Republic Hydrometeorological Service of Serbia
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Republic of Serbia

MONTHLY BULLETIN FOR SERBIA

MAY 2024

Belgrade, the 5th of June 2024

Division for Climate Monitoring and Climate Forecast
Department of National Center for Climate Change, Climate Model Development and Disaster Risk Assessment
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AIR TEMPERATURE

Mean monthly air temperature

Averagely warm May in most of the country. Mean air temperature in May ranged from 14,9ºC in Dimitrovgrad to 19,2ºC in Kikinda, Belgrade observed air temperature of 19,0ºC whereas on the mountains it ranged from 8,2ºC at Kopaonik to 12,9ºC at Zlatibor (*Figure 1*).

Departure of the mean monthly air temperature from the normal[1] for the 1991–2020 base period ranged from -0,6ºC in Negotin to +1,8ºC in Kikinda (*Figure 2).*

Mean air temperature, based on the percentile method[2], was in the normal category in most of the country, warm category on Palic, Sombor, Novi Sad, Zrenjanin, Kikinda, Loznica and Sremska Mitrovica (*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

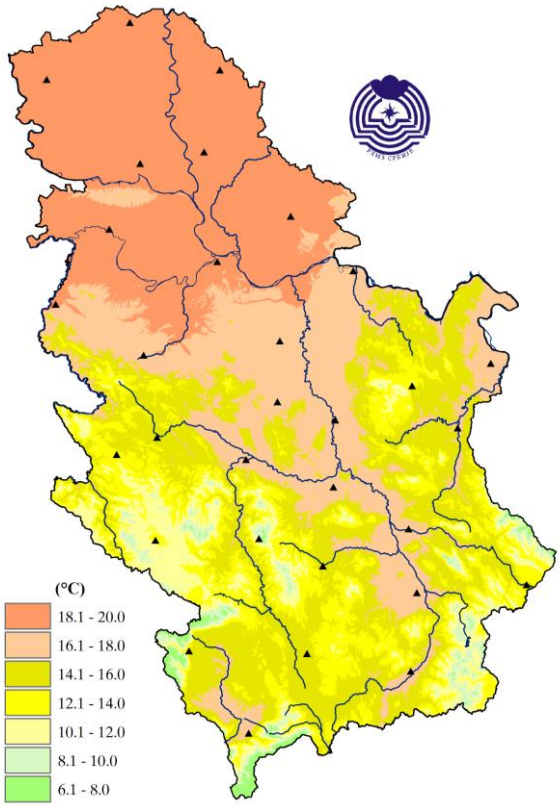


Figure 1. Spatial distribution of mean monthly air temperature (ºC)

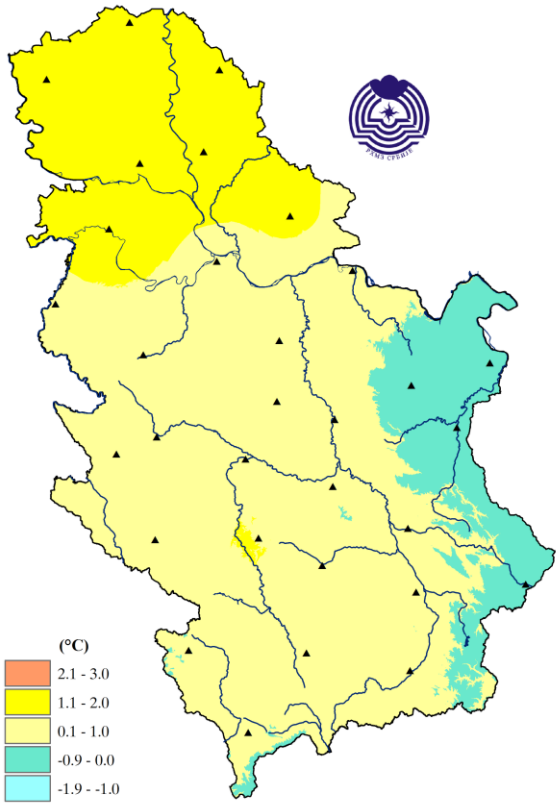


Figure 2. Spatial distribution of mean monthly air temperature anomaly (ºC)

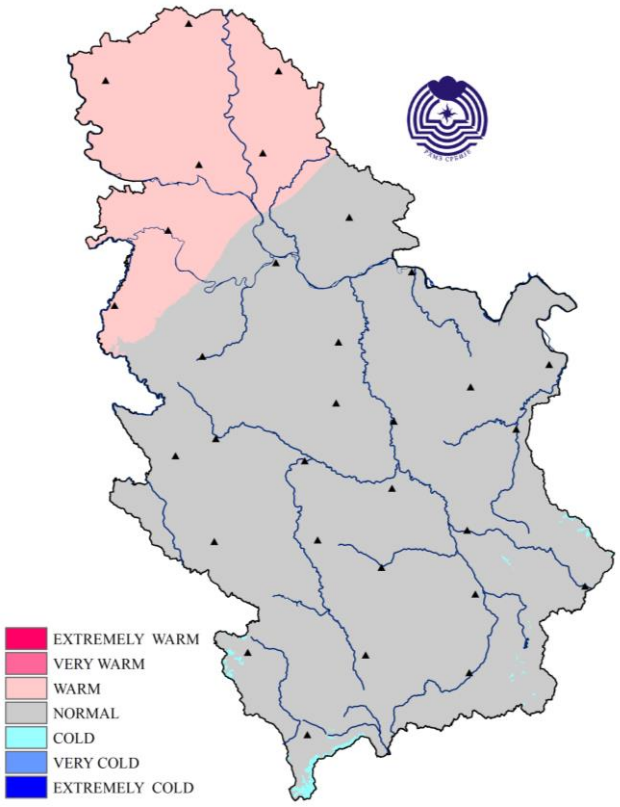


Figure 3. Spatial distribution of the mean monthly air temperature using percentile method

Mean daily air temperature in Belgrade, based on the percentile method, was within the average most of May (*Figure 4*). 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.

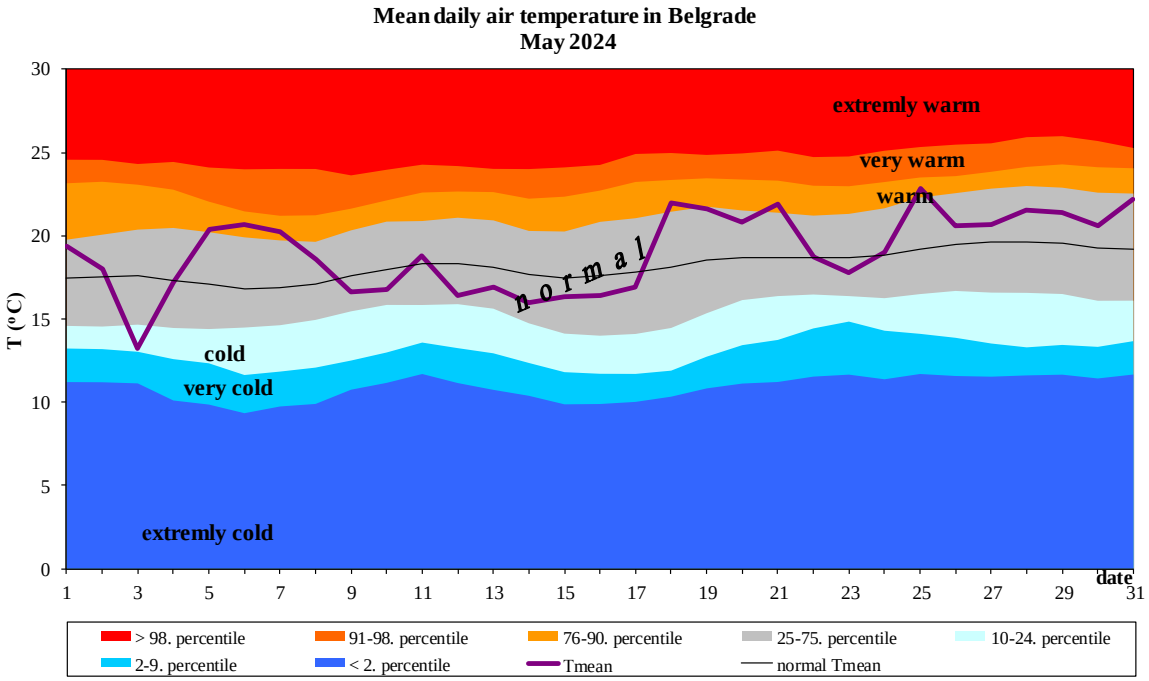


Figure 4. Daily course of the mean daily air temperature and accompanying percentiles for Belgrade

Maximum air temperature

Mean maximum air temperature in May ranged from 21,4ºC in Dimitrovgrad to 25,2ºC in Sombor, whereas Belgrade observed 24,2°C. On the mountains, mean maximum May air temperature ranged from 12,3ºC at Kopaonik to 18,4ºC in Sjenica.

Based on the percentile method, mean maximum monthly air temperature was in the normal category in most of the country, warm category on Palic, Sombor, Novi Sad, Kikinda, Loznica and Valjevo, and cold category at Crni Vrh and Zajecar.

The highest maximum daily air temperature of 29,9ºC was measured in Serbia on May 19 in Novi Sad while Belgrade observed 27,8ºC on May 25 and 27.

Summer days[3] were recorded in most of the country aside on the mountains. Number of summer days ranged from 5 in Dimitrovgrad to 18 in Sombor. The observed number of summer days was 2 to 5 days above the average in the north.

Figure 5 shows daily course of the maximum daily air temperature and the accompanying percentiles for Belgrade in May 2024 and for the stations Sombor, Novi Sad, Loznica, Negotin, Kragujevac, Zlatibor, Nis and Vranje are given in the Appendix.

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

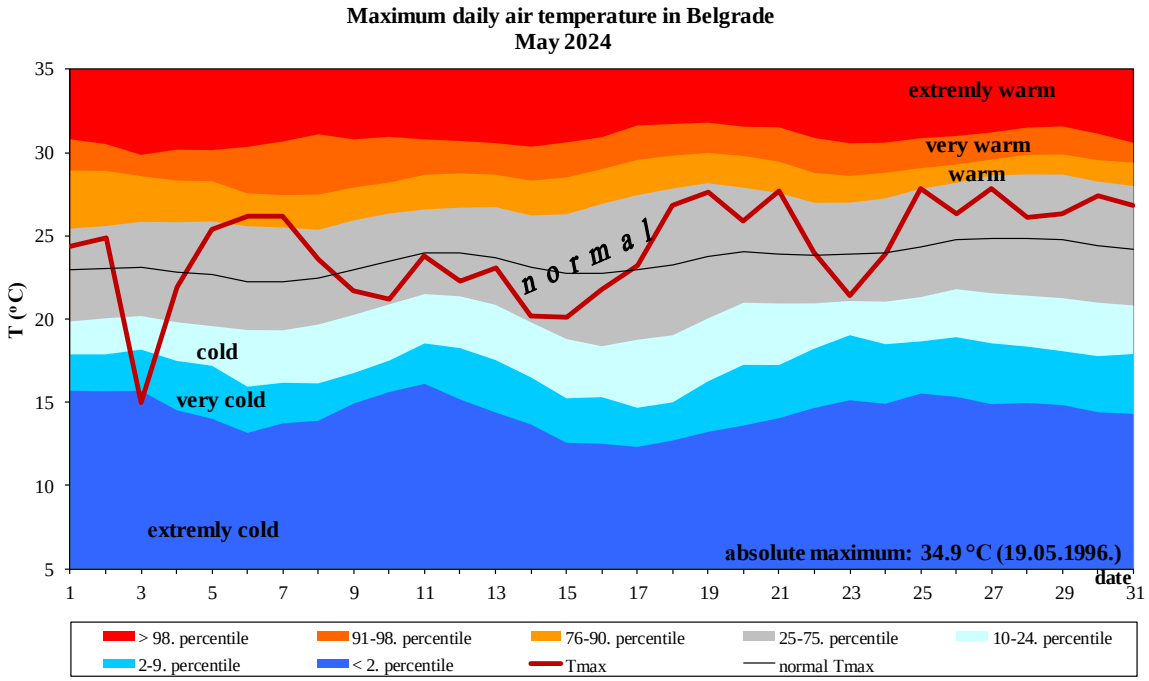


Figure 5. Daily course of the maximum daily air temperature and accompanying percentiles for Belgrade

Minimum air temperature

Mean minimum air temperature in May ranged from 9,9ºC in Dimitrovgrad to 14,3ºC in Belgrade. On the mountains, mean minimum air temperature ranged from 4,9ºC at Kopaonik to 8,8ºC at Zlatibor.

Based on the percentile method, mean minimum monthly air temperature was in the categories of warm and very warm in most of the country, and normal in Negotin and Crni Vrh.

The lowest minimum daily air temperature of 0,7ºC was measured in Sjenica on May 12. In the low-lying areas, the lowest daily air temperature of 3,6ºC was measured in Dimitrovgrad on May 11. On May 13, Belgrade observed the lowest monthly air temperature of 9,7ºC.

Figure 6 shows assessment of the minimum and maximum air temperature in Serbia for May based on the tercile distribution relative to the 1991-2020 base period. It can be noted that the mean minimum air temperature was above the upper tercile threshold and the mean maximum air temperature was within the average.

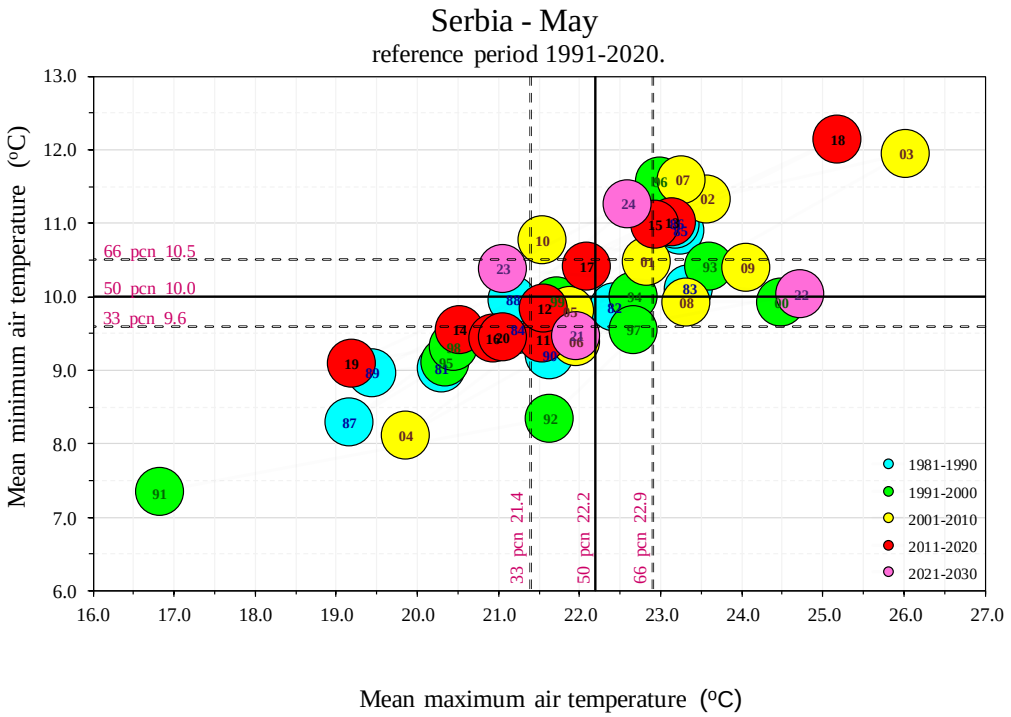


Figure 6. Assessment of minimum and maximum air temperature for Serbia with the accompanying terciles in relation to the 1991-2020 base period

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

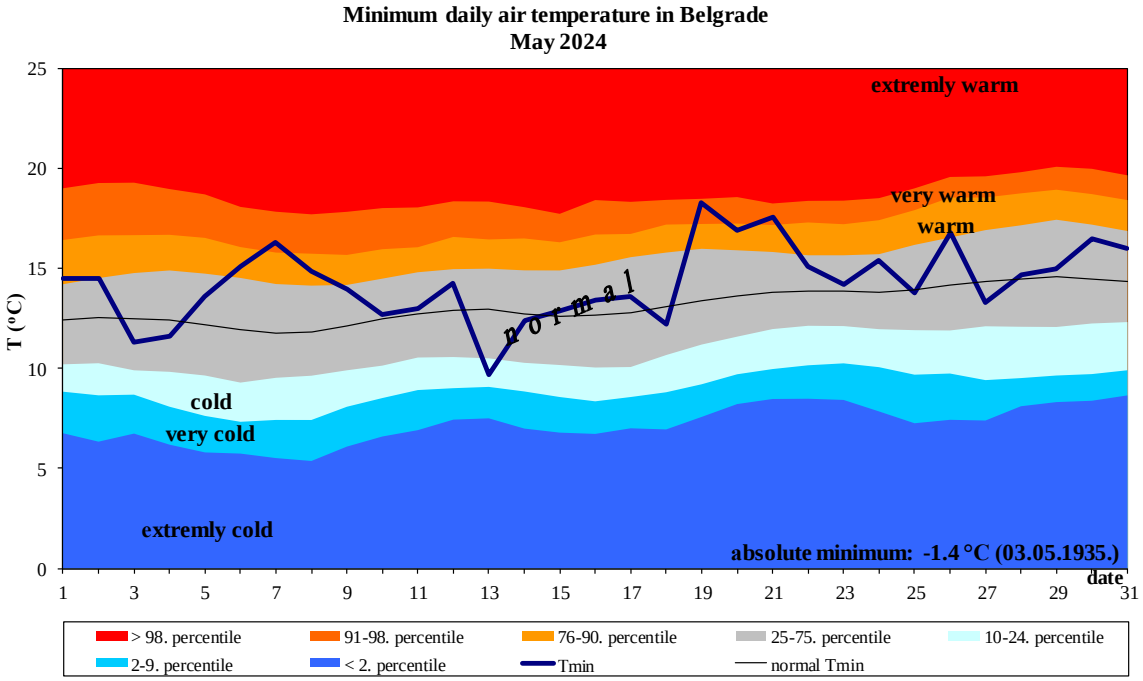


Figure 7. Daily course of the minimum daily air temperature and accompanying percentiles for Belgrade

PRECIPITATION

May precipitation sums ranged from 46,8 mm on Palic to 151,4 mm in Sremska Mitrovica, while Belgrade recorded 111,3 mm of precipitation (*Figure 8*).

