VERIFICATION OF THE SEECOF–32 WINTER 2024/2025 CLIMATE OUTLOOK AND SEASONAL BULLETIN FOR THE TERRITORY OF SERBIA

Belgrade, 31 March 2025

Temperature

The SEECOF-32 outlook for the winter 2024/2025 in Serbia indicated above- normal temperature in Serbia with 50% probability relative to the 1991–2020 climatological base period (*Figure* A).

Climatological monitoring showed that the winter 2024/2025 was warm in the entire Serbia, with above-normal temperature based on the tercile method (*Figure* B). The outlook for a warm winter was correct.
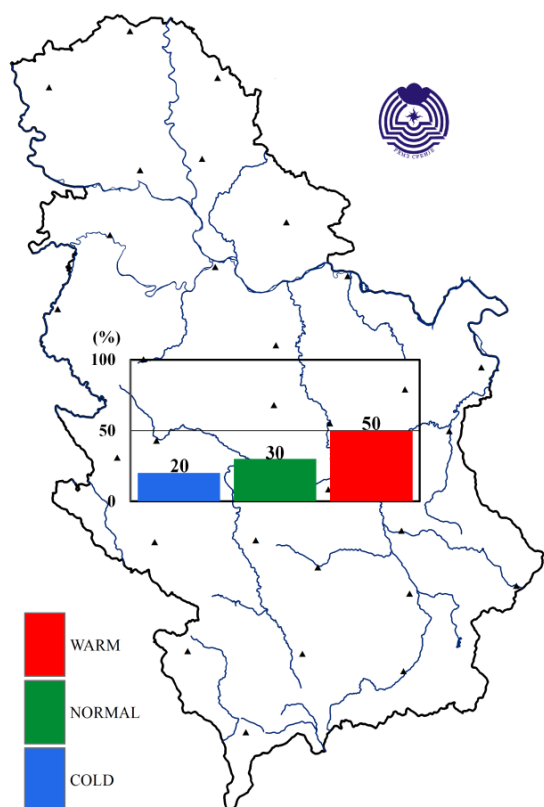
OUTLOOK – WINTER **2024/2025**   MONITORING – WINTER **2024/2025**

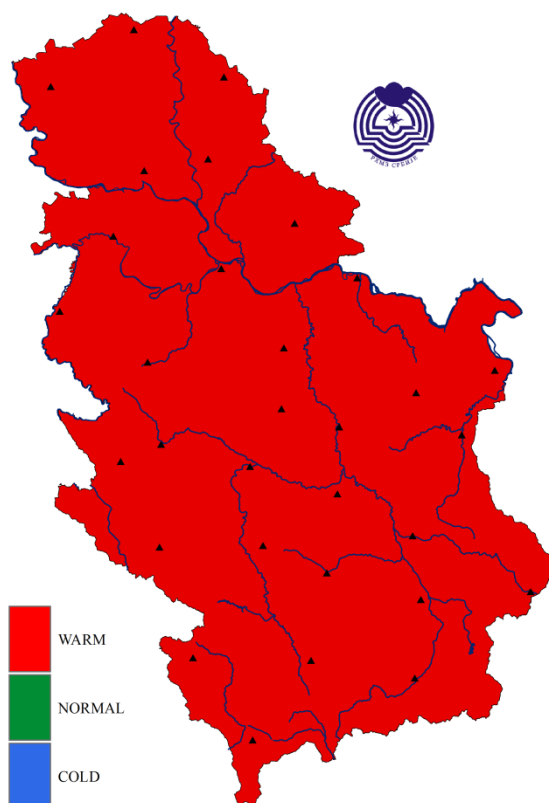

Figure A. SEECOF-32 – winter temperature outlook

Figure B. Monitoring of the winter temperature using tercile method compared to the 1991-2020 base period

Precipitation

According to the SEECOF-32 outlook for the winter 2024/2025, approximately equal probabilities for below, near or above normal precipitation were indicated for Serbia, relative to the 1991–2020 climatological base period (*Figure* C), hence climatology (average seasonal precipitation) was suggested.

Based on the climatological monitoring of precipitation, the winter of 2024/2025 was dry in most of Serbia whilst average precipitation sums were recorded in some parts of eastern, northwestern, southwestern and central Serbia (*Figure* D). The outlook for the average winter precipitation sums was correct for some parts of eastern, northwestern, southwestern and central Serbia.
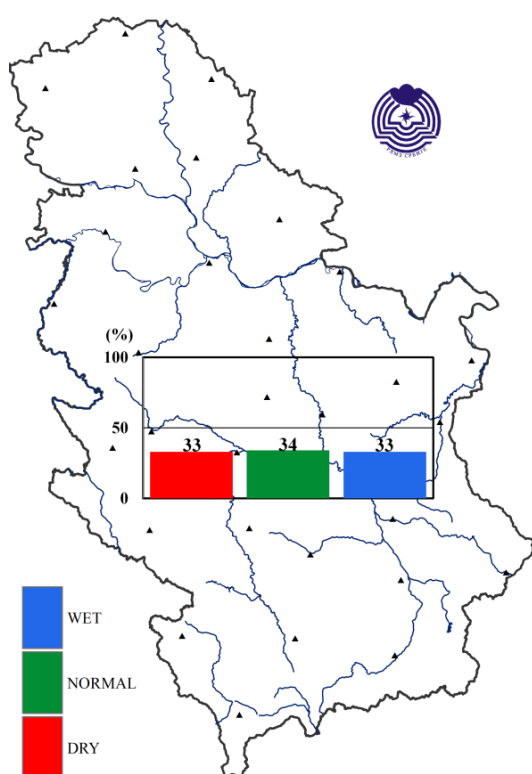
OUTLOOK – WINTER **2024/2025**

Figure C. SEECOF-32 - winter precipitation outlook
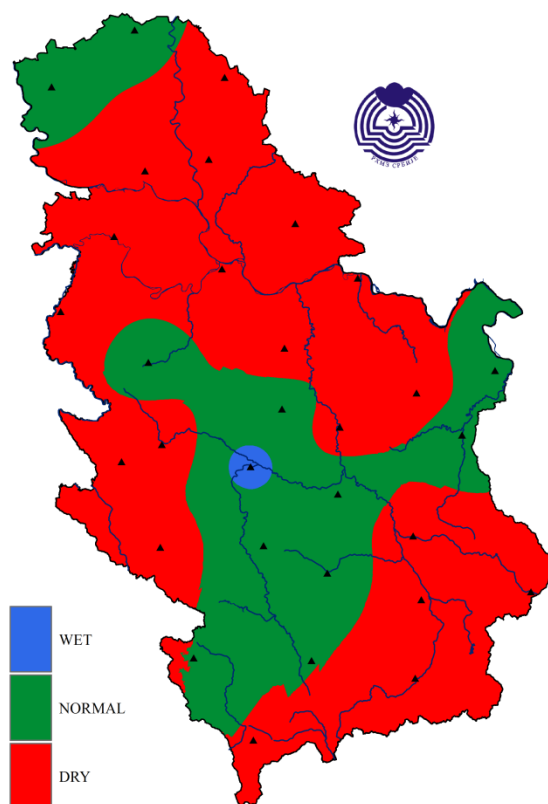
MONITORING – WINTER **2024/2025**

Figure D. Monitoring of the winter precipitation using tercile method compared to the 1991-2020 base period

Winter 2024/2025			Air Temperature (°C)			
Station	Rank[*]	Rank[**]	33	50	66	Observed value
Belgrade (1887-2024)	24	14	1.7	2.6	3.7	**4.2**
Palić (1945-2024)	23	15	0.2	1.0	2.1	**2.1**
Sombor (1941-2024)	21	15	0.5	1.1	2.1	**2.2**
Novi Sad (1948-2024)	23	14	0.8	1.3	2.4	**2.8**
Zrenjanin (1943-2024)	22	15	0.6	1.5	2.4	**2.6**
Kikinda (1948-2024)	14	14	0.3	1.4	2.1	**2.4**
Banatski Karlovac (1985-2024)	20	13	0.5	1.5	2.2	**2.8**
Loznica (1952-2024)	24	15	1.5	2.1	3.1	**3.3**
Sremska Mitrovica (1925-2024)	22	15	0.6	1.3	2.3	**2.5**
Valjevo (1926-2024)	21	13	1.2	1.9	2.8	**3.1**
Kragujevac (1925-2024)	19	12	1.2	2.2	2.8	**3.3**
Smederevska Palanka (1939-2024)	19	13	1.0	1.9	2.8	**3.2**
Veliko Gradište (1926-2024)	18	11	0.4	1.5	2.2	**2.7**
Crni Vrh (1966-2024)	13	11	-3.3	-2.8	-2.0	**-1.0**
Negotin (1927-2024)	13	9	0.7	1.4	1.9	**2.7**
Zlatibor (1950-2024)	16	11	-2.0	-1.2	-0.5	**0.0**
Sjenica (1946-2024)	13	11	-3.4	-2.5	-1.6	**-1.0**
Pozega (1952-2024)	14	10	-1.0	0.0	0.7	**1.1**
Kraljevo (1926-2024)	19	12	1.1	1.8	2.4	**2.8**
Kopaonik (1949-2024)	8	7	-5.0	-4.3	-3.6	**-2.5**
Kursumlija (1952-2024)	13	10	0.4	1.3	2.0	**2.8**
Krusevac (1927-2024)	20	13	0.8	1.9	2.4	**2.8**
Cuprija (1948-2024)	16	11	0.6	1.7	2.2	**2.9**

Nis (1925-2024)	18	13	1.2	2.1	2.9	**3.4**
Leskovac (1948-2024)	22	14	0.5	1.5	2.2	**2.5**
Zajecar (1929-2024)	15	11	0.1	0.7	1.2	**2.1**
Dimitrovgrad (1945-2024)	15	10	-0.3	0.6	1.5	**2.1**
Vranje (1926-2024)	23	13	0.5	1.4	2.2	**2.3**

[*]Rank –period of stations work (warmest season)
[**]Rank – 1991-2025 period (warmest season)

Winter 2024/2025			**Precipitation sums (mm)**			
Station	Rank[*]	Rank[**]	33	50	66	Observed Value
Belgrade (1887-2024)	36	9	139.2	155.4	168.8	**95.7**
Palić (1936-2024)	43	16	95.9	114.7	133.2	**106.6**
Sombor (1931-2024)	45	18	107.6	116.0	132.8	**116.0**
Novi Sad (1945-2024)	22	8	116.0	127.7	146.7	**101.4**
Zrenjanin (1925-2024)	21	9	110.7	122.9	140.6	**87.5**
Kikinda (1925-2024)	29	9	100.6	112.6	126.7	**94.6**
Banatski Karlovac (1946-2024)	16	10	108.3	124.3	143.6	**83.2**
Loznica (1925-2024)	44	11	171.7	205.5	209.6	**165.0**
Sremska Mitrovica (1925-2024)	14	7	103.7	124.9	137.9	**74.5**
Valjevo (1926-2024)	39	13	140.8	162.2	181.4	**145.0**
Kragujevac (1925-2024)	46	16	118.8	127.2	142.4	**123.5**
Smederevska Palanka (1926-2024)	32	10	124.0	144.5	165.6	**119.1**
Veliko Gradište (1926-2024)	11	6	110.3	142.8	162.3	**90.1**
Crni Vrh (1966-2024)	20	11	127.6	160.5	183.1	**124.3**
Negotin (1941-2024)	27	13	108.4	163.1	206.9	**120.6**

