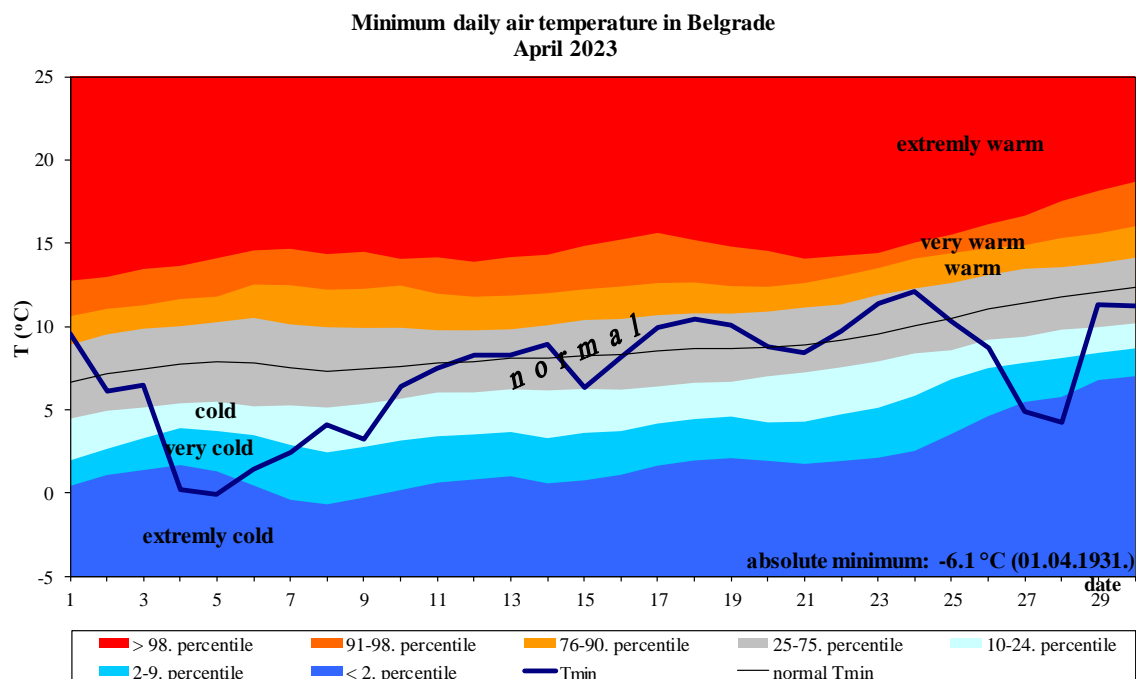


Figure 7. Daily course of the minimum daily air temperature and accompanying percentiles for Belgrade

PRECIPITATION

April precipitation sums ranged from 36,9 mm on Palic to 153,2 mm at Kopaonik, whilst Belgrade received 79,0 mm of precipitation (*Figure 10*).

The total precipitation sums relative to the normal for the 1991-2020 base period ranged from 76% in Nis to 205% in Negotin (*Figure 11*).

Based on the percentile method, precipitation sums in most of the country were in the rainy and normal categories, very rainy in Sombor, Kikinda, Krusevac, Zlatibor and Kopaonik, and extremely rainy in Negotin (*Figure 12*).

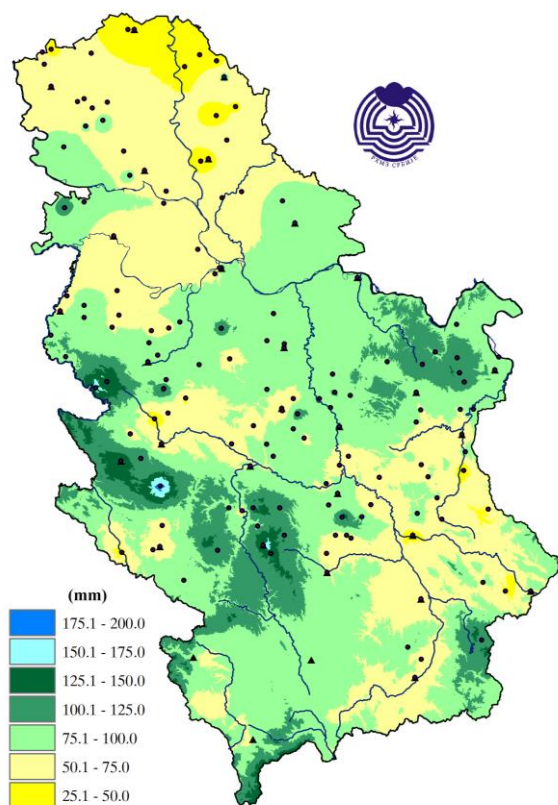


Figure 10. Spatial distribution of the monthly precipitation sums (mm) according to data from 28 major meteorological, 23 climatological and 101 rain gauge stations

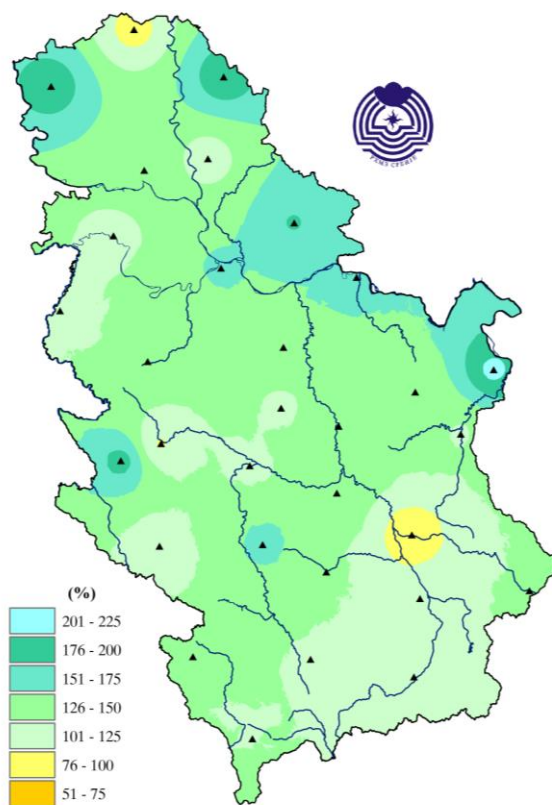


Figure 11. Spatial distribution of the monthly precipitation sums in the percentages of normal for the 1991–2020 base period

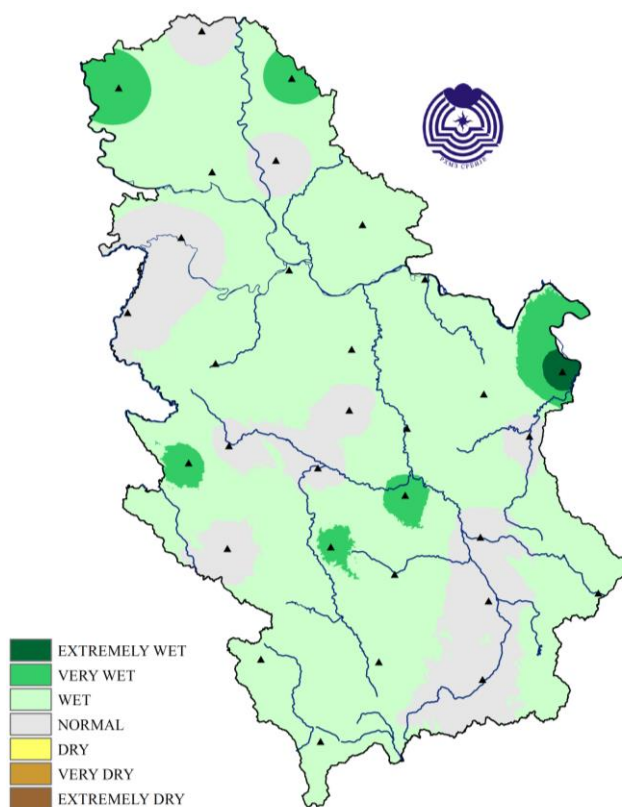


Figure 12. Monthly precipitation sums according to the percentile method

April 2023 ranks as **the 6th wettest** for Serbia in the period from 1951 (*Figure 13*), 2nd wettest for Kopaonik (since 1950), 3rd wettest for Zlatibor (since 1950, Figures 14 and 15), 7th wettest for Banatski Karlovac (since 1946), and 9th wettest for Negotin (since 1941).

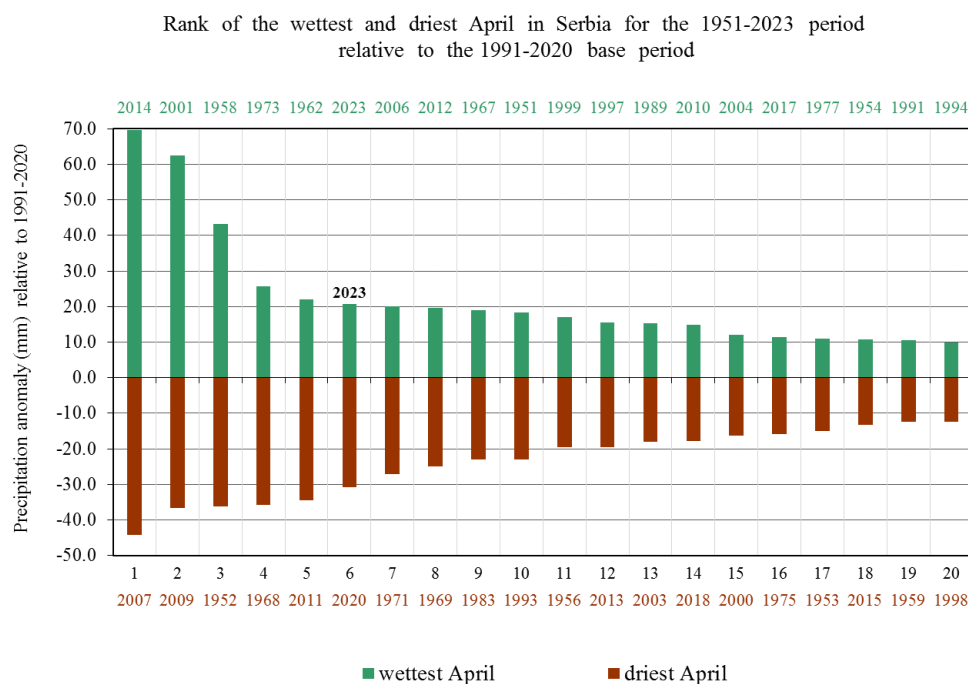


Figure 13. Ranking driest and wettest April in Serbia

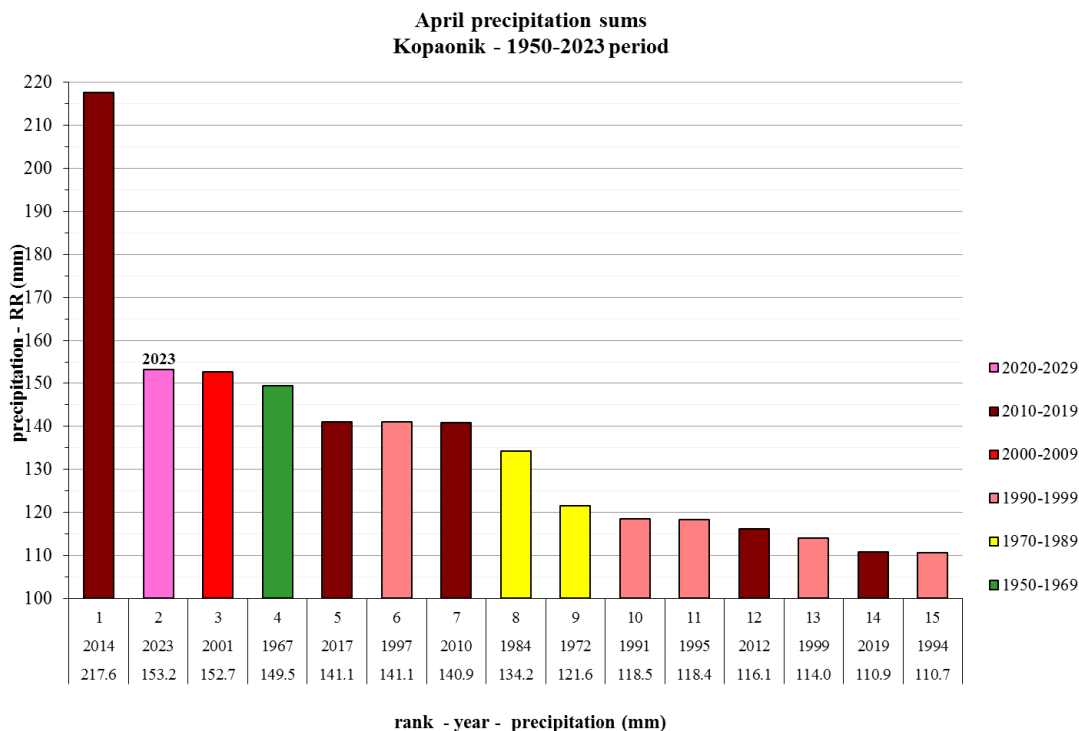


Figure 14. The highest precipitation on Kopaonik

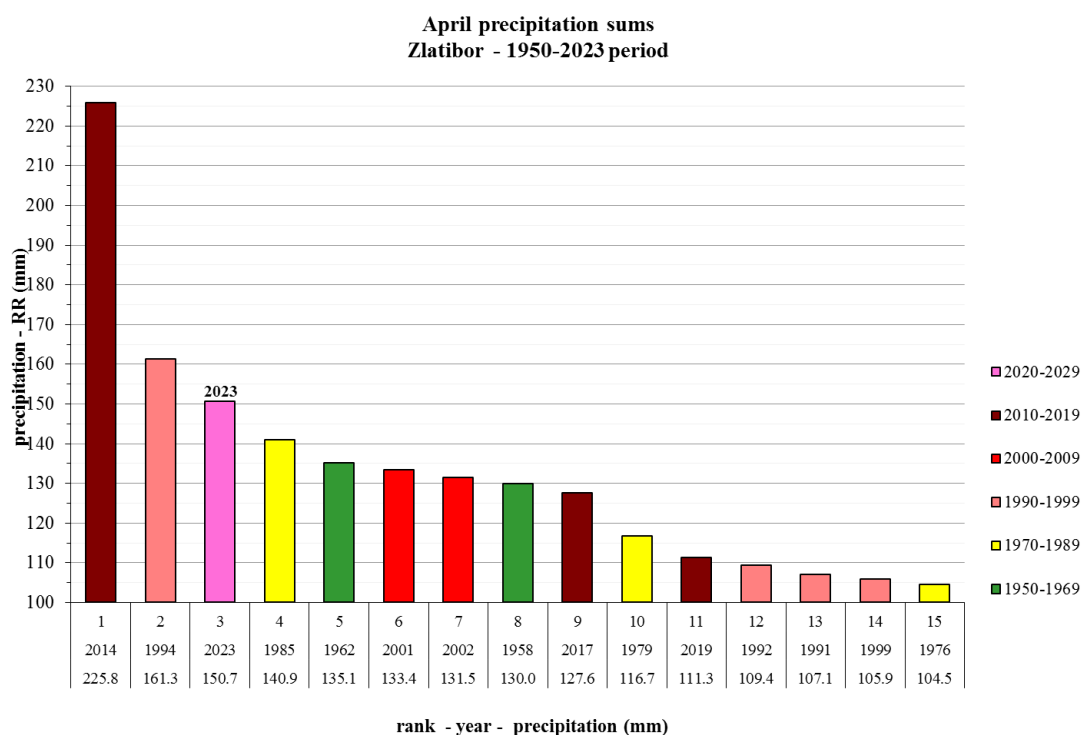


Figure 15. The highest precipitation on Zlatibor for the period 1950-2023

The highest daily precipitation sum of 51,5 mm was recorded in Krusevac on April 4. On the same day, Belgrade observed the highest daily precipitation sum of 19,8 mm.

