

## **Annex**

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### **Assessment of the SEECOF-33 Climate Outlook for Slovenia – Summer 2025**

#### **SEECOF-33 Climate Outlook for Slovenia – Summer 2025**

The consensus statement from SEECOF-33 regarding the climate outlook for the summer of 2025 highlighted that neutral ENSO and Indian Ocean Dipole conditions were expected to persist over the coming months. Positive temperature anomalies were anticipated in the north-eastern region. Forecasting systems tended to under-represent the Greenland Anticyclone and Atlantic Low regimes, while over-representing the Zonal regime.

The consensus indicated that summer temperatures across the entire SEECOF region were likely to be above normal, with probabilities reaching up to 70 % in Zone 1 (Figure 1). For Slovenia, the estimated probabilities for below-, near-, and above-normal temperatures were 10 %, 20 %, and 70 %, respectively.

Uncertainties in regional forecasts are generally higher for precipitation than for temperature. Most parts of the SEECOF region were likely to experience below-normal summer precipitation totals (Zone 1 in Figure 2), whereas in the southern Balkans, Eastern Mediterranean, Cyprus, and the Middle East, the probability for summer precipitation was evenly distributed across categories (Zone 2 in Figure 2). Notably, certain areas of the region—particularly mountainous zones—could observe near- or above-normal precipitation due to episodes of enhanced convection accompanied by heavy rainfall. For Slovenia, the estimated probabilities for below-, near-, and above-normal precipitation were 50 %, 30 %, and 20 %, respectively.

Figures 1 and 2 present the probabilistic consensus forecast for tercile categories of seasonal temperature and precipitation anomalies, relative to the 1991–2020 reference period. Due to the ongoing climate-warming trend, these anomalies are influenced by the choice of reference period.

