

Qualitative verification of the of the seasonal winter outlook over The Republika Srpska, Bosnia and Herzegovina

1. SEECOF-30, MedCOF-20 Climate outlook for the 2024/2024 winter season:

Winter temperature over the Republika Srpska was likely to be near or above-normal (below-left, zone 1 and 2 in Figure 1). Observed data showed **exceptionally warm** winter season over the whole territory, with **above-normal temperatures**, based on the tercile method (Figure 1 above - left). The outlook for temperature was fully correct.

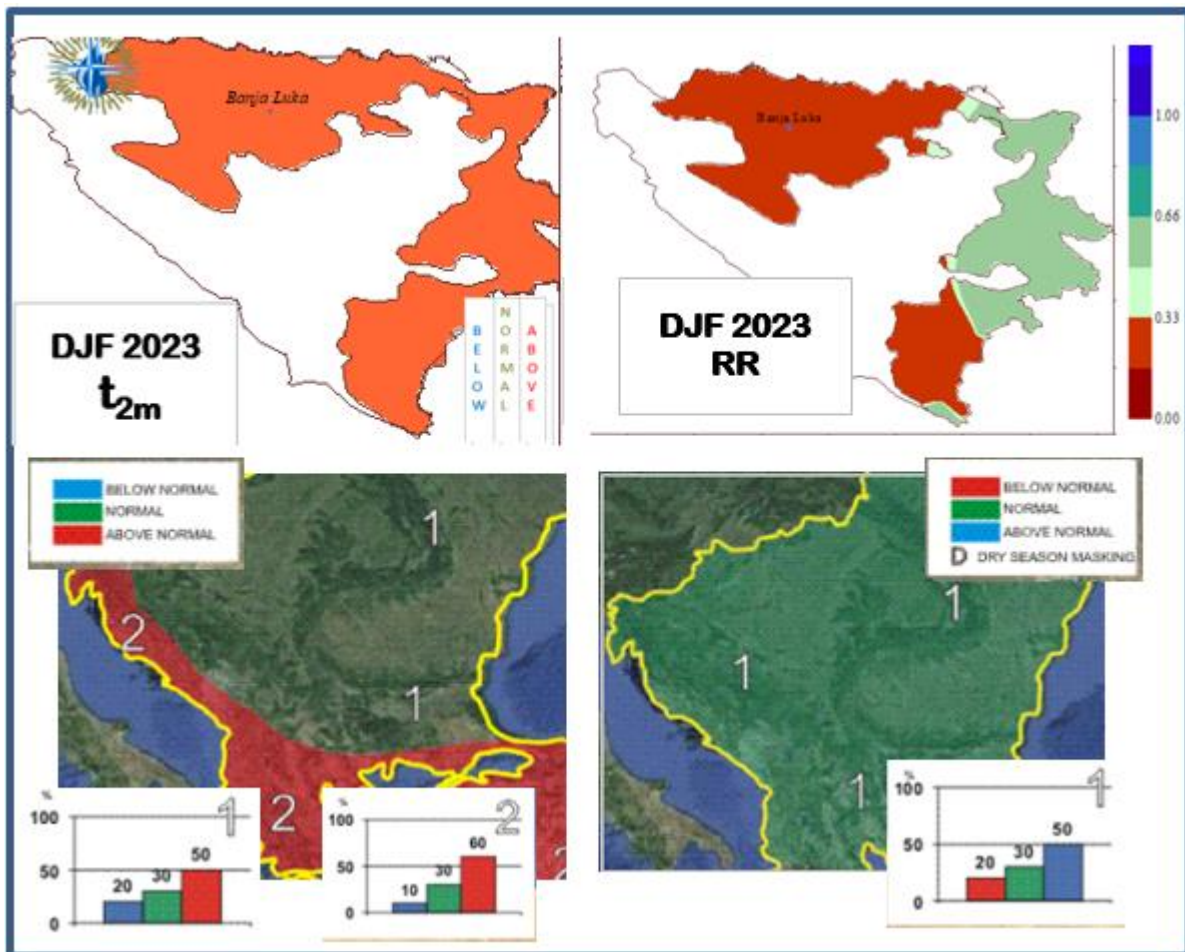


Figure 1: DJF 2024 Temp 2m (left) and PRC (right);
DJF 2024 outlook (below), observed values (above)

Outlook for precipitation pattern indicated normal to wetter weather conditions. Based on the climatological monitoring of precipitation, the winter 2024 was below normal or normal in the eastern region of the Republika Srpska. The outlook for precipitation was partially correct.

