

Annex

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Assessment of the SEECOF-21 Climate Outlook for Slovenia for the summer season 2019

SEECOF-21 Climate Outlook for Slovenia for the summer season 2019

The consensus statement of SEECOF-21 for the 2019 summer season emphasized the weak El Niño conditions during the June–August 2019 season, with sea surface temperatures in the Niño 3.4 and Niño 3 regions consistently predicted to be approximately 0.7 to 0.9 °C above average by majority of dynamical models. Nevertheless, the spread between the models were rather high, with considerable number of models overpassing 1 °C anomaly. The ENSO situation was recommend to be monitored in the months to come.

No extra-tropical connections were visible, and consequently the signal seemed to be trapped in low latitudes. Differences between models were noticeable for the North Atlantic and Europe circulation, however a blocking pattern and relative low geopotential over Central Atlantic were foreseen by most of them.

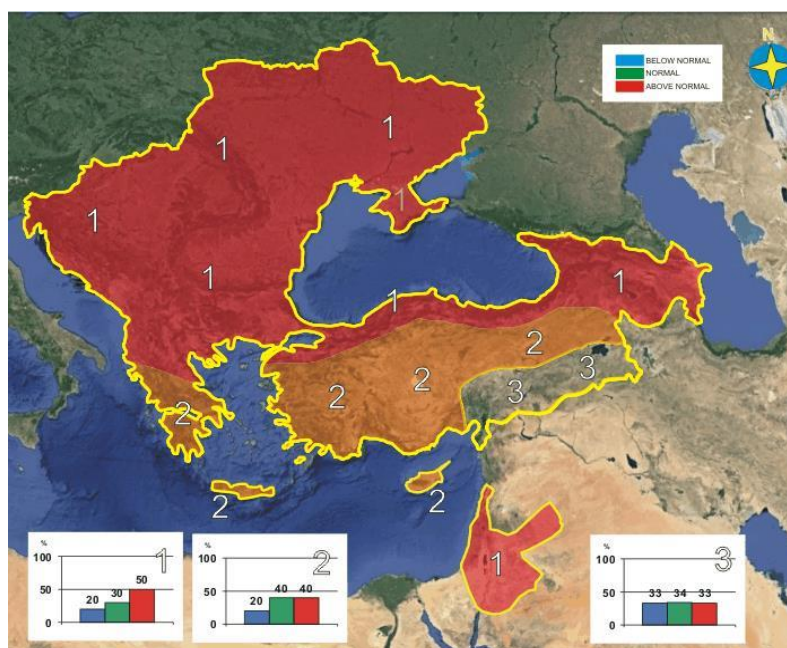


Figure 1. Graphical presentation of the summer 2019 temperature outlook

The consensus was that the probability for the above-average summer temperature was decreasing across the SEECOF region spreading from northern–north-eastern toward south-eastern parts. The most of the SEECOF region was likely to experience above-average summer temperature (Figure 1, zone 1), while central and southern Greece, Ionian Sea, Aegean Sea, Eastern Mediterranean, as well as western, southern and central parts of Turkey were likely to have near- or above normal conditions. On the other hand, in south-eastern part of Turkey (Figure 1, zone 3) there were approximately equal probabilities for below-, near- or above normal-averages of the summer temperature. The generalized relatively high warm signal was probably partly due to the background climatic warming trend. For Slovenia the probabilistic forecast for the tercile categories of anomalies for mean temperature, relative to the period 1981–2010, was 20 % for below-, 30 % for near- and 50 % for above-average conditions.