Precipitation totals compared to the normal for the 1991-2020 base period ranged from 75% on Palic and Valjevo to 222% in Sremska Mitrovica *(Figure 9*).

Based on the percentile method, precipitation sums were in the categories of normal and rainy in most of the country, very rainy in Sremska Mitrovica, Belgrade, Negotin, Pozega, Leskovac and Vranje (*Figure 10).*

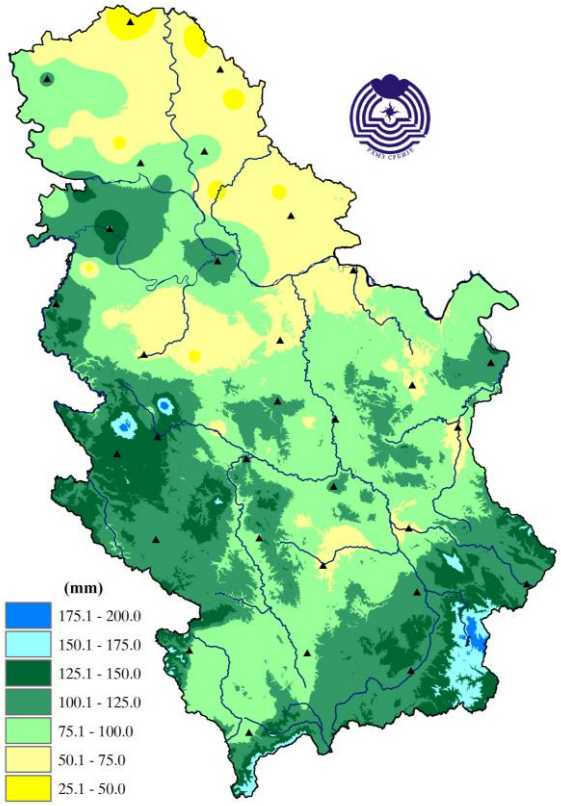


Figure 8. Spatial distribution of the monthly precipitation sums (mm) according to data from 28 major meteorological, 20 climatological and 76 rain gauge stations

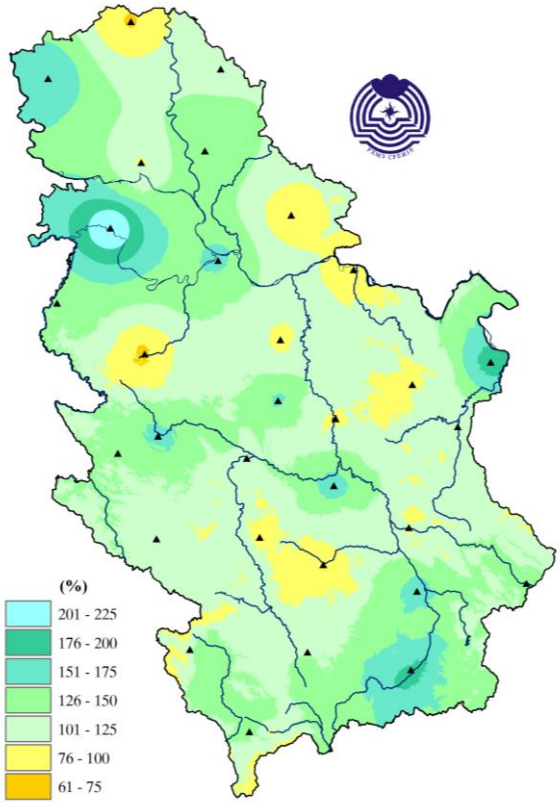


Figure 9. Spatial distribution of the monthly precipitation sums in the percentages of normal for the 1991–2020 base period

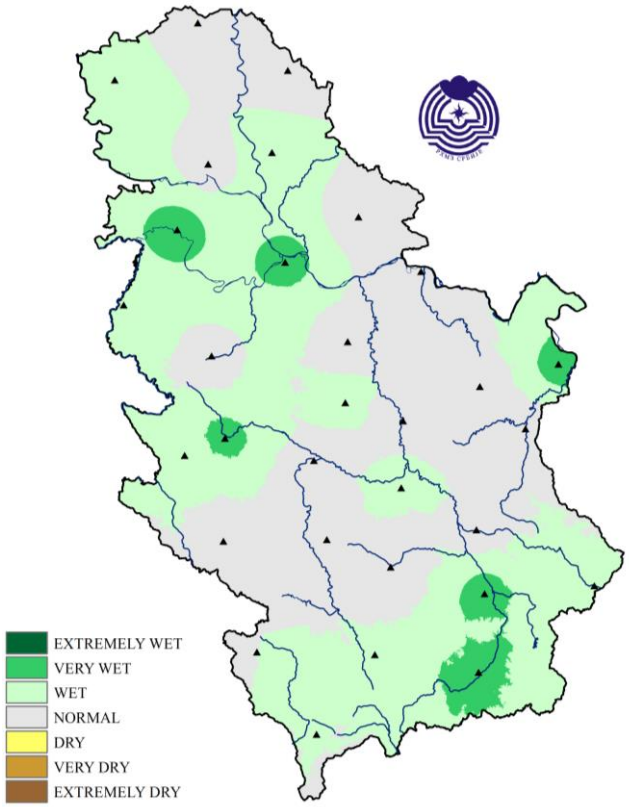
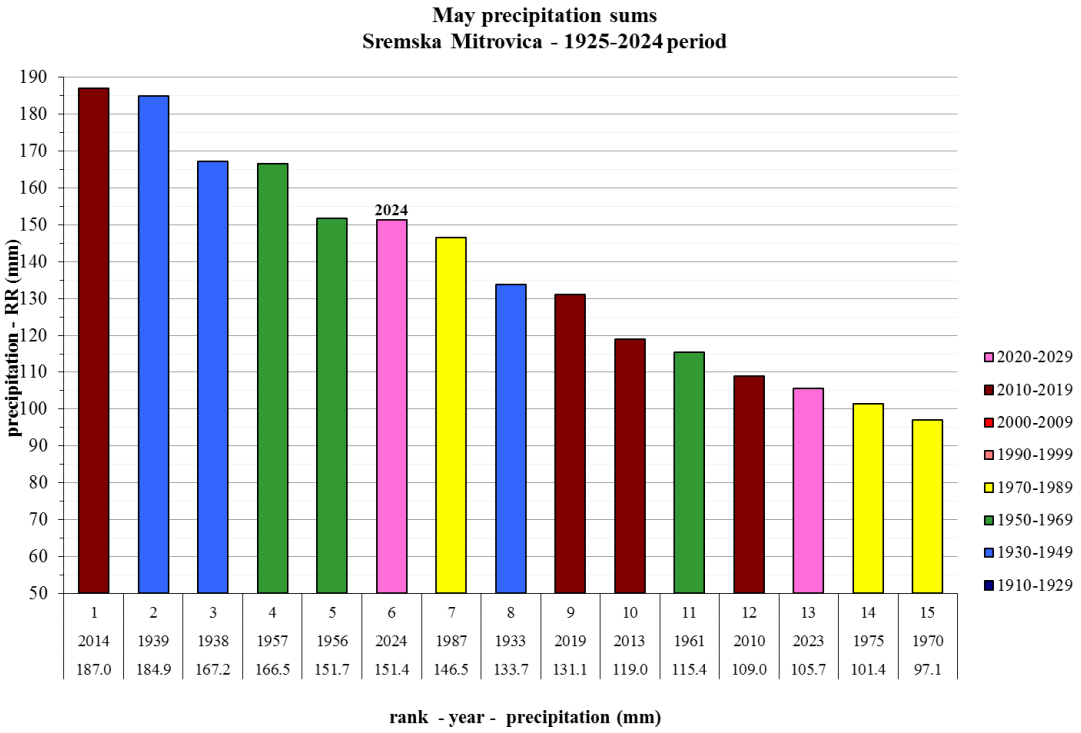


Figure 10. Monthly precipitation sums according to the percentile method

May 2024 ranks as **the 6th wettest** for Sremska Mitrovica, and **the 7th wettest** for Vranje (*Figures 11 and 12).*



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2014	1939	1938	1957	1956	2024	1987	1933	2019	2013	1961	2010	2023	1975	1970
187.0	184.9	167.2	166.5	151.7	151.4	146.5	133.7	131.1	119.0	115.4	109.0	105.7	101.4	97.1

Figure 11. Rank of the highest precipitation in Sremska Mitrovica

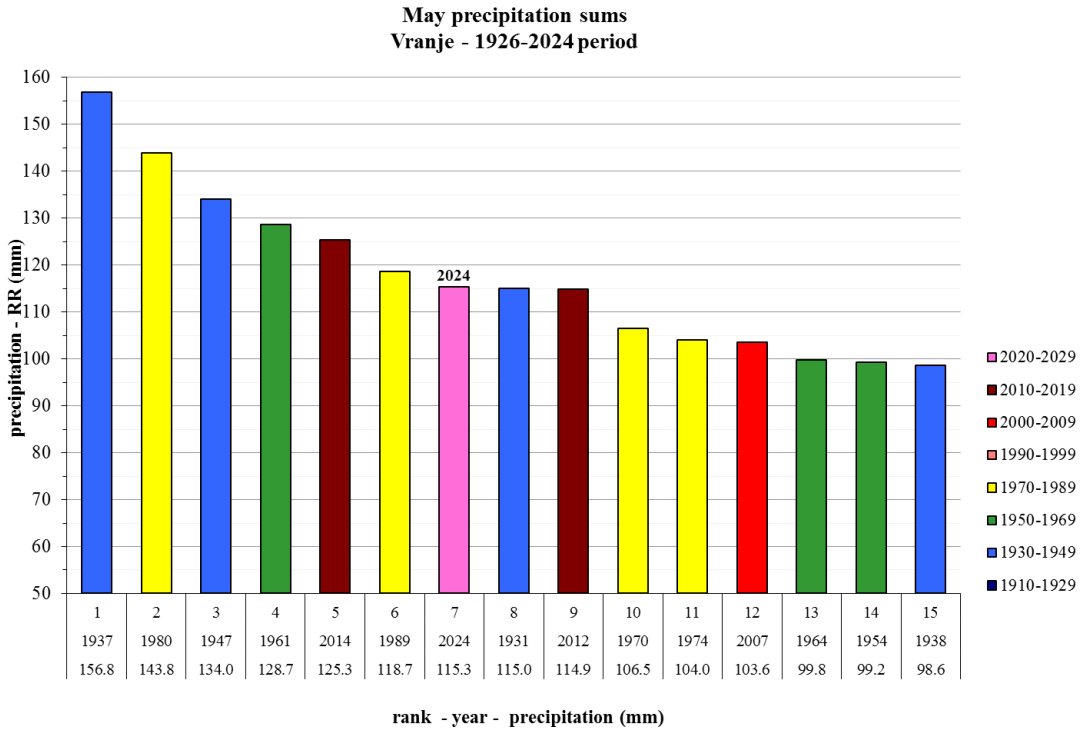


Figure 12. Rank of the highest precipitation in Vranje

The highest daily precipitation sum of 55,2 mm was recorded in Kikinda on May 23. On May 3, Belgrade observed the highest daily precipitation sum of 44,5 mm.

The number of days with precipitation in May ranged from 8 in Sombor to 20 at Kopaonik and Zlatibor *(Figure 13)*. The observed number of days with precipitation was around and below the average in the northern areas, up to 5 days in Sombor, elsewhere above the average, up to 6 days above the average in Kursumlija and Krusevac (*Figure 14*).

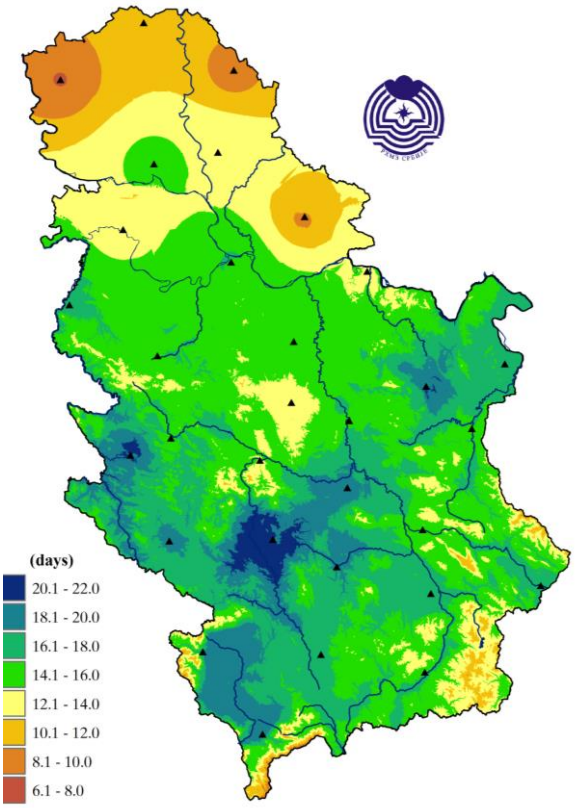


Figure 13. Spatial distribution of number of days with precipitation

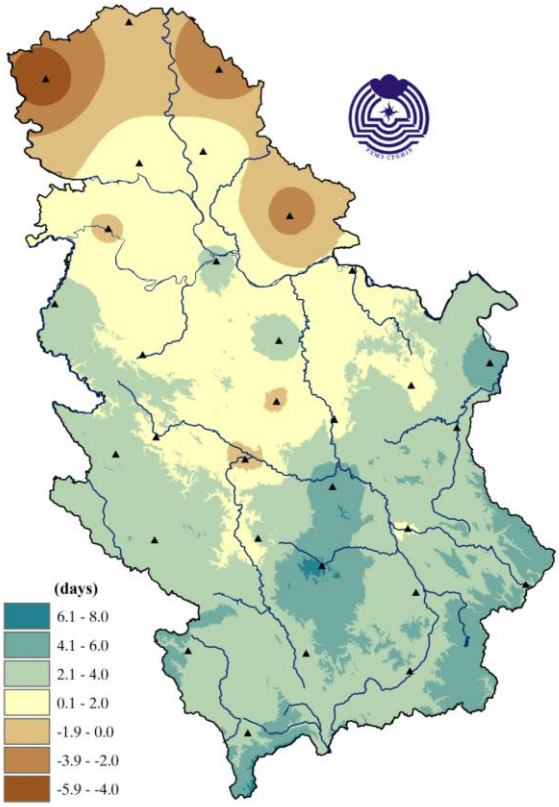


Figure 14. Spatial distribution of deviation of number of days with precipitation

Figure 15 shows assessment of air temperature and precipitation sums for Serbia for May based on the tercile distribution relative to the 1991 – 2020 base period. It can be noted that May 2024 was marked by air temperature at the upper tercile threshold and precipitation sums slightly above the upper tercile threshold.

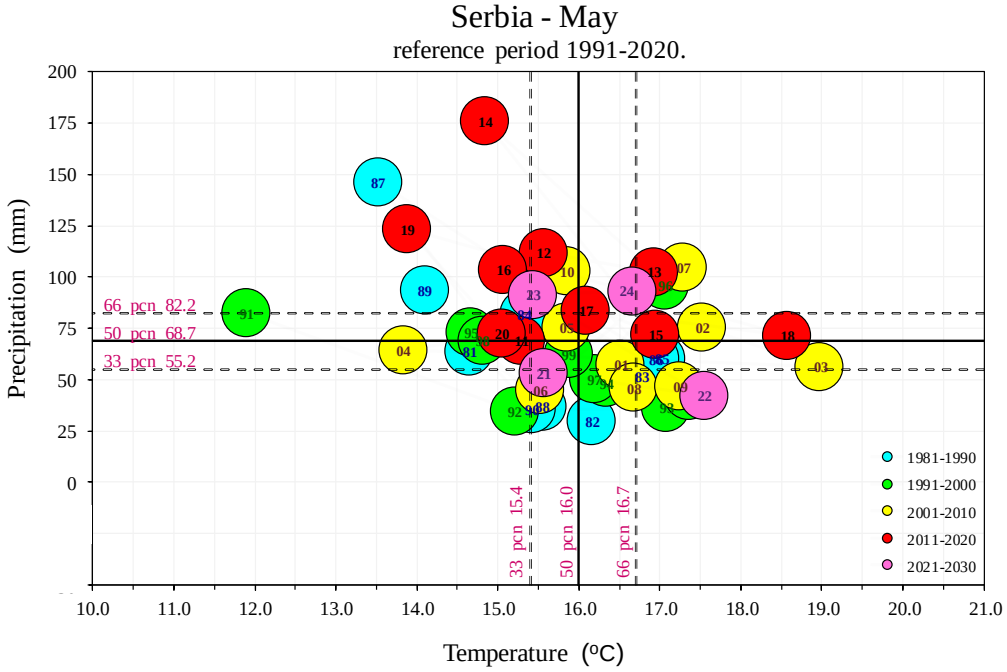


Figure 15. Assessment of air temperature and precipitation for Serbia with the accompanying terciles in relation to the 1991-2020 base period

Figure 16 show daily and cumulative precipitations sums with averaged normal 1991-2020 for May in Belgrade, and for the stations Sombor, Novi Sad, Loznica, Negotin, Kragujevac, Zlatibor, Nis and Vranje precipitation sums are given in Appendix.

