Annex

Country: Slovenia

Institute: Slovenian Environment Agency

Name: Renato Bertalanič

E-mail: Renato.Bertalanic@gov.si

Assessment of the SEECOF-23 Climate Outlook for Slovenia for the summer season 2020

SEECOF-23 Climate Outlook for Slovenia for the summer season 2020

The consensus statement of SEECOF-23 climate outlook for the 2020 summer season emphasized the neutral El Niño conditions. Observed sea surface temperature along the most of the tropical Pacific was slightly above normal, with higher anomalies over the west of the basin. Below-normal anomalies in subsurface suggested that development of La Niña event was starting, which was supported by most of the models. However, majority of them still predicted normal conditions during period from June to August 2020. Indian Ocean dipole was neutral at the time, but it was forecasted to become negative during summer.

Atmospheric response was consistent over tropics, but less clear over north Atlantic and Europe. There were differences among models. In general, they seemed to favour higher pressure over Central and Southern Europe, and more intense westerlies over Northern Europe. Some parts of Central Europe and the Balkan Peninsula had experienced significant drought over the previous few months, with soil moisture below normal in May. In case of anticyclonic situations, a dry soil could have enhanced risk of the onset of heat waves.

The consensus was that above normal summer temperature was likely in the whole SEECOF region, with probability for the above-average temperature decreasing from northern–north-eastern toward south-eastern parts of the region. In most of the SEECOF region there was high probability for above-average summer temperature (zone 1 in Figure 1) relative to the continental parts of Turkey and South Caucasus region (zone 2 in Figure 1). The generalized relatively high warm signal was probably partly due to the background climatic warming. For Slovenia, the probabilities for below-, near- and above-normal temperature were estimated to be 10, 30 and 60 %.

Uncertainties in regional predictions are higher for precipitation than for temperature. The uncertainty was high for the South Caucasus region, most of the continental parts of Turkey and northern parts of Ukraine (zone 2 in Figure 2), with approximately equal probabilities for below-, near- or above-normal averages of summer precipitation sums. In contrast, most of the SEECOF region was likely to experience a precipitation deficit (zone 1 in Figure 2). It was noted that certain parts of the country, particularly mountain regions might observe near- or above-normal summer precipitation due to the episodes of enhanced convection

accompanied by heavy precipitation. For Slovenia that meant probabilities of 10, 30 and 60 % for below-, near- and above-normal temperature, except for certain parts, particularly mountain regions due to certain conditions.

Figures 1 and 2 show the probabilistic consensus forecast for tercile categories of anomalies of seasonal temperature and precipitation, relative to the period 1981–2010.