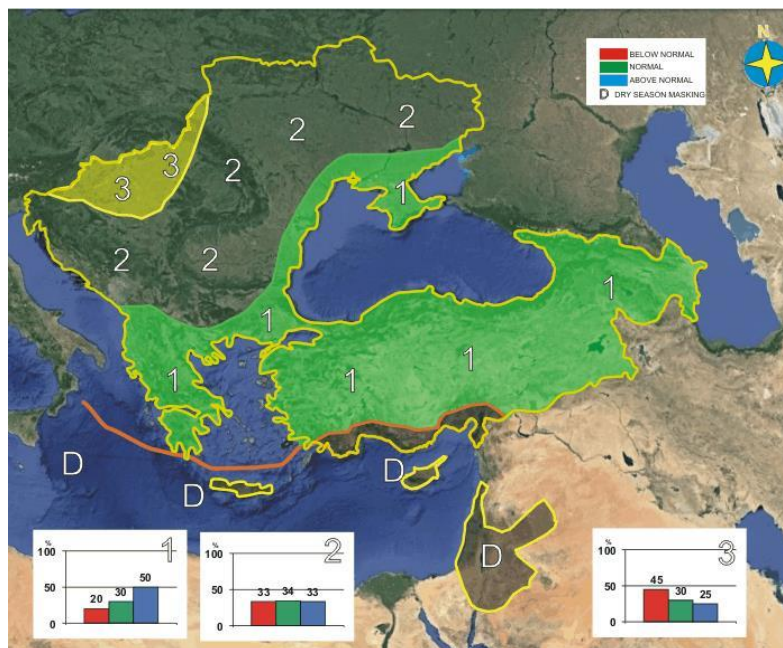


Figure 2. Graphical presentation of the summer 2019 precipitation outlook

The consensus forecast for precipitation was that the coasts of the Aegean and Black Sea, the southern Balkans, south Caucasus region and most of Turkey would receive above normal summer precipitations (Figure 2, zone 1). On the other hand, Pannonia Plain and the north-western slopes of the Carpathian region (Figure 2, zone 3) would likely to experience a precipitation deficit. In most of the SEECOF region (Figure 2, zone 2), there were approximately equal probabilities for below-, near- or above normal-averages. As always, it was noted that certain parts of the countries, particularly mountain regions may observe near- or above- normal summer precipitation due to the episodes of enhanced convection accompanied by heavy precipitation. Due to dry season masking, it was not possible to forecast summer precipitation totals for the Eastern Mediterranean with belonging coasts and hinterland, Crete, Israel and Jordan. For Slovenia all that means that lower than normal precipitation conditions in north-eastern region were most probable (45 % for below, 30 % for near- and 25 % for above-average conditions) and that there was no signal for the rest of Slovenia (probabilities for below-, near- and above-average conditions were approximately equal).

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.

Analysis of the summer season 2019

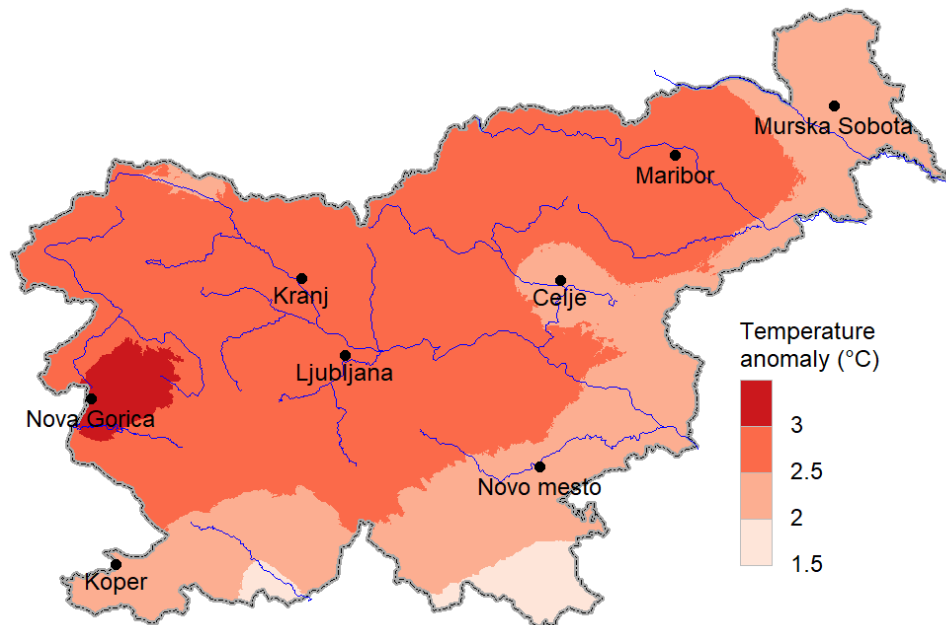


Figure 3. Mean air temperature anomaly in Slovenia in summer 2019, relative to the 1981–2010 average. Data are from 32–34 meteorological stations.