- ❖ Warmer than any other winter in the data record, at 3.3°C above the 1991-2020 average for the DJF season
- ❖ Precipitation exceptionally below normal (0.19th percentile)

2. A more detailed visualisation of analysed climate indices follows:

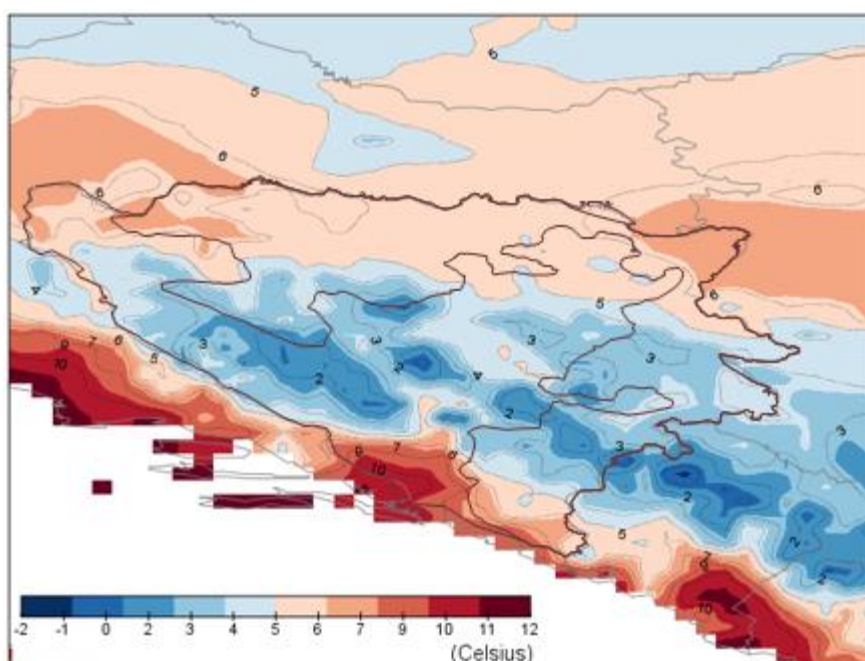
Temperature

Extremely hot winter, breaking previous hottest record in 2014. The Tmean for the territory of Srpska for DJF 2024 was 4.52°C - category relative to normal *exceptionally above* (percentile 1.00).

DJF air temperature ranges from 1.4°C (Sokolac) to 8.9°C (Trebinje).

Table 1. DJF-2024 t_{mean} (degC) statistics over RS (ref 1981-2010)

Station	1981-2010	STD	z (SPI)	NORMSDIST (z) (percentile)	PercRank 2024	2024	departure	33,33	66,67	50,00	tercile anom.cat
Бања Лука Bana Luka	1.5	1.7	2.76	1.00	1.00	6.3	4.8	0.7	2.6	1.4	above
Приједор Priedor	1.5	1.5	2.54	0.99	1.00	5.4	3.9	0.5	2.2	1.1	above
Нови Град NoviGrad	1.2	1.7	2.55	0.99	1.00	5.5	4.3	0.5	2.2	1.2	above
Добој Doboy	1.3	1.6	2.87	1.00	1.00	5.9	4.6	0.7	2.2	1.3	above
Бијељина Vijeljina	1.6	1.8	2.64	1.00	1.00	6.2	4.7	0.6	2.6	1.5	above
Соколац Sokolac	-2.4	1.5	2.54	0.99	0.98	1.5	3.9	-3.1	-1.5	-2.4	above
Билећа Vileca	3.9	1.1	2.04	0.98	0.98	6.2	2.3	3.6	4.4	4.0	above
Гацко Gasko	-0.5	1.2	3.13	1.00	1.00	3.3	3.8	-1.0	0.2	-0.4	above
Чемерно Schemerno	-2.1	1.3	2.68	1.00	0.98	1.3	3.4	-2.8	-1.4	-2.0	above
Требиње Trebinje	6.2	1.0	2.85	1.00	1.00	8.9	2.8	5.9	6.8	6.3	above
Дринић Drinic	-0.5	1.6	2.79	1.00	1.00	3.9	4.4	-0.9	0.4	-0.3	above
МркГрад MrkonjG	0.3	1.7	2.65	1.00	1.00	4.8	4.5	-0.3	1.2	0.3	above
Фоча Fosca	0.7	1.3	2.63	1.00	1.00	4.1	3.4	0.3	1.7	0.7	above
Вишеград Visegrad	1.1	1.5	1.92	0.97	0.98	3.9	2.9	0.2	1.8	1.0	above



Hottest years in Srpska, according to the 1950-2024 data set of the Republic of Srpska stations' network:

2024; 2014; 1951; 2007 ...

