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

MONTHLY BULLETIN
ANOMALIES OF MEAN MONTHLY AIR TEMPERATURE AND MONTHLY PRECIPITATION ON THE TERRITORY OF KAZAKHSTAN
IN MAY 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 monthly air temperatures and monthly precipitation totals in the period since 1941.

Anomalies of mean monthly surface air temperatures and monthly 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 MEAN MONTHLY AIR TEMPERATURE

In May, positive air temperature anomalies were observed throughout Kazakhstan (Fig. 1). The average monthly air temperature anomaly was + 2.47 °C (Rank 3). The previous highs were observed in May 2020 and 2021 (Table 1). There is a tendency for air temperature anomalies to increase in the direction from the northwest (from 0.1 °C in Ushtagan MS – Atyrau region) to the south and southeast (up to 4.5 °C in Kyzylorda MS – Kyzylorda region). According to 98 meteorological stations located in the southern and southeastern mountainous and foothill regions, it was extremely warm - the air temperature values entered the «extremely warm» gradation with a probability of not exceeding 95–100 % (Fig. 2). Of these, 32 meteorological stations set record maximum values of the average monthly air temperature (Table 2).

Table 1. The warmest years for the period 1941–2025 and the corresponding average monthly air temperature anomalies calculated relative to the period 1991–2020

Rank	May	t, °C
1	2021	3.54
2	2020	2.56
3	2025	2.47
4	2001	2.45
5	2008	1.50
6	2014	1.44
7	1977	1.37
8	2012	1.31
9	1961	1.30
10	1980	1.22

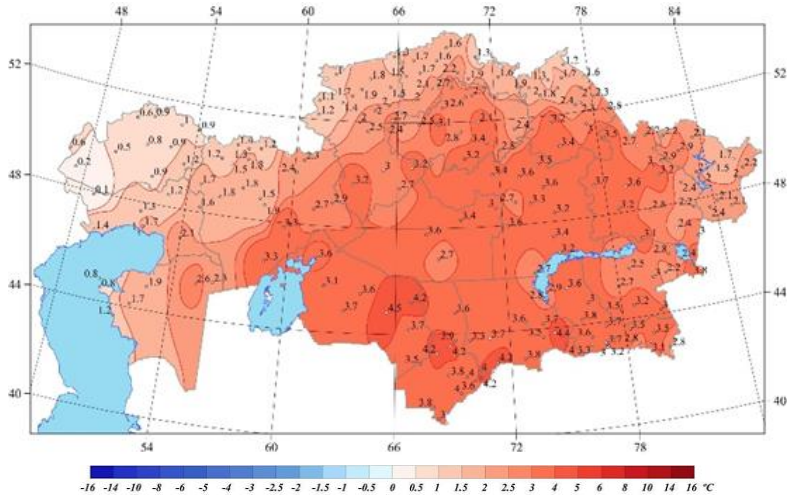

Figure 1 – Spatial distribution of anomalies of mean monthly air temperature (°C) in May 2025, calculated relative to the norms for the period 1991–2020

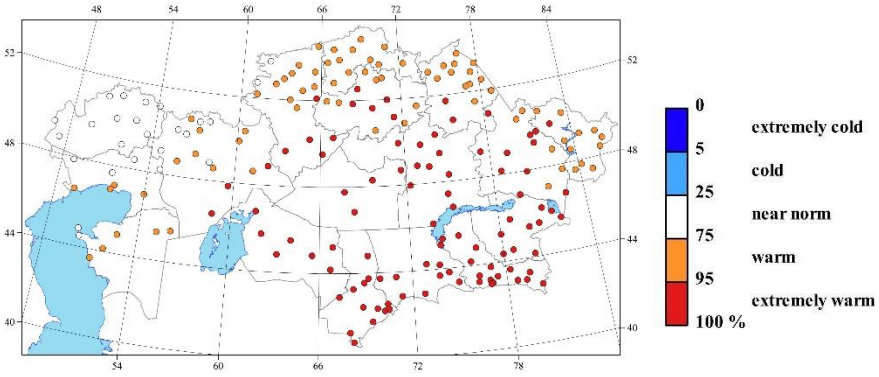

Figure 2 – Spatial distribution of probabilities of non-exceedance of air temperature in May 2025 calculated from data of the period 1941–2025