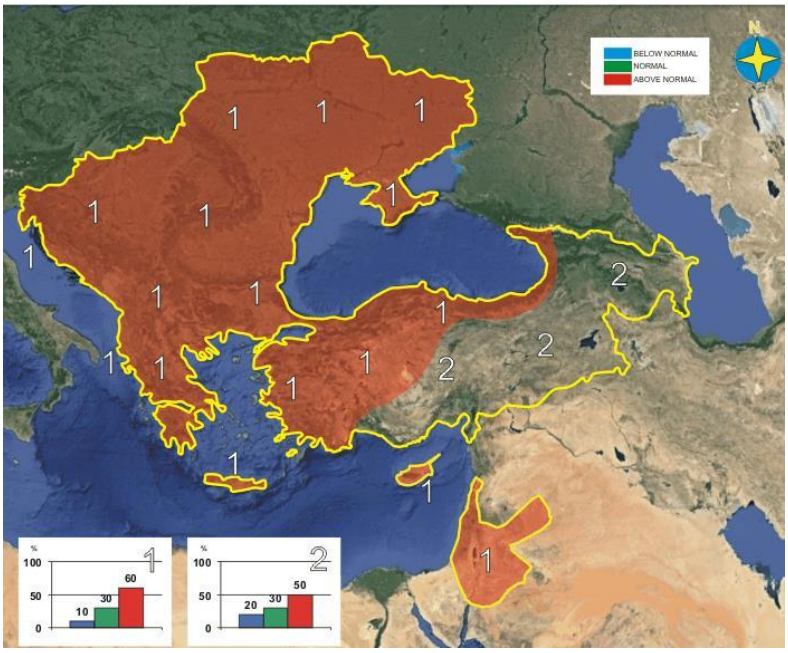

Figure 1. Graphical presentation of the summer 2020 temperature outlook

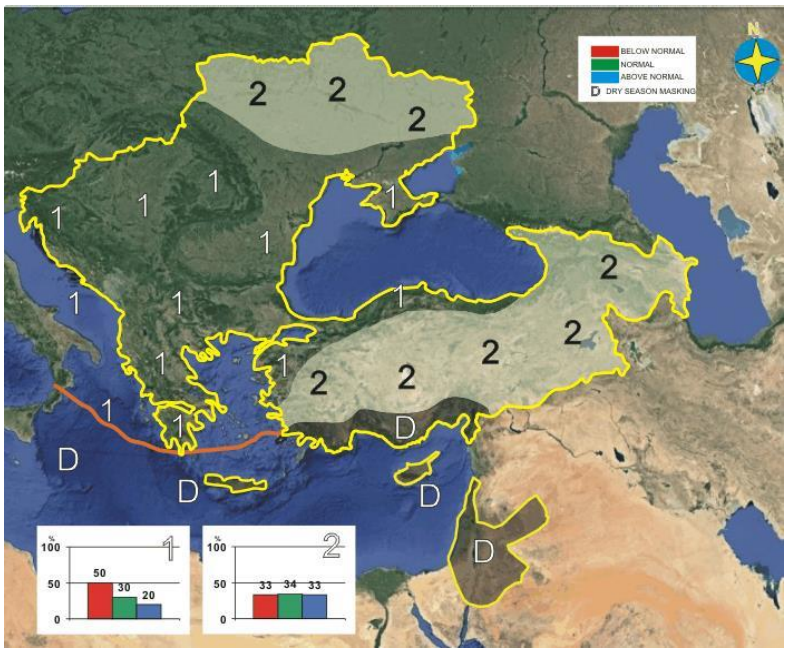

Figure 2. Graphical presentation of the summer 2020 precipitation outlook

Analysis of the summer season 2020

Average air temperature in Slovenia in summer 2020 was above the multi-annual average of the 30-year period 1981–2010 in whole country (Figure 3). Corresponding air temperature anomalies for summer 2020 (months June, July and August) were between 0.4 °C and 1.5 °C, average anomaly was 0.9 °C (surface weighted average value). In the major part of the country the anomalies were between 0.5 °C and 1.0 °C, only in the central to south-east of Slovenia and in the parts of east were anomalies larger, between 1.0 °C and 1,5 °C.

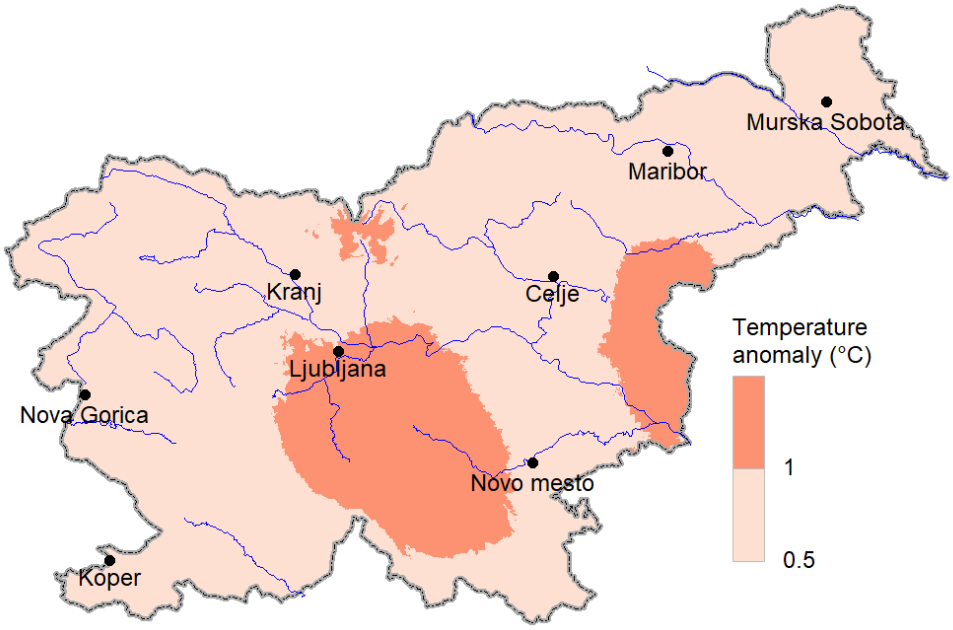

Figure 3. Mean air temperature anomaly in Slovenia in summer 2020, relative to the 1981–2010 average. Data are from 62–63 meteorological stations.

According to tercile ranks, thermal conditions in Slovenia in summer 2020 were above normal in the whole country (Figure 4).