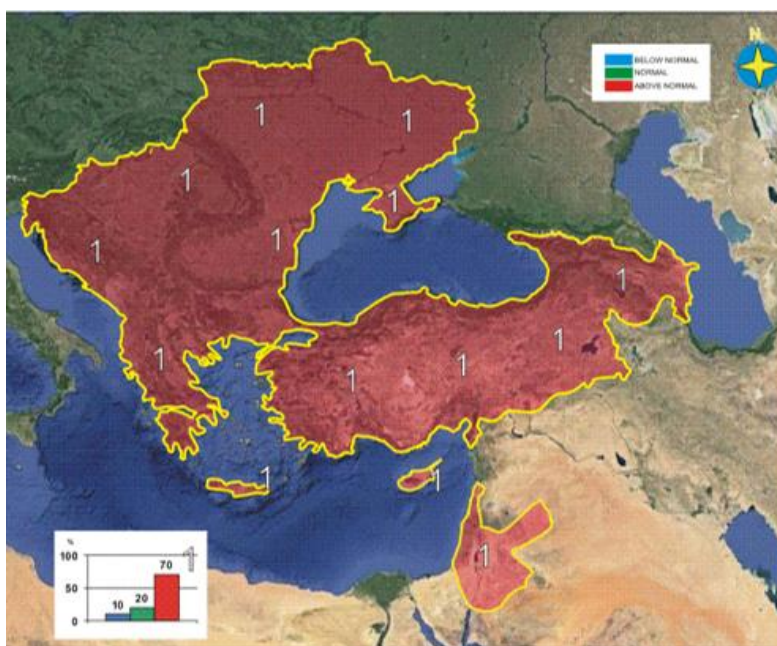


Figure 1. Graphical presentation of the summer 2025 temperature outlook

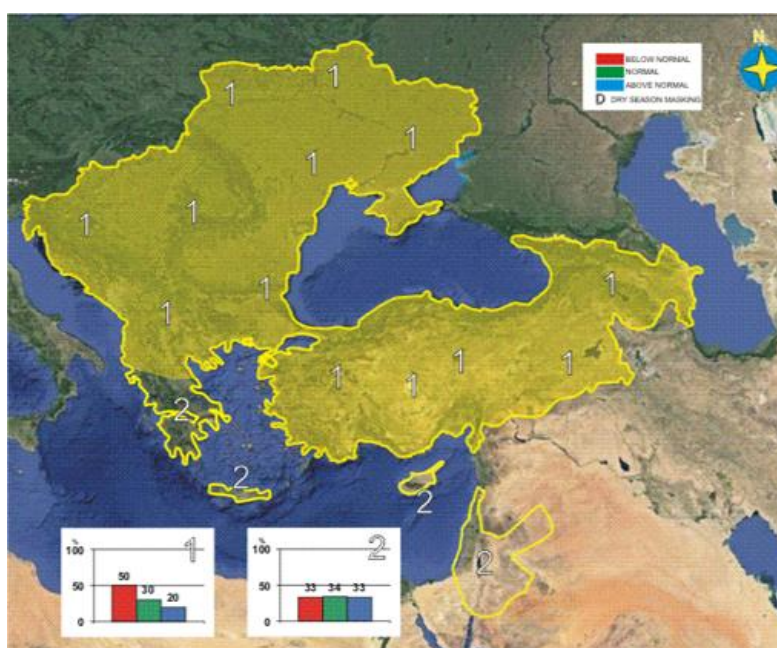


Figure 2. Graphical presentation of the summer 2025 precipitation outlook

## Analysis of the Summer 2025 Season

The average air temperature in Slovenia during summer 2025 was above the 1991–2020 baseline across the entire country (Figure 3). Temperature anomalies for the summer months—June, July, and August—ranged from 1.0 °C to 1.9 °C, with a national surface-weighted average anomaly of 1.5 °C. Most deviations fell between 1.4 °C and 1.8 °C, with slightly cooler conditions observed in parts of western and southern Slovenia, where anomalies ranged from 1.2 °C to 1.4 °C. Summer 2025 ranks as the sixth warmest on record nationally since 1950.

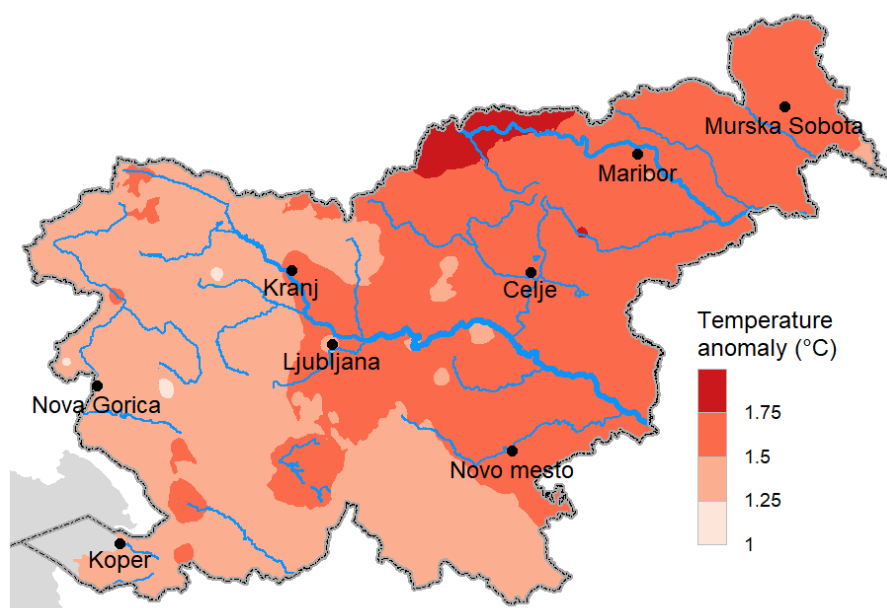


Figure 3. The mean air temperature anomaly in Slovenia during summer 2025, relative to the 1991–2020 average. It was calculated using data from 100 meteorological stations.

According to tercile ranks, thermal conditions across Slovenia during summer 2025 were consistently above normal (Figure 4).

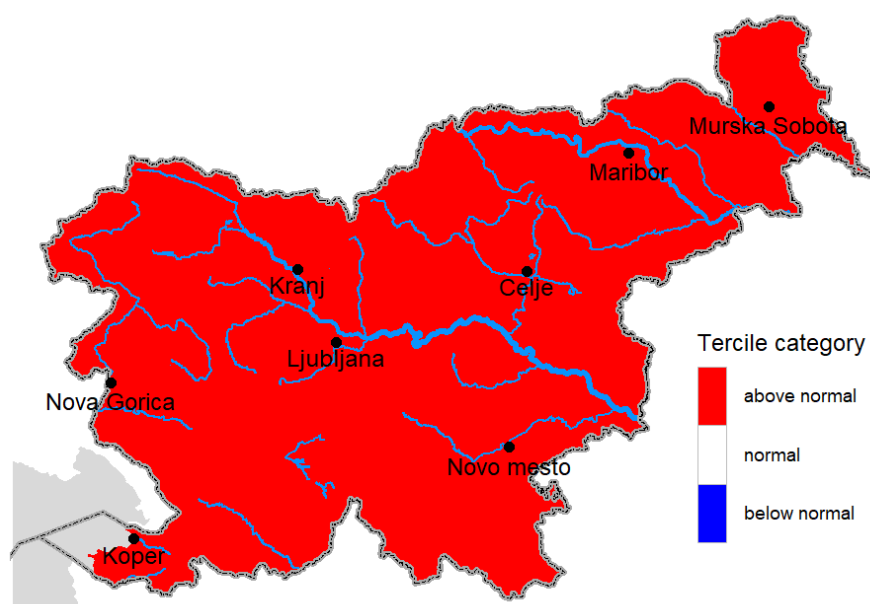


Figure 4. The mean air temperature tercile category of anomaly in Slovenia during summer 2025, relative to the 1991–2020 average. It was calculated using data from 60 meteorological stations.