Number of days with precipitation in April ranged from 11 in Zrenjanin to 23 at Zlatibor (*Figure 16*). Banatski Karlovac observed 17 days with precipitation thereby breaking **the previous record** of 16 days set in April 1988, 1994, 1999 and 2012. The recorded number of days with precipitation was 3 to 7 days above the April average (*Figure 17*).

Most of Serbia saw one day with precipitation of 20 mm and above; 2 days were recorded in Veliko Gradiste, Kursumlija and Kopaonik, and 3 days at Zlatibor.

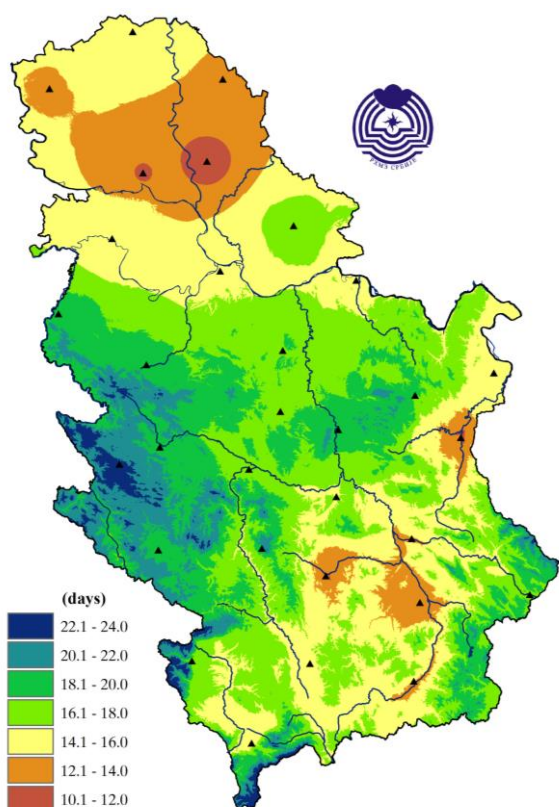


Figure 16. Spatial distribution of number of days with precipitation

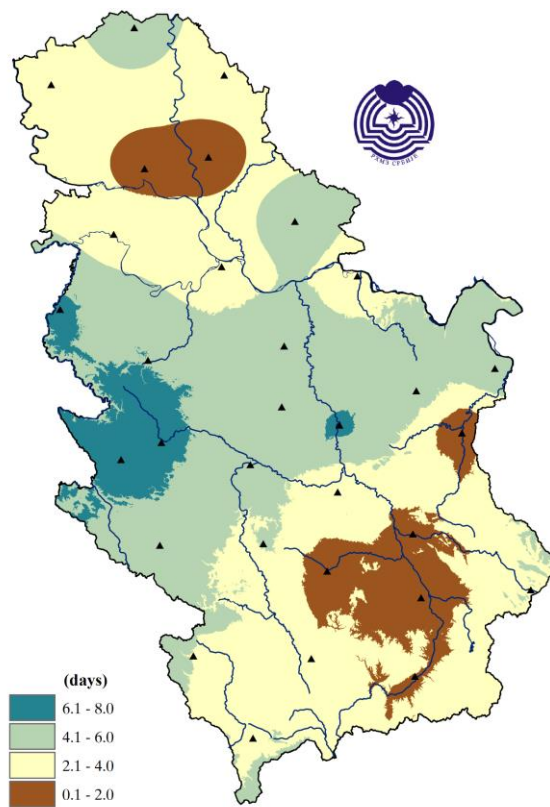


Figure 17. Spatial distribution of deviation of number of days with precipitation

Snow cover was registered in most of Serbia. The highest snow depth of 54 cm was measured at Kopaonik on April 5. In the lowland, the highest snow depth of 18 cm was measured in Kraljevo on April 4. Belgrade and Smederevska Panka observed **record-breaking snow cover depth** in April. On April 5, Belgrade recorded snow cover depth of 17 cm thereby breaking the previous record of 10 cm set in April 7, 2021. On April 4, Smederevska Palanka observed snow cover depth of 11 cm set in April 7, 2021.

Kopaonik observed the highest number of days with snow cover, total of 26 days, Zlatibor recorded 7 days, Sjenica observed 5 days, Crni Vrh recorded 4 days. As for the lowland, most places saw 1 to 3 days with snow cover. Zrenjanin and Krusevac observed **record-breaking number of days with snow cover**. Zrenjanin observed 2 days besting the previous record of 1 day set in April 1955, 1958, 1986 and 1995. Krusevac recorded 3 days with snow cover besting the previous recorded of 2 days which is a recurrent phenomenon during April.

Figure 18 shows assessment of air temperature and precipitation sums for Serbia for April based on the tercile distribution relative to the 1991 – 2020 base period. It can be noted that April 2023 was marked by air temperature significantly below the lower tercile and precipitation sums above the upper tercile.

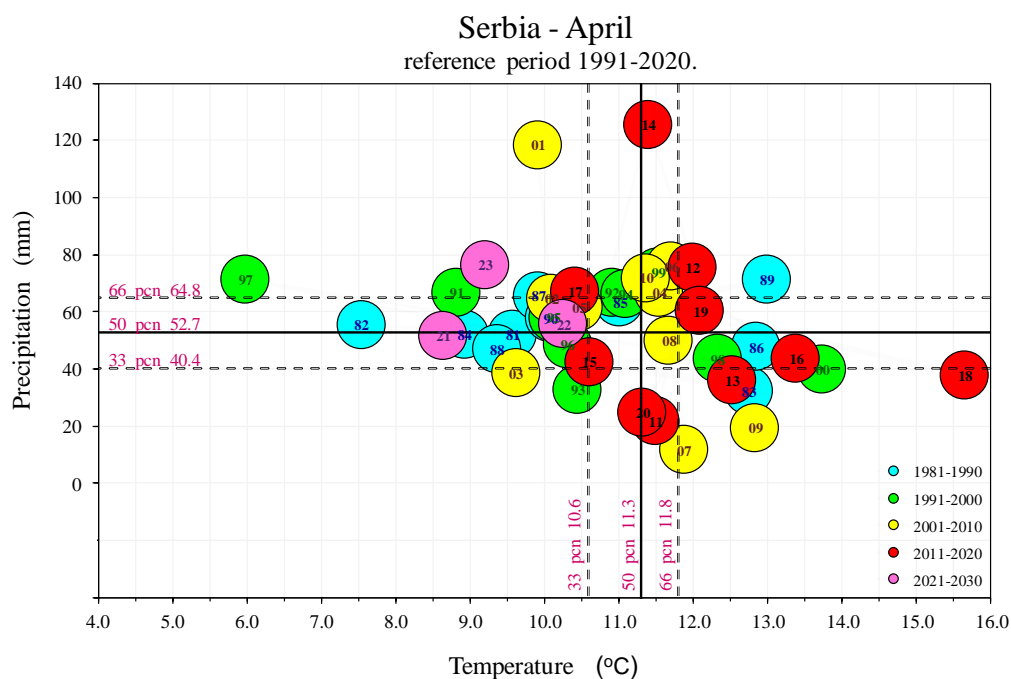


Figure 18. Assessment of air temperature and precipitation for Serbia with the accompanying terciles in relation to the 1991-2020 base period

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

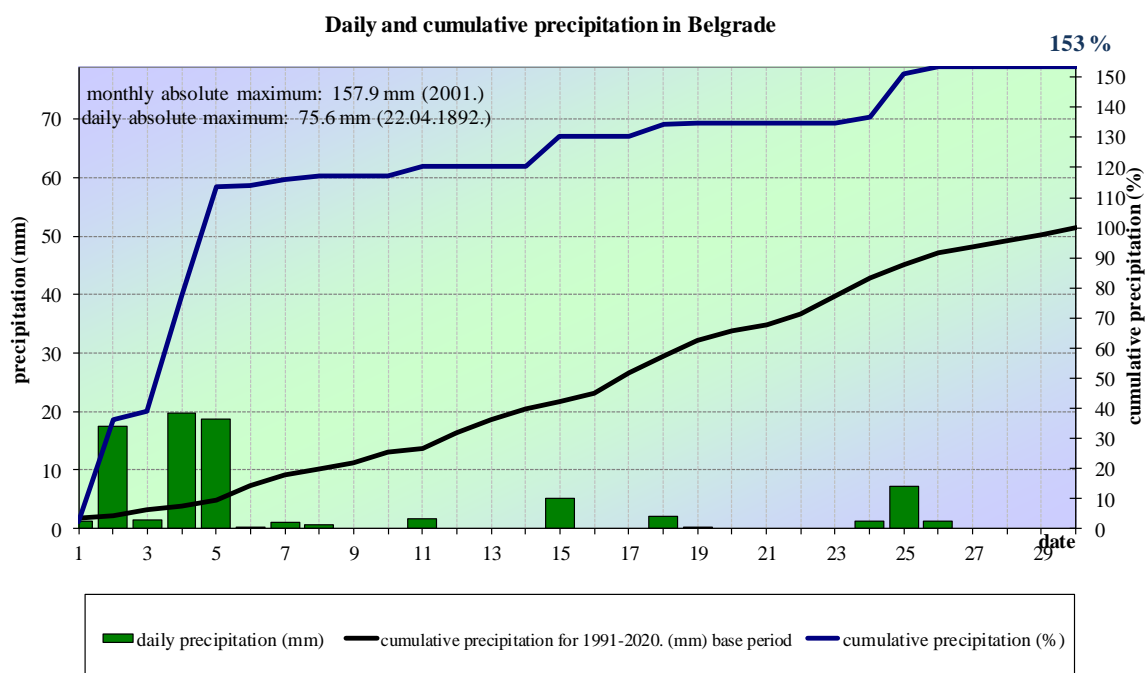


Figure 19. Daily and cumulative precipitation in Belgrade

CLOUD COVER, BRIGHT AND CLOUDY DAYS

Mean April cloud cover in Serbia was around and slightly above the average, ranging from 6/10 to 8/10. Figures 20, 21 and 22 show the average daily cloud cover in April for Belgrade, Kopaonik and Novi Sad.

Bright days⁵ were not recorded in Sombor, Sremska Mitrovica, Valjevo, Sjenica, Pozega, Kraljevo, Zlatibor and Kopaonik, whilst the highest number of bright days, total of 4, was observed in Banatski Karlovac. Belgrade recorded 2 bright days. The observed number of bright days was 3 to 5 days below the April average.

The lowest number of cloudy days⁶ total of 9, was recorded in Novi Sad, Valjevo and Negotin whilst the highest number of cloudy days, total of 17 days, was recorded at Zlatibor. Belgrade observed 11 cloudy days. Zlatibor **observed record-breaking number of cloudy days thereby breaking the previous record of 16 days** set in April 1956 and 2006. Number of cloudy days was 2 to 6 days above the April average in most places.