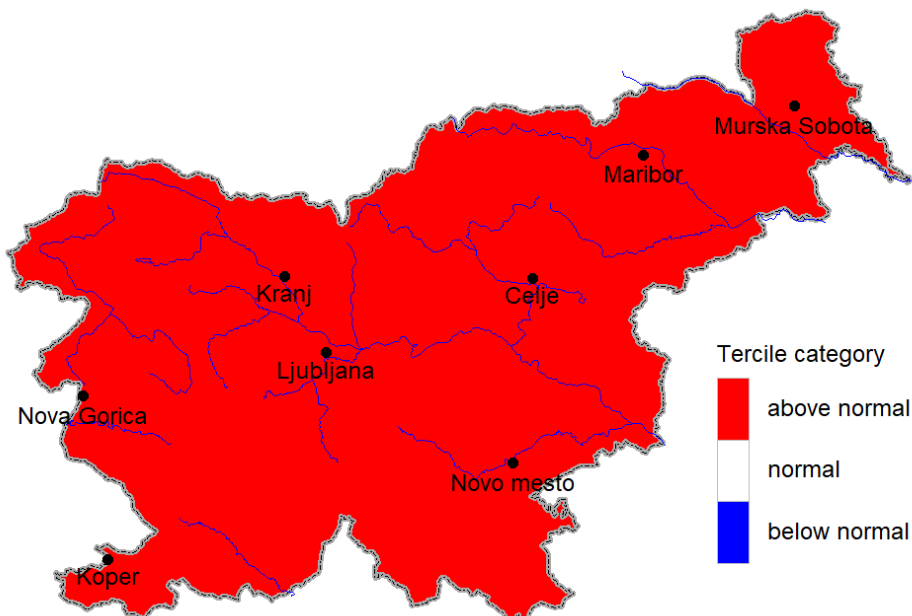


Figure 4. Mean air temperature tercile category of anomaly in Slovenia in summer 2019, relative to the period 1981–2010. Data are from 32 meteorological stations.

Average air temperature in Slovenia in summer 2019 was above the multi-annual average of the 30-year period 1981–2010 in whole country (Figure 3). Summer 2019 was the second

warmest summer since 1961, second only to summer 2003. Corresponding air temperature anomalies for summer 2019 (months June, July and August) were between 1.7 °C to 3.5 °C, average anomaly was 2.6 °C (surface weighted average value). Anomalies were largest in the western and north-western parts of the country (above 2.5 °C) and the smallest in the eastern and southern regions (between 1.5 and 2.5 °C).

According to tercile ranks, thermal conditions in Slovenia in summer 2019 were above normal, relative to the period 1981–2010, in whole country (Figure 4).

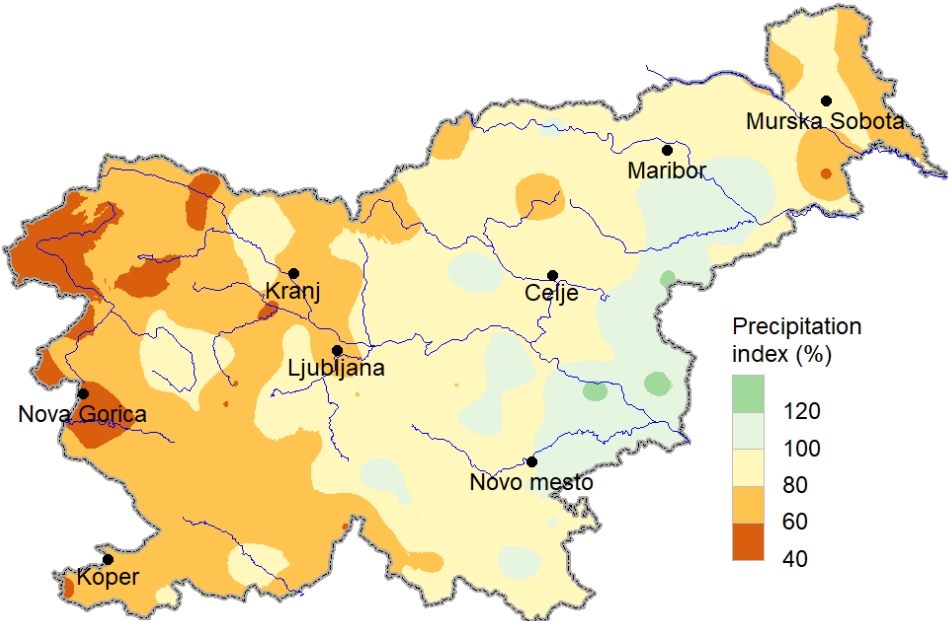


Figure 5. Precipitation index in Slovenia in summer 2019, relative to the 1981–2010 average. Data are from 161–163 meteorological stations.