Zlatibor (1950-2024)	29	9	204.3	229.6	237.8	**185.4**
Sjenica (1925-2024)	41	10	143.5	170.7	192.5	**140.2**
Pozega (1925-2024)	23	10	122.6	155.7	171.1	**113.5**
Kraljevo (1926-2024)	64	23	127.3	142.5	163.6	**164.0**
Kopaonik (1949-2024)	30	12	156.1	207.8	254.5	**184.0**
Kursumlija (1925-2024)	43	14	123.5	150.9	175.8	**131.2**
Krusevac (1925-2024)	68	22	121.8	137.7	163.4	**161.1**
Cuprija (1947-2024)	30	10	136.7	159.6	176.9	**127.0**
Nis (1925-2024)	17	10	117.7	142.4	163.1	**91.2**
Leskovac (1925-2024)	27	8	134.0	153.8	174.9	**110.3**
Zajecar (1925-2024)	64	22	102.6	140.1	158.2	**151.4**
Dimitrovgrad (1926-2024)	24	8	118.4	130.3	171.3	**95.4**
Vranje (1926-2024)	27	10	121.1	133.4	154.3	**105.2**

[*]Rank –period of stations work (lowest seasonal precipitation)
[**]Rank – 1991-2025 period (lowest seasonal precipitation)

Country	Seasonal temperature DJF		Seasonal precipitation DJF		High Impact Events
	Observed	SEECOF-32 climate outlook for temperature	Observed	SEECOF-32 climate outlook for precipitation	
Serbia (1)	Above normal	**Above-normal** (20, 30, 50) in entire Serbia	Below normal in most of Serbia, average precipitation sums in some parts of eastern, northwestern, southwestern and central Serbia	**No predictive signal** (33, 34, 33) in entire Serbia	❖ *Warm winter in Serbia as well as dry in most of the country* ❖ *3 heat waves; the first was recorded in Negotin and Zajecar, the second in Kikinda, Belgrade and Nis, and the third in most of Serbia* ❖ *2 cold waves in Dimitrovgrad, and 1 in Zajecar* ❖ *Number of days with snow cover significantly below the normal in the low-lying areas of Serbia*

Analysis of winter season 2024/2025 for Serbia relative to the 1991-2020 base period

Warm and dry (*Figure 1*) with the mean seasonal air temperature slightly above the normal[1] and precipitation sums at the lower tercile threshold.
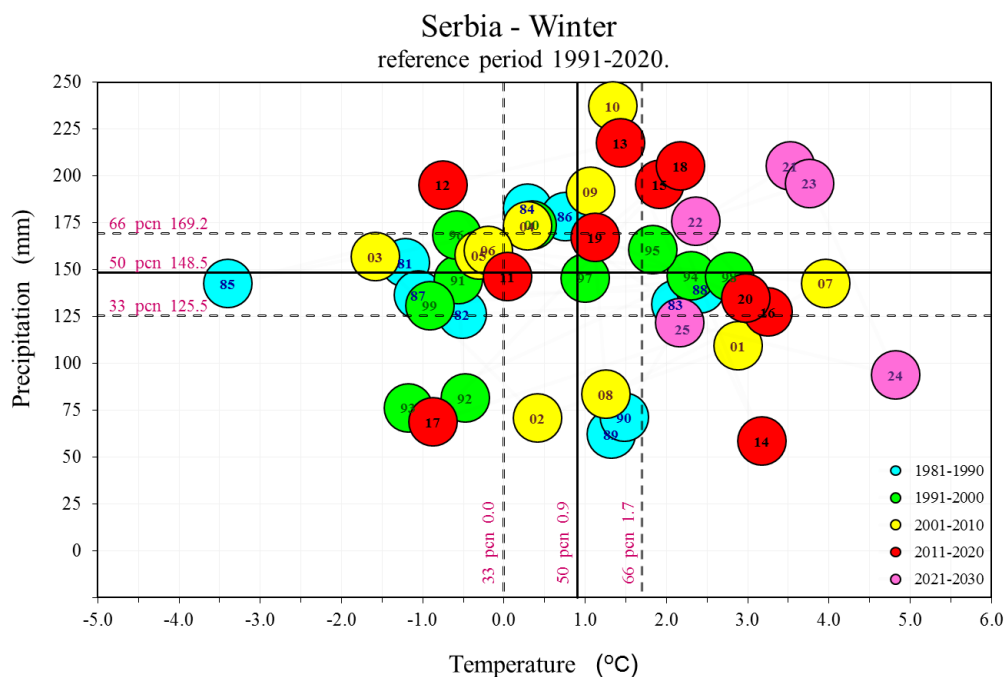
Figure 1. Assessment of mean air temperature and precipitation for winter in Serbia based on the accompanying terciles relative to the 1991-2020 base period

---

[1] Term **normal** refers to **climatological standard normal**, that is, the average value of a particular climate event, calculated for the period from 1 January 1991 to 31 December 2020

Temperature

Winter 2024/2025 was in Serbia with an average air temperature of 2.2 °C, which is +1.2 °C higher than normal in the period 1951-2025 (Figure 2). Winter season 2024/25 was the 8th warmest for Kopaonik since 1950 with the air temperature of -2,5 °C and anomaly of +1,6 °C.
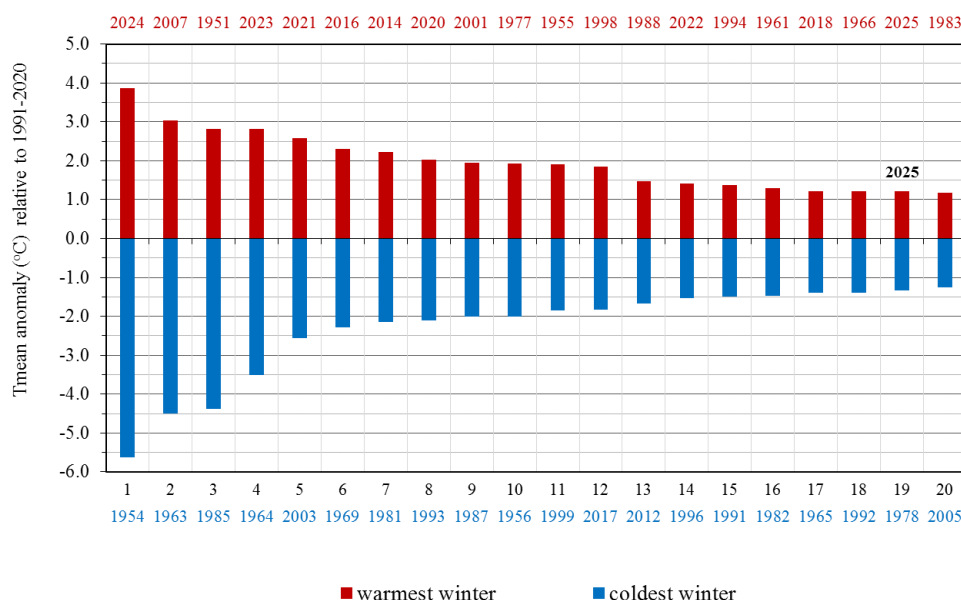
Figure 2. Rank of twenty warmest and coldest winter seasons in Serbia for the 1951-2025 period
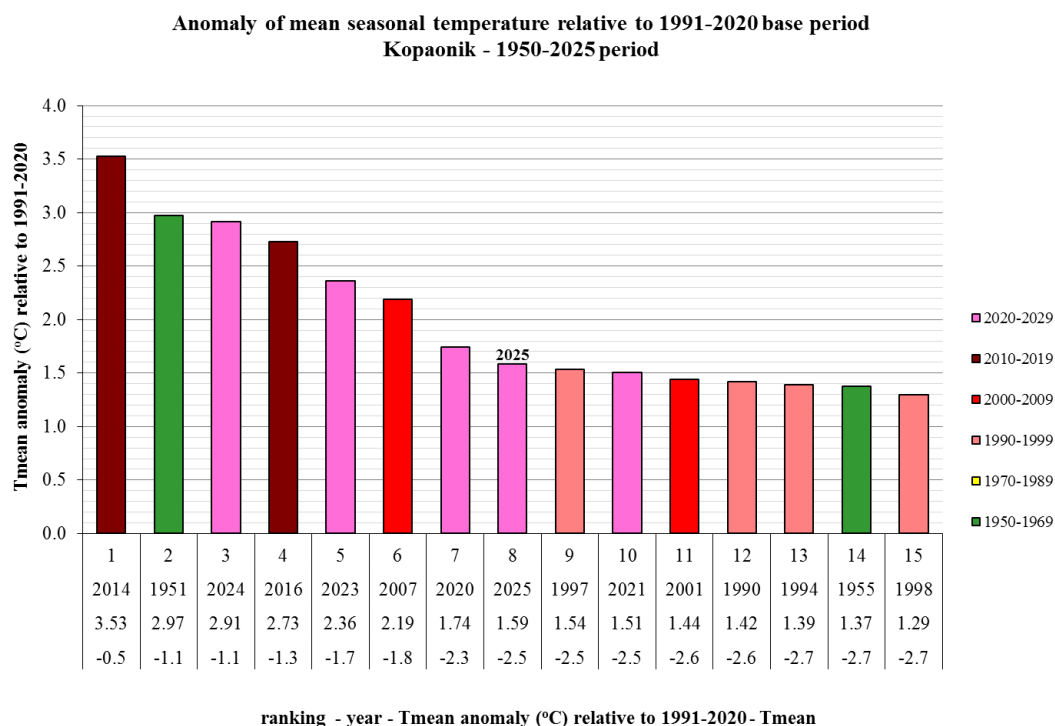
Figure 3. Rank of the warmest winters on Kopaonik for the 1950-2025 period

Mean seasonal winter air temperature ranged from 1,1 ºC in Pozega to 4,2 ºC in Belgrade, and on the mountains from –2,5 ºC at Kopaonik to 0,0 ºC at Zlatibor (*Figure 4*).

Departure of the mean seasonal air temperature from the normal during winter ranged from +0,9 ºC in Loznica and Sombor to +1,6 ºC at Kopaonik and Kuršumlija (*Figure 5*).