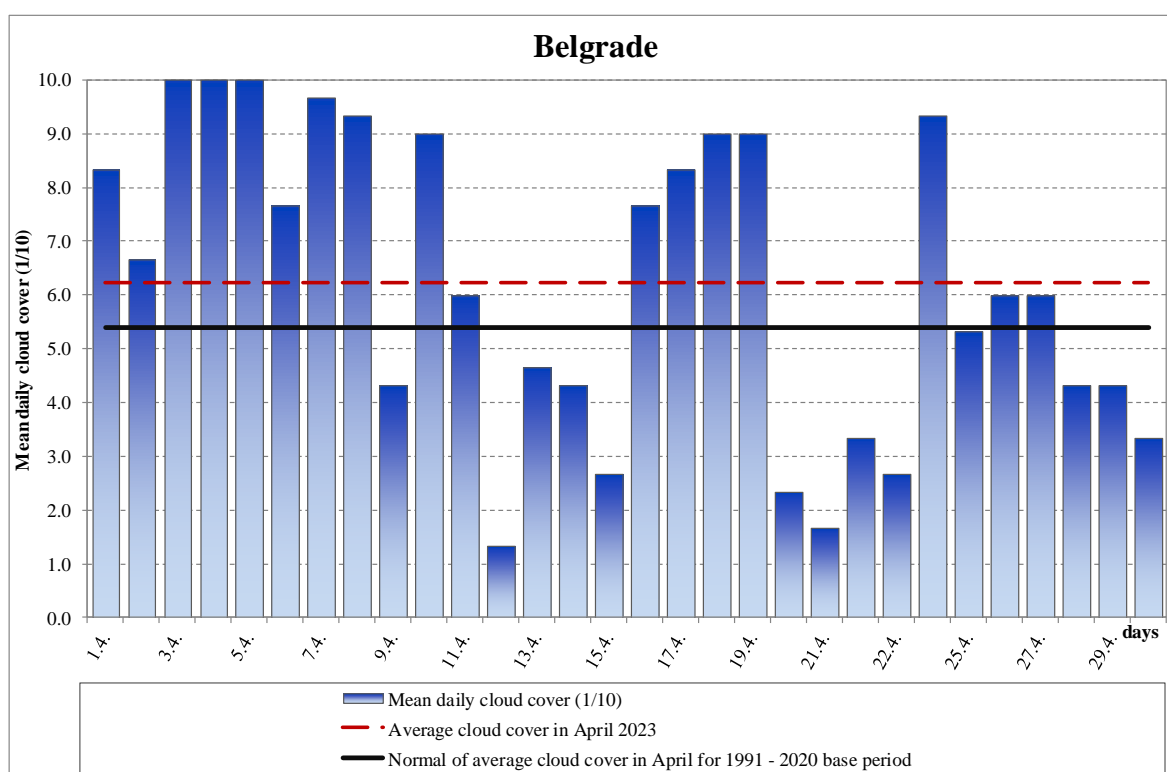


Figure 20. Mean daily cloud cover in Belgrade

⁵ Bright day refers to a day with cloud cover less than 2/10

⁶ Cloudy day refers to a day with cloud cover over 8/10

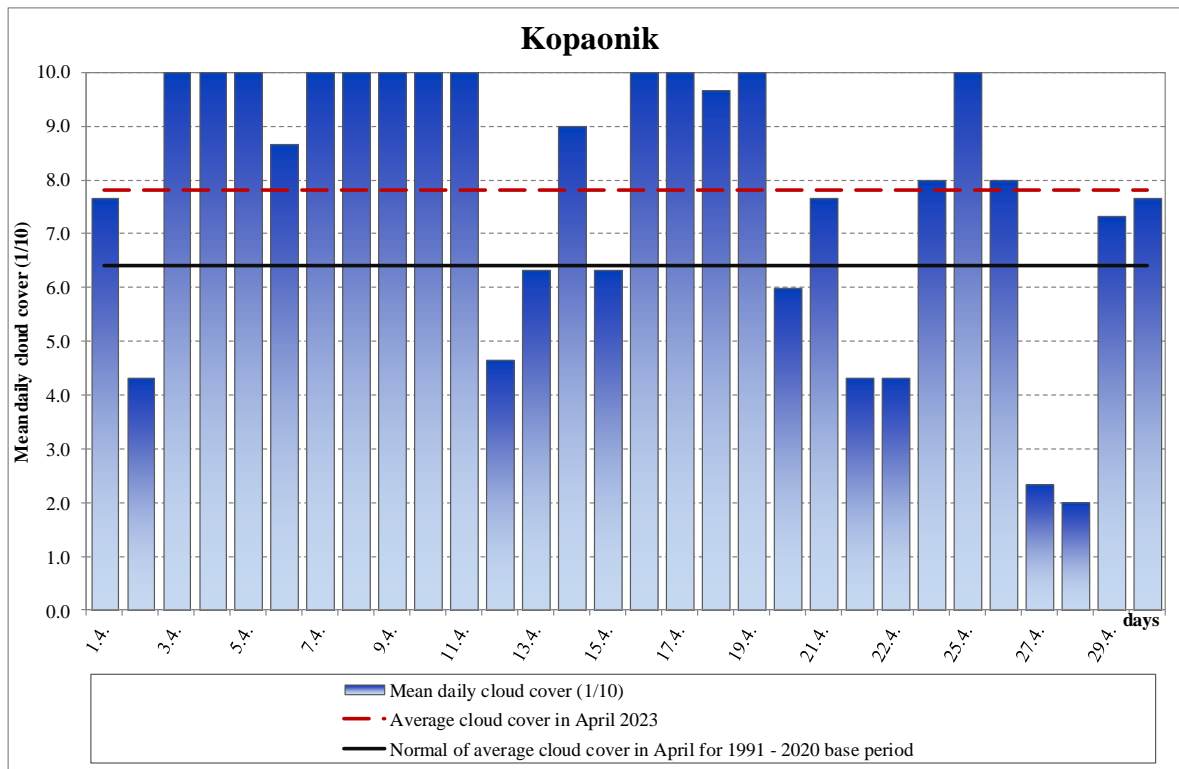


Figure 21. Mean daily cloud cover on Kopaonik

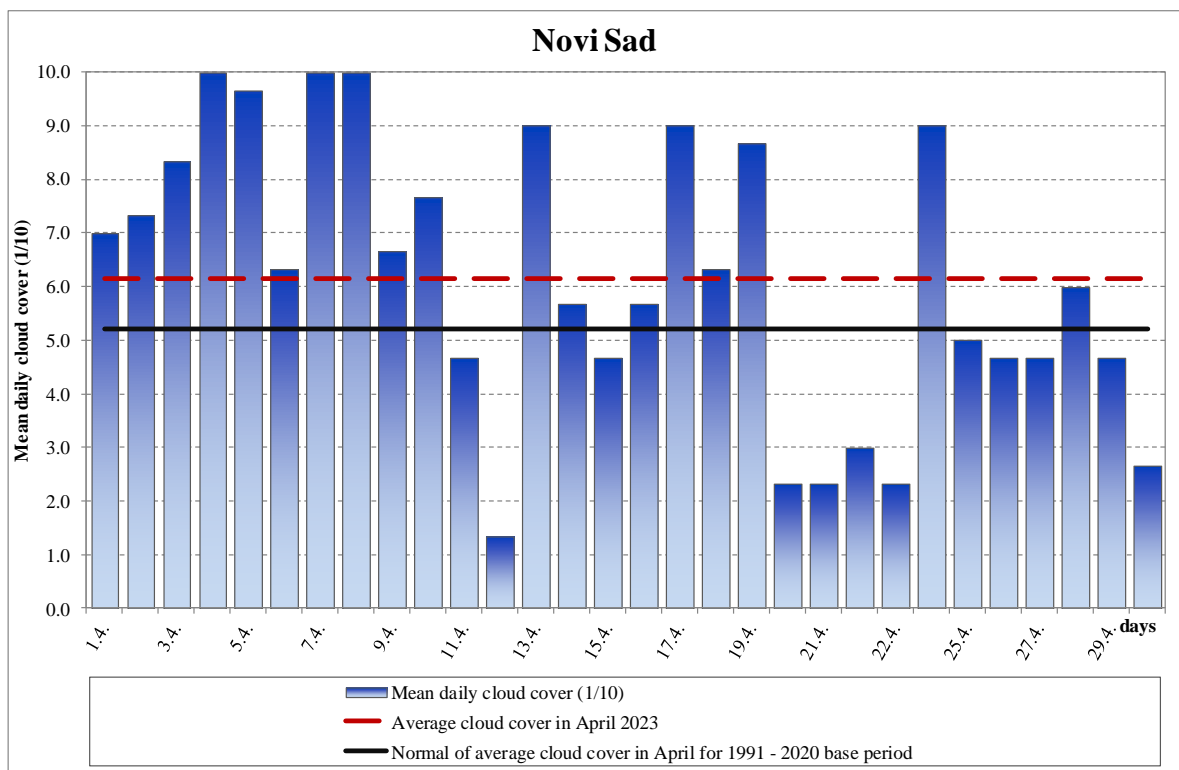


Figure 22. Mean daily cloud cover in Novi Sad

SUNSHINE DURATION (INSOLATION)

Sunshine duration in April ranged from 76,4 hours at Kopaonik to 185,4 hours in Negotin (*Figure 23*). **The previous record** of 91, 0 hours set in April 2014 was thus exceeded at Kopaonik.

April insolation ranged from 48% hours at Kopaonik to 92% hours in Negotin relative to the normal for the 1991-2020 base period (*Figure 24*).

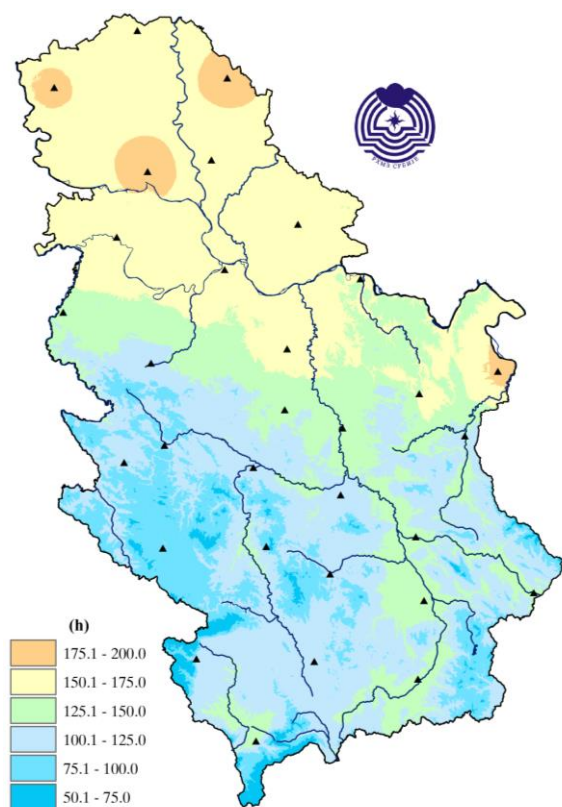


Figure 23. Insolation, expressed in hours

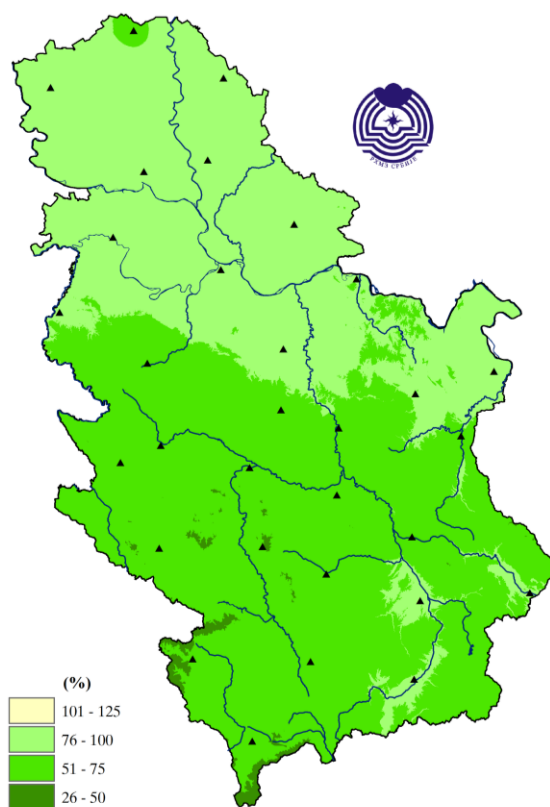


Figure 24. Insolation expressed in the percentages of normal

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

OVERVIEW OF THE SYNOPTIC SITUATION*

Low pressure activities in the northern and eastern Atlantic, advection of cold air from the north, cyclogenesis in the Genoa Bay with anticyclone briefly forming above the Balkans; changeable weather with snow in the low land during the first decade

Beginning of the month was marked by relatively warm weather with passage of the wet air wave from the west and southwest within the spatial low pressure in the central Europe and western Mediterranean. Brief cloudiness accompanied by rain and thundershowers was observed mostly in central, northern and eastern areas. Consequently, new depression was developed in Genoa Bay and transferred towards Aegean Sea, southeast of the Balkans and Black Sea concurrently followed by advection of cold air from the north of the continent. Significant cooling with snow and formation of snow cover was recorded in the lowland. Until the end of the first decade pertained changeable and chilly weather for this time of the year following the maintenance of upper air low pressure circulation within the Pannonia Plain, Balkans and the Apennine peninsula.

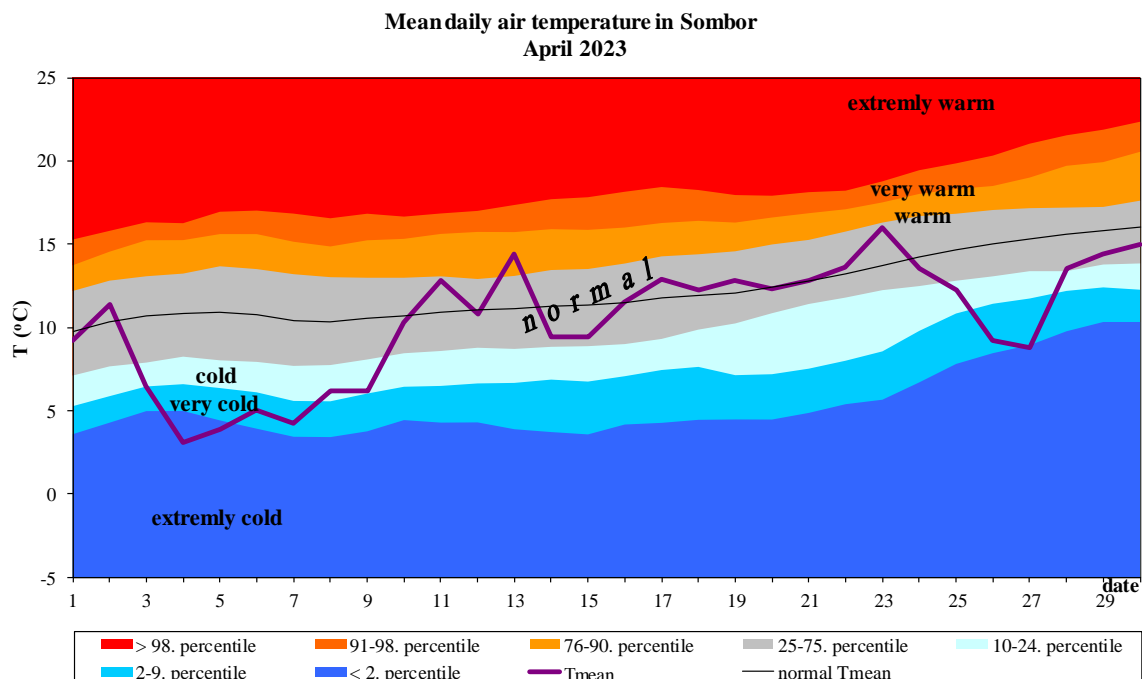
Period during the second decade was marked by weakening influence of the upper air low pressure and formation of northwesterly circulation following the ridge strengthening in the central Mediterranean, i.e. development of low pressure in the Atlantic and northwest of Europe. Weather was gradually warmer with passage of the wet air wave in the northwesterly circulation across the northern areas. Consequently, development of new low pressure in the Genoa Bay took place and deepening in the northern Adriatic influenced by passage of the new frontal wave across our territory towards east with scattered rain and brief thundershowers. Period until the end of the second decade was characterized by wet air series within the low pressure emanating from the Mediterranean with changeable and intermittently rainy weather.

Period at the beginning of the third decade was marked by gradual formation of anticyclone across the central Europe and Balkans producing more settled weather, with more sunny intervals and warmer compared to the previous days. In a subsequent period, new waves of wet air from the northwest and west of the continent were observed within the spatial low pressure, followed by passage and deepening of the upper air trough coupled with changeable and rainy weather. As of April 27, northwesterly circulation was established, geopotential rise took place with more sunny intervals observed across the entire country.

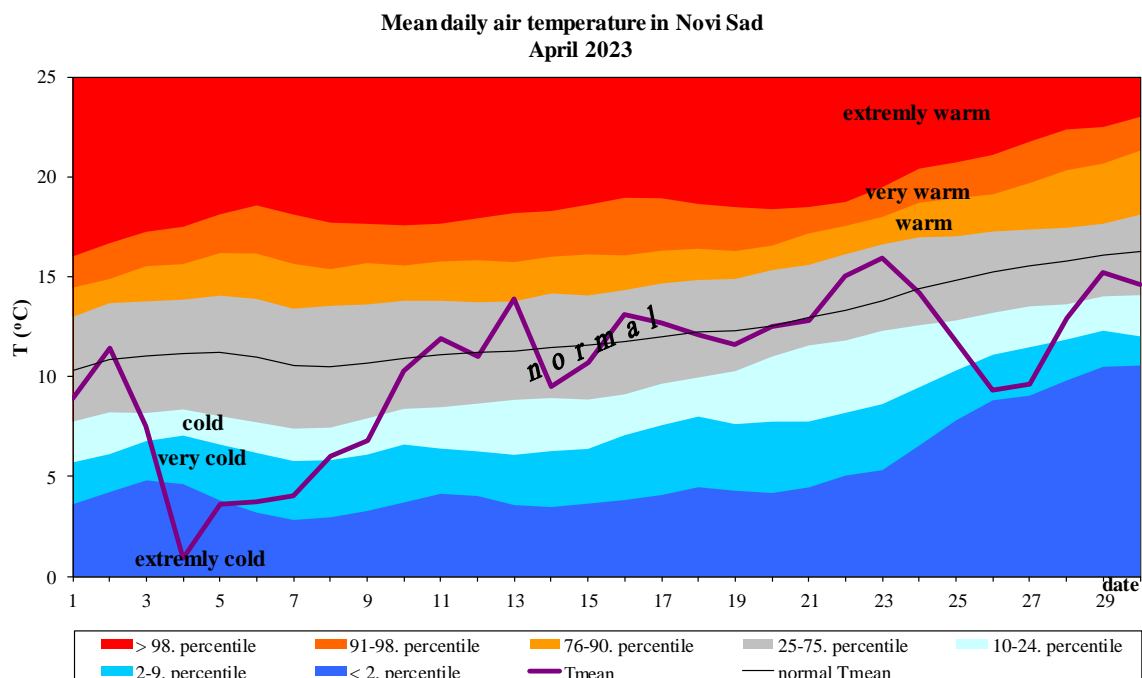
* National Center for Hydrometeorological Early Warning System