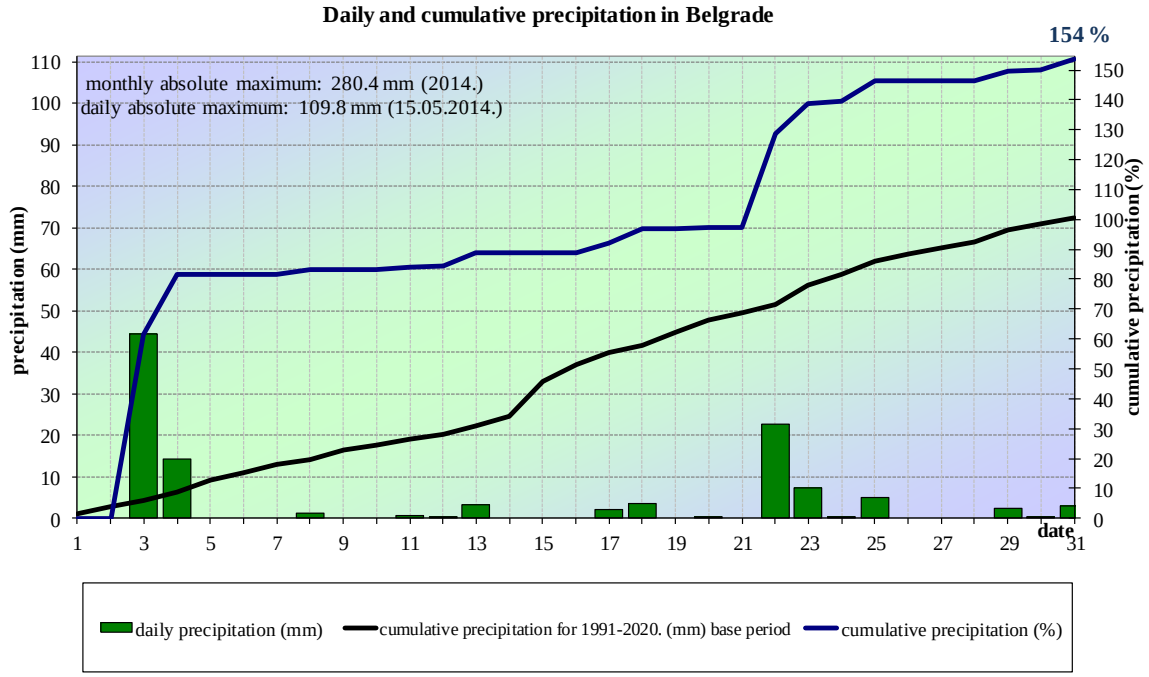


Figure 16. Daily and cumulative precipitation in Belgrade

CLOUD COVER, BRIGHT AND CLOUDY DAYS

Mean May cloud cover in Serbia was around the average, ranging from 5/10 to 8/10. Average daily cloud cover in May for Belgrade, Crni Vrh and Sombor is shown in Figures 17, 18 and 19.

Most places didn't see any bright days[4], whereas the highest number, total of 4 days was recorded in Banatski Karlovac. Belgrade observed 3 bright days. The observed number of bright days was 1 to 5 days below the May average in most of the country.

The least number of cloudy days[5] was recorded in Sombor, Loznica and Belgrade, total of 3 days, while the highest number of cloudy days, total of 14 days, was recorded at Crni Vrh and Kopaonik. Number of cloudy days was below the average in the north and west, elsewhere above the May average, with Kursumlija observing 6 days above the May average.

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

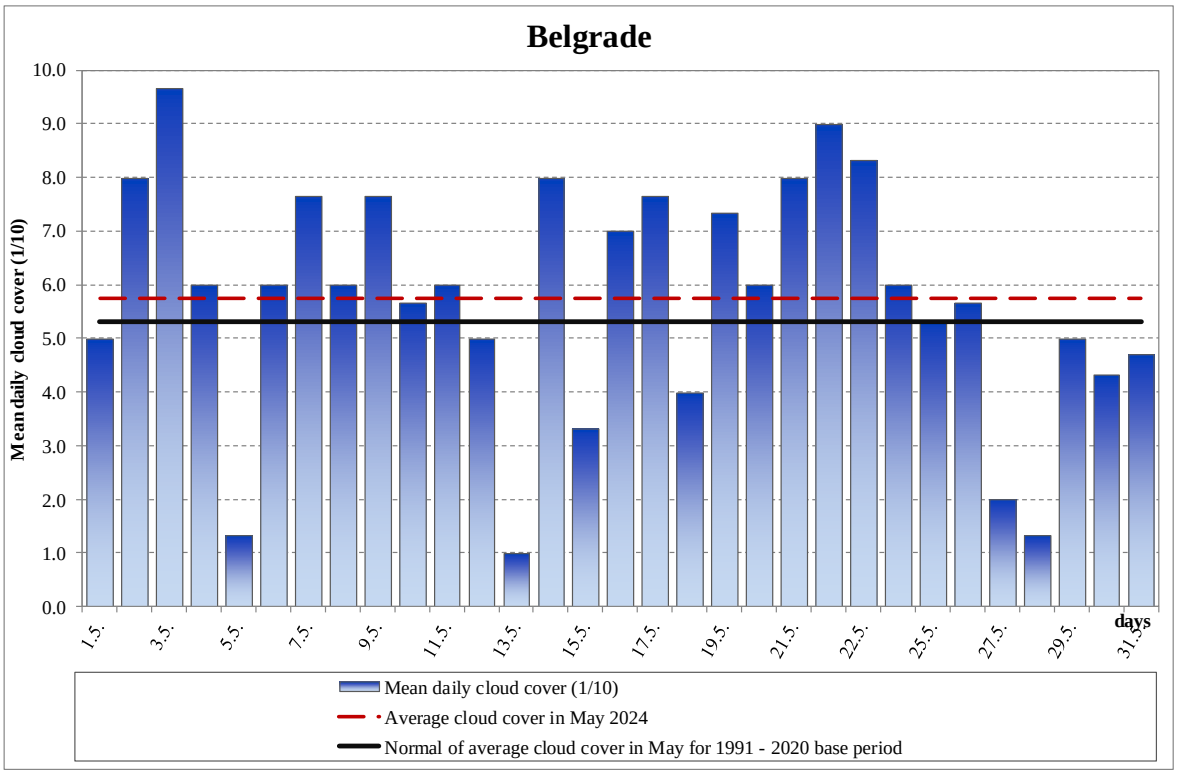


Figure 17. Mean daily cloud cover in Belgrade

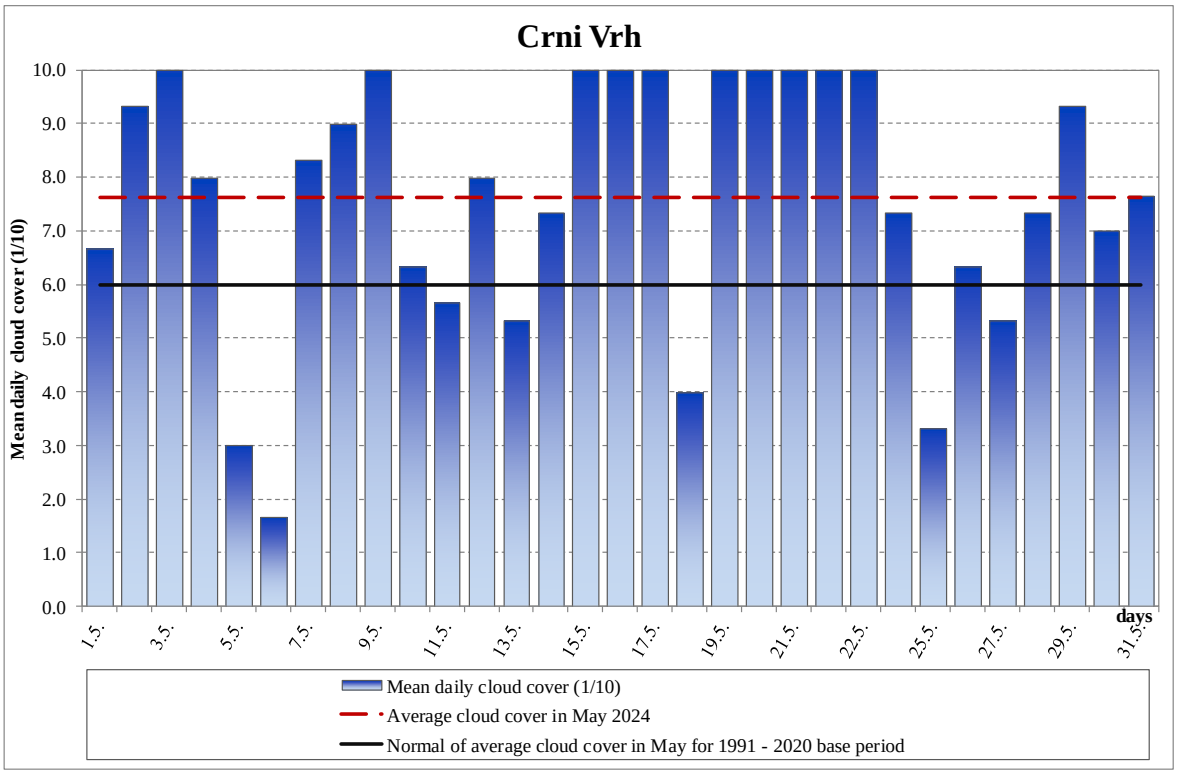


Figure 18. Mean daily cloud cover on Crni Vrh

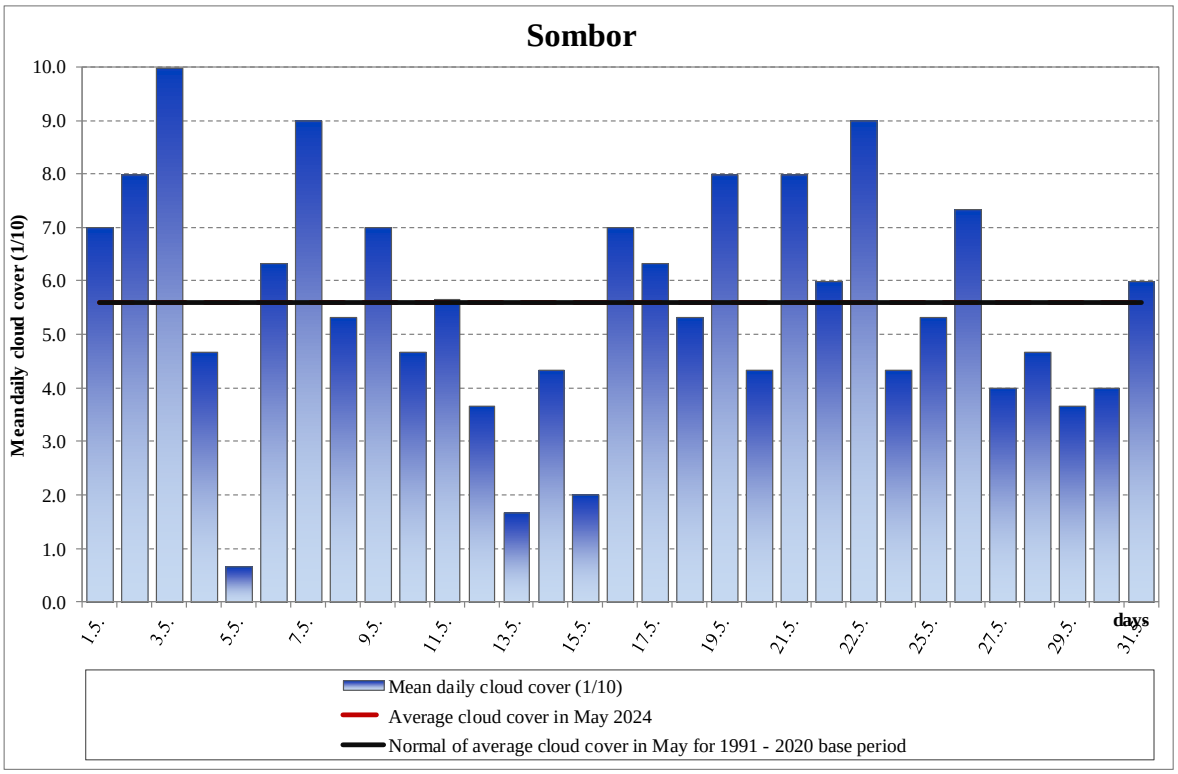


Figure 19. Mean daily cloud cover in Sombor

SUNSHINE DURATION (INSOLATION)

Sunshine duration in May ranged from 145,8 hours at Crni Vrh to 305,4 hours in Kikinda (*Figure 20*).

Sunshine duration in May ranged from 67% at Crni Vrh to 117% in Kikinda compared to the normal for the 1991-2020 base period *(Figure 21).*

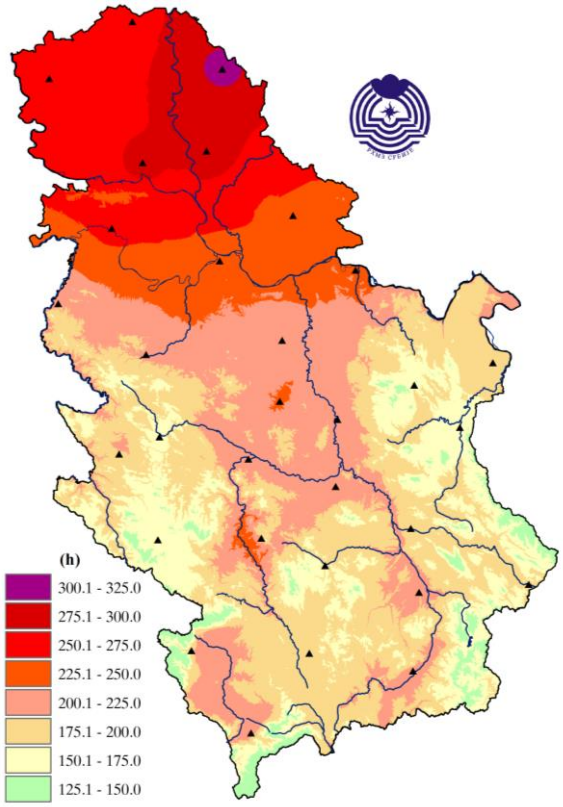


Figure 20. Insolation, expressed in hours

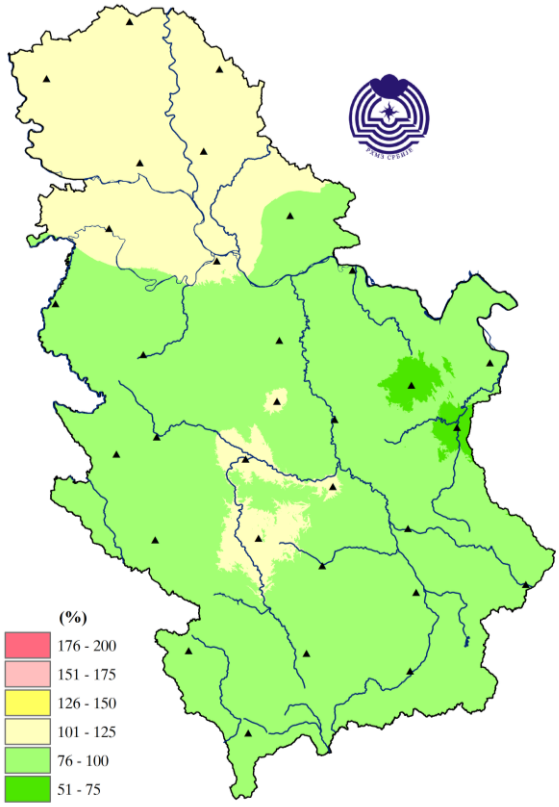


Figure 21. Insolation expressed in the percentages of normal

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

OVERVIEW OF THE SYNOPTIC SITUATION*

Short periods of influence of the ridge, settled and dry weather; prolonged changeable and unsettled with frequent rain, showers and thunderstorms, locally heavy precipitation in a short time accompanied by severe weather

Period at the very beginning of the month was marked by the influence of a ridge and a warm air mass on the front side of a low pressure emanating from the northwest of the continent, resulting in warm and dry weather. The subsequent period was characterized by incursion from the west and northwest, from the area of the Alps, the northern Adriatic, and the western Balkans. Simultaneously, the passage of a low pressure field and accompanying waves of wet and cold air over our country caused cloudy weather with rain, showers and thunderstorms, in the north and east with scattered heavy rain and cold conditions. In the second part of the first decade, a ridge was temporarily established with the advection of a warm air mass along the axis of the ridge from North Africa across the central Mediterranean, bringing warmer and predominantly dry weather in most areas. In the ensuing days, the next incursion of a wave of wet and unstable air from the north took place, as part of a low pressure generated in Eastern Europe.