Coldest years:

1963; 1954; 1985 ...

Compared to the 1991-2020 climatology, DJF deviation for winter 2024 ranges from 2.53°C at southern places to 4.29°C over the north; averaged over the Republika Srpska, 3.3°C warmer

Figure 1: Winter 2024 mean temperature, based on ECA&D/E-OBS data.
Data visualisation: RHMS RS-climatology

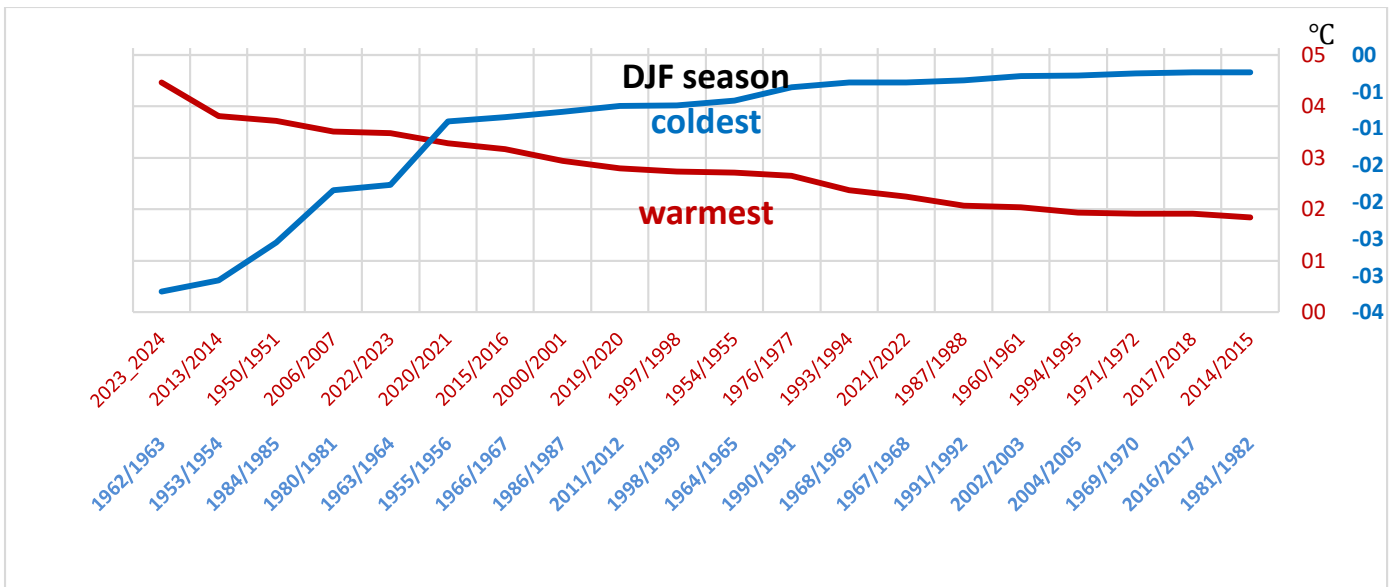


Figure 2: warmest (in red)/coldest (in blue) winters, according to 1950-2024 data set of the RHMS

