Republic Hydrometeorological Service of Serbia
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Republic of Serbia

MONTHLY BULLETIN FOR SERBIA

April 2020

Belgrade, the 5th of May 2020

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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- ***Kikinda observed record low April air temperature***
- ***Heat wave lasting for 5 days in Banatski Karlovac***
- ***Cold wave in Kikinda, Belgrade, Pozega and Sjenica***

AIR TEMPERATURE

Mean monthly air temperature

Mean April air temperature ranged from 9,9ºC in Dimitrovgrad to 14,2ºC in Belgrade, and on the mountains from 3,0ºC at Kopaonik to 8,3ºC on Zlatibor (Figure 1).

Departure of the mean monthly air temperature from the normal[1] for the 1981–2010 base period ranged from -0,5ºC in Zajecar to 1,5ºC on Crni Vrh, in Belgrade 1,4ºC (Figure 2).

Mean April air temperature, based on the percentile method[2] was in the normal category in most of the country and warm category in Banatski Karlovac, Belgrade and Crni Vrh (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 February 1, 1981 to December 31, 2010

[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

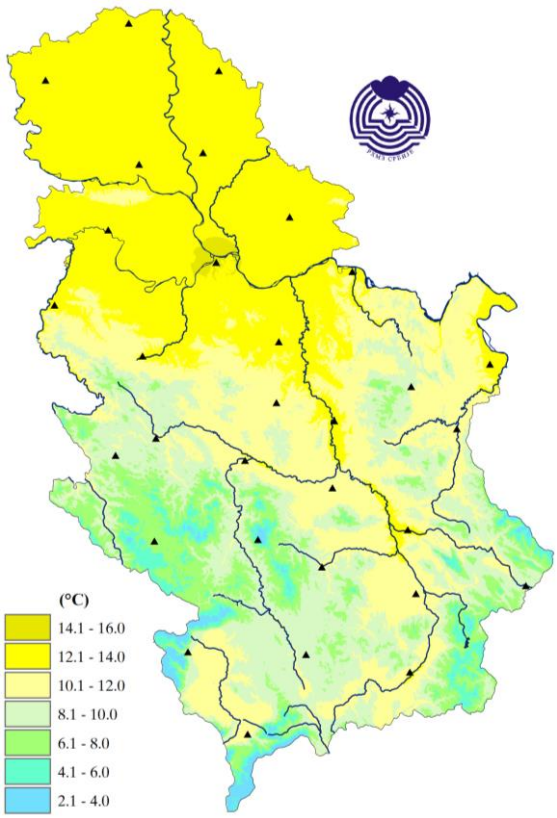


Figure 1. Spatial distribution of mean monthly air temperature (ºC)

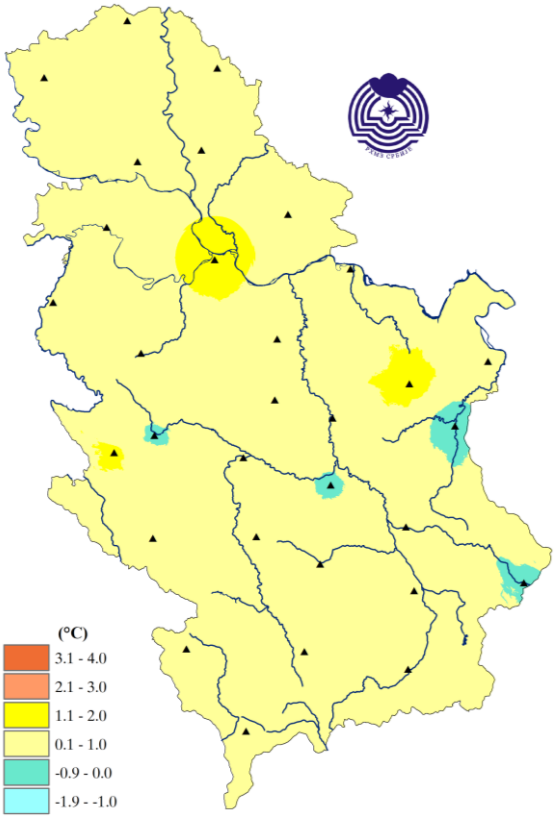


Figure 2. Spatial distribution of mean monthly air temperature anomaly (ºC) for the 1981–2010 base period

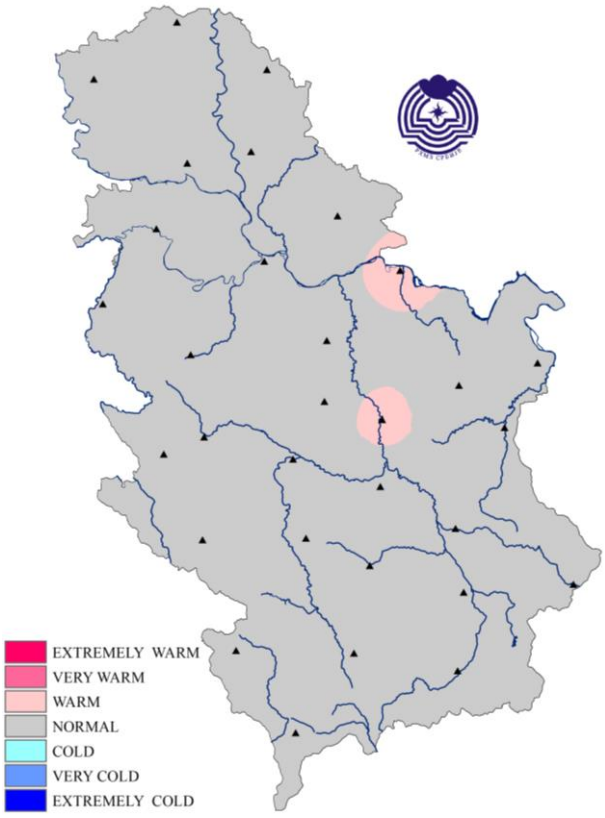


Figure 3. Spatial distribution of the mean monthly air temperature using percentile method

Mean daily air temperature in Belgrade, based on the percentile method was in the normal category most of the month. At the beginning of the first and middle of the second and third decade, mean daily air temperature was in the categories from extremely cold to cold. Most of the second decade and in the period at end of the month it was extremely warm (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.

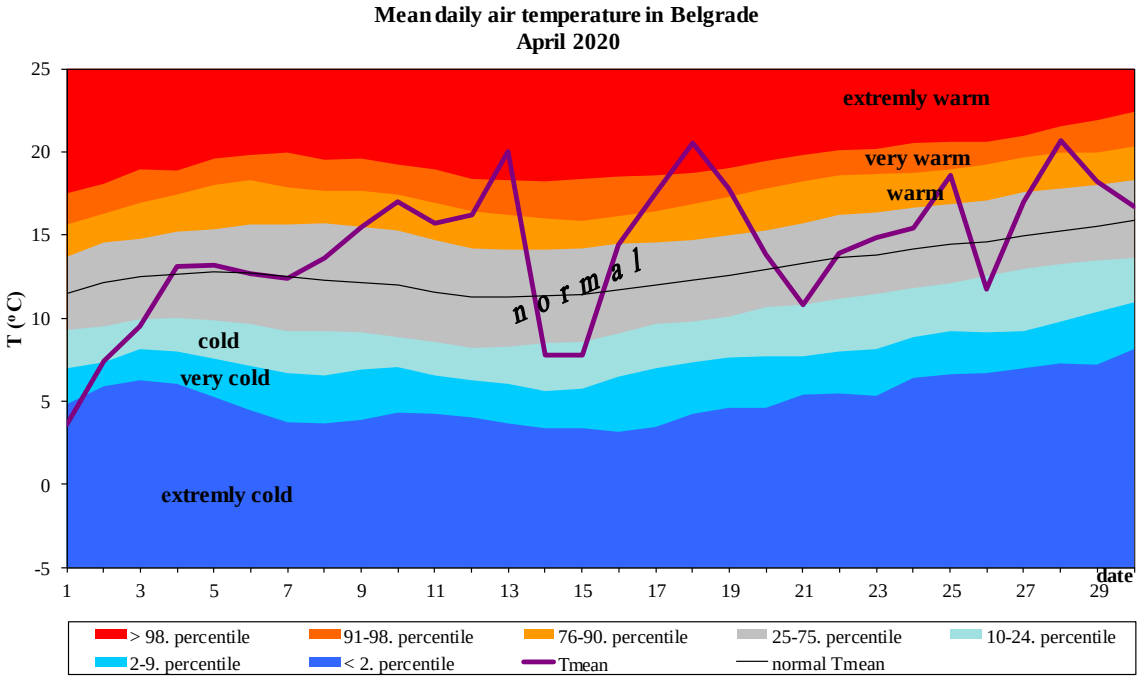


Figure 4. Daily course of the mean daily air temperature and accompanying percentiles for Belgrade

Maximum air temperature

Mean maximum air temperature in April ranged from 18,2ºC in Dimitrovgrad to 21,0ºC in Banatski Karlovac, and Belgrade observed mean maximum air temperature of 20,7ºC. In the mountainous regions, mean maximum air temperature ranged from 7,6ºC at Kopaonik to 14,4ºC in Sjenica.

Based on the percentile method, mean maximum monthly air temperature was in the following categories: warm category in most of the country, very warm category in northern areas, Smederevska Palanka and Veliko Gradiste, and normal category in Vranje and Dimitrovgrad.

The highest maximum daily air temperature of 29,5ºC was measured in Zajecar on April 19. On the same day Belgrade observed the highest daily air temperature of 27,5ºC as well.

In April, Serbia saw only one heat wave lasting for 5 days in Banatski Karlovac, in the period between April 10 and 14.

Mountain regions observed one ice day[3].

Summer days[4] were registered in most of the country, except in mountainous areas. Number of summer days ranged from 2 in Dimitrovgrad to 8 days in Zajecar. Figure 5 shows daily course of the maximum daily air temperature and the accompanying percentiles for Belgrade in April 2020. Daily course of the maximum daily air temperature and the accompanying percentiles for the stations Sombor, Novi Sad, Loznica, Negotin, Kragujevac, Zlatibor, Nis and Vranje is given in the Appendix.

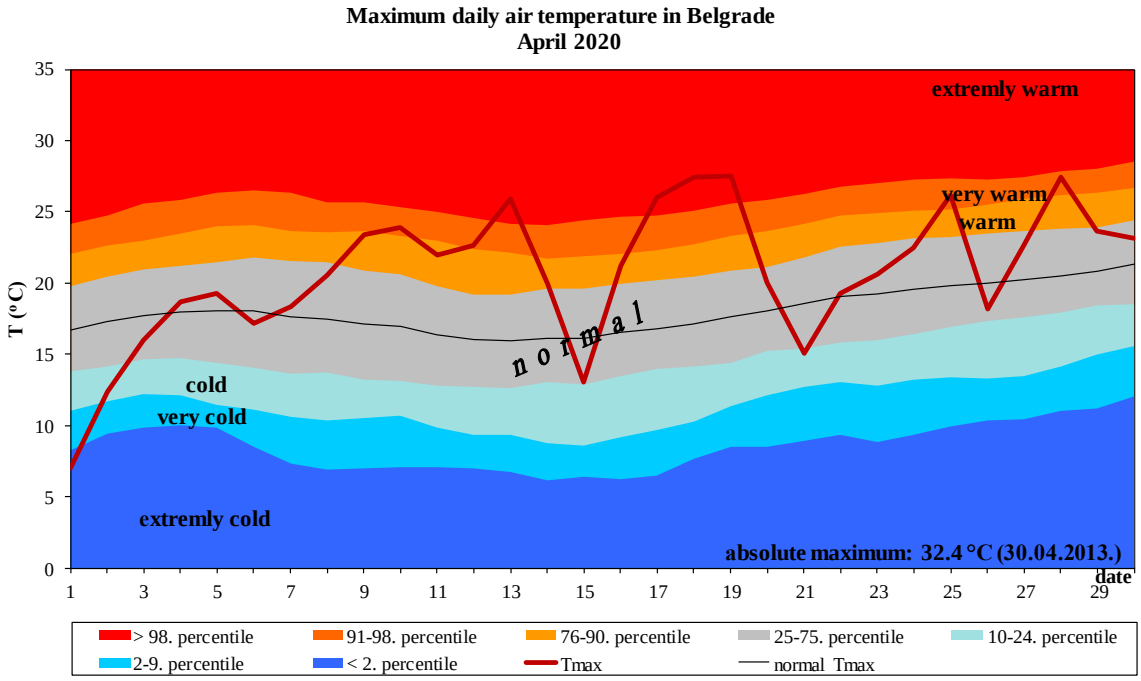


Figure 5. Daily course of the maximum daily air temperature and accompanying percentiles for Belgrade

Minimum air temperature

Mean minimum air temperature in April ranged from 1,7ºC in Pozega to 7,8ºC in Belgrade. In the mountain regions, mean minimum air temperature ranged from -1,2ºC at Kopaonik to 3,2ºC at Zlatibor.

Based on the percentile method, mean minimum monthly air temperature was in the following categories: cold category in most of the country, cold category on Palic, Novi Sad, Valjevo, Kursumlija, Cuprija, Nis and Vranje, and normal category in the hilly-mountainous regions.

The lowest minimum daily air temperature of -10,6ºC was measured at Kopaonik on April 1. On the same day, the lowest daily air temperature of -6,3ºC was measured in the lowland, i.e. in Kikinda thereby breaking the previous record of -5,9ºC set on April 7, 2003. On April 1 as well, Belgrade observed air temperature of 0,8ºC.

[3] Ice day is defined as the day with maximum air temperature below 0°C
[4] Summer day refers to a day with maximum air temperature 25°C and above

Cold waves were recorded in the following period: Kikinda in the period April 1-5, Belgrade in the period March 31 – April 4, and Pozega and Sjenica in the period April 6-10.

In April, frost days[5] were recorded across the entire country apart from Belgrade. Number of frost days in the lowland ranged from 3 on Palic and Zrenjanin to 11 days in Zajecar. Number of frost days on the mountains ranged from 8 days up to 16 days at Kopaonik. The recorded number of frost days was 2 to 7 days above the April average in most of the country.

Kopaonik recorded one day with severe frost.

Figure 6 shows the assessment of the minimum and maximum air temperature for Serbia for April based on tercile distribution relative to the 1981-2010 base period. It can be noted that the maximum air temperature was significantly above the upper tercile, whilst the minimum air temperature was below the lower tercile.

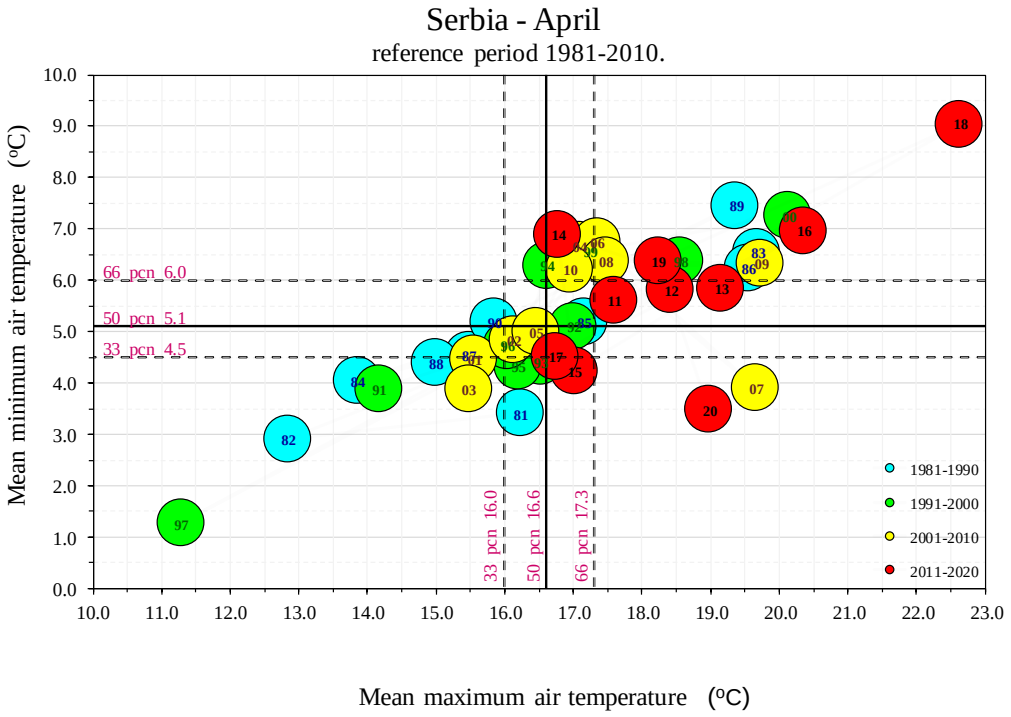


Figure 6. Assessment of minimum and maximum air temperature in April for Serbia with the accompanying terciles in relation to the 1981-2010 base period

Figure 7 shows daily course of the minimum daily air temperature and the accompanying percentiles for Belgrade in April 2020, and for the stations Sombor, Novi Sad, Loznica, Negotin, Kragujevac, Zlatibor, Nis and Vranje are given in the Appendix.