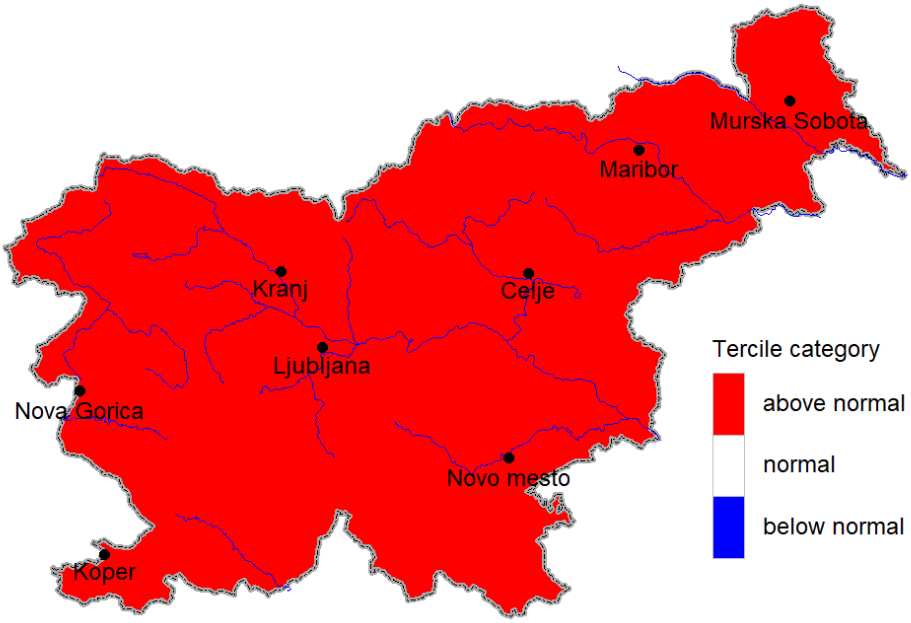

Figure 4. Mean air temperature tercile category of anomaly in Slovenia in summer 2020, relative to the period 1981–2010. Data are from 60 meteorological stations.

Precipitation in summer is usually very heterogeneous due to its convective nature. Precipitation index in Slovenia in summer 2020 was above average in whole country except in south-east and smaller areas in central Slovenia (Figure 5). The precipitation index in southeast Slovenia was below 100 %. Precipitation index was within the range from 77 % to 184 %, average precipitation index was 119 % (surface weighted average value).

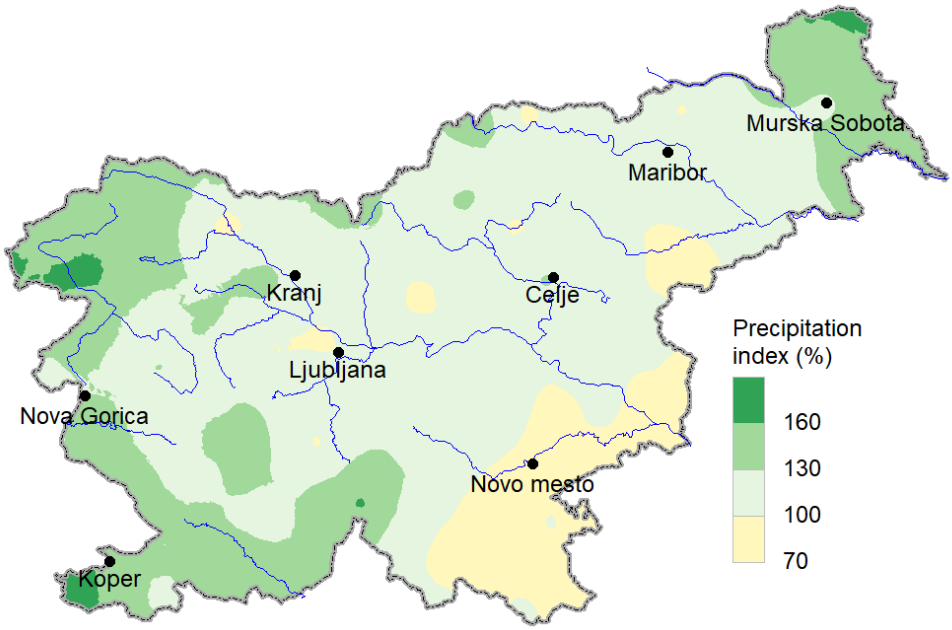

Figure 5. Precipitation index in Slovenia in summer 2020, relative to the 1981–2010 average. Data are from 154–159 meteorological stations.