Based on the percentile method, mean seasonal winter air temperature was in the categories of normal and warm (*Figure 6).*

Based on the tercile method, mean seasonal winter air temperature was in the warm category in all of Serbia (*Figure 7).*

(ºC)	
	4.1 - 6.0
	2.1 - 4.0
	0.1 - 2.0
	-1.9 - 0.0
	-3.9 - -2.0

(ºC)	
	2.1 - 3.0
	1.1 - 2.0
	0.1 - 1.0
	-0.9 - 0.0
	-1.9 - -1.0
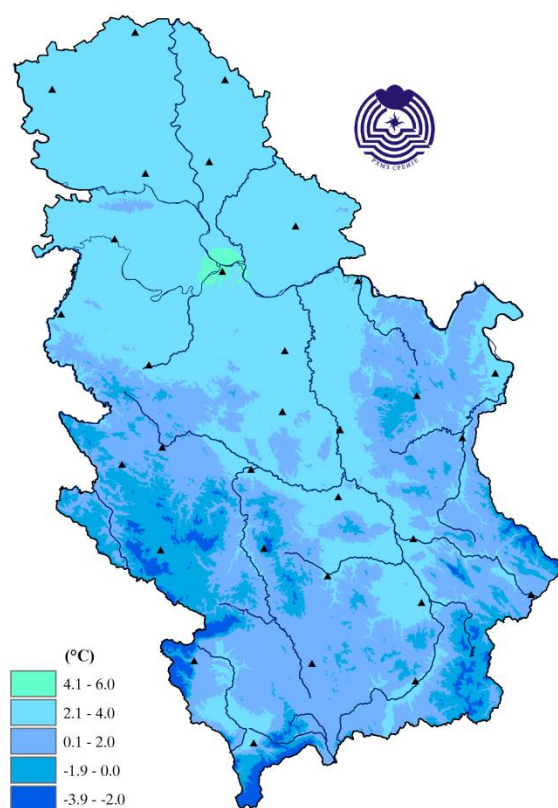
Figure 4. Spatial distribution of mean winter air temperature
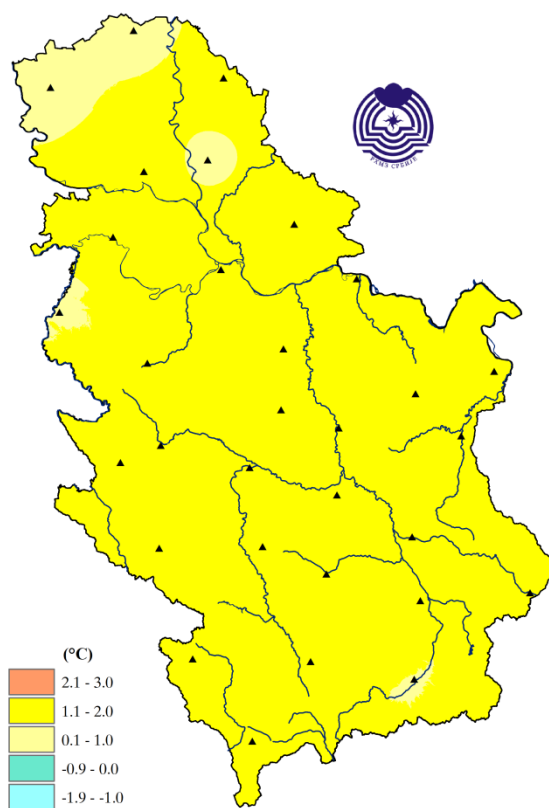
Figure 5. Spatial distribution of mean winter air temperature anomaly from the normal
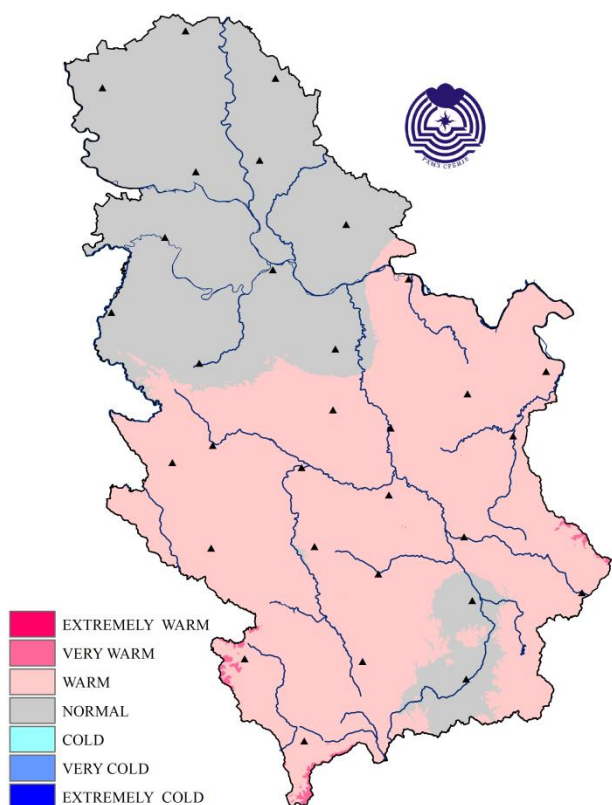
Figure 6. Spatial distribution of mean winter air temperature according to the percentile method
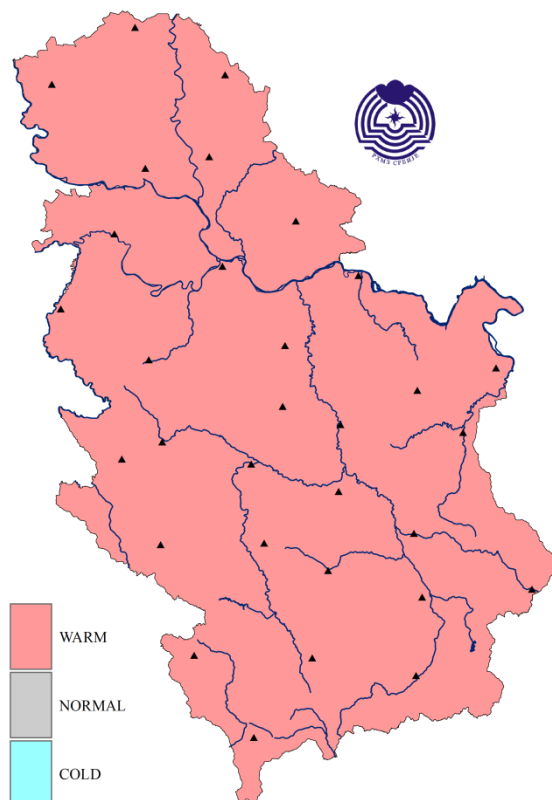
Figure 7. Spatial distribution of mean winter air temperature according to the tercile method

Mean maximum air temperature ranged from 5,7 °C in Pozega to 8,1 °C in Zajecar; Belgrade observed air temperature of 7,9 °C. In the upland it ranged from 1,1 °C at Kopaonik to 4,5 °C in Sjenica.

The highest winter air temperature of 21,8 ºC was measured in Kragujevac and Smederevska Palanka on January 28.

Number of ice days, with the maximum daily air temperature below 0 ºC ranged from 1 in Negotin to 12 in Kikinda; Belgrade recorded 6, while in the upland, their number ranged from 15 in Sjenica to 36 days at Kopaoniok. Number of ice days was below (from 5 to 15 days) the winter average in all of Serbia (*Figure 8).*

The mean minimum air temperature ranged from -2,6 °C in Zajecar to 1,0 °C in Belgrade, and in the upland from -5,4 °C in Sjenica to -2,8 °C at Zlatibor.

The lowest winter air temperature of -21,7 ºC was measured in Sjenica on February 20. On the same day, in the lowland, Dimitrovgrad recorded -15,5 °C. Additionally, on the same day, February 20, Belgrade observed the lowest air temperature of -5,4 °C

Number of frost days, with the minimum daily air temperature below 0 ºC, ranged from 40 days in Belgrade to 60 days in Zajecar, and on the mountains, from 62 at Zlatibor to 79 days at Kopaonik. Number of frost days was 3 to 10 days below the winter average (*Figure 9).*

(days)

-2.9 - 0.0
-5.9 - -3.0
-8.9 - -6.0
-11.9 - -9.0
-14.9 - -12.0
-17.9 - -15.0

(days)

0.1 - 3.0
-2.9 - 0.0
-5.9 - -3.0
-8.9 - -6.0
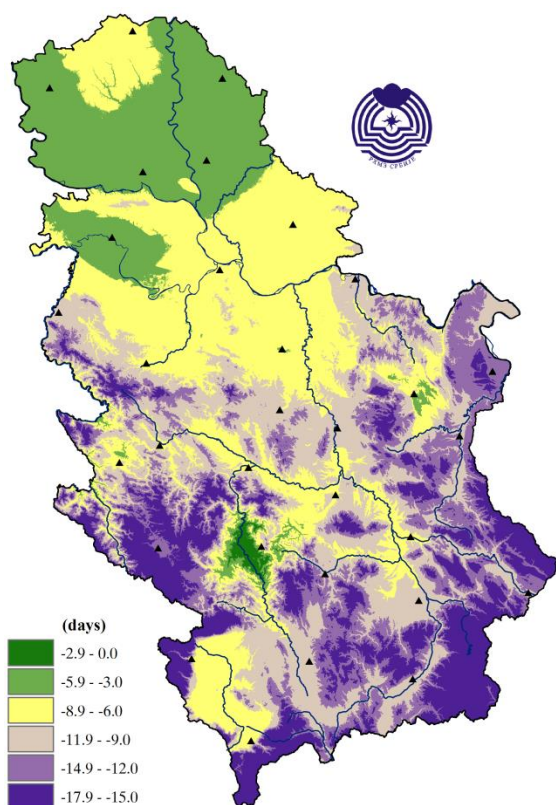-11.9 - -9.0
-14.9 - -12.0
-17.9 - -15.0

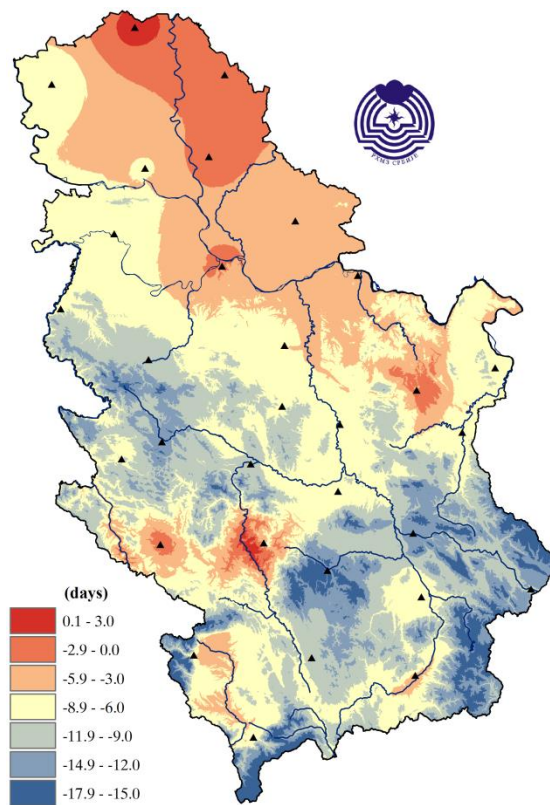Figure 8. Deviation of the number of ice days from the normal

Figure 9. Deviation of the number of frost days from the normal

The highest number of days with severe frost, with the minimum daily temperature below -10 ºC was measured in Zajecar, total of 7 days, Dimitrovgrad recorded 6 days, Kursumlija registered 5 days, elsewhere up to 3 days with severe frost were recorded. On the mountains, their number ranged from 4 days at Zlatibor to 20 days in Sjenica. The recorded number of days with severe frost was up to 3 to 7 days below the winter average in most of country.

