CITIZEN-SCIENCE STUDENT PROJECT UNDER GROMADA ERASMUS+

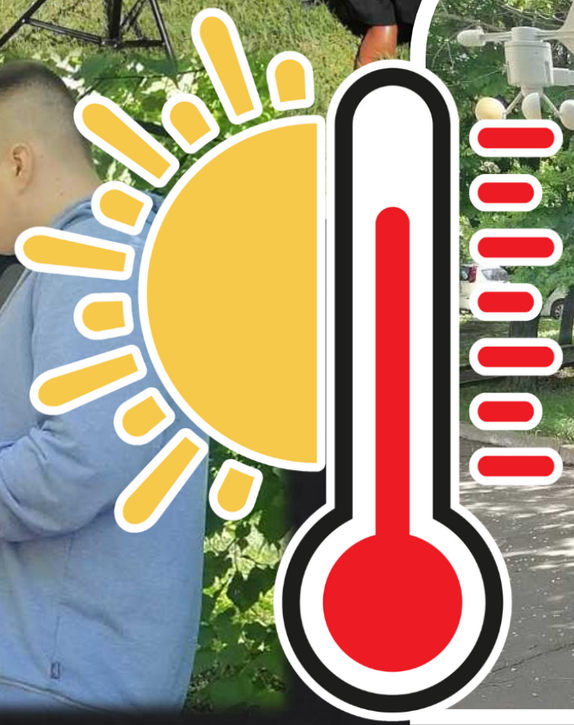
Determining Regional Environmental Responses to Changes Occurring in the Climatic System of the Modern Period Based on the Main Meteorological Regime Indicators of area University campus at Lvivska Street

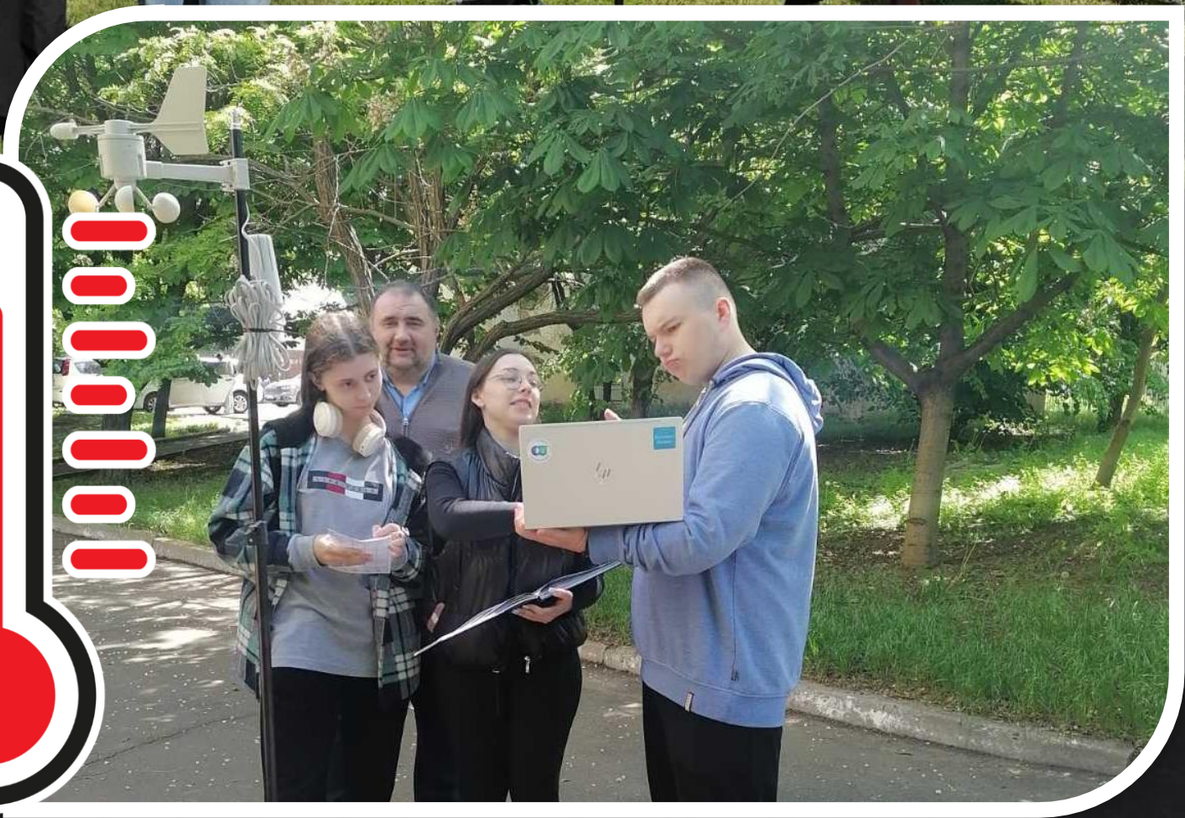
This study focuses on identifying regional ecological responses to changes in the climate system. We will analyze the impacts of climate change on the urban environment using detailed data from the campus weather station located on Lvivska Street.

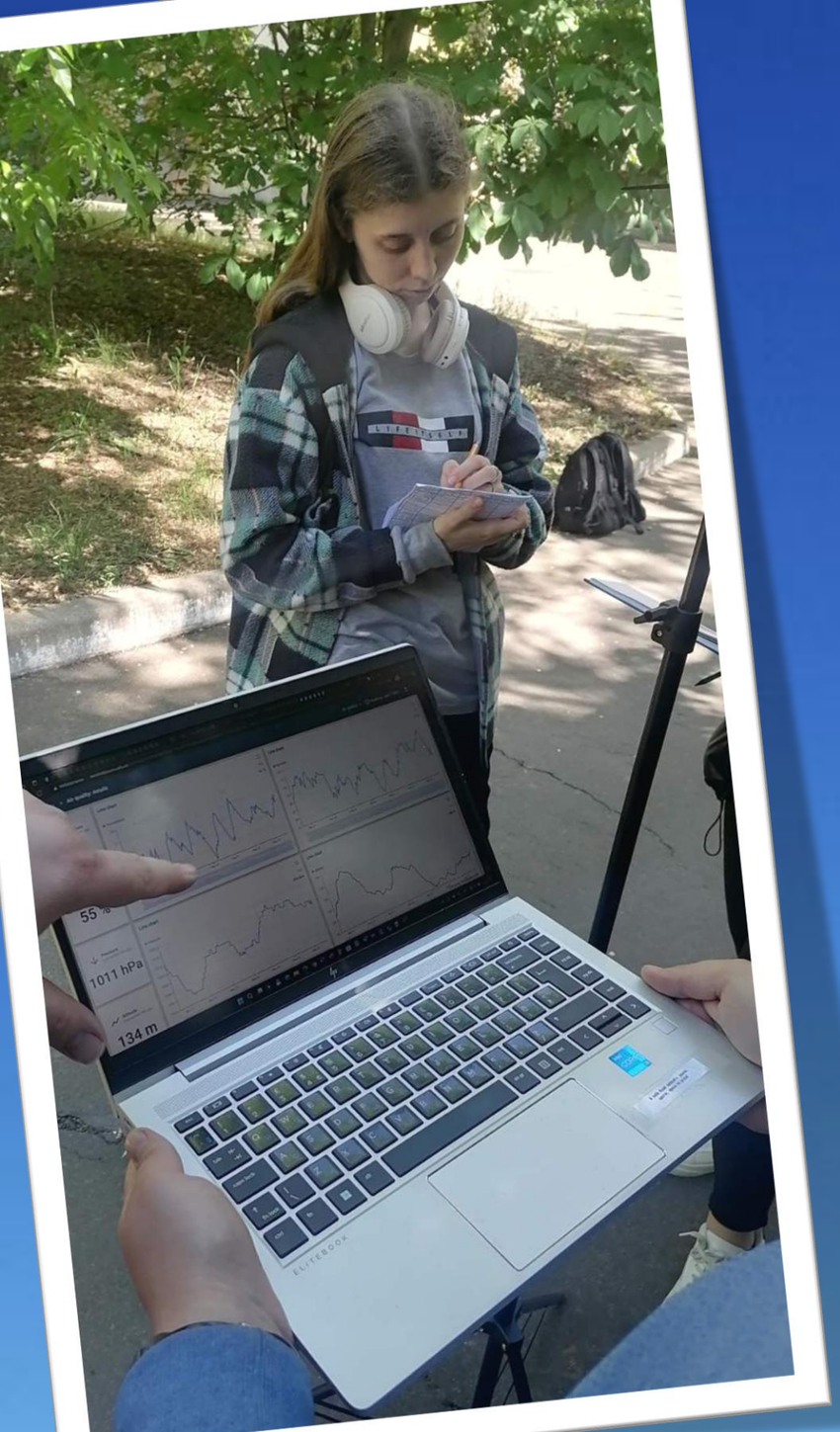
The findings will be essential for developing effective adaptation and mitigation strategies tailored to urban agglomerations.