[5] Frost day is defined as the day with minimum air temperature lower than 0°C

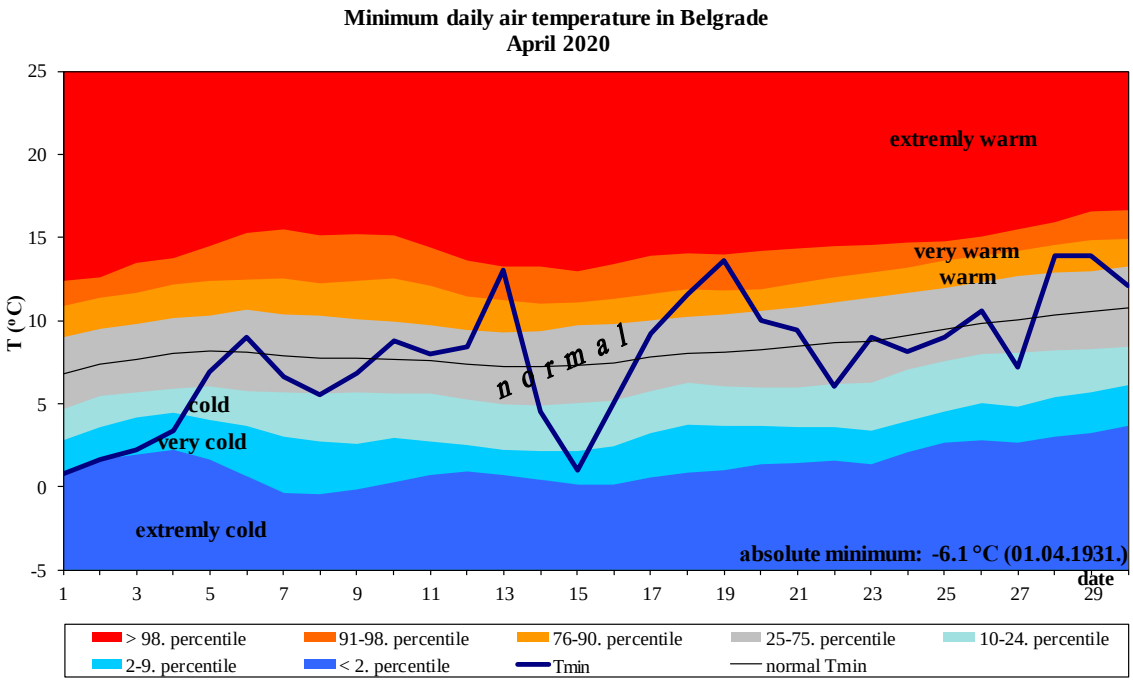


Figure 7. Daily course of the minimum daily air temperature and accompanying percentiles for Belgrade

PRECIPITATION

In April, recorded precipitation sums ranged from 2,5 mm in Veliko Gradiste to 69,2 mm in Kursumlija, whilst Belgrade observed 8,9 mm of precipitation (*Figure 8*).

Precipitation totals relative to the 1981-2010 base period ranged from 4 % in Veliko Gradiste to 125% in Kuršumlija (*Figure* 9).

Based on the percentile method, precipitation sums were in the following categories: very dry in most of the country, extremely dry in parts of northern and eastern Serbia, dry in Kraljevo and Zlatibor, rainy in Kursumlija, and normal category in Kikinda, Krusevac, Leskovac, Dimitrovgrad, Vranje and Sjenica (*Figure* 10).

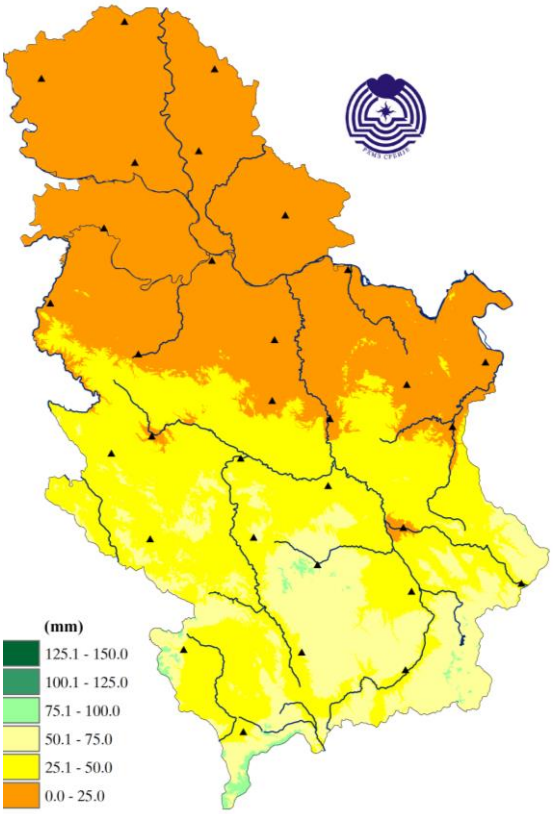


Figure 8. Spatial distribution of the monthly precipitation sums (mm) according to data from 28 major meteorological, 26 climatological and 110 rain gauge stations

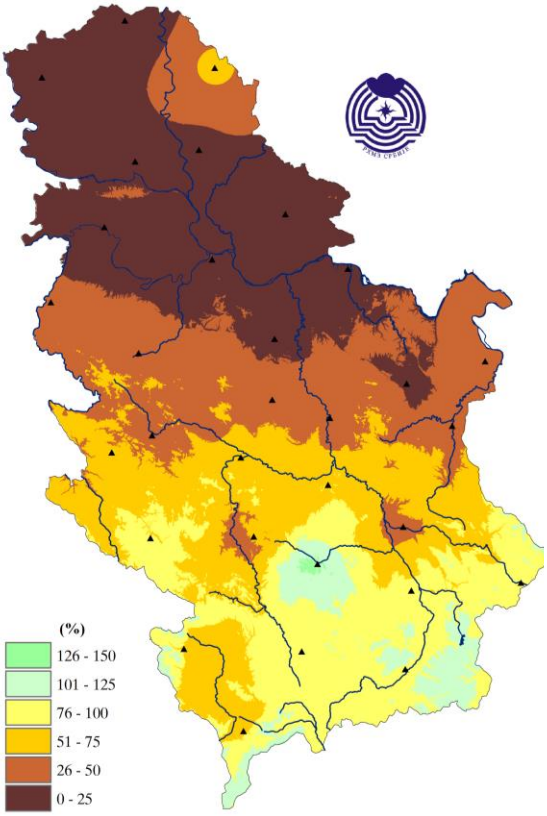


Figure 9. Spatial distribution of the monthly precipitation sums in the percentages of normal for the 1981–2010 base period.

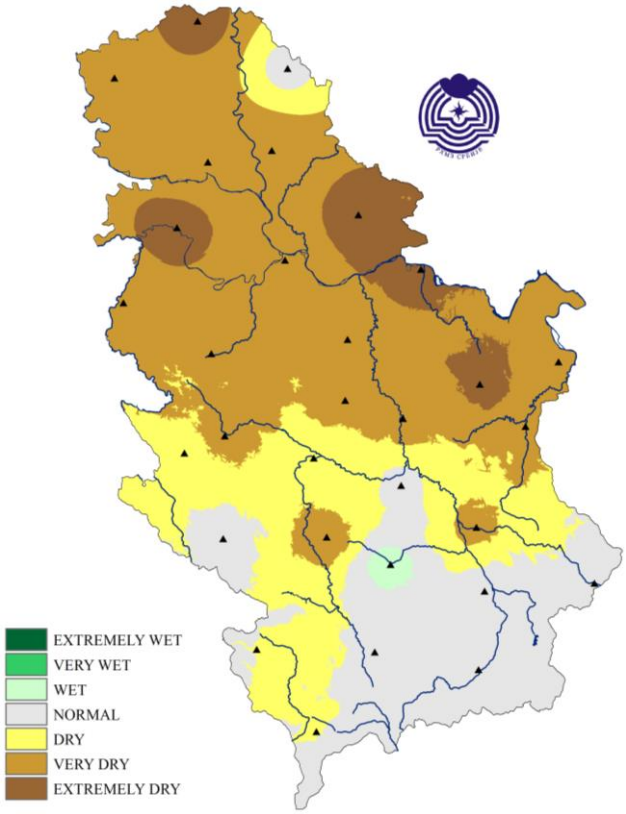


Figure 10. Monthly precipitation sums according to the percentile method

April 2020 ranks as the driest on record for Veliko Gradiste with the precipitation sum of 2,5 mm thereby breaking the previous record of 6,0 mm of precipitation set in April 2007 (Figure 11). Similarly, Crni Vrh observed record dry April with the precipitation sum of 17,4 mm thereby besting the previous record of 18 mm of precipitation set in April 2007 (Figure 12).

April 2020 ranks as the 2nd driest April on record for Smederevska Palanka, Sremska Mitrovica and Banatski Karlovac, and 3rd driest for Palic and Belgrade.

April 2020 ranks as the 6th driest on record for Serbia in the period from 1951 to 2020 (Figure 13).

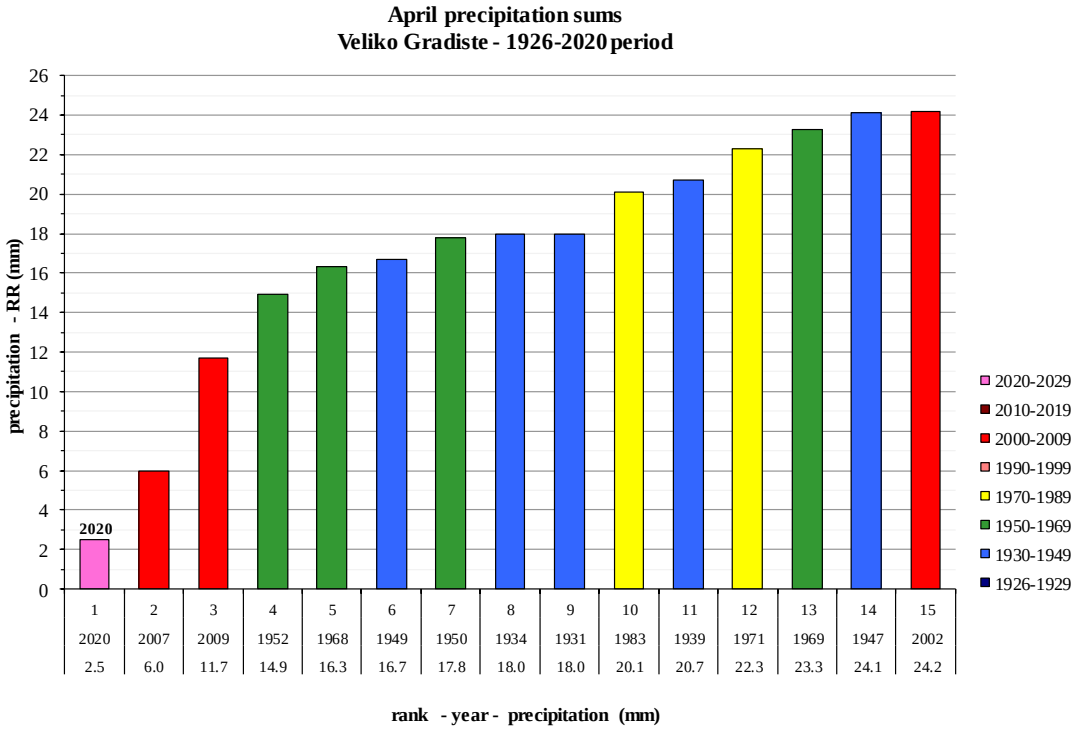


Figure 11. The lowest precipitation in Veliko Gradiste for the period 1926-2020

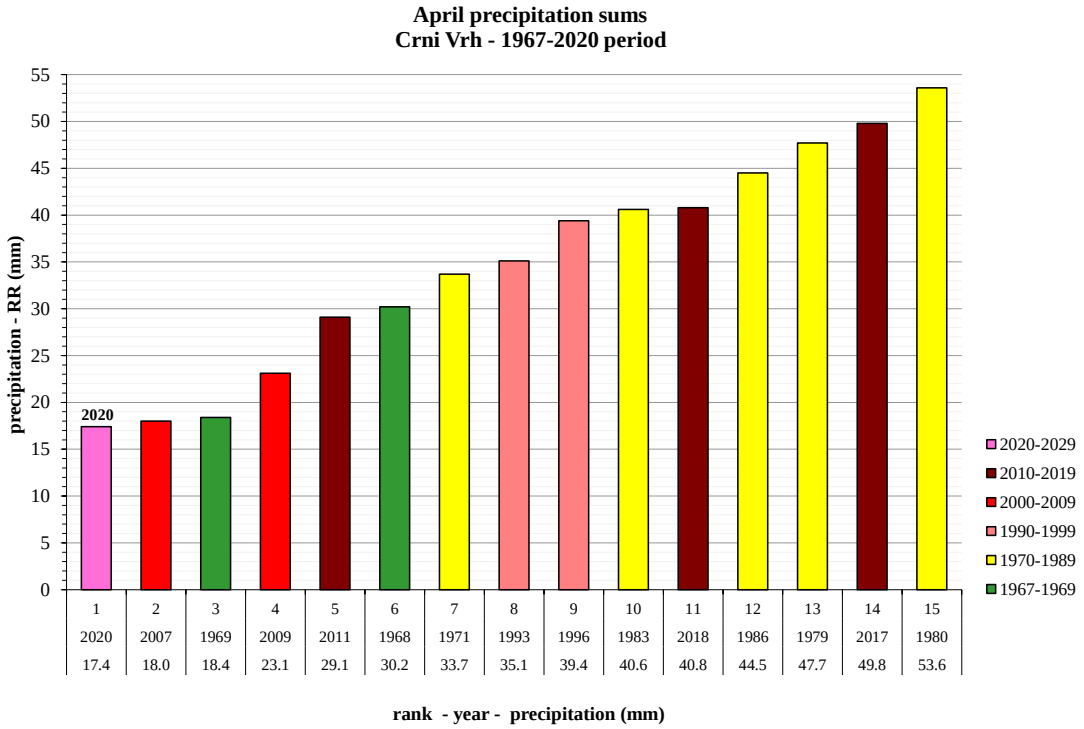


Figure 12. The highest precipitation in Crni Vrh for the period 1967-2020

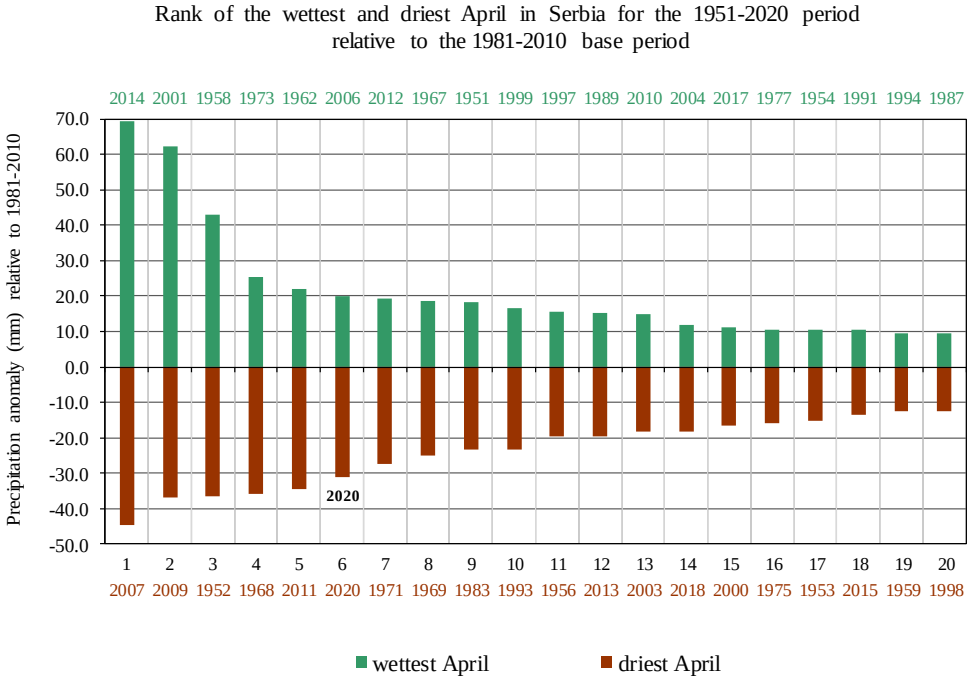


Figure 13. Rank of the wettest and driest April for Serbia for the 1951-2020 base period

The highest daily precipitation sum of 23,2 mm was registered in Kursumlija on April 22. On April 15, Belgrade observed the highest daily precipitation sum of 6,2 mm.

Number of days with precipitation in April ranged from 2 to 8 days, on the mountains up to 11 days (Figure 14). The observed number of days with precipitation was 5 to 10 days below the average in most of Serbia (Figure 15).

One day with precipitation sums of 20 mm and above was recorded in Kuršumlija.