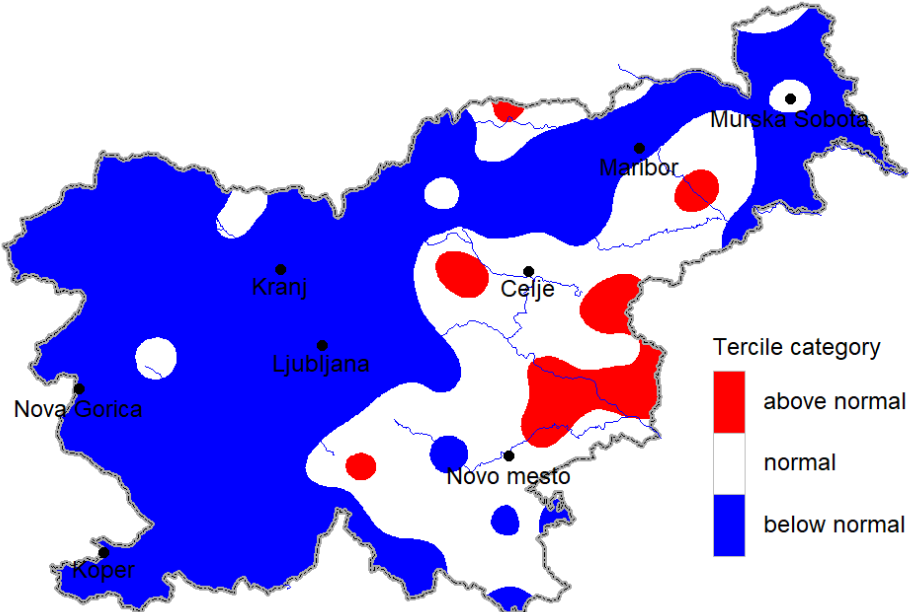


Figure 6. Precipitation tercile category of anomaly in Slovenia in summer 2019, relative to the period 1981–2010. Data are from 160 meteorological stations.

Precipitation index in Slovenia in summer 2019, relative to the period 1981–2010, was below average in most of the country except in some parts of the east Slovenia, where the index was average (Figure 5). The precipitation index was the lowest in parts of west Slovenia, where it was below 60 %. In west and north-east Slovenia its values were below 80 % elsewhere between 80 and 132 %. Average precipitation index was 84 % (surface weighted average value).

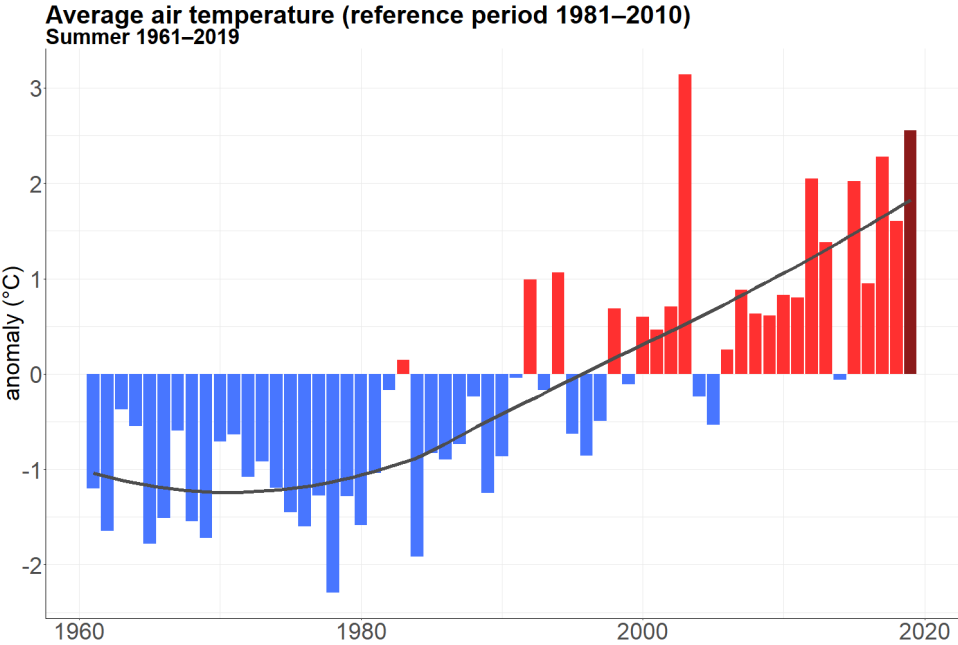


Figure 7. Summer mean air temperature anomaly in Slovenia in the period 1961–2019, relative to the 1981–2010 average

