Annex

Country: Slovenia

Institute: Slovenian Environment Agency

Name: Renato Bertalanič

E-mail: renato.bertalanic@gov.si

Assessment of the SEECOF-32 Climate Outlook for Slovenia for the winter season 2024/25

SEECOF-32 Climate Outlook for Slovenia for the winter season 2024/25

The consensus statement of SEECOF-32 climate outlook for the winter season of 2024/25 emphasized that observed sea surface temperatures and forecast for the coming three winter months indicated dominant La Niña conditions, a negative to positive Indian Ocean Dipole, and positive anomalies over the tropical and most of northern Atlantic Ocean, but with lower anomalies comparing to winter before. In the atmosphere, models were showing different cyclonic anomalies over Europe, and anticyclonic anomalies over the Middle East. Diagnostics of upper levels indicated a positive NAO phase and a moderate positive EA pattern unlike winter before which had a strongly positive EA.

The consensus was, that in the entire SEECOF region winter temperatures were likely to be above-normal, with the probability increasing from the north (Zone 1 in Figure 1) towards the south of the region (Zone 2 in Figure 1). For Slovenia, the probabilities for below-, near- and above-normal temperature were estimated to be 20, 30 and 50 %, respectively.

Uncertainties in regional predictions are higher for precipitation than for temperature. Southern and eastern Turkey, Cyprus and Middle East were likely to experience below-normal conditions in terms of winter precipitation sums (Zone 2 in Figure 2). However, in the most of the SEECOF region, there is an equal probability for winter precipitation (Zone 1 in Figure 2). It was noteworthy that certain parts of the countries, particularly mountainous regions, might observe near- or above-normal winter precipitation totals due to the episodes of enhanced convection accompanied by heavy precipitation. For Slovenia that meant no clear signal or probabilities 33 % for each tercile category.

Figures 1 and 2 show the probabilistic consensus forecast for tercile categories of anomalies of seasonal temperature and precipitation, relative to the period 1991–2020.