Summer precipitation is typically highly variable due to its convective nature. In summer 2025, the precipitation index in Slovenia was above average only in parts of the south-west and west, while below-average values were recorded in the north, east, and north-east (Figure 5). The precipitation index ranged from 50 % to 163 %, with a surface-weighted

national average of 85 %. Summer 2025 ranks among the 15 driest summers on record since 1950.

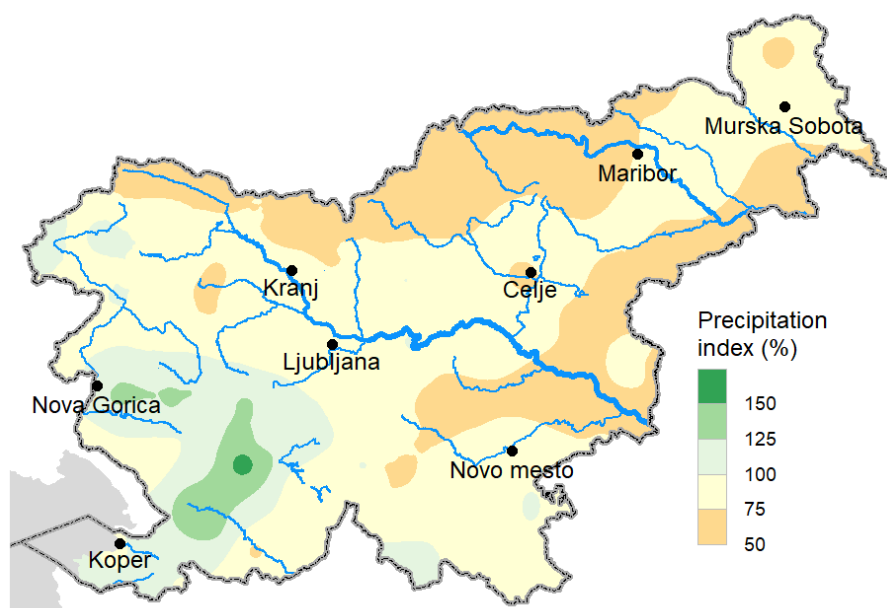


Figure 5. The precipitation index in Slovenia during summer 2025, relative to the 1991–2020 average. It was calculated using data from 224–227 meteorological stations.

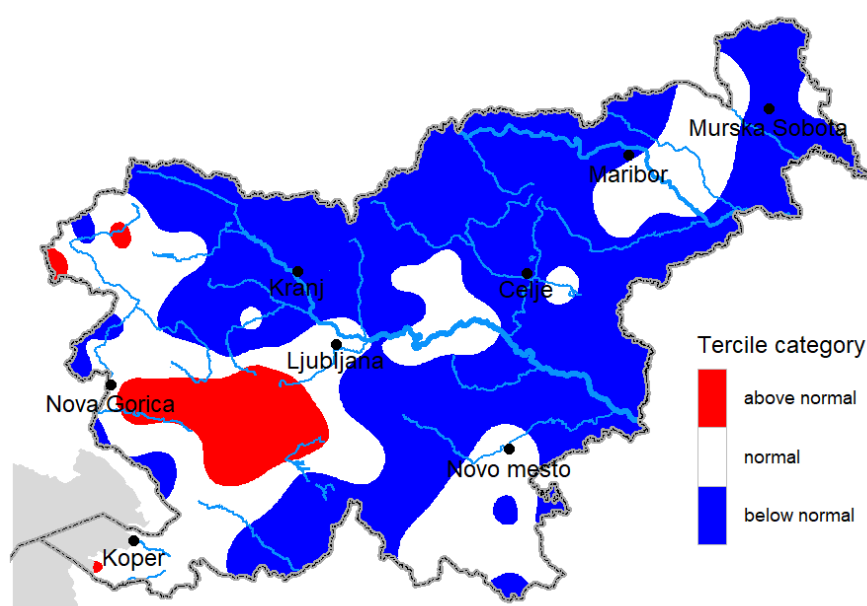


Figure 6. The precipitation tercile category of anomaly in Slovenia in summer 2025, relative to the 1991–2020 average. It was calculated using data from 153 meteorological stations.

According to this data, precipitation in parts of western and north-western Slovenia fell within the third tercile (above normal). In the north, as well as parts of the south, east and north-east, it was within the first tercile (below normal). Elsewhere, precipitation was classified within the second tercile (normal) (Figure 6).