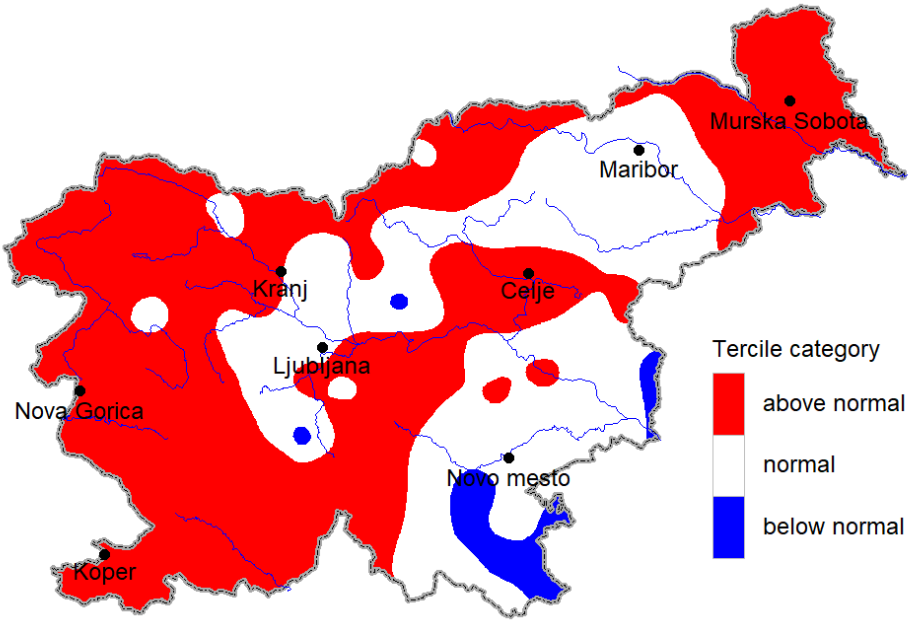

Figure 6. Precipitation tercile category of anomaly in Slovenia in summer 2020, relative to the period 1981–2010. Data are from 149 meteorological stations.

According to this, the precipitation was within the third tercile (above-normal) in major part of Slovenia (65 % of the stations), especially in the west, north and outermost north-east. On 30 % of weather station, mostly in the area from central to north-east and in the south-east of the country, was the precipitation in the second (normal) tercile and only on 5 % of weather stations, mostly in south-east and east, within first (below-normal) tercile (Figure 6). On a national level, the precipitation index was within third (above-normal) tercile.

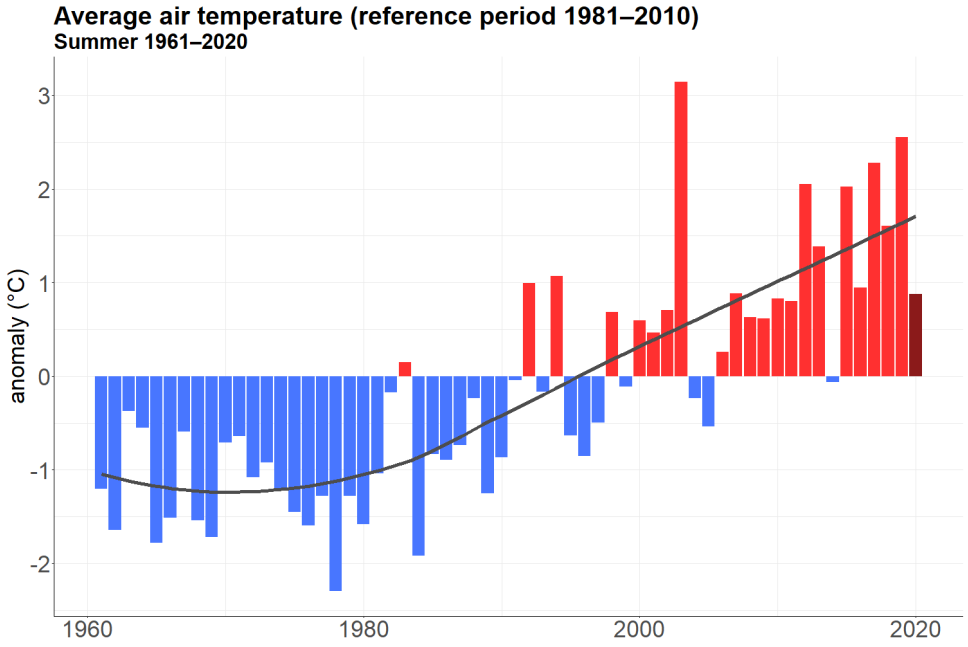

Figure 7. Summer mean air temperature anomaly in Slovenia in the period 1961/62–2020, relative to the 1981–2010 average. Summer 2020 is marked with dark red colour.

