



Ministry of ecology and natural
resources of The Republic Of
Kazakhstan Republican State
Enterprise «Kazhydromet»

SEASONAL BULLETIN ANOMALIES OF AVERAGE AIR TEMPERATURE AND PRECIPITATION IN KAZAKHSTAN FOR THE SPRING OF 2025

Astana, 2025

INTRODUCTION

The study of regional climate and continuous monitoring of its change is one of the priority tasks of the national hydrometeorological service of Kazakhstan RSE «Kazhydromet».

For the preparation of the bulletin used observation data on the network of meteorological monitoring RSE «Kazhydromet»: series of average seasonal air temperatures and seasonal precipitation totals in the period since 1941.

Anomalies of mean seasonal surface air temperatures and seasonal precipitation totals are determined relative to the norms - mean multiyear values calculated for the period 1991–2020, recommended by the World Meteorological Organization as a baseline for monitoring the degree of anomaly of the current climate. Air temperature anomalies are calculated as deviations of the observed value from the norm. Precipitation anomalies are presented in percent of the norm, that is as a percentage ratio of the amount of precipitation to the corresponding value of the norm.

To characterize climatic extremes, maps are given, where for each station the range of empirical probability of non-exceedance of the current value in the time series of the variable under consideration for the period from 1941 to the current year is given (empirical probability of non-exceedance is the fraction of time series values less than or equal to the current value). If the probability of non-exceedance of the current value of the variable falls into the extreme ranges (0–5 % or 95–100 %), it means that this value occurred in no more than 5 % of cases in the period from 1941. If we look at the amount of precipitation, the former indicates extremely low precipitation, the latter extremely high precipitation.

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ANOMALIES OF THE AVERAGE AIR TEMPERATURE PER SEASON

In spring, positive temperature anomalies were distributed evenly across the entire territory of Kazakhstan (Fig. 1). Temperature anomalies ranged from $+1\text{ }^{\circ}\text{C}$ to $+4.4\text{ }^{\circ}\text{C}$. The lowest temperature anomalies across Kazakhstan (from $+1\text{ }^{\circ}\text{C}$) were recorded in the mountainous and foothill regions. Increases in temperature anomalies were observed both from west to east and from east to west, converging in the northwest, where the maximum positive anomaly of $+4.4\text{ }^{\circ}\text{C}$ was recorded (Karabutak meteorological station). No negative anomalies were recorded throughout Kazakhstan. During the spring period, one-third of meteorological stations registered new maximum record values (Appendix, Table 1). More than half (108) of the meteorological stations fell into the “extremely warm” category with a non-exceedance probability of 95–100 % (Fig. 2). Meteorological stations located in the Karaganda and East Kazakhstan regions, as well as in Abai and Zhetysu regions, were classified as “warm” with a non-exceedance probability of 75–95 %.

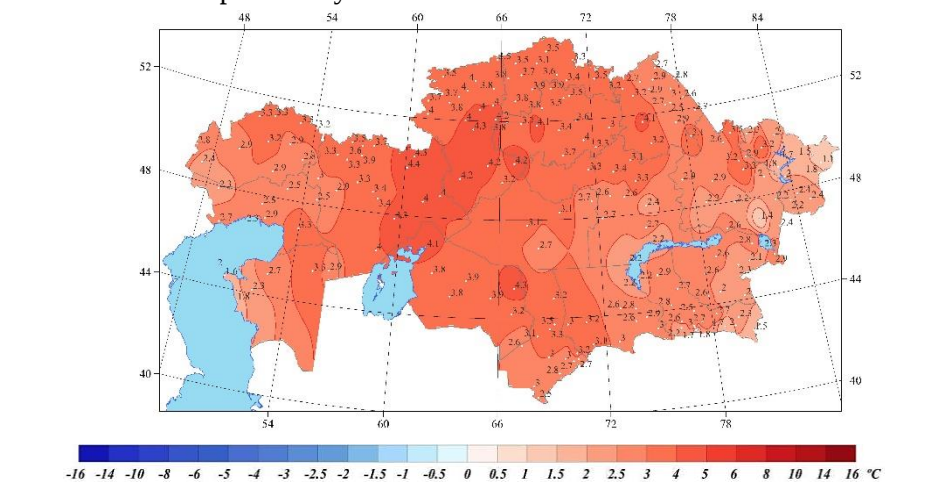


Figure 1–Spatial distribution of anomalies of the average spring air temperature ($^{\circ}\text{C}$) in 2025, calculated relative to the norms for the period 1991–2020

