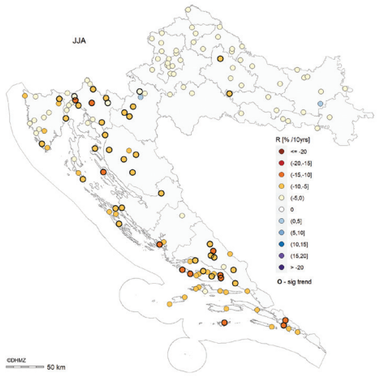
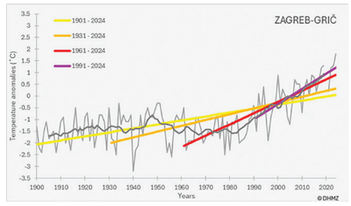
OBSERVED CLIMATE CHANGE





Consistent warming is observed in Croatia:

- the annual mean air temperature is increasing by 0.2 °C to 0.5 °C per decade, especially in the summer,
- average minimum and maximum air temperatures are also increasing across all seasons and on an annual basis,
- frequency of warm days is increasing,
- frosty/cold days are becoming less frequent.

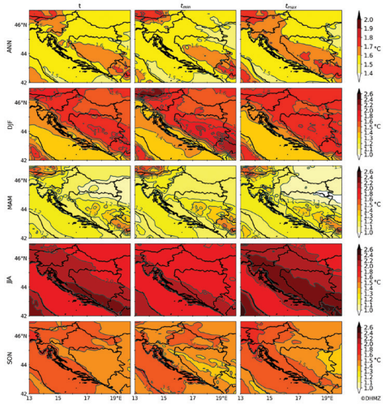
Changes in precipitation amounts show pronounced seasonal and regional differences:

- a decrease in summer precipitation is observed, especially along the Adriatic coast and its hinterland,
- autumn precipitation is increasing at most stations, particularly in central Croatia.

Air temperature trends for 35 stations and precipitation trends for 143 stations, including extreme indices for 1961–2020, are available in the *Selected Chapters of the Eighth National Communication of the Republic of Croatia Under the United Nations Framework Convention on Climate Change (UNFCCC).*

Air temperature for four periods beginning in 1901, 1931, 1961, 1991 (all ending in 2024) at the Zagreb-Grič station shows an increasingly rapid rise in temperatures in the recent past, with the steepest trend observed in 1991–2024. Anomalies are compared to the 1991–2020 average.

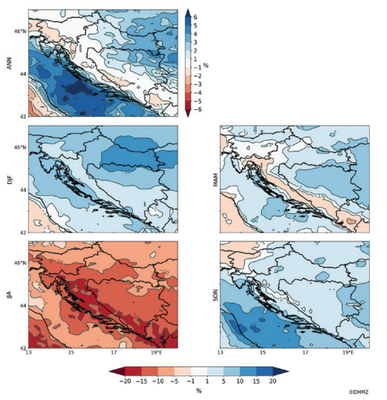
EXPECTED CLIMATE CHANGE



According to simulations of regional climate models (EURO-CORDEX) for the RCP4.5 scenario, a significant increase in air temperatures is expected in Croatia in the mid-21st century (2041–2070) compared to the historical climate (1981–2010).

Across the Croatian territory, the following changes are expected:

- an increase in mean annual and seasonal temperatures in all regions,
- the largest increase in the mean air temperature in the summer, ranging from 1.2 to 2.4 °C,
- minimum and maximum temperatures also show the highest increase in the summer, 2.0–2.4 °C,
- the number of warm days per year will increase by 12–24, especially in the summer, but also in the spring (up to 5 days) and autumn (2.5–7.5 days).



Changes in precipitation in the period 2041–2070 (P1) compared to 1981–2010 (P0) show:

- a small change in annual precipitation amounts, ranging from -1 to +5%,
- future changes similar to observed data trends,
- a decrease in precipitation in the summer and a slight increase in other seasons,
- summer reduction: 5–10% in northern and eastern Croatia, 15–20% along parts of the coast and in mountainous regions,
- winter increase across the whole country, particularly in eastern Croatia (10–15%).

The change in precipitation amounts in the period 2041–2070 compared to 1981–2010 is expressed as a relative change: (P1-P0)/P0, in percentages. For more information, see the *Selected Chapters of the Eighth National Communication of the Republic of Croatia Under the United Nations Framework Convention on Climate Change (UNFCCC).*

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CLIMATE AND CLIMATE CHANGE

REPUBLIKA HRVATSKA
REPUBLIC OF CROATIA

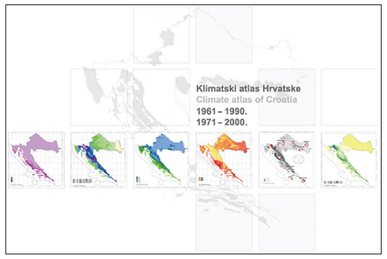
DRŽAVNI HIDROMETEOROLOŠKI ZAVOD
CROATIAN METEOROLOGICAL AND HYDROLOGICAL SERVICE

Year of publication 2025

Monitoring climate and climate change is an important task of a national meteorological service.

Climate change in Croatia is primarily characterized by an increase of mean, minimum, and maximum air temperatures, longer lasting and more intense heatwaves, an increasing number of warm days, and a decreasing number of cold days. Changes in the precipitation regime include a summer decrease in precipitation amounts and an increasing frequency of dry days, and an autumn increase in precipitation amounts and the number of very wet days, as well as the maximum daily precipitation amounts.

