Weather, water and air

2025

Czech Hydrometeorological Institute

CHMI operates


Photo: Archive CHMI

32
synoptic meteorological stations

207
automated meteorological stations

178
automated rain gauge stations

1
aerological station

2
meteorological radars

2
sodars

48
surface water quality monitoring locations (sediments, biota, suspended sediments)

285
manual rain gauge stations

4
windprofilers

537
surface water limnographic stations

1 518
hydrogeological wells

317
springs

60
automated snow gauge stations

22
automated snow pillows

52
air pollution monitoring stations with manual programme

53
air pollution monitoring stations with automatic programme

44
air pollution monitoring stations with manual and automatic programmes

727
groundwater quality monitoring sites

14
rain water quality monitoring stations

27
phenological monitoring locations

Meteorological stations

Hydrology station network

Air quality monitoring

Products and services


Photo: Archive CHMI

Being a semi-autonomous organisation the CHMI serves as the Czech Republic's central government institution for the fields of air quality, hydrology, water quality, climatology and meteorology as specialist services provided to state administration as a priority.

Institute structure reflects regional and disciplinary classification. Four specialized departments, meteorology and climatology, hydrology, air quality and forecasting service, are complemented by an economic and administrative department and a separate IT department for technical support of computational and communication activities. Regional activities are carried out by CHMI branch offices in Prague, České Budějovice, Pilsen, Ústí nad Labem, Hradec Králové, Brno and Ostrava.

Numerical weather forecasting model – ALADIN

Weather forecasts ranging from nowcasting, short-term, medium-term and long-term to special meteorological forecasts

- Meteorological support in the field of air transport (Air Navigation Services, aerial observers, airport management)
- Meteorological support in the field of road network management and maintenance
- Meteorological support in the field of agriculture
- Meteorological support for the operation of nuclear energy facilities

Prediction and warning systems

- Early warning system (EWS)
- Integration warning system service

Flood reporting and forecasting service

Smog warning and regulation system

Information systems – web pages

- National greenhouse gas emission inventory system
- Climatological database CLIDATA
- Public administration information system VODA
- ISVS system in the field of hydrology (ARROW, HYDROFOND)
- Air quality information system (ISKO)

Calibration laboratory

Expert studies

Communication and promotion

- Info web https://info.chmi.cz
- Social networks – Facebook, Twitter, YouTube, Instagram, LinkedIn
- Yearbooks – **meteorology and climatology**, **hydrology**, **air quality** – https://info.chmi.cz/rocenka
- Press releases, materials for media
- Popularization events – open day, science festival, researchers' night, etc.

Mobile application Weather CHMI

Expert assessments and activities in the fields of competence

Content

Photo: Adobe Stock

7

December was very dry. The average precipitation amount in the Czech Republic was only 18 mm, which is 39% of the 1991–2020 normal. Thus, it was the 3rd driest December since 1961.

14–15

The most striking episode of the polar aurora over the Czech Republic in 2025 occurred on November 11 and 12.

9

In deeper groundwater circulation, the water level in September dropped to a strongly subnormal annual minimum.

22

In mid-August, three smog situations were declared due to elevated ground-level ozone concentrations, namely in the Prague agglomeration, and in the Ústí nad Labem and Central Bohemian regions.

14

On July 2, the highest temperature of 2025 (37.4 °C) was recorded at the Husinec, Řež station. It was the only day of the year when the temperature in our territory reached 37 °C or higher.

6

January was warmer than normal, with the monthly mean air temperature in the Czech Republic 1.8 °C higher than the 1991–2020 normal.

7

February was the driest month of the year in terms of precipitation. An average of only 11 mm of precipitation fell across the Czech Republic, which is 30% of the normal amount, and it was the 4th driest February since 1961. Following the very low precipitation, low temperatures, and unfavorable conditions for the dispersion of air pollutants, elevated – and in some locations even above-limit value – concentrations of PM_{10}, were recorded in February 2025.

8

The spring months were the driest part of the year in terms of runoff in most catchment areas. The year 2025 can be assessed as significantly below average in terms of discharge across the entire territory of the Czech Republic.

6

May was the coldest month of the year compared to the normal with an anomaly of monthly mean air temperature in the Czech Republic of −1.9 °C.

10–11

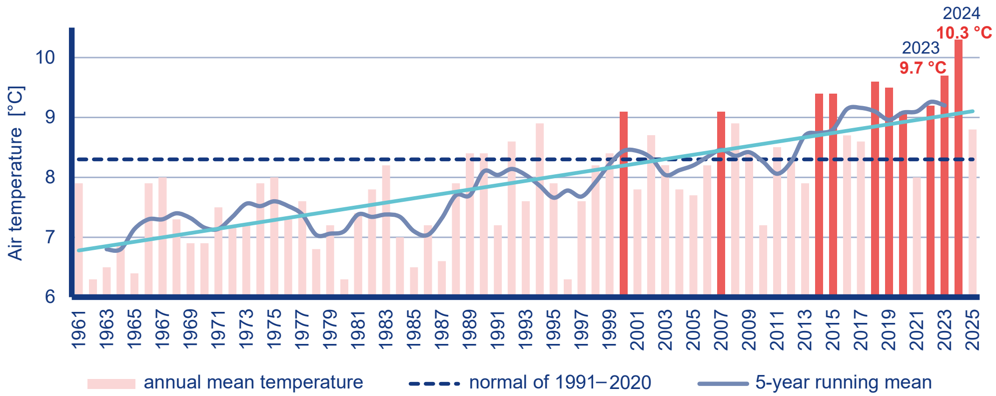
On June 5, the largest hailstones of the year with a diameter of 6.5 cm were recorded in Nový Hrozenkov. On the same day, a strong downburst hit Zděchov in the Vsetín region.

Content

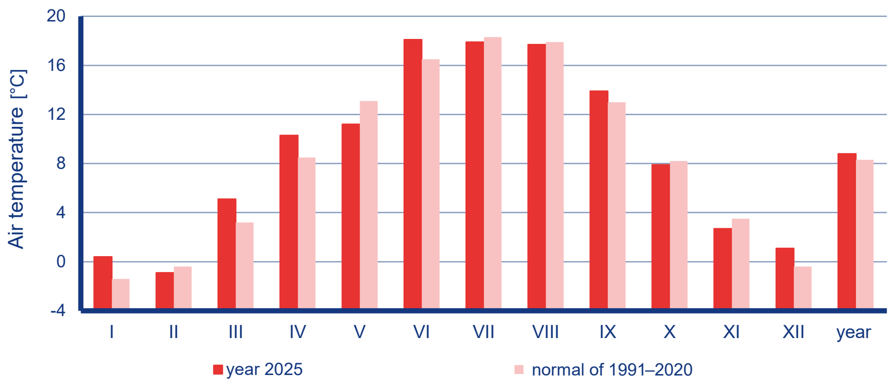
Air temperature

The year 2025 was near-normal in terms of annual mean air temperature. The annual mean air temperature over the area of the Czech Republic (8.8 °C) was 0.5 °C above the 1991–2020 normal.

The year 2025 was the 13th warmest according to the annual mean air temperature since 1961. The last time a lower mean temperature was recorded was in 2021 (8.0 °C). The warmest year on record remains record-breaking warm 2024 (10.3 °C) followed by 2023 (9.7 °C), 2018 (9.6 °C), 2019 (9.5 °C).



Annual mean air temperature over the area of the Czech Republic [°C] from 1961–2025 in comparison to the 1991–2020 normal and fitted linear line (blue).



Annual and monthly mean air temperature over the area of the Czech Republic [°C] in 2025 in comparison to the 1991–2020 normal.

Temperature Conditions in 2025

Half months of 2025 recorded a positive and half moths recorded a negative anomaly of the monthly mean air temperature in the Czech Republic relative to the 1991–2020 normal. Warm or very warm months occurred mostly in the first half of the year, although we also recorded a cold May. Monthly mean air temperature in May was 1.9 °C below normal. In the second half of the year, all months had a near-normal mean temperature.

The warm or very warm months compared to normal were January (anomaly of +1.8 °C), March (anomaly of +1.9 °C), April (anomaly of +1.8 °C), and June (anomaly of +1.6 °C). June was the warmest month of the summer. A very warm period occurred from June 22 to July 6, when daily maximum air temperatures in our territory frequently exceeded 30 °C or even 35 °C on several days and stations. December, with a mean air temperature of 1.1 °C (anomaly of +1.5 °C), was on the borderline between a near-normal and warm month.

Precipitation

In the year 2025, the Czech Republic received below-normal precipitation amount. The mean annual precipitation amount over the area of the Czech Republic was 571 mm (83% of the 1991–2020 normal).

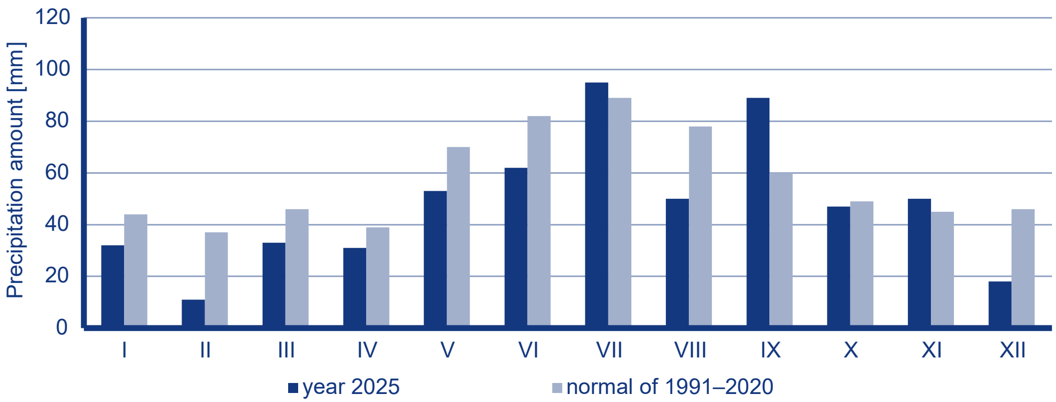
It was the 7th driest year in a series of the annual precipitation amounts since 1961. The last time a lower annual precipitation amount was recorded was in 2015 (532 mm, 78 % of normal) and 2018 (522 mm, 76 % of normal).


Photo: Adobe Stock

Precipitation in the Year 2025

In most months of 2025, the Czech Republic received lower precipitation amounts than the 1991–2020 normal. The first half of the year was exceptionally dry. From January to June 2025, an average of 222 mm of precipitation fell across the country (70% of normal), marking the lowest precipitation total for this period since 1961.

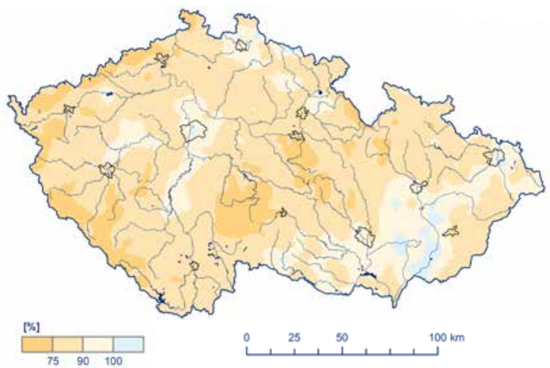
Only September was wetter than normal (148% of normal). Slightly higher precipitation amounts than normal were recorded also in July (107% of normal) and November (111% of normal). Dry or very dry months were February (30% of normal), August (64% of normal) and December (39% of normal). Thus, the precipitation deficit has gradually increased since the beginning of the year, with higher precipitation totals in September providing only a slight relief.



Mean monthly precipitation amount over the area of the Czech Republic [mm] in 2025 in comparison to the 1991–2020 normal.

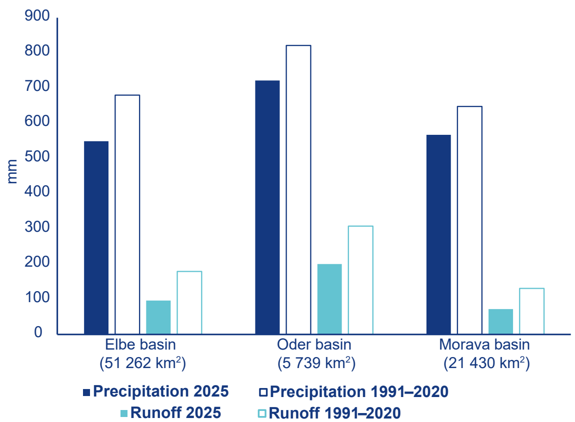
Spatial Distribution of Precipitation

In 2025, Bohemia received 554 mm of precipitation (81% of normal), while Moravia and Silesia received 606 mm of precipitation (88% of normal). The annual precipitation amounts were below normal in all regions of the Czech Republic. The wettest regions in comparison to normal were South Moravian region (91% of normal). The driest regions compared to normal were western and eastern Bohemia, namely the Karlovy Vary, Plzeň, Ústí nad Labem, Pardubice and Vysočina regions (less than 80% of normal).



Annual precipitation amount in 2025 in % of the 1991–2020 normal.

Runoff conditions



Comparison of precipitation and runoff for 2025 with long-term averages for the period 1991–2020 in the watersheds of major watercourses.

In terms of flow rates, 2025 can be characterized as significantly below average across the entire territory of the Czech Republic.

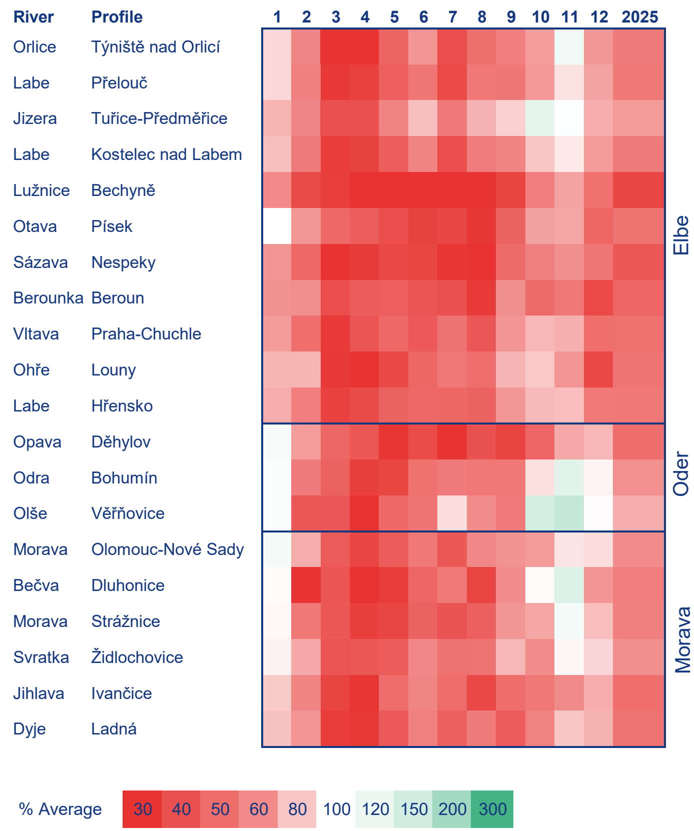
Annual runoff

Compared to long-term average flows for the period 1991–2020, annual runoff was well below average. The Elbe basin saw 54% of the long-term average, the Odra basin 65%, and the Morava basin 55%. Average annual flows were among the lowest on record in long-term observations, particularly in the Elbe River basin. On the Vltava River in Prague, this was the second-lowest annual flow since 1901; on the Orlice River in Týniště and the Lužnice River in Bechyně, it was even a record low since 1911.

Distribution of runoff throughout the year

Throughout the year, average monthly flows ranged from 35% (April) to 91% (November) of their long-term values. The most significant fluctuation in flows was recorded on the Olše River at the Věřňovice station, where the April flow was exceptionally below average (30%), while in November it reached a strongly above-average value (164%).

In January, river flows were mostly average, but from February through September they ranged from below average to well below average, and in some places were even exceptionally low. Compared to long-term monthly averages, the spring months of March and April were the driest part of the year in terms of runoff in most river basins. In October, due to significant rainfall events in the Krkonoše and Beskydy Mountains, flows increased, particularly on the Jizera and Olše rivers, with the average monthly flow rising significantly above the long-term average. November was the wettest month of 2025 thanks to several significant rainfall events, particularly in Moravia. In December, however, flows declined again.



Monthly runoff in 2025 as a percentage of the long-term average monthly runoff for the period 1991–2020.

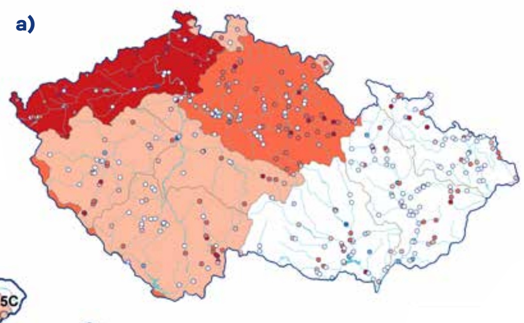
Groundwater levels

In the shallow aquifer, the groundwater level in 2025 was generally moderately below normal. In the deeper aquifer (areas of water management significance), conditions were generally well below normal.

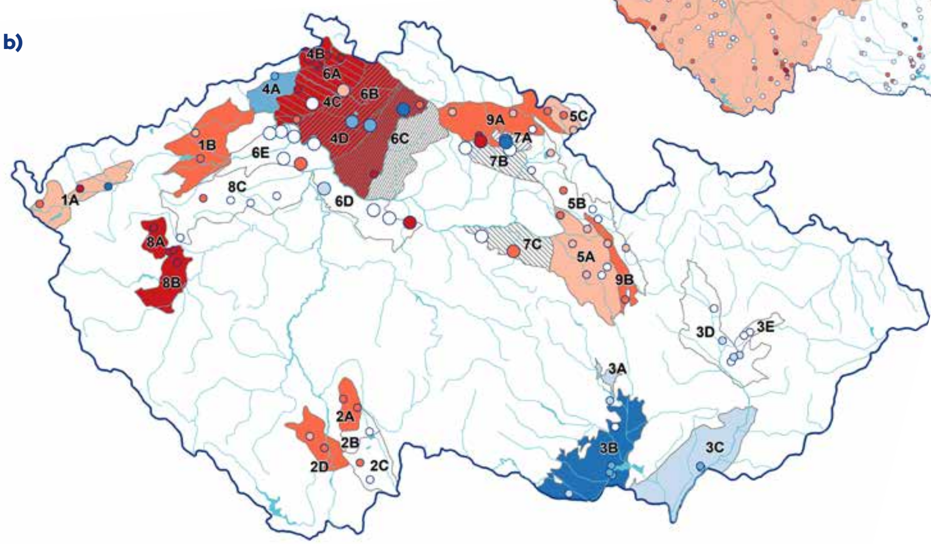
Shallow Wells

The beginning of the year was generally normal, with the annual maximum occurring in January. From March onward, the level gradually dropped to moderately to extremely below-normal values (in the Ohře, Lower Elbe, and other Elbe tributary basins). The exception was the Dyje basin, where normal conditions persisted until June. A moderately below-normal annual minimum occurred in August. In September, the water level began to rise, and from October through the end of the year, normal conditions prevailed across most of the region, with the exception of the Ohře, Lower Elbe, and other Elbe tributary basins, where the water level was much below normal in December.

a)



b)



extremely below normal
much below normal
moderately below normal
normal
moderately above normal
much above normal
extremely above normal

HGR – cenoman

extremely below normal
much below normal
moderately below normal
normal
moderately above normal
much above normal
extremely above normal

HGR group
1 – Under the Ore Mountains basins
2 – South Bohemian basins
3 – Moravian Tertiary
4 – North Bohemian Cretaceous basins
5 – East Bohemian Cretaceous basins
6 – Nort Bohemian Cretaceous basins – Cenomanian
7 – East Bohemian Cretaceous basins – Cenomanian
8 – Permocarboniferous basins of the Western and middle Bohemia
9 – Permocarboniferous basins of the Eastern Bohemia

Boreholes
HGR – main layer HRG cenoman

Groundwater levels in 2025 compared to the 1991–2020 reference period: a) in shallow wells in sub-basins, b) in deep wells in groups of hydrogeological regions (HGR).

Deep wells

From a normal annual maximum in January, groundwater levels declined to a much below-normal annual minimum in September and then increase slightly to moderately below normal by December. However, regional differences were observed. In the North Bohemian Cretaceous basins, levels remained extremely below normal throughout the year, even falling below the 1991–2020 reference-period minima. Much to extremely below-normal conditions also prevailed in the Permocarboniferous of the Western and middle Bohemia, as well as Eastern Bohemia. By contrast, levels in the Moravian Tertiary were much above normal from January to March and normal thereafter.

Convective season

The 2025 convective season was one of the least active in recent years. Compared to previous years, June and August in particular saw very few thunderstorms. August, in particular, saw an exceptionally low number of thunderstorms over our territory. In parts of the Olomouc and Moravian-Silesian regions, we did not even record a single day with a thunderstorm during the month. Nothing like this had happened during the summer in the previous five years. The number of thunderstorm warnings issued in August was even lower than in the following month of September. June was also a very quiet month, despite typically being one of the most active months for thunderstorms. In June 2025, a total of 99,381 lightning strikes were recorded over our territory according to the Blitzortung detection network; the previous year, that number was nearly double.

One of the reasons last year's season was so unremarkable was the lack of significant moisture, especially in the lower atmosphere. Thunderstorms were often weaker and less extensive precisely because of the lack of available convective energy, which is highly dependent on moisture. Furthermore, the second half of the summer was marked by more stable weather without significant triggering factors, even from a synoptic perspective. Despite the "weak" season, however, we still recorded several notable events.

Photo: Adobe Stock

The largest hailstones of 2025 measured over 5 cm

The largest hailstones of last year occurred on June 5, 2025, around 8:30 p.m. in Nový Hrozenkov in the Vsetín region. The largest documented hailstone was about 6.5 cm in size. Hailstones of this size occurred only very locally within this village during a very intense supercell that was moving in from the west. It is worth noting that hailstones larger than 5 cm are produced almost exclusively by supercell storms.

A photo of damage in the forests behind Zděchov, indicating an intense downburst. Source: H. Macek.

Despite the size of the hailstones in this event, however, we can still assess last year as below average in terms of the occurrence of large hailstones. Hailstones larger than 5 cm were recorded only during this event.

Zděchov Downburst

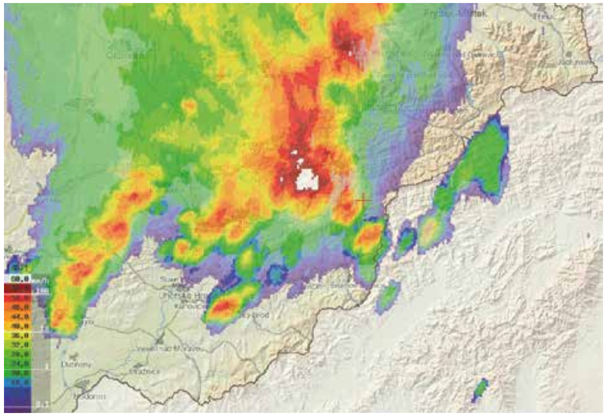
Hailstones were not the only phenomenon brought by the aforementioned event of June 5, 2025. Just a few kilometers to the southwest, about 10 minutes earlier, a local downburst occurred near the village of Zděchov in the Javorníky Mountains in the Vsetín region. A convective system was passing through the area, which at that time began to form into the typical radar reflection structure of a bow echo. It is precisely at the leading edge of a bow echo that local downbursts often occur – plunges of cold air causing extensive wind damage. In Zděchov itself, we recorded significant damage, and we also have video footage from the Koliba Zděchov camera, which provides precise information on when the event occurred. It is clear from the video and the nature of the damage that the force acted in a single direction; therefore, this was not a tornado, but indeed a downburst. Damage to the roofs of houses was also reported in the village, and the local cemetery was damaged. Localized but significant damage to the forests was also documented outside the village. Based on photographic documentation of the damage, we can estimate the damage at IF 1.5 according to the IF scale (International Fujita Scale), which corresponds to a wind speed of approximately 180 km·h^{-1} (around 50 m·s^{-1}).

Torrential Rainfall on the Ground

On July 13, 2025, we recorded a very unusual case in which a relatively weak storm (with precipitation totals of “only” around 20 mm according to radar estimates) near Ostrov u Macochy caused underground water to rise, trapping a group of eight people in a local underground via ferrata. The incident required the presence of firefighters, who fortunately rescued the group quickly, and the incident resulted in no injuries. This situation, however, showed us that no one is completely safe from storms and their effects anywhere – not even underground.

Tornadoes

The number of recorded weaker tornadoes was also low during the 2025 season. Although a suspicious event occurred in southern Bohemia (Vyšný) in May – which was initially classified as a tornado – a retrospective assessment suggests it was more likely a downburst. A confirmed tornado did not occur until September 13 in the Hodonín region (on the border with Slovakia, or just across the border). The tornado appeared in a densely forested area along the Morava River and thus caused no property damage. It was also documented on video. This was a typical case of a weak tornado, of which several occur in our country throughout the year.



A radar image of a developing convective system (bow echo) approximately at the time the downburst occurred in Zděchov in the Vsetín region. The red cross marks the location of Zděchov.

A photo of last year’s largest recorded hailstone, with a diameter of 6.5 cm, from Nový Hrozenkov. Source: Šimon Babica/Facebook.

Drought

Photo: Archive CHMI

Groundwater

Much above-normal conditions in the previous year mitigated the overall impact of drought in 2025, particularly during the first quarter. Shallow-groundwater drought was more pronounced in Bohemia than in Moravia, especially in the Ohře, Lower Elbe and other Elbe tributary basins, where annual conditions were extremely below normal. In the deep groundwater circulation, much below-normal conditions persisted from April to December. Water levels in the North Bohemian Cretaceous basins and the Permocarboniferous basins of Western and Central Bohemia remained extremely below normal throughout the year; in the North Bohemian Cretaceous basins, they even fell below the 1991–2020 reference-period minima.

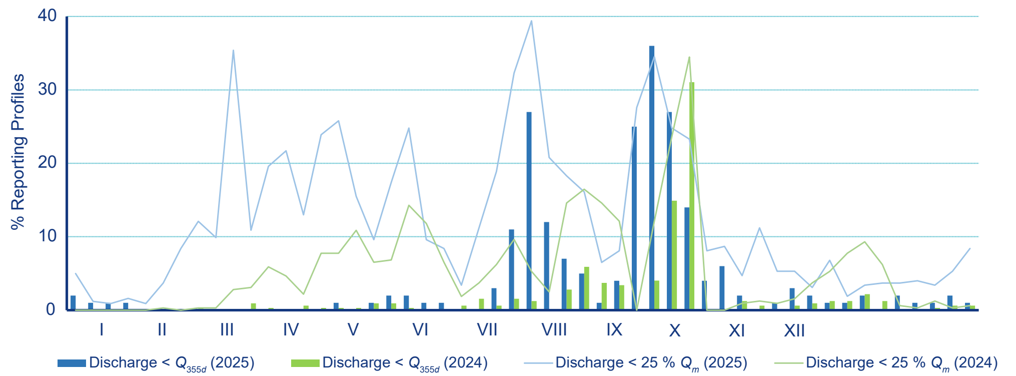
* Q_{355d} – represents the flow rate that was reached or exceeded on average 355 days a year at a given profile (relative to the reference period 1991–2020)

** SGI – Standardised Groundwater Index, which represents the groundwater level in shallow and deep boreholes

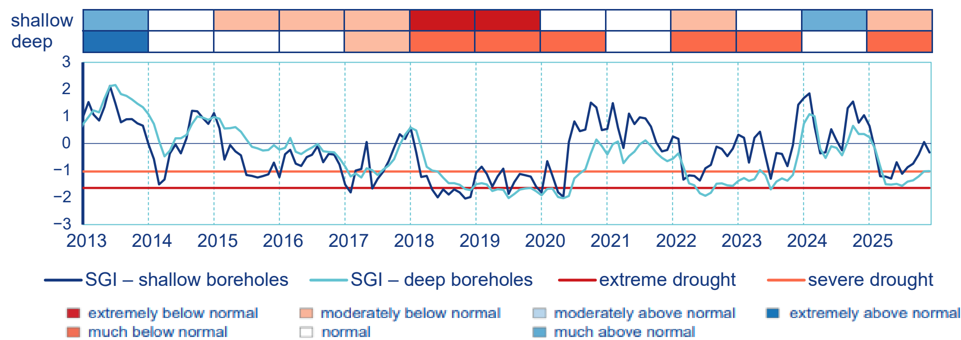
The year 2025 was significantly drier than the previous year, both in terms of surface water and in the shallow and deep groundwater systems.

Surface Waters

Compared to the previous year, 2025 was significantly drier in terms of hydrological drought. From January until mid-June, drought was almost absent across the Czech Republic; however, streamflow was much below normal, particularly during the spring months. From mid-June onwards, the number of profiles with discharges indicating drought (< Q_{355d}) or flows below 25% of Qm gradually increased. Rainfall at the end of July temporarily interrupted the drought, but it soon returned and peaked in mid-August, when drought was recorded at about 35% of profiles. Heavier rainfall at the end of August caused a runoff response, and the number of profiles indicating drought began to decline. From mid-September until the end of the year, drought occurred only sporadically, affecting less than 2% of profiles.



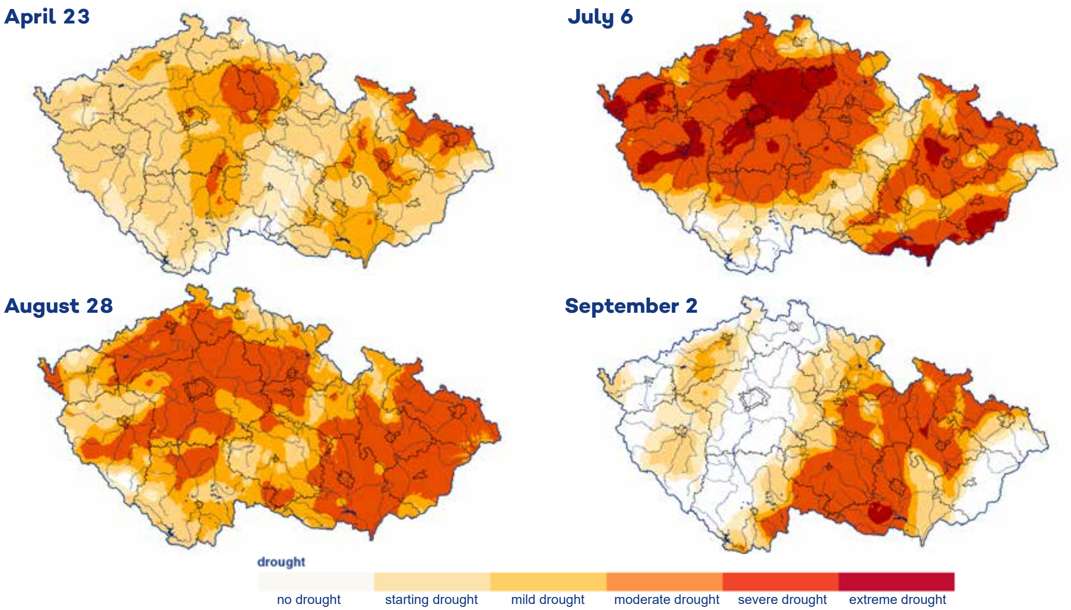
Weekly drought trends (Q_{355d}*) at 322 monitoring sites across the Czech Republic in 2024 and 2025. Q_m – monthly flow.



Monthly SGI index values. The colored bands represent the annual SGI value for shallow (upper band) and deep wells (lower band).**

Soil drought

In terms of soil drought, the year 2025 was characterized by significant short-term episodes, the intensity of which peaked during the summer. The most significant episode of soil drought was recorded at the turn of June and July, when severe to extreme soil drought occurred across a large part of the Czech Republic.



State of soil drought in the surface layer of 0–40 cm on April 23, July 7, August 28 and September 2, 2025.

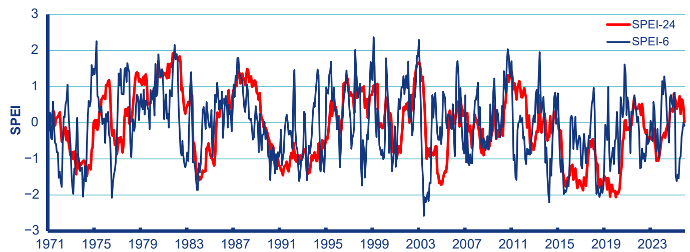
Soil drought conditions in the 0–40 cm surface layer showed considerable temporal and spatial variability throughout the year. In April, mild to severe drought occurred across most of the country, which temporarily eased in May, with the exception of southern Moravia. The situation deteriorated significantly in June and especially in early July, when severe to extreme drought spread to most of Bohemia and parts of Moravia. Throughout August, a significant soil moisture deficit persisted, particularly in the northern half of Bohemia and in Moravia. Following heavier rainfall in early September, the drought in Bohemia eased, while severe to extreme drought continued to occur in some areas of Moravia and Silesia.

* SPEI index (Standardized Precipitation-Evapotranspiration Index) is based on the difference between precipitation amount and potential evapotranspiration. It is a standardized quantity, which means its values can be compared across various regions and periods.

SPEI can be calculated for periods of various lengths. In this case values of SPEI-6 (6 months) and SPEI-24 (24 months) are given. SPEI-6 can be used for evaluation of agricultural drought, while SPEI-24 is used to assess the course of long-term drought.

Course of SPEI* indices

From September 2024 through the end of 2025, the SPEI-24 remained in positive values and thus did not indicate drought conditions. However, due to low precipitation totals in 2025, the index gradually declined to zero by the end of the year. SPEI-6 index was considerably in negative values from March to August 2025.



Course of SPEI indices calculated for 6 and 24 months from 1971–2025 for the region of the Czech Republic. The lower the values, the more intense the drought.

Map of extreme events

The most prominent episode of polar aurora in 2025 over the Czech Republic occurred on November 11 and 12. The polar aurora was well observable especially in the mountains and above the inversion layer, where clear weather prevailed.

Photo: Adobe Stock

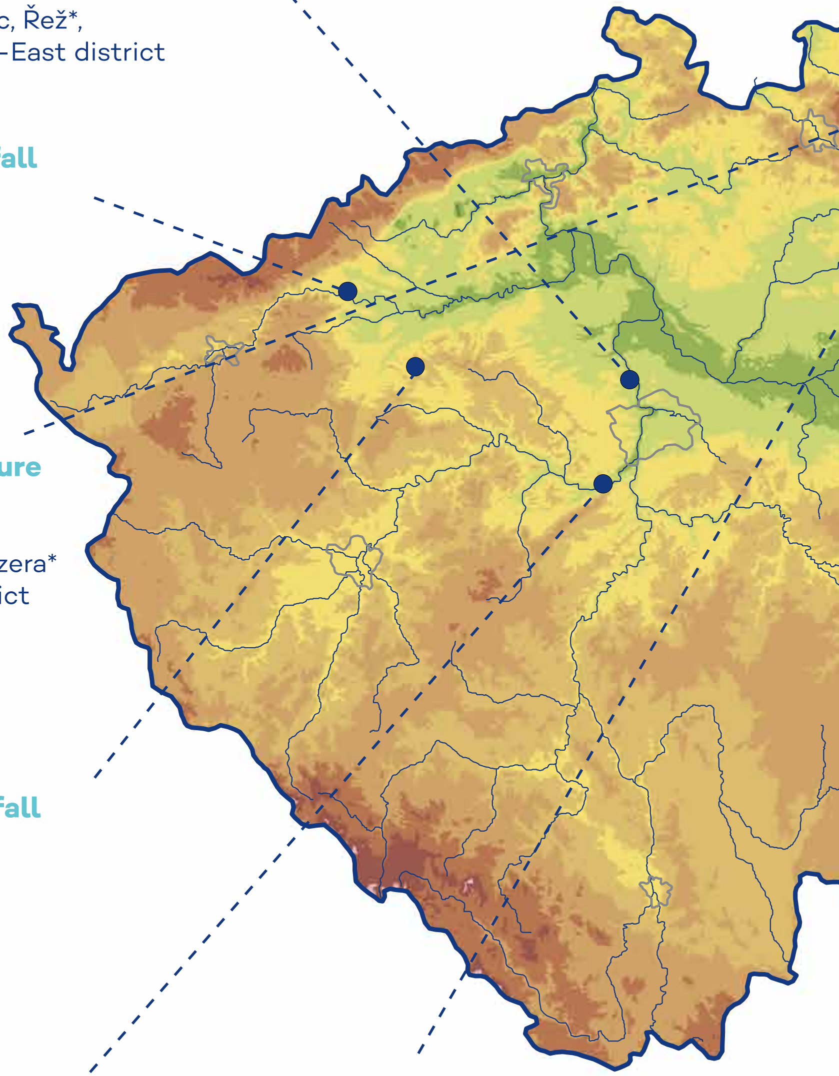
- **Tropical (hot) day – day with a maximum air temperature of at least 30.0 °C**
- **Ice day – day with a maximum temperature below 0.0 °C (all-day freezing temperatures)**
- **Sunny day – ratio between actual and astronomically possible sunshine duration larger than 0.8**

Maximum air temperature
37.4 °C
July 2, 2025
Husinec, Řež*,
Prague-East district

Highest hourly rainfall
41.6 mm
June 15, 2025
Tušimice
Chomutov district

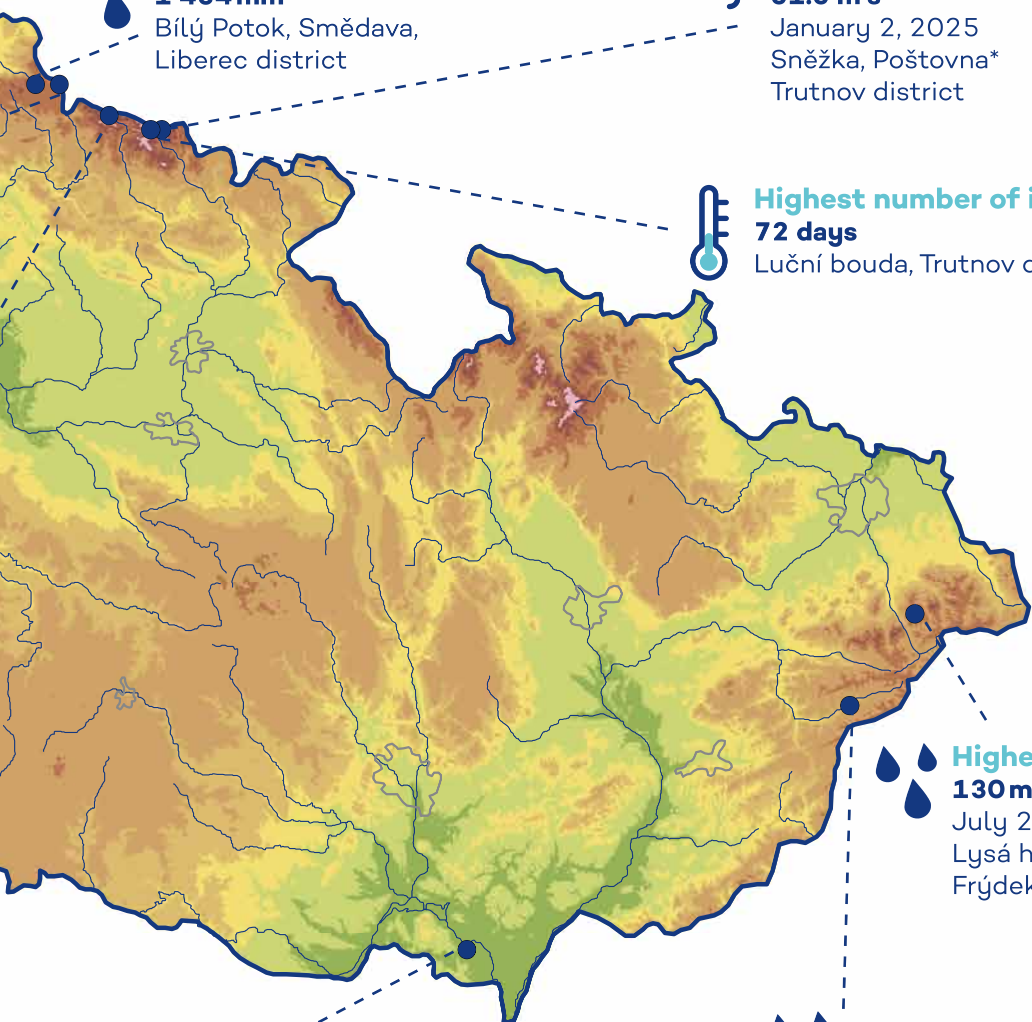
Minimum air temperature
−30.8 °C
February 18, 2025
Kořenov, Jizerka, Horní Jizera*
Jablonec nad Nisou district

Lowest annual rainfall
364.4 mm
Velká Černoc
Louny district



Highest number of tropical days
28 days
Dobřichovice, Prague-West district

Highest snowdepth total
141 cm
February 17, 2025
Labská bouda, Trutnov district



* **Stations not operated by the