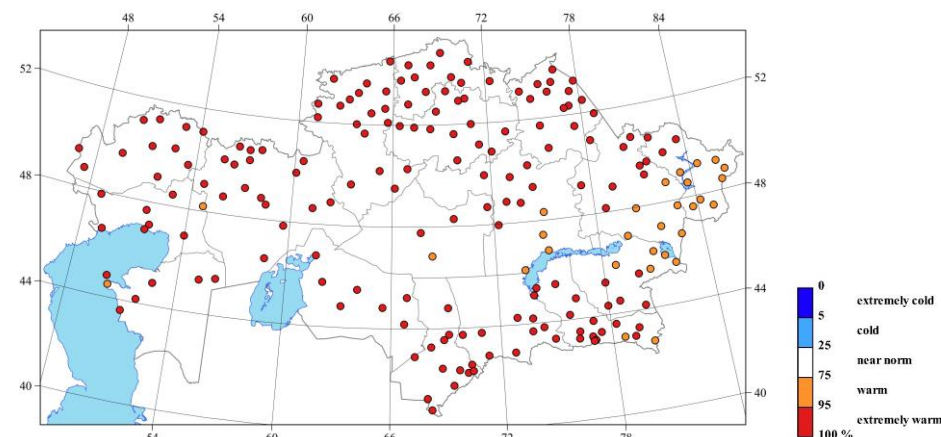


Figure 2 – Spatial distribution of probabilities of non-exceeding the average spring air temperature ($^{\circ}\text{C}$) in 2025, calculated relative to the norms for the period 1941–2025

A comparative analysis of air temperature changes showed that the spring period of 2025 was warmer than the spring period of 2024 relative to the norms for the long-term period of 1991–2020 (Fig. 3). The highest positive temperature anomaly was $+6\text{ }^{\circ}\text{C}$ in April at the Zheleznodorozhny meteorological station in Kostanay region. The most significant negative anomaly was observed in March and amounted to $-0.1\text{ }^{\circ}\text{C}$ at the Ayagoz meteorological station in Abai region and the Kogaly meteorological station in Zhetysu region.

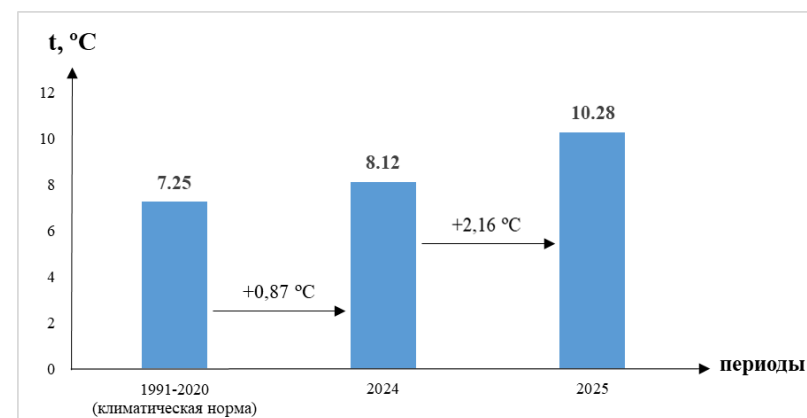


Figure 3–Average spring air temperature ($^{\circ}\text{C}$) relative to the norm for the long-term period 1991–2020, for the springs of 2024 and 2025

SEASONAL PRECIPITATION

In the spring of 2025, precipitation across the country was distributed unevenly (Fig. 4). A deficit of precipitation was predominantly observed, covering almost the entire territory of the country, except for the North Kazakhstan, Akmola, and East Kazakhstan regions.