our team

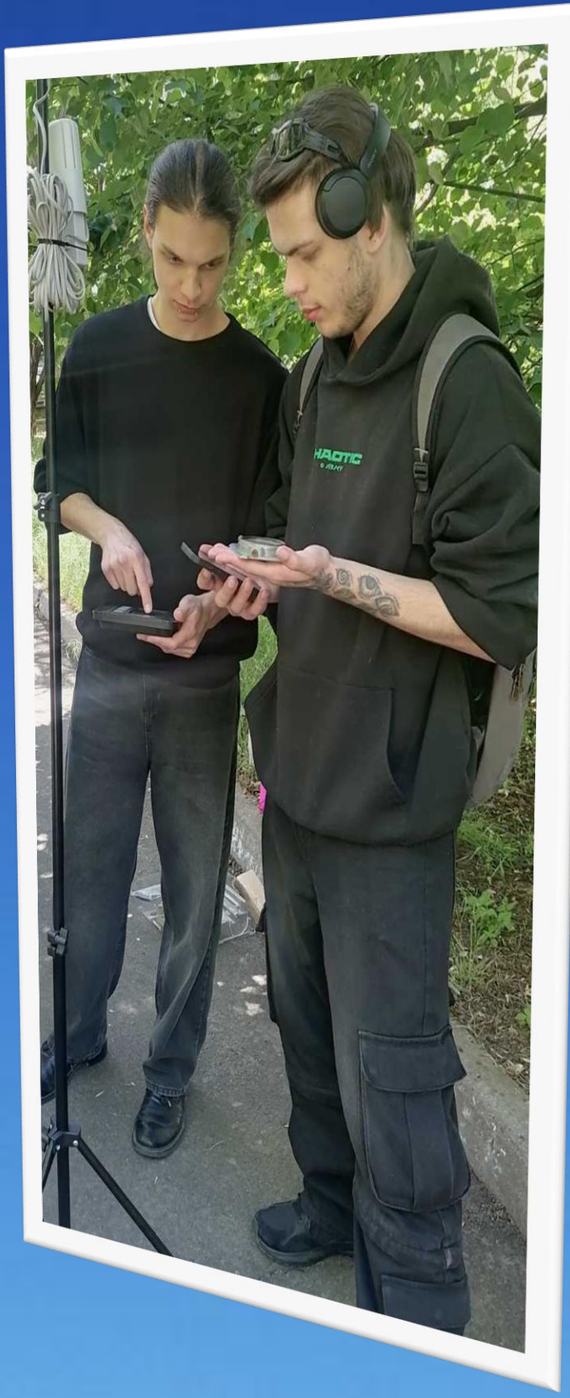
The study involved students from the Faculty of Hydrometeorology and Ecology: dedicated young scientists who are deeply concerned about the future of the planet and eager to actively contribute to the study of contemporary climate change.







This project aims
to analyze regional
environmental
responses to changes
in the climate system
by monitoring
key meteorological
parameters at selected
sites across
Odesa



Environmental conditions are closely linked to the climate system, so any ongoing changes in the climate directly affect the environment.

Significant deviations in meteorological parameters from climatological standard normals serve as indicators of current climate change in the study area.

Research methodology

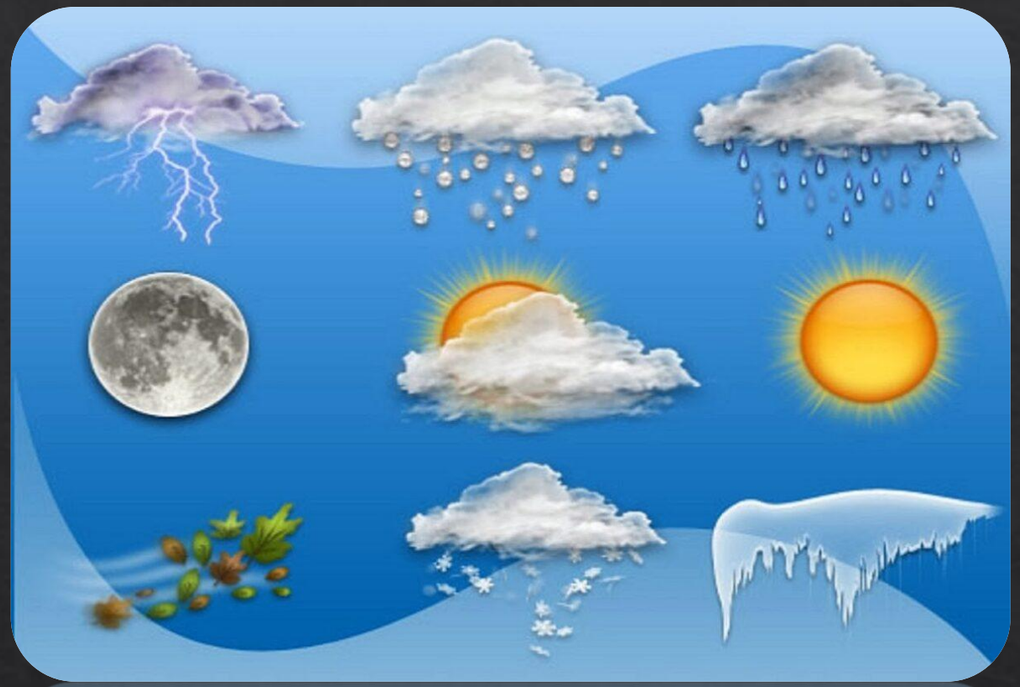
Using an automatic weather station, the following meteorological parameters were measured:

- Air temperature (current, daily minimum, and daily maximum)
- Relative humidity
- Wind direction and speed
- Precipitation amount

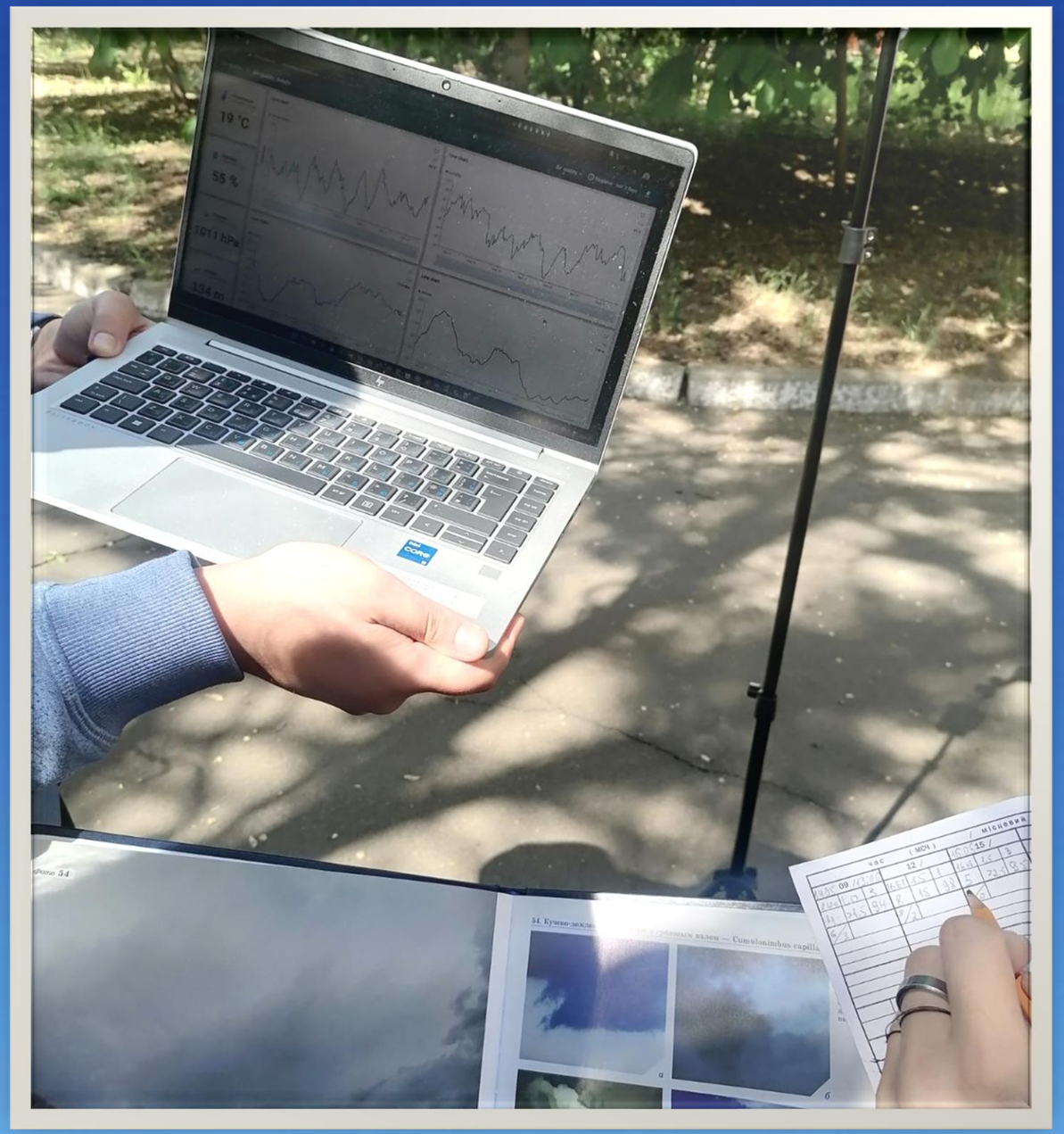
Research methodology

Visually observed:

- Amount of cloud cover and identification of specific cloud types
- Weather phenomena at and between observation times



The observation results were recorded in the KM1 logbook and subsequently entered into an electronic database.



Why here and now?!?

Location and equipment

The weather station is located on the university campus at 15 Lvivska Street, providing representative data for the local urban environment.

Observation period

Data were collected during April and May of this year, enabling the identification of the meteorological regime's characteristics for the area during this period, as well as deviations of the observed meteorological parameters from long-term climatic norms.

Key indicators

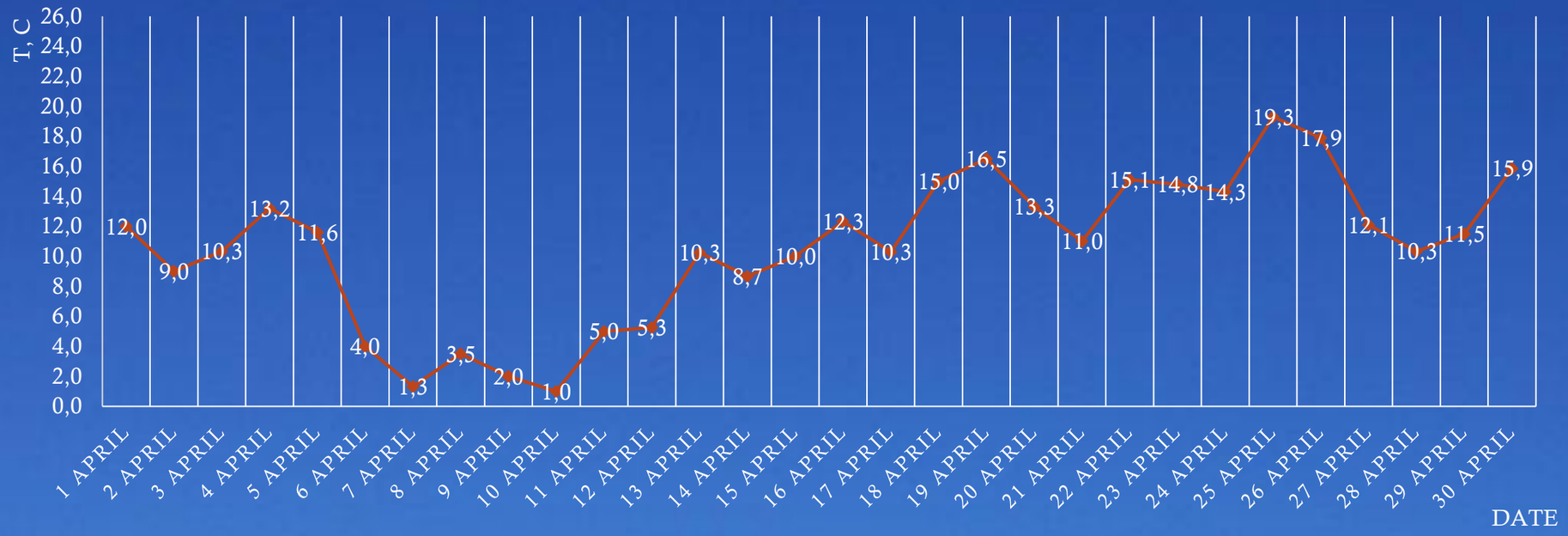
Analysis of the established meteorological database enables the identification of regional indicators of climate change observed in the spring of this year.