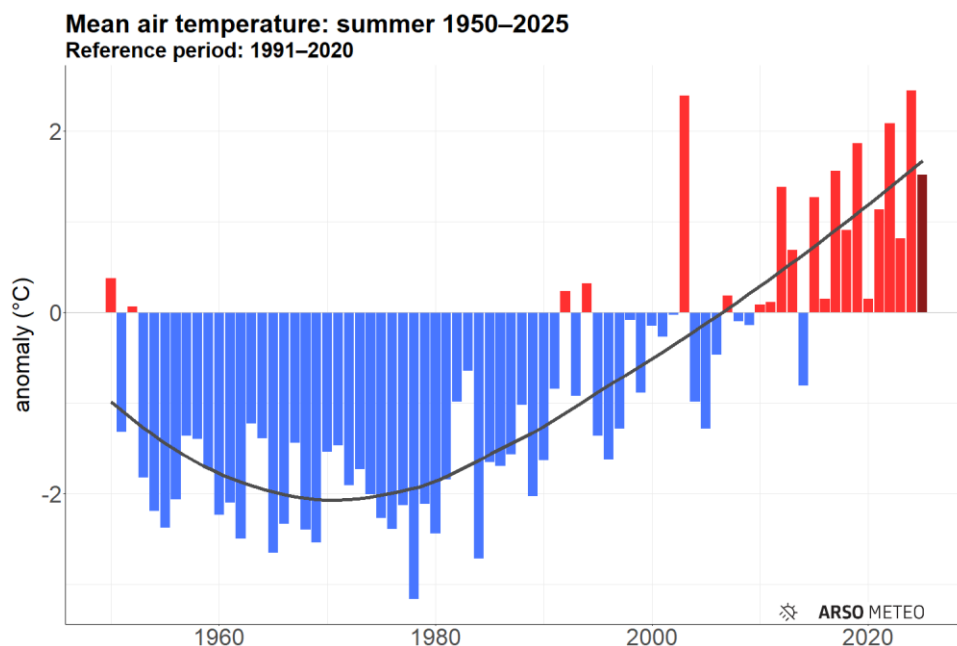


Figure 7. Summer mean air temperature anomaly in Slovenia from 1950 to 2025, relative to the 1991–2020 average. Summer 2025 is highlighted in dark red.

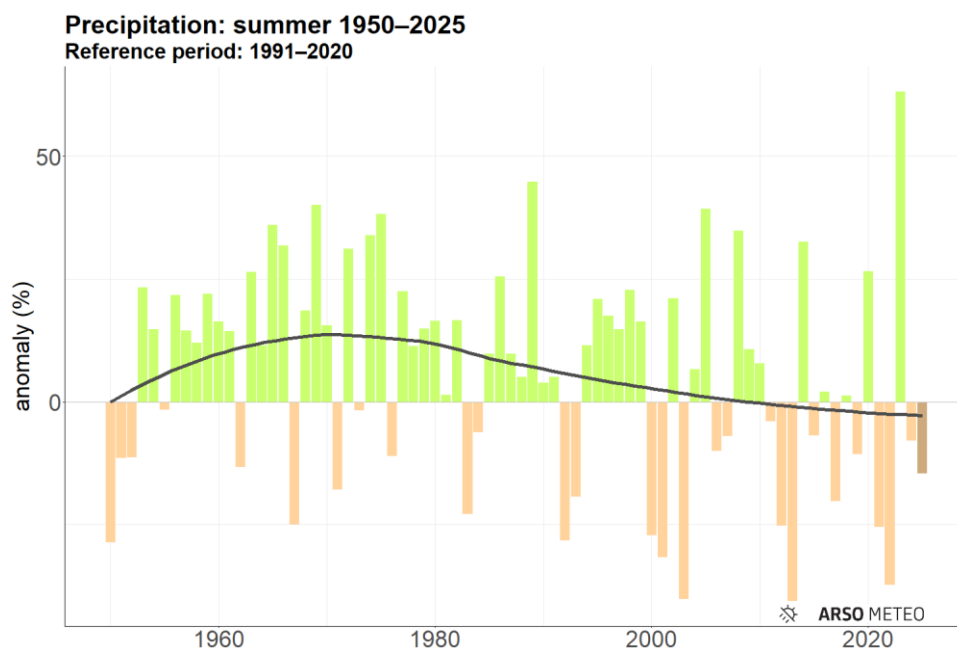


Figure 8. Summer precipitation anomaly in Slovenia from 1950 to 2025, relative to the 1991–2020 average. Summer 2025 is highlighted in dark green.

Since 1950, the average summer temperature in Slovenia initially declined, influenced by the exceptionally warm summers of 1950 and 1952, and continued this downward trend until the 1970s. However, a distinct positive linear trend has been observed since then, with summer temperatures rising by over 3.5 °C. Compared to the most recent 30-year reference period, only four summers prior to the year 2000 were above average. In contrast, the 21<sup>st</sup> century has seen the majority of above-average summers, totalling 17. Summer 2025 marks the 11<sup>th</sup> consecutive above-average summer (Figure 7).