APPENDIX

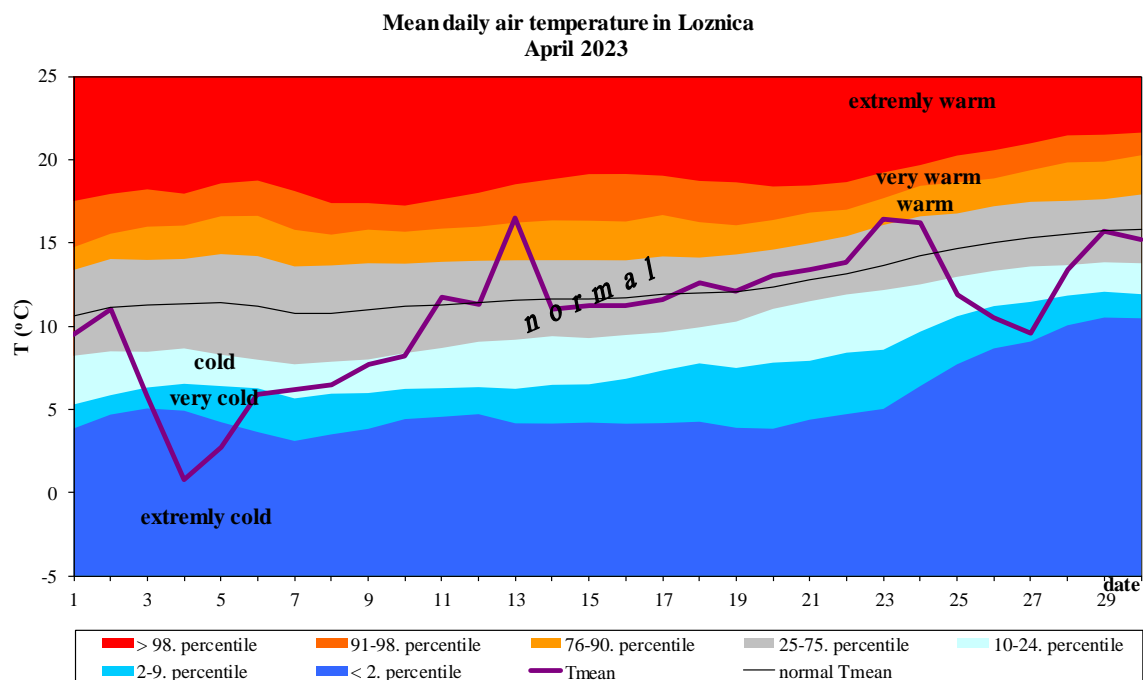
Mean air temperature



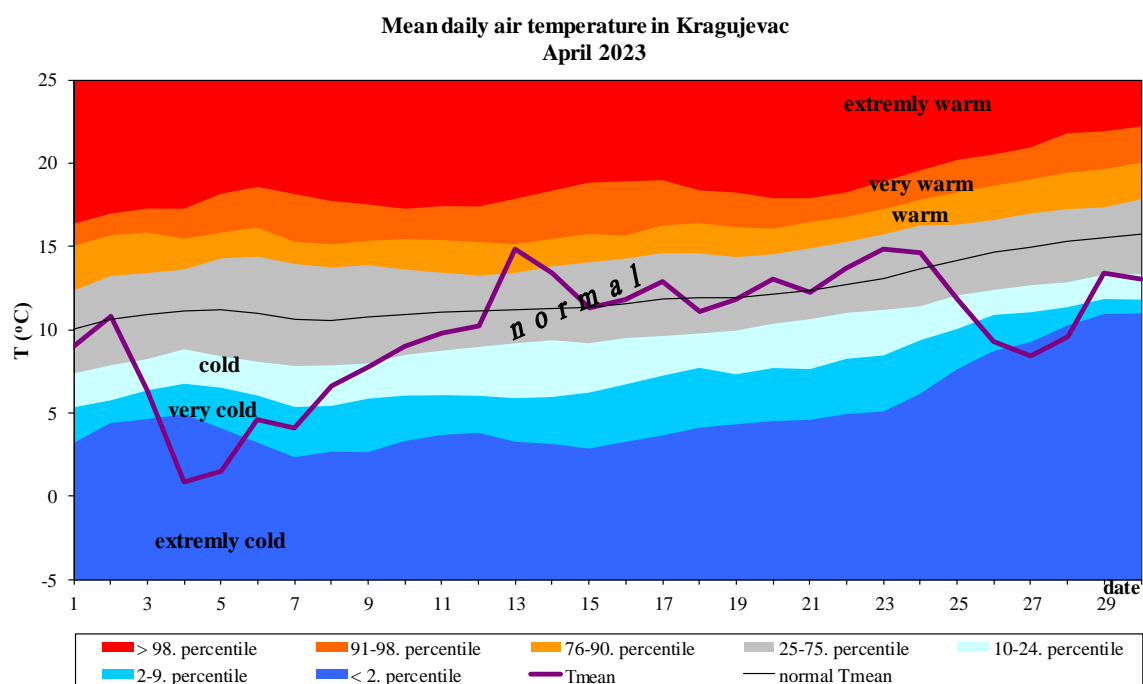
Appendix 1. Daily course of the mean daily air temperature and accompanying percentile for Sombor



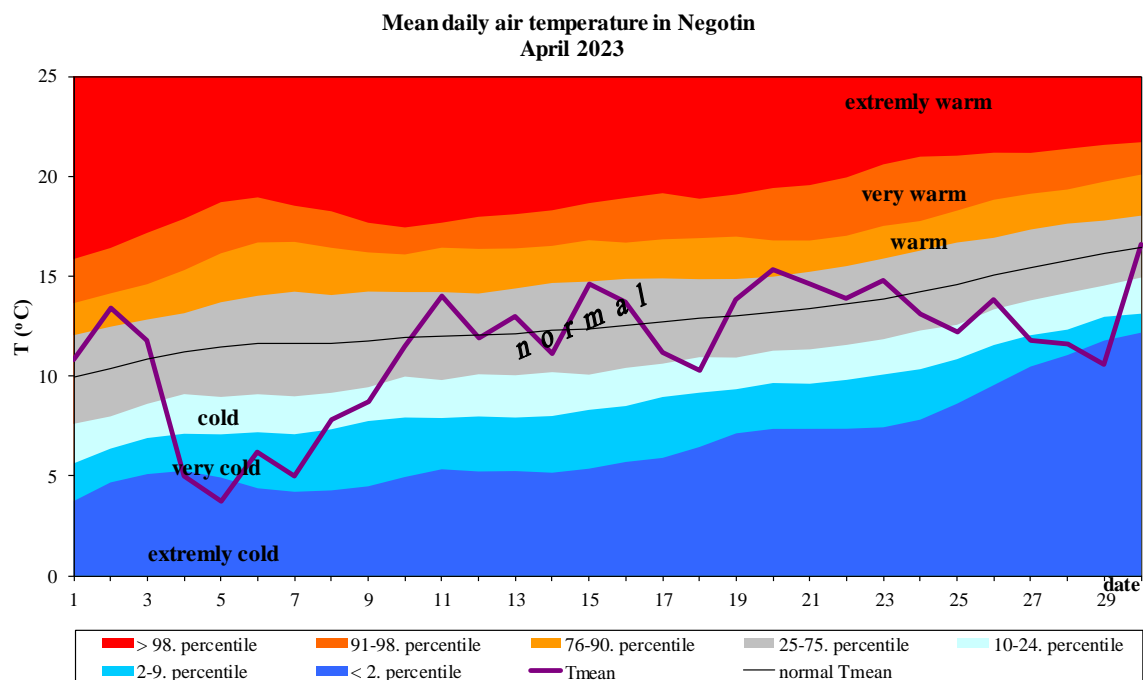
Appendix2. Daily course of the mean daily air temperature and accompanying percentile for Novi Sad



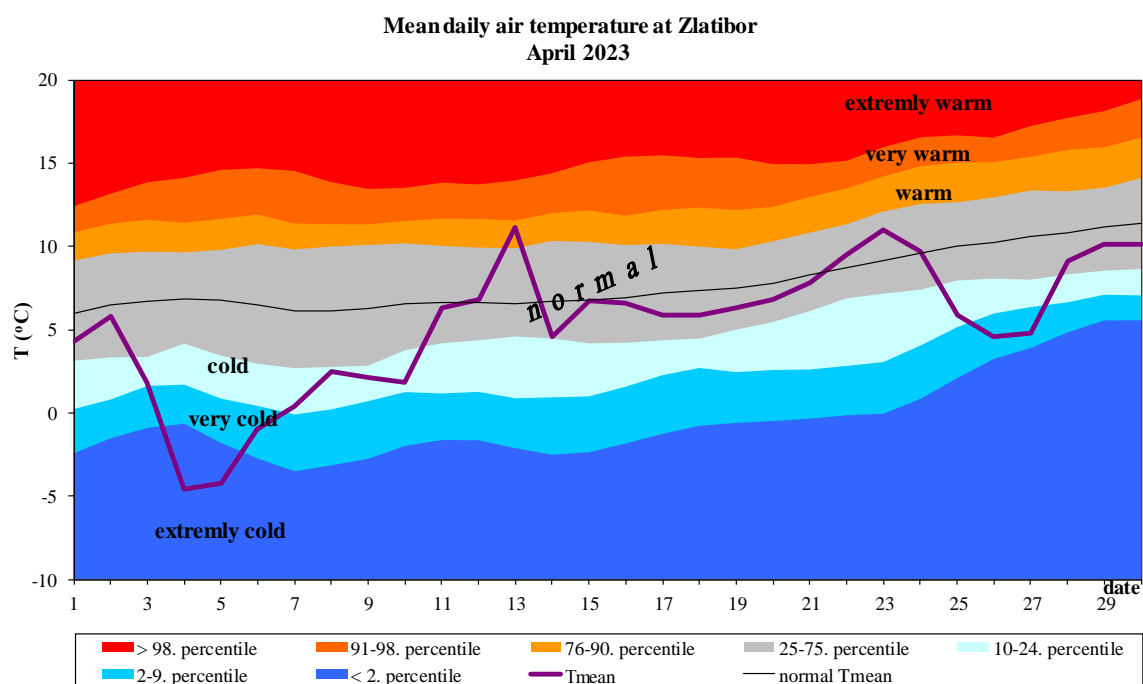
Appendix 3. Daily course of the mean daily air temperature and accompanying percentile for Loznica



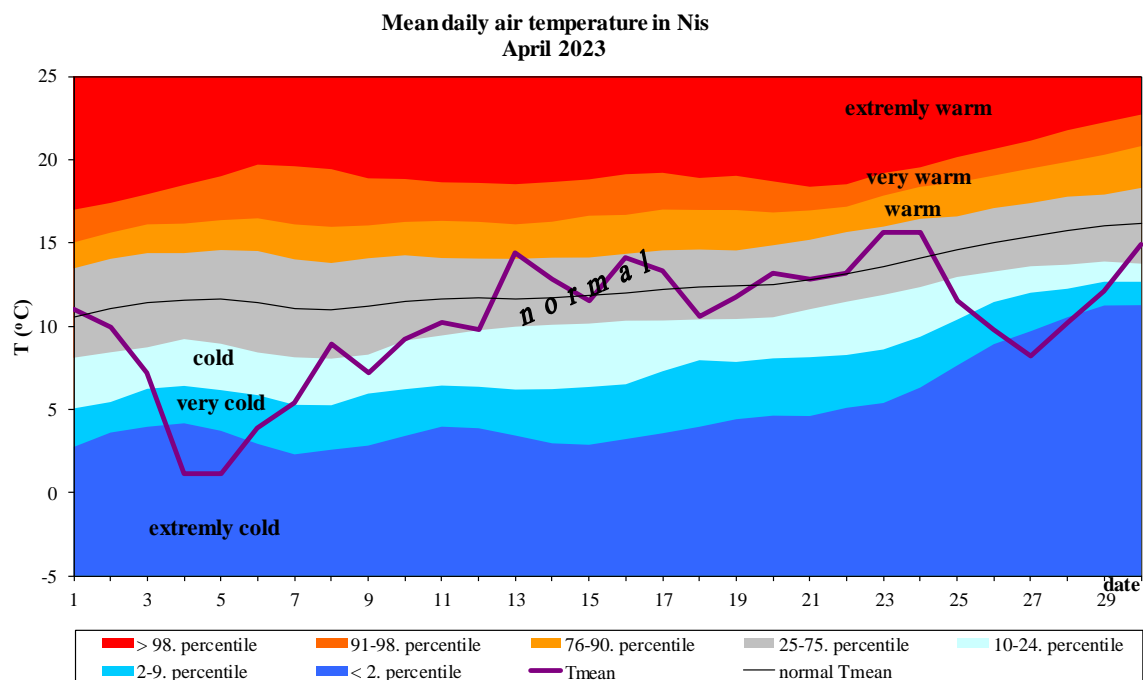
Appendix 4. Daily course of the mean daily air temperature and accompanying percentile for Kragujevac



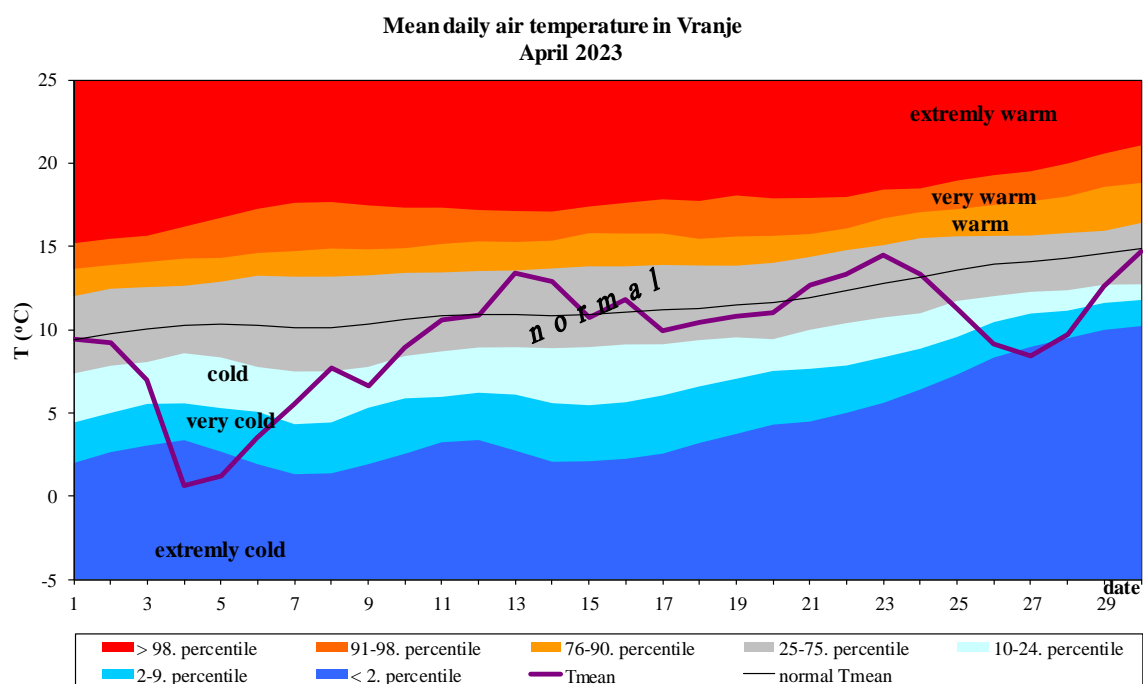
Appendix 5. Daily course of the mean daily air temperature and accompanying percentile for Negotin



Appendix 6. Daily course of the mean daily air temperature and accompanying percentile on Zlatiboru