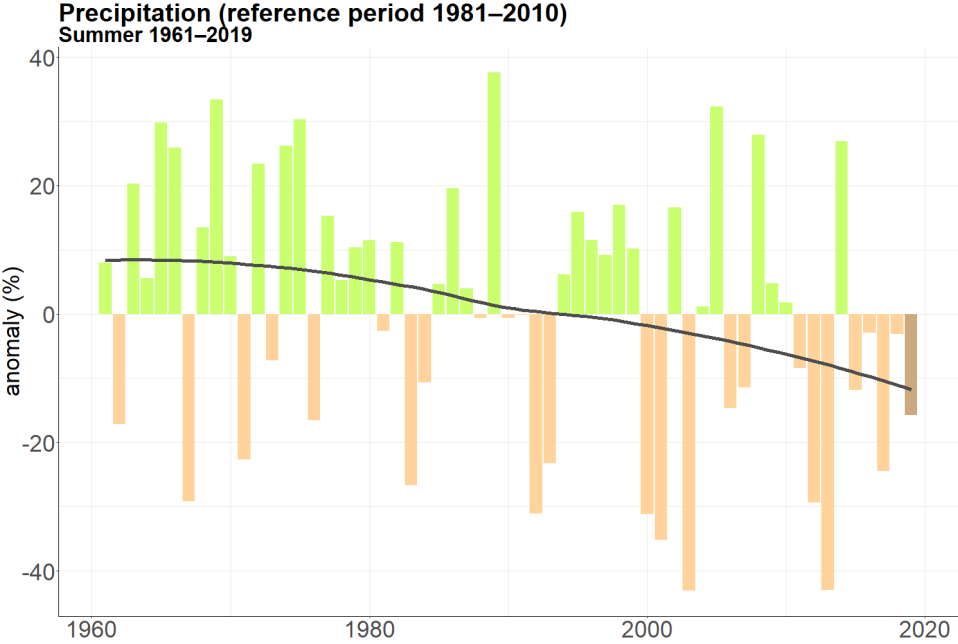


Figure 8. Summer precipitation anomaly in Slovenia in the period 1961–2019, relative to the 1981–2010 average

According to this, the precipitation was within the first tercile (below-normal) west, north-west, north and north-east Slovenia, relative to 1981–2010 period (69 % of the stations), on 23 % of weather stations in east and south-east was precipitation in the second (normal) tercile and on 8 % of remaining weather stations within third (above-normal) tercile (Figure 6).

Summer 2019 was the second warmest since 1961 (and very likely for even larger period), second only to summer 2003 (Figure 7). It was the fifth consecutive summer with below-normal precipitation index (Figure 8).

Average air temperature in *June 2019* was above the multi-annual average of the 30-year period 1981–2010 in whole Slovenia. Air temperature anomalies were between 3.2 °C to 5.4 °C (Figure 9), average anomaly was 4.2 °C (surface weighted average value), which is the second largest since 1961 (and probably even more), second only to June 2003. According to tercile ranks, thermal conditions in Slovenia were above-normal, relative to the period 1981–2010.

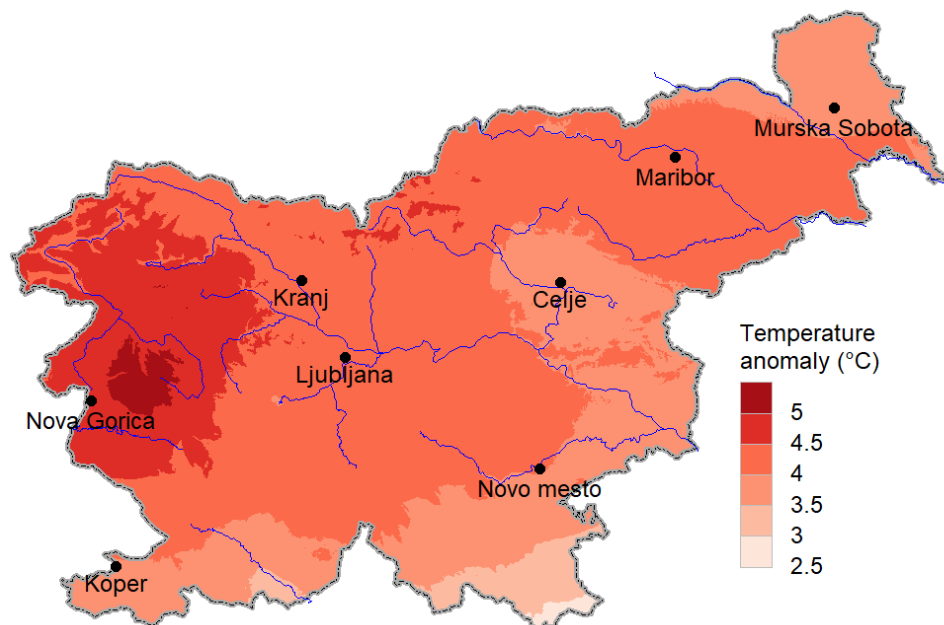


Figure 9. Mean air temperature anomaly in Slovenia in June 2019, relative to the 1981–2010 average. Data are from 32 meteorological stations.

June 2019 was very dry, the precipitation index, relative to the period 1981–2010, was below average in the whole country, except in some points (Figure 10). Precipitation index was within the range from 6 % to 123 %, its average value was 50 % (surface weighted average value). Precipitation index was within the first (below-normal) tercile, compared with the period 1981–2010, almost everywhere (91 % of the stations), except some parts of east and north-east Slovenia, where it was within second (normal) tercile (8 % of the stations).

Average air temperature in *July 2019* was also above the multi-annual average of the 30-year period 1981–2010, but anomalies were lower. Their values were between 0.4 °C and 2.3 °C (Figure 11), their average value was 1.4 °C (surface weighted average value). Average temperature was decreasing from north-west to south-east. According to tercile ranks, thermal

conditions in Slovenia were above-normal, relative to the period 1981–2010, for the whole country except for south-east where the conditions were within second (normal) tercile.