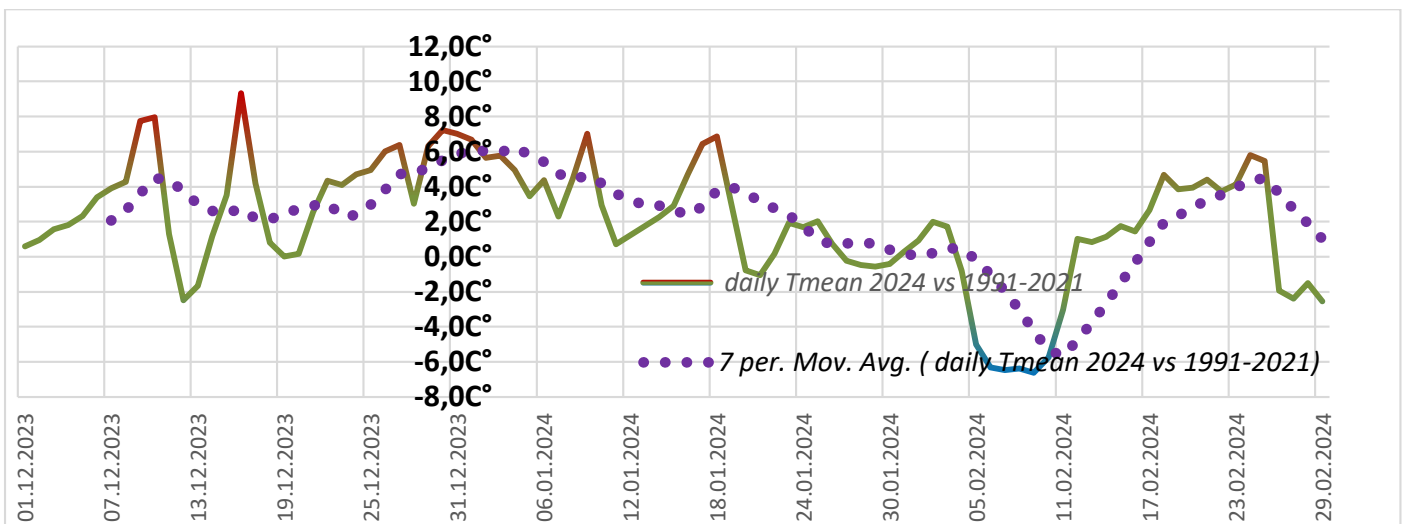


Figure 3: daily anomalies for DJF2024 relative to the 1991-2020 period for the Republika Srpska, Bosnia and Herzegovina

December 2023 was extremely above normal, 2.8 degrees higher than the average; the warmest was 2022 (5.15°C); The Coldest was 2001 (-2.83°C) from 1950 onwards.

During 1st and 2nd in December, a strong cyclone stretched from northern Europe to the Mediterranean, Northern Africa and the Balkans. There was a strong and stormy wind, and in some cases an orcan wind, which caused an additional increase in temperature throughout the region. At a large number of stations of the Republic Hydrometeorological Institute of the Republic of Srpska, new records were recorded for the absolute maximum air temperature for December month:

January 2024 was well above normal, 1.44 degrees higher than 1991-2020; from 1950 onwards, the warmest was 2014 (TSR=4.1°C) and the coldest was 1963 (TSR=-5.6).

February 2024 was extremely warm, with temperatures extremely above normal; the average monthly deviation for Srpska is 5.21°C compared to the normal 1991-2020. Hottest years in Srpska: 2024; 2016; 1966; 2014 ... Coldest years: 1956; 1954; 1965 ...

In Banja Luka, February 2024 was the warmest since 1860. years.