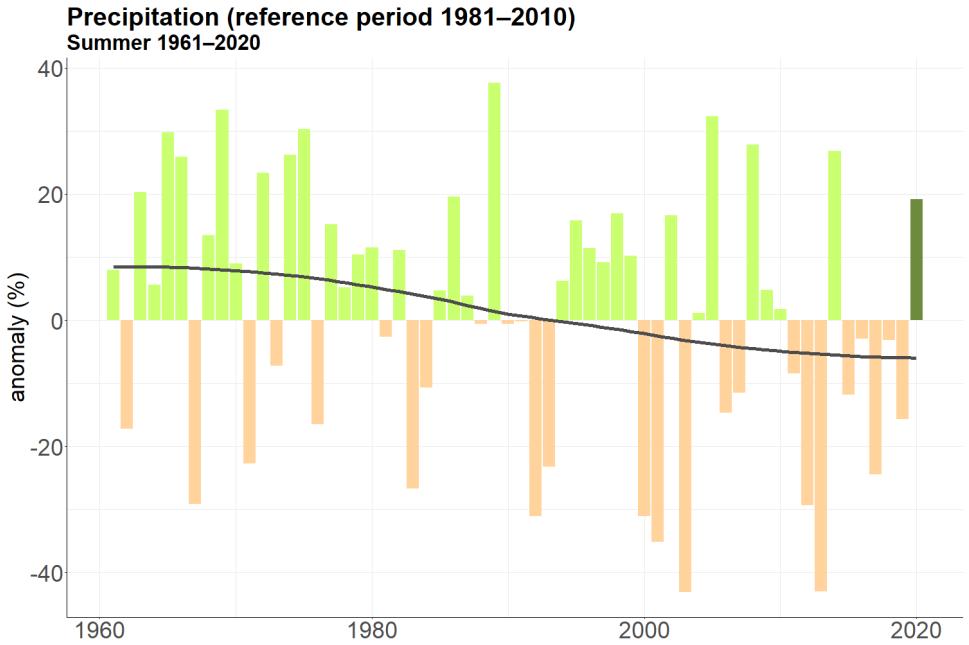

Figure 8. Summer precipitation anomaly in Slovenia in the period 1961/62–2020, relative to the 1981–2010 average. Summer 2020 is marked with dark green colour.

Since 2001 there have been 17 summers with positive temperature anomaly and only 3 with negative anomaly, but negative anomalies have been smaller than positive (Figure 7). The record as the warmest summer still holds the summer 2003. Summer 2020 is the first wet summer after five consecutive summer with below-normal precipitation index (Figure 8).

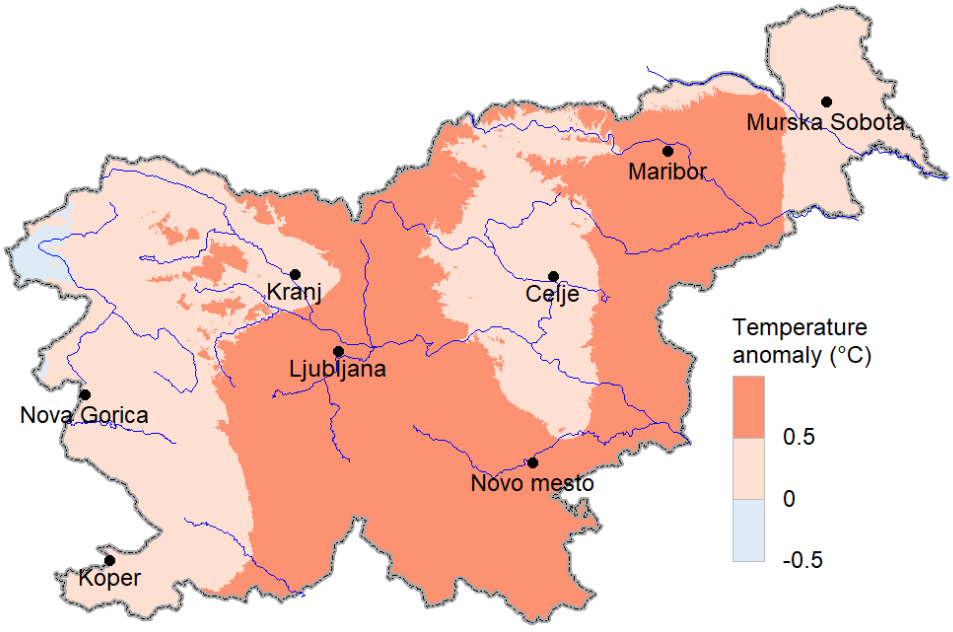

Figure 9. Mean air temperature anomaly in Slovenia in June 2020, relative to the 1981–2010 average. Data are from 63 meteorological stations.