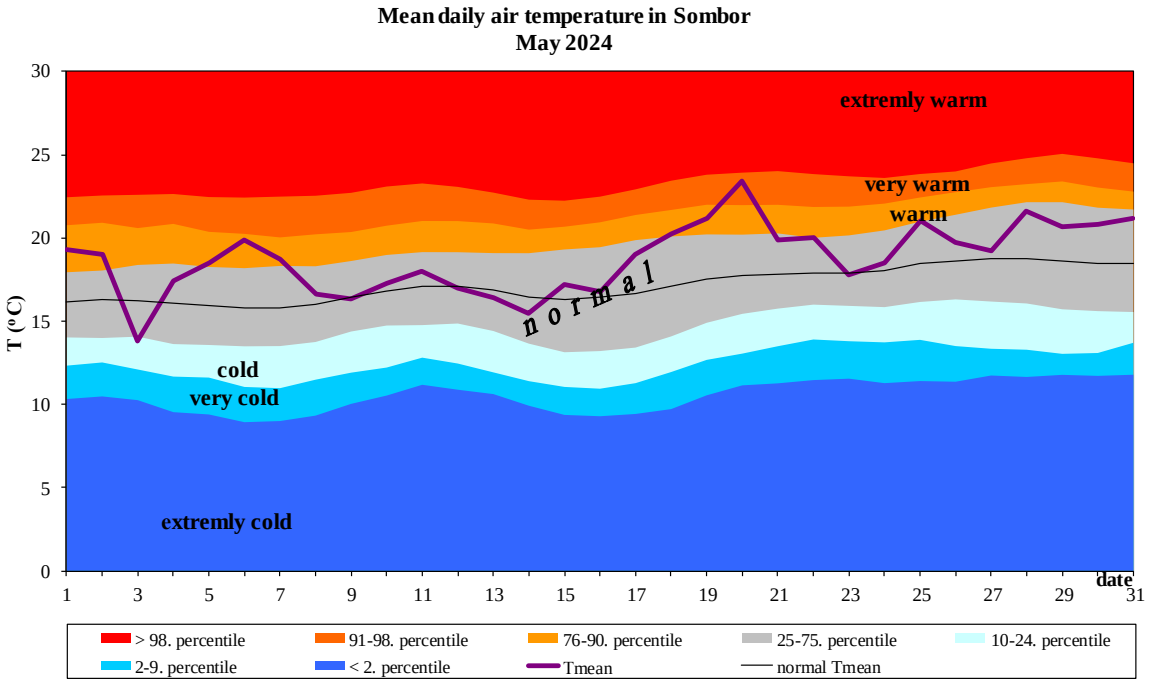
At the beginning of the second decade, the influence of the low-pressure field and accompanying frontal waves continued emanating from the south and southeast. Specifically, the development of a low-pressure field in the western Mediterranean and its transfer along the Mediterranean across the south of the Apennine Peninsula, the south and southeast of the Balkan Peninsula towards Asia Minor, and then the regeneration of the low pressure in the east. These synoptic and mesoscale processes caused changeable and unstable weather with occasional rain and showers, more frequent in the north and east compared to other parts of the country. In the middle of the second decade brief pause was registered, mostly without precipitation, followed by a new incursion from the west in the second half of the month. Initially, an increase in amplitude in the meridional direction across the British Isles and France towards the western Mediterranean and advection of warm air over the Apennines towards the Balkans, as well as strong gradients in the pressure field were observed. Windy, warm and changeable weather, but mostly dry, with cooler and cloudy weather in the east. Short-term precipitation, locally heavy, cheifly in the southwest and north on the southern and southeastern side of a spatial low-pressure field with weak gradients that spanned from northern Europe to the central and western Mediterranean.

Period at the beginning of the third decade marked development of low-pressure field in the northern Adriatic, influence of warm, wet and unsettled air mass and frontal waves in the southwestern upper air circulation as well as transfer of the mentioned low-pressure field towards the Baltics. More precipitation was observed in the western, southwestern and northern areas, at places heavy precipitation. In the following days, influence of spatial low air pressure field maintained, resulting with changeable and unsettled weather with rain, showers and thunderstorm, with strong wind, hail, severe thunderstorms and intense lightning.

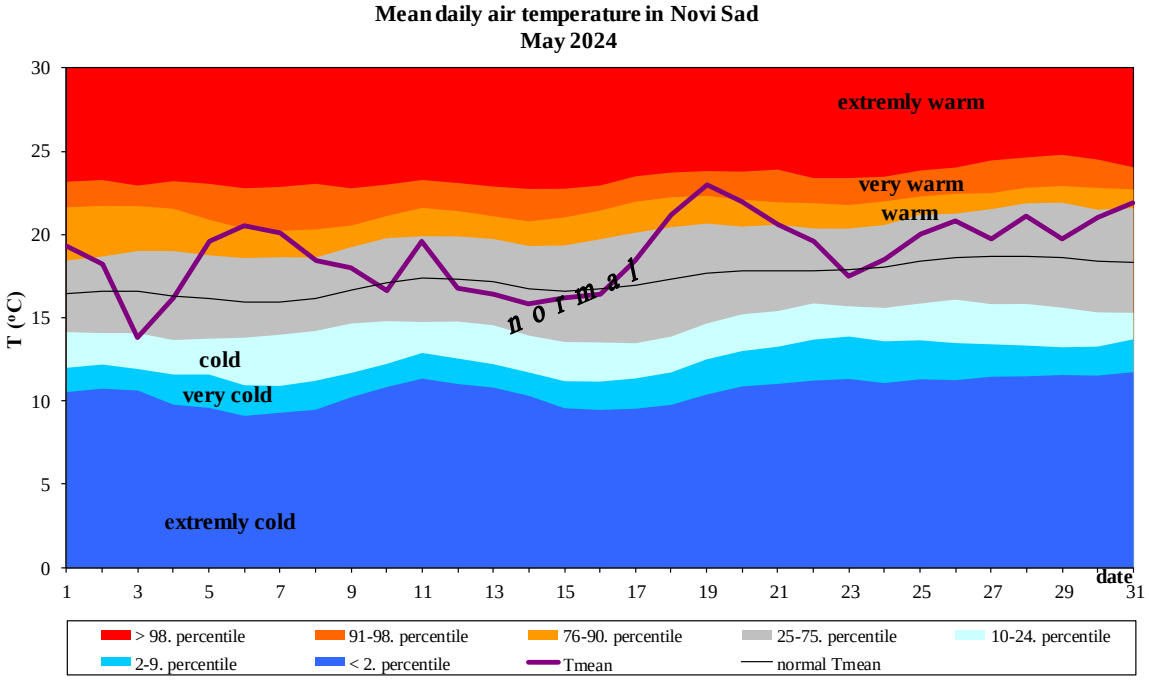
* National Center for Hydrometeorlogical Early Warning System

APPENDIX

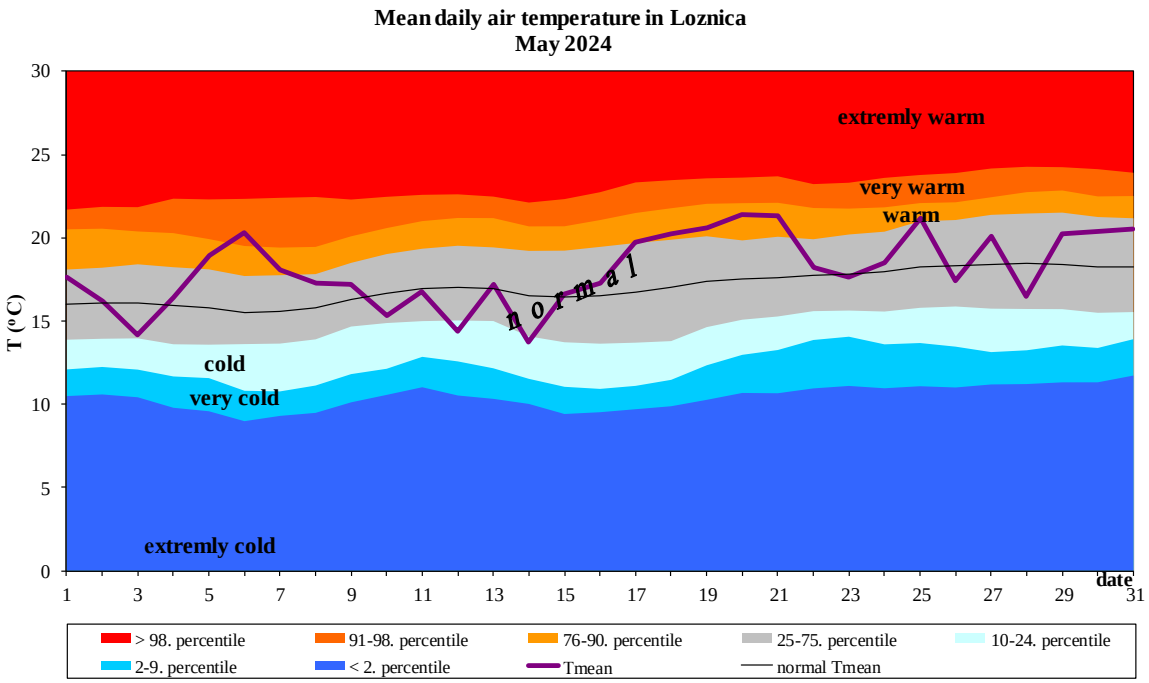
Mean air temperature



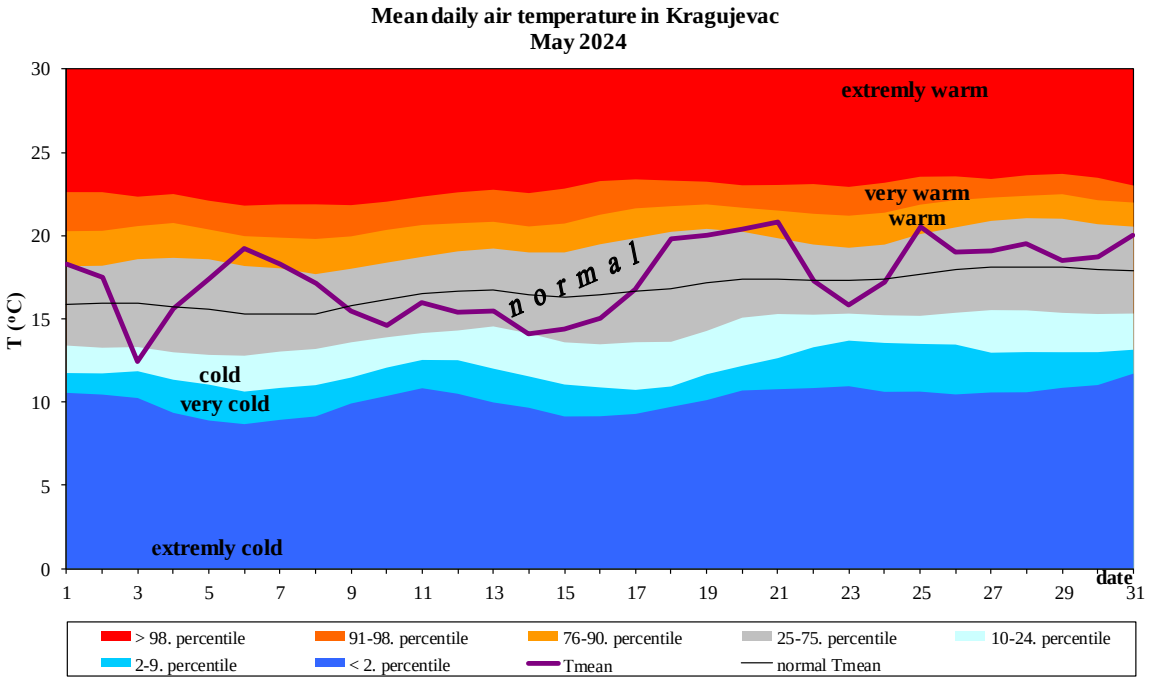
Appendix 1. Daily course of the mean daily air temperature and accompanying percentile for Sombor



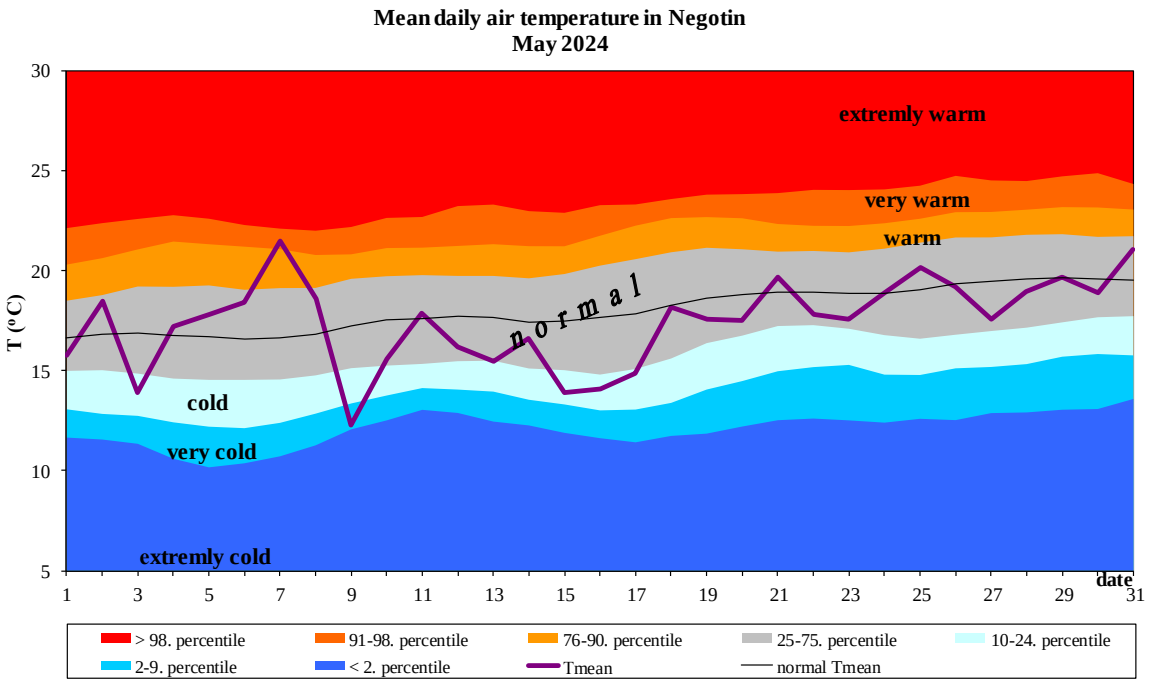
Appendix 2. Daily course of the mean daily air temperature and accompanying percentile for Novi Sad



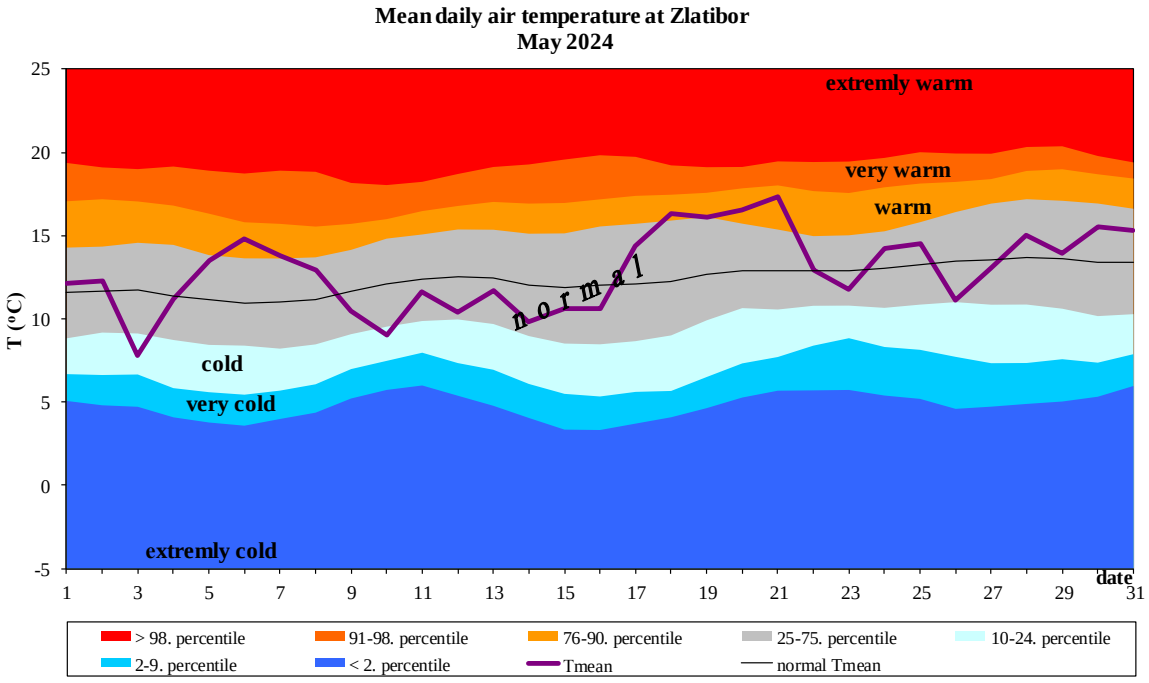
Appendix 3. Daily course of the mean daily air temperature and accompanying percentile for Loznica