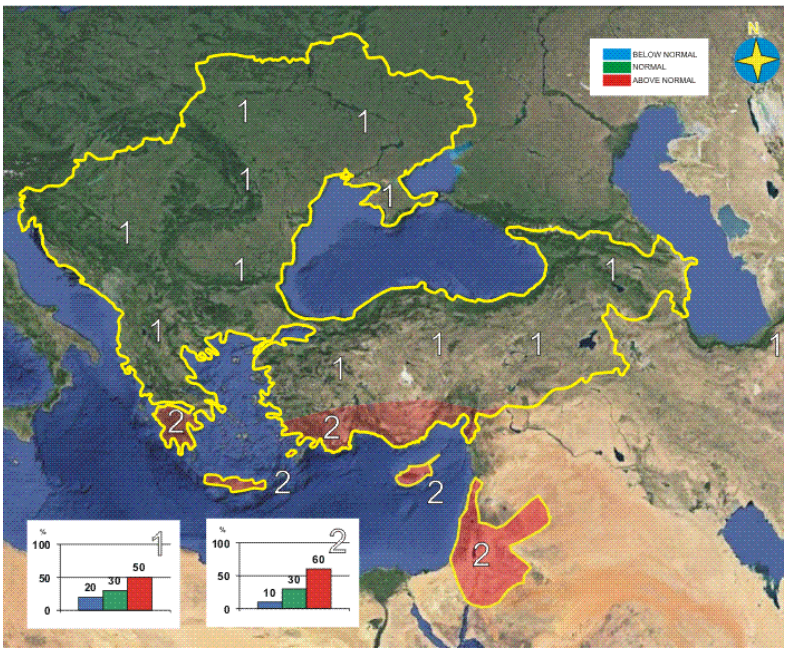

Figure 1. Graphical presentation of the winter 2024/25 temperature outlook

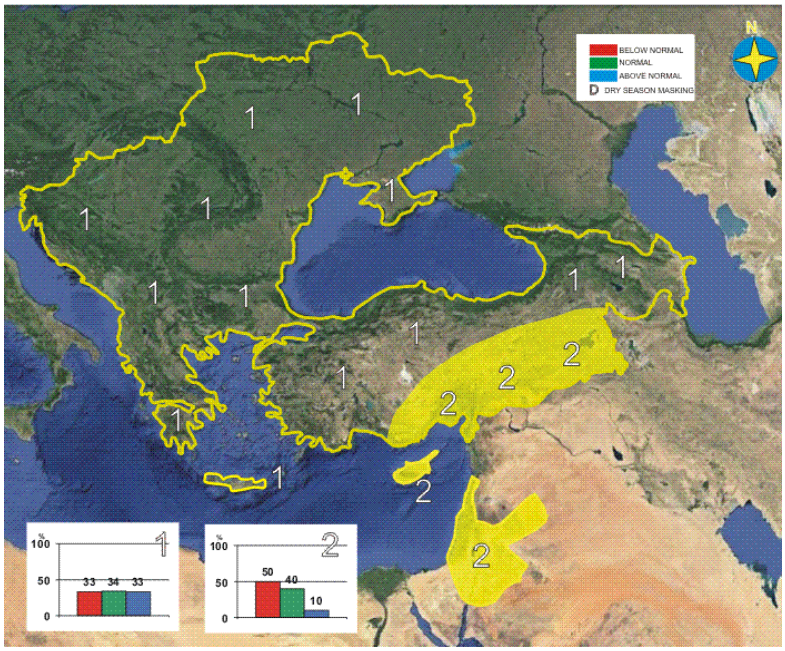

Figure 2. Graphical presentation of the winter 2024/25 precipitation outlook

Analysis of the winter season 2024/25

The average air temperature in Slovenia during winter 2024/25 was above the 1991–2020 average across the entire country (Figure 3). The temperature anomalies for winter 2024/25 (December, January, and February) ranged from 0.7 °C to 2.3 °C, with a national average anomaly of 1.4 °C (surface-weighted average). The lowest temperature deviation from the long-term average was observed in higher altitudes, northeastern Slovenia, and parts of southern Slovenia (between 0.7 °C and 1.4 °C). Otherwise, the deviation mostly ranged between 1.4 °C and 2.3 °C. Winter 2024/25 has been the eleventh warmest on record at the national level since 1950.

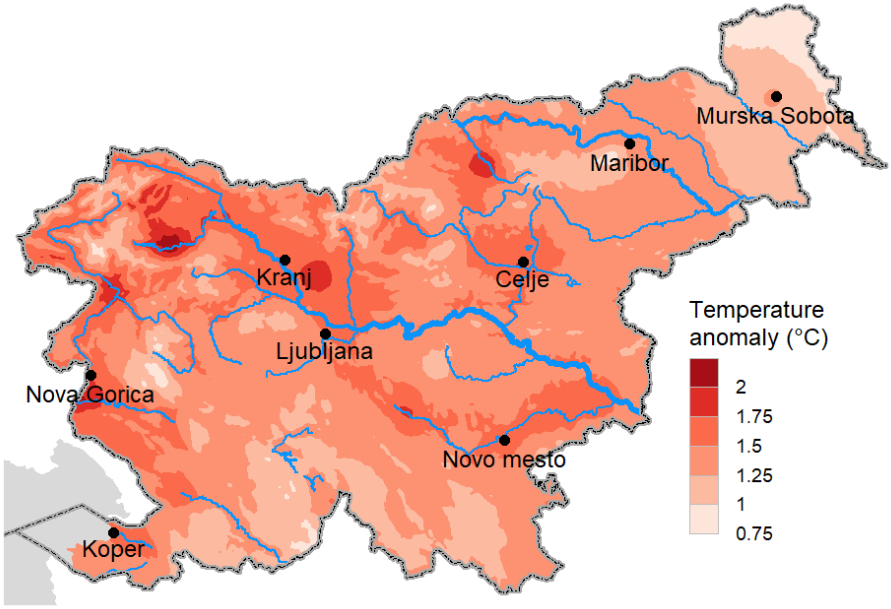

Figure 3. The mean air temperature anomaly in Slovenia during winter 2024/25, relative to the 1991/92–2020/21 average. It was calculated using data from 100 meteorological stations.

According to tercile ranks, thermal conditions in Slovenia in winter 2024/25 were almost everywhere above normal (Figure 4).