maximum temperature

feb-2024

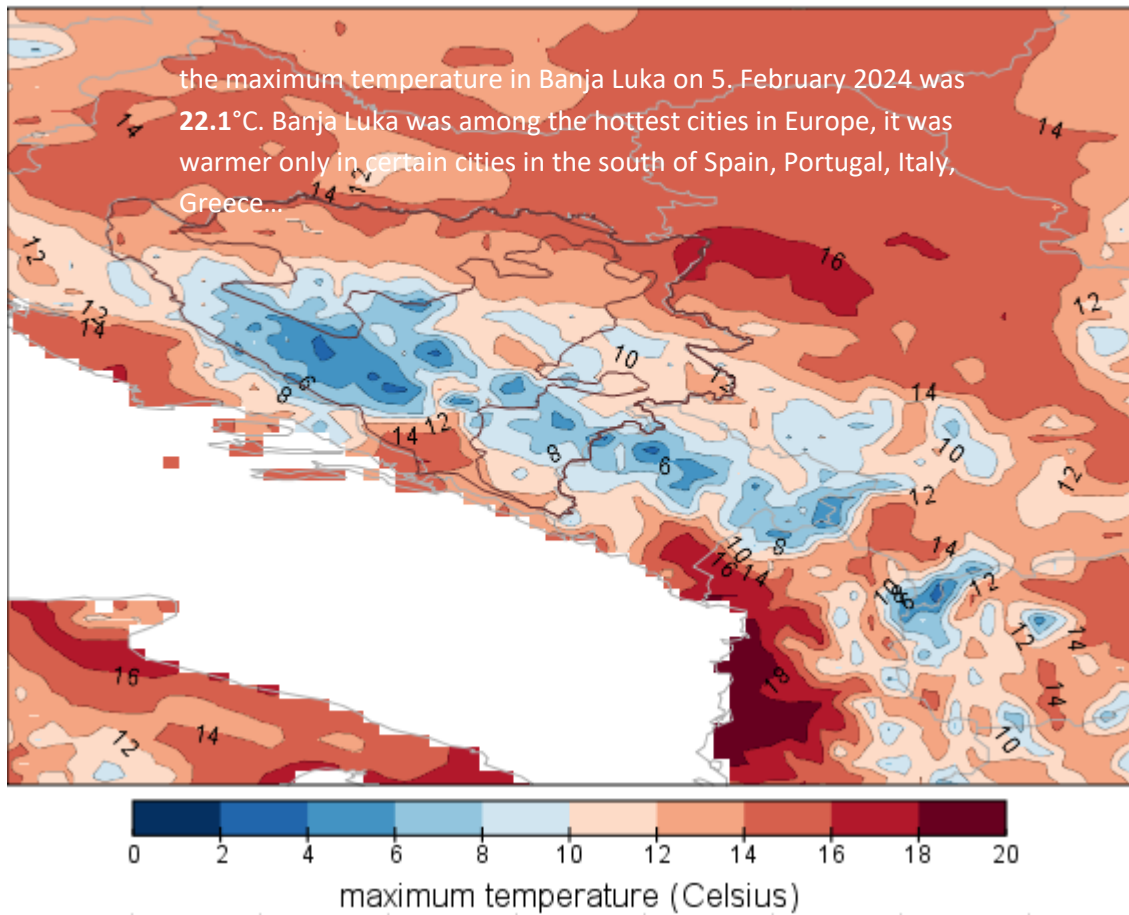


Figure 4: Tmean for February 2024 according to E-OBS/ECA&D

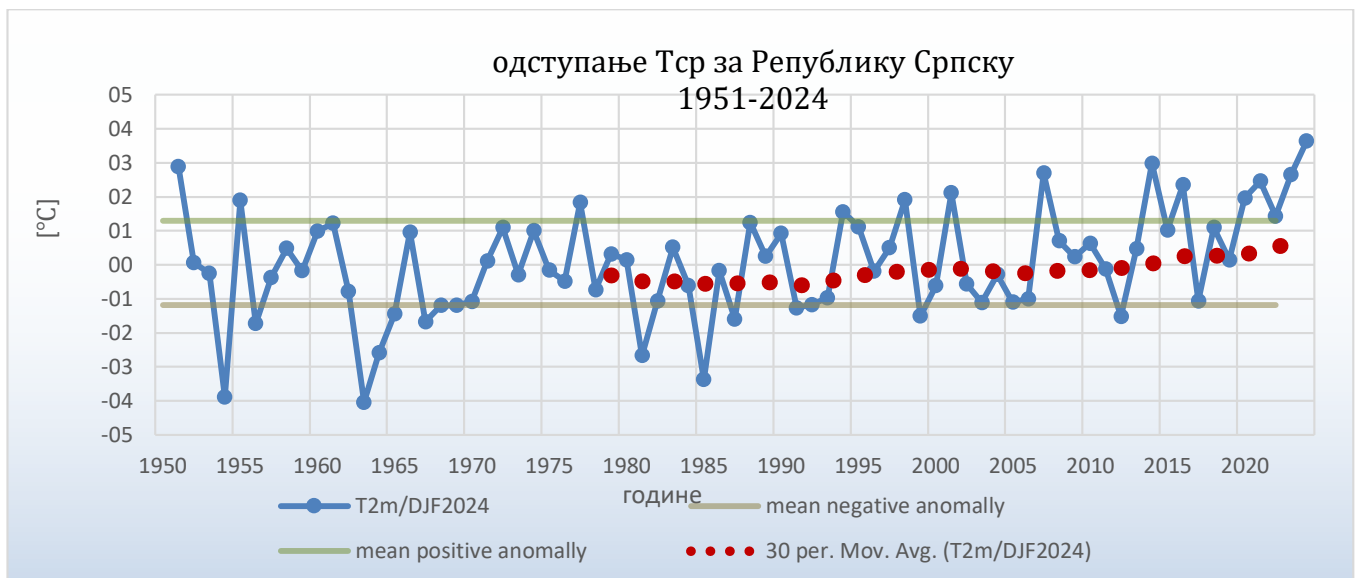


Figure 5: mean anomalies for winter season 1951-2024 averaged over the Republika Srpska

30-year moving Tmean deviation (climate) is settled within the climate average over the last 4 decades (Fig 4, red line). The highest positive deviations in particular year (weather) were in 2024, 2014, 1951, 2007. The biggest negative deviation were in 1963, 1954, 1985, 1981, 2012...