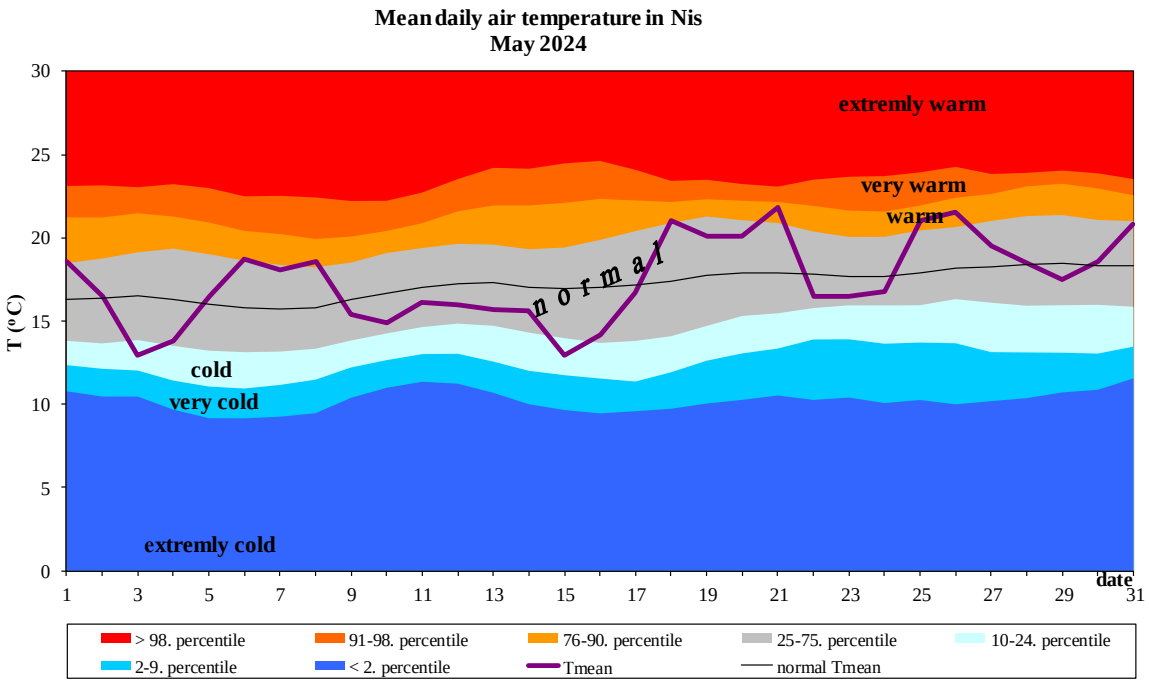
Appendix 4. Daily course of the mean daily air temperature and accompanying percentile for Kragujevac



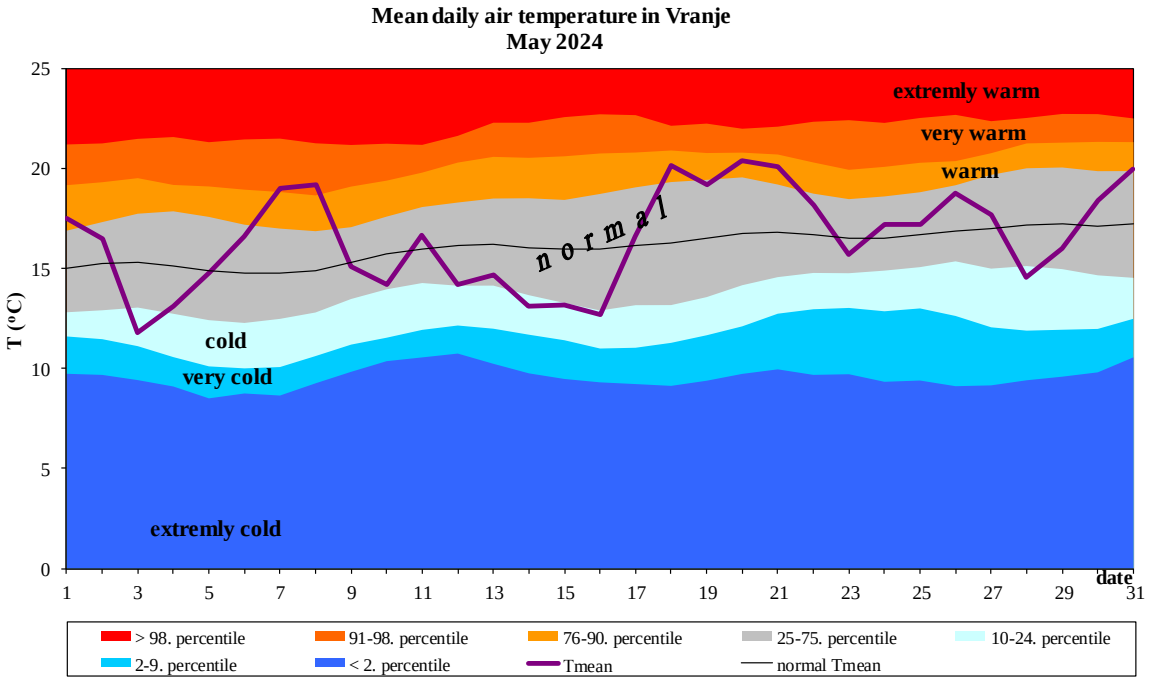
Appendix 5. Daily course of the mean daily air temperature and accompanying percentile for Negotin



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

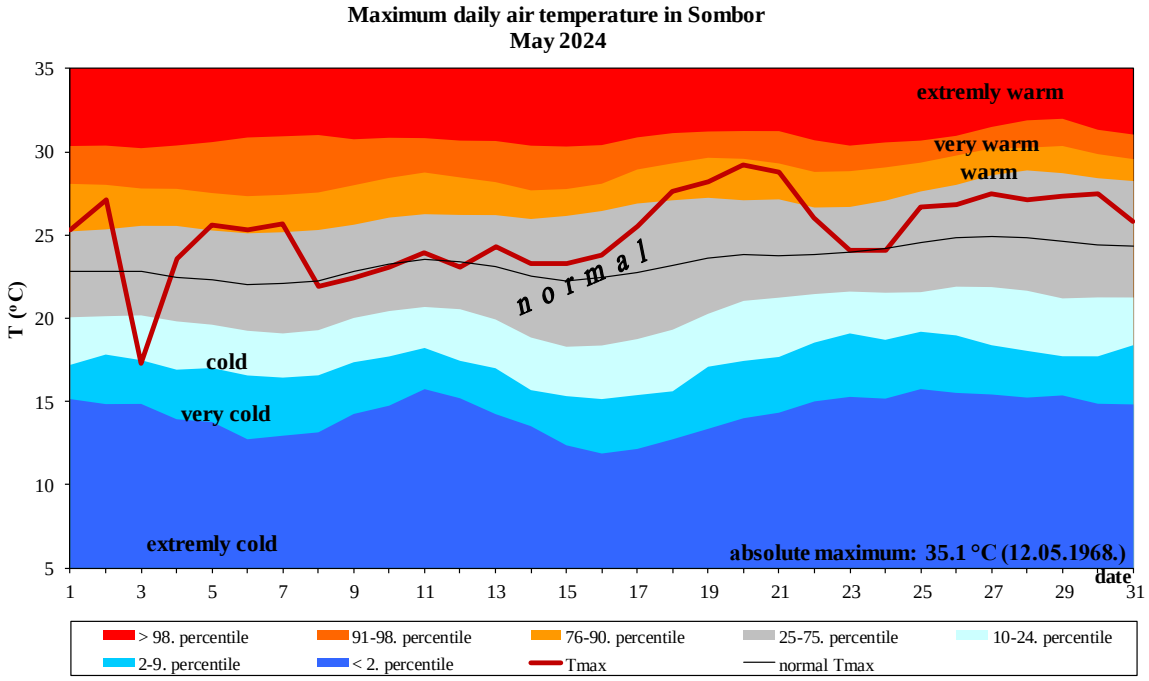


Appendix 7. Daily course of the mean daily air temperature and accompanying percentile for Nis

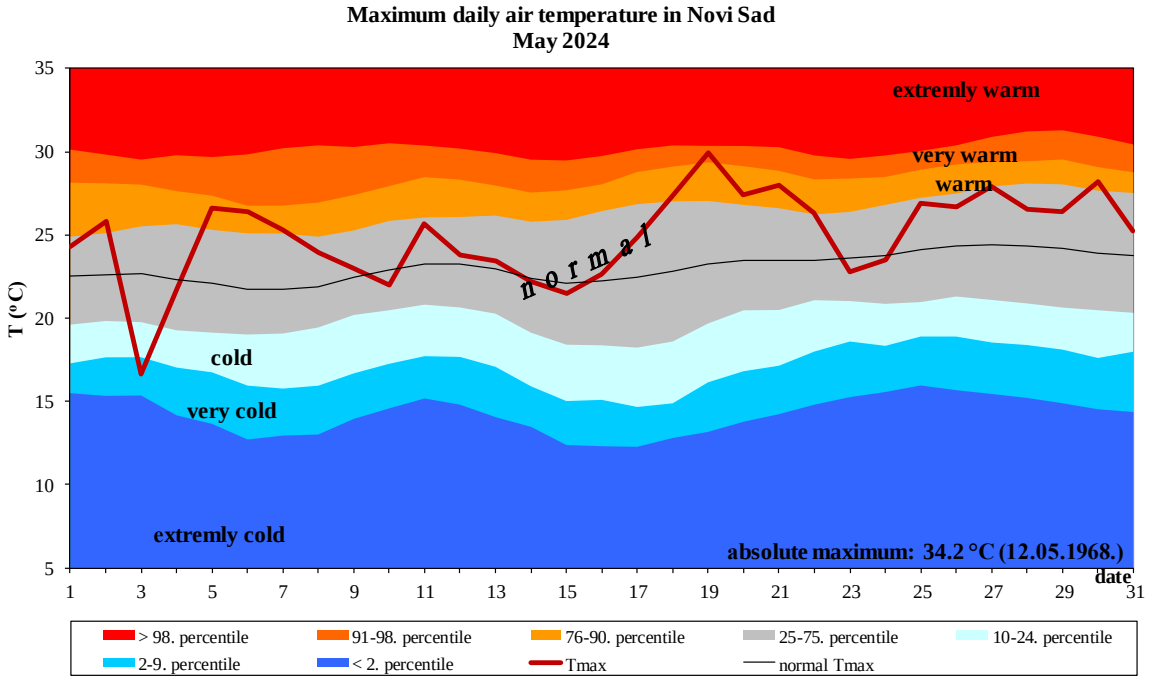


Appendix 8. Daily course of the mean daily air temperature and accompanying percentile for Vranje

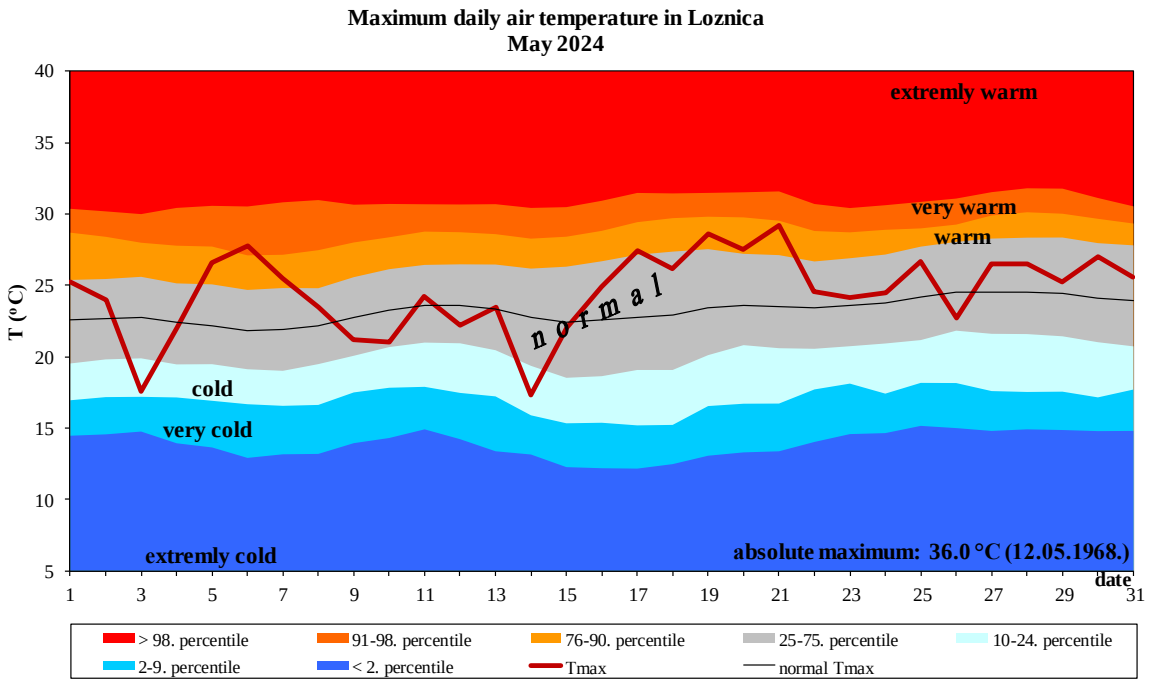
Maximum air temperature



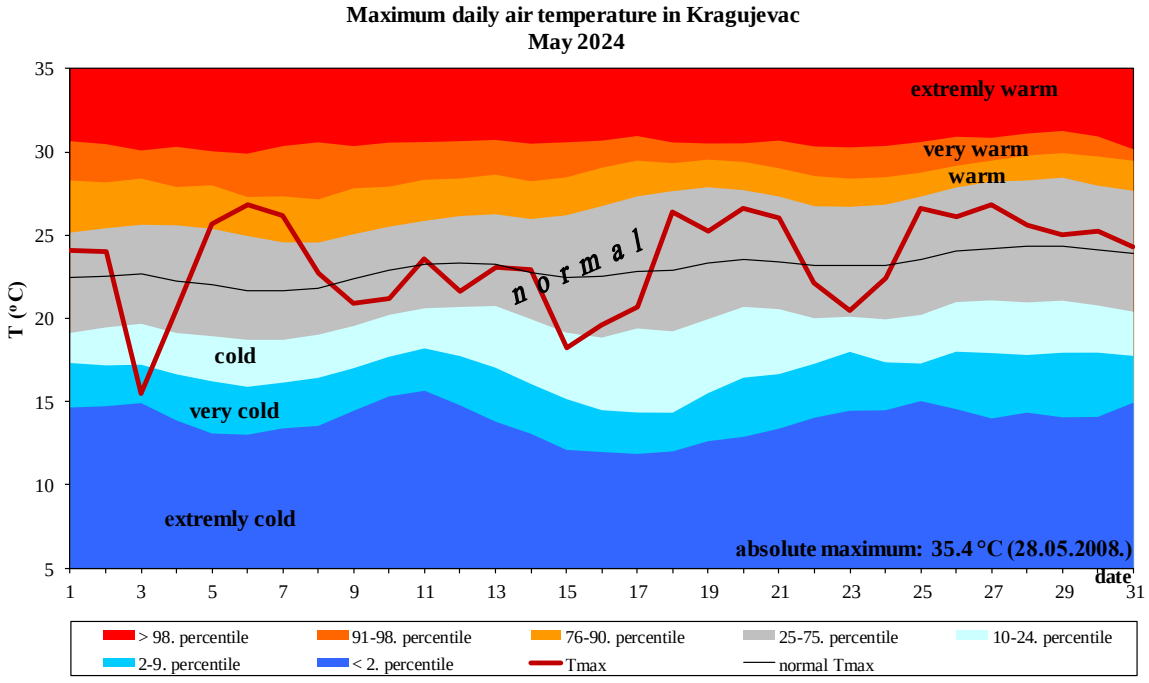
Appendix 9. Daily course of the maximum daily air temeperature and the accompanying percentile for Sombor