CLIMATE ATLAS OF CROATIA 1961–1990, 1971–2000

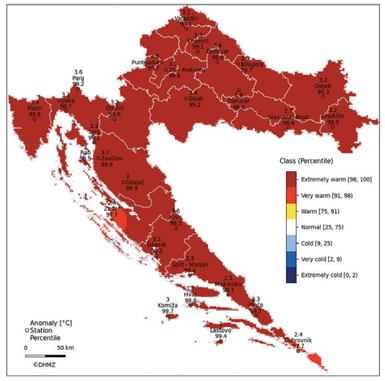


A fundamental publication about climate characteristics and climate potential of Croatia contains:

- maps showing the spatial distribution of climatological elements for the reference normal 1961–1990,
- annual cycle graphs for ten locations,
- tables for 20 locations and two climate periods,
- descriptions and interpretations of Croatia's climate characteristics,
- the maps are also available in raster format for GIS users.

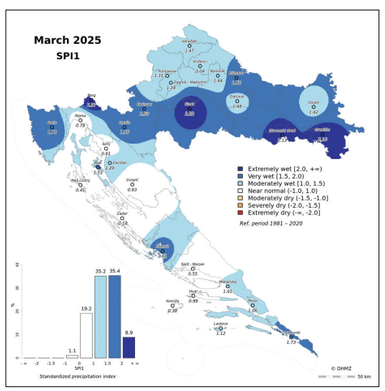
Climate characteristics will soon be supplemented with a climate atlas for the new climatological standard normal 1991–2020.

CLIMATE MONITORING



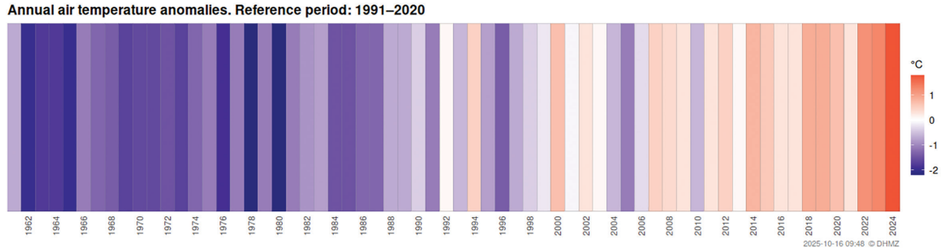
Climate variability is monitored on daily, monthly, seasonal and annual time scales:

- cumulative daily precipitation amounts and anomalies,
- monthly anomalies of mean air temperature and precipitation amount relative to multiannual averages,
- Standardized Precipitation Index (SPI),
- Standardized Precipitation Evapotranspiration Index (SPEI).



Analyses and indices are used in technical reports, studies, and media statements and featured in the following DHMZ publications:

- monthly *Meteorological and Hydrological Bulletin (Meteorološki i hidrološki bilten),*
- annual *Reviews (Prikazi),*
- *Applied Scientific Research at the Croatian Meteorological and Hydrological Service (Primijenjena znanstvena istraživanja u Državnom hidrometeorološkom zavodu).*

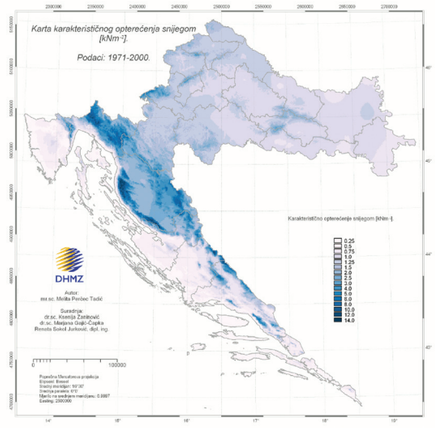


Graphic inspired by the Climate Stripes created by Professor Ed Hawkins, University of Reading

Climate stripes for Croatia, based on data from 31 main meteorological stations for the period 1961–2024 show:

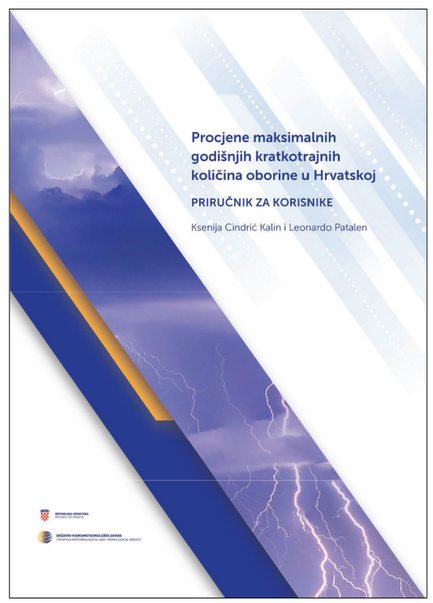
- air temperatures after 2000 are predominantly above the 1991–2020 average,
- 2024 was the hottest year, with an anomaly of about 1.8°C above the 1991–2020 average, followed by 2023, 2022, 2019 and 2018,
- nine out of ten hottest years are recorded after 2011.

CLIMATE EXTREMES



The cartographic bases for the *National Annexes to Eurocode 1: Actions on structures* are an important part of technical regulations impacting the stability and safety of civil engineering structures in Croatia. Their purpose is to design structures with long lifespans that are exposed to rare but significant meteorological events. The annexes contain:

- maps of minimum and maximum air temperature for a return period of 50 years,
- maps of maximum wind speed,
- map of characteristic snow load.



Analysis of maximum annual short-term precipitation amounts is crucial for designing structures that are required to endure intense precipitation events, such as drainage systems.
The *User Manual* presents an analysis of data from 54 meteorological stations for the period 1961–2020, encompassing maximum precipitation amounts for durations between 5 minutes and 24 hours.