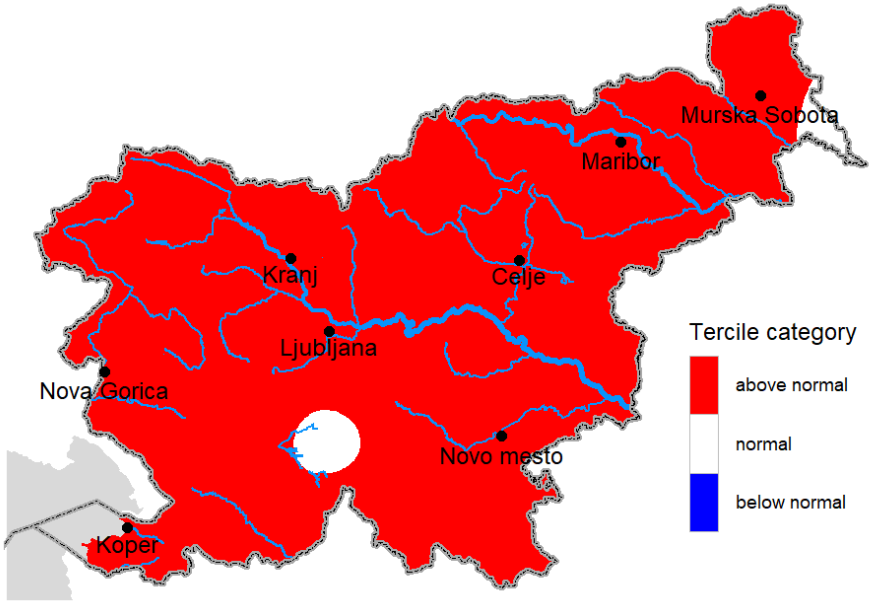

Figure 4. The mean air temperature tercile category of anomaly in Slovenia during winter 2024/25, relative to the 1991/92–2020/21 average. It was calculated using data from 100 meteorological stations.

Averaged across the country, this winter was drier than average compared to the reference period 1991/92–2020/21. The precipitation index was 85 %, placing it among the driest third of winters since the 1950/51 season. Spatially, the largest positive deviation in precipitation from the long-term average was observed on the southern slopes of the Julian Alps, in the Škofja Loka Hills, Trnovo Forest Plateau, and Slovenian Istria (all in west Slovenia), where the index

ranged between 105 and 125% (Figure 5). The lowlands of western Slovenia had average precipitation, while the relative precipitation decreased towards the northeast, reaching as low as 46 % in the far northeastern Slovenia.

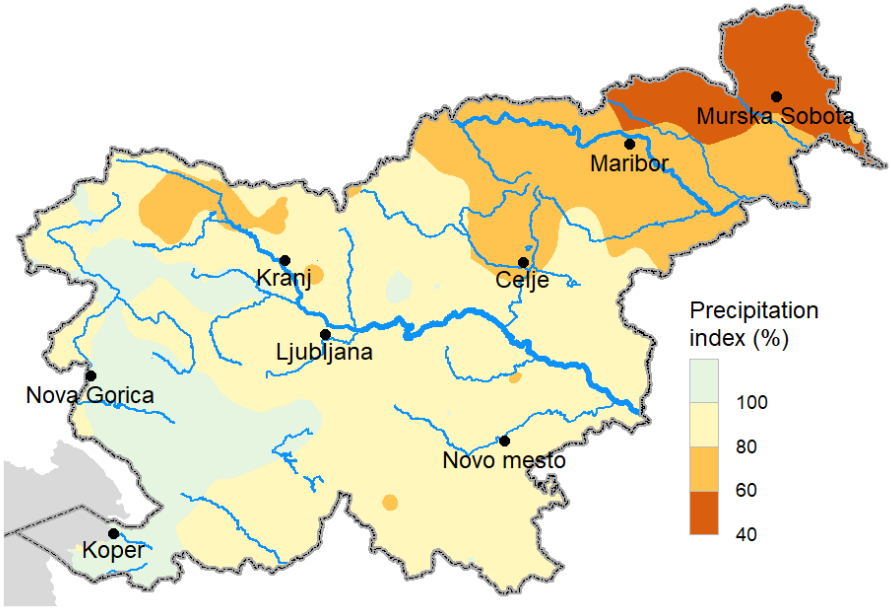

Figure 5. The precipitation index in Slovenia during winter 2024/25, relative to the 1991/92–2020/21 average. It was calculated using data from 227–228 meteorological stations.