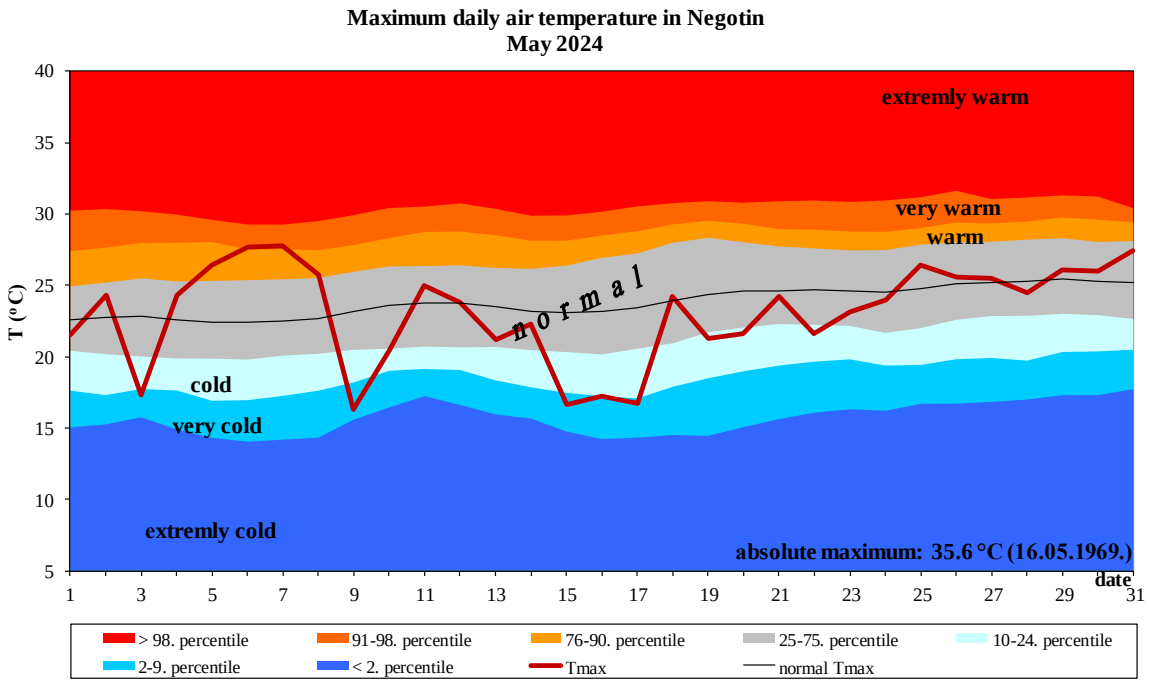
Appendix 10. Daily course of the maximum daily air temeperature and the accompanying percentile for Novi Sad



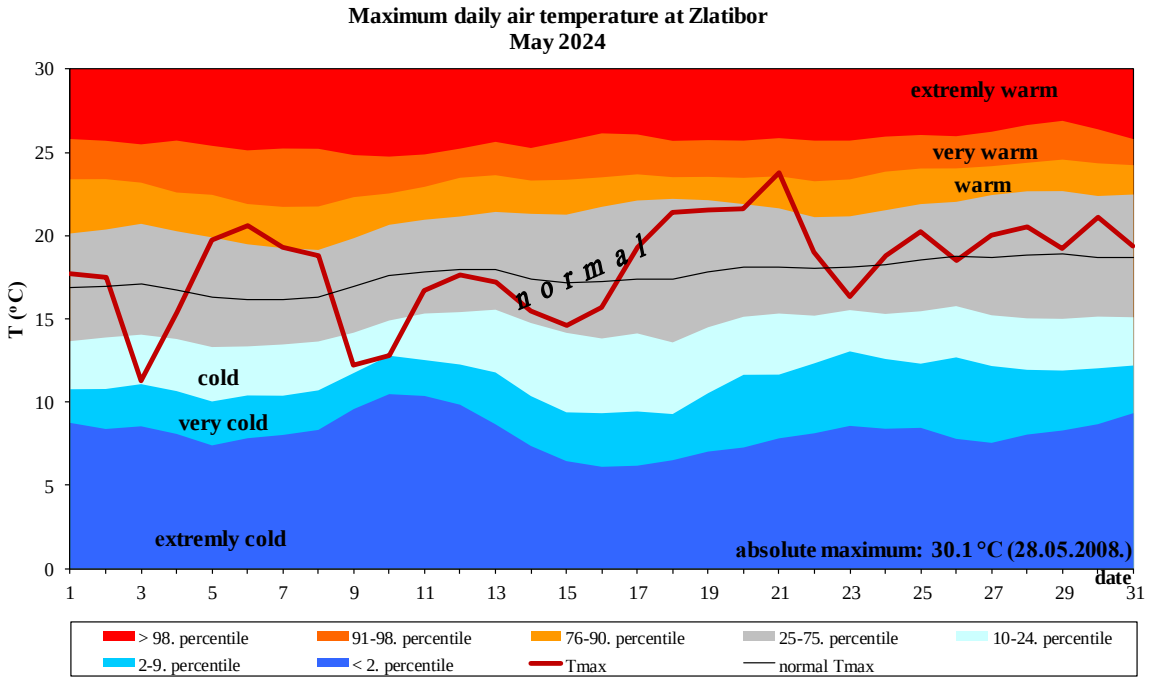
Appendix 11. Daily course of the maximum daily air temeperature and the accompanying percentile for Loznica



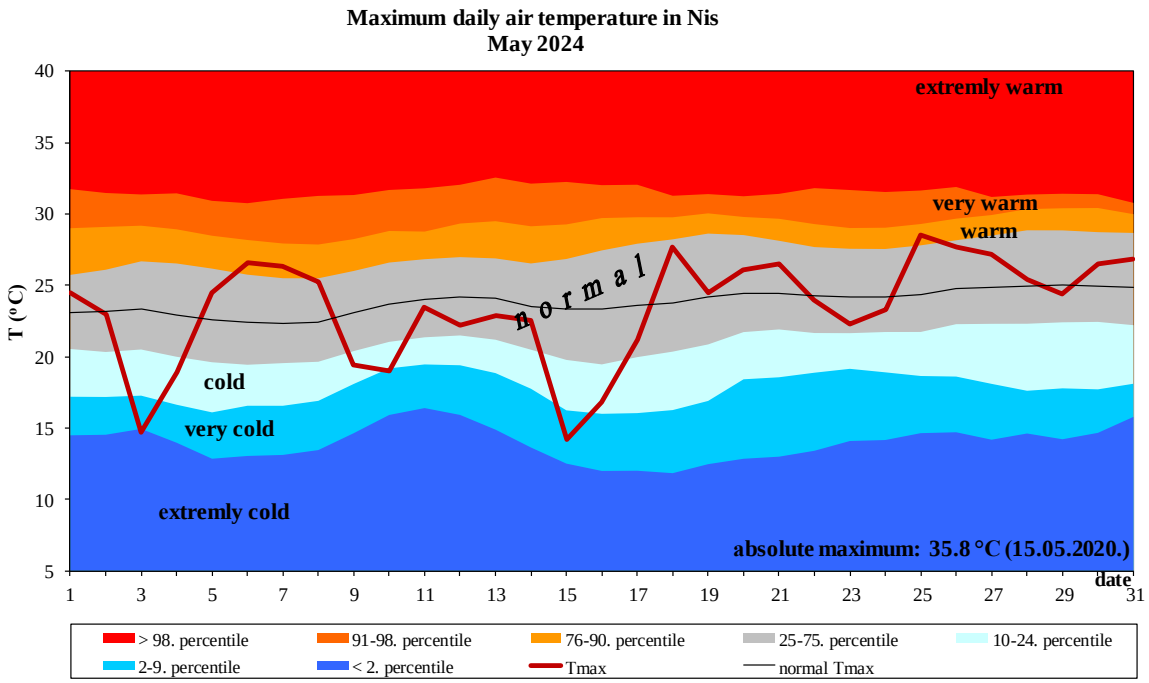
Appendix 12. Daily course of the maximum daily air temeperature and the accompanying percentile for Kragujevac



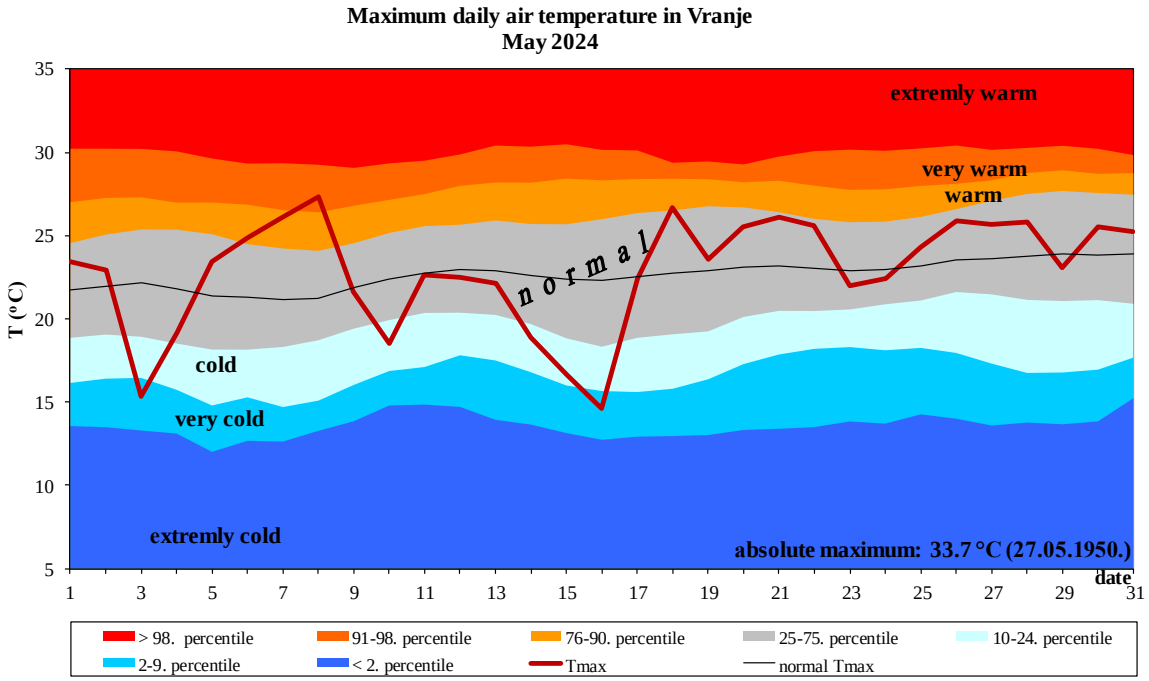
Appendix 13. Daily course of the maximum daily air temeperature and the accompanying percentile for Negotin



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

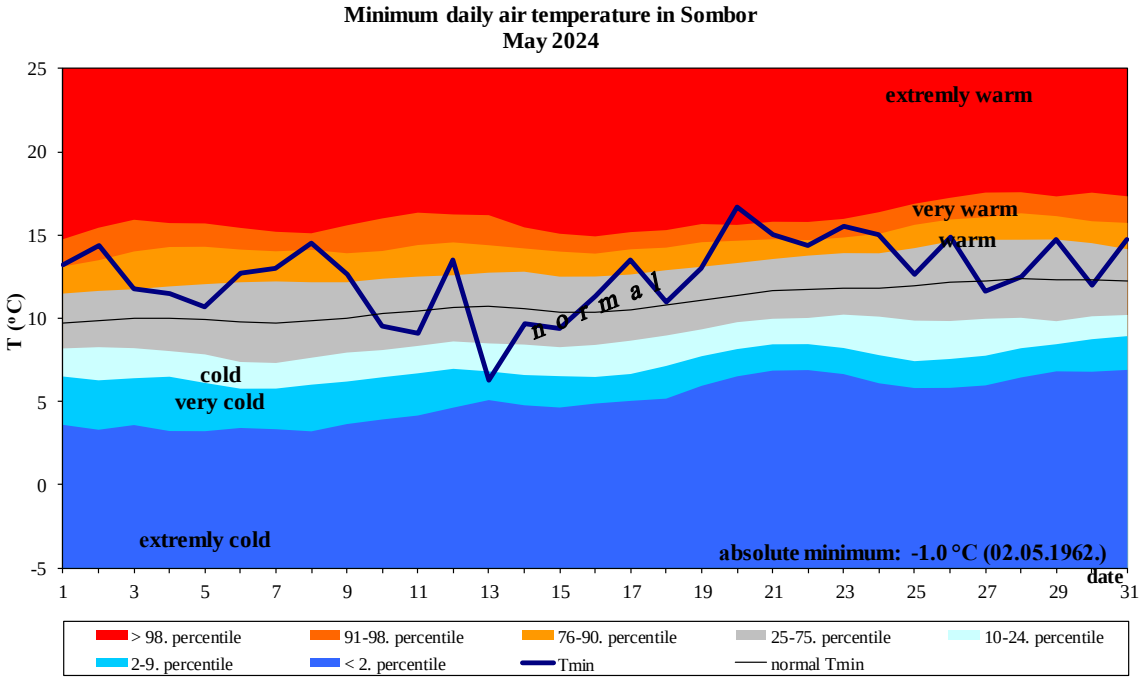


Appendix 15. Daily course of the maximum daily air temeperature and the accompanying percentile for Nis

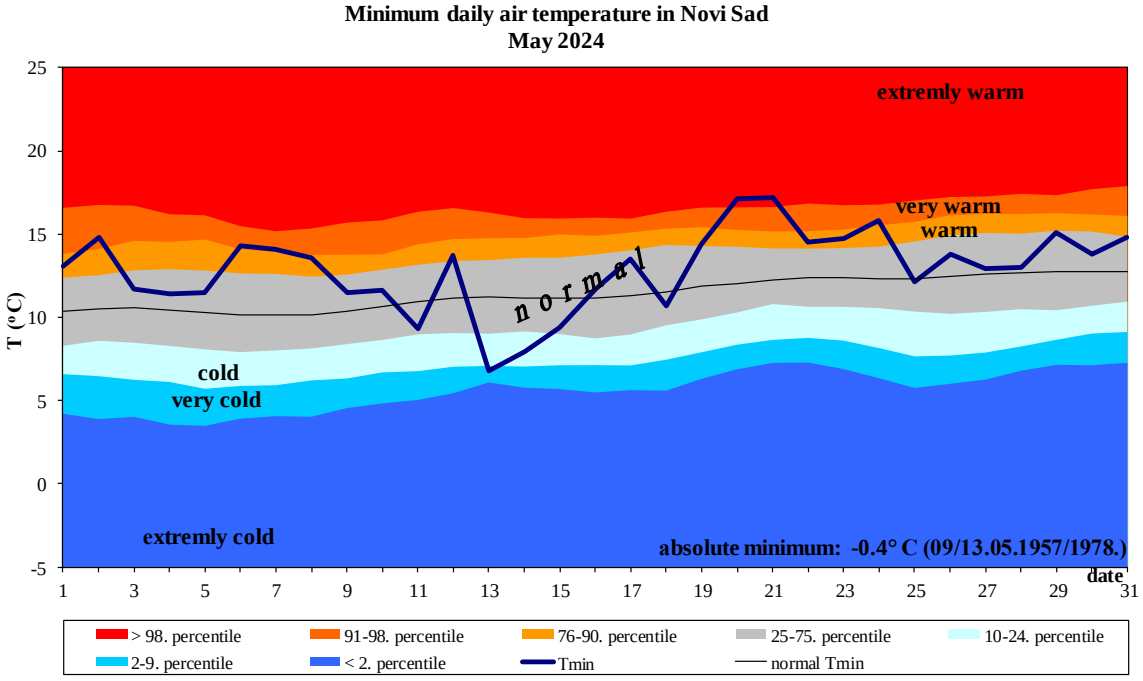


Appendix 16. Daily course of the maximum daily air temeperature and the accompanying percentile for Vranje