average temperatures

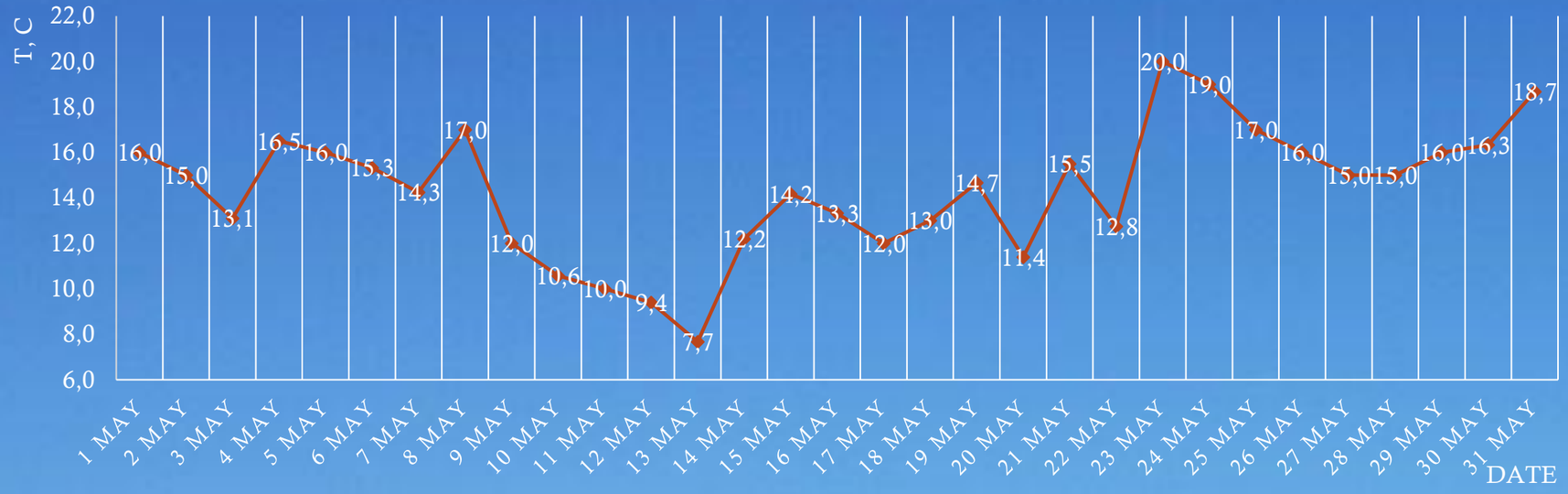
The climate normal air temperature in April is 10.5 C.

Air temperatures in April 2025 were predominantly above the climatic norm.

The average monthly temperature for April 2025 was 10.3 °C.



The average monthly air temperature for May 2025 was 14.3 °C.



The climate normal for air temperature in May is 16.5 C.

Air temperatures in May 2025 were predominantly below the climatic norm.

Analysis of Daily Mean Temperatures

The highest value

April	19.3 C	(25.04)
May	20.0 C	(23.05)

The lowest value

April	1.0 C	(10.04)
May	7,.7 C	(13.05)