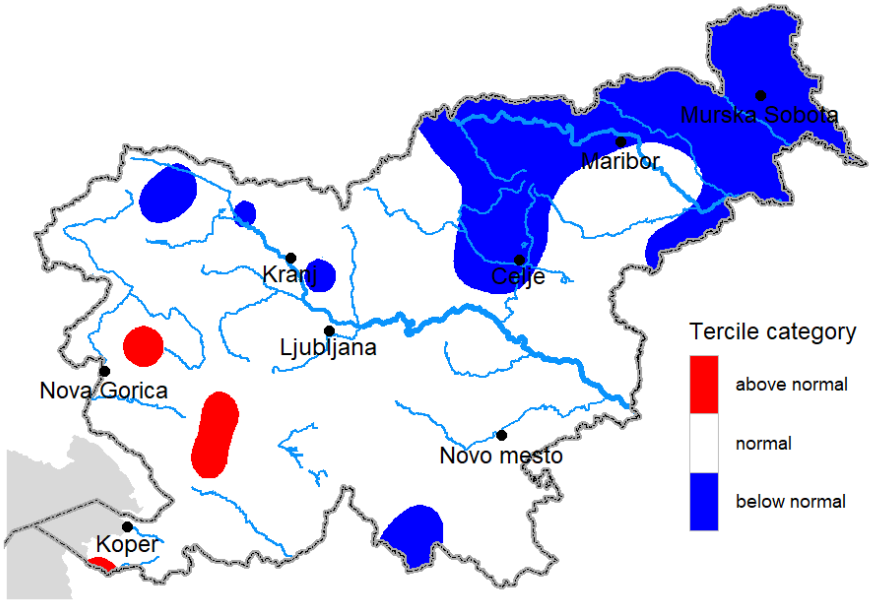

Figure 6. The precipitation tercile category of anomaly in Slovenia in winter 2024/25, relative to the 1991/92–2020/21 average. It was calculated using data from 224 meteorological stations.

According to this data, precipitation in most of western, central, and south-eastern Slovenia was within the second tercile (normal), with only limited areas experiencing precipitation within the first and third terciles (Figure 6). In the northeast, precipitation was within the first tercile (below-normal).

Since the 1970s, winter temperature in Slovenia has been rising and has increased by more than 3 °C since then (Figure 7). Since 2000/01 there have been 14 winters with positive and 11 with negative temperature anomalies, but the negative anomalies have been much smaller than the positive ones. This winter is already the eighth consecutively warmer than average. In the last twelve years, only the winter of 2016/17 was colder than the long-term average. The linear winter temperature trend over the period 1950/51–2024/25, at 0.3 °C per decade, is statistically significant.

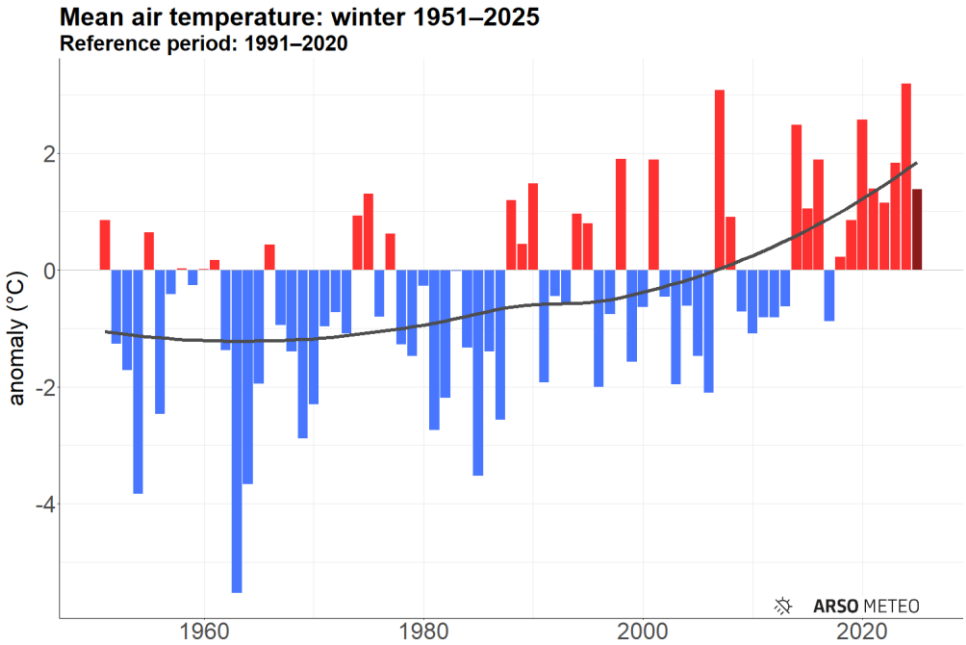

Figure 7. Winter mean air temperature anomaly in Slovenia from 1950/51 to 2024/25, relative to the 1991/92–2020/21 average. Winter 2024/25 is highlighted in dark red.