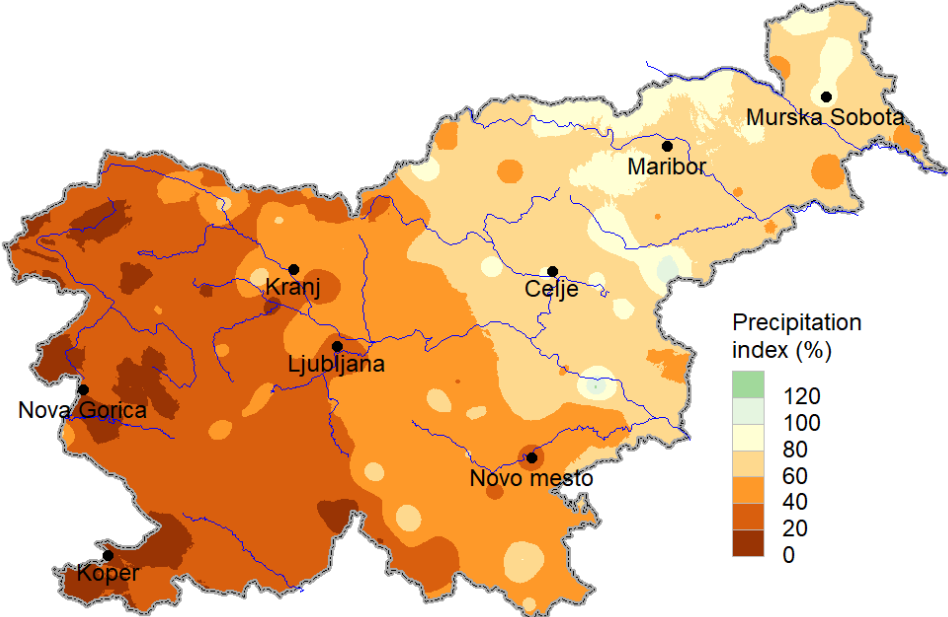


Figure 10. Precipitation index in Slovenia in June 2019, relative to the 1981–2010 average. Data are from 162 meteorological stations.

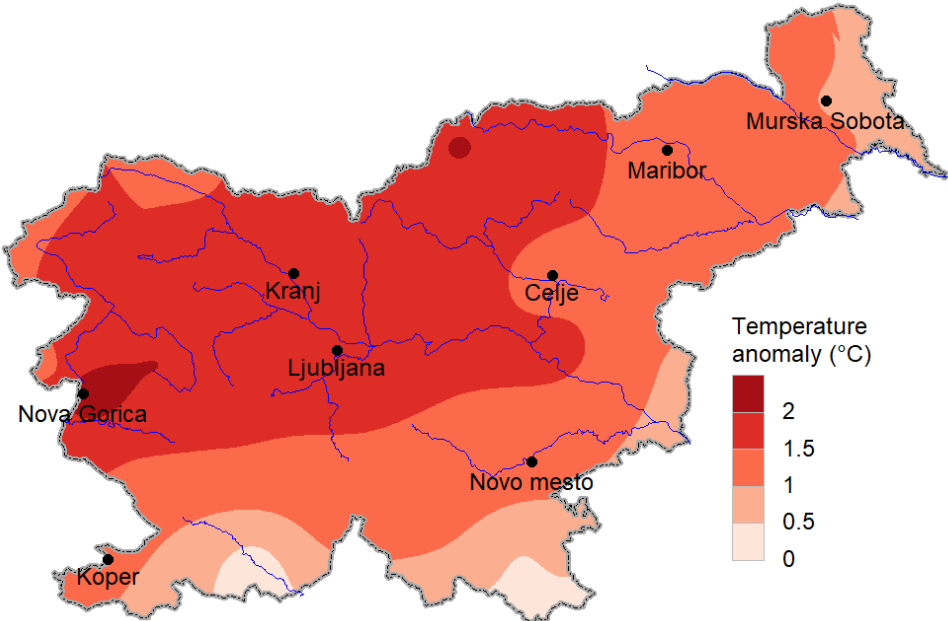


Figure 11. Mean air temperature anomaly in Slovenia in July 2019, relative to the 1981–2010 average. Data are from 33 meteorological stations.

July 2019 wasn't dry, in contrast to June and August. The precipitation index was above 100 %, relative to the period 1981–2010, in most of the country and below 100 % only in some parts of north-west and north-east Slovenia (Figure 12). Its values were within the range from 68 % to 260 %, its average value was 135 % (surface weighted average value). In the west precipitation was within the second (normal) tercile (39 % of the stations), compared with the

period 1981–2010, in the east and at the coast in third (above-normal) tercile (60 % of the stations) and only on two stations within first (below-normal) tercile.