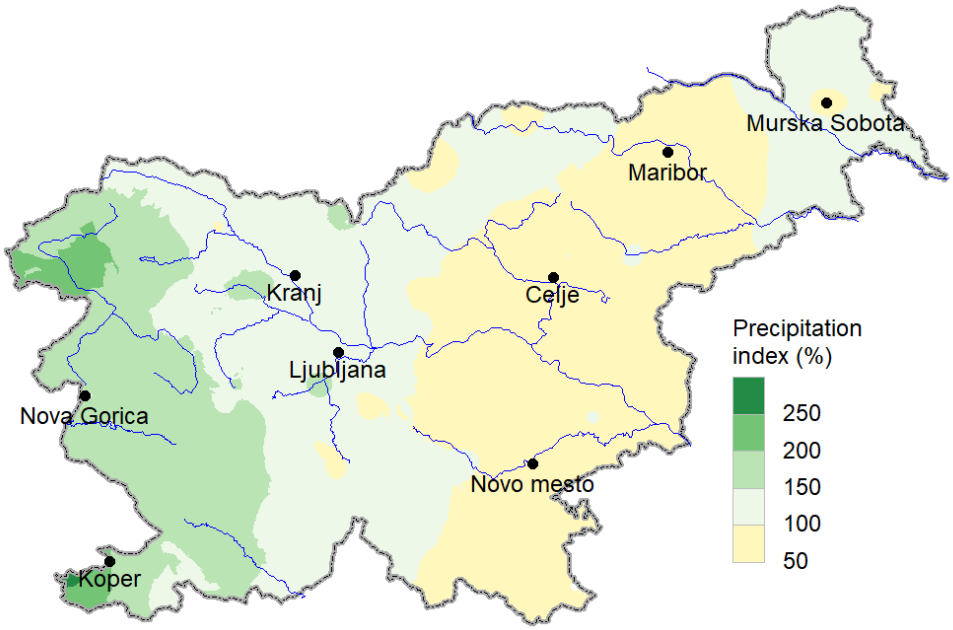

Figure 10. Precipitation index in Slovenia in June 2020, relative to the 1981–2010 average. Data are from 159 meteorological stations.

Average air temperature in *June 2020* was above the multi-annual average of the 30-year period 1981–2010 in whole Slovenia except for the small area in the north-west. Air temperature anomalies were between –0.3 °C and 1.3 °C (Figure 9), average anomaly was 0.5 °C (surface weighted average value). According to tercile ranks, thermal conditions in Slovenia were above-normal in major part of Slovenia, except for the west and south-west where they were within second (normal) tercile.

June 2020 was wet in the west and dry in some eastern parts of Slovenia. Precipitation index was above average in the west of the country, with values up to 300 % (Figure 10), and below average in the east, especially south-east and central east Slovenia. Precipitation index was within the range from 48 % to 292 %, its average value was 119 % (surface weighted average value). Precipitation index was within the third (above-normal) tercile in the west of the country and some parts of outermost north-east, first (below normal) tercile in south-east and central east, and within second (normal) tercile elsewhere.

Average air temperature in *July 2020* was above the multi-annual average of the 30-year period 1981–2010 in whole Slovenia, except in the outermost north-east where was slightly below average. Anomalies were between –0.2 °C and 1.4 °C (Figure 11), their average value was 0.4 °C (surface weighted average value). According to tercile ranks, thermal conditions in Slovenia were above normal in the triangle from west to just below Celje and some parts in the north, and normal elsewhere.

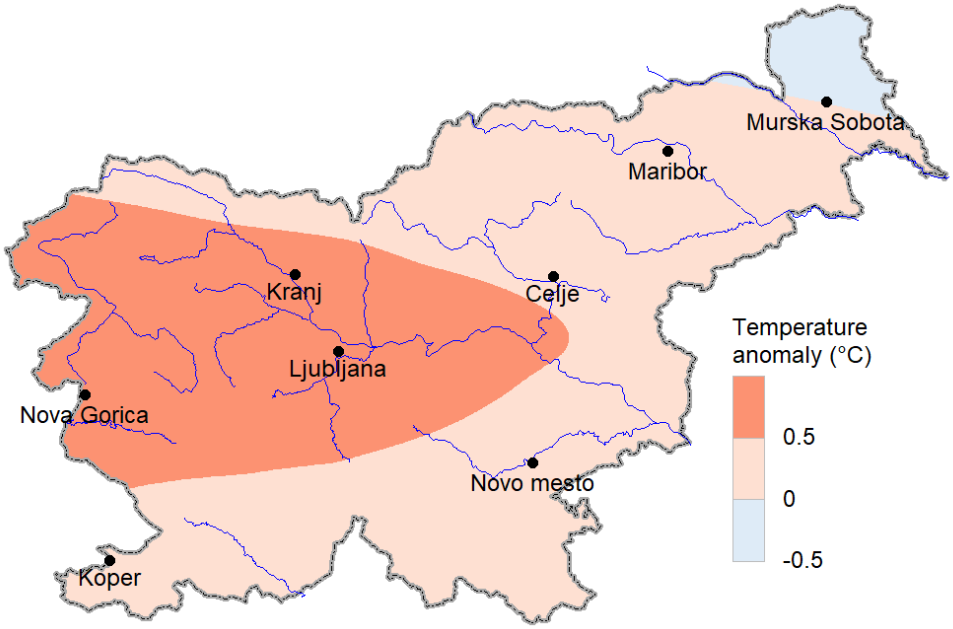

Figure 11. Mean air temperature anomaly in Slovenia in July 2020, relative to the 1981–2010 average. Data are from 62 meteorological stations.

July 2020 was normal to dry in the west and wet in the east (Figure 12). The precipitation index was within the range from 58 % to 235 %, its average value was 130 % (surface weighted average value). The precipitation index was within the first (below-normal) tercile in some parts of west, normal in the west and above-normal in the east.