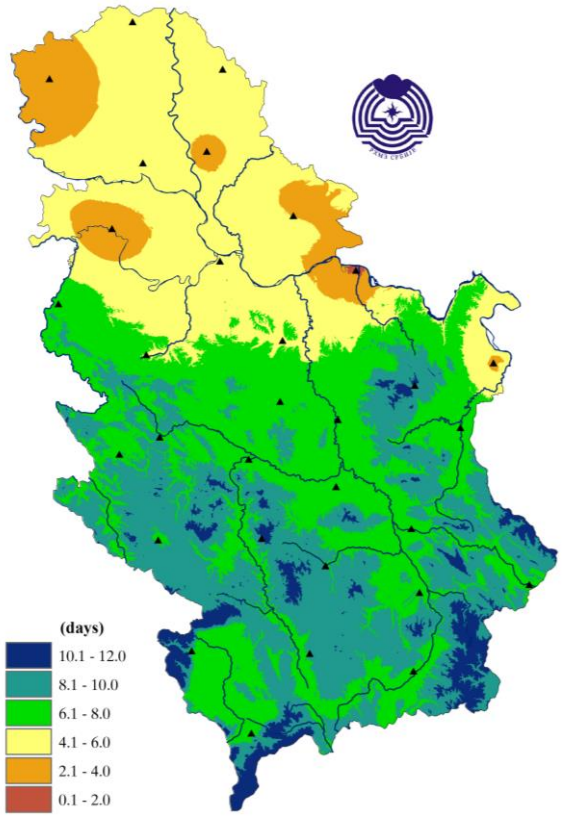


Figure 14. Spatial distribution of number of days with precipitation

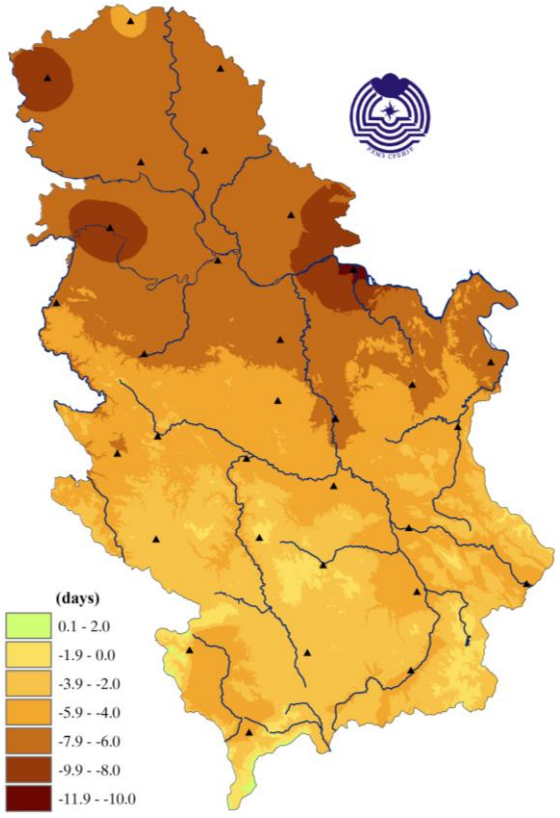


Figure 15. Spatial distribution of deviation of number of days with precipitation

Snow cover was recorded at the beginning of April in parts of central, eastern, southern and southwestern Serbia. The highest snow depth of 62 cm was measured at Kopaonik on April 1. In the low-lying areas, the highest snow depth of 21 cm was measured in Dimitrovgrad on April 2.

In the low-lying areas, there were 3 days with snow cover in Dimitrovgrad and Kursumlija, elsewhere 1 to 2 days were observed. The exception to that were northern and western parts of the country as well as parts of central Serbia where snow wasn't registered at all. In the hilly-mountainous regions, the highest number of days with snow cover, total of 19 days, was registered at Kopaonik.

Figure 16 shows assessment of the air temperature and precipitation sums for Serbia for April based on the tercile distribution relative to the 1981-2010 base period. It can be noted that April 2020 was marked by air temperature within the domain of multiannual average and precipitation sums significantly above the multiannual average.

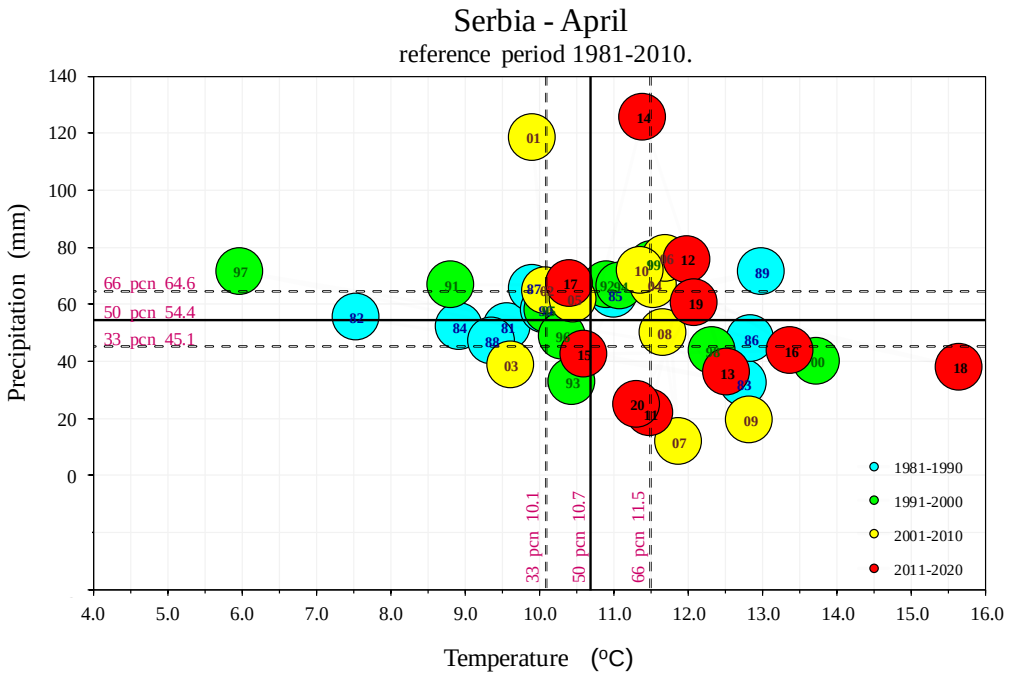


Figure 16. Assessment of air temperature and precipitation in April for Serbia with the accompanying terciles in relation to the 1981-2010 base period

Figure 17 show daily and cumulative precipitations sums with averaged normal 1981-2010 for April in Belgrade, and for the stations Sombor, Novi Sad, Loznica, Negotin, Kragujevac, Zlatibor, Nis and Vranje precipitation sums are given in Appendix.

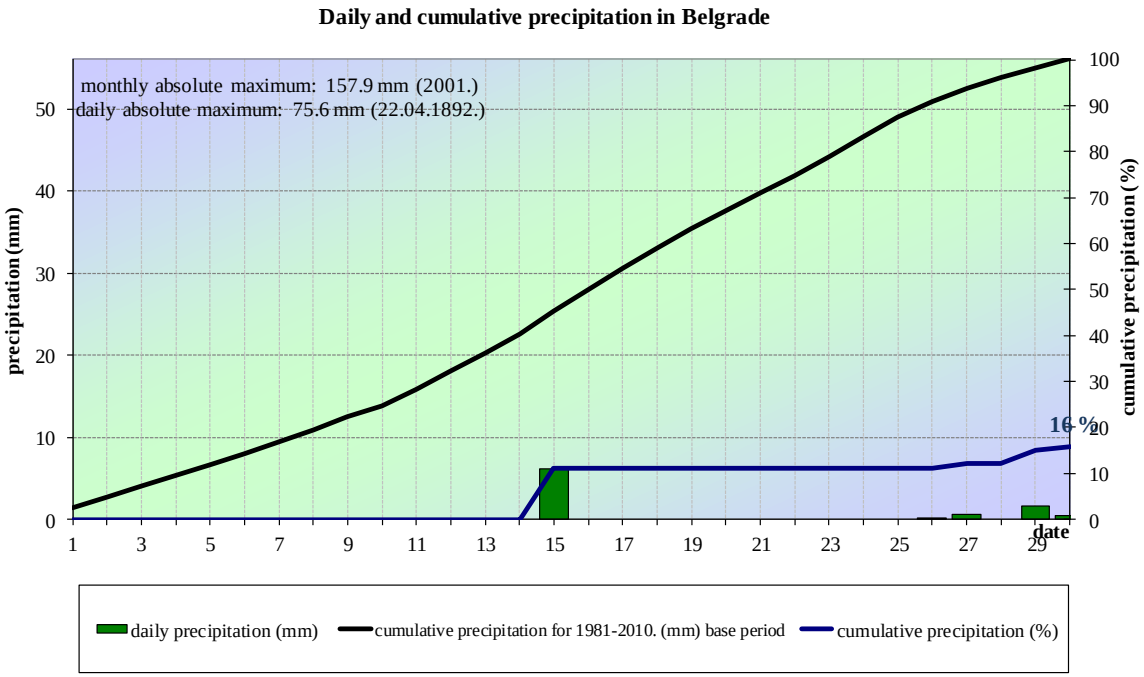


Figure 17. Daily and cumulative precipitation in Belgrade

CLOUD COVER, BRIGHT AND CLOUDY DAYS

Mean April cloud cover in Serbia was below the average, ranging from 3/10 to 5/10. Figures 18, 19 and 20 show an average daily cloud cover in April for Belgrade, Kopaonik and Palic.

Number of bright days ranged from 9 days in Zajecar to 16 days in Belgrade and Loznica. The observed number of bright days was 5 to 12 days above the April average in most of the country.

In April, Serbia saw 1 to 7 cloudy days, which is 1 to 7 days below the April average. Belgrade observed 2 cloudy days.

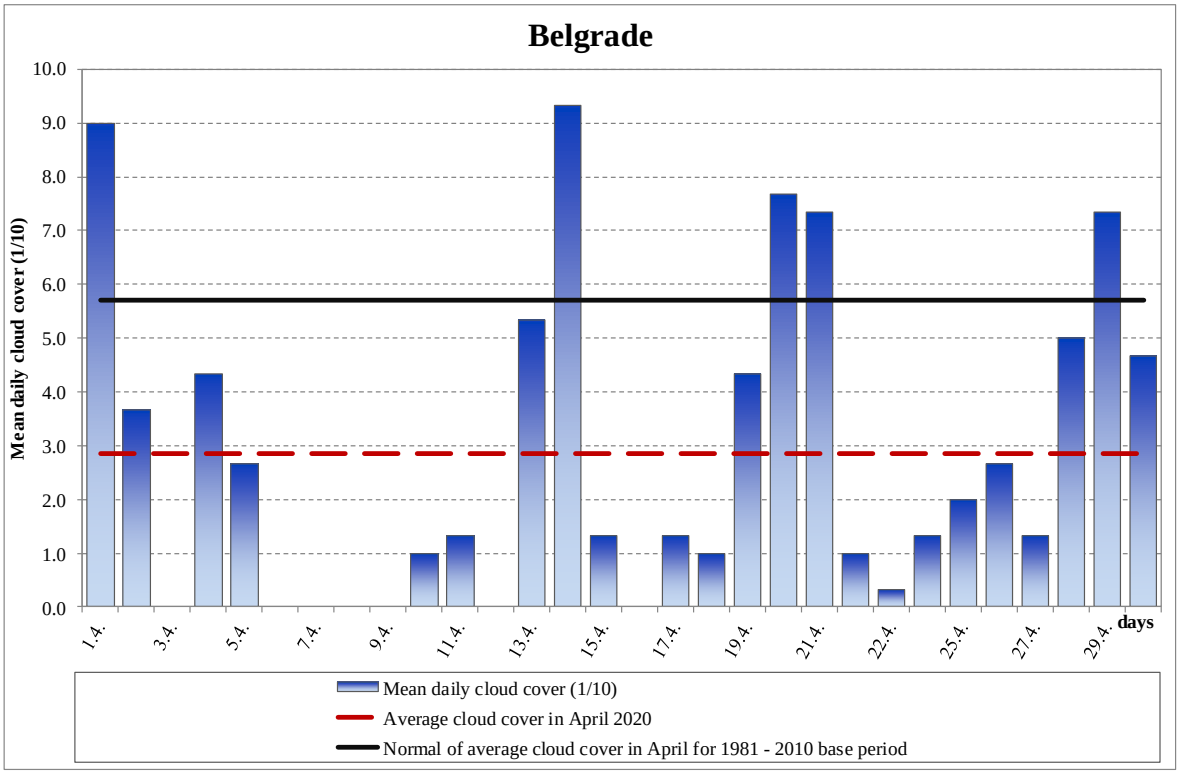


Figure 18. Mean daily cloud cover in Belgrade

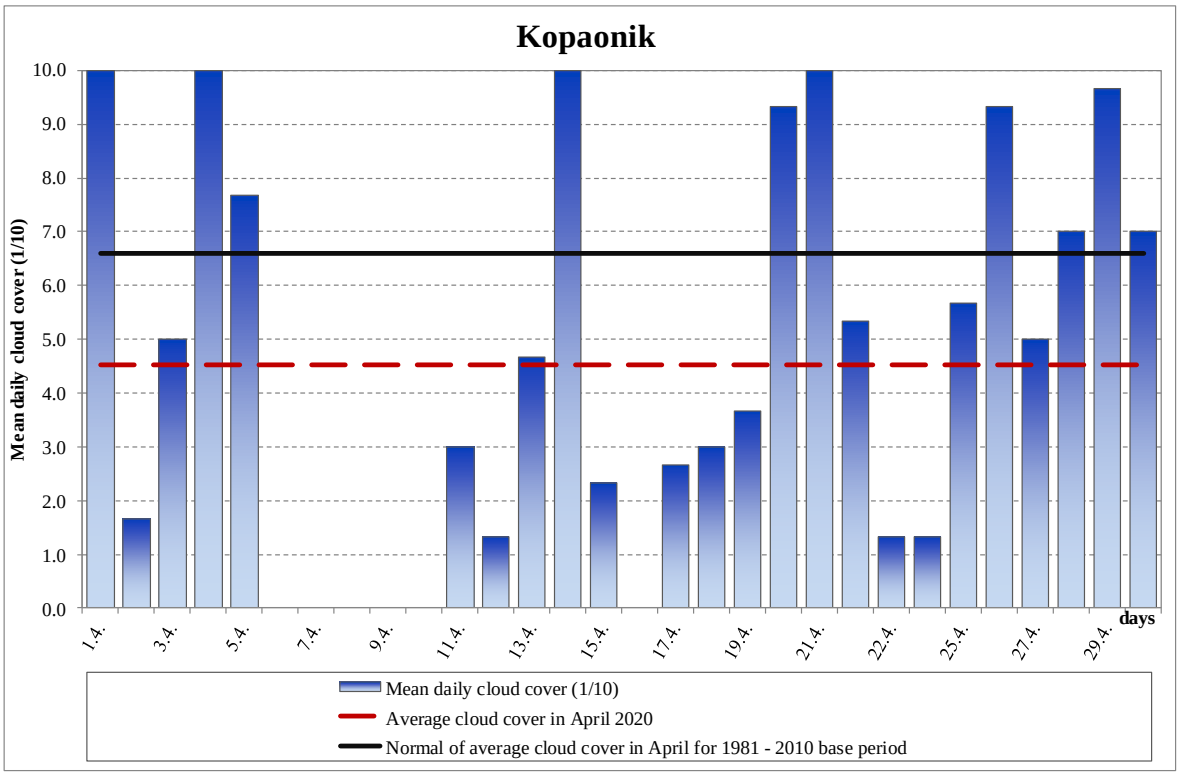


Figure 19. Mean daily cloud cover on Kopaonik

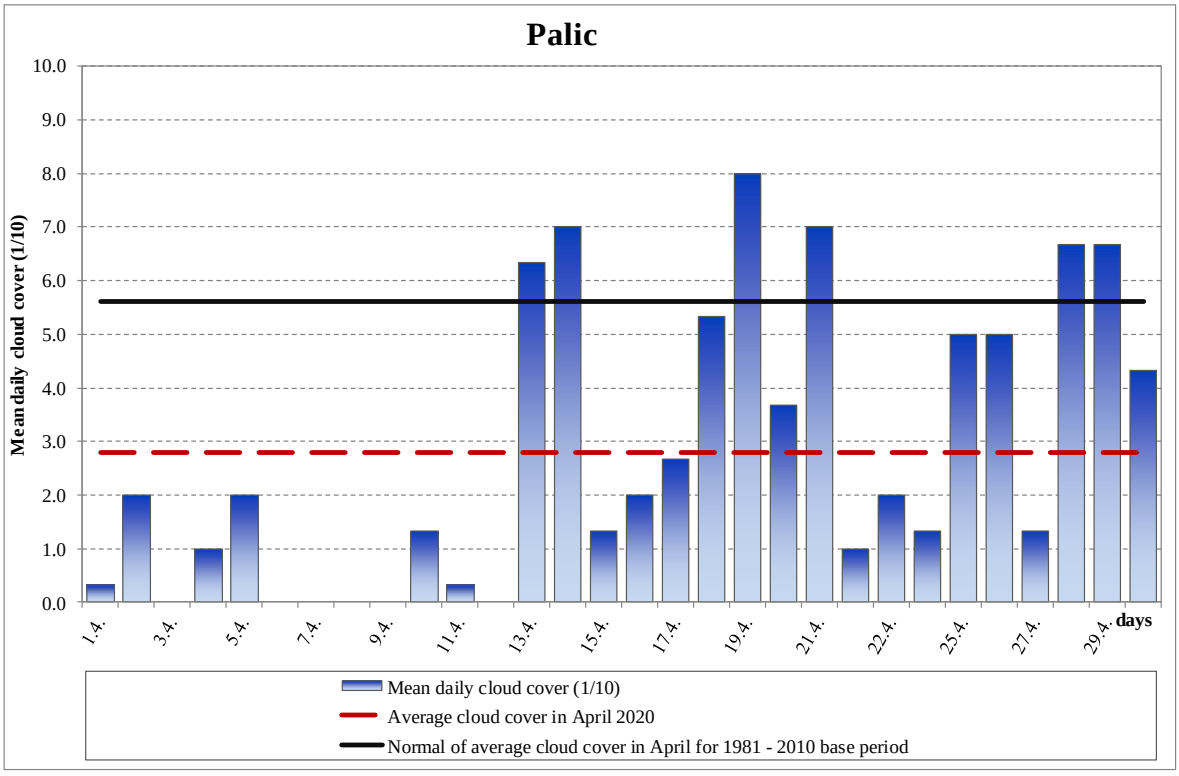


Figure 20. Mean daily cloud cover on Palic

SUNSHINE DURATION (INSOLATION)

Sunshine duration in April ranged from 204,1 hours in Zajecar to 315,7 hours in Kikinda (Figure 21).

April insolation ranged from 123% in Zajecar to 179% in Pozega compared to the normal for the 1981-2010 base period (Figure 22).