In the west, precipitation deficits (less than 80 % of the climatic norm) were recorded in the northern Caspian area, the southeastern part of West Kazakhstan region, as well as in Aktope region, except for the Mugodzhary ridge. In the north, a deficit was noted in Kostanay region, while in the east it covered the majority of Abai region and the southeastern part of Pavlodar region. The central and southern regions also experienced a pronounced precipitation deficit, except for the Zhetysu region.

Excess precipitation (more than 120 % of the norm) was observed in Mangystau region, the southeastern part of Atyrau region, and in the Mugodzhary ridge area, as well as in the northern and eastern regions of Kazakhstan.

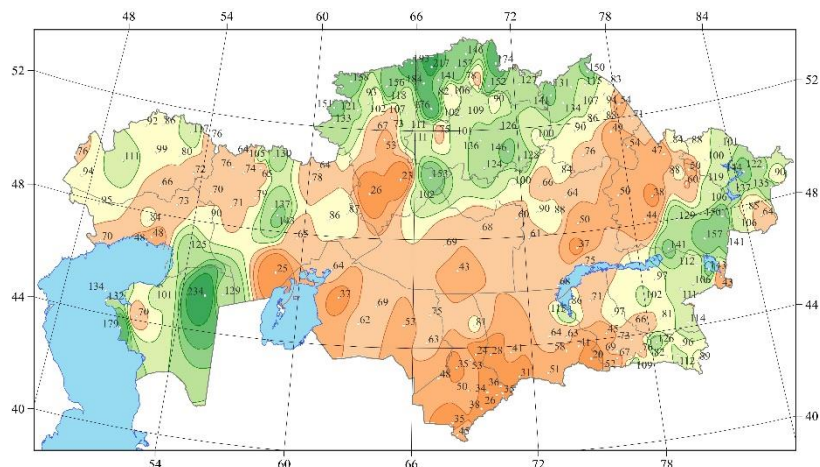


Figure 4–Spatial distribution of the average amount of atmospheric precipitation over the spring period of 2024–2025 (in % of the norm calculated relative to the base period 1991–2020)

The highest amount of precipitation during the spring period was recorded at the Beyneu meteorological station in Mangystau region and amounted to 32.9 mm, which corresponds to 234 % of the norm.

In Kostanay, Abai, and southern regions of the country, 5 % precipitation extremes classified as “extremely dry” were recorded at 12 meteorological stations. At 7 meteorological stations located in Turkestan and Zhambyl regions, minimum precipitation records were updated (Appendix 1, Table 2).

According to data from 9 meteorological stations located in North Kazakhstan, Kostanay, and Mangystau regions, 5 % precipitation extremes classified as “extremely wet” were recorded. Additionally, maximum precipitation records for the spring season were updated in North Kazakhstan and Kostanay regions (Appendix 1, Table 3).

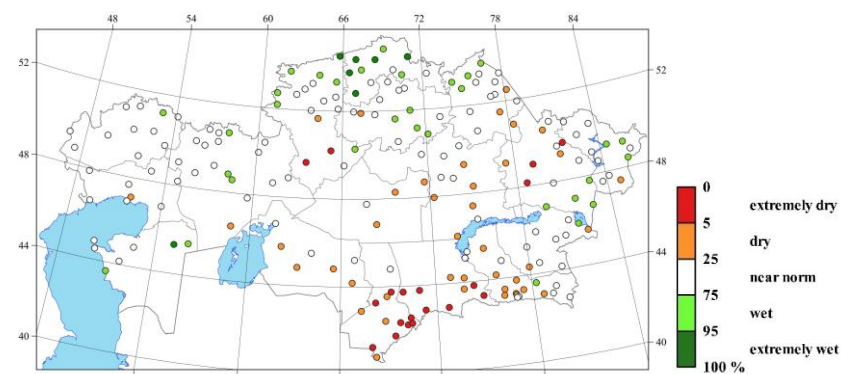


Figure 5 – Spatial distribution of the probability of not exceeding the average amount of precipitation over the spring period of 2025. The probabilities are calculated based on data from the period 1941–2025

A comparative analysis of total precipitation showed that during the spring period of 2025, less precipitation fell compared to the spring period of 2024, and also less than the norms for the long-term period of 1991–2020 (Fig. 6).