August 2020 was warm. Air temperature anomalies were between 1.2 °C and 2.4 °C (Figure 13), the average anomaly was 1.8 °C (surface weighted average value). According to tercile ranks, thermal conditions in Slovenia were above-normal in whole country.

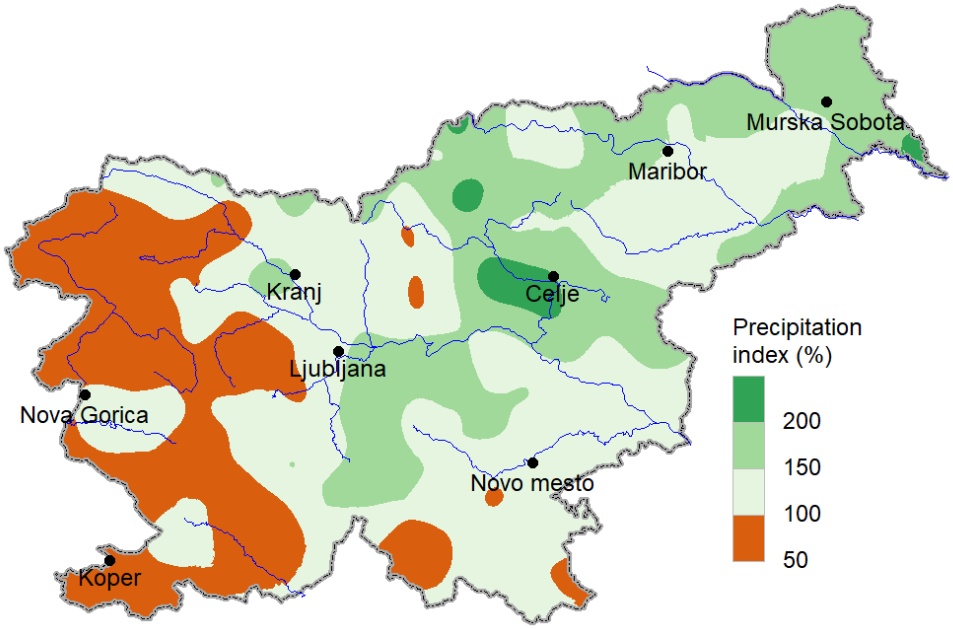

Figure 12. Precipitation index in Slovenia in July 2020, relative to the 1981–2010 average. Data are from 158 meteorological stations.

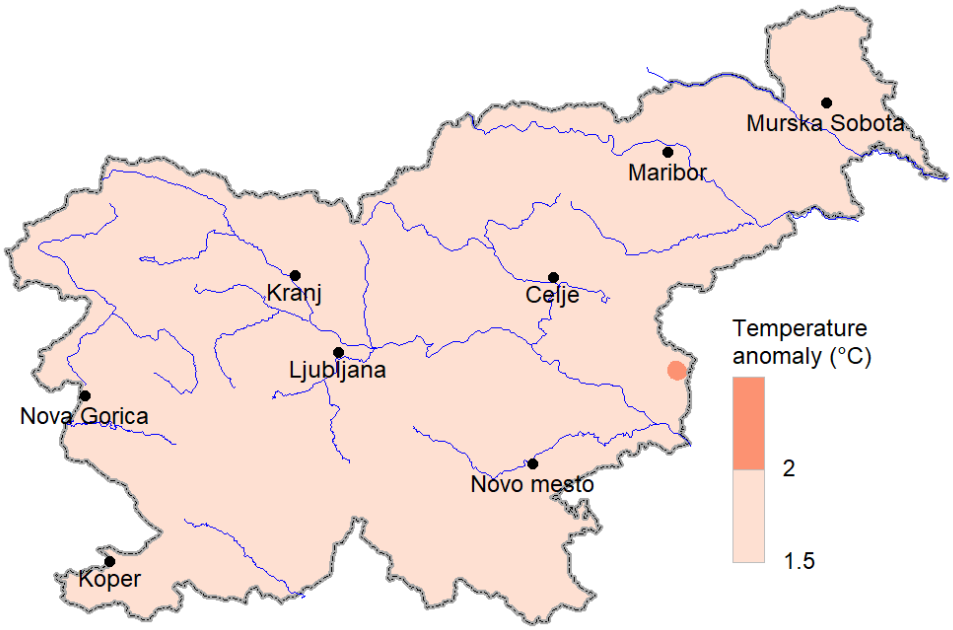

Figure 13. Mean air temperature anomaly in Slovenia in August 2020, relative to the 1981–2010 average. Data are from 63 meteorological stations.

Precipitation index in *August 2020* was above average in the west, south and outermost north-east and below average in central and east Slovenia (Figure 14). Precipitation index was within the range from 46 % to 230 %, its average value was 109 % (surface weighted average value). In the west, south-west and north-east precipitation was within the third (above-average) tercile, within first (below-normal) tercile in parts of central, east and north, and within the second (normal) tercile elsewhere.