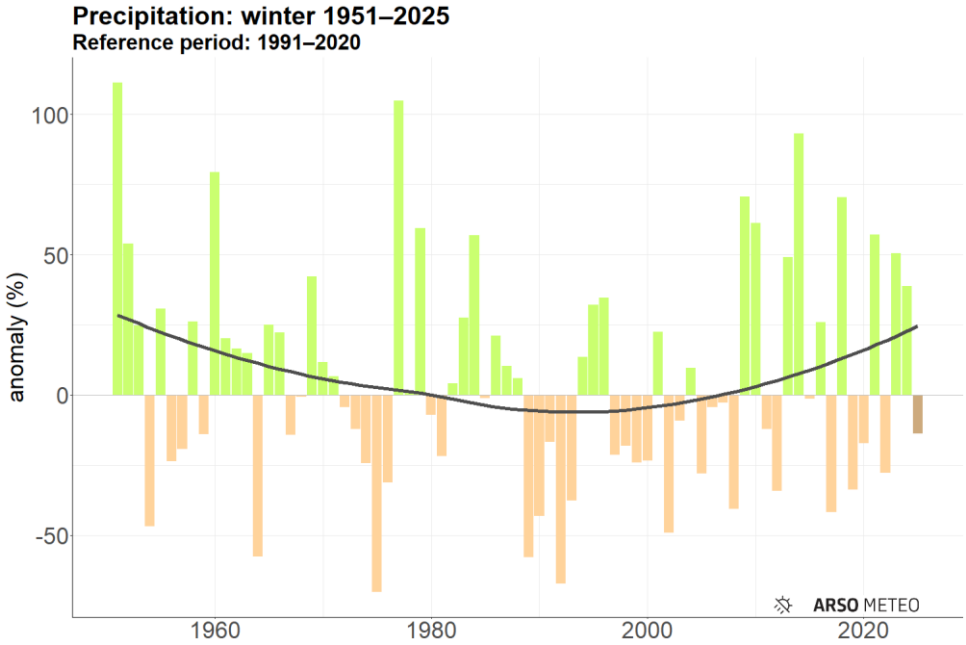

Figure 8. Winter precipitation anomaly in Slovenia from 1950/51 to 2024/25, relative to the 1991/92–2020/21 average. Winter 2024/25 is highlighted in dark green.

Since the winter of 1950/51, the winter precipitation index decreased until the mid-1990s, after which the trend reversed and has been increasing since then. There have been 11 winters with an above-average precipitation index since 2000/01 (Figure 8).

December 2024 was warm, with the average air temperature being 1.0 °C above the 1991–2020 average. Air temperature anomalies ranged from –0.7 °C to 2.0 °C (Figure 9). It was the 20th warmest December since 1950. According to tercile ranks, thermal conditions in Slovenia were above-normal everywhere.

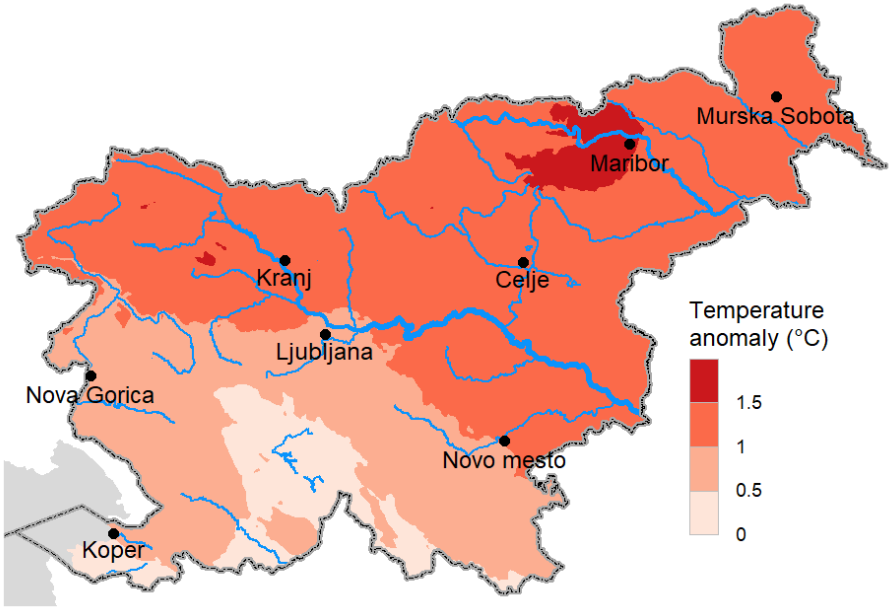

Figure 9. The mean air temperature anomaly in Slovenia during December 2024, relative to the 1991–2020 average. It was calculated using data from 100 meteorological stations.