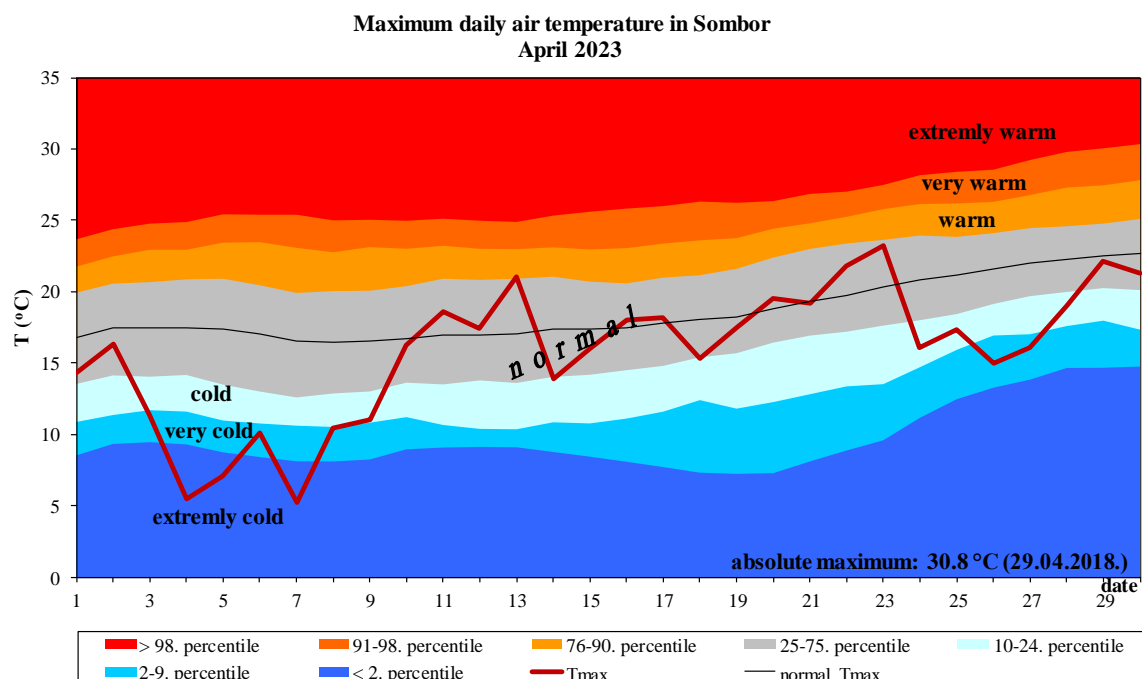


Appendix 7. Daily course of the mean daily air temperature and accompanying percentile for Nis

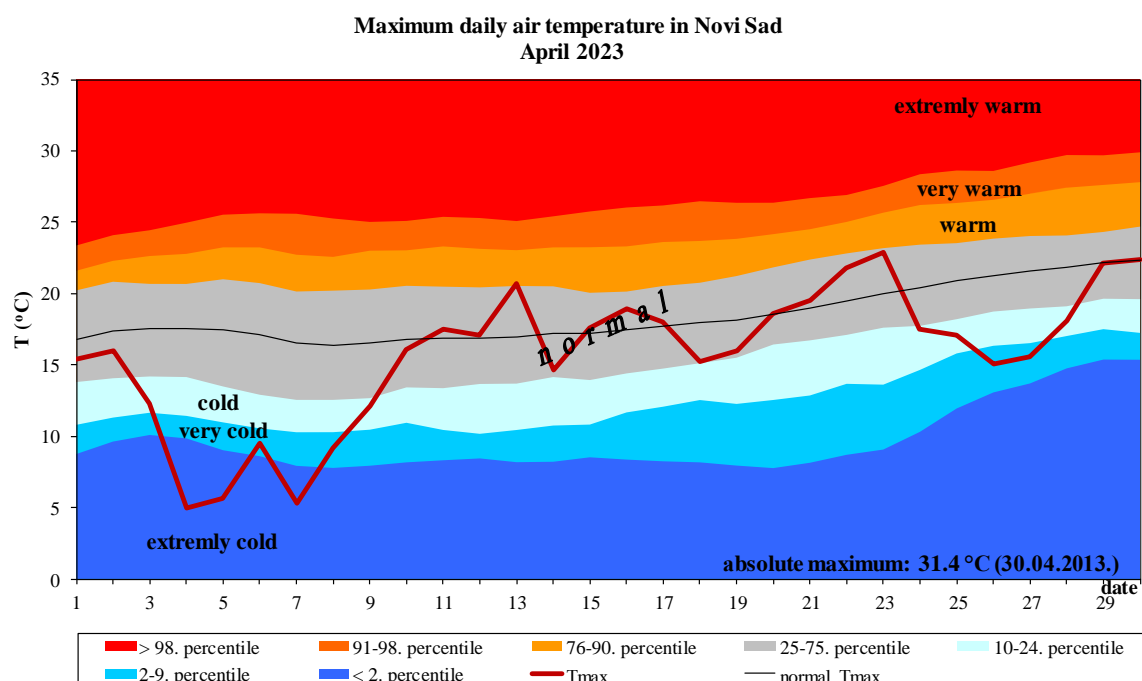


Appendix 8. Daily course of the mean daily air temperature and accompanying percentile for Vranje

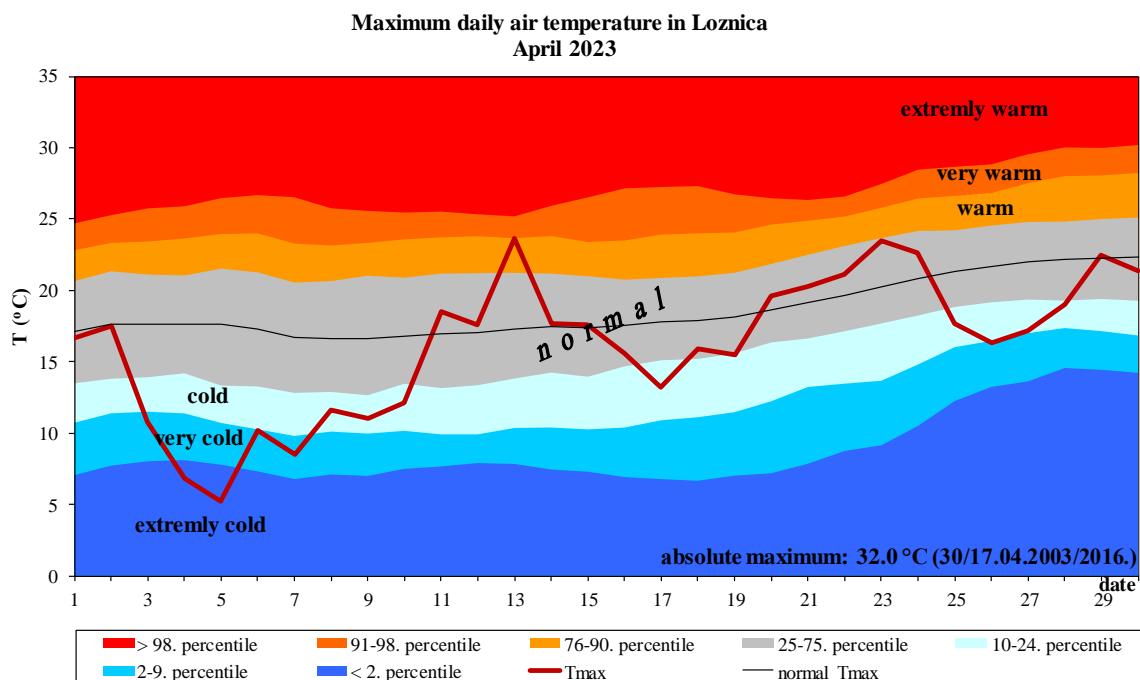
Maximum air temperature



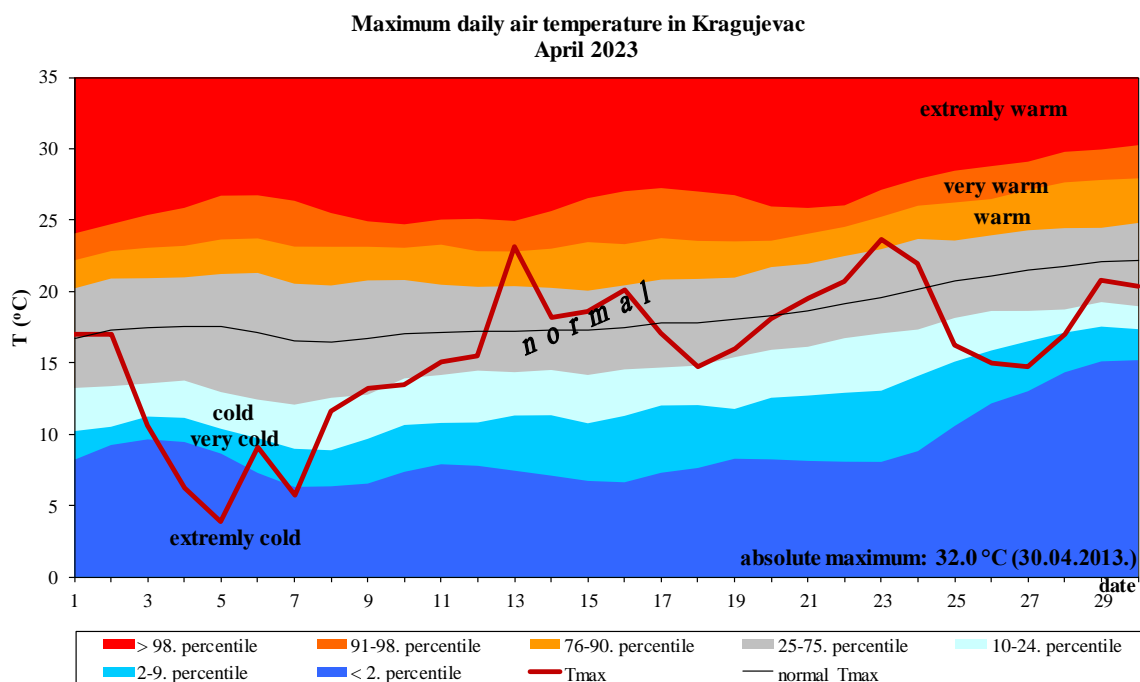
Appendix 9. Daily course of the maximum daily air temperature and the accompanying percentile for Sombor



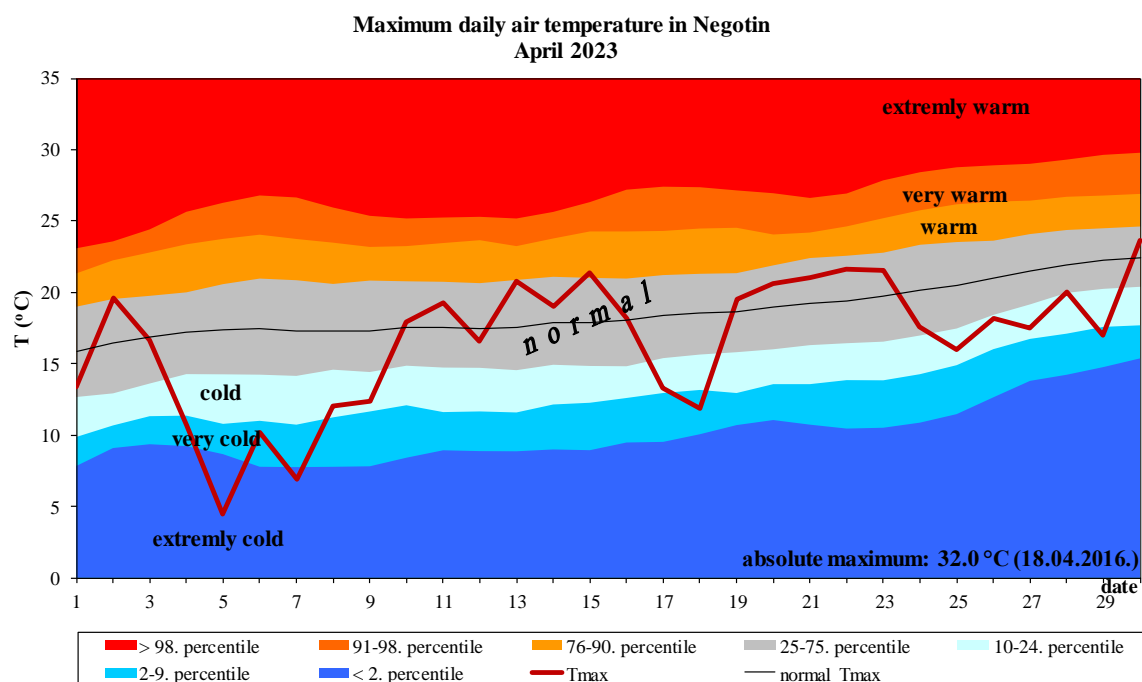
Appendix 10. Daily course of the maximum daily air temperature and the accompanying percentile for Novi Sad



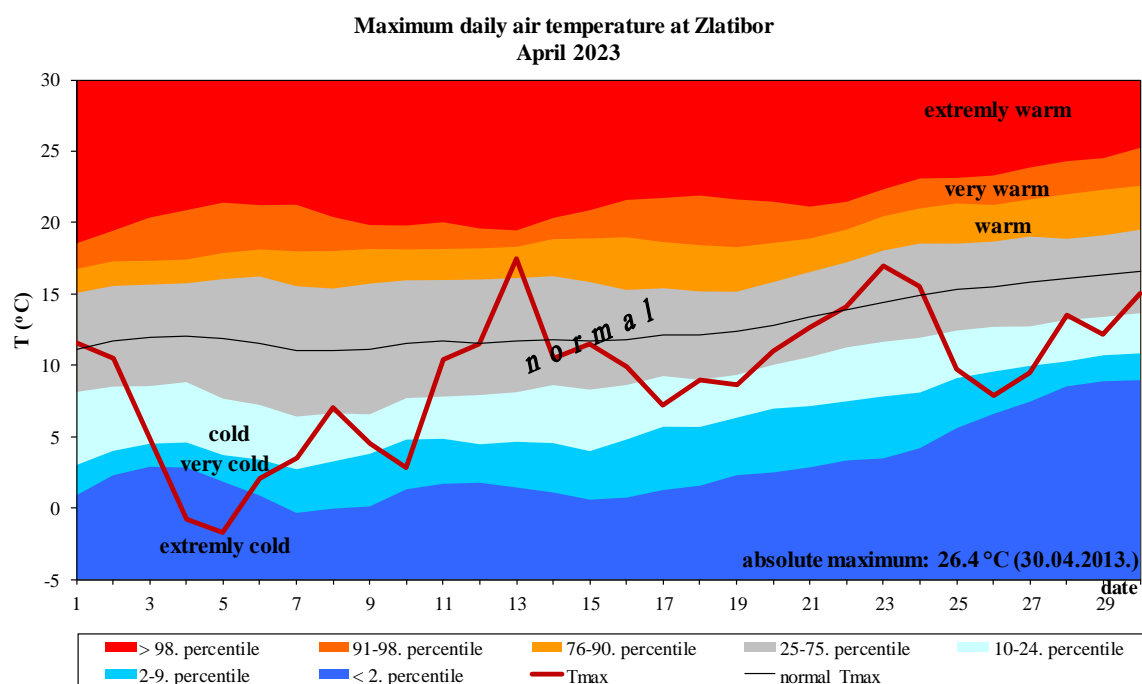
Appendix 11. Daily course of the maximum daily air temperature and the accompanying percentile for Loznica