The coldest winter in this 21st century was in 2011/2012 (-1.5°C) due to the extremely cold February month (-5.3°C).

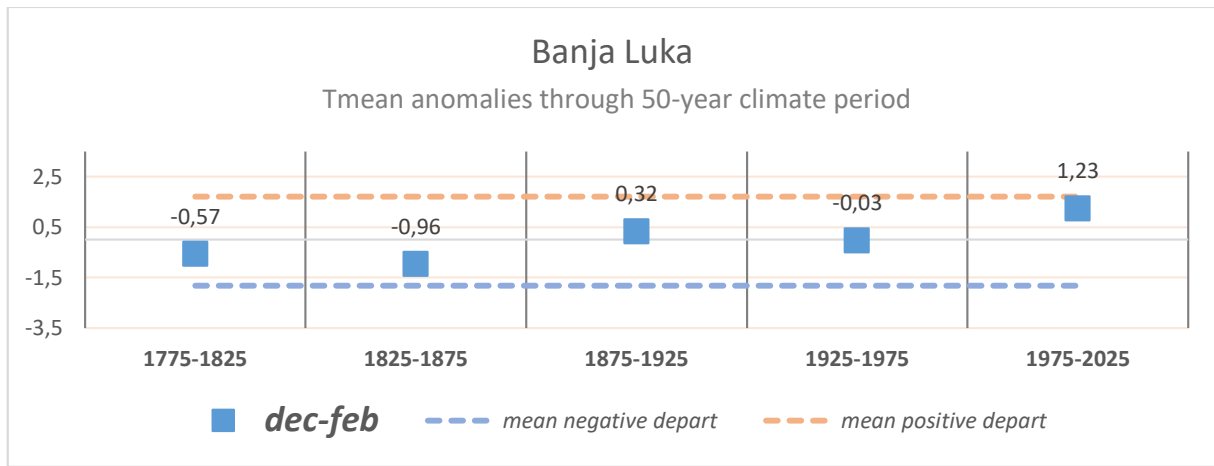


Figure 6: Tmean anomalies through 50-year climate period for Banja Luka, Republic of Srpska/Bosnia and Herzegovina.

Precipitation

DJF amount of precipitation for winter 2024 is 223mm, the category *much below* (percentile 0.19); the sum of precipitation ranged from 103mm (north-east) to 388 mm (southern);

Table 2. DJF-2024 precipitation (mm) statistics over the Republika Srpska climatological stations (ref 1981-2010);

Station	normal	STD	z (SPI)	NORMSDIST (z) (percentile)	PercRank 2024	DJF 2024	% from normal	suf/deficit %	33,33	66,67	50,00	tercile anom.cat
Бања Лука Bana Luka	222	74	-1.12	0.13	0.13	140	63	-37.1	198	252	228	<i>below</i>
Приједор Priedor	199	67	-0.53	0.30	0.34	164	82	-18	162	228	204	<i>normal</i>
Нови Град NoviGrad	233	84	-0.29	0.38	0.37	208	89	-11	197	264	237	<i>normal</i>
Добој Doboy	190	58	-1.40	0.08	0.06	108	57	-43	176	217	198	<i>below</i>
Бијељина Bijeljina	160	50	-1.42	0.08	0.08	88	55	-45	139	189	163	<i>below</i>
Соколац Sokolac	173	66	-0.36	0.36	0.32	150	86	-14	150	208	177	<i>below</i>
Билећа Bileca	476	207	-0.71	0.24	0.21	329	69	-31	395	600	518	<i>below</i>
Гацко Gacko	485	230	-0.27	0.39	0.37	424	87	-13	392	573	487	<i>normal</i>
Чемерно Schemerno	497	211	-0.16	0.44	0.39	464	93	-7	438	619	522	<i>normal</i>
Требиње Trebine	553	228	-0.96	0.17	0.15	334	60	-40	449	660	568	<i>below</i>
Дринић Drinic	304	116	-0.11	0.46	0.44	291	96	-4	257	365	316	<i>normal</i>
Фоча Focxa	163	73	0.13	0.55	0.50	173	106	6	159	227	173	<i>normal</i>
МркГрад MrkonjicG	234	79	-0.85	0.20	0.21	167	71	-29	204	278	250	<i>below</i>
Фоча Focxa	163	73	0.13	0.55	0.50	173	106	6	159	227	173	<i>normal</i>
Вишеград Visegrad	268	124	-1.09	0.14	0.23	132	49	-51	161	225	187	<i>below</i>