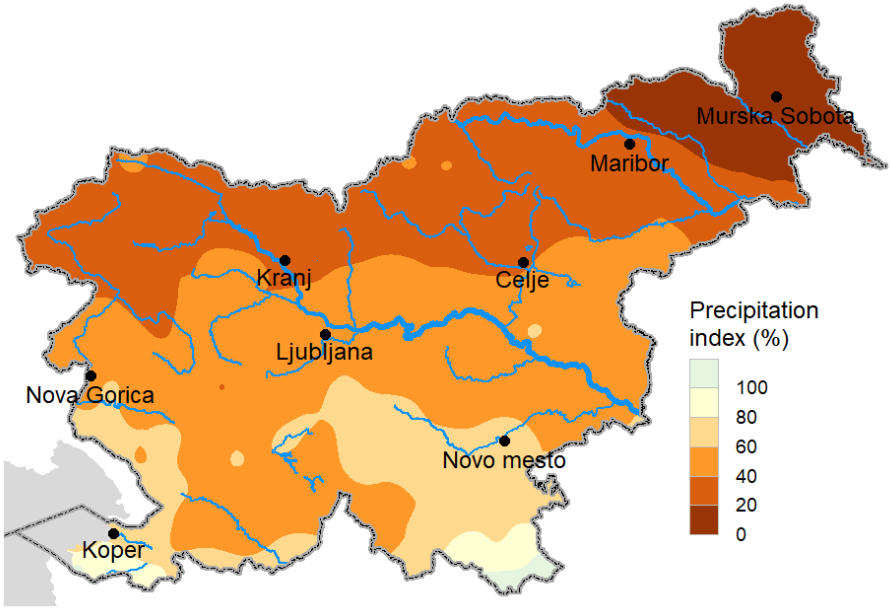

Figure 10. The precipitation index in Slovenia during December 2024, relative to the 1991–2020 average. It was calculated using data from 228 meteorological stations.

December 2025 was dry almost everywhere, with normal precipitation only in a small area in the southeast (Figure 10). The national precipitation index was 44 % (surface-weighted average), ranging from 10 % to 110 %. It ranked among the 13 driest Decembers since 1950. According to tercile ranks, precipitation in Slovenia were below-normal almost everywhere.

January 2025 was very warm, with the national average air temperature 2.8 °C above the 1991–2020 multi-annual average. Anomalies ranged from 1.0 °C to 3.8 °C (Figure 11. It was the fifth warmest January since 1950. According to tercile ranks, thermal conditions in Slovenia were above-normal everywhere.

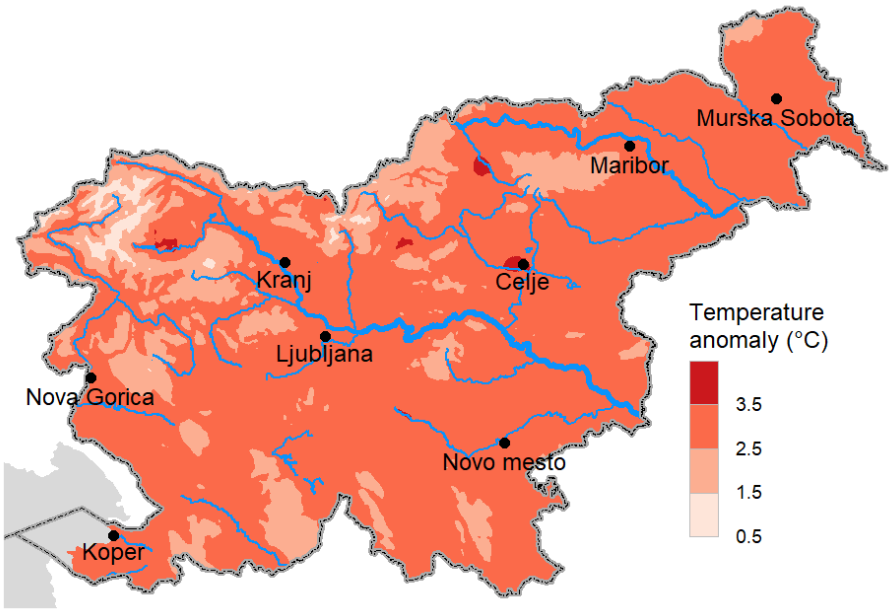

Figure 11. The mean air temperature anomaly in Slovenia during January 2025, relative to the 1991–2020 average. It was calculated using data from 100 meteorological stations.