Summer precipitation levels increased until the 1970s but have been declining since. Nevertheless, dry and wet summers continue to alternate. Since 2000, 14 summers have recorded below-average precipitation, while 11 have been above average (Figure 8).

*June 2025* was record-breakingly warm, with the average air temperature  $3.6^{\circ}\text{C}$  above the 1991–2020 baseline and  $0.3^{\circ}\text{C}$  higher than the previously record-breaking June of 2003. Temperature anomalies ranged from  $2.7^{\circ}\text{C}$  to  $4.4^{\circ}\text{C}$  (Figure 9). According to tercile rankings, thermal conditions across Slovenia were above normal throughout the country.

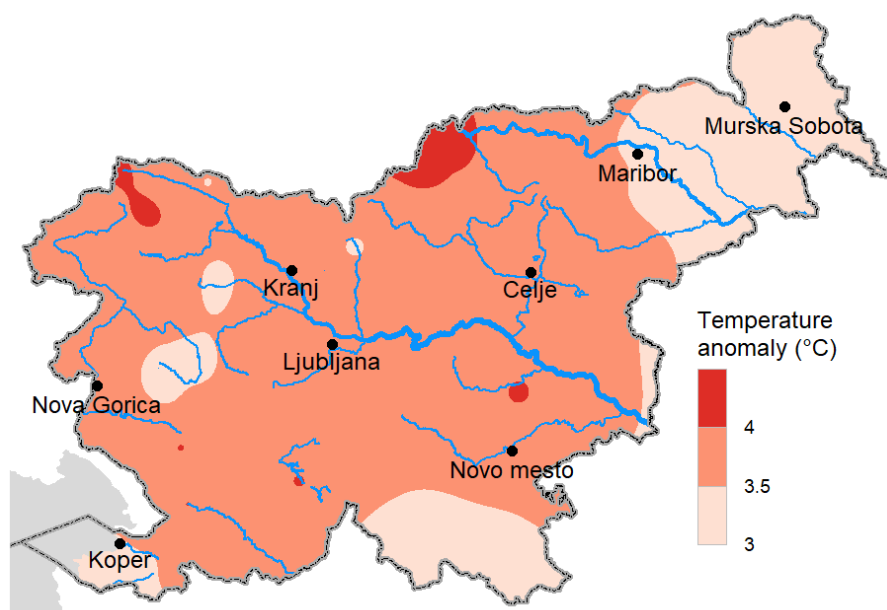


Figure 9. The mean air temperature anomaly in Slovenia during June 2025, relative to the 1991–2020 average. It was calculated using data from 100 meteorological stations.

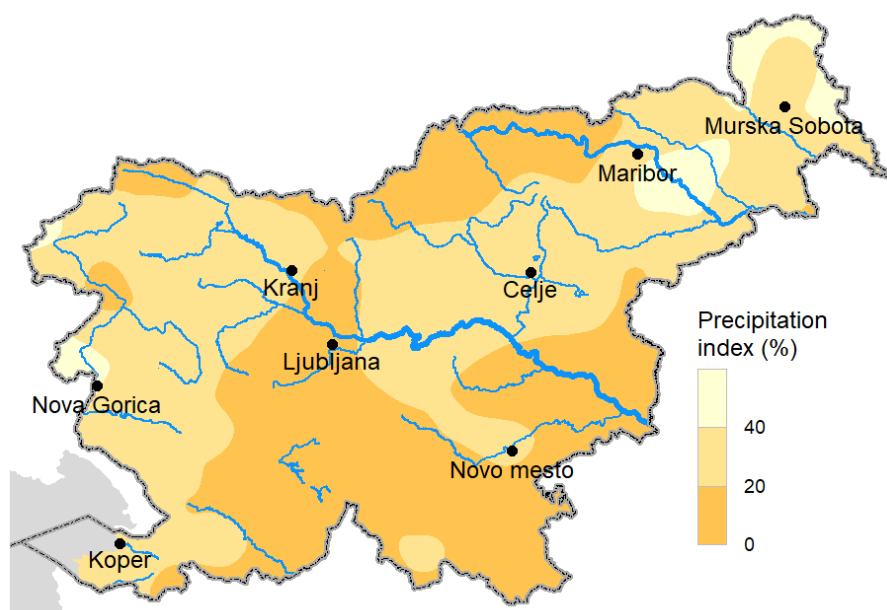


Figure 10. The precipitation index in Slovenia during June 2025, relative to the 1991–2020 average. It was calculated using data from 227 meteorological stations.