An analysis of monthly precipitation totals from March to May 2025 showed that the highest amount of precipitation fell in March at the Fort-Shevchenko meteorological station in Mangystau region – 399.1 %, which amounted to 44.7 mm. However, this amount of atmospheric precipitation did not exceed the record value of 47.3 mm set in 2017.

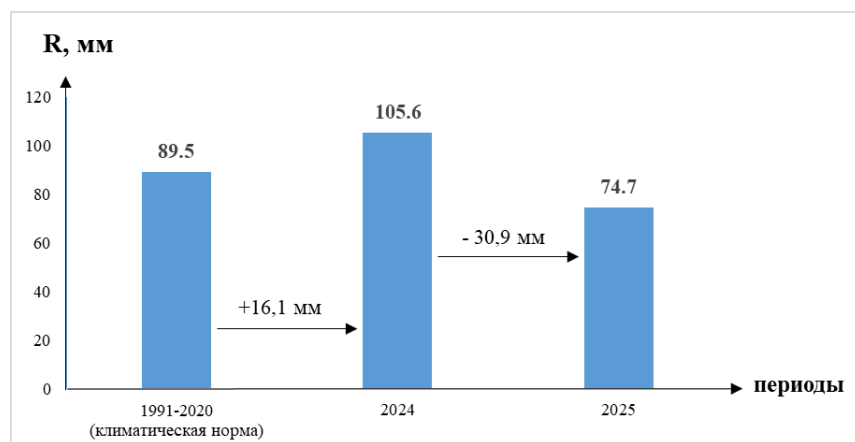


Figure 6 – Average amount of precipitation over the winter period (°C) relative to the norms for the long-term period 1991-2020, for the springs of 2024 and 2025

Table 1. Maximum Record Values of Air Temperature for spring 2025

№	Meteostation	Region	New Record of Air Temperature, °C	Previous Record of Air Temperature, °C
1	Zhalgyz-tobe	Abai	8.7	8.6 (1997)
2	Shar	Abai	8.0	8.0 (2023)
3	Akkol	Akmola	7.3	7.0 (2020)
4	Arshaly	Akmola	7.2	7.0 (2020)
5	Astana	Akmola	9.0	8.9 (2020)
6	Atbasar	Akmola	7.5	7.1 (2020)
7	Balkashino	Akmola	6.5	6.2 (2020)
8	Yesil	Akmola	8.4	7.5 (2020)
9	Zhaltyr	Akmola	7.5	7.3 (2020)
10	Korgalzhyn	Akmola	8.0	7.7 (2001)
11	Aktobe	Aktobe	10.1	9.6 (2023)
12	Ayakkum	Aktobe	13.6	13.3 (2023)
13	Irgiz	Aktobe	11.7	11.5 (2023)
14	Karabutak	Aktobe	9.6	8.9 (2008)
15	Komsomolskoye	Aktobe	9.0	8.1 (2008)
16	Martuk	Aktobe	9.5	9.4 (2023)
17	Nura	Aktobe	11.8	11.6 (2023)
18	Shalkar	Aktobe	12.3	12.2 (2023)
19	Rodnikovka	Aktobe	8.2	8.2 (2008)
20	Kos-Istek	Aktobe	8.0	7.5 (1995)
21	Yesik	Almaty	12.8	12.7 (2008)
22	Shelek / Chilik	Almaty	15.0	14.6 (2022)
23	Kulan	Zhambyl	14.4	14.4 (2008)
24	Taraz / Zhambyl	Zhambyl	14.9	14.7 (2008)
25	Shokpar	Zhambyl	14.3	14.2 (2008)
26	Bes-Oba	Karaganda	7.0	6.8 (1997)
27	Karaganda	Karaganda	8.3	8.0 (2020)
28	Amangeldy	Kostanay	10.0	9.3 (2008)
29	Arkalyk	Kostanay	8.8	8.0 (2020)
30	Arshalinsky State Farm	Kostanay	7.5	7.2 (2020)
31	Dievskaya	Kostanay	8.4	7.5 (2020)
32	Zheleznodorozhny	Kostanay	7.9	6.8 (2020)
33	Zhitikara	Kostanay	8.2	7.7 (2020)
34	Karabalyk	Kostanay	7.8	7.7 (2020)
35	Karamendy	Kostanay	9.0	8.1 (2020)
36	Karasu	Kostanay	7.6	6.9 (2020)