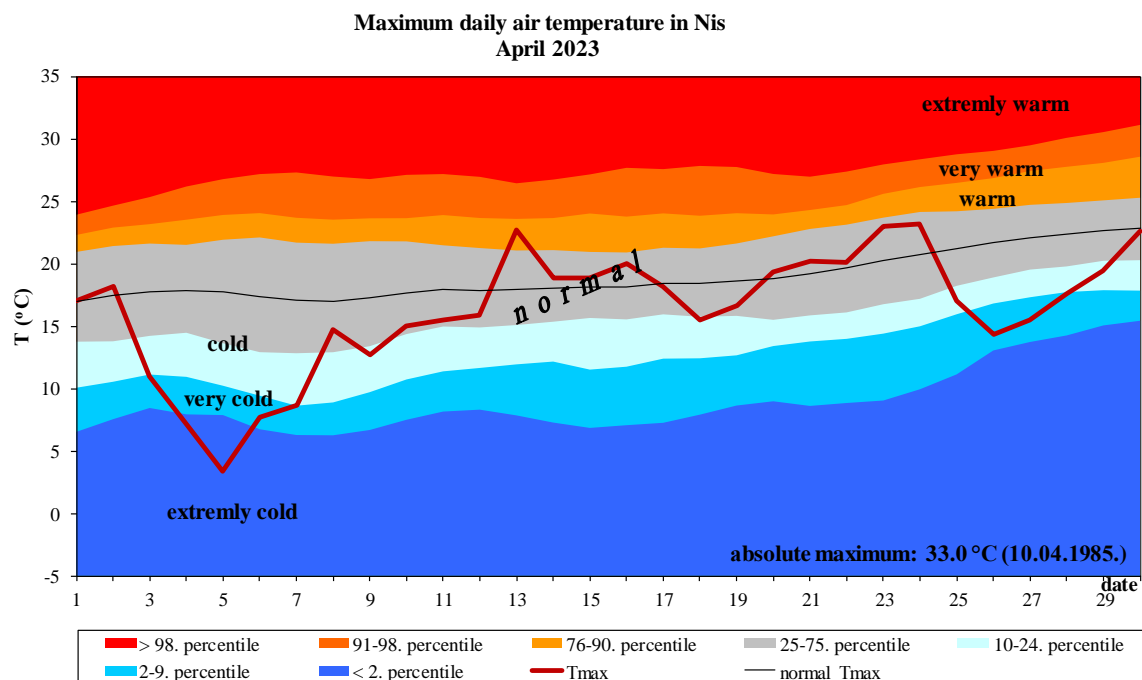
Appendix 12. Daily course of the maximum daily air temperature and the accompanying percentile for Kragujevac



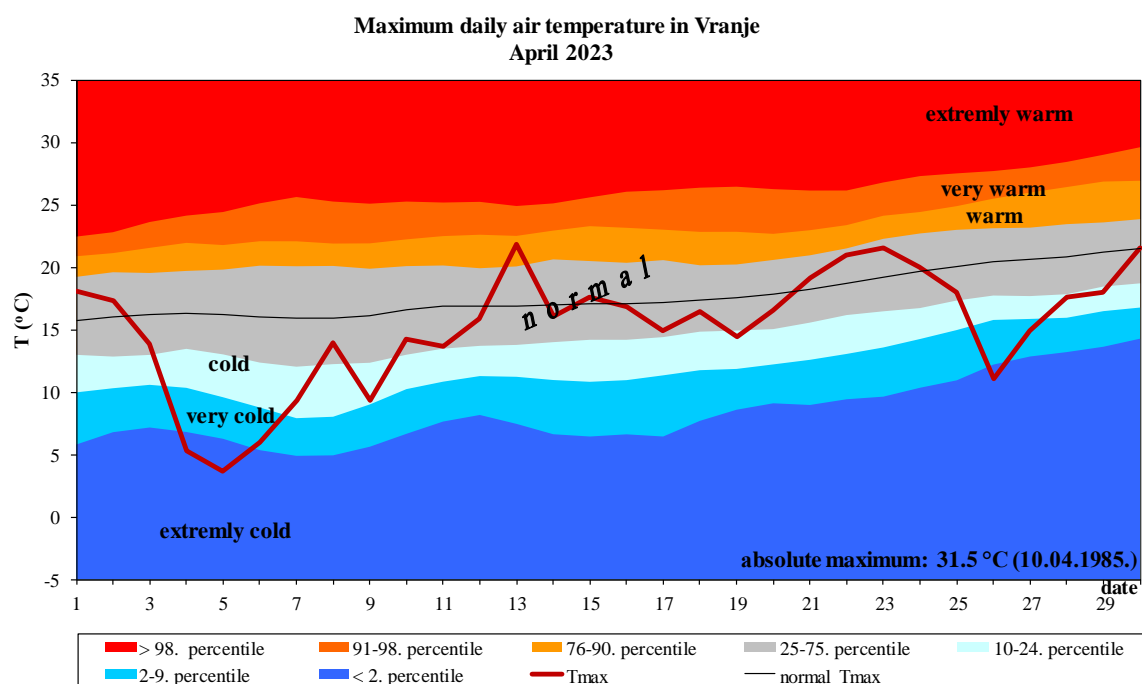
Appendix 13. Daily course of the maximum daily air temperature and the accompanying percentile for Negotin



Appendix 14. Daily course of the maximum daily air temperature and the accompanying percentile on Zlatibor

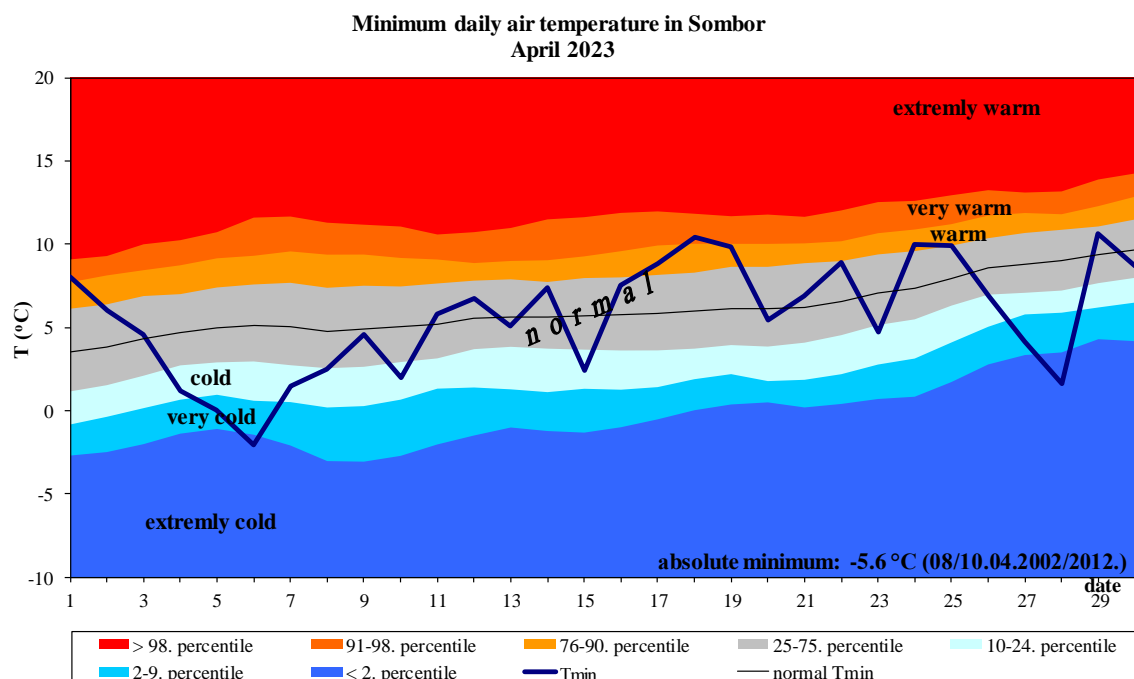


Appendix 15. Daily course of the maximum daily air temperature and the accompanying percentile for Nis

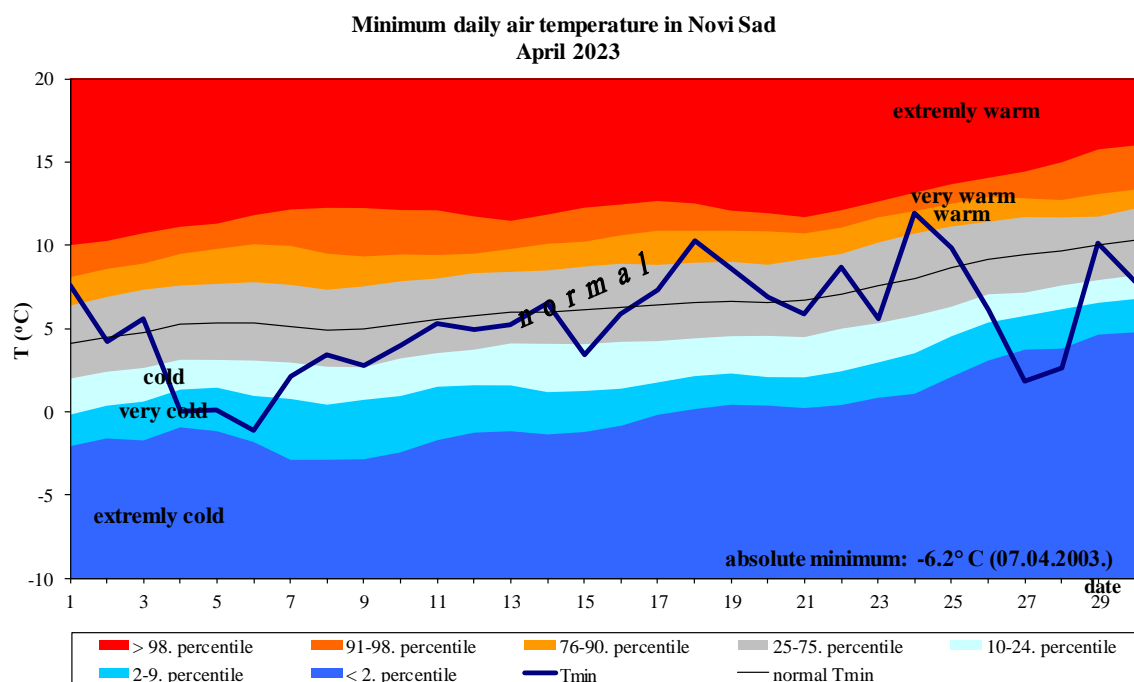


Appendix 16. Daily course of the maximum daily air temperature and the accompanying percentile for Vranje

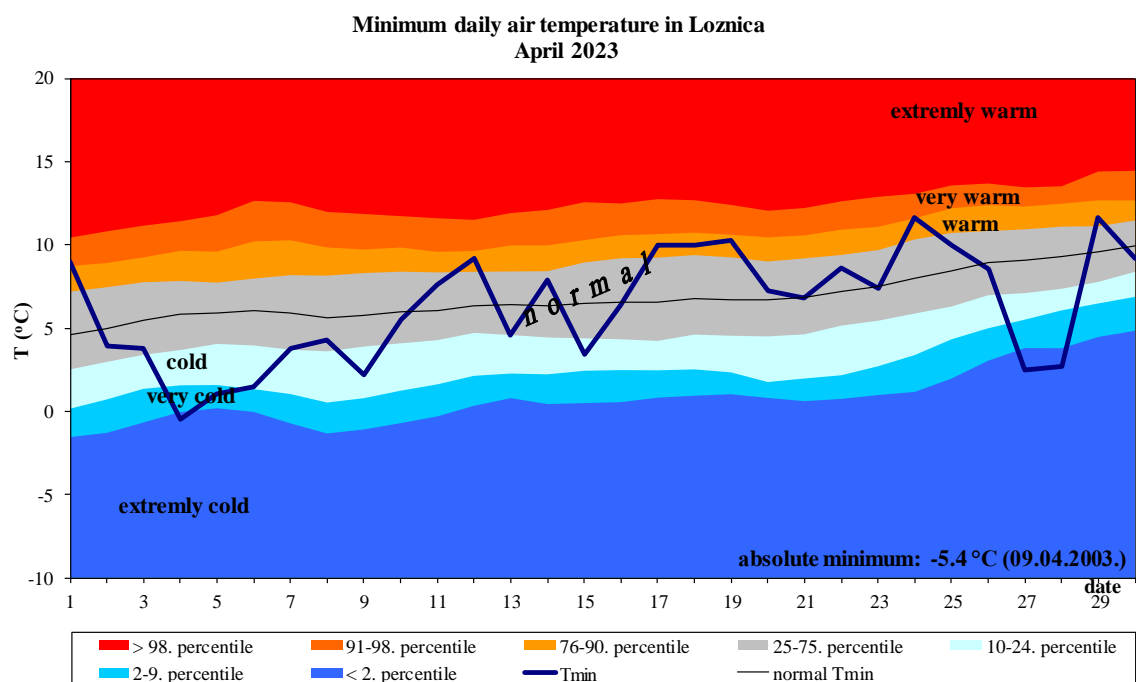
Minimum air temperature



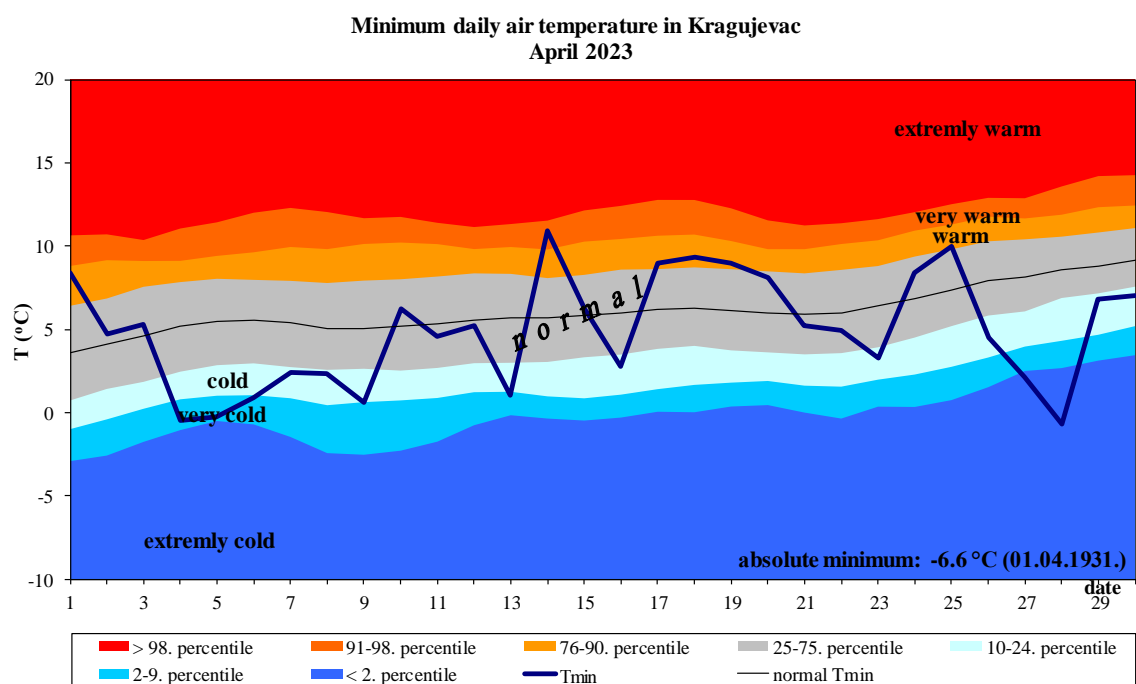
Appendix 17. Daily course of the minimum daily air temperature and the accompanying percentile for Sombor