*June 2025* was also exceptionally dry, setting a new record since 1950 (Figure 10). The national precipitation index was 23 % (surface-weighted average), with values ranging from 0 % to 61 %.

*July 2025* was of near-average warmth, with the national mean air temperature 0.4 °C above the 1991–2020 multi-annual average. Temperature anomalies ranged from –0.4 °C to 1.1 °C (Figure 11). It was the 20<sup>th</sup> warmest July on record since 1950. According to tercile rankings, thermal conditions in Slovenia were above normal in parts of the south-east and north-east, and normal elsewhere.

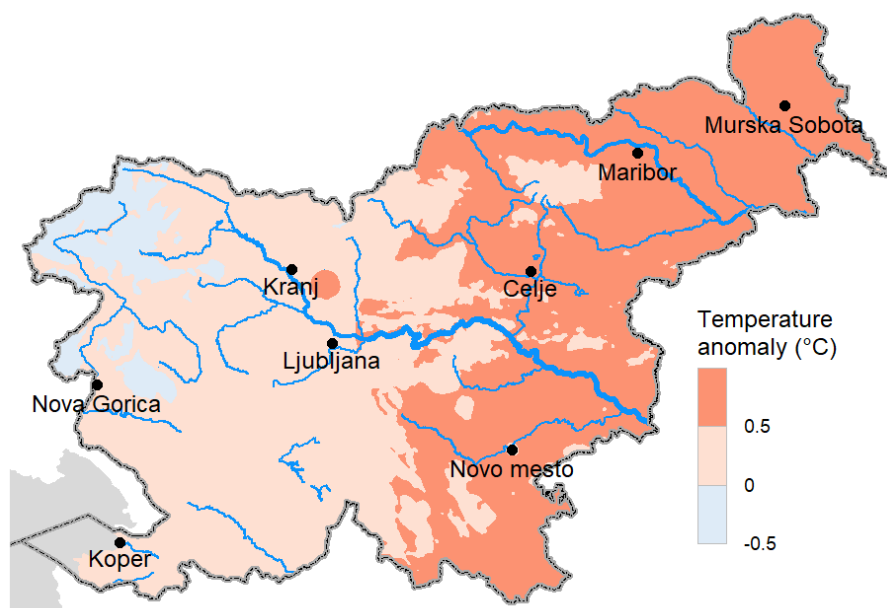


Figure 11. The mean air temperature anomaly in Slovenia during July 2025, relative to the 1991–2020 average. It was calculated using data from 100 meteorological stations.

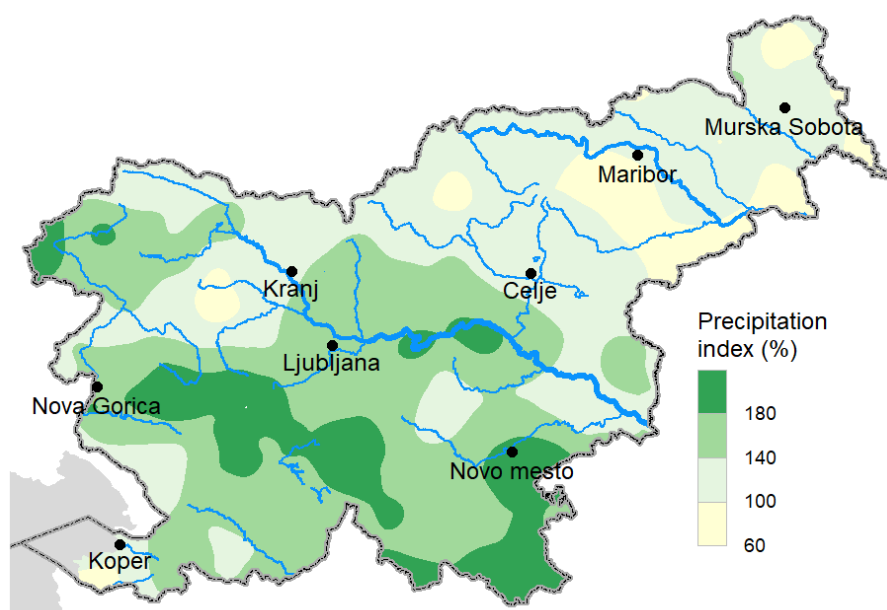


Figure 12. The precipitation index in Slovenia during July 2025, relative to the 1991–2020 average. It was calculated using data from 227 meteorological stations.

In *July 2025*, precipitation levels at the national scale were above the long-term average. The precipitation index ranged from 64 % to 225 %, with a surface-weighted national average of 141 %. The distribution of precipitation across Slovenia was highly variable due to its convective nature. With the exception of a few smaller areas, most regions experienced higher-than-usual rainfall. The highest amounts were recorded in parts of western, south-western, and south-eastern Slovenia, where the precipitation index exceeded 180 % (Figure 12). July 2025 ranked among the 14 wettest Julys since 1950.