In Belgrade, warmer periods, with the air temperature above the multiannual average, were registered in mid-December, most of January, as well as at the beginning of the first decade, beginning of the second decade and end of February. Colder periods, with the air temperature below the multiannual average, were recorded at the end of December, beginning and mid-January, as well as most of February (*Figure 10).*
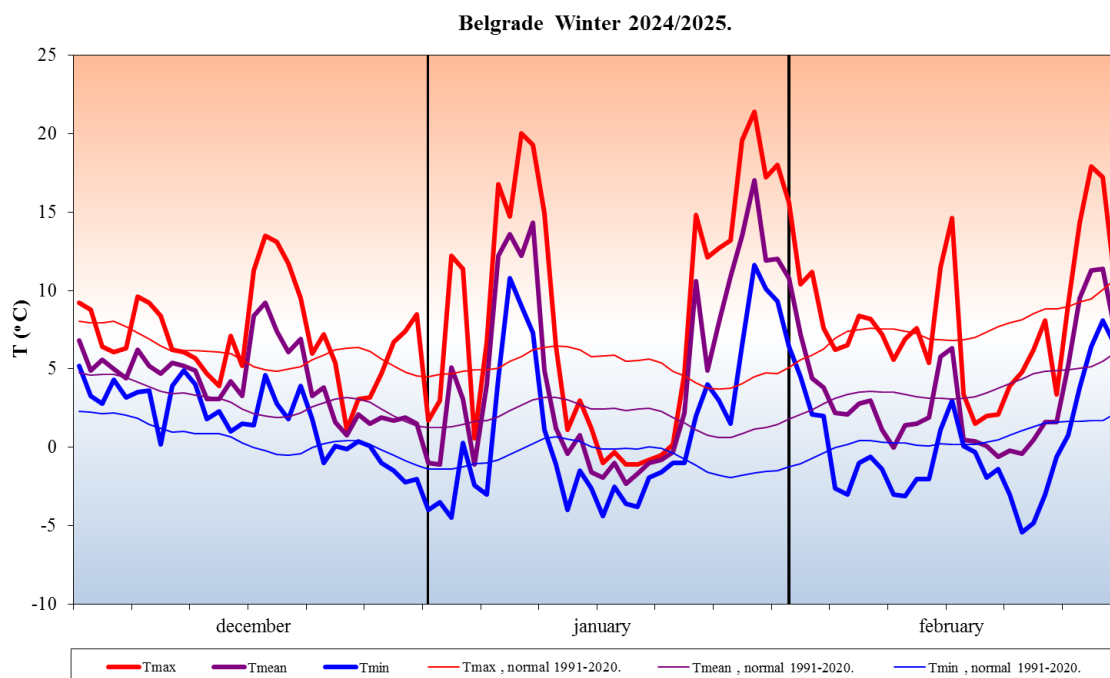
Belgrade Winter 2024/2025.

Figure 10. Three–month course of the mean, maximum and minimum daily air temperature in Belgrade
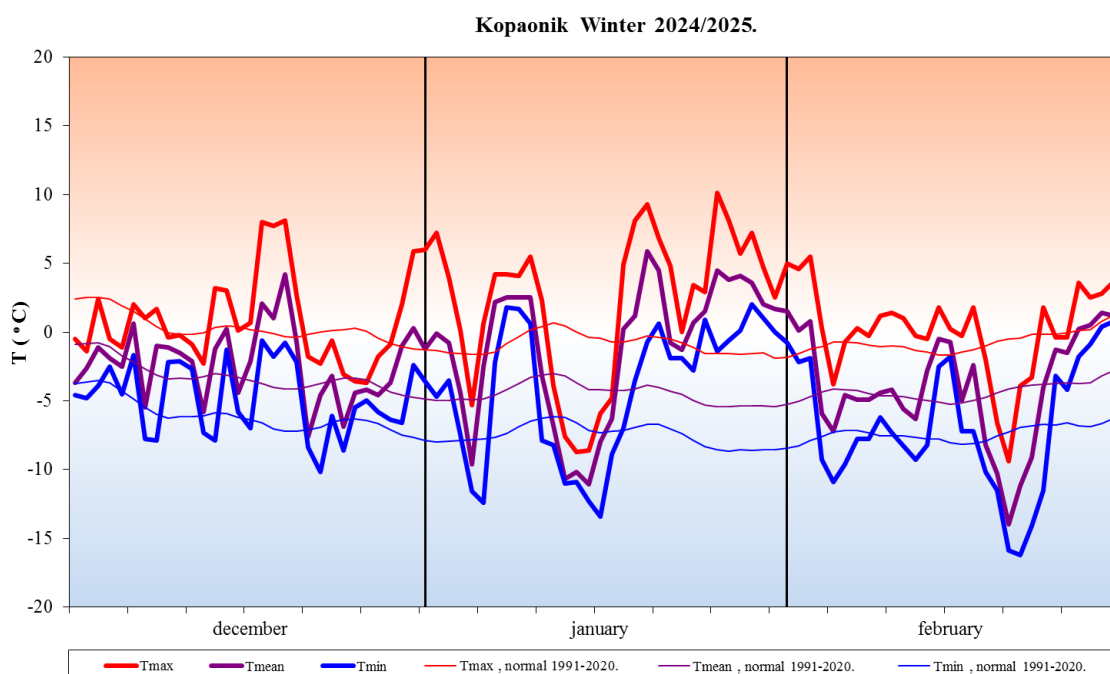
Kopaonik Winter 2024/2025.

Figure 11. Three–month course of the mean, maximum and minimum daily air temperature at Kopaonik

Cold wave / heat wave

In winter 2024/2025, there were 3 heat waves[2] (*Table 1*). The first heat wave was recorded in Negotin and Zajecar, lasting from December 30 to January 3, the second heat wave was registered in Kikinda, Belgrade and Nis lasting from 6 to 10 January, and the third heat wave lasted from January 25 to 31 affecting most of Serbia apart from Loznica and Vranje. Dimitrovgrad observed 2 cold waves[3] lasting from 8 to 12 February, and then from 19 to 23 February corresponding with the cold wave observed in Zajecar.

Table 1.

HEAT AND COLD WAVES IN SERBIA - WINTER 2024/2025

(reference period 1991-2020)

The table shows daily heat/cold wave categories (EW = Extremely Warm, VW = Very Warm, VC = Very Cold, EC = Extremely Cold) for each station across December, January and February. The principal entries by station and month are summarised below:

station/day	December (wave days)	January (wave days)	February (wave days)
PALIC		VW EW VW EW EW EW EW EW EW (≈23–31)	
SOMBOR		EW EW EW VW VW (≈25–31)	
KIKINDA	EW VW EW EW VW (≈6–10)	VW VW VW EW EW EW EW EW EW (≈23–31)	
ZRENJANIN		VW EW EW EW EW EW VW (≈24–31)	
NOVI SAD		VW VW EW EW EW VW VW (≈24–31)	
SR.MITROVICA		EW EW EW EW VW VW (≈25–31)	
BEOGRAD	EW VW VW EW EW VW (≈6–10)	EW VW VW VW EW EW EW EW VW (≈23–31)	
LOZNICA			
VALJEVO		VW EW EW EW VW VW VW (≈24–31)	
V.GRADISTE		VW VW EW EW EW EW EW EW (≈24–31)	
SM.PALANKA		VW VW EW EW EW VW EW VW (≈24–31)	
KRAGUJEVAC		VW VW EW EW EW VW EW VW (≈24–31)	
KRALJEVO		VW EW EW EW VW VW (≈25–31)	
POZEGA		VW EW EW VW EW EW VW (≈24–31)	
ZLATIBOR		EW VW EW EW VW VW VW (≈24–31)	
CUPRIJA		VW VW EW EW EW EW EW (≈24–31)	
KRUSEVAC		VW VW EW EW EW VW VW VW (≈24–31)	
NEGOTIN	EW EW VW EW EW VW (≈30 Dec–3 Jan)	VW EW EW VW VW VW (≈25–31)	
ZAJECAR	VW VW VW EW EW VW (≈30 Dec–3 Jan)	EW VW EW EW VW VW VW (≈25–31)	VC EC EC EC EC EC (≈19–23)
CRNI VRH		EW EW EW EW EW VW (≈25–31)	
KOPAONIK		EW EW VW EW VW (≈24–31)	
SJENICA		VW VW EW EW EW EW (≈23–31)	
NIS	VW VW EW EW EW VW (≈6–10)	VW EW EW VW EW EW VW (≈24–31)	
VRANJE			
DIMITROVGRAD		VW EW EW EW EW EW EW VW (≈24–31)	VC VC VC VC VC (≈8–12); EC EC EC EC VC (≈19–23)
LESKOVAC		VW EW EW EW VW VW VW (≈24–31)	
KURSUMLIJA		VW EW EW EW VW VW VW (≈24–31)	
B.KARLOVAC		VW EW EW EW EW VW VW (≈24–31)	

	Legend
EW	EXTREMELY WARM
VW	VERY WARM
VC	VERY COLD
EC	EXTREMELY COLD

---

[2] Heat wave, according to the percentile method, is a period of minimum five days with maximum daily air temperature is in the very warm and extremely warm categories
[3] Cold wave, according to the percentile method, is a period of minimum five days with minimum daily air temperature is in the very cold and extremely cold categories

Precipitation

Winter 2024/2025 was normal and dry. Winter precipitation totals ranged from 74,5 mm in Sremska Mitrovica to 165,0 mm in Loznica, and in the upland from 124,3 mm at Crni Vrh to 185,4 mm at Zlatibor (*Figure 12*).