Monthly temperature amplitude

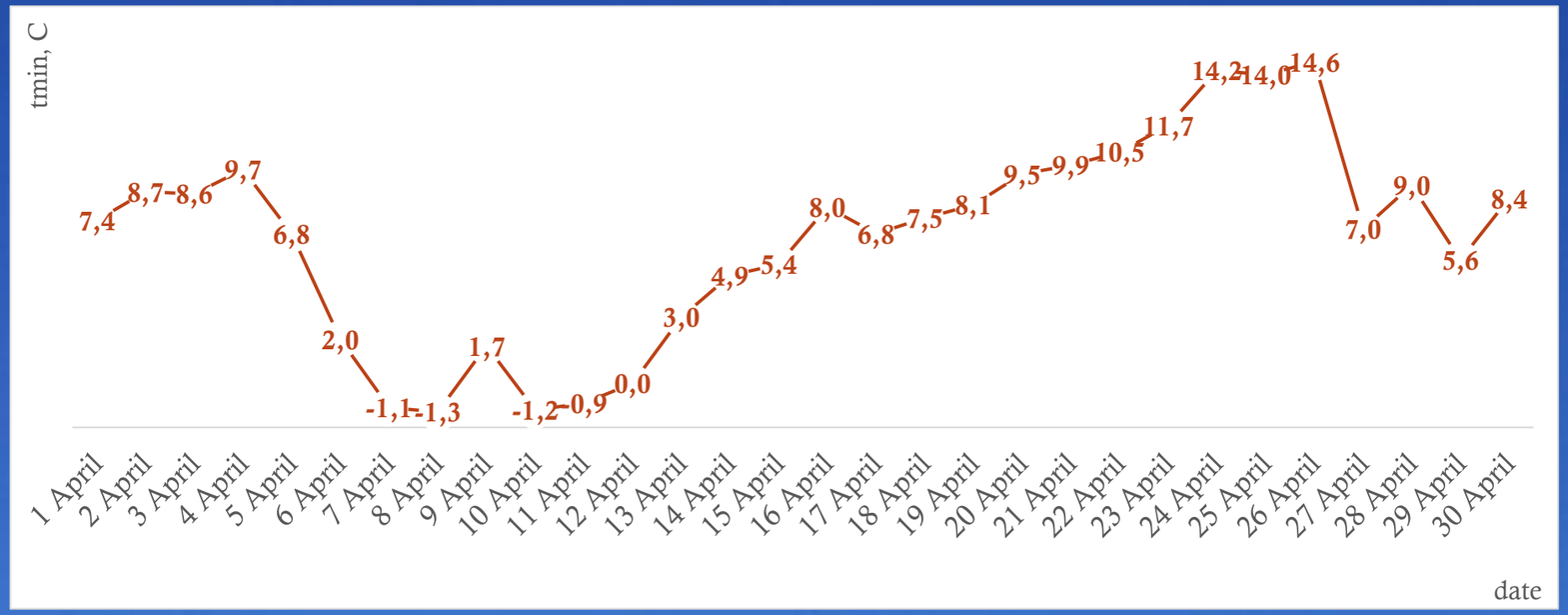
April	18.3 C	May	12.3 C

minimum temperatures

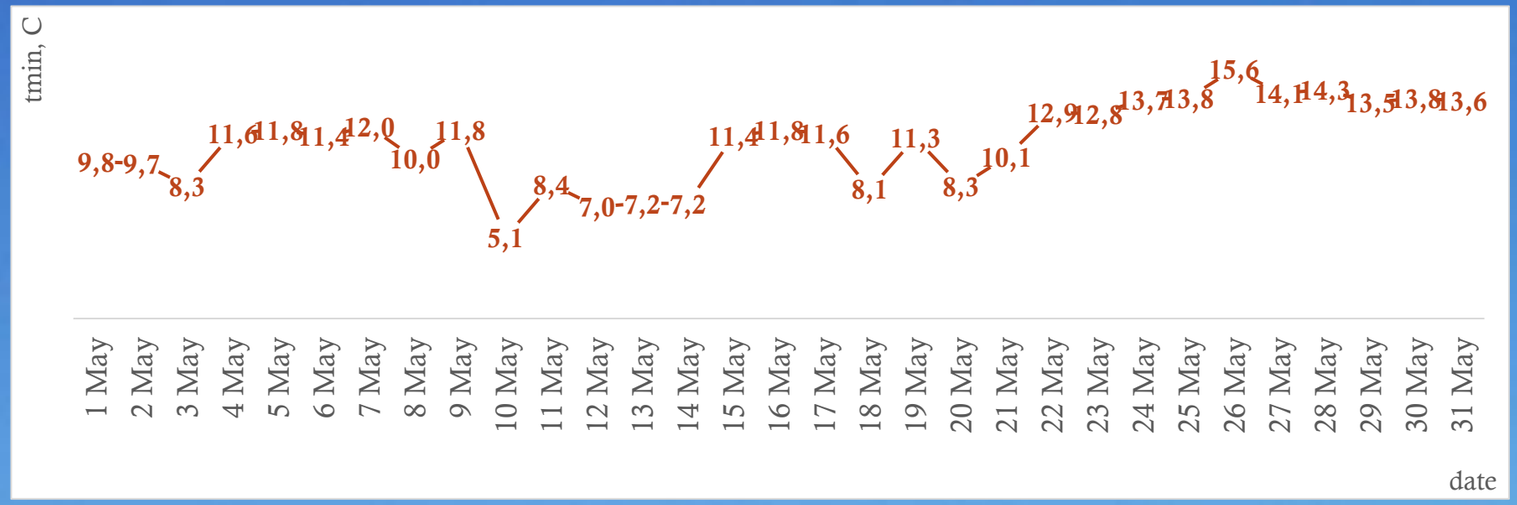
The average minimum temperature in April, based on the most recent climatic norm, is 6.8 °C.

In April 2025, minimum temperatures were predominantly above the climate normal.

The average minimum temperature in April 2025 was 6.6 C.

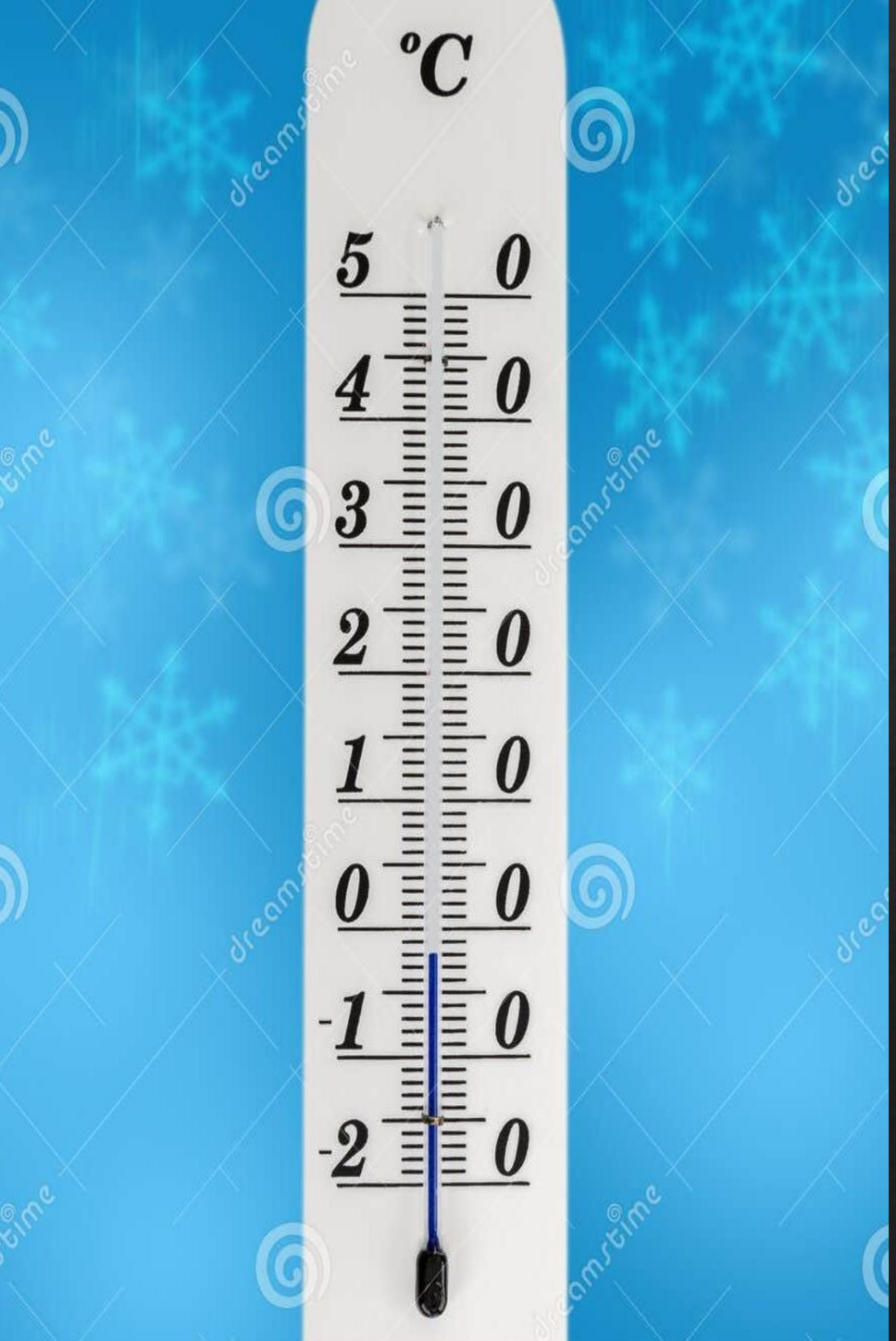


The average minimum temperature in May 2025 was 11.0 C.



The average minimum temperature for May, based on the most recent climatic norm, is 12.6 °C.

In May 2025, minimum temperatures were predominantly below the climate normal.