Precipitation deficit for the territory of Srpska is -28.13%.

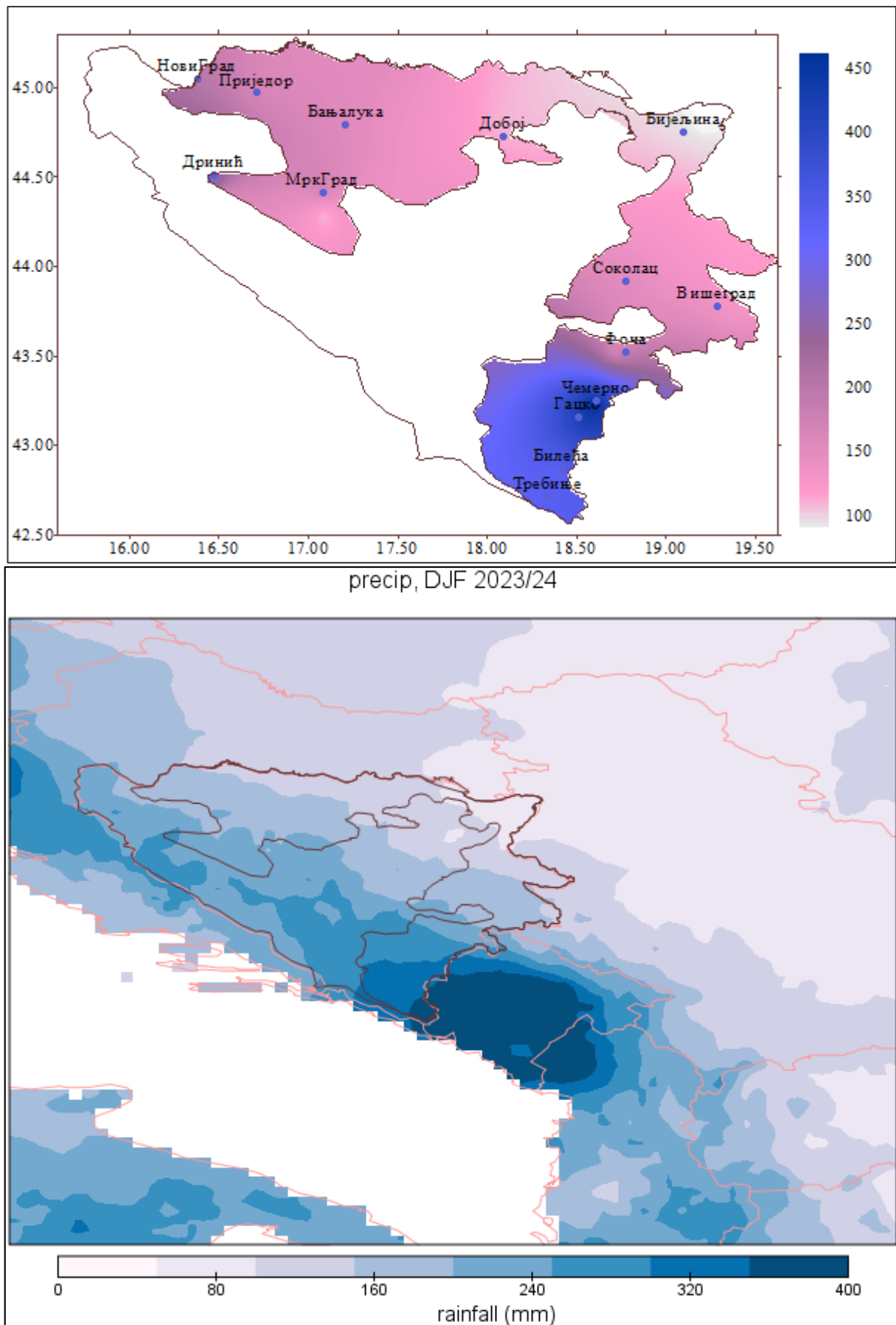


Figure 7: DJF Precip amount, according to ECA&D/E-OBS (belows) and RHMS RS data source (above)