Precipitations sums expressed in the percentages of normal ranged from 63% in Sremska Mitrovica to 114% in Krusevac, and in the upland from 79% at Crni Vrh to 88% at Kopaonik (*Figure 13*).
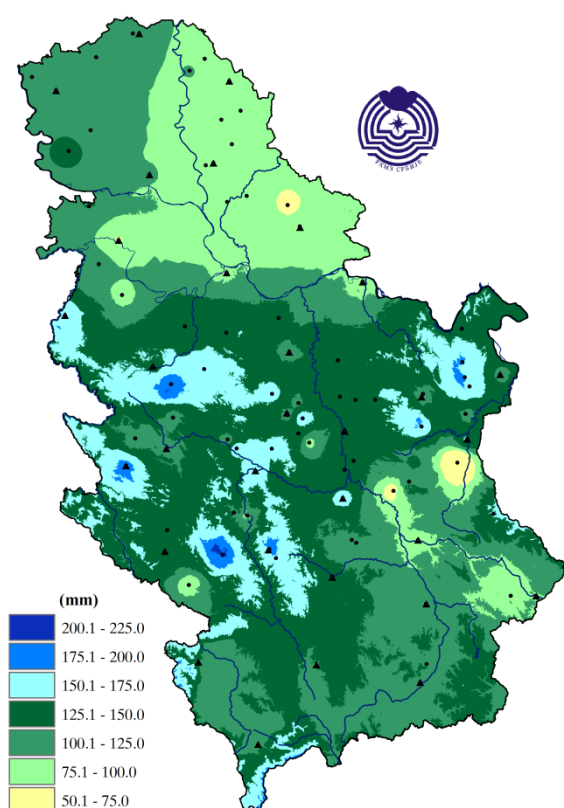

Figure 12. Spatial distribution of winter precipitation sums based on data from 28 Primary meteorological, 13 climatological and 47 rain gauge stations
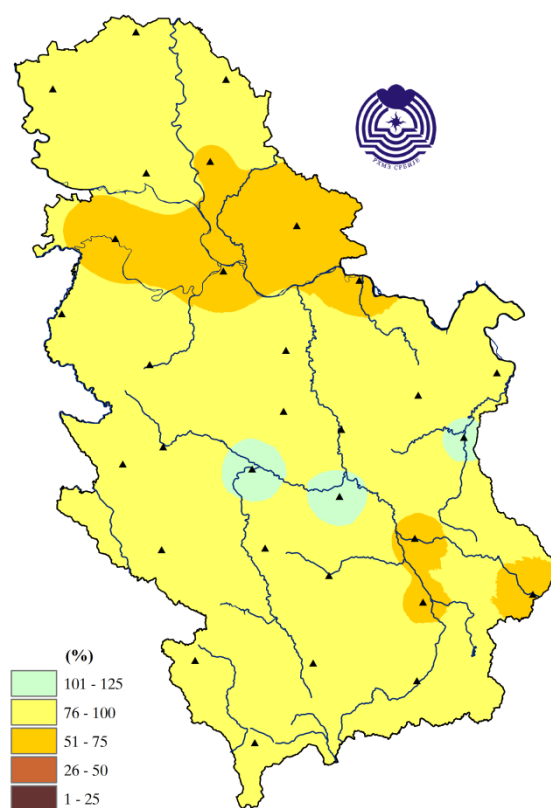
Figure 13. Spatial distribution of winter precipitation sums in percentage of normal

Based on the percentile method, winter precipitation sums were in the normal and dry categories (*Figure 14*).

Based on the tercile method, precipitation sums were in the dry category in almost entire Serbia, in the normal category on Palic, Sombor, Valjevo, Kragujevac, Negotin, Kursumlija, Krusevac, Zajecar and Kopaonik, and rainy category in Kraljevo (*Figure 15*).

EXTREMELY WET
VERY WET
WET
NORMAL
DRY
VERY DRY
EXTREMELY DRY

WET
NORMAL
DRY
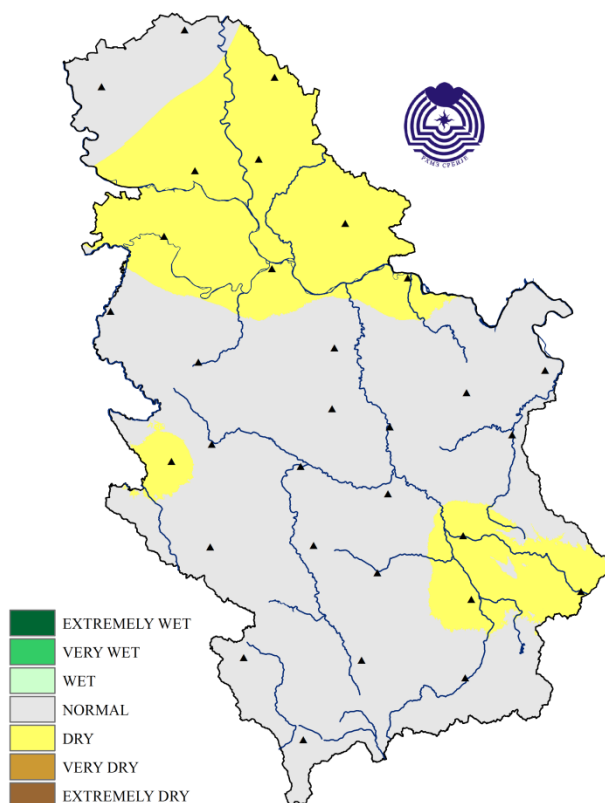
Figure 14. Winter precipitation sums according to the percentile method
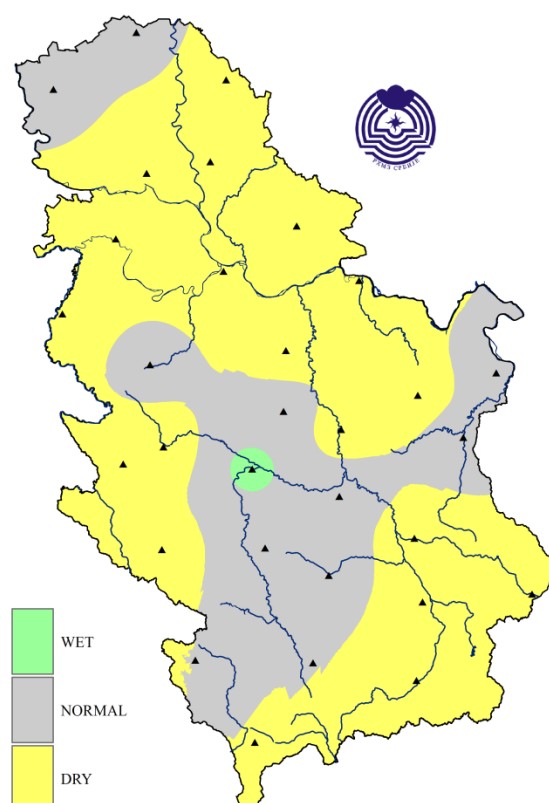
Figure 15. Winter precipitation sums according to the tercile method

The highest daily precipitation sum of 40,3 mm was measured on Zlatibor on December 1.

In winter, number of days with precipitation of 0,1 mm and above, ranged from 26 in Kikinda, Belgrade and Zajecar to 33 in Kursumlija, Leskovac and Dimitrovgrad, and on the mountains from 30 in Sjenica to 40 days at Kopaonik. The observed number of days with precipitation was up to 14 days below the winter average in most of Serbia (*Figure 16*).

During winter, snow cover wasn't recorded on Palic and Sremska Mitrovica while in the low-lying areas Pozega recorded up to 20 days. In the hilly-mountainous regions, number of days with snow cover ranged from 63 in Sjenica to 90 days at Kopaonik. **Number of days with snow cover was significantly below the normal in the low-lying areas of Serbia,** 15 days below the average in Loznica to 33 days below the average in Negotin (*Figure 17).*

On December 26, Crni Vrh recorded the maximum snow depth of 63 cm. In the low-lying areas, the highest snow depth of 21 cm was measured in Loznica on December 24.
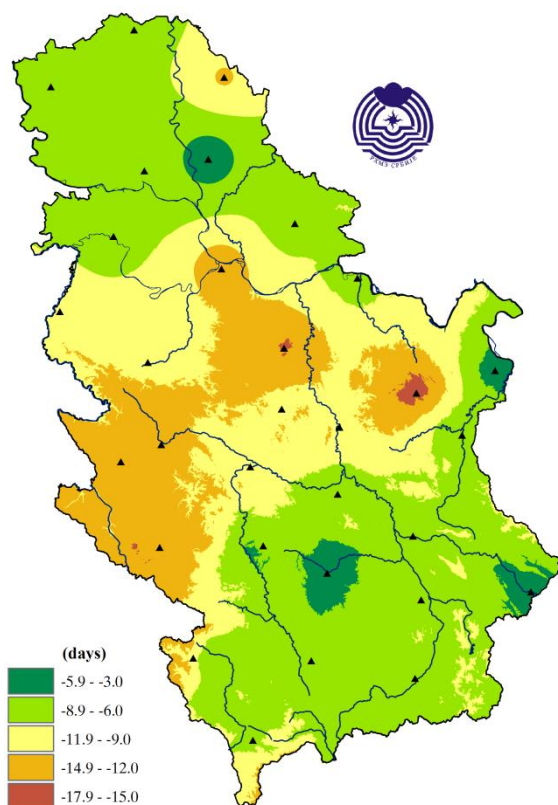
Figure 16. Deviation of number of days with precipitation of 0.1 mm and more from the normal
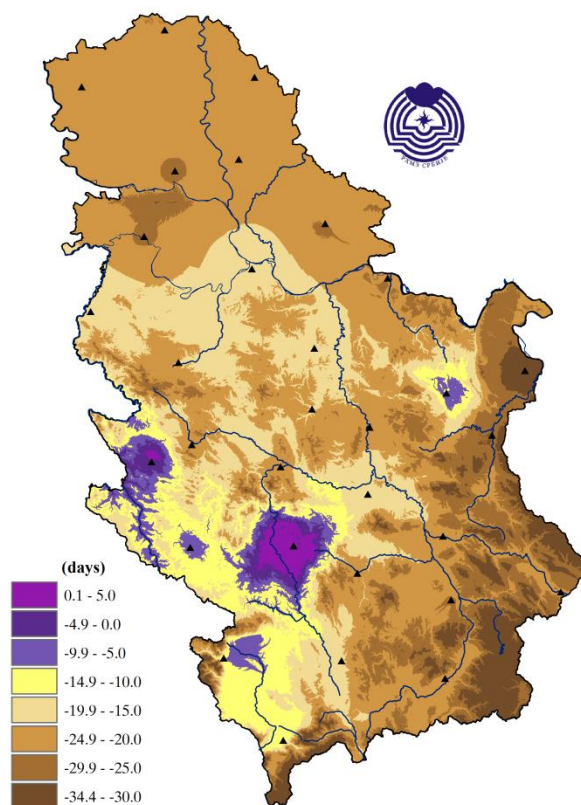
Figure 17. Deviation of number of days with snow cover from the normal