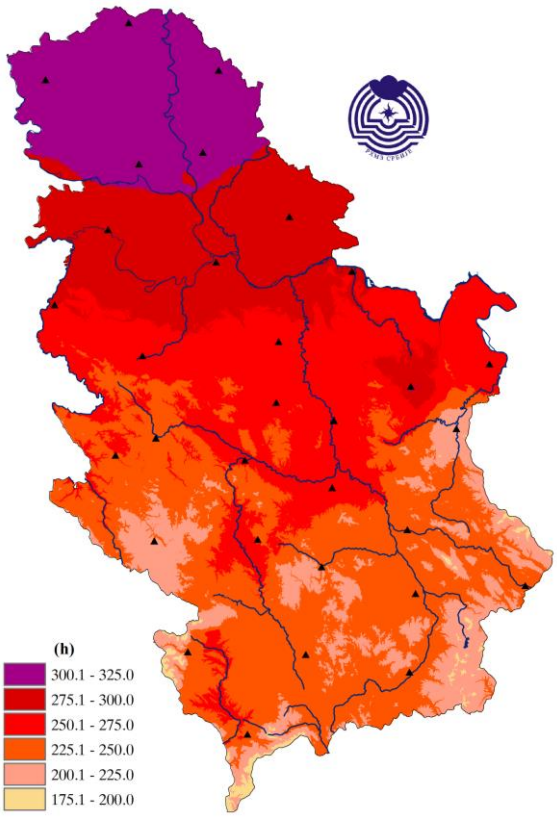


Figure 21. Insolation, expressed in hours

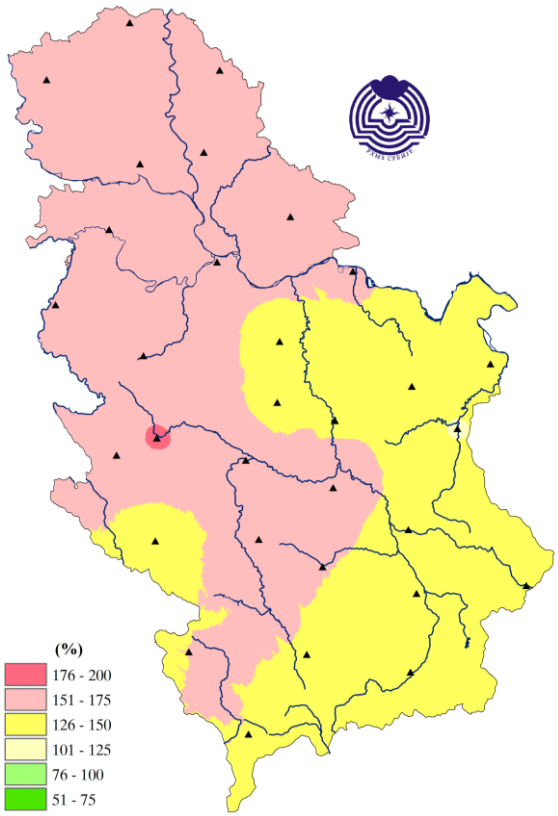


Figure 22. Insolation expressed in the percentages of normal

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

OVERVIEW OF THE SYNOPTIC SITUATION*

A few deeper disruptions, incursions of the cold air through influence of cyclone activity from the north of the continent, occasionally with cyclone activity in western and central Mediterranean; prevalence of anticyclone and period of dry and very warm weather.

Period at the beginning of the month was characterized by cutoff of the upper air cyclone across the Balkans and its transfer toward central, then eastern Mediterranean and the Aegean Sea. This process maintained changeable, cold and wet weather, precipitation was observed in eastern and southeastern parts of the country, in the low-lying areas with scattered snow. Period in the middle of the first decade was marked by establishment of northeasterly upper air circulation due to the pertaining upper air depression in the Levant area along with ridge across the Balkans.

Brief disruption of the ridge at the end of the first decade and shallow ill formation in the field of geopotential brought slight oscillations of the maximum air temperature and light rain in northwest of the country. Hence, weather remained settled, dry, gradually warmer and predominantly sunny until the middle of the month.

As of April 14, new incursion from the north took place followed by significant ill formation in meridional direction, deepening of upper air trough as well as influence and passage of the cold front within the spatial cyclone from the north of the continent. Weather was cloudy and rainy, in low-lying areas with rain, on the mountains of southwestern and central Serbia with snow.

In the subsequent period, at the beginning of the second half of April, weather was more settled with establishment of the ridge along with periphery of anticyclone emanating from the western Europe. Simultaneously, new surface depression was developed in the north of the continent along with frontal system, which occasionally disrupted ridge with shallow waves, whereas the main cloudy system waved across the central parts and the Pannonia Plain. Additionally, cyclone circulation strengthened and maintained in the western and central Mediterranean producing warm airwave from the southwest. Consequently, at the end of the second decade, it was very warm at times.

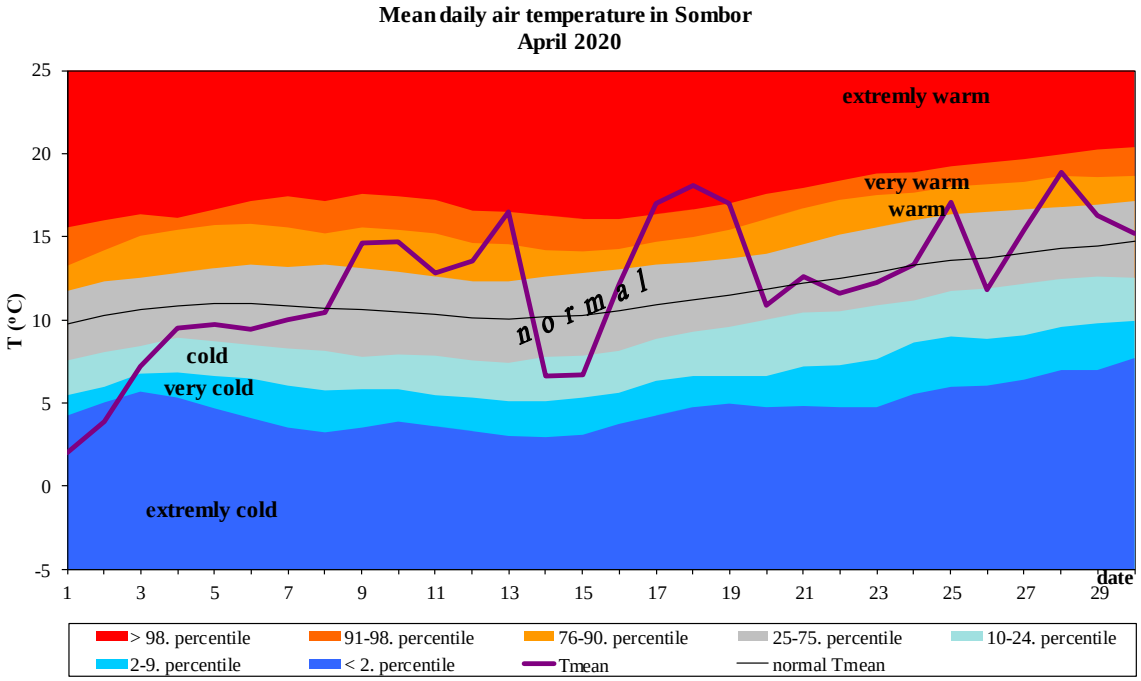
The ensuing days, until the middle of the third decade, mostly dry weather remained in the north but somewhat colder compared to the previous period given the passage of the shallow ill formation in the upper air circulation and weakly pronounced atmospheric fronts across our territory. Elsewhere, it was rather rainy owing to the influence of the cyclone from Mediterranean.

Period from the middle of the third decade until the end of the month was characterized by influence and passage of another cold atmospheric front from the north followed by weak gradient cyclone field, unsettled and relatively warm air mass as well as rainy weather with intermittent patches of rain and isolated showers.

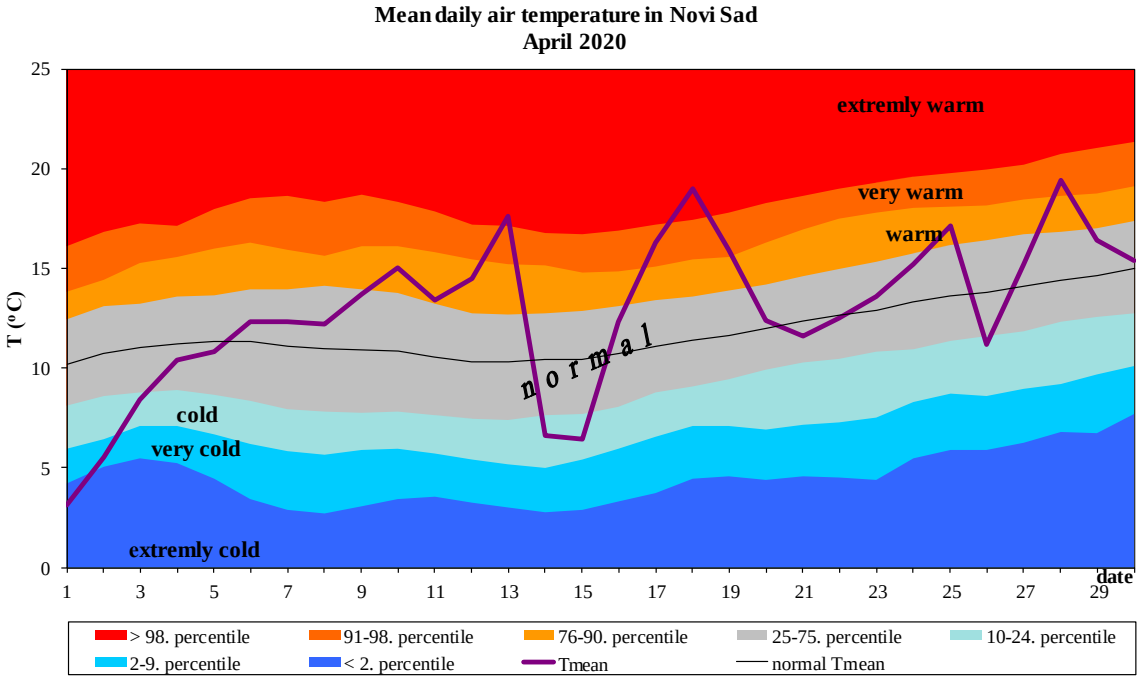
* National Center for Hydrometeorlogical Early Warning System

APPENDIX

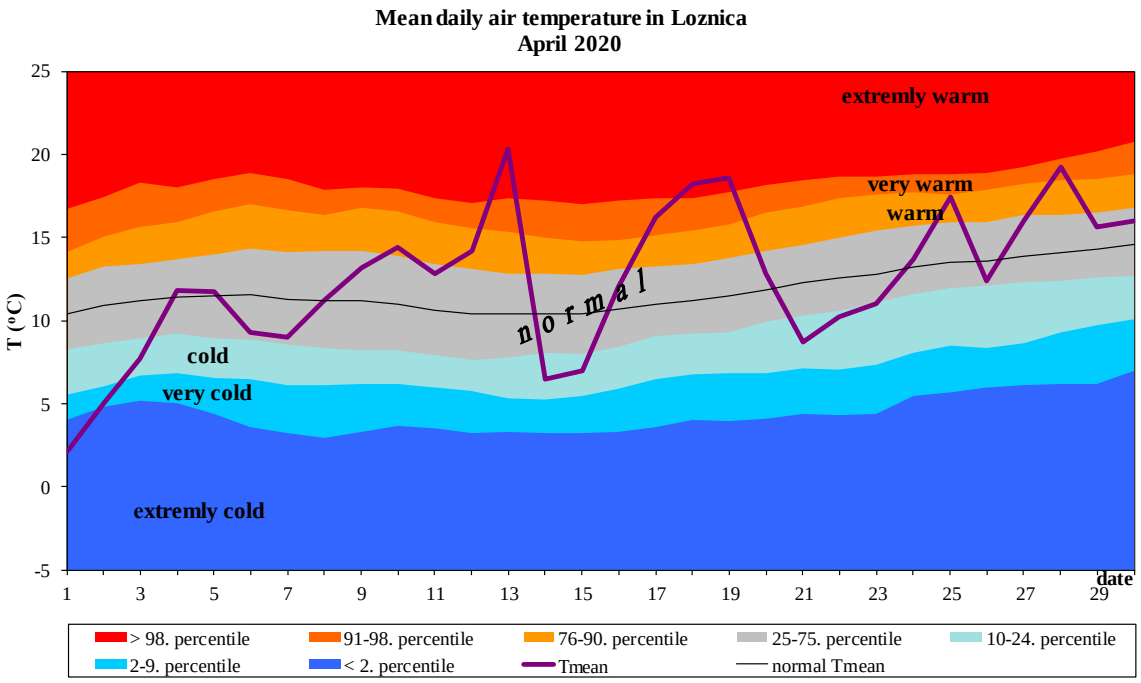
Mean air temperature



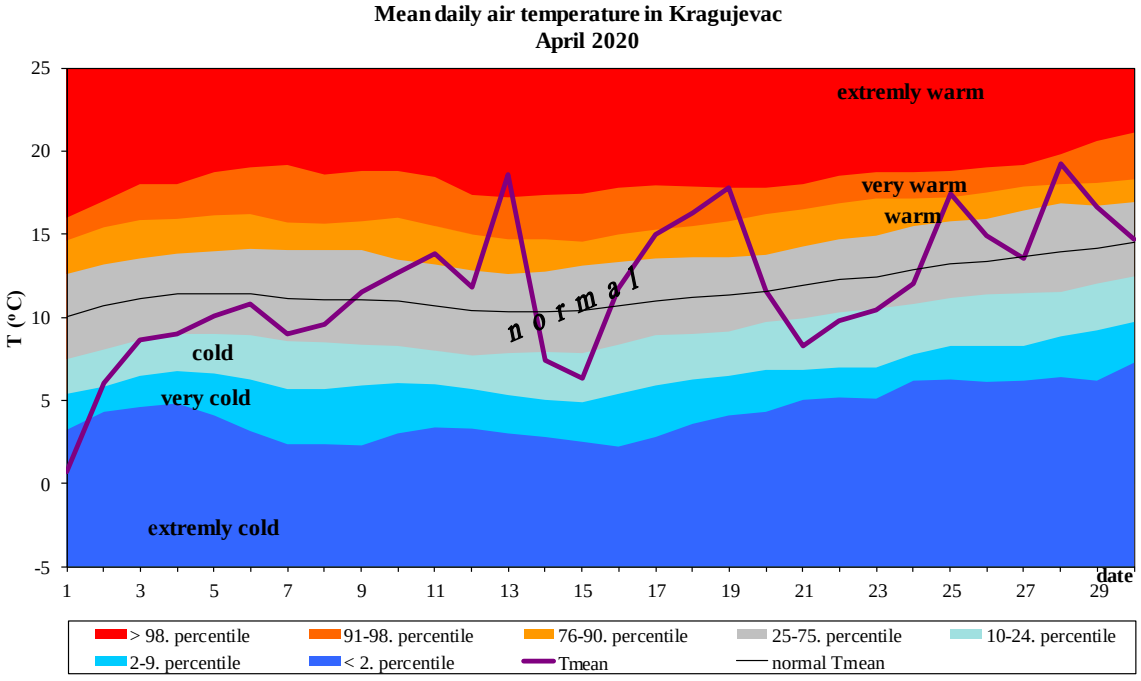
Appendix 1. Daily course of the mean daily air temperature and accompanying percentile for Sombor



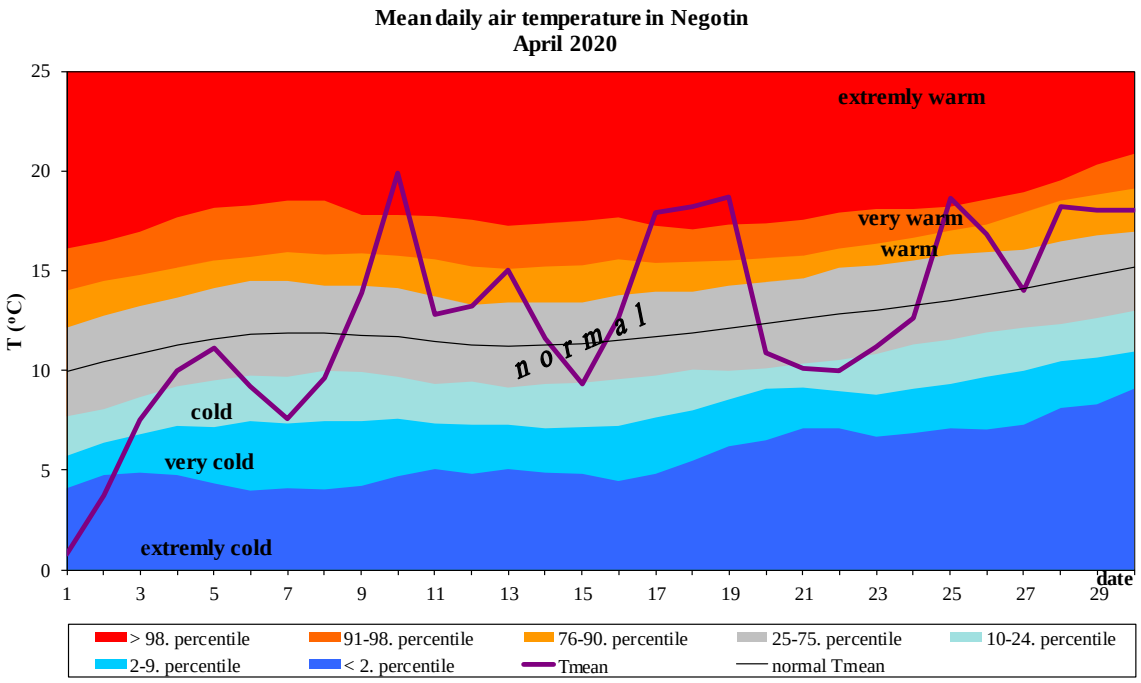
Appendix 2. Daily course of the mean daily air temperature and accompanying percentile for Novi Sad



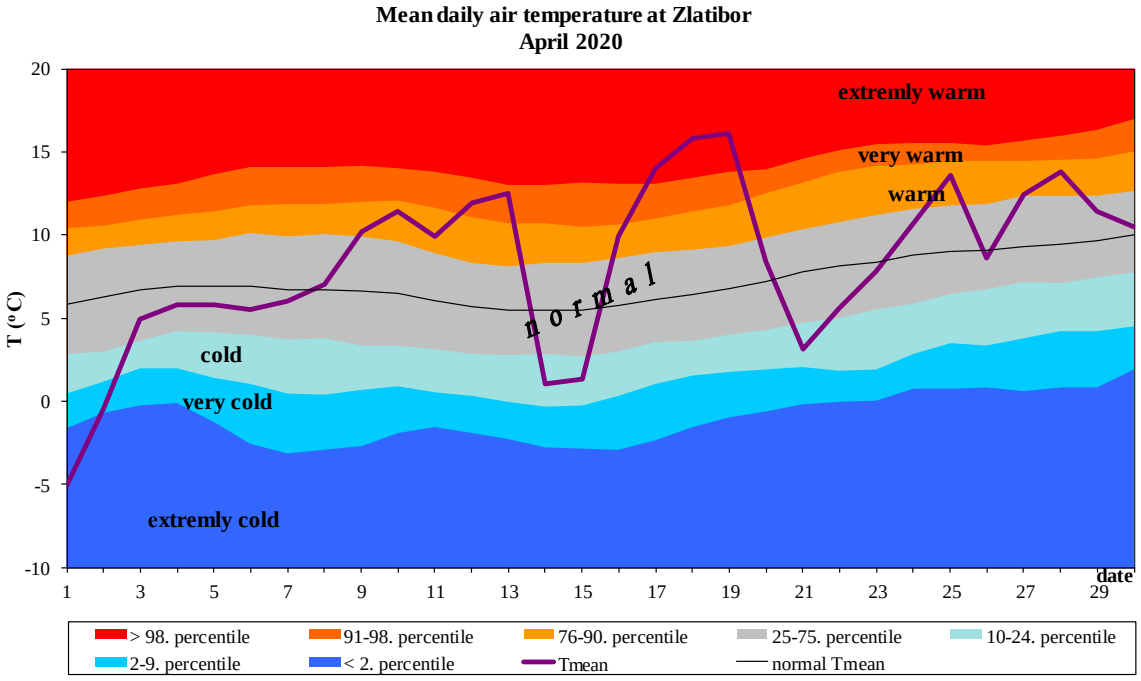
Appendix 3. Daily course of the mean daily air temperature and accompanying percentile for Loznica



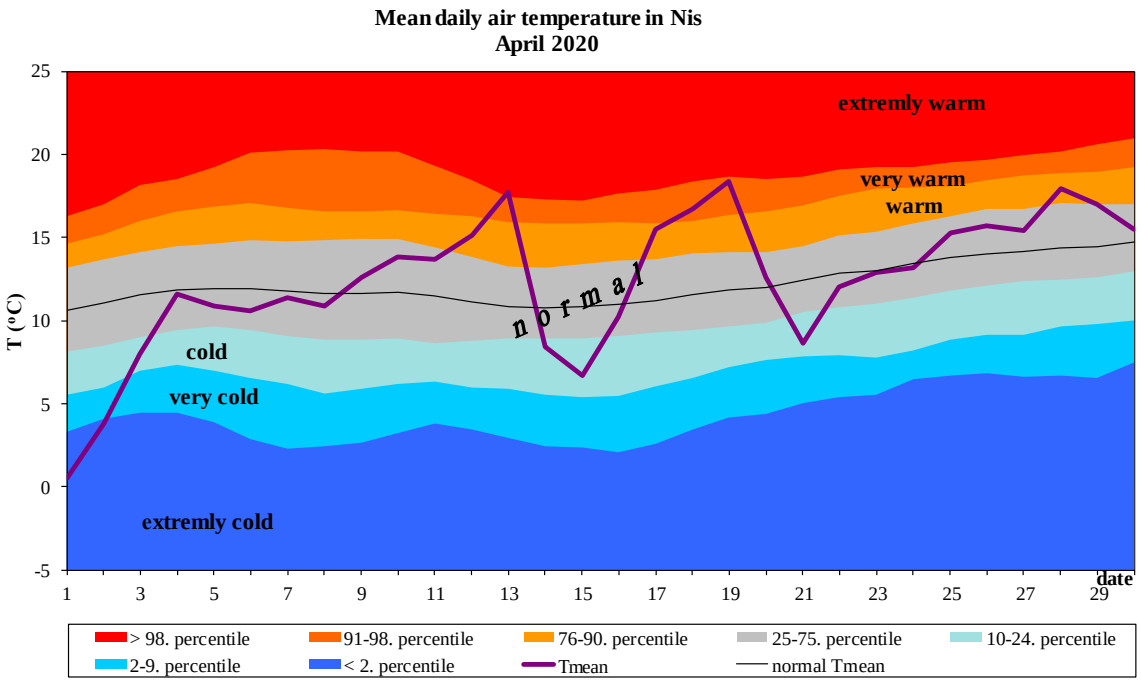
Appendix 4. Daily course of the mean daily air temperature and accompanying percentile for Kragujevac



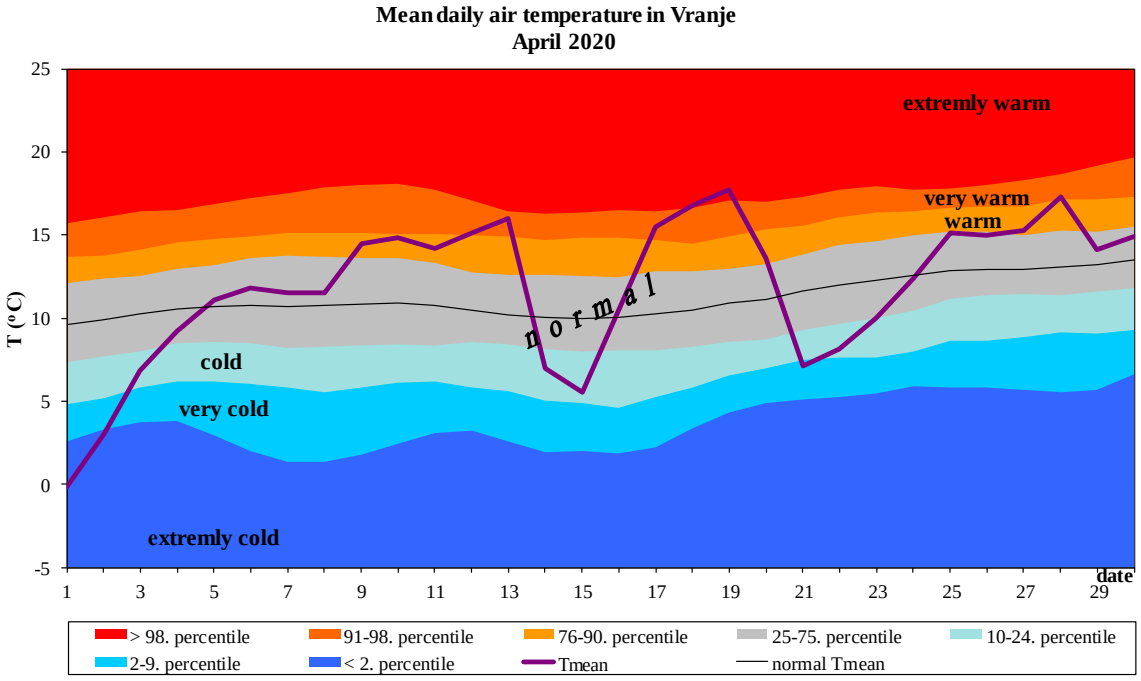
Appendix 5. Daily course of the mean daily air temperature and accompanying percentile for Negotin



Appendix 6. Daily course of the mean daily air temperature and accompanying percentile for Zlatibor

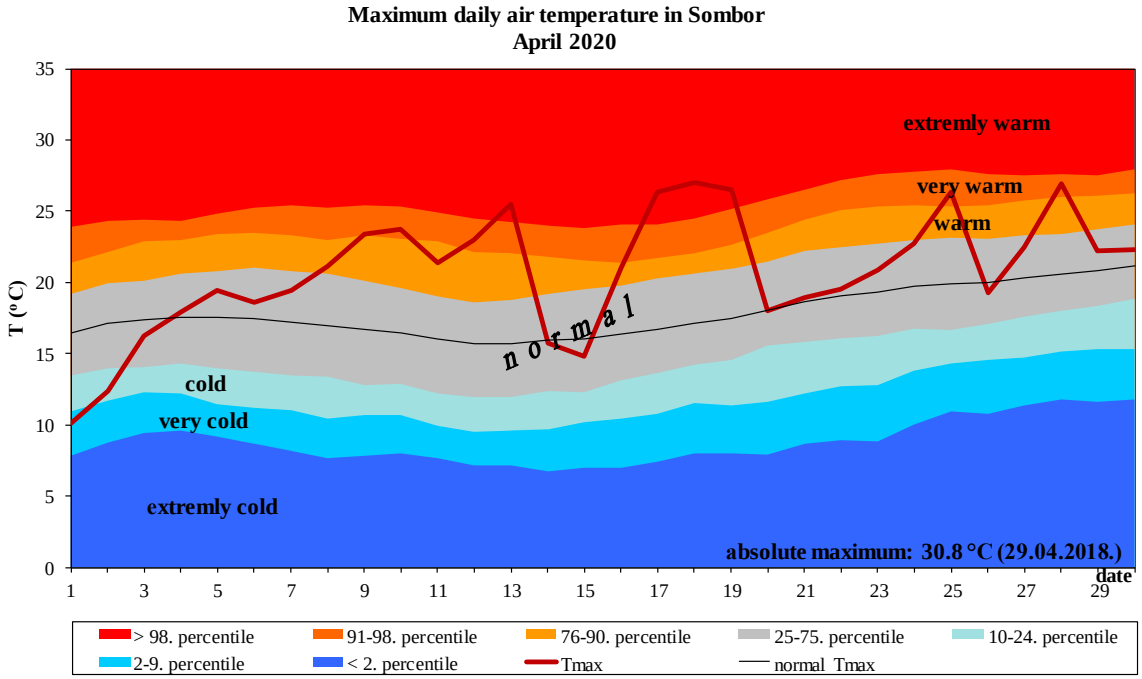


Appendix 7. Daily course of the mean daily air temperature and accompanying percentile for Nis

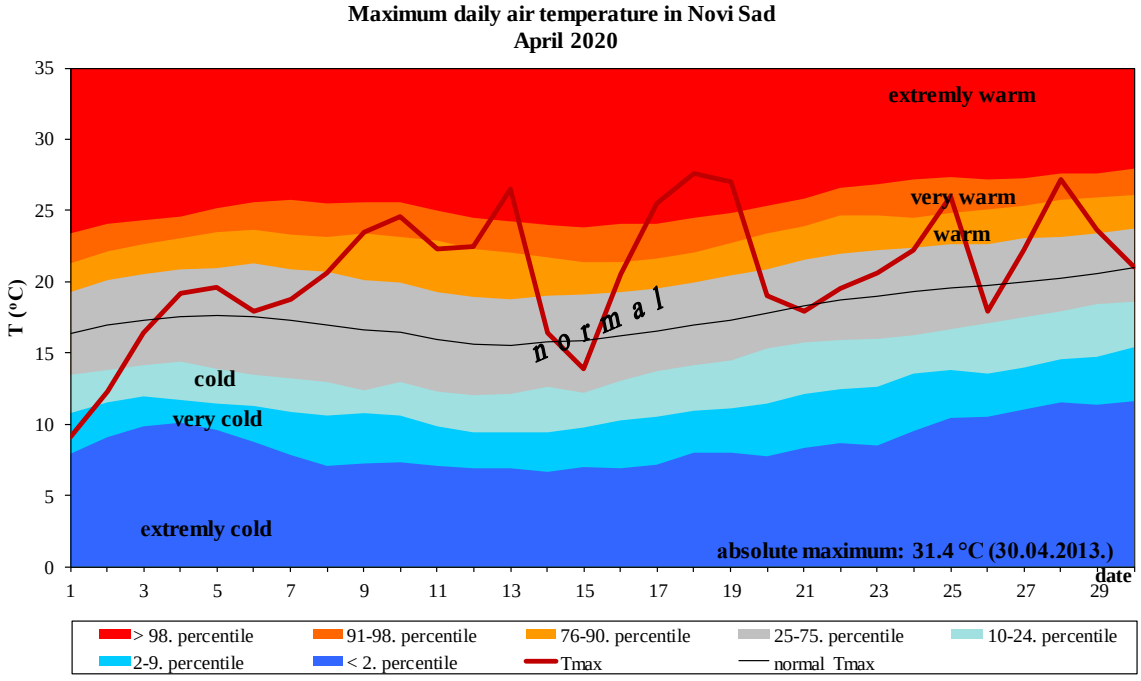


Appendix 8. Daily course of the mean daily air temperature and accompanying percentile for Vranje

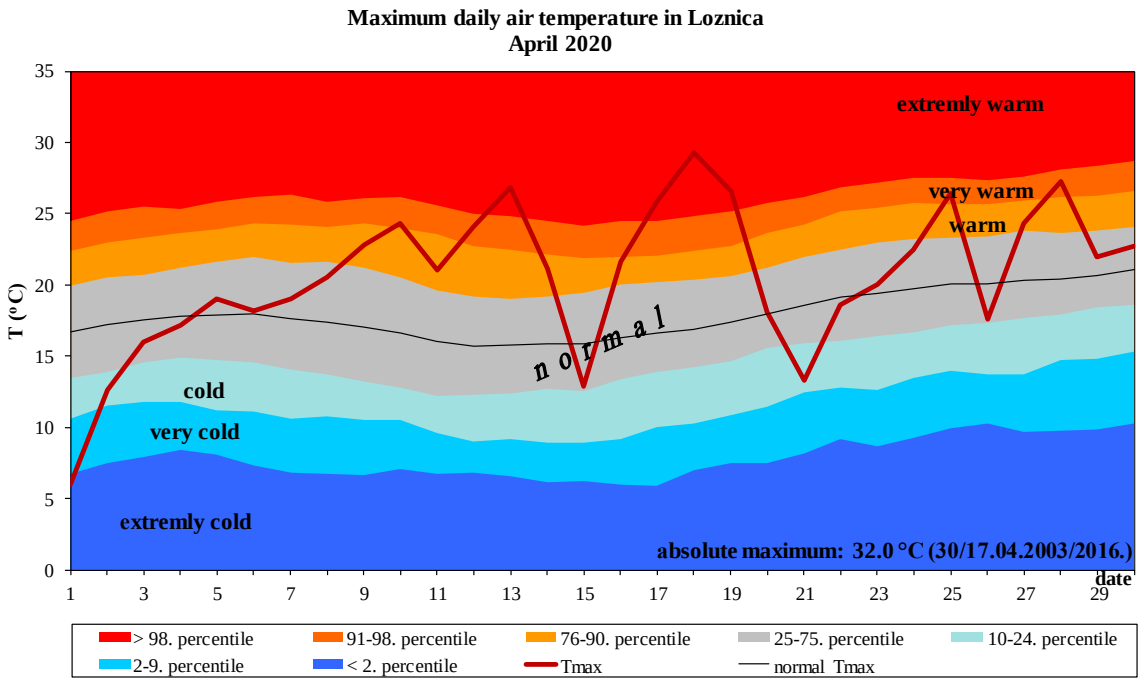
Maximum air temperature



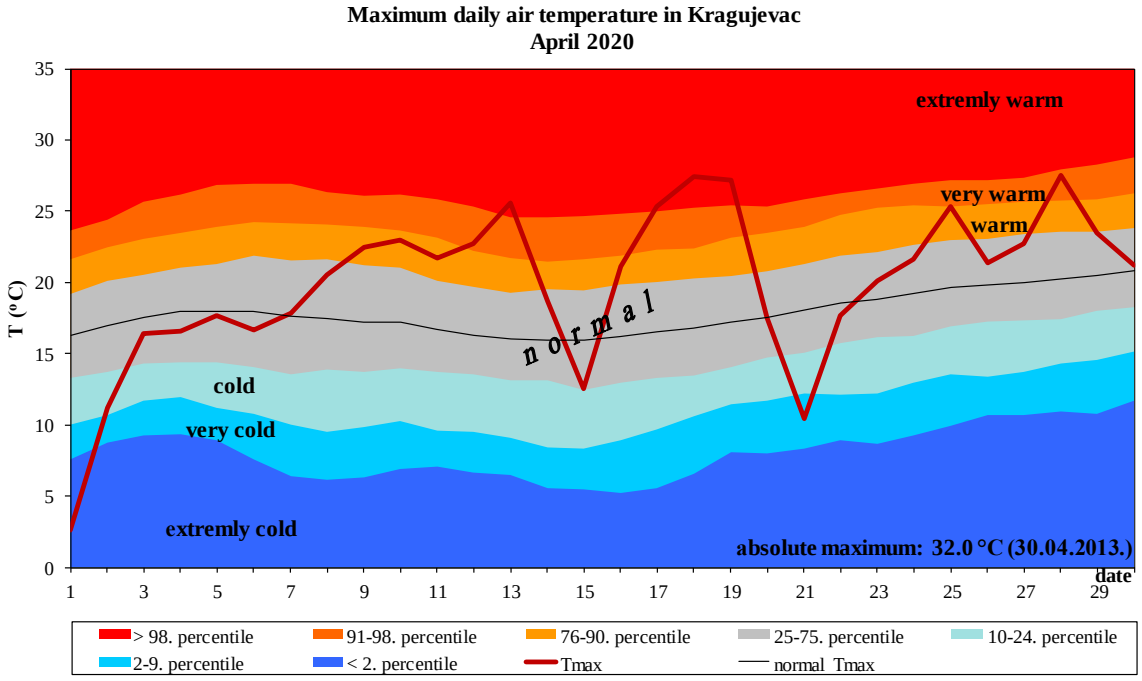
Appendix 9. Daily course of the maximum daily air temeperature and the accompanying percentile for Sombor



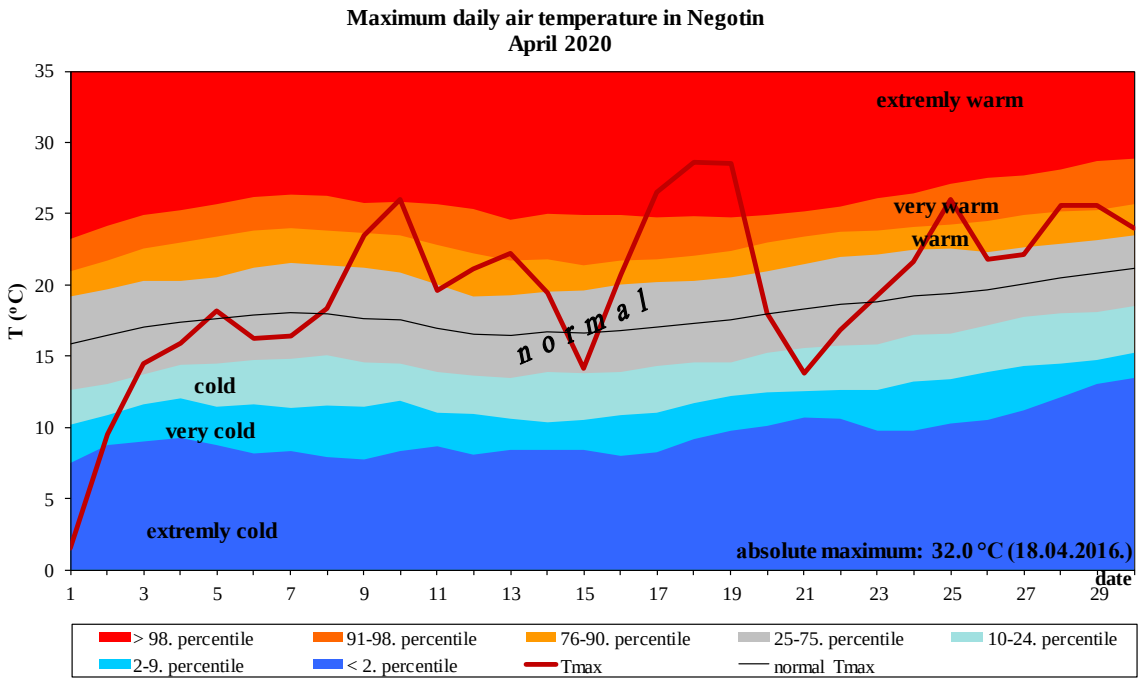
Appendix 10. Daily course of the maximum daily air temeperature and the accompanying percentile for Novi Sad



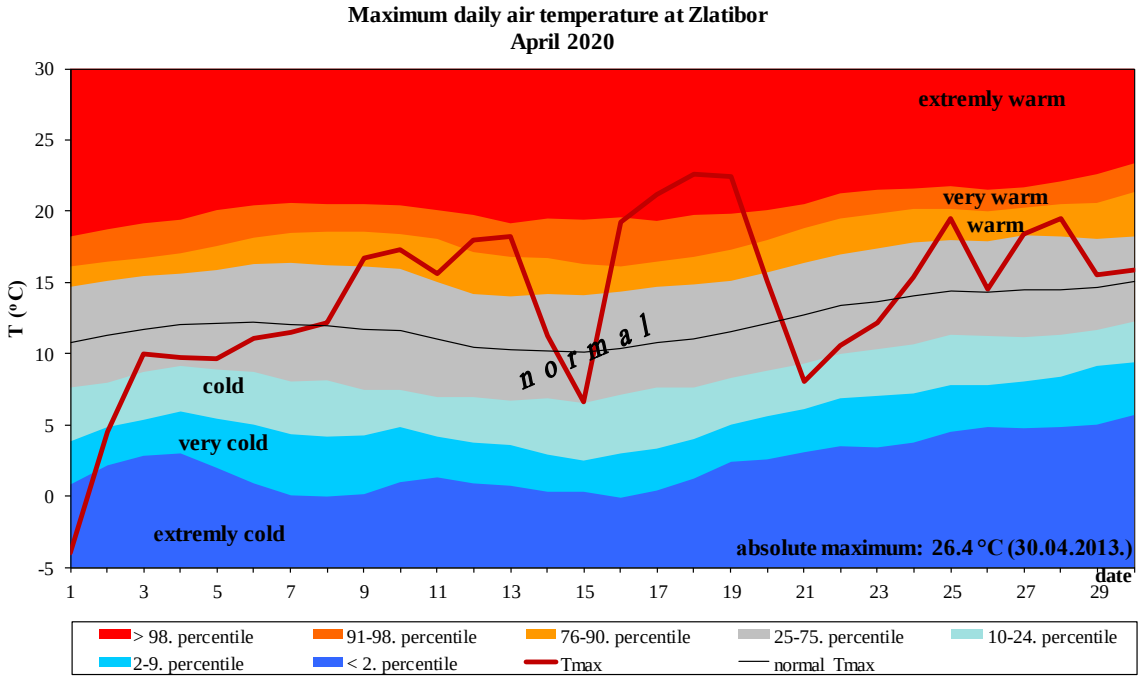
Appendix 11. Daily course of the maximum daily air temeperature and the accompanying percentile for Loznica



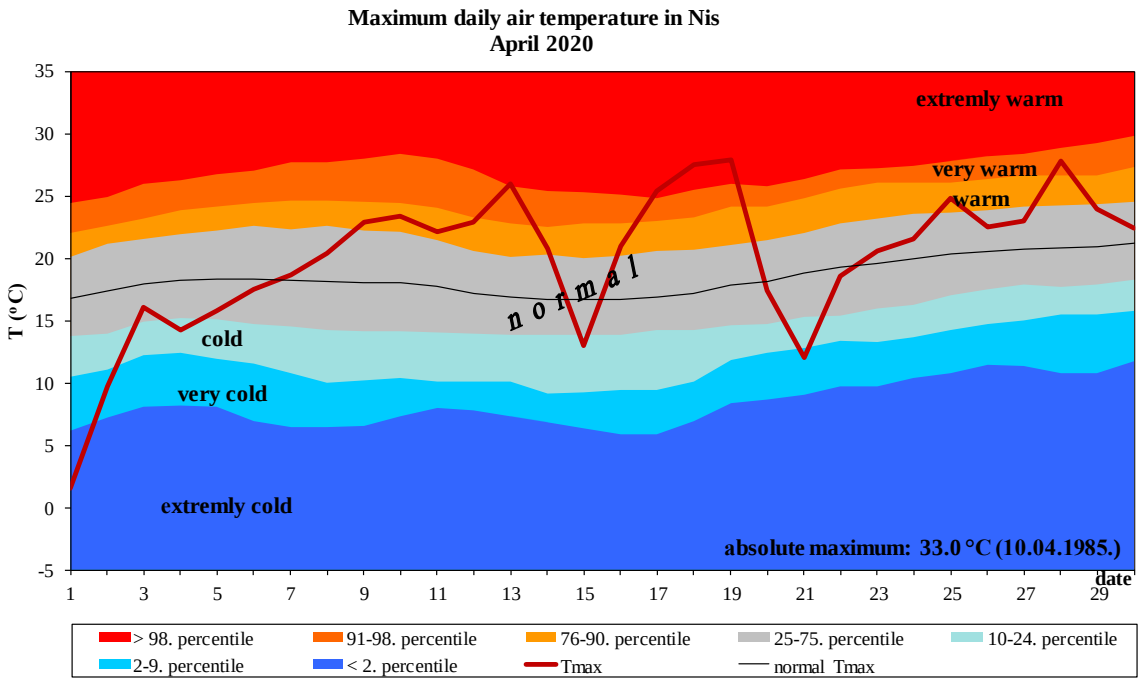
Appendix 12. Daily course of the maximum daily air temeperature and the accompanying percentile for Kragujevac



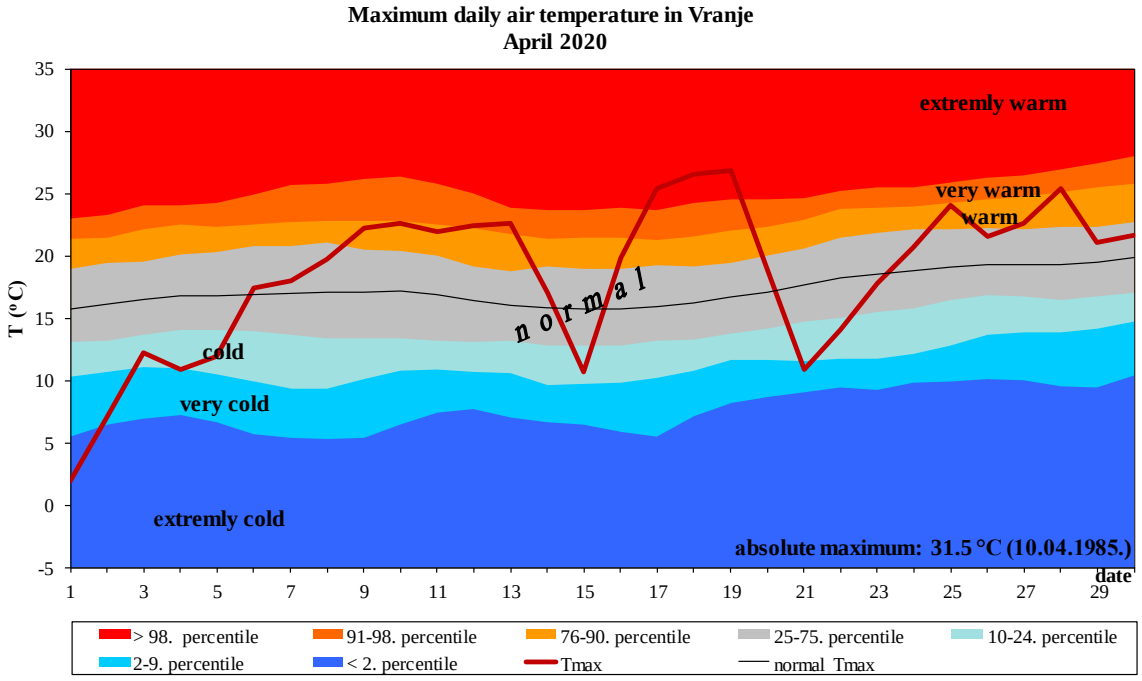
Appendix 13. Daily course of the maximum daily air temeperature and the accompanying percentile for Negotin



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

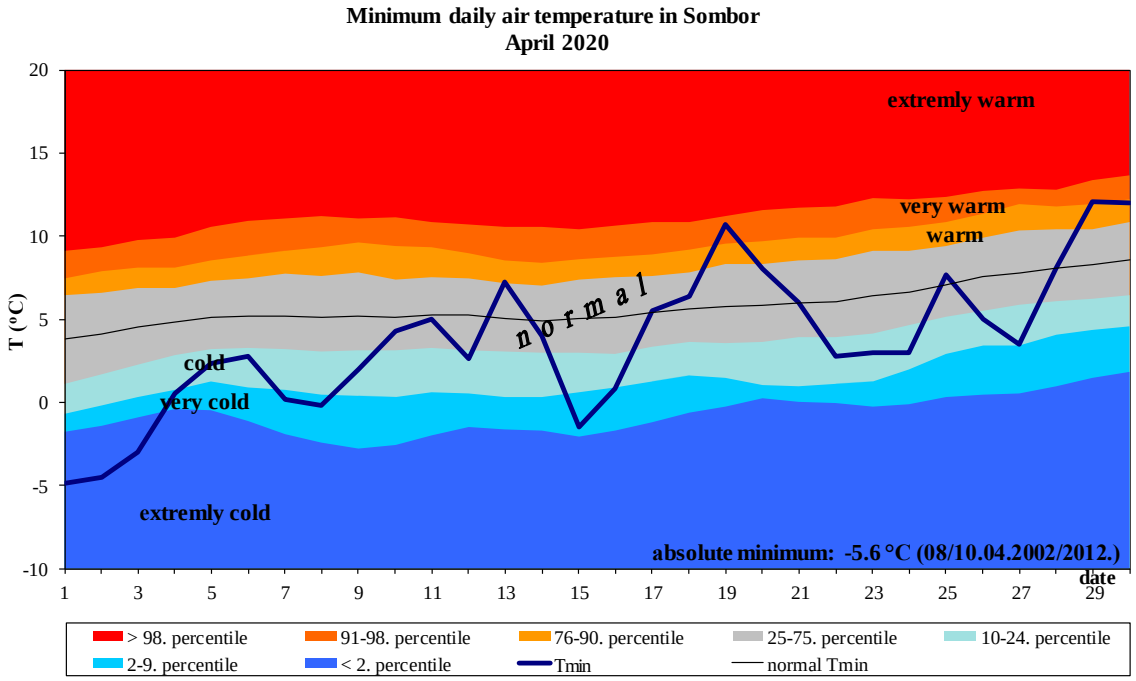


Appendix 15. Daily course of the maximum daily air temeperature and the accompanying percentile for Nis

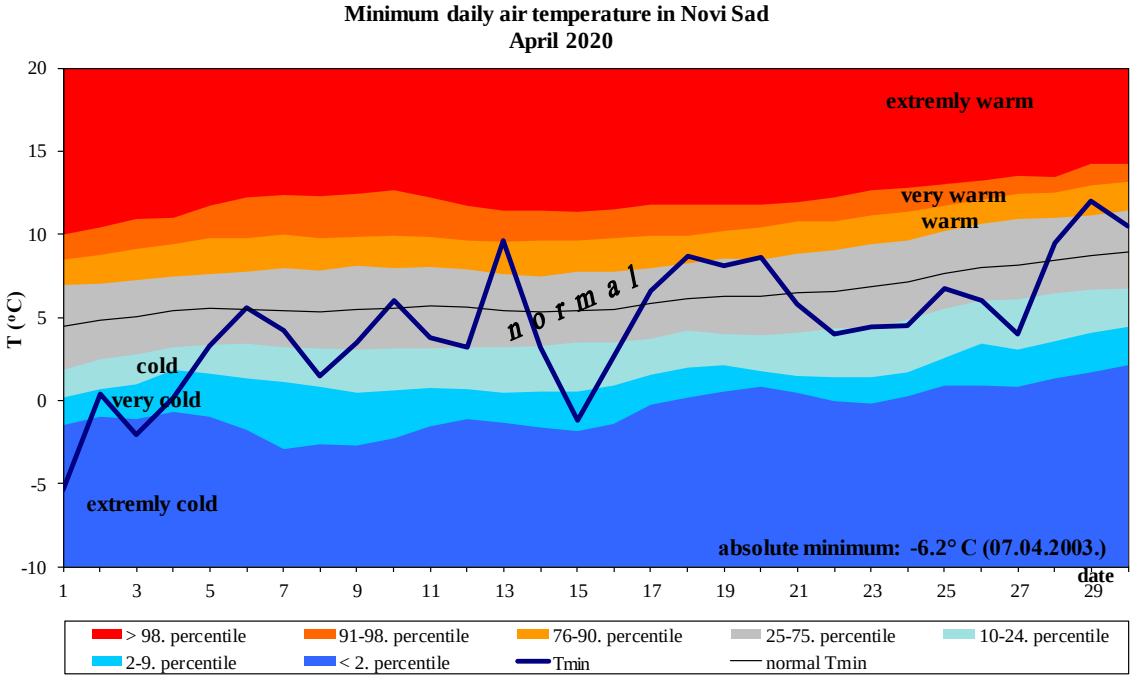


Appendix 16. Daily course of the maximum daily air temeperature and the accompanying percentile for Vranje

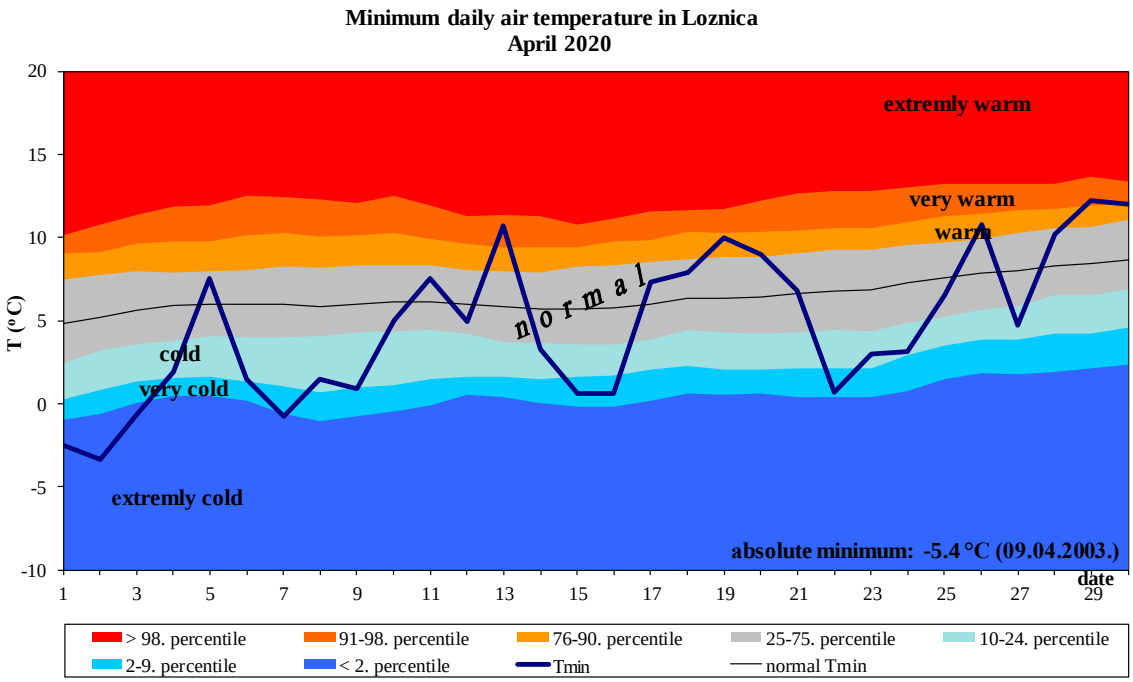
Minimum air temperature



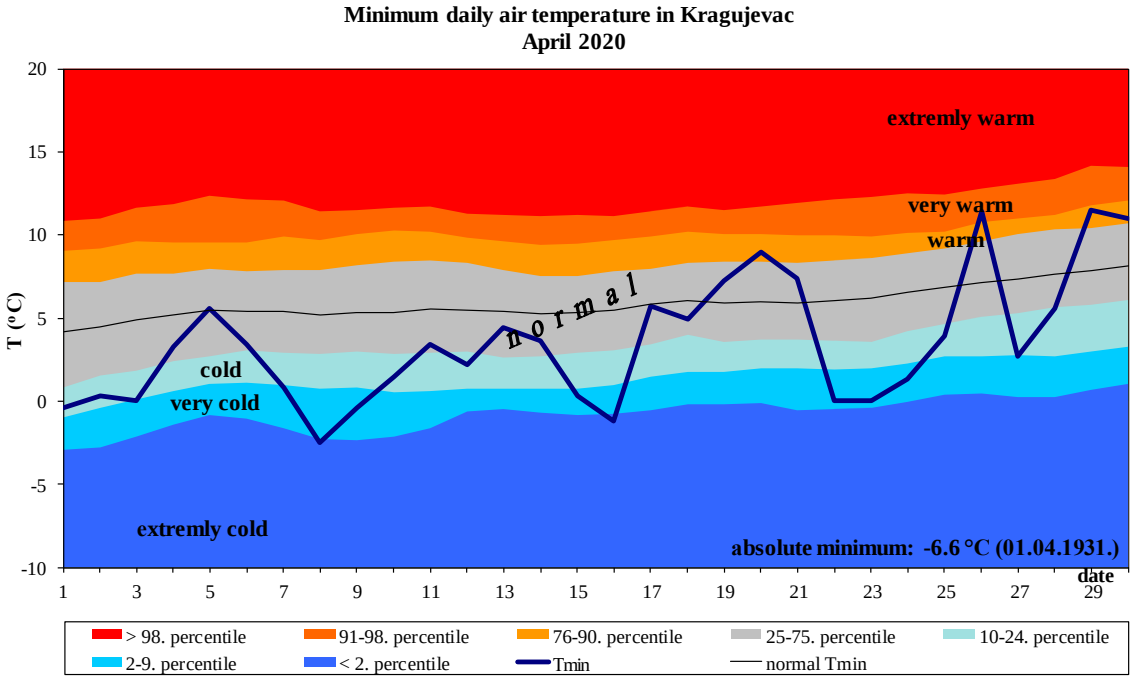
Appendix 17. Daily course of the minimum daily air temperature and the accompanying percentile for Sombor



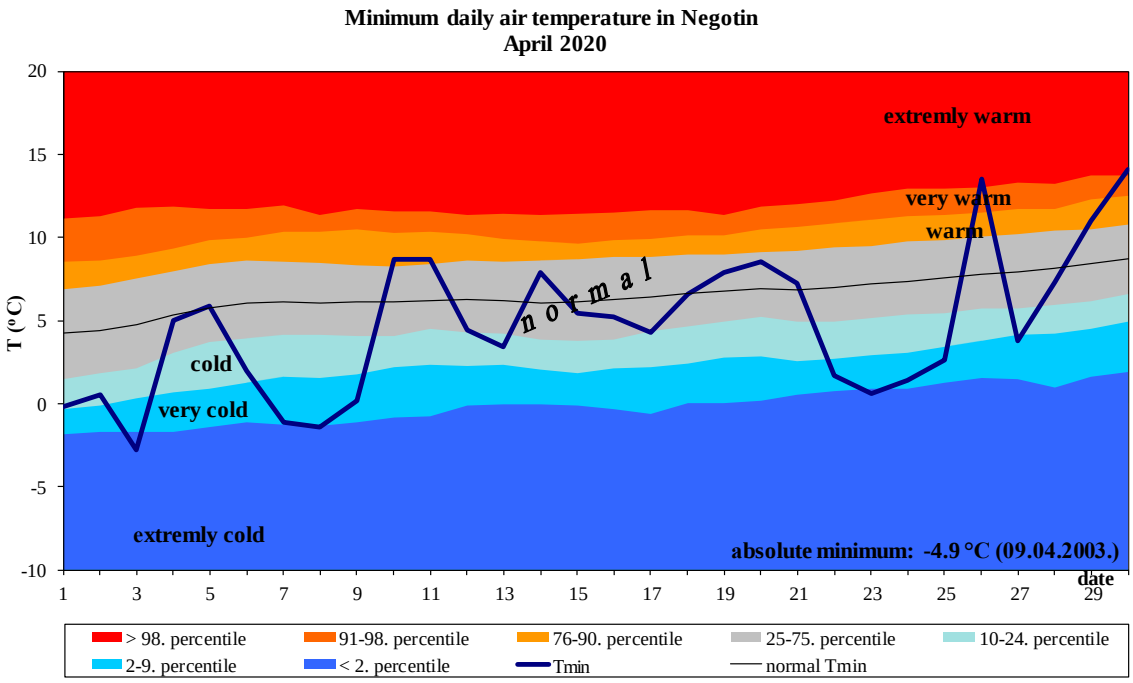
Appendix 18. Daily course of the minimum daily air temperature and the accompanying percentile for Novi Sad



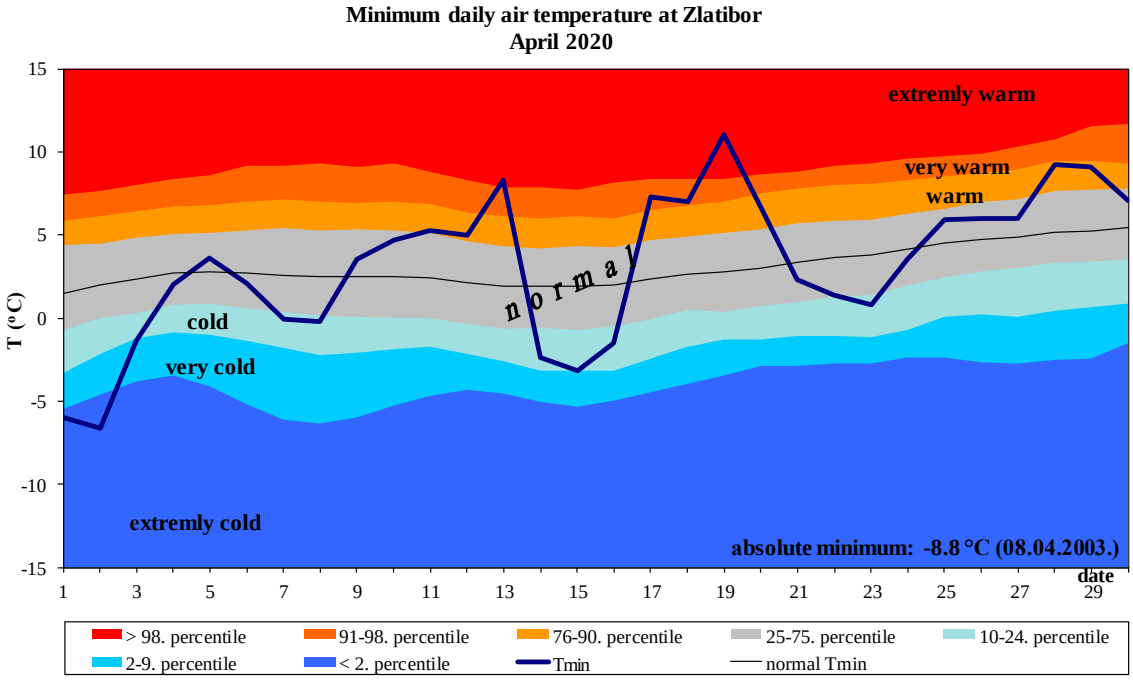
Appendix 19. Daily course of the minimum daily air temperature and the accompanying percentile for Loznica



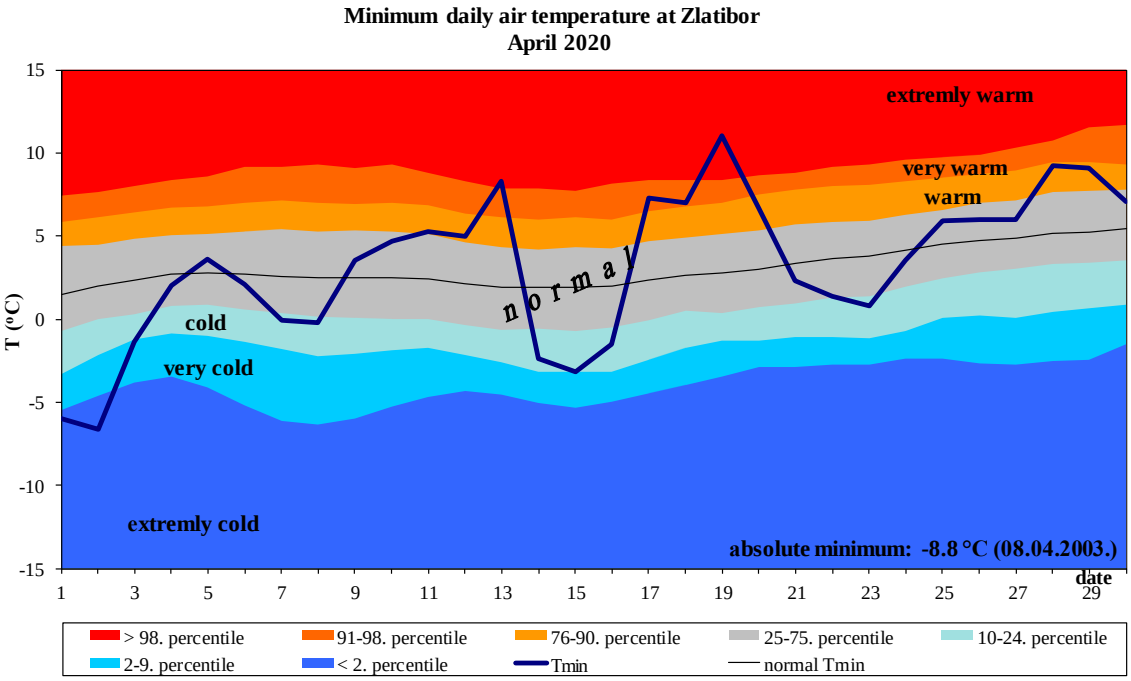
Appendix 20. Daily course of the minimum daily air temperature and the accompanying percentile for Kragujevac



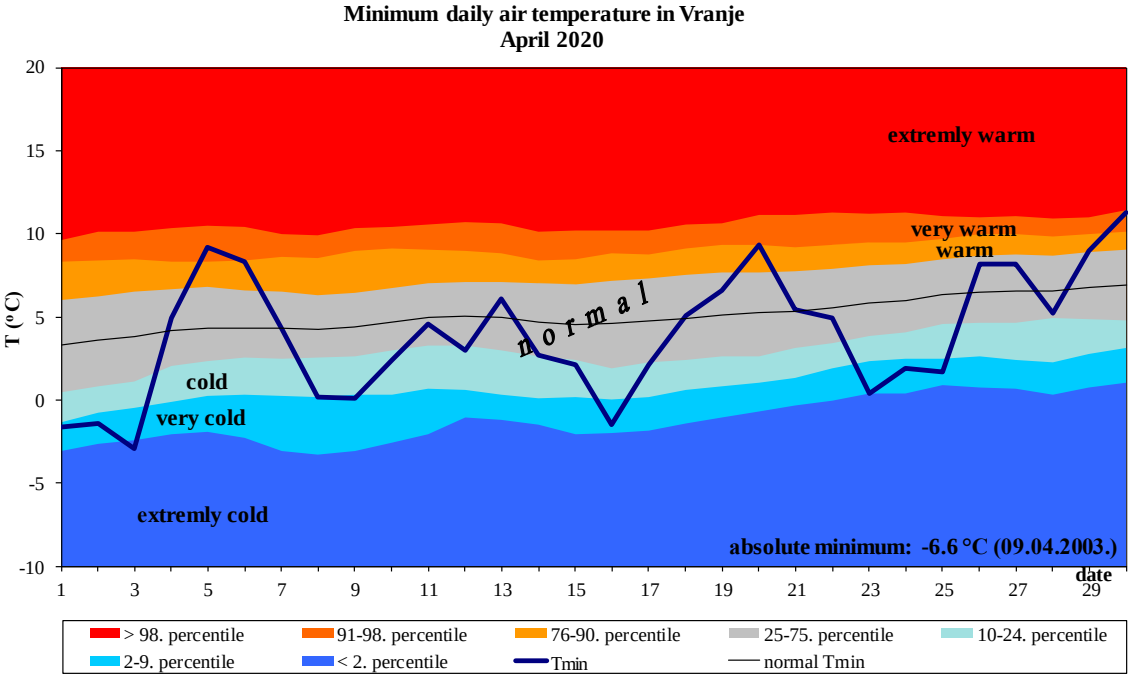
Appendix 21. Daily course of the minimum daily air temperature and the accompanying percentile for Negotin



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

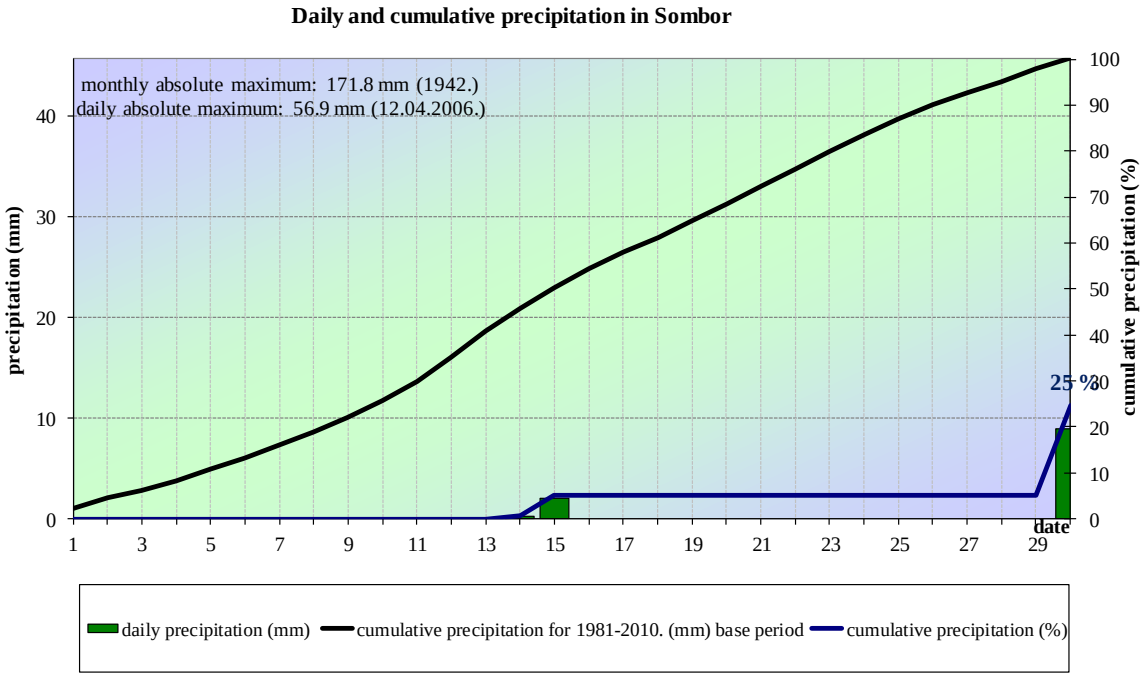


Appendix 23. Daily course of the minimum daily air temperature and the accompanying percentile for Nis

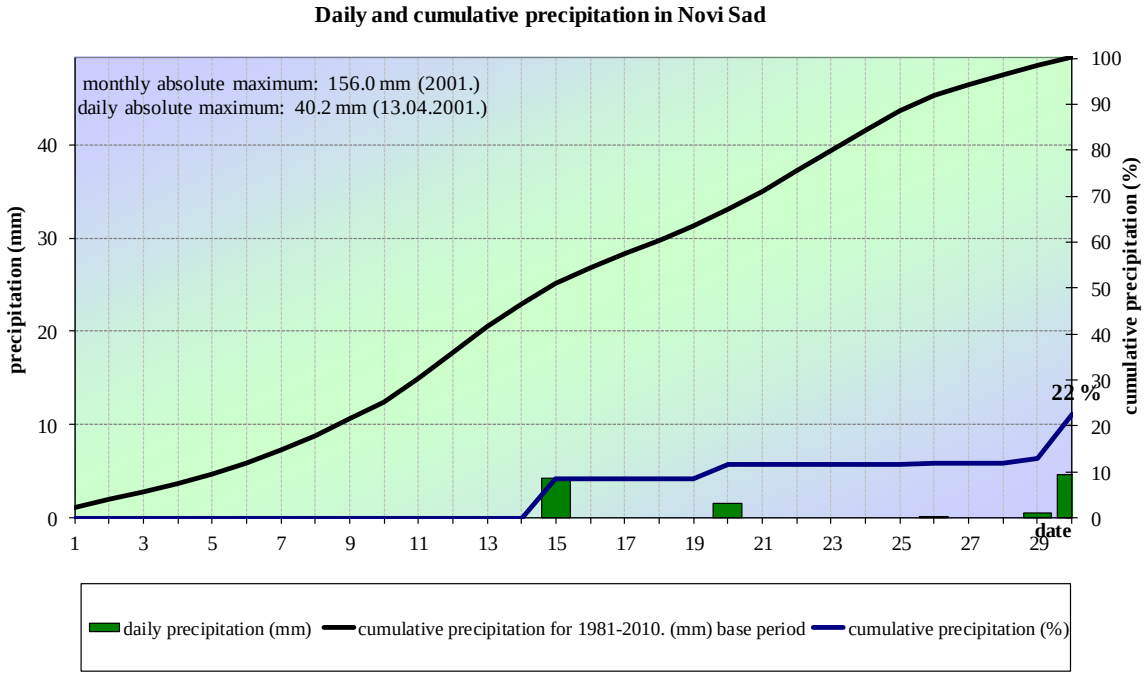


Appendix 24. Daily course of the minimum daily air temperature and the accompanying percentile for Vranje

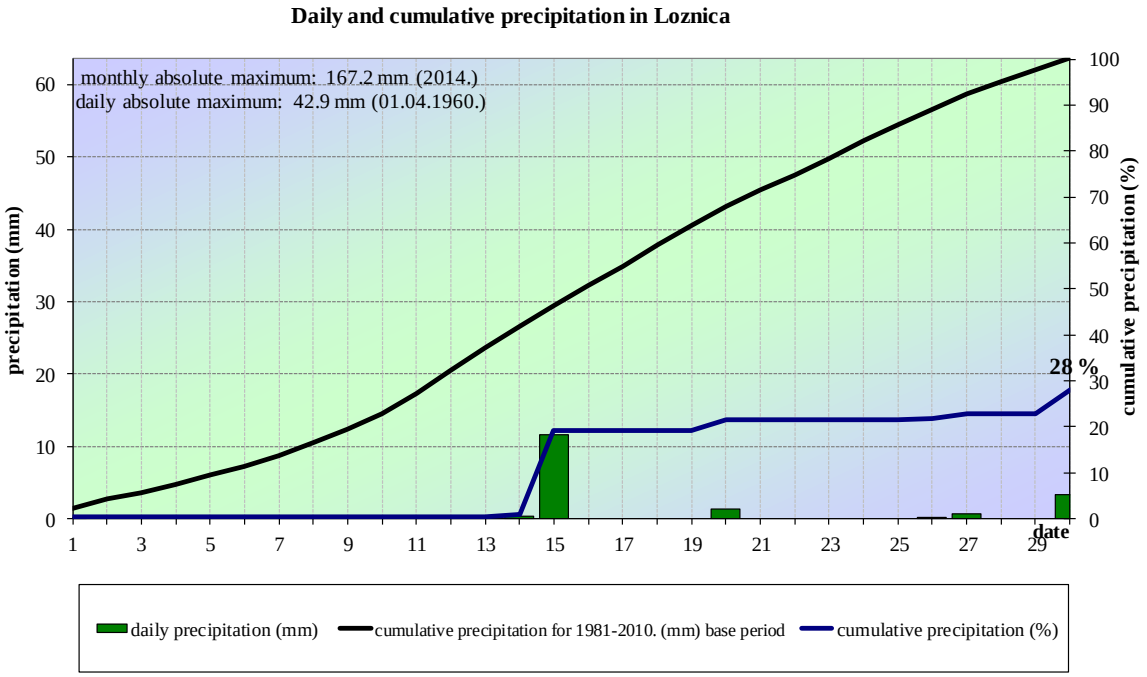
Precipitation



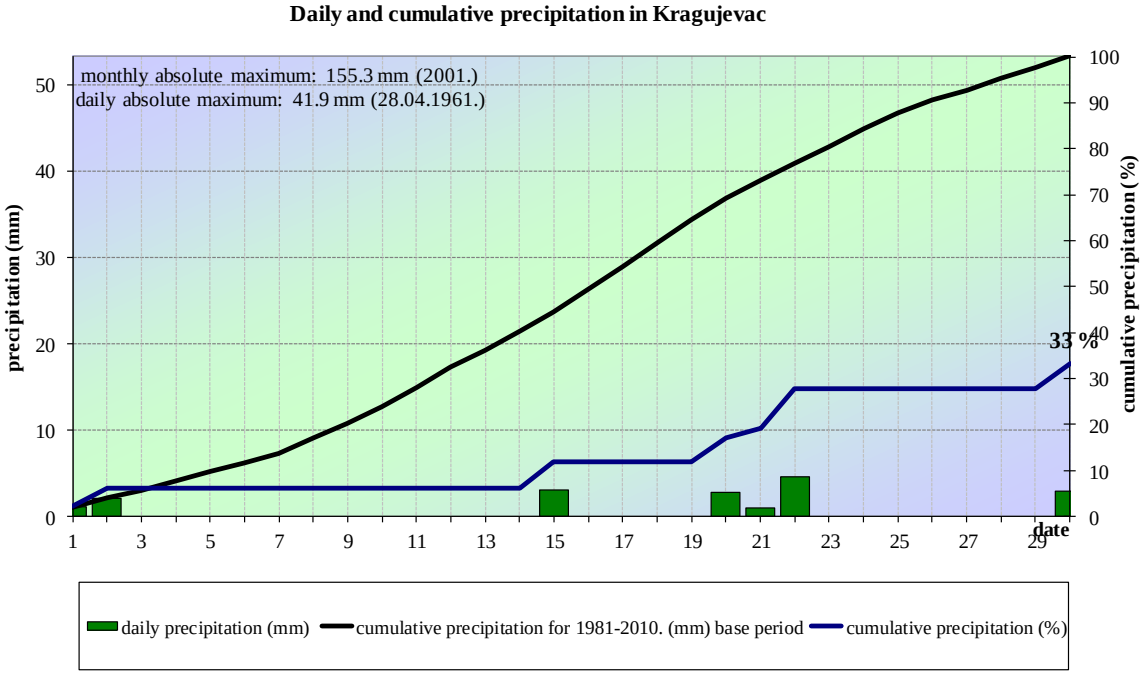
Appendix 25. Daily and cumulative precipitation sums for Sombor



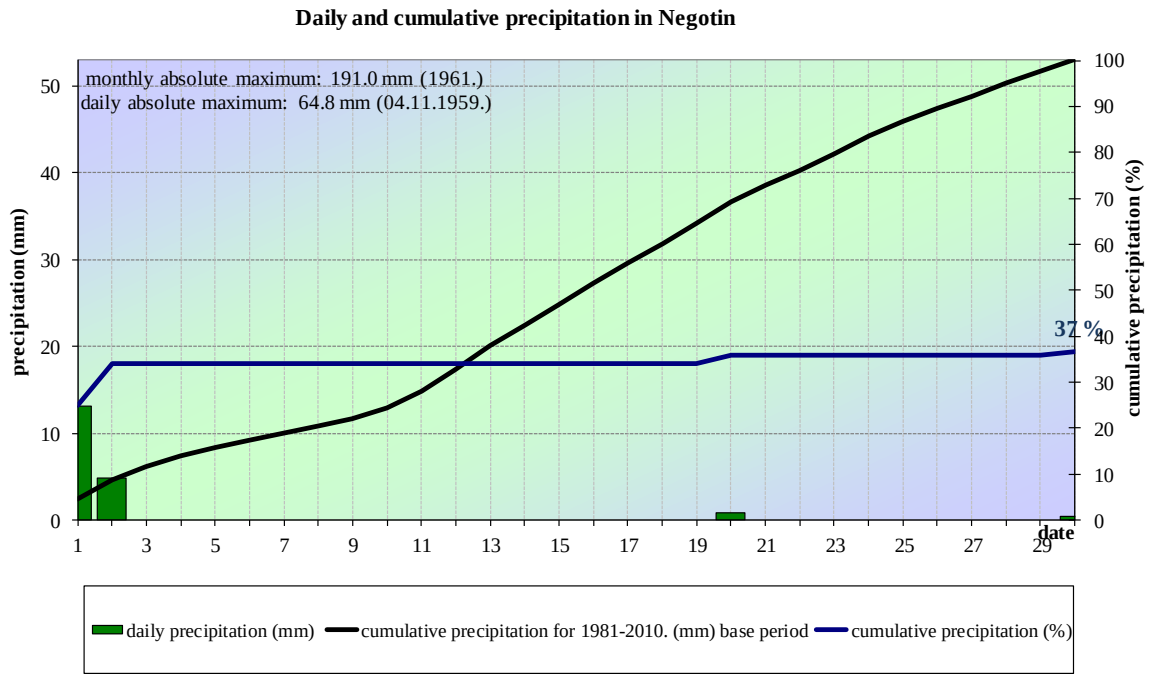
Appendix 26. Daily and cumulative precipitation sums for Novi Sad



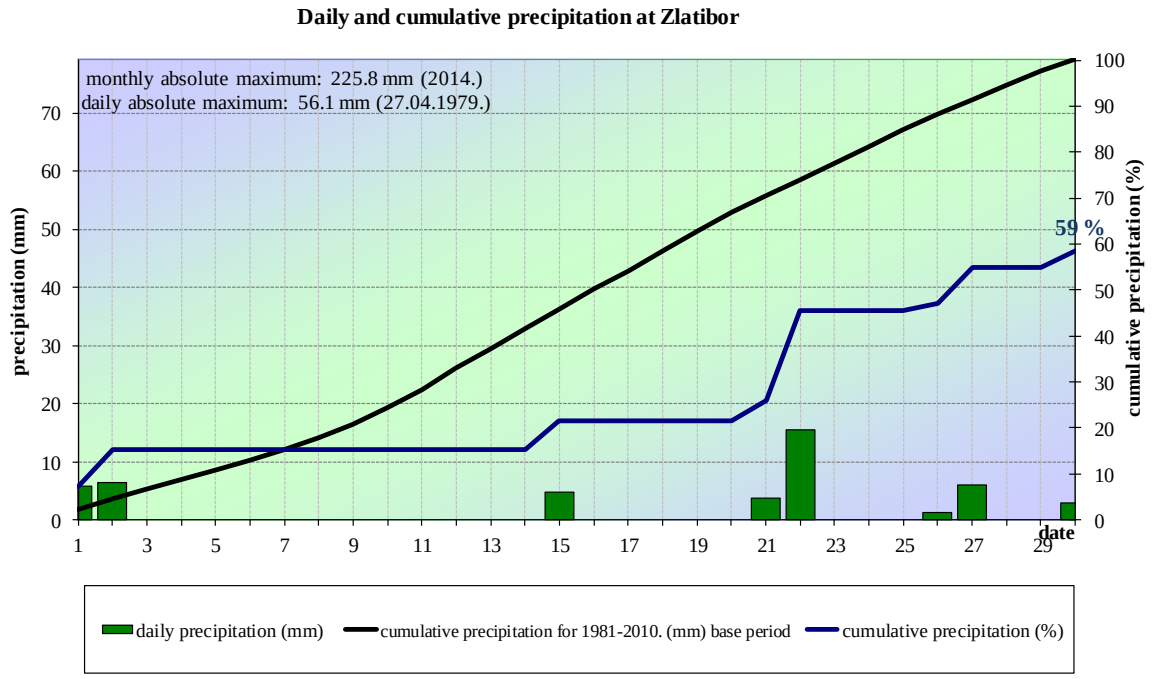
Appendix 27. Daily and cumulative precipitation sums for Loznica



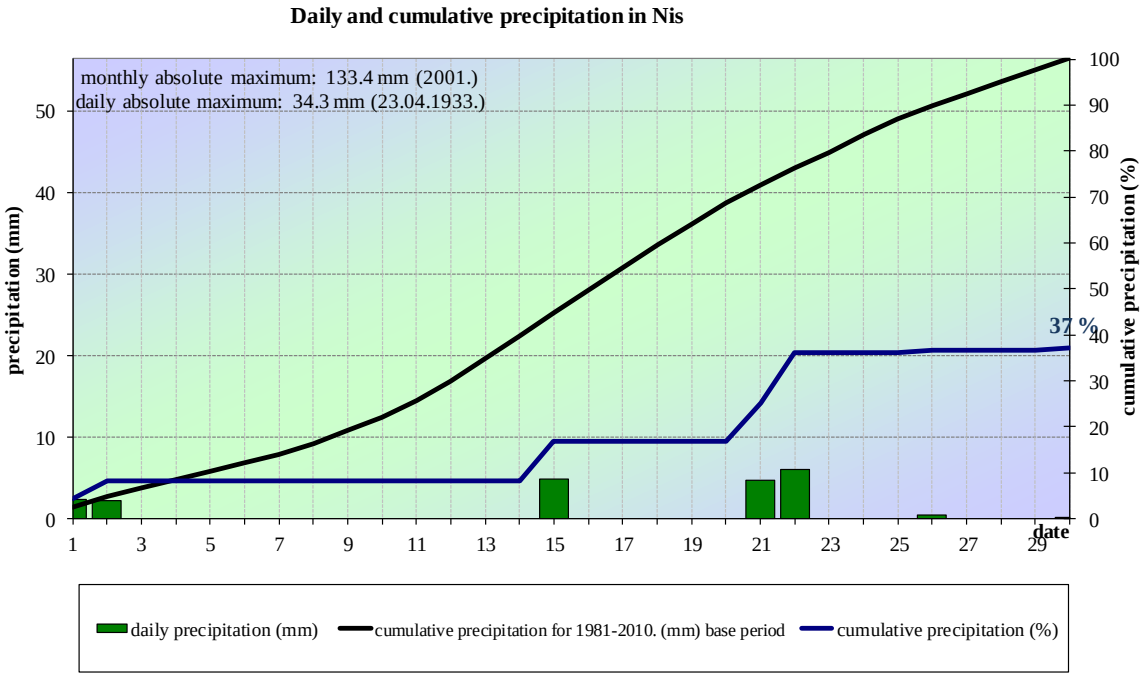
Appendix 28. Daily and cumulative precipitation sums for Kragujevac



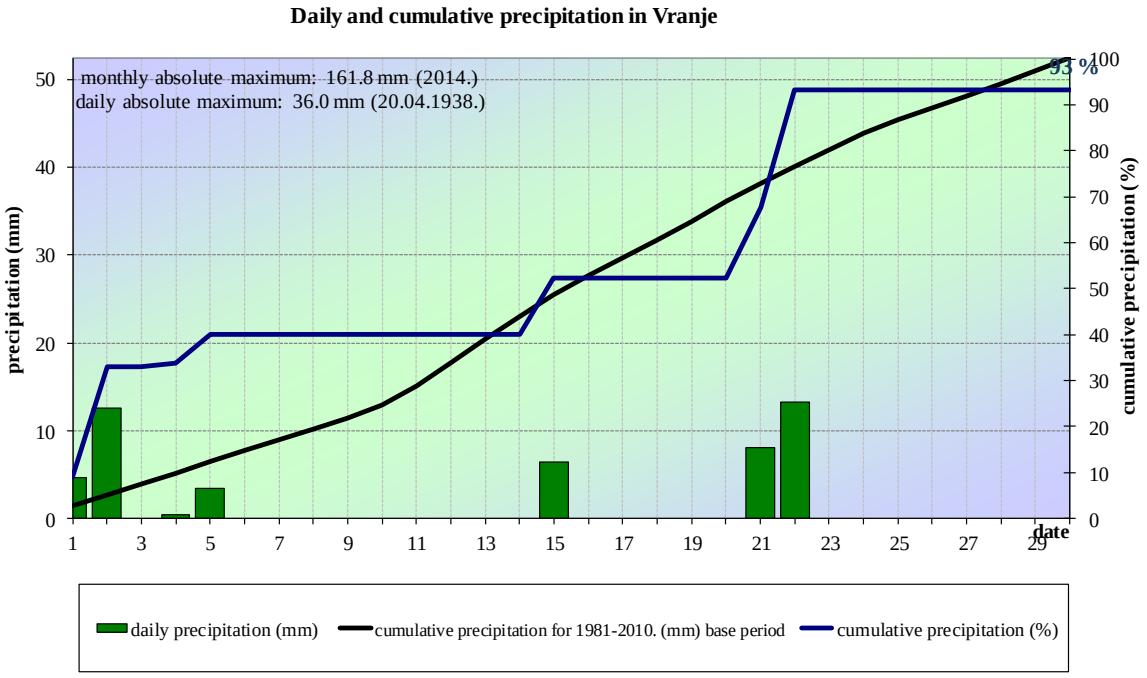
Appendix 29. Daily and cumulative precipitation sums for Negotin



Appendix 30. Daily and cumulative precipitation sums for Zlatibor



Appendix 31. Daily and cumulative precipitation sums for Nis



Appendix 32. Daily and cumulative precipitation sums for Vranje