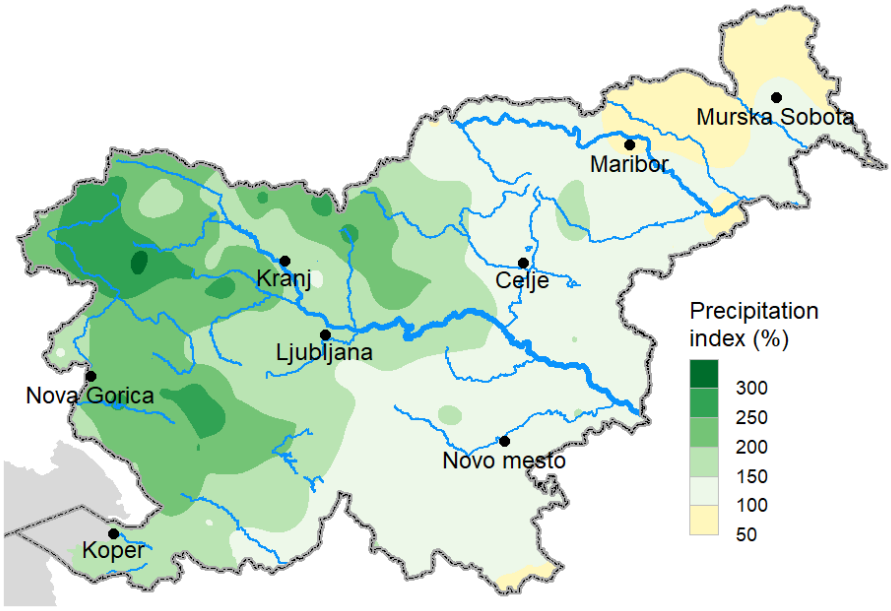

Figure 12. The precipitation index in Slovenia during January 2025, relative to the 1991–2020 average. It was calculated using data from 227 meteorological stations.

January 2025 was wet in western Slovenia, normal in the east, and dry in northeastern Slovenia (Figure 12). The precipitation index ranged from 72 % to 320 %, with a surface-weighted average value of 161 %. It ranked among the 20 wettest Januarys since 1950. According to tercile ranks, precipitation in Slovenia were above-normal in the west and central regions, and normal elsewhere.

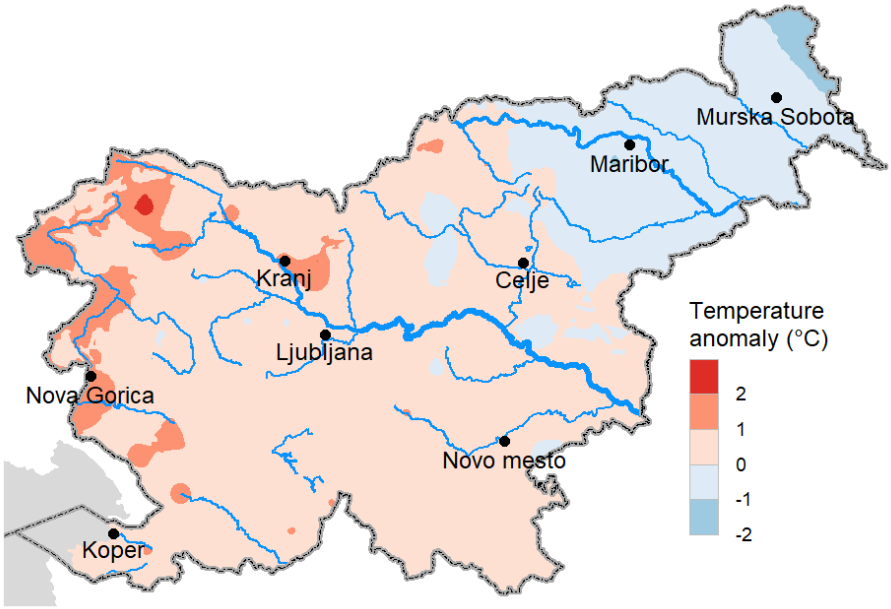

Figure 13. The mean air temperature anomaly in Slovenia during February 2025, relative to the 1991–2020 average. It was calculated using data from 100 meteorological stations.