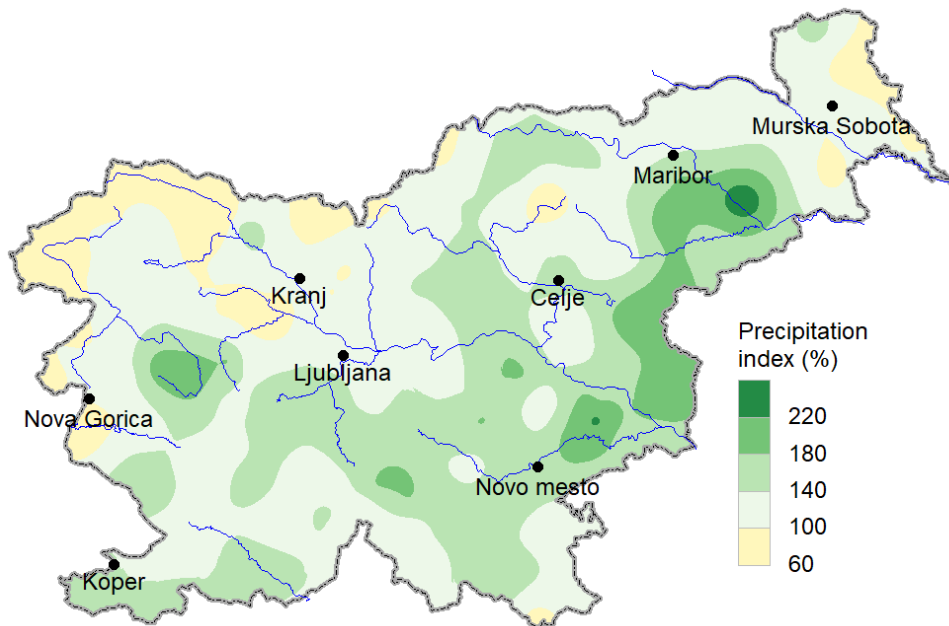


Figure 12. Precipitation index in Slovenia in July 2019, relative to the 1981–2010 average. Data are from 163 meteorological stations.

August 2019 was also very warm. It was approximately among 6 warmest Augusts since 1961. Air temperature anomalies were between 1.5 °C to 3.0 °C (Figure 13), the average anomaly was 2.1 °C (surface weighted average value). According to tercile ranks, thermal conditions in Slovenia were above normal, relative to the period 1981–2010, in the whole country.

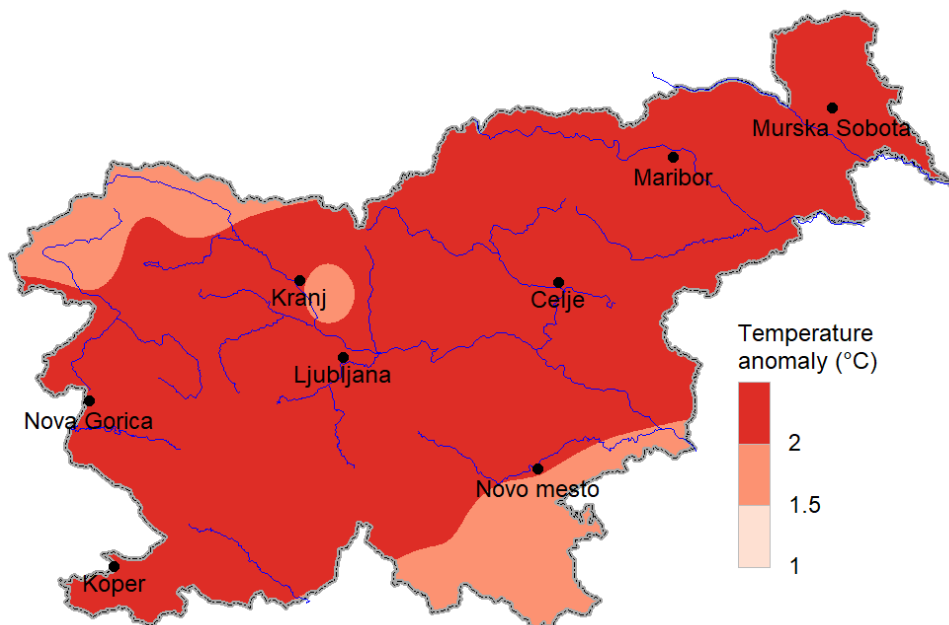


Figure 13. Mean air temperature anomaly in Slovenia in August 2019, relative to the 1981–2010 average. Data are from 34 meteorological stations.

August 2019 was again a dry month, the precipitation index, relative to the period 1981–2010, was below average almost everywhere, except in the south-east of the country (Figure 14). Precipitation index was within the range from 19 % to 148 %, its average value was 77 % (surface weighted average value). In the north-western and north-eastern parts of Slovenia precipitation was within the first (below average) tercile (54 % of the stations), compared with the period 1981–2010, in south and south-east within second (normal) tercile (41 % of the stations) and only on nine stations third (above-normal) tercile.