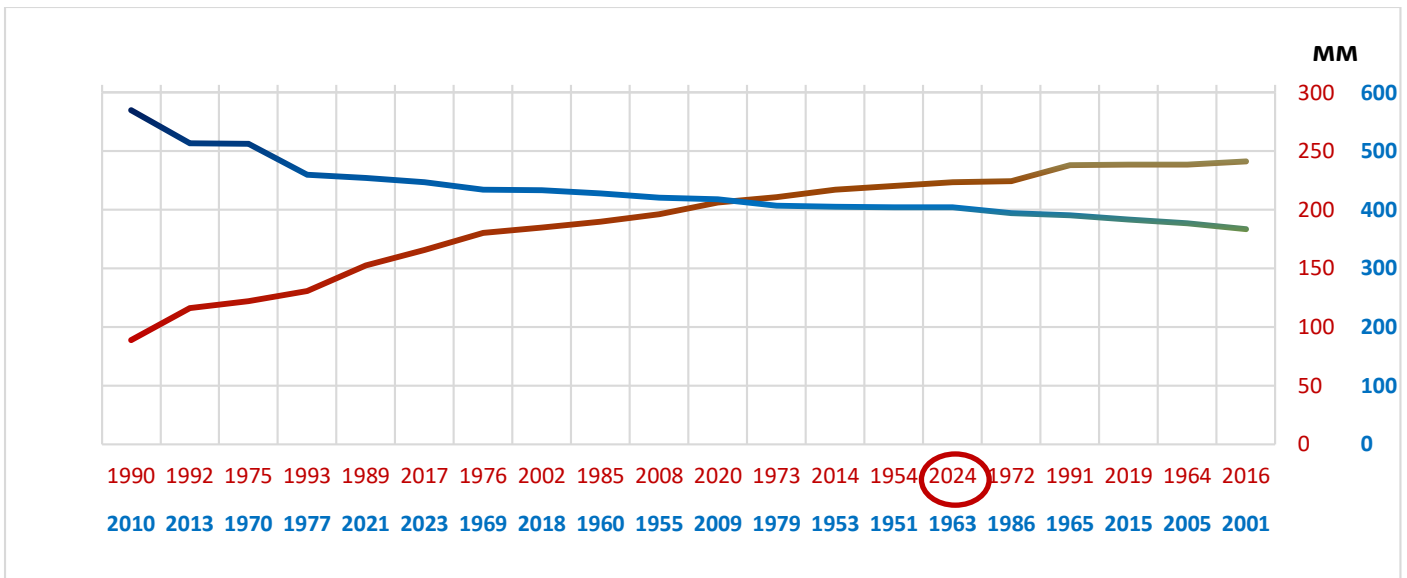


Figure 8: wettest/driest DJF season in R.Srpska according the 1951-2024; 2024 winter was 16th driest since 1951 year, according to RHMS RS data base.

driest winters: 1990; 1992; 1975; 1993; 1989 wettest winters 2010; 2013; 1970; 1977; 2021

3. High impact events:

Storm winds, sometimes orcan wind gust forces, caused some material damage to buildings in the days 10-11 and 23-24 of February.

10th february: Čemerno 94km/h; Bileća 92.9 km/h; Ribnik 74 km/h; Han Pijesak 71.6 km/h.

23rd february: Banja Luka 70.6 km/h; Višegrad 71.3 km/h; Čemerno 79.9 km/h; Ribnik 96.8km/h

4. Verification of the SEECOF-28 & MedCOF-19 climate outlook for the 2024 winter season

Country	Seasonal temperature (DJF)		Seasonal precipitation (DJF)	
	Observed	SEECOF30, MedCOF-20 climate outlook	Observed	SEECOF30, MedCOF-20 climate outlook
The Republika Srpska - Bosnia and Herzegovina	<u>above normal</u>	above normal	<u>normal to below normal</u>	normal to above normal

The outlook for winter 2024 mean temperature was fully correct; precipitation partially correct.