Analysis of Minimum Daily Temperatures

The highest value

April	16.4 C	(26.04)
May	15.6 C	(26.05)

The lowest value

April	-1.3 C	(08.04)
May	5.1 C	(10.05)

Monthly temperature amplitude

April	17.7 C	May	20.7 C

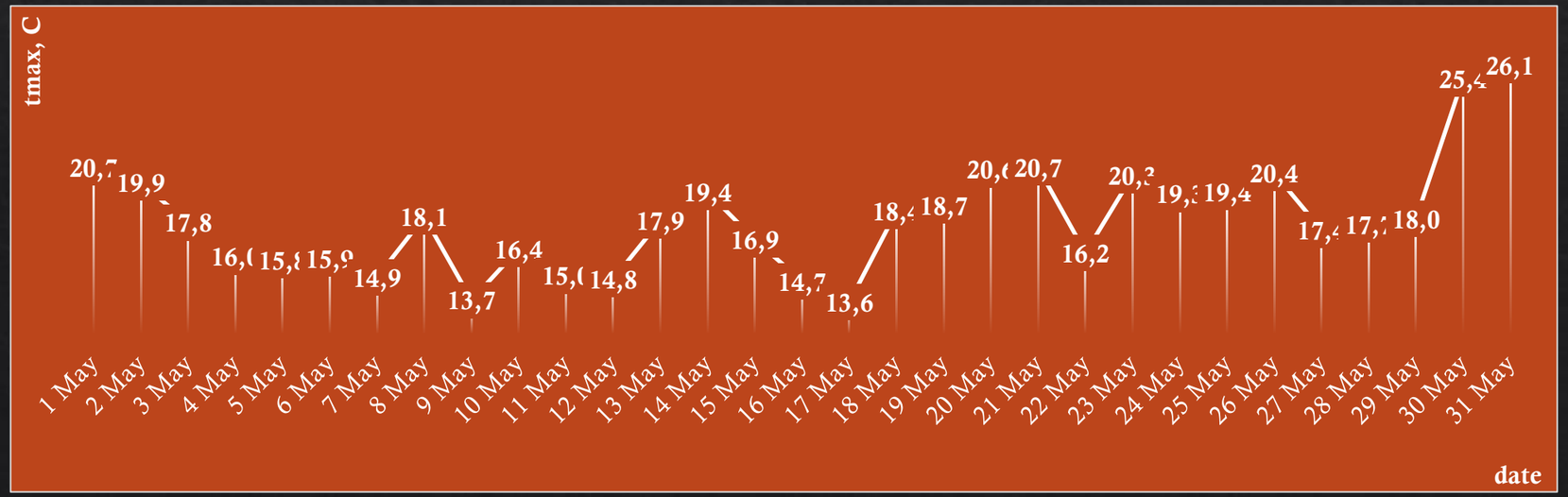
maximum temperatures

The average maximum temperature in April, based on the most recent climatic norm, is 13.7 C.

In April 2025, maximum temperatures were predominantly above the climate normal.

The average maximum temperature in April 2025 was 14.3 C.

The average maximum temperature in May 2025 was 18.1 C.



The average maximum temperature in May, based on the most recent climatic norm, is 20.3 C.

In May 2025, maximum temperatures were predominantly below the climate normal.

Analysis of Maximum Daily Temperatures

The highest value

April	26.8 C	(25.04)
May	26.1 C	(31.05)

The lowest value

April	3.7 C	(11.04)
May	13.6 C	(17.05)

Monthly temperature amplitude

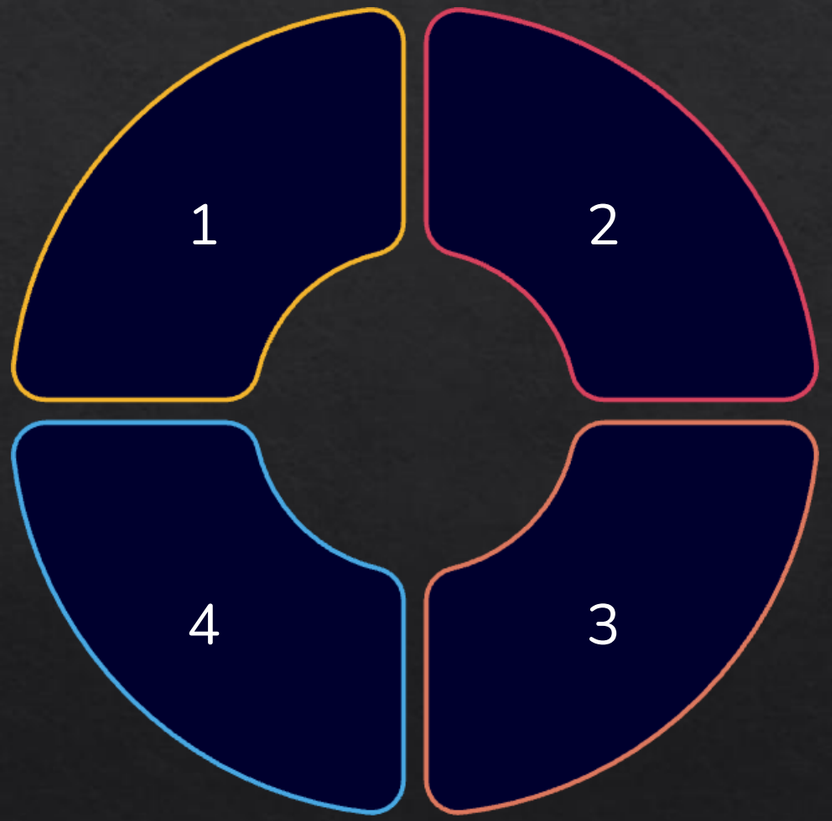
April	23.1 C	May	12.5 C

Analysis of other indicators

Number of days with daily minimum air temperature 0°C and below

The climate normal for April is 0.5 days, meaning such an event typically occurs 5 times in 10 years, or approximately once every 2 years.

In April 2025, 6 such days were recorded, indicating that the month was colder than the climate normal.



Number of days with daily maximum air temperature of 30°C and above

The climate normal for May is 0.3 days., which corresponds to approximately 3 days in 10 years.

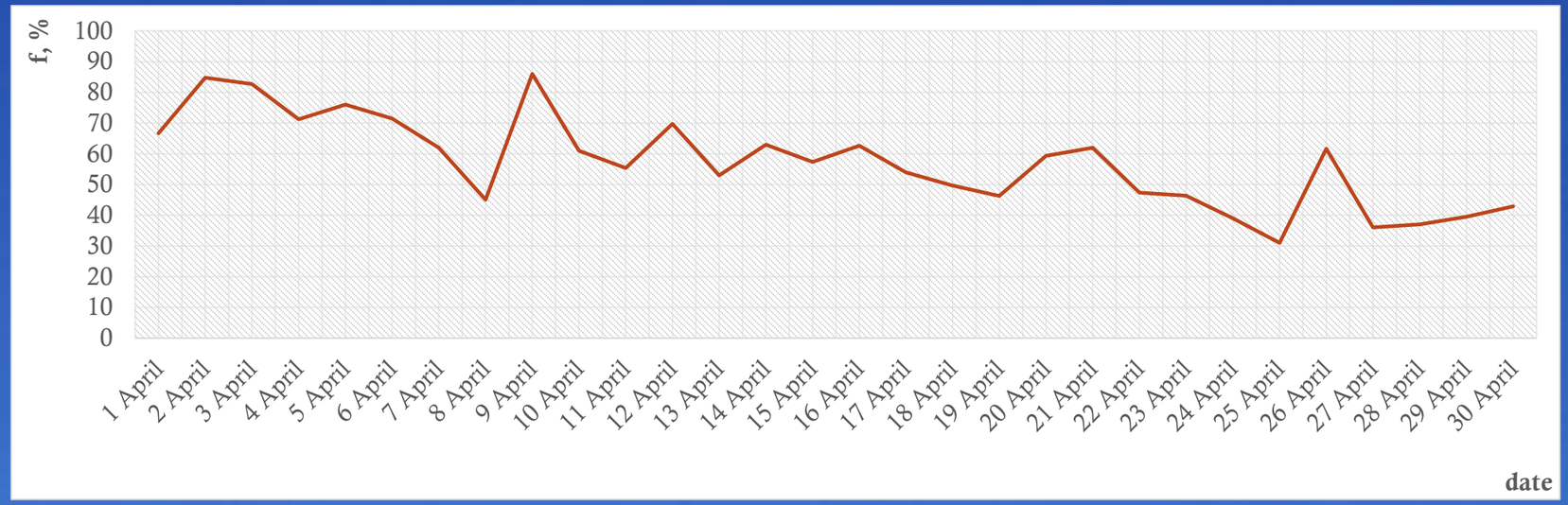
In May 2025, there were 0 such days recorded, indicating that the month was colder than the climatic norm.