Figure 18 shows cumulative precipitation sums for Belgrade in winter, by month and compared to the average cumulative precipitation sums, and in the appendix are graphs for the stations: Sremska Mitrovica, Veliko Gradiste, Nis, Kikinda, Dimitrovgrad, Novi Sad, Krusevac and Zlatibor.
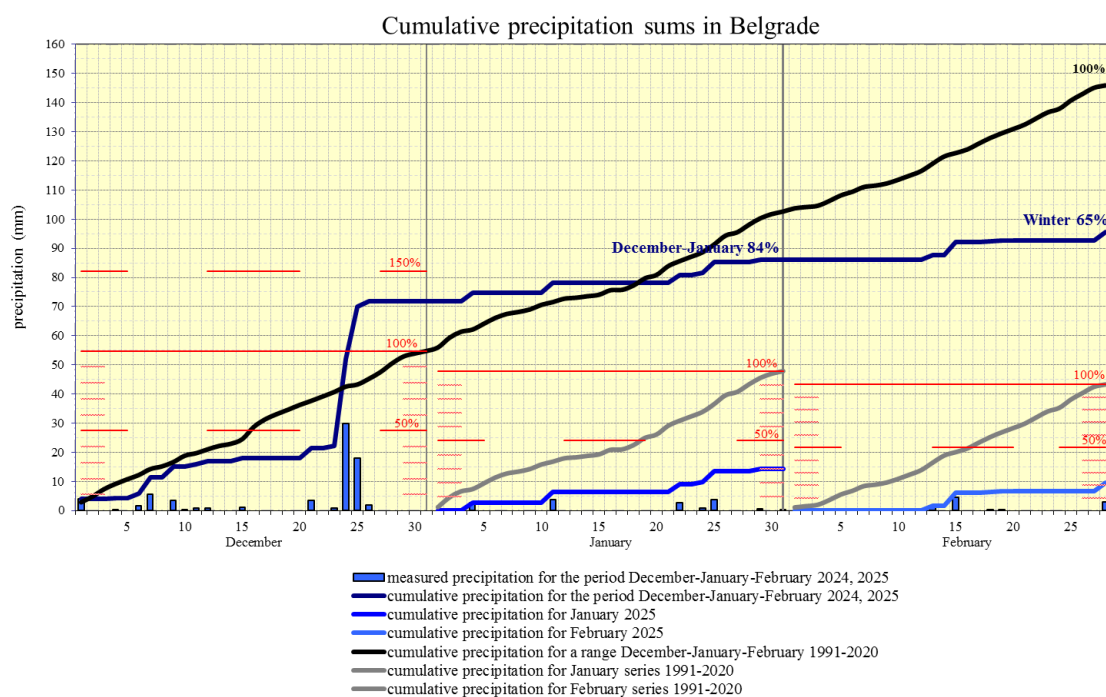

Figure 18. Daily and cumulative precipitation sums for Belgrade

Sunshine duration (insolation)

In winter, sunshine duration ranged from 183,7 hours in Pozega to 309,2 hours in Negotin (*Figure 19*).

Compared to the normal for the 1991-2020 base period, sunshine duration ranged from 85% at Zlatibor to 128% in Zajecar (*Figure 20*).

(h)	
■	300.1 - 325.0
■	275.1 - 300.0
■	250.1 - 275.0
■	225.1 - 250.0
■	200.1 - 225.0
■	175.1 - 200.0
■	150.1 - 175.0

(%)	
■	176 - 200
■	151 - 175
■	126 - 150
■	101 - 125
■	76 - 100
■	51 - 75
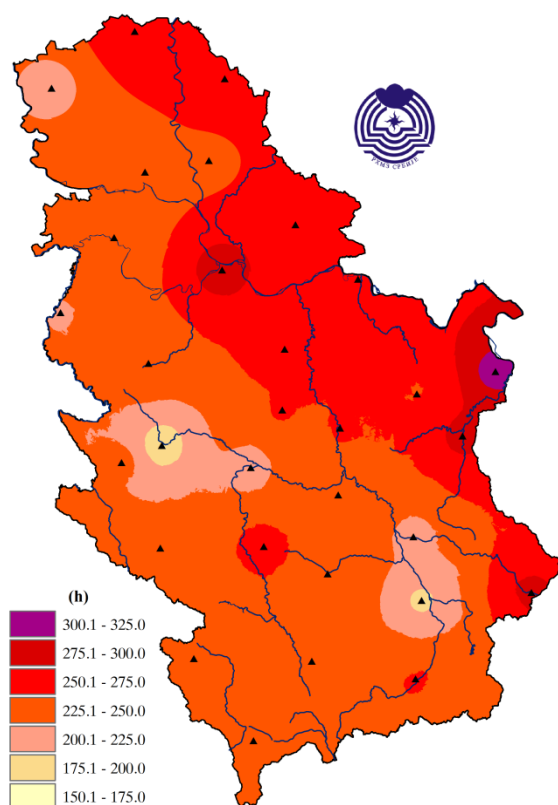
Figure 19. Insolation in hours   Figure 20. Insolation in percentage of normal
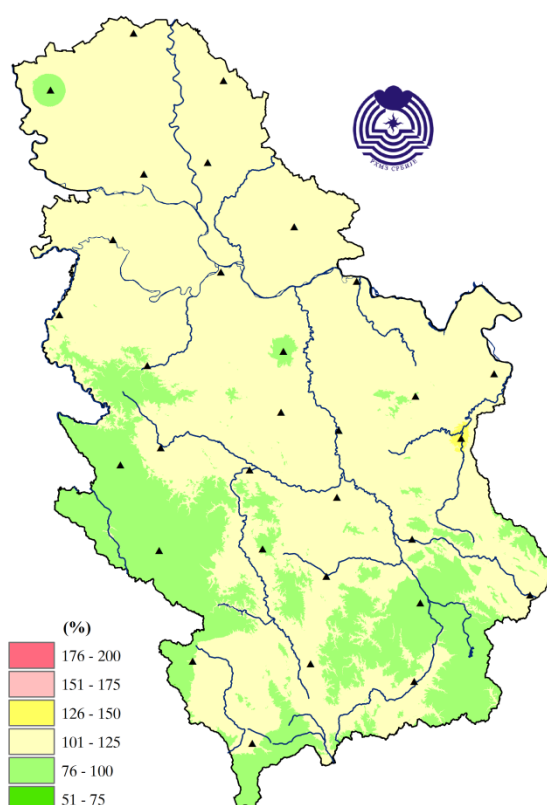
Analysis of the winter season 2024/2025 for Serbia relative to the 1961-1990 base period

Temperature

Departure of the mean air temperature from the normal for the 1961-1990 base period ranged from +1,5 ºC in Vranje to +2,4 ºC at Kopaonik (*Figure 21*).

Based on the percentile method, mean winter air temperature was in the categories of warm and very warm, and extremely warm in Sjenica and Kopaonik (*Figure 22*).

Based on the tercile method, mean winter air temperature was above the average, in the warm category in all of Serbia.
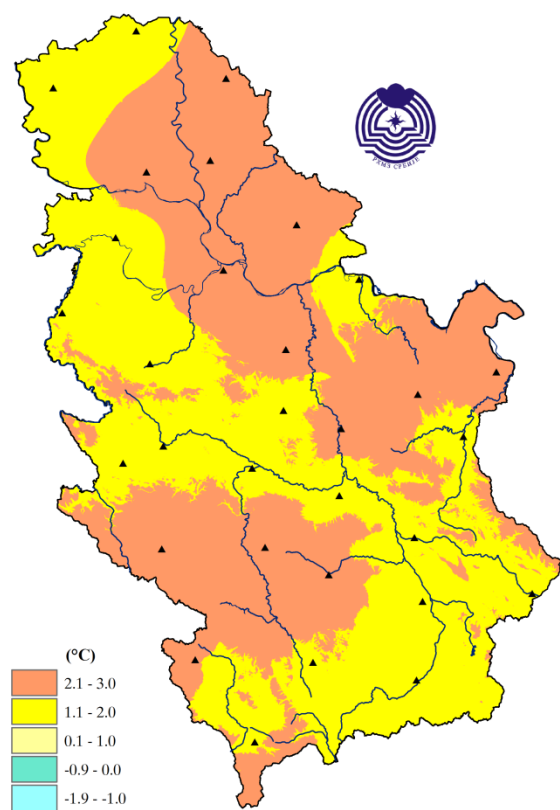
Figure 21. Spatial distribution of mean winter air temperature anomaly from the 1961-1990 normal
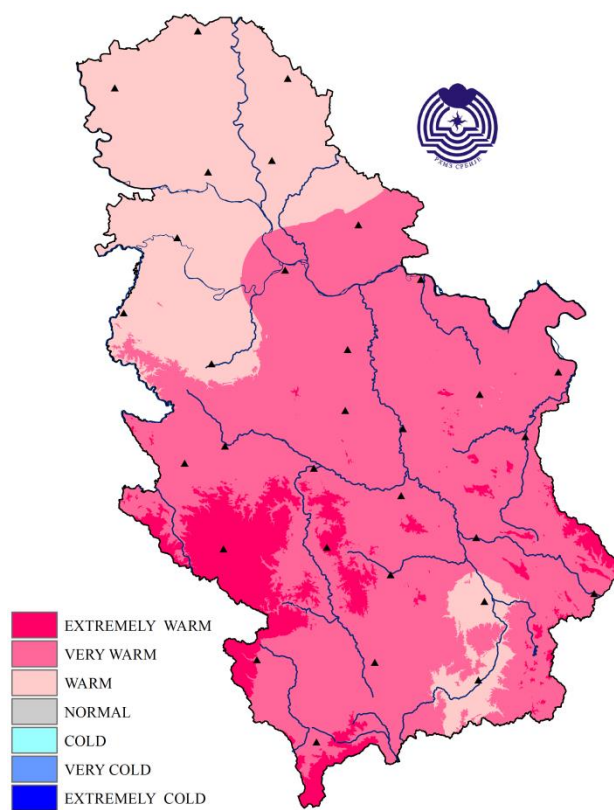
Figure 22. Spatial distribution of mean winter air temperature according to the percentile method

Precipitation

Precipitation sums expressed in the percentages of normal for the 1961-1990 base period ranged from 58% in Sremka Mitrovica to 118% in Krusevac (*Figure 23*).

Based on the percentile method, winter precipitation sums were in the normal and dry categories in most of Serbia, very dry in Veliko Gradiste, and rainy in Krusevac (*Figure 24*).

Precipitation sums, based on the tercile method, were in the categories of dry and normal in all of Serbia, and rainy category in Krusevac and Zajecar.

(%)
101 - 125
76 - 100
51 - 75
26 - 50
1 - 25
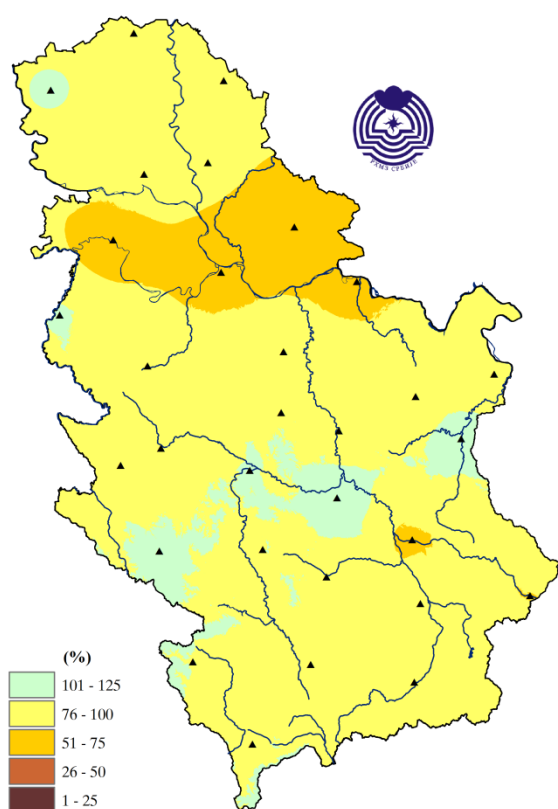
Figure 23. Spatial distribution of winter precipitation sums in percentage of the 1961-1990 normal