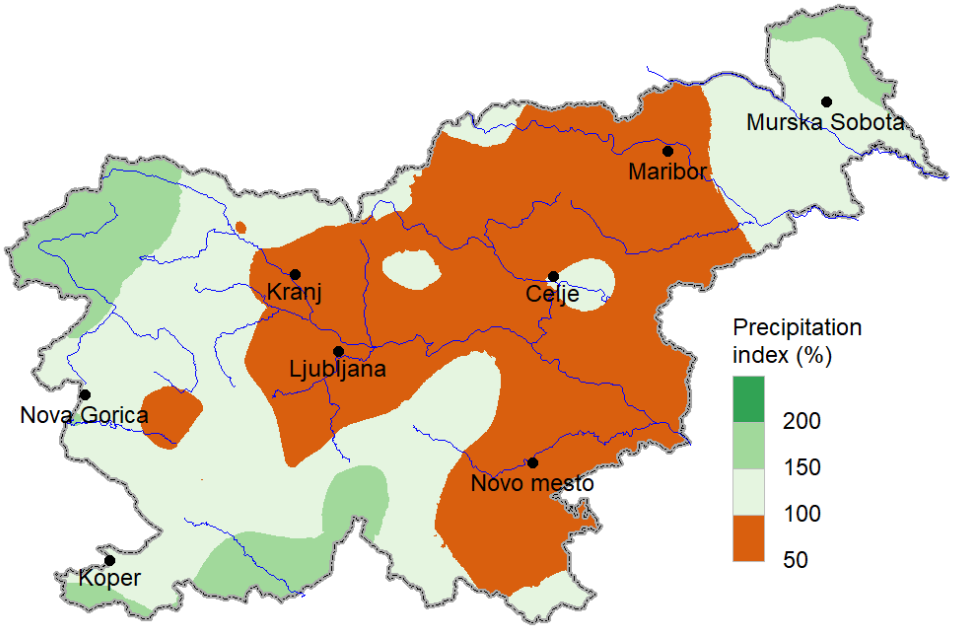

Figure 14. Precipitation index in Slovenia in August 2020, relative to the 1981–2010 average. Data are from 151 meteorological stations.

The summary for summer 2020 and monthly (June, July and August) temperature and precipitation conditions can be found in the Table 1.

Table 1. The summary for summer 2020 temperature and precipitation in Slovenia

SLOVENIA	Temperature anomaly, relative to the period 1981–2010	Average temperature anomaly	Precipitation index, relative to the period 1981–2010	Average precipitation index
June 2020	–0.3 to 1.3 °C	0.5 °C	48 to 292 %	119 %
July 2020	–0.2 to 1.4 °C	0.4 °C	58 to 235 %	130 %
August 2020	1.2 to 2.4 °C	1.8 °C	46 to 230 %	109 %
Summer 2020	**0.4 to 1.5 °C**	**0.9 °C**	**77 to 184 %**	**119 %**

High Impact Events

Highlights for the summer 2020 in Slovenia:

- Temperature above average, not very hot, small number f heat waves,
- Precipitation above average, except in south-east.

Most noticeable high impact events:

- Intense high precipitation supercell storm in Domžale (10 km north-east from Ljubljana) and surroundings on 29 July. Extreme rainfall in places (> 50 mm/hour), giant hail (hailstones larger than 5 cm in diameter, some pieces 10 cm or even more),
- Fast moving (25 m/s) supercell storm caused damage in a long stretch in eastern Slovenia (area from Radeče to Ormož, around 46.25 °N, 15.63° E) on 30 August. Medium to large size hail and severe wind gusts (Lisca officially 25.6 m/s, Rogaška Slatina 21,1 m/s; locally more than 28 m/s),
- Brief, but intense hailstorm (5–10 minutes at places) in Kras (Tomaj and surroundings, about 45.76° N, 13.86° E) on 30 August.

Verification of the SEECOF-23 Climate Outlook in Slovenia for summer season 2020

In the table 2 a verification summary of the SEECOF-23 climate outlook for the summer season 2020 (DJF) can be found. The climatological reference period is 1981–2010.

Table 2. SEECOF-23 climate outlook verification summary for Slovenia for summer 2020

Country	Seasonal temperature (JJA)		Seasonal precipitation (JJA)	
	Observed	SEECOF-23 climate outlook for temperature	Observed	SEECOF-23 climate outlook for precipitation
SLOVENIA	warmer than normal	warmer than normal	wetter than normal, except in the central, east and parts of north-east where normal, and south-east where drier than normal	drier than normal

Users' Perception of the SEECOF-23 Outlook

Meteorological Service at the Slovenian Environment Agency at this moment doesn't provide seasonal outlook for the country.