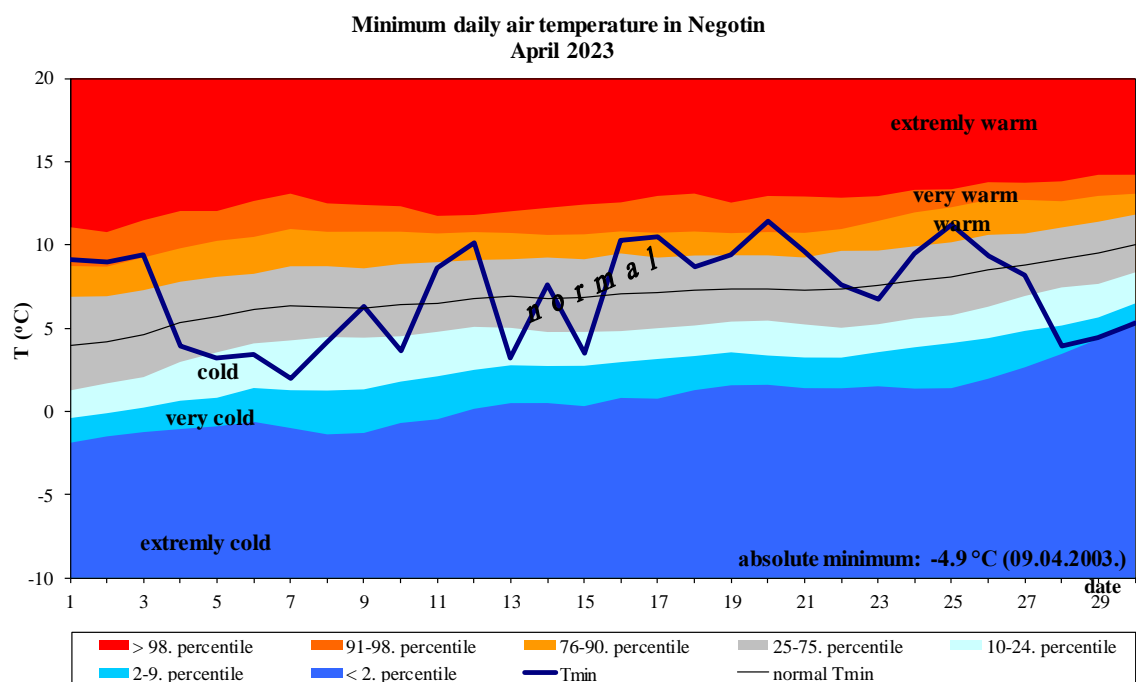
Appendix 18. Daily course of the minimum daily air temperature and the accompanying percentile for Novi Sad



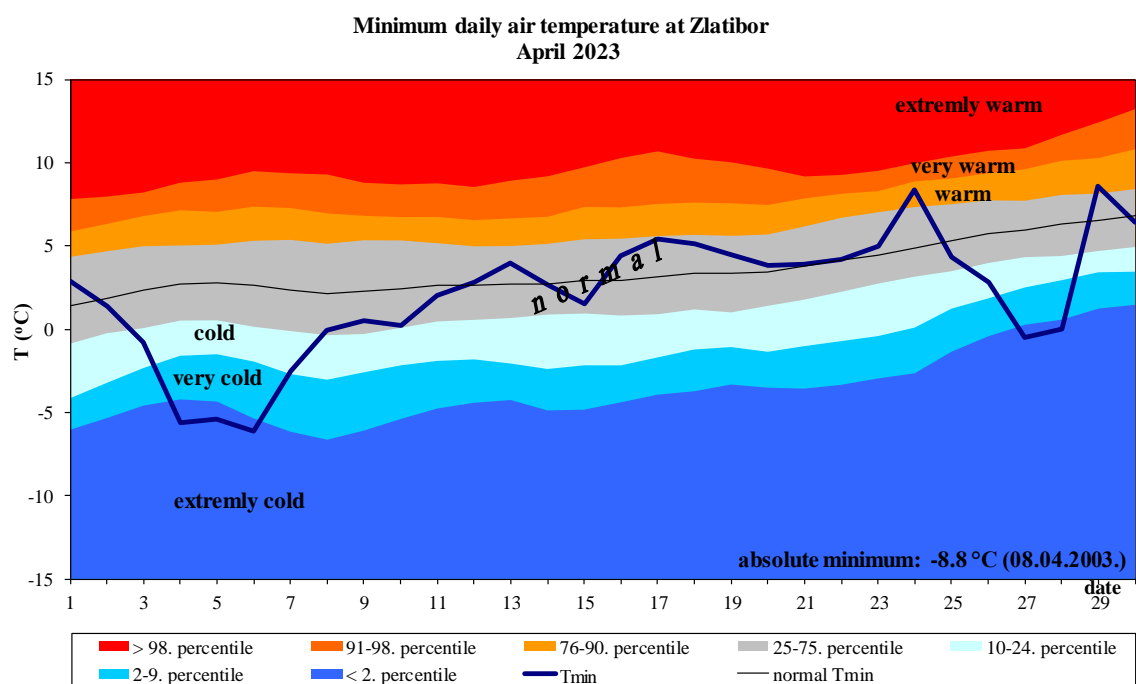
Appendix 19. Daily course of the minimum daily air temperature and the accompanying percentile for Loznica



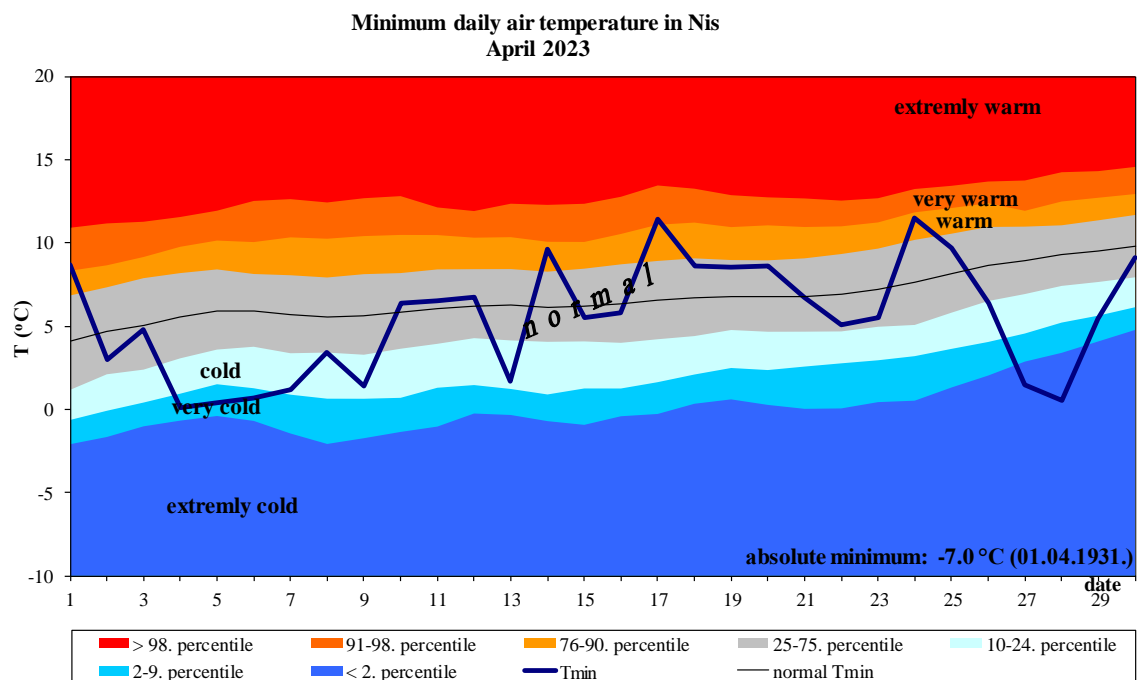
Appendix 20. Daily course of the minimum daily air temperature and the accompanying percentile for Kragujevac



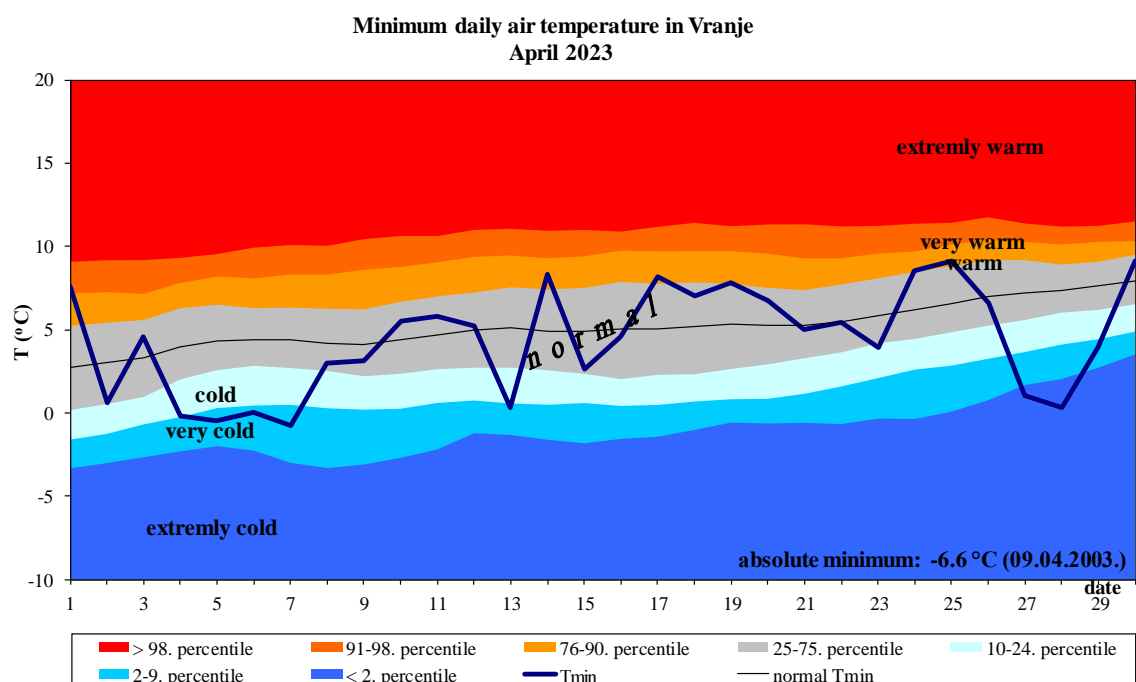
Appendix 21. Daily course of the minimum daily air temperature and the accompanying percentile for Negotin



Appendix 22. Daily course of the minimum daily air temperature and the accompanying percentile on Zlatibor

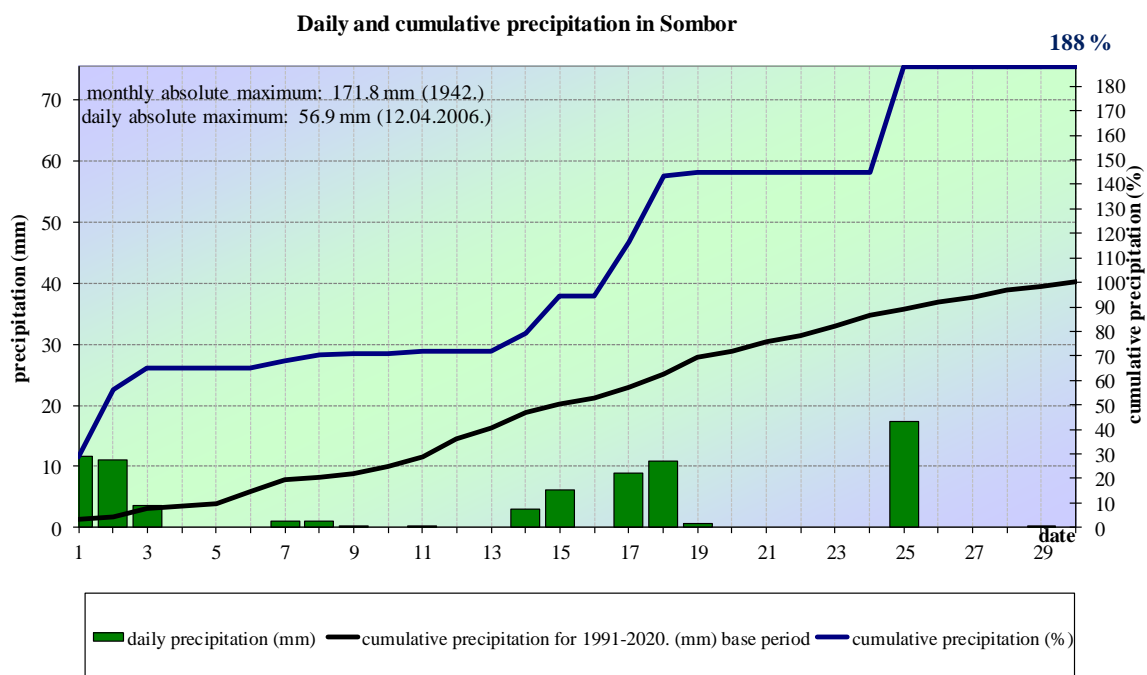


Appendix 23. Daily course of the minimum daily air temperature and the accompanying percentile for Nis

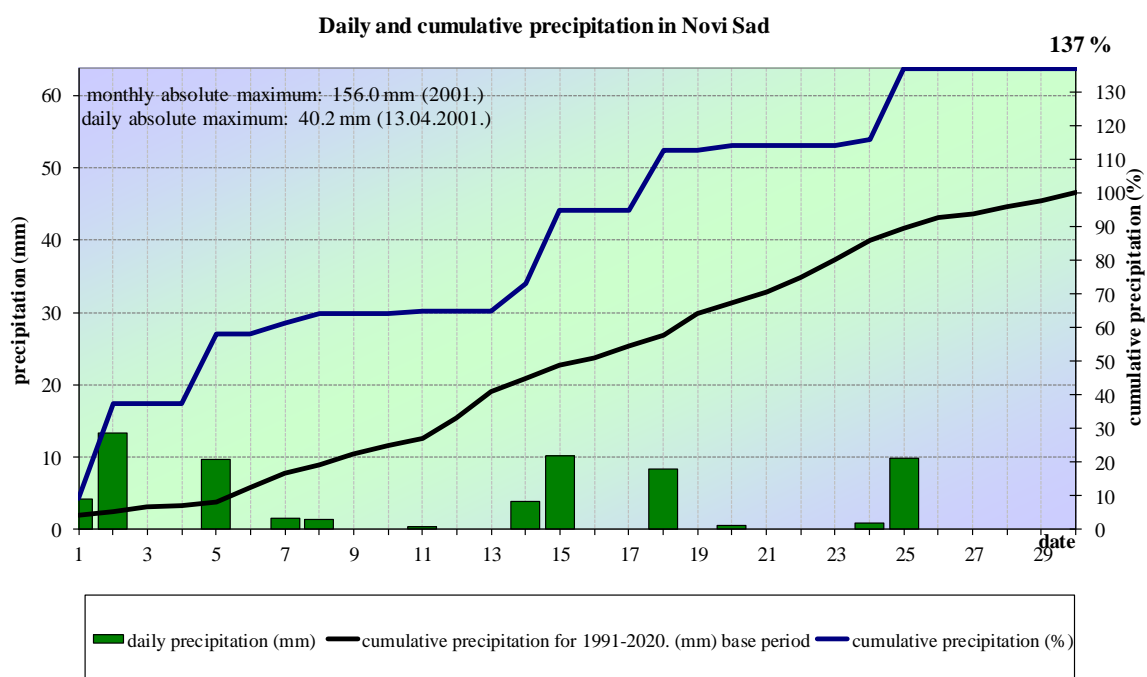


Appendix 24. Daily course of the minimum daily air temperature and the accompanying percentile for Vranje