Daily mean relative humidity

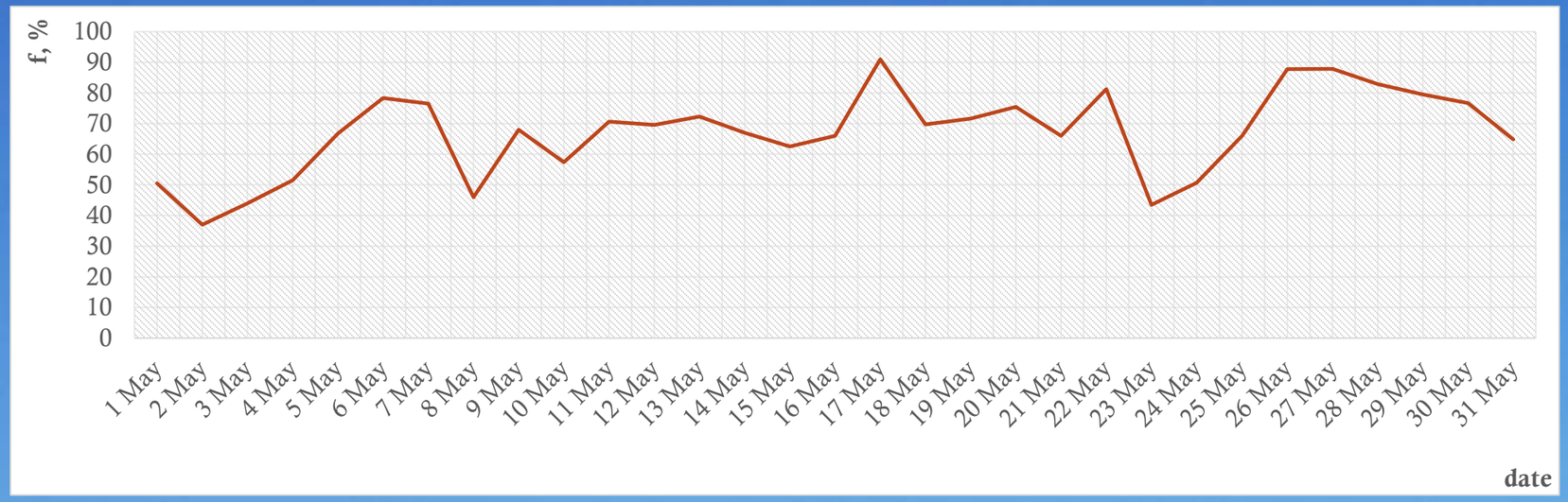
The monthly average relative humidity for April, according to the latest climatic norm, is 73%.

April 2025 was significantly drier compared to the climatic norm.

The monthly average relative humidity for April 2025 was 57%.



The monthly average relative humidity for May 2025 is 67%.



The monthly average relative humidity for May, according to the latest climatic norm, is 71%.

May 2025 was significantly drier compared to the climatic norm.

Analysis of Daily Relative Humidity

The highest value

April	86%	(09.04)
May	91%	(17.05)

The lowest value

April	31%	(25.04)
May	37%	(02.05)

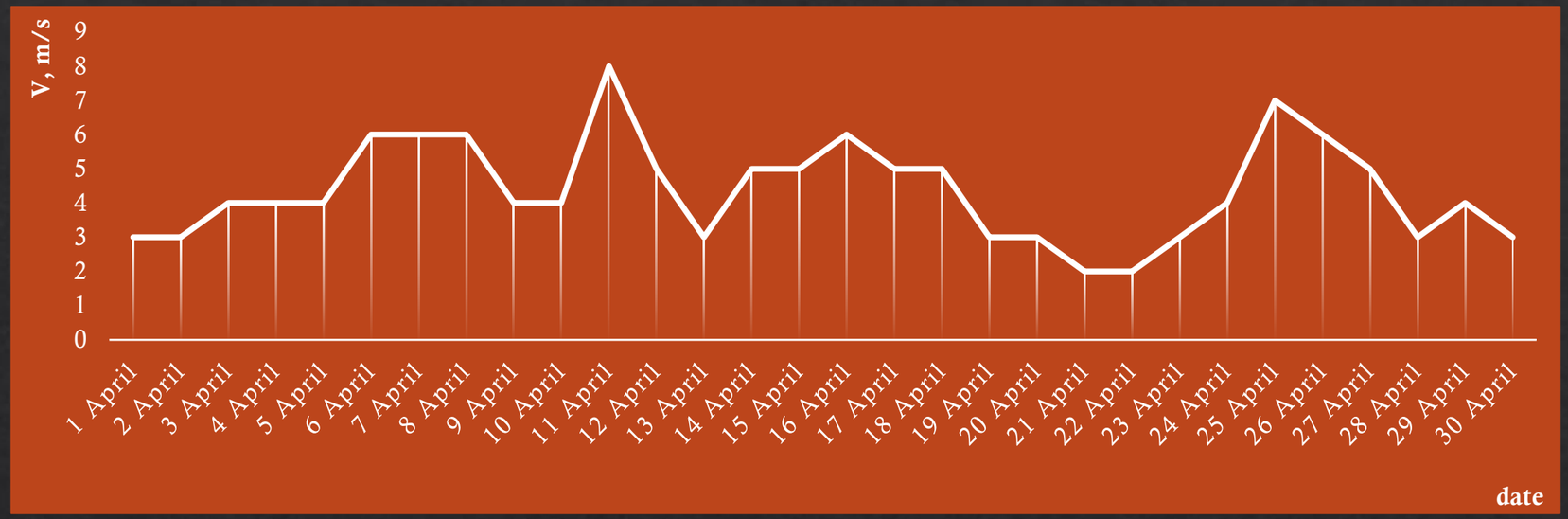
According to the climatic norm, the number of days with relative humidity of 80% or higher is 9.2 days for April and 6.8 days for May. In April 2025, only 2 such days were recorded, and in May 2025, 4 days, both significantly below the climatic norm.