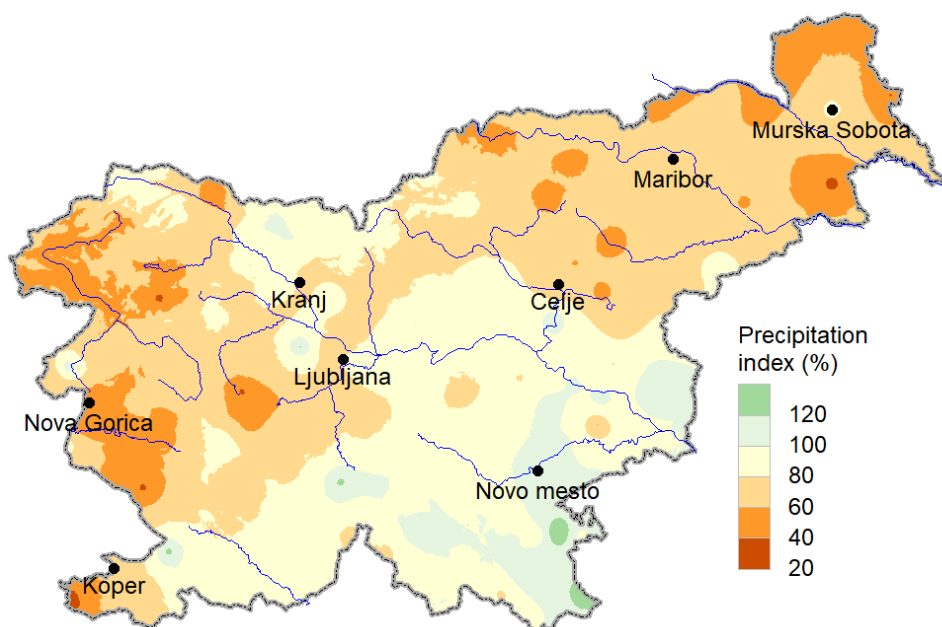


Figure 14. Precipitation index in Slovenia in August 2019, relative to the 1981–2010 average. Data are from 161 meteorological stations.

The summary for summer 2019 and monthly (June, July and August) temperature and precipitation conditions can be found in the Table 1.

Table 1. The summary for summer 2019 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 2019	3.2 to 5.4 °C	4.2 °C	6 to 123 %	50 %
July 2019	0.4 to 2.3 °C	1.4 °C	68 to 260 %	135 %
August 2019	1.5 to 3.0 °C	2.1 °C	19 to 148 %	77 %
Summer 2019	1.7 to 3.5 °C	2.6 °C	43 to 132 %	84 %

High Impact Events

Highlights for summer 2019 in Slovenia:

- Second warmest summer since 1961, second only to summer 2003,

- Second warmest June since 1961, second only to June 2003. Two to three heatwaves. June temperature records for Slovenia: Ljubljana 36.5 °C (former record 35,6 °C in 2003), Rateče (35.5 °C), Kredarica (20,8 °C) and many more.
- August among 6 warmest since 1961.
- Summer was dry, among 15 driest since 1961,
- This summer, there were large number of thunderstorms with hail, heavy precipitation and strong wind gusts. Some featured episodes:
 - 11 June in south-east Slovenia thunderstorms with hail with diameter between 5 and 10 cm (Stari trg ob Kolpi near border with Croatia). Some damage.
 - 19–23 June thunderstorms with heavy precipitation and hail (20 June Trzin near Ljubljana 120 mm precipitation in one hour).
 - 7 July, thunderstorms with strong wind gusts over central and north-east Slovenia. Ptuj region wind gusts over 28 m/s, precipitation 49 mm in 25 minutes. Damage: floods, ruined trees, damage on roofs and crops.
 - 8 July, Supercell storm from south foothills of Julian Alps over Ljubljana region to Kočevje region (south east Slovenia): strong wind gusts, heavy precipitation and hail. Some damage.

Verification of the SEECOF-21 Climate Outlook in Slovenia for summer season 2019

In the table 2 a verification summary of the SEECOF-21 climate outlook for the summer season 2019 (DJF) can be found. The climatological reference period is 1981–2010.

Table 2. SEECOF-21 climate outlook verification summary for Slovenia for summer 2019

Country	Seasonal temperature (DJF)		Seasonal precipitation (DJF)	
	Observed	SEECOF-21 climate outlook for temperature	Observed	SEECOF-21 climate outlook for precipitation
SLOVENIA	warmer than normal	warmer than normal	drier than normal in the west and north-east, normal to wetter than normal in the south-east	drier than normal in the north-east, no clear signal elsewhere

Users' Perception of the SEECOF-21 Outlook

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