EXTREMELY WET
VERY WET
WET
NORMAL
DRY
VERY DRY
EXTREMELY DRY
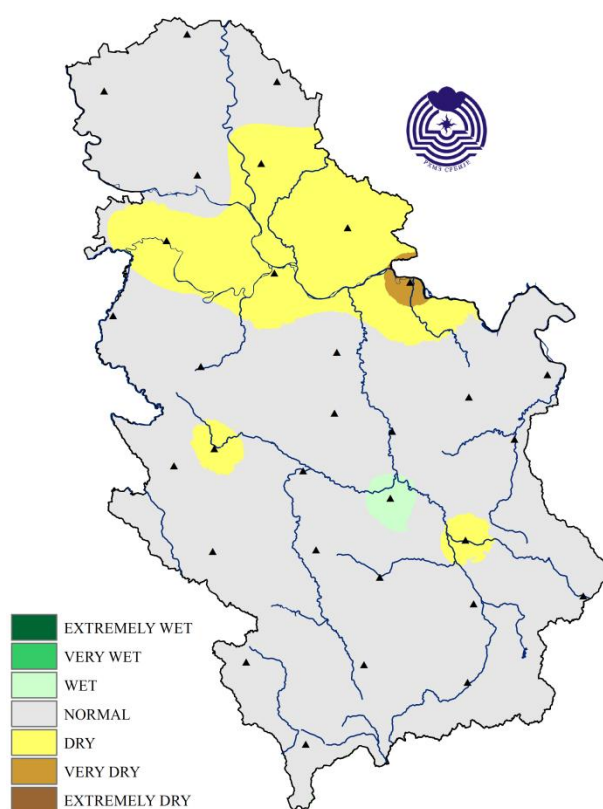
Figure 24. Winter precipitation sums according to the percentile method

Note: Climatological analysis of the meteorological elements based on the preliminary data obtained from the 28 Primary meteorological stations
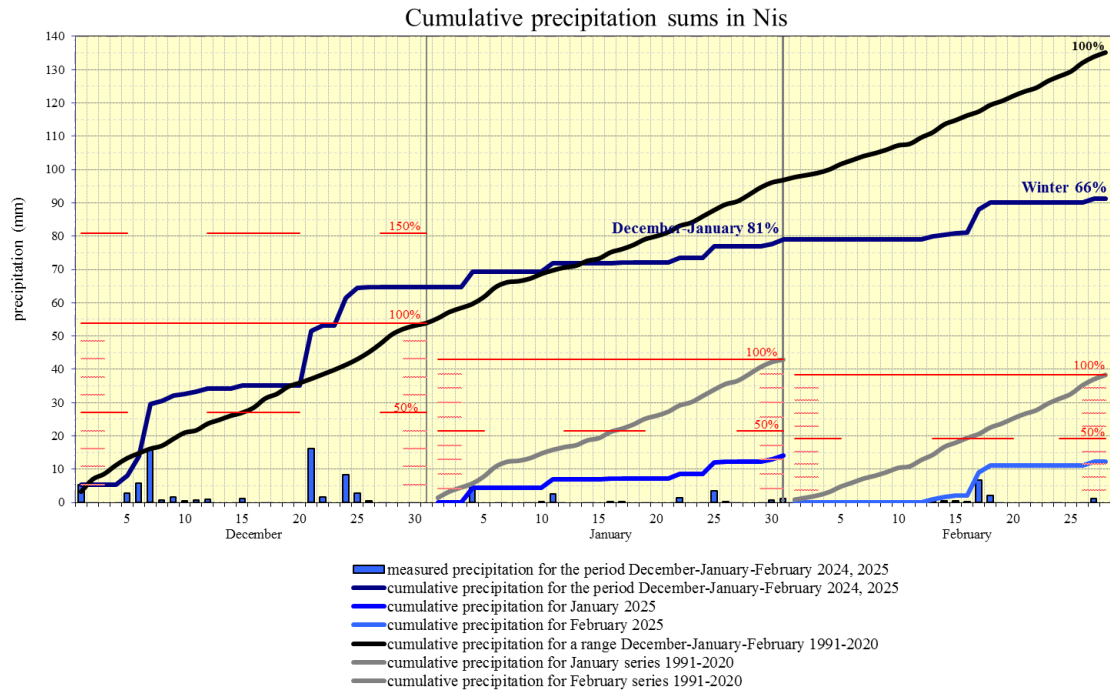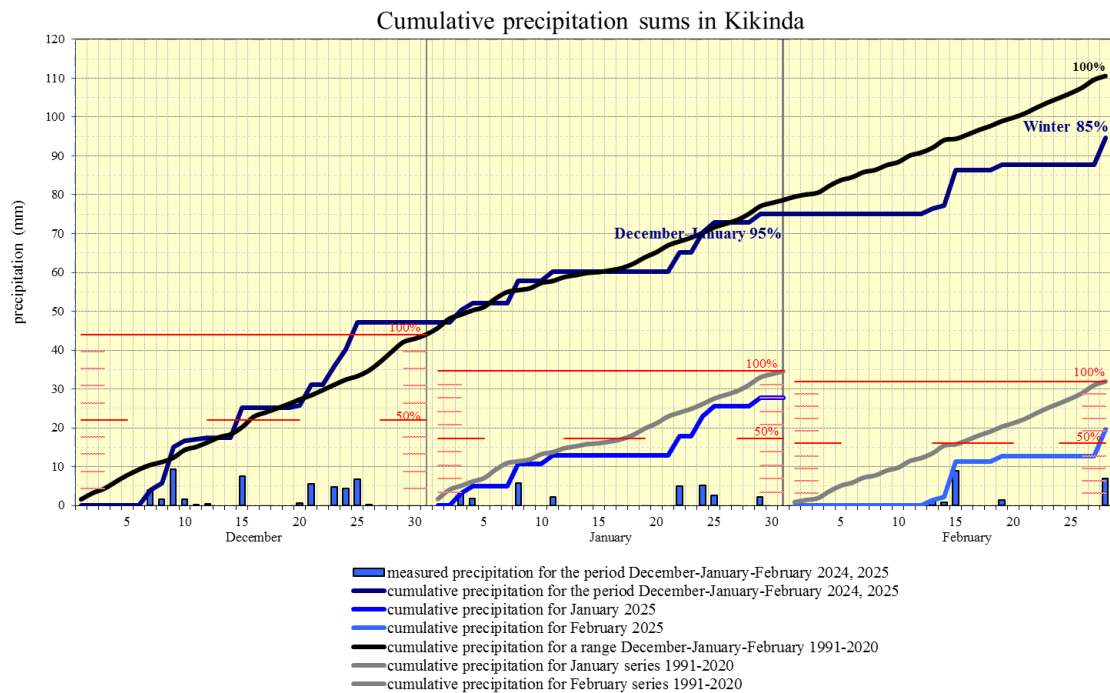
APPENDIX