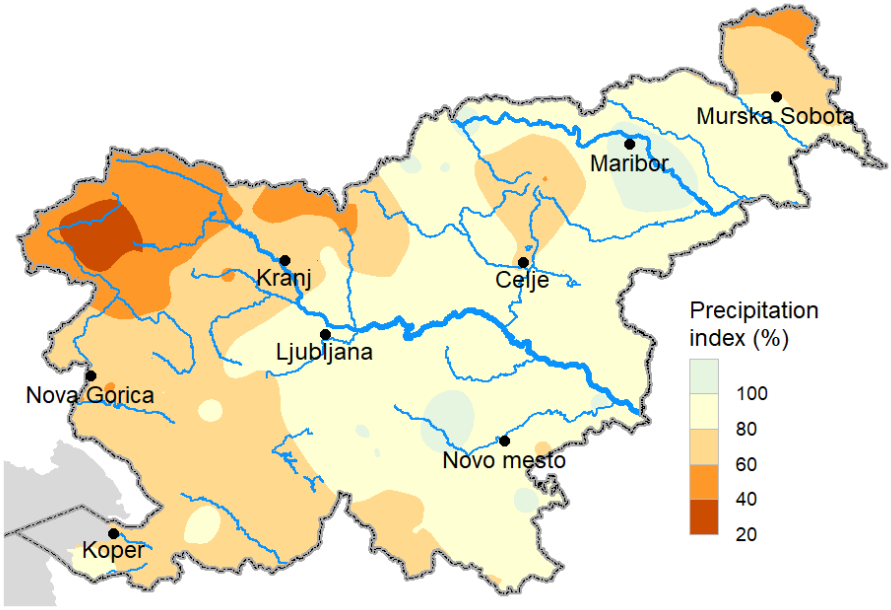

Figure 14. The precipitation index in Slovenia during February 2025, relative to the 1991–2020 average. It was calculated using data from 227 meteorological stations.

Temperatures in *February 2025* were above average in western, central, and eastern Slovenia, and below average in the northeast. Air temperature anomalies ranged from –0.9 °C to 2.7 °C

(Figure 13), with an average anomaly of 0.3 °C (surface-weighted average). According to tercile ranks, thermal conditions in Slovenia were normal (second tercile) across entire country, except for some areas in the west where they were above-normal (third tercile).

February 2025 was also drier than average almost everywhere, with the precipitation index below average in most of the country, except for parts of eastern and northeastern Slovenia (Figure 14). The index ranged from 26 % to 126 %, with a surface-weighted average value of 79 %.

A summary of winter 2025 and the monthly (December, January, and February) temperature and precipitation conditions can be found in Table 1.

Table 1. The summary for winter 2024/25 temperature and precipitation in Slovenia

SLOVENIA	Temperature anomaly, relative to the 1991–2020 period	Average temperature anomaly	Precipitation index, relative to the 1991–2020 period	Average precipitation index
December 2024	–0.7 to 2.0 °C	1.0 °C	10 to 110 %	44 %
January 2025	1.0 to 3.8 °C	2.8 °C	72 to 320 %	161 %
February 2025	–0.9 to 2.7 °C	0.3 °C	26 to 126 %	79 %
Winter 2024/25	**0.7 to 2.3 °C**	**1.4 °C**	**46 to 125 %**	**86 %**

High Impact Events

Nothing noticeable.

Verification of the SEECOF-32 Climate Outlook in Slovenia for the winter season 2024/25

Table 2 provides a verification summary of the SEECOF-32 climate outlook for the winter season 2024/25 (DJF), using the climatological reference period 1991–2020.

Table 2. SEECOF-32 climate outlook verification summary for Slovenia for winter 2024/25

Country	Seasonal temperature (JJA)		Seasonal precipitation (JJA)	
	Observed	SEECOF-32 climate outlook for temperature	Observed	SEECOF-32 climate outlook for precipitation
SLOVENIA	warmer than normal	warmer than normal	normal almost everywhere, drier than normal in northeastern Slovenia	no signal

Users' Perception of the SEECOF-32 Outlook

The meteorological Service at the Slovenian Environment Agency currently doesn't provide a seasonal outlook for the country.