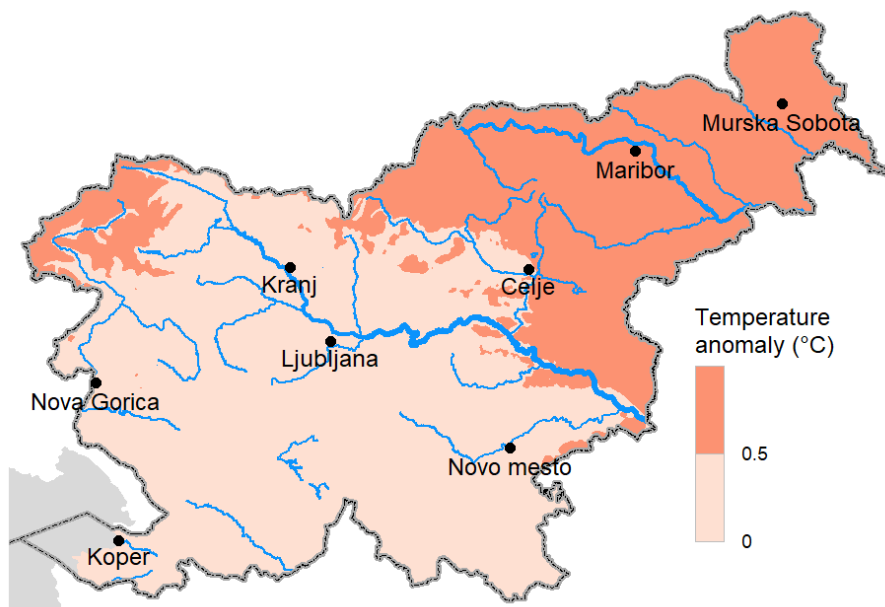


Figure 13. The mean air temperature anomaly in Slovenia during August 2025, relative to the 1991–2020 average. It was calculated using data from 100 meteorological stations.

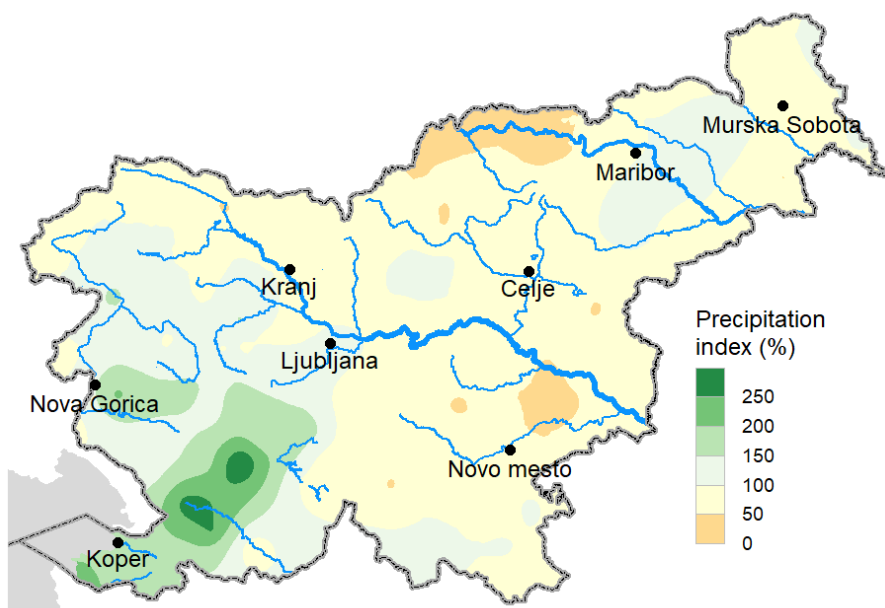


Figure 14. The precipitation index in Slovenia during August 2025, relative to the 1991–2020 average. It was calculated using data from 226 meteorological stations.



*August 2025* was also of near-average warmth. Air temperature anomalies ranged from 0.0 °C to 1.2 °C (Figure 13), with a surface-weighted national average anomaly of 0.5 °C. It ranked among the 18 warmest Augusts on record since 1950. According to tercile rankings, thermal conditions across Slovenia were normal (second tercile), except for a few areas in the north-east where they were above normal (third tercile).

*August 2025* was moderately wet, though precipitation varied considerably between regions. Above-average rainfall was recorded in a belt stretching from the Slovene Littoral to Ljubljana, where the precipitation index ranged from 120 % to as much as 307 % in Postojna. Most areas northwest of this belt, along with parts of the extreme south of Slovenia and the corridor between Maribor and Ptuj, also experienced wetter-than-average conditions. Elsewhere in Slovenia, precipitation was below average, with the lowest amounts recorded in parts of the northern region—some locations receiving less than 40 % of the average (Figure 14). Overall, the precipitation index ranged from 31 % to 307 %, with a surface-weighted national average of 97 %.