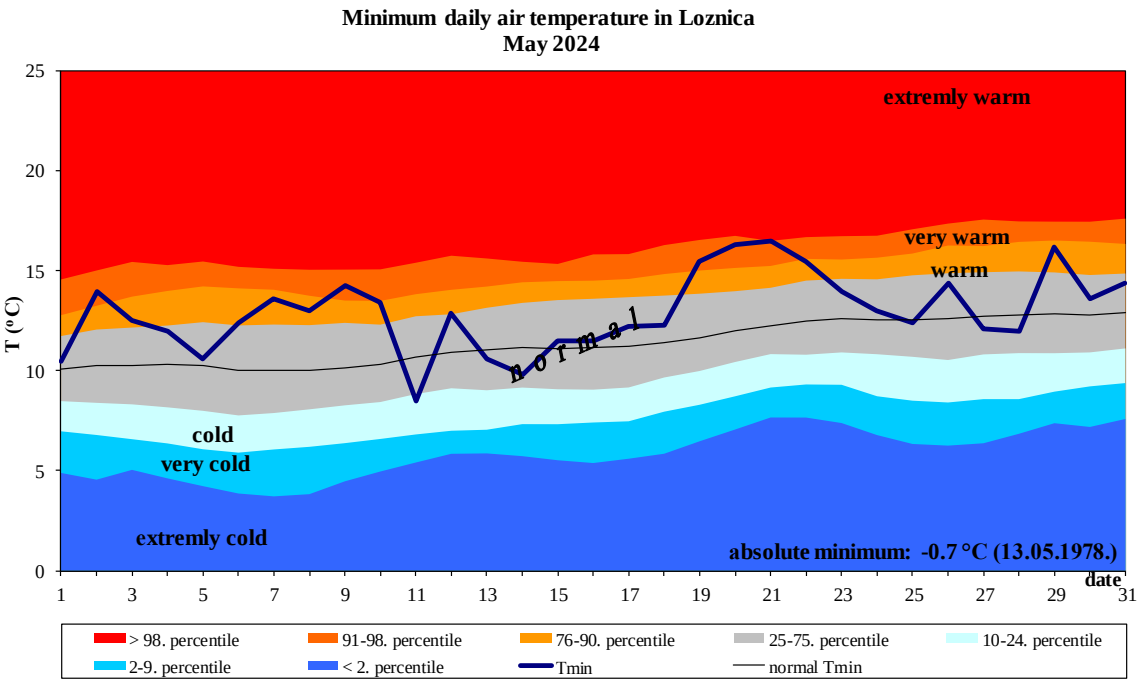
Minimum air temperature



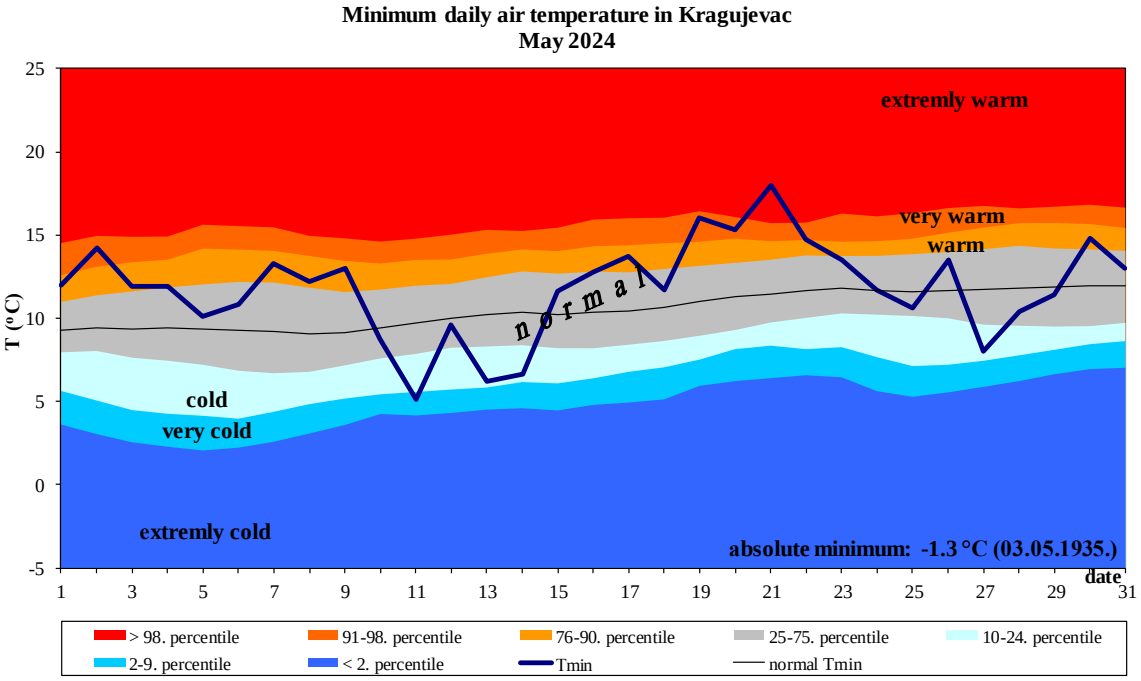
Appendix 17. Daily course of the minimum daily air temperature and the accompanying percentile for Sombor



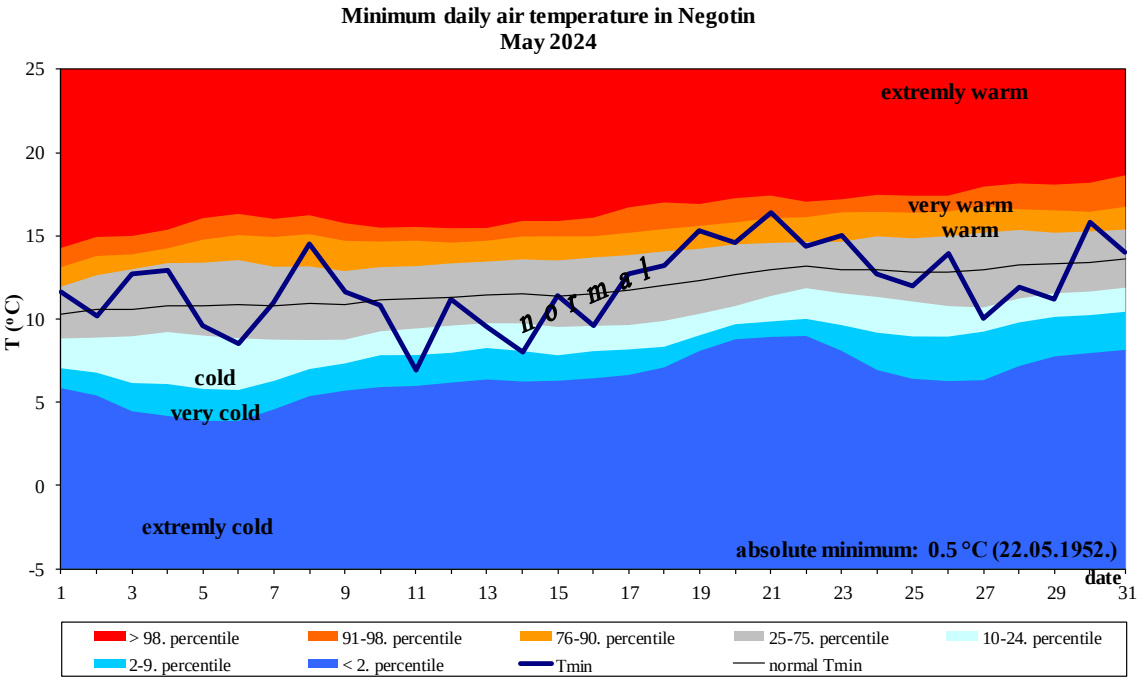
Appendix 18. Daily course of the minimum daily air temperature and the accompanying percentile for Novi Sad



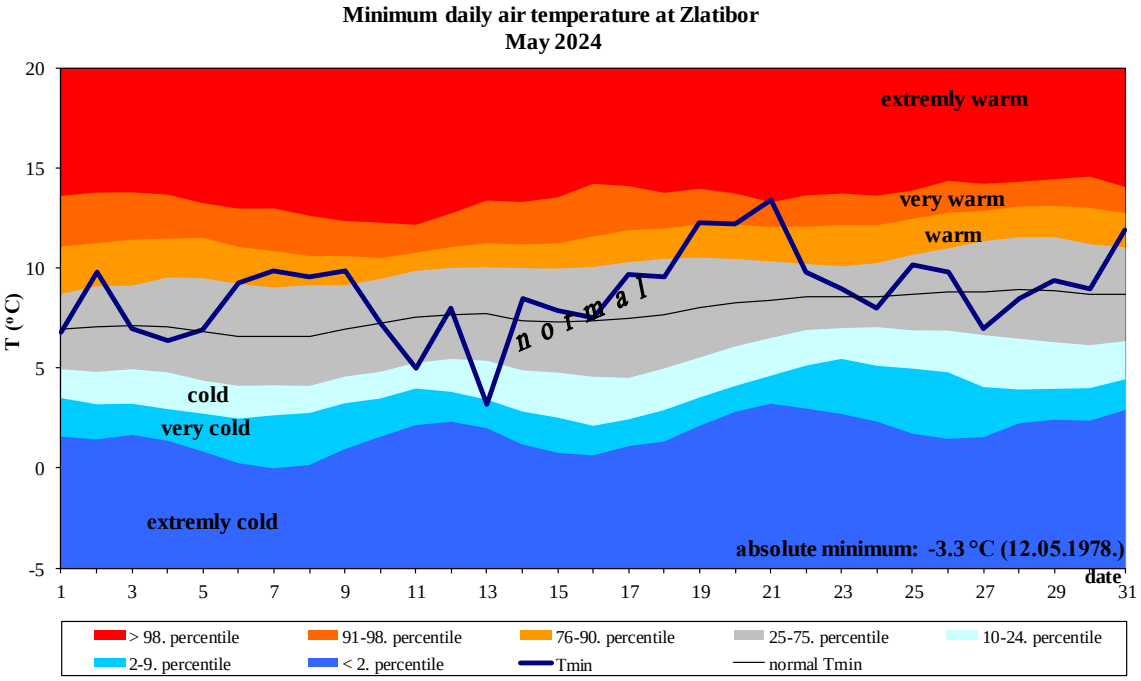
Appendix 19. Daily course of the minimum daily air temperature and the accompanying percentile for Loznica



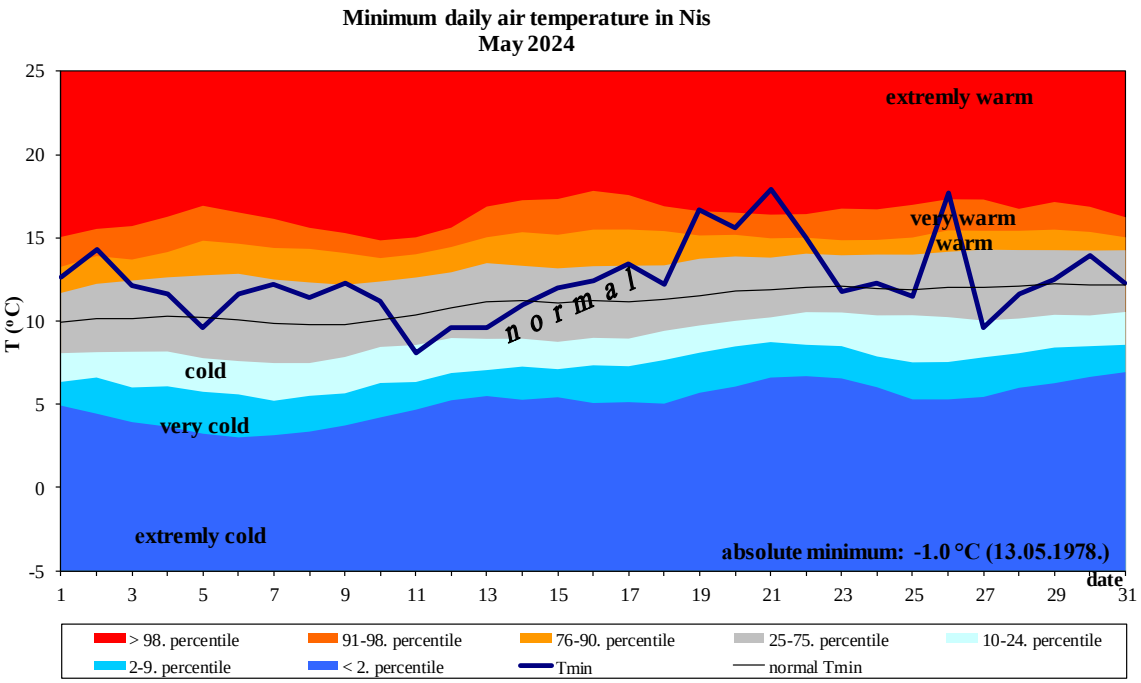
Appendix 20. Daily course of the minimum daily air temperature and the accompanying percentile for Kragujevac



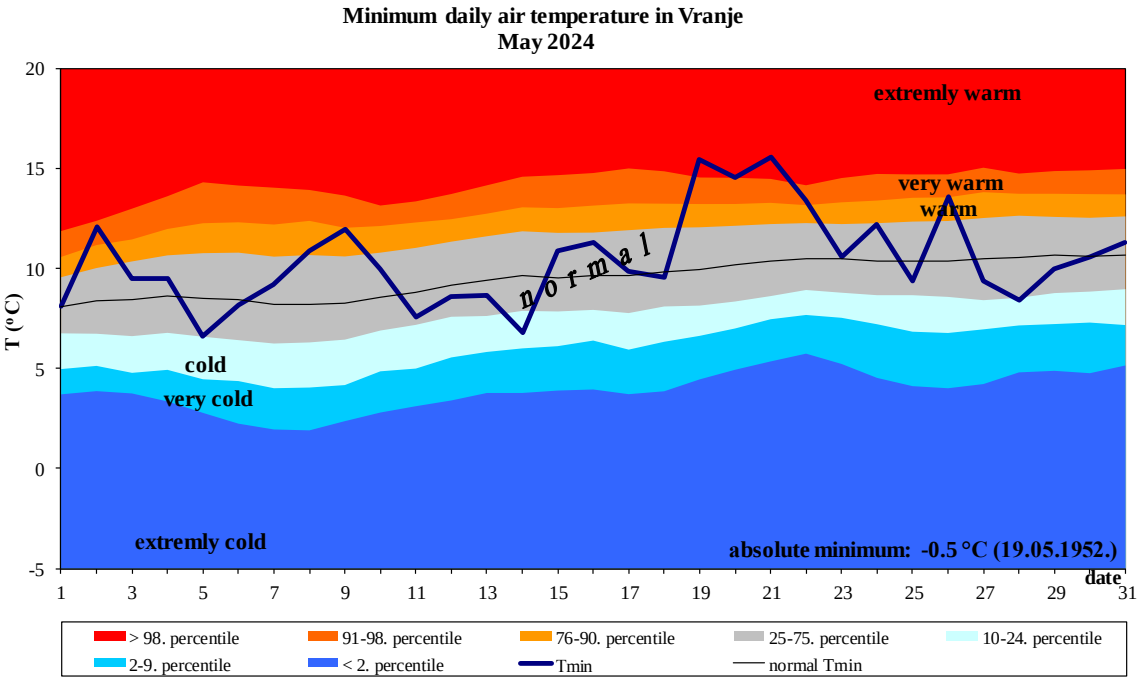
Appendix 21. Daily course of the minimum daily air temperature and the accompanying percentile for Negotin



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

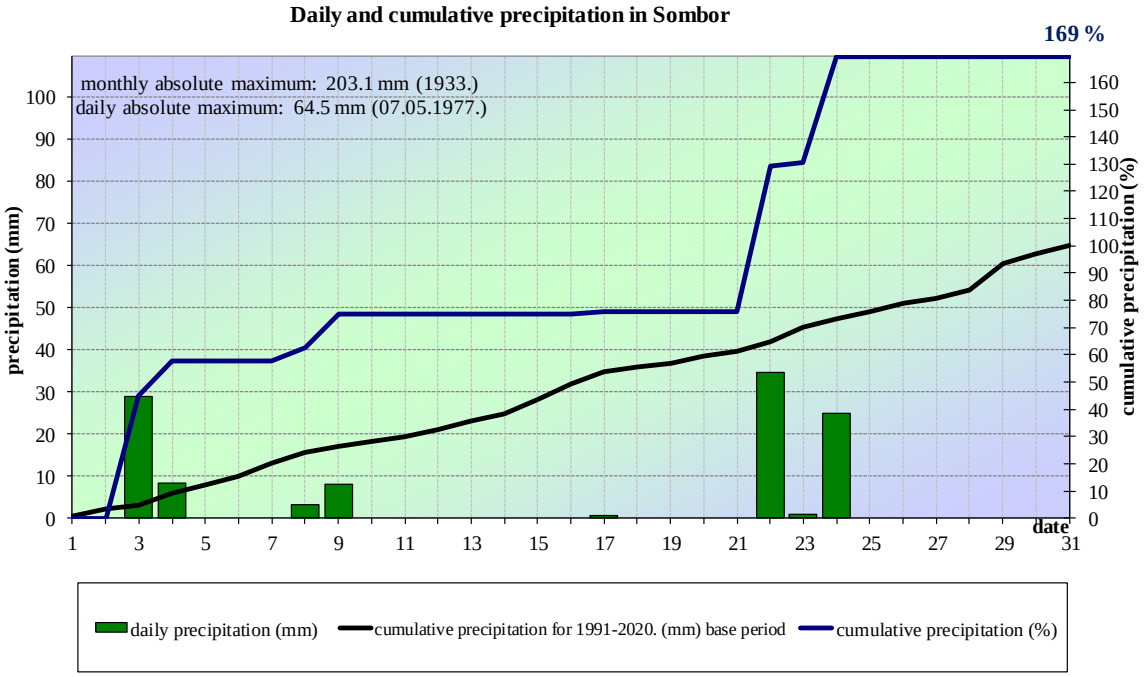


Appendix 23. Daily course of the minimum daily air temperature and the accompanying percentile for Nis