Table 2. Record values of the average monthly air temperature in May 2025

№	Meteorological station	Region	New maximum air temperature, ºC	The previous record of the average monthly air temperature, ºC
1	Aidarly	Almaty	22.3	22.1 (2001 y.)
2	Almaty_OGMS	Almaty	20.8	20.6 (2008 y.)
3	Aul Turara Ryskulova	Turkestan	21.8	21.8 (2001 y, 1961 y.)
4	Achisai	Turkestan	21.9	21.8 (2001 y.)
5	Bakanas	Almaty	21.6	21.5 (2022 y.)
6	Besoba	Karaganda	15.8	15.5 (2001 y.)
7	Esik	Almaty	19.4	19.1 (2001 y.)
8	Kazygurt	Turkestan	23.1	22.6 (2001 y.)
9	Kainar	Abai	15.9	15.6 (2020 y.)
10	Kapshagai	Zhetysu	21.6	21.2 (1961 y.)
11	Karaul	Abai	17.5	17.3 (2022 y.)
12	Kegen	Almaty	13.2	12.9 (2008 y.)
13	Kordai	Zhambyl	18.7	18.3 (2008 y.)
14	Kuigan	Almaty	21.3	21.1 (2008 y.)
15	Kulan	Zhambyl	21.1	20.4 (2008 y.)
16	Kyrgyzsai	Almaty	18.5	18.4 (2008 y.)
17	Moiynkum	Zhambyl	22.9	22.7 (2001 y.)
18	Mynzhilki	Almaty	6.0	5.6 (2008 y.)
19	Narynkol	Almaty	14.0	13.8 (1961 y.)
20	Ulken Almaty Lake. /BAO	Almaty	9.1	9.0 (2008 y.)
21	Taraz /Zhambyl	Zhambyl	22.1	21.4 (2001 y.)
22	Tasty	Turkestan	23.9	23.6 (2001 y.)
23	Tole bi	Zhambyl	22.3	21.8 (2001 y.)
24	Turkestan	Turkestan	26.1	25.6 (2001 y.)
25	Uyuk	Zhambyl	23.3	23.0 (2001 y.)
26	Shardara	Turkestan	25.8	25.6 (2001 y.)
27	Shelek	Almaty	22.0	21.6 (2001 y.)
28	Sholakkorgan	Turkestan	22.8	22.4 (2001 y.)
29	Shuuldak	Turkestan	14.9	14.1 (2001 y.)
30	Shymkent	Turkestan	23.3	22.9 (2001 y.)
31	Zhalanashkol	Zhetysu	22.4	21.6 (2022 y.)
32	Shokpar	Zhambyl	22.1	21.3 (2001 y.)

MONTHLY PRECIPITATION

In May, there was mostly a shortage of precipitation in the country (Fig. 3). Precipitation deficit of less than 80 %, in some places even less than 10–20 % of the norm, was observed in the southern and central regions, in most of the western and southeastern regions, as well as in some areas of northern Kazakhstan. Values with a probability of non-excess in the range of 0–5 % were recorded at 6 weather stations in Turkestan, Almaty and Pavlodar regions, which corresponds to the gradation «extremely dry» (Fig. 4). Precipitation of more than 120 % was observed in the northern and extreme eastern and western regions, as well as in most of the Mangystau region. Values exceeding the norm by two times were observed in North Kazakhstan, Kostanay and Mangystau regions. At a number of weather stations in these regions, 5 % extremes of the probability of non-elevation were observed, which makes it possible to classify the conditions as «extremely humid». Records of monthly precipitation totals were updated for 4 MS in the North Kazakhstan and Kostanay regions (Table 3). The most significant amount of precipitation fell on Blagoveshchenka MS (North Kazakhstan region) – 118.1 mm, which amounted to 396.3 % of the norm.

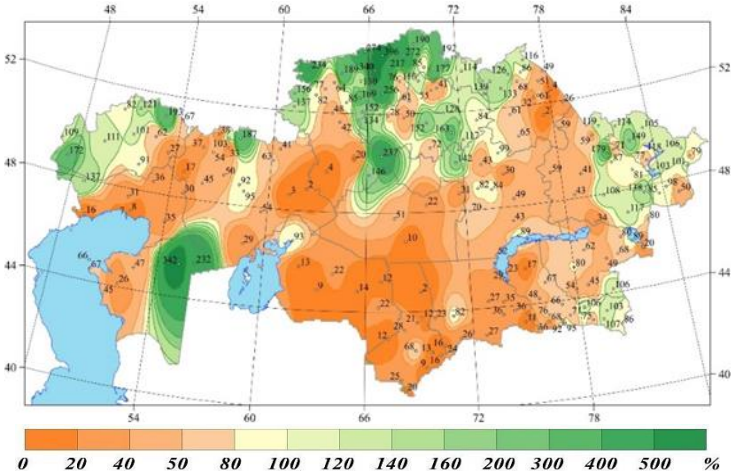

Figure 3 – Spatial distribution of precipitation in May 2025 (in % of the norm calculated relative to the base period 1991–2020)

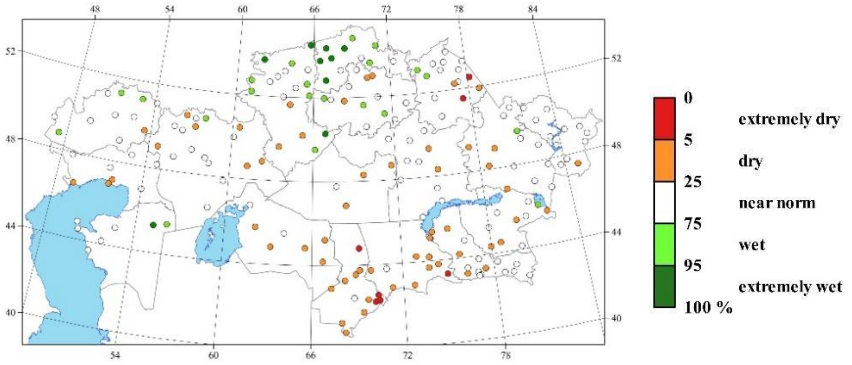

Figure 4 – Spatial distribution of probability of non-exceedance of precipitation in May 2025. Probabilities are calculated from data of the period 1941–2025

Table 3. Maximum record values of monthly precipitation in May 2025

№	Meteorological station	Region	New record for monthly precipitation, mm	The previous record for monthly precipitation, mm
1	Blagoveshchenka	North Kazakhstan	118.1	99.8 (1953 y.)
2	Presnogorkovka	Kostanay	89.7	84.0 (1963 y.)
3	Ruzaevka	North Kazakhstan	103.5	100.2 (2007 y.)
4	Yavlenka	North Kazakhstan	92.9	86.8 (2011 y.)