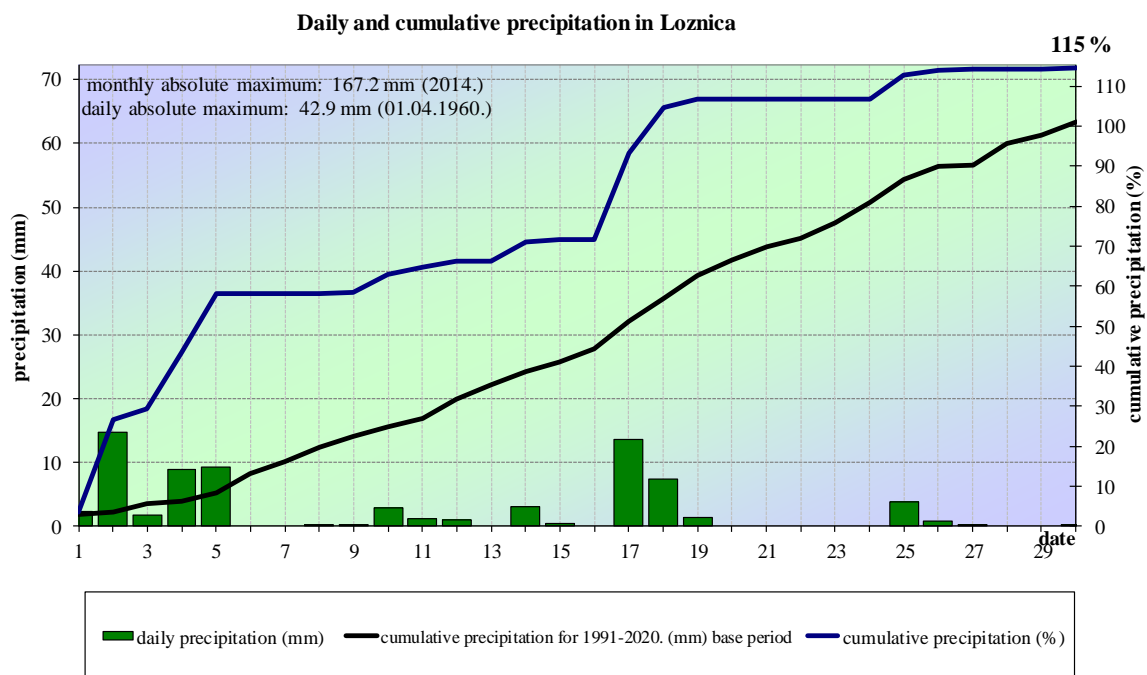
Precipitation



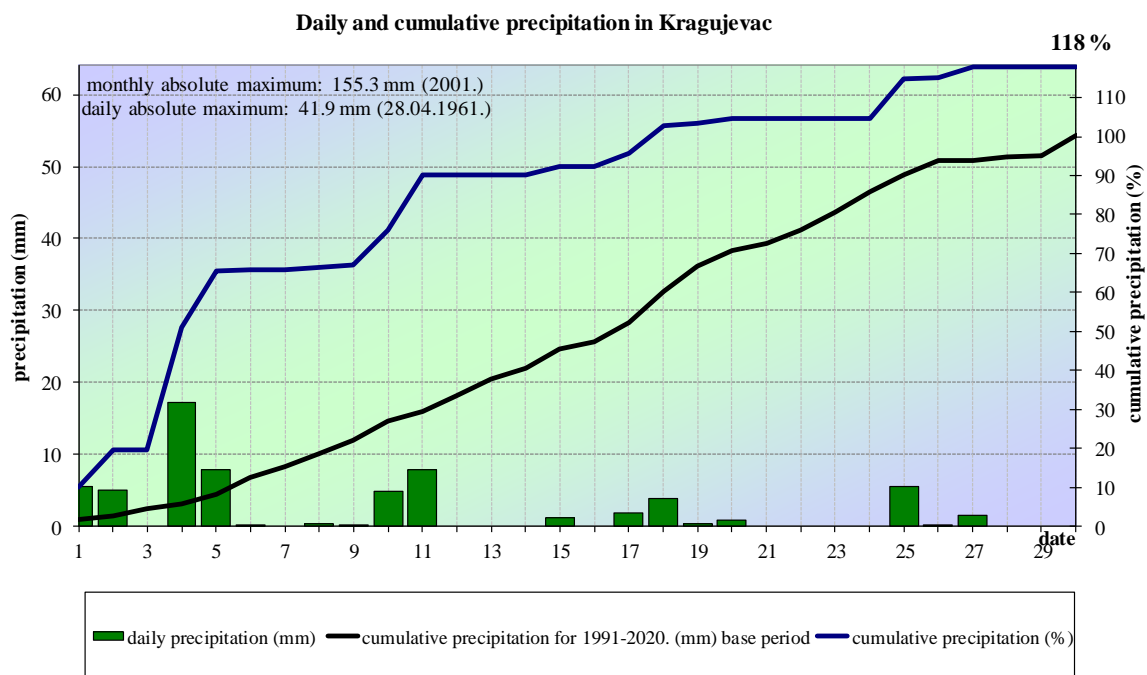
Appendix 25. Daily and cumulative precipitation sums for Sombor



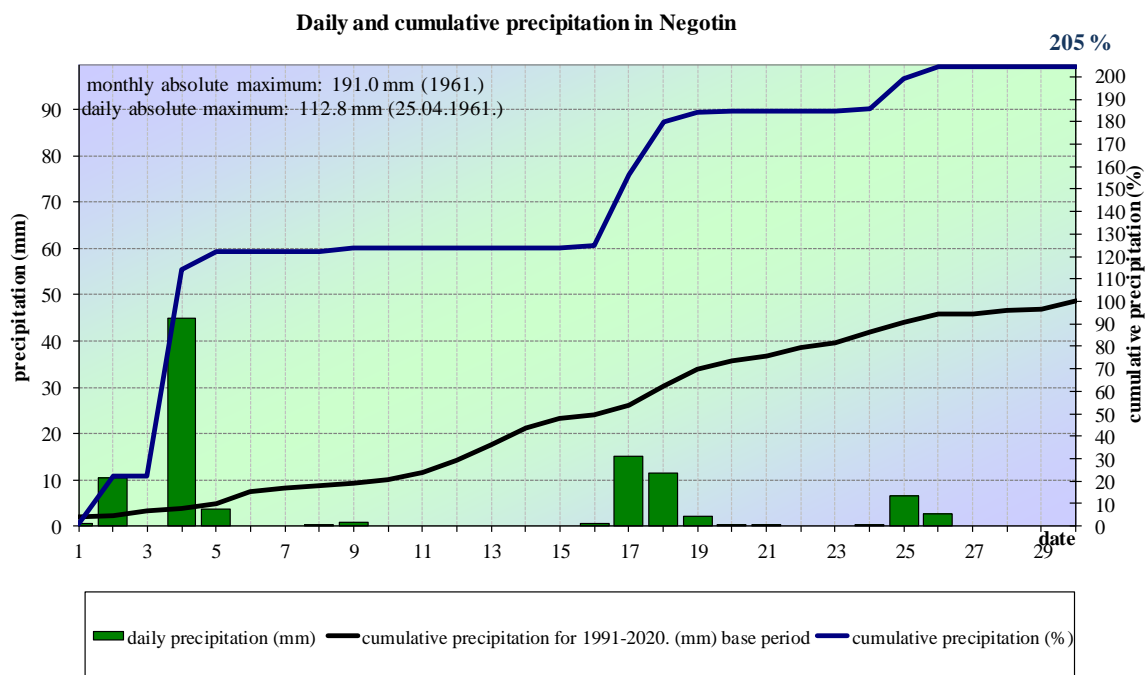
Appendix 26. Daily and cumulative precipitation sums for Novi Sad



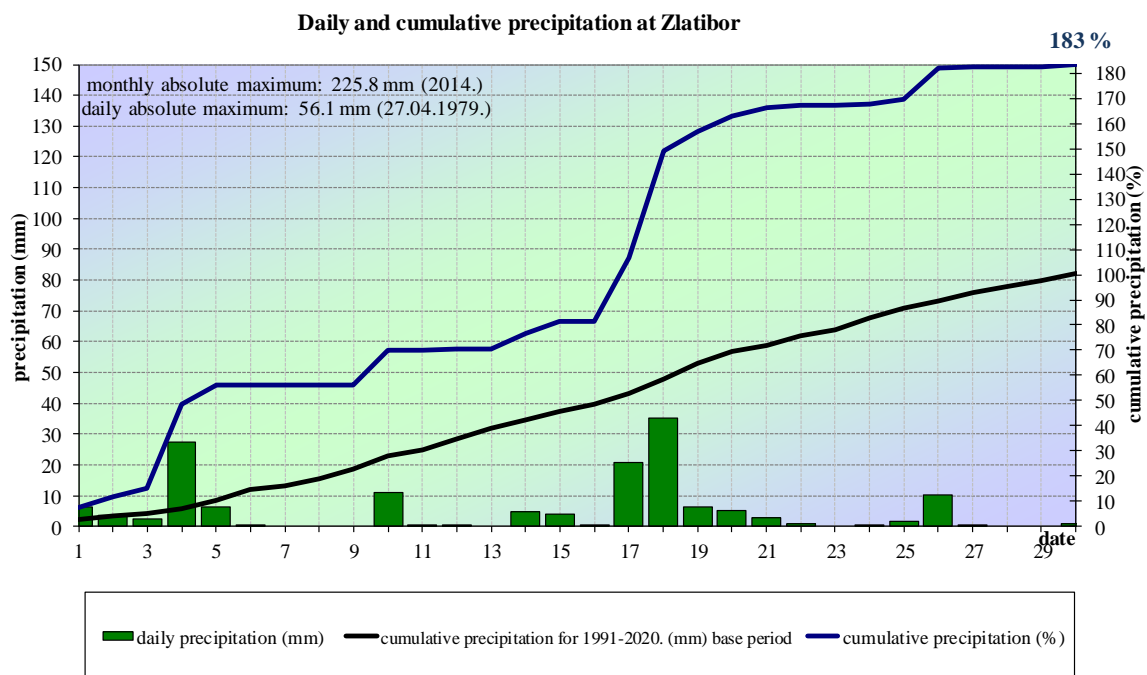
Appendix 27. Daily and cumulative precipitation sums for Loznica



Appendix 28. Daily and cumulative precipitation sums for Kragujevac

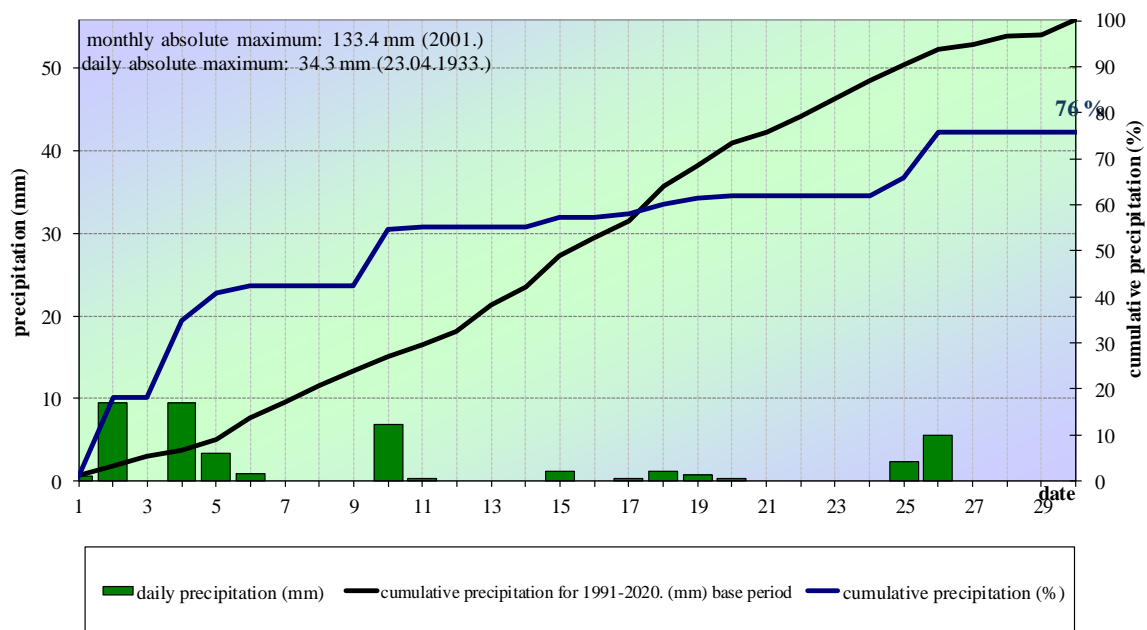


Appendix 29. Daily and cumulative precipitation sums for Negotin



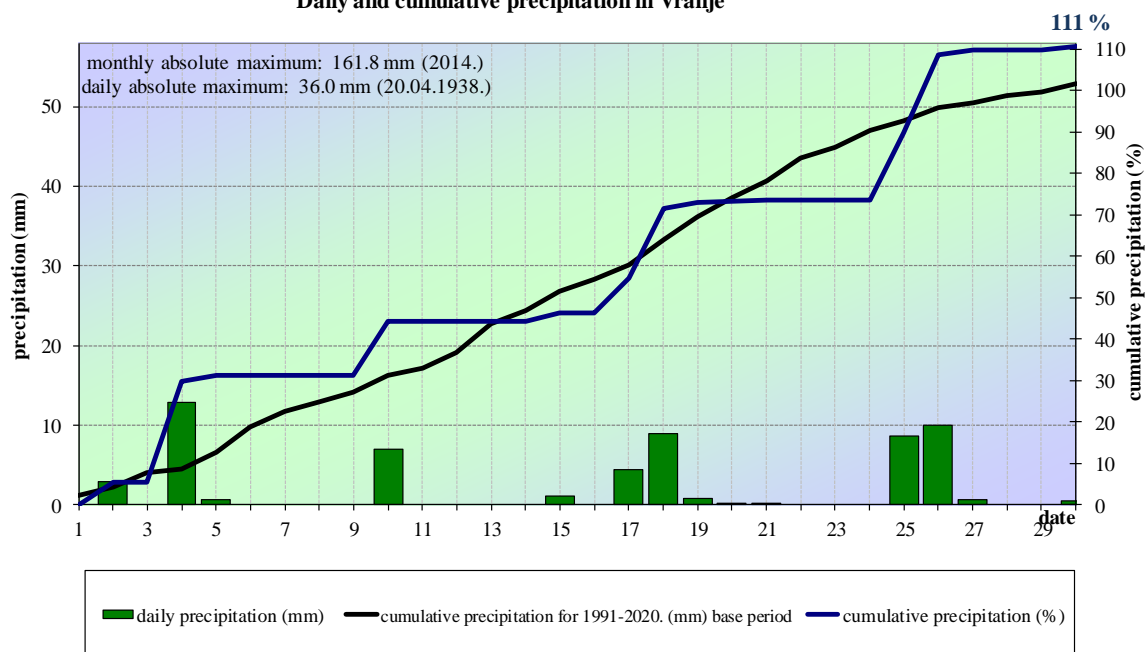
Appendix 30. Daily and cumulative precipitation sums on Zlatibor

Daily and cumulative precipitation in Nis



Appendix 31. Daily and cumulative precipitation sums for Nis

Daily and cumulative precipitation in Vranje



Appendix 32. Daily and cumulative precipitation sums for Vranje