№	Meteostation	Region	New Record of Air Temperature, °C	Previous Record of Air Temperature, °C
37	Kostanay	Kostanay	8.7	7.8 (2020)
38	Kushmurun	Kostanay	8.4	8.1 (2020)
39	Mikhailovka_Kost	Kostanay	7.9	7.2 (2020)
40	Rudny	Kostanay	7.9	7.4 (2020)
41	Sarykol/Uritsky	Kostanay	7.7	7.5 (1981)
42	Tobol	Kostanay	8.1	7.3 (2020)
43	Torgay	Kostanay	11.0	10.7 (2008)
44	Aral Sea	Kyzylorda	14.6	14.3 (2023)
45	Zlikha	Kyzylorda	15.6	14.9 (2008)
46	Kazaly/Kazalinsk	Kyzylorda	15.2	14.5 (2023)
47	Karak	Kyzylorda	16.2	15.6 (2023)
48	Kyzylorda	Kyzylorda	16.9	16.2 (2008)
49	Shieli	Kyzylorda	16.9	16.7 (2008)
50	Zhosaly	Kyzylorda	15.5	14.9 (2023)
51	Ruzaevka	North Kazakhstan	7.5	7.1 (2020)
52	Saumalkol / Volodarskoye	North Kazakhstan	7.2	7.0 (2020)
53	Timiryazovo / Voskhod State Farm	North Kazakhstan	7.5	7.3 (2020)
54	Arys	Turkestan	17.7	17.4 (2008)
55	Aul Turar Ryskulov	Turkestan	15.4	15.2 (2008)
56	Ashysay	Turkestan	14.5	14.1 (2008)
57	Tasaryk	Turkestan	13.0	12.8 (2008)
58	Tasty	Turkestan	15.7	15.4 (2008)
59	Shardara	Turkestan	18.3	18.0 (2008)
60	Sholakorgan	Turkestan	15.1	14.5 (2008)
61	Shymkent	Turkestan	16.7	16.4 (2023)
62	Zhetysai	Turkestan	18.3	18.2 (2008)

Table 2. Minimum Record Values of Monthly Atmospheric Precipitation for spring

№	Meteostation	Region	New Minimum Total Atmospheric Precipitation. mm	Previous Minimum Total Atmospheric Precipitation. mm
1	Aul T. Ryskulov	Turkestan	29.3	33.1 (1989)
2	Kazyghurt	Turkestan	23.2	24.5 (1995)
3	Korday	Turkestan	11.8	24.6 (2000)

№	Meteostation	Region	New Minimum Total Atmospheric Precipitation. mm	Previous Minimum Total Atmospheric Precipitation. mm
4	Shuyldak	Turkestan	36.0	40.6 (2001)
5	Shymkent	Turkestan	24.1	25.5 (1995)
6	Taraz	Zhambyl	13.0	13.6 (1982)
7	Tasaryk	Zhambyl	27.7	41.7 (1975)

Table 3. Maximum Record Values of Monthly Atmospheric Precipitation for spring

№	Meteostation	Region	New Record Total Atmospheric Precipitation. mm	Previous Record Total Atmospheric Precipitation. mm
1	Blagoveshchenka	North Kazakhstan	51.5	42.3 (1970)
2	Ruzaevka	North Kazakhstan	51.1	49.9 (2011)
3	Presnogorkovka	Kostanay	45.7	39.4 (2015)