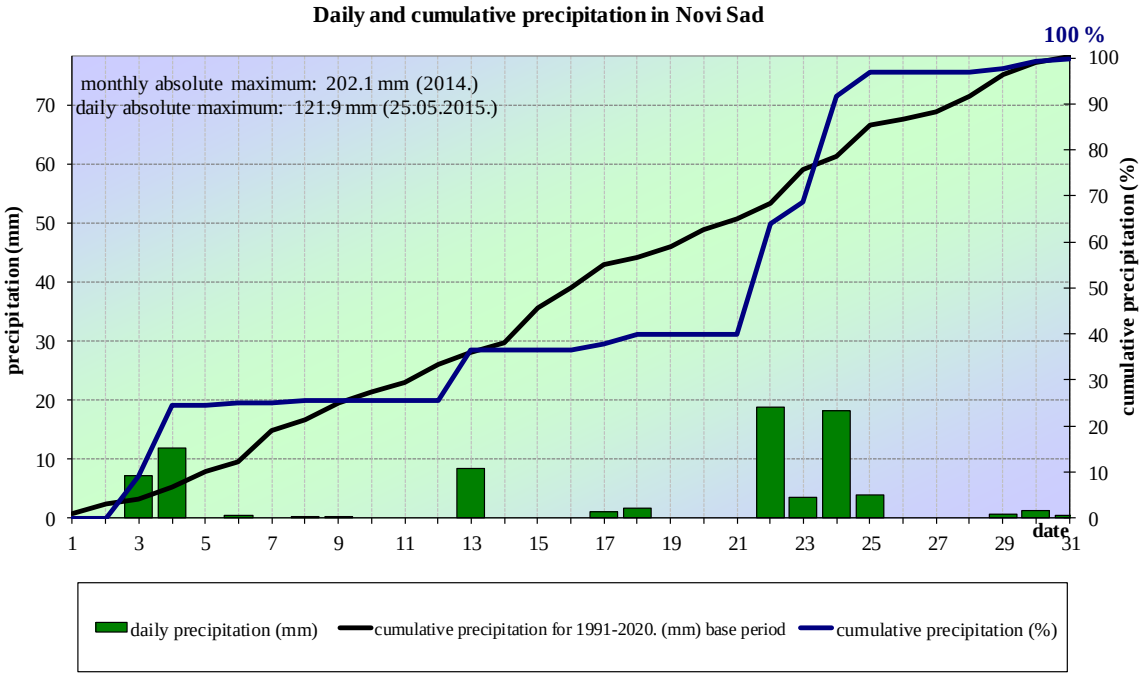


Appendix 24. Daily course of the minimum daily air temperature and the accompanying percentile for Vranje

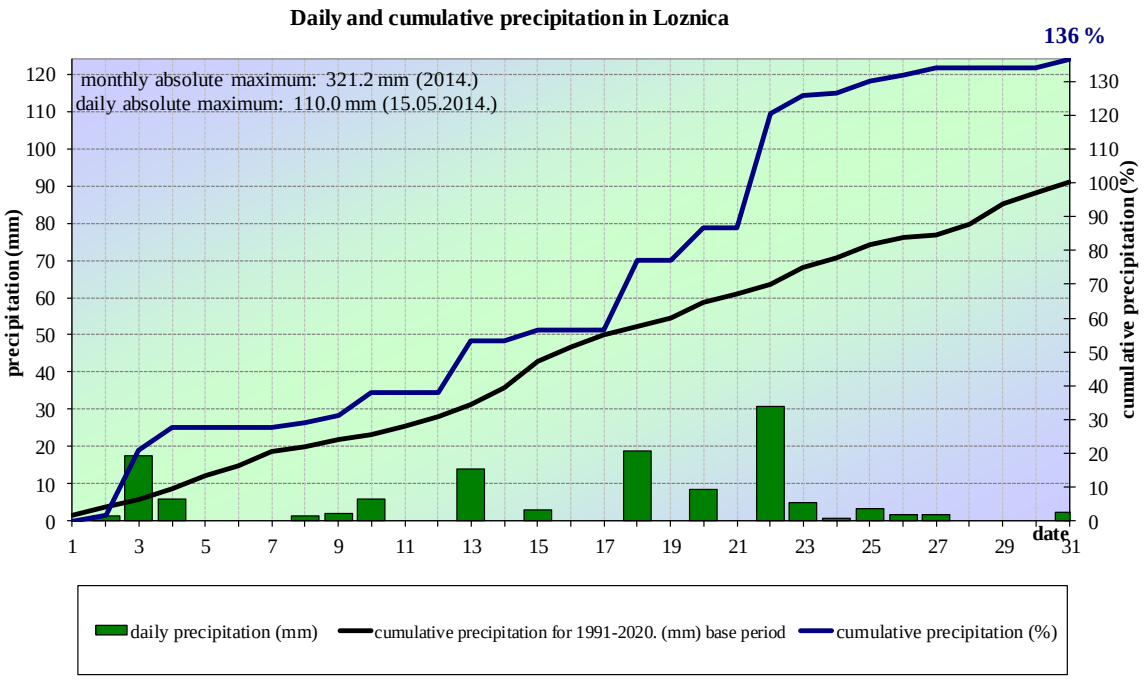
Precipitation



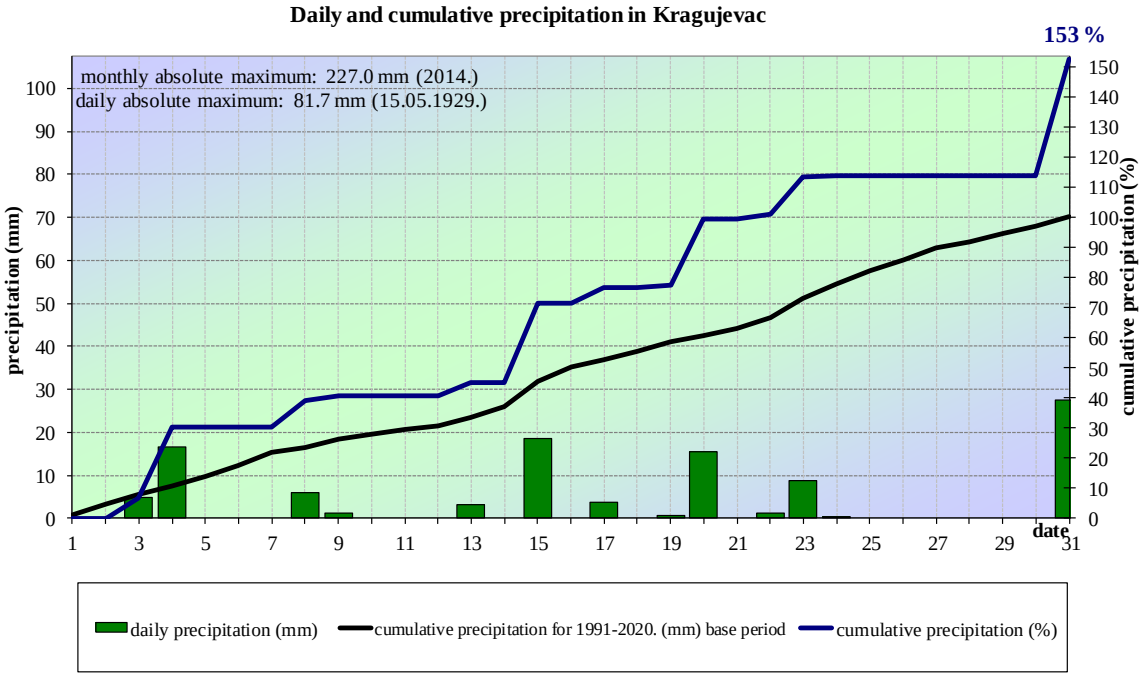
Appendix 25. Daily and cumulative precipitation sums for Sombor



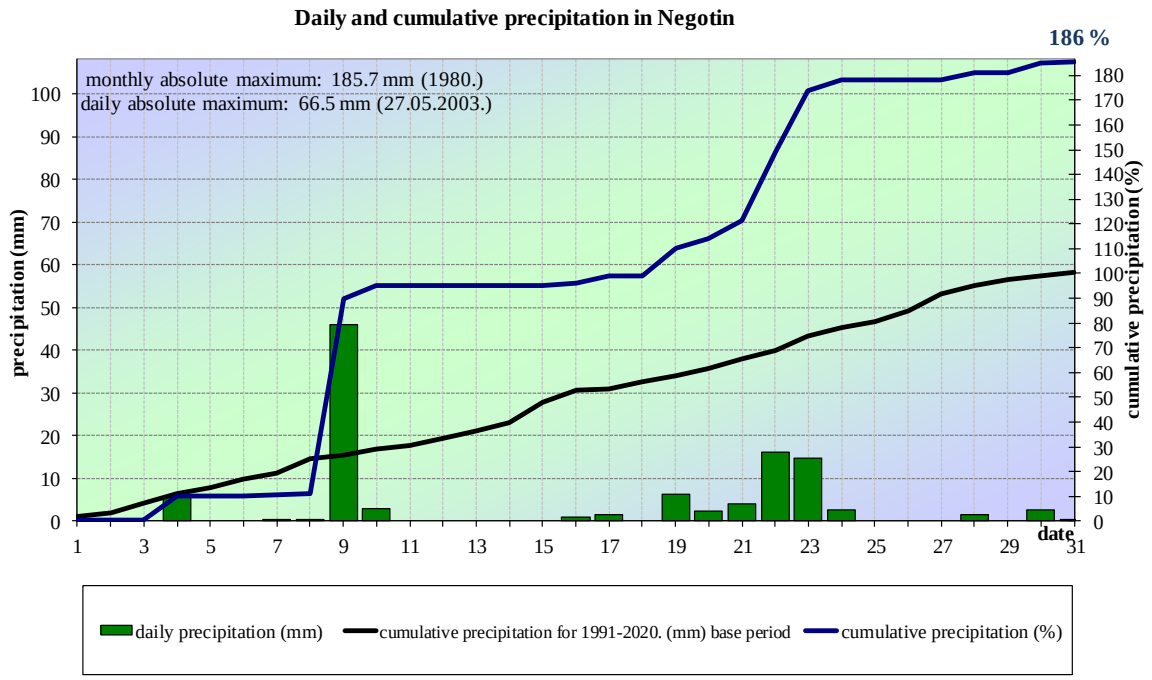
Appendix 26. Daily and cumulative precipitation sums for Novi Sad



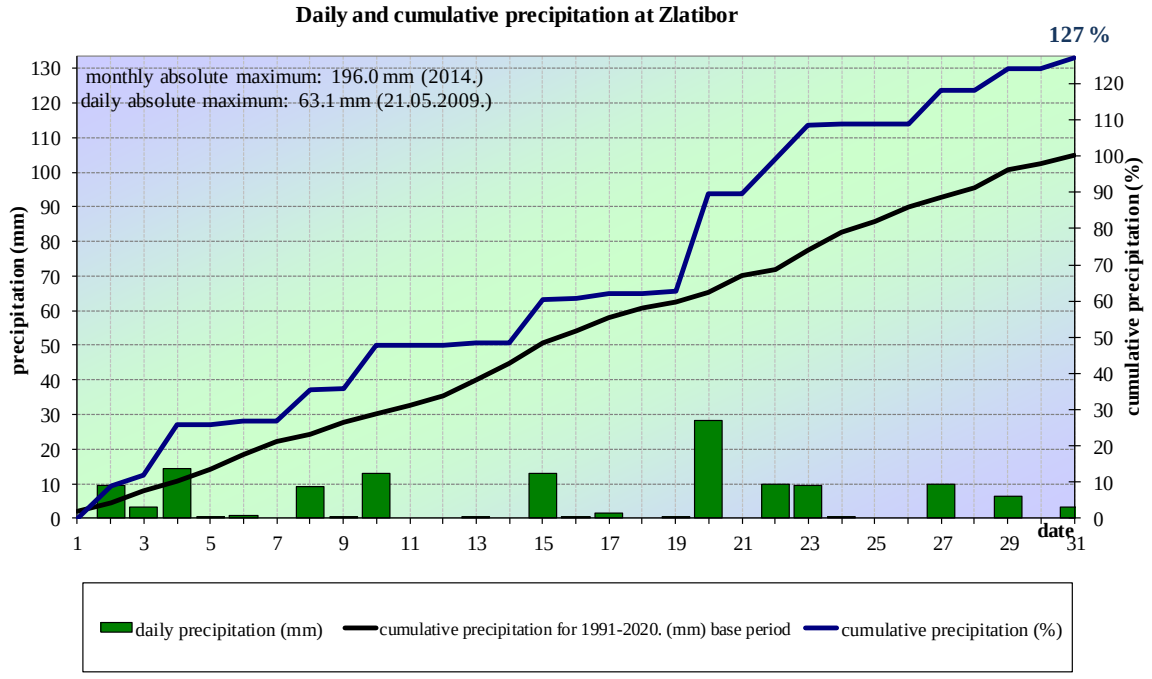
Appendix 27. Daily and cumulative precipitation sums for Loznica



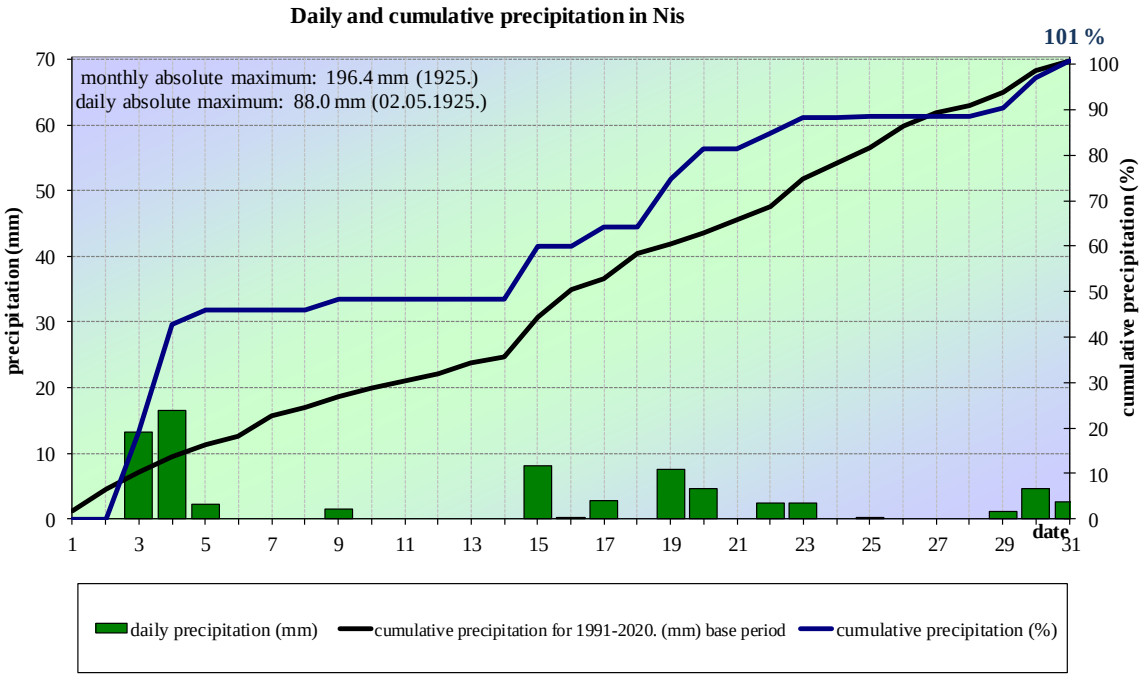
Appendix 28. Daily and cumulative precipitation sums for Kragujevac



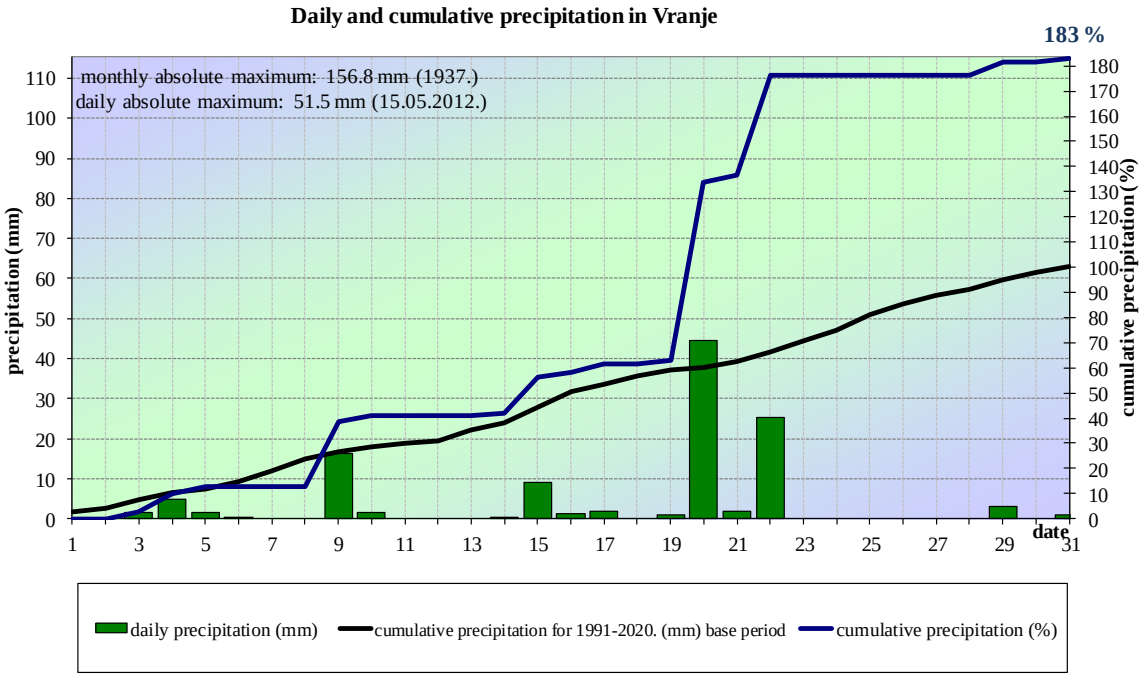
Appendix 29. Daily and cumulative precipitation sums for Negotin



Appendix 30. Daily and cumulative precipitation sums on Zlatibor



Appendix 31. Daily and cumulative precipitation sums for Nis



Appendix 32. Daily and cumulative precipitation sums for Vranje