average daily wind speed values

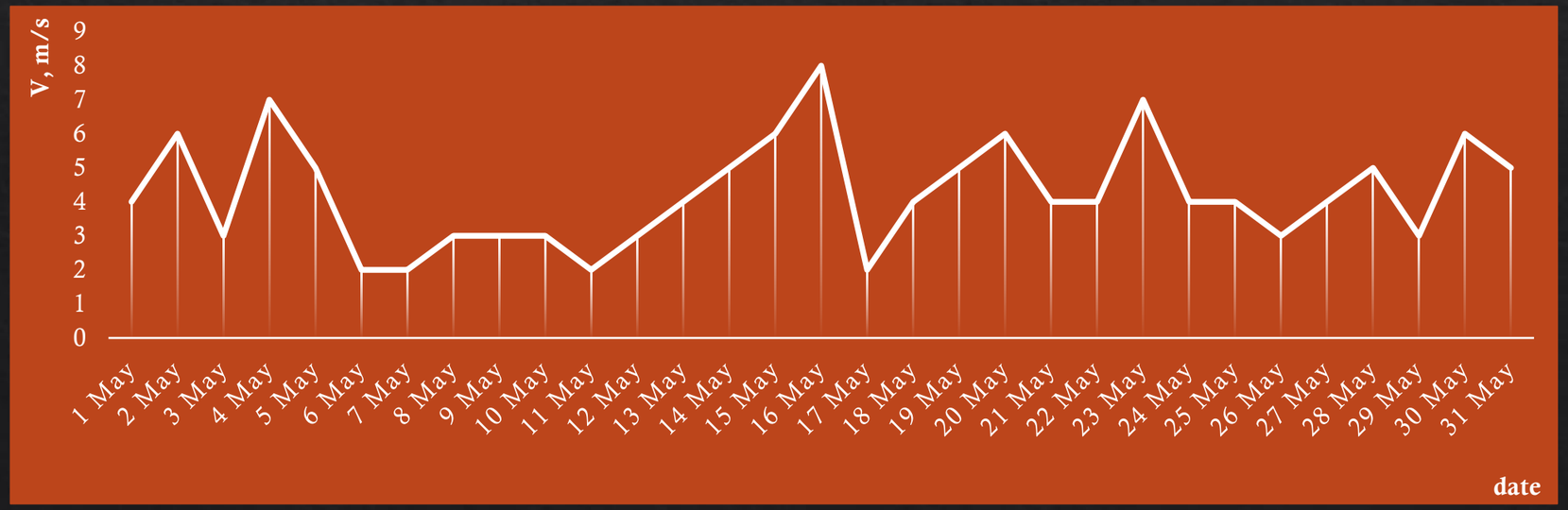
The average monthly wind speed for the period of the latest climate norm for April is 2.8 m/s.

Wind speed in April 2025 was significantly higher than the climatic norm.

The average monthly wind speed in April 2025 is 4.4 m/s.

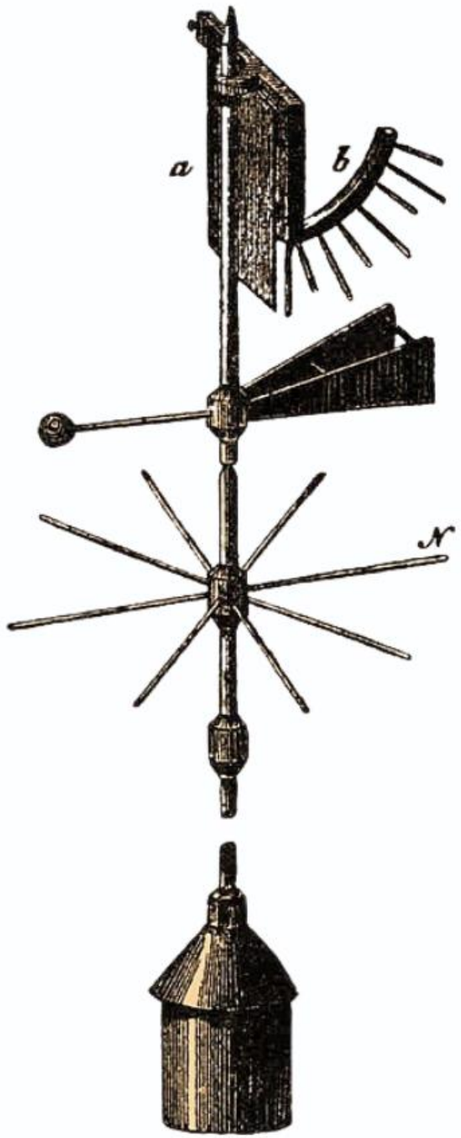


The average monthly wind speed in May 2025 is 4.3 m/s.



The average monthly wind speed for the period of the latest climatic norm for May is 2.5 m/s.

Wind speed in May 2025 was significantly higher than the climate norm.



Analysis of Daily Average Wind Speed

The highest value

April	8 m/s	(11.04)
May	8 m/s	(16.05)

The lowest value

April	2 m/s	(21-22.04)
May	2 m/s	(06, 07, 11, 17.05)

It should be noted that in April and May 2025, winds with speeds of 10 m/s or higher were not recorded, despite the climatic norm indicating a recurrence rate of 1.2% in April and 0.5% in May.

Precipitation Distribution

Climate Normal

April - 28 mm.
May - 29 mm.

Actual precipitation amount in 2025

April – 21.2 mm.
May – 90.0 mm.

Conclusion

There is a noticeable redistribution of precipitation throughout the year.
For example, precipitation in April was nearly 30% below the climatic norm, while in May it exceeded the norm by 310%.
Such significant variability adversely affects urban green spaces.

Environmental consequences of climate change

Impact on green spaces

Sharp fluctuations in temperature and precipitation adversely affect campus and urban green spaces, causing stress and, in some cases, plant mortality.

Change in species composition

Rising global temperatures can alter the species composition of plants and animals, disrupting ecosystem stability and resilience.

Invasive species

The risk of invasive species spreading and displacing native flora and fauna is increasing, which threatens biodiversity and ecosystem health.

Air and water quality

Climate change is contributing to the deterioration of air and water quality, directly affecting human health and the proper functioning of ecosystems.

Preliminary Findings

1

Significant impact

Climate change is profoundly affecting the urban environment, necessitating urgent and comprehensive action

2

Constant monitoring

The necessity of continuous monitoring and adaptation to climate change to ensure sustainable development.

3

Evidence-based decisions

The importance of integrating all available meteorological and climatic data to make informed decisions in urban management and ecology.

Changes in the Urban Climate of Odesa as a Result of Military Actions: a Student Scientific Perspective

The war related changes of Odesa urban microclimate are primarily driven by the disruption of the traditional urban ecological structure, reduced industrial and transport activity, increased areas of destruction, and alterations in the heat balance.

Military actions disrupt the microclimatic balance of the coastal zone, affecting local circulation processes. Damage to green spaces, the cessation of their maintenance, and reduced water supply influence the soil's moisture retention capacity, which alters the hydrothermal conditions of the city.

Equally significant is the reduction in funding and the destruction of meteorological infrastructure leading to decrease in the density of regular observations in the city. This hampers both the timely analysis of weather dynamics and the long-term monitoring of climate changes.

CONCLUSIONS

The urban climate of Odesa, like that of other Ukrainian cities, is undergoing indirect transformations under the influence of military actions.

Military actions intensify and exacerbate the impacts of climate change that are already manifesting in the city. The continuous destruction of the urban environment makes addressing climate change and combating its consequences increasingly difficult. In conditions of high population density and strong dependence on engineering infrastructure, cities are particularly vulnerable to such challenges.

The main consequences include changes in thermal and wind regimes, atmospheric pollution patterns, and urban ventilation features. To fully understand these processes, it is essential to restore and support climate monitoring—particularly through remote sensing methods and citizen science initiatives.