A summary of summer 2025, including monthly temperature and precipitation conditions for June, July, and August, is presented in Table 1.

Table 1. The summary for summer 2025 temperature and precipitation in Slovenia

| <b>SLOVENIA</b>    | Temperature anomaly, relative to the 1991–2020 period | Average temperature anomaly | Precipitation index, relative to the 1991–2020 period | Average precipitation index |
|--------------------|-------------------------------------------------------|-----------------------------|-------------------------------------------------------|-----------------------------|
| June 2025          | 2.7 to 4.4 °C                                         | 3.6 °C                      | 0 to 61 %                                             | 23 %                        |
| July 2025          | –0.4 to 1.1 °C                                        | 0.4 °C                      | 64 to 225 %                                           | 141 %                       |
| August 2025        | 0.0 to 1.2 °C                                         | 0.5 °C                      | 31 to 307 %                                           | 97 %                        |
| <b>Summer 2025</b> | <b>1.0 to 1.9 °C</b>                                  | <b>1.5 °C</b>               | <b>50 to 163 %</b>                                    | <b>85 %</b>                 |

## High-Impact Events

Highlights for summer 2025 in Slovenia:

- **Temperature:**

Above average overall, making it the sixth warmest summer on record since 1950.

June: Record-breakingly warm.

July and August: Slightly above average at the national level.

- **Precipitation:**

Mostly below average, with above-average levels only in parts of south-western and western Slovenia.

June: Record-breakingly dry.

July: Mostly moist.

August: Moderately wet, with exceptionally high precipitation in the belt stretching from the Slovene Littoral to Ljubljana.

Most noticeable outstanding events:

- **3 June 2025**

A severe thunderstorm, accompanied by hailstones exceeding 5 cm in diameter, struck the northern Goričko region between 1 and 2 p.m., causing extensive damage.

- **26 June 2025**

The eastern half of Slovenia experienced the peak of a prolonged heatwave. Numerous locations recorded the highest June temperatures ever measured.

Dobliče near Črnomelj: 38.4 °C – new national June record

Metlika: 37.9 °C

Lendava: 37.4 °C

Ravne na Koroškem: 37.3 °C

Celje: 36.9 °C

Novo mesto: 36.7 °C

Lisca (947 m ASL): 32.1 °C

Rogla (1492 m ASL): 25.5 °C

Daily mean temperatures were also exceptionally high:

Dobliče: 31.5 °C

Celje and Cerklje ob Krki Airport: 29.7 °C

Ljubljana: 29.0 °C

- **7 July 2025**

In the second half of the night (6–7 July), heavy rainfall affected parts of the Kras and Vipava Valley.

Dolenje near Ajdovščina: 129 mm of rain in 145 minutes

- **11 August 2025**

A record-warm morning occurred in parts of the Littoral region due to a warm air mass and bora wind. A new national record for daily minimum temperature was set at Koper Markovec, where the temperature did not fall below 28.0 °C. Other notably high daily minimum temperatures included:

Podnanos: 27.0 °C

Vedrijan: 26.4 °C

Škocjan near Divača: 23.5 °C

- **14 August 2025**

Extremely hot conditions prevailed, especially along the coast, with light bora in the afternoon.

Portorož Airport: 38.8 °C – new absolute record,

Koper Markovec: 37.9 °C.

- **29 August 2025**

Intense downpours occurred, particularly in a belt from the Koper coastal area to the Ljubljana Marshes. In many places more than 100 mm of rain fell in only several hours:

Postojna: 204 mm – new daily rainfall record, highly surpassing the previous daily rainfall record,

Dekani: 175 mm,

Kozina: 160 mm,

Planina near Postojna: 143 mm.

## **Verification of the SEECOF-33 Climate Outlook in Slovenia for the summer season 2025**

Table 2 provides a verification summary of the SEECOF-33 climate outlook for the summer season 2025 (DJF), using the climatological reference period 1991–2020.

Table 2. SEECOF-33 climate outlook verification summary for Slovenia for summer 2025

| Country         | Seasonal temperature (JJA) |                                           | Seasonal precipitation (JJA)                                                                                                                     |                                             |
|-----------------|----------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
|                 | Observed                   | SEECOF-33 climate outlook for temperature | Observed                                                                                                                                         | SEECOF-33 climate outlook for precipitation |
| <b>SLOVENIA</b> | warmer than normal         | warmer than normal                        | drier than normal in the north, parts of the south, east and the northeast, wetter than normal in parts of west and north-west, normal elsewhere | drier than normal                           |

## **Users' Perception of the SEECOF-33 Outlook**

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