Precipitation
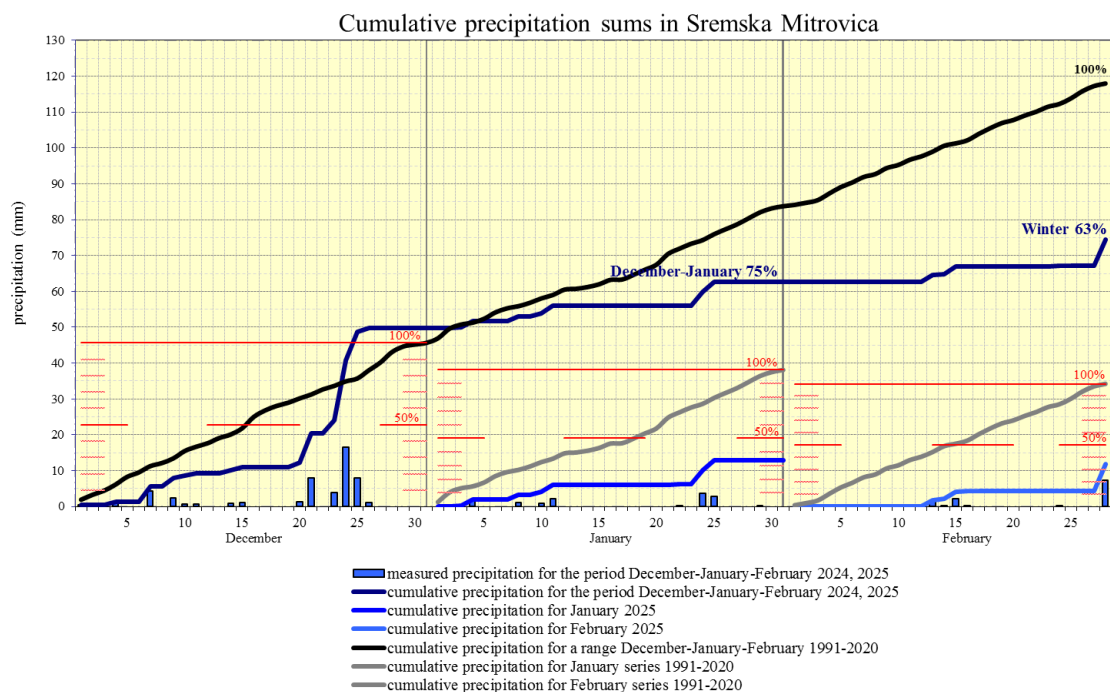
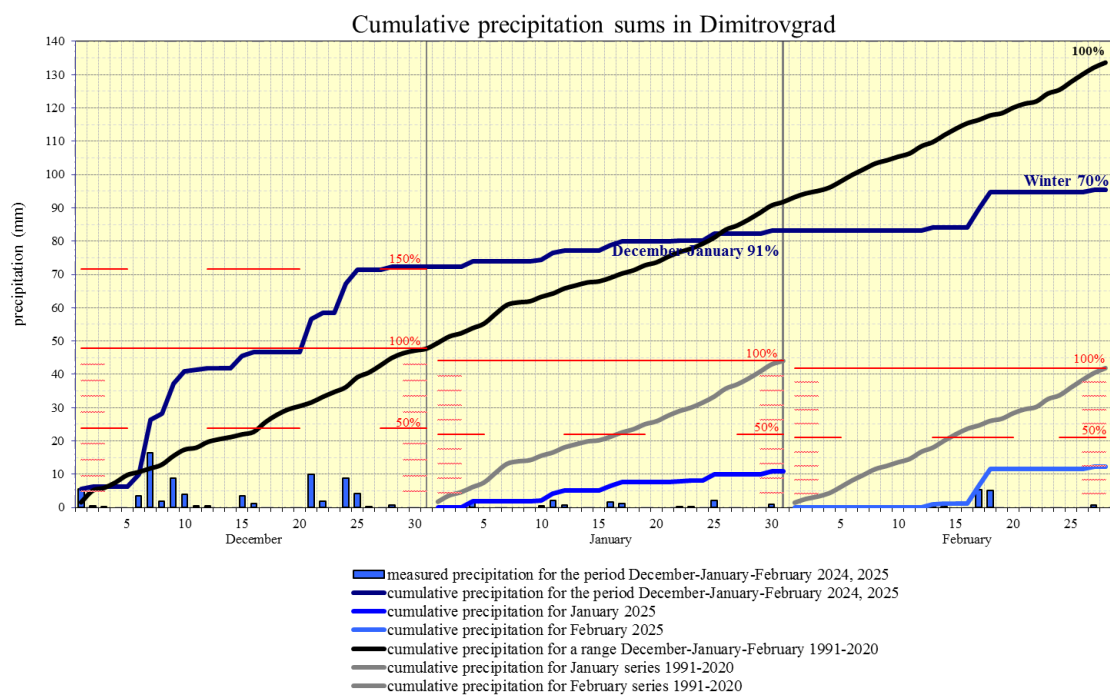Appendix 1. Daily and cumulative precipitation sums for Sremska Mitrovica
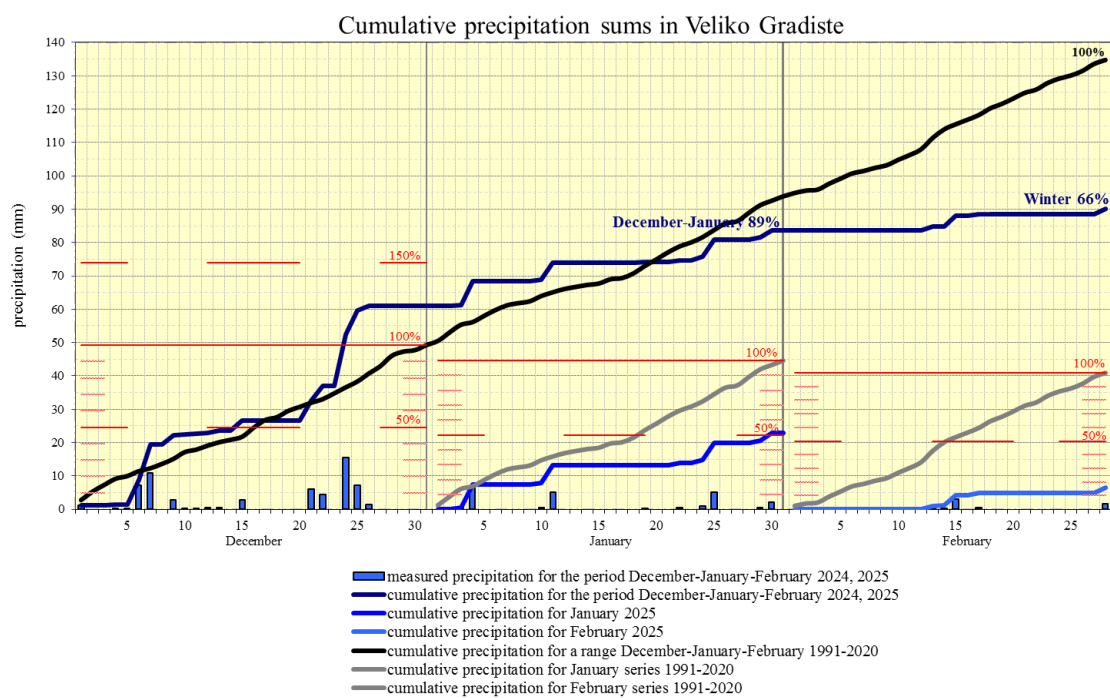
Appendix 2. Daily and cumulative precipitation sums for Veliko Gradiste
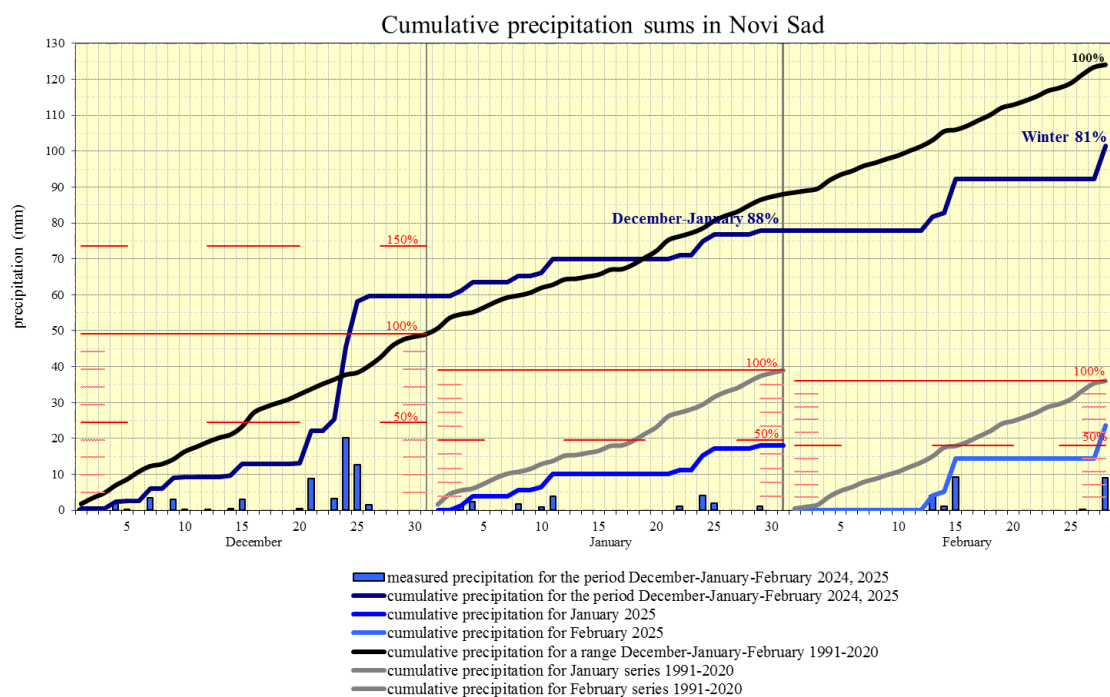
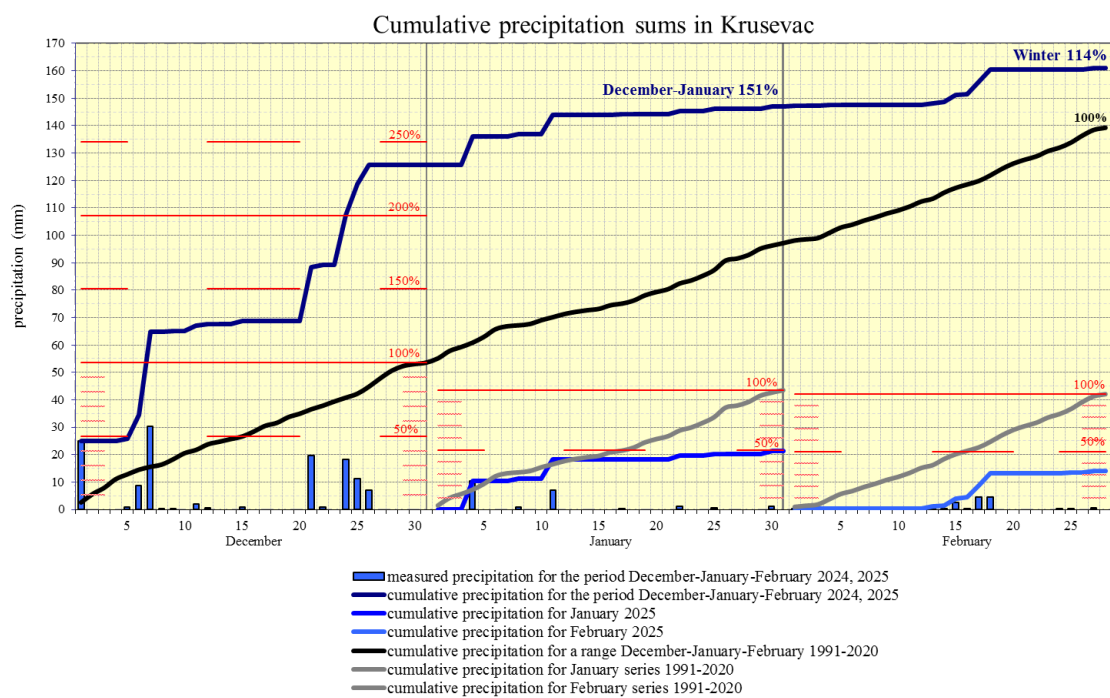Appendix 3. Daily and cumulative precipitation sums for Nis

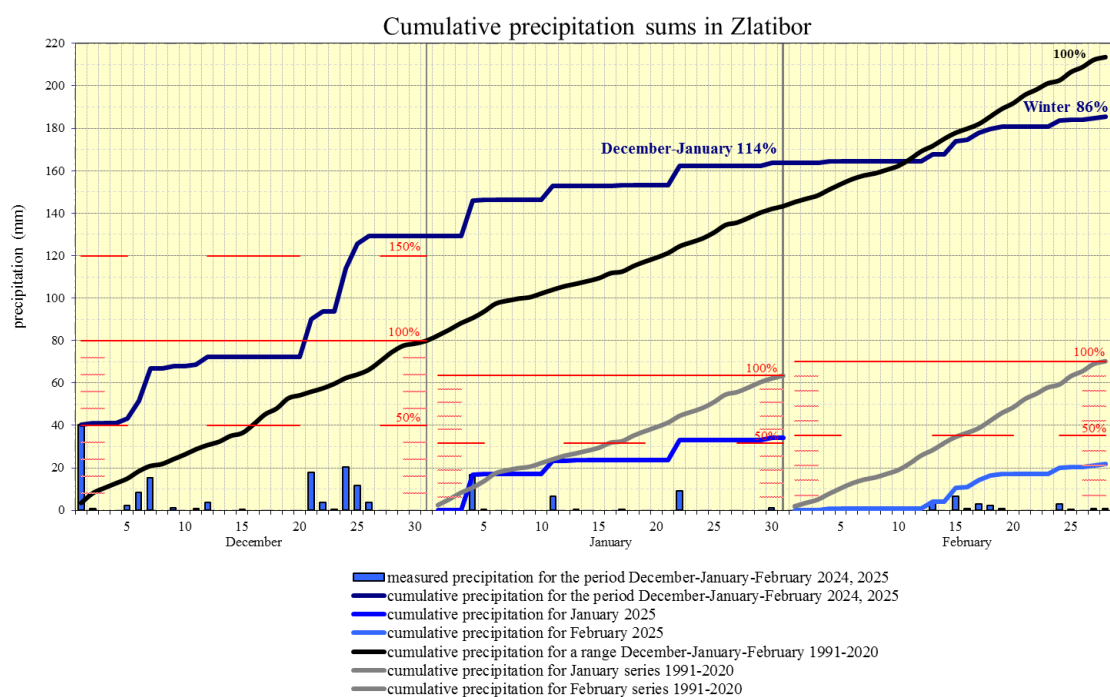Appendix 4. Daily and cumulative precipitation sums for Kikinda

Appendix 5. Daily and cumulative precipitation sums for Dimitrovgrad

Appendix 6. Daily and cumulative precipitation sums for Novi Sad

Appendix 7. Daily and cumulative precipitation sums for Krusevac

Appendix 8. Daily and cumulative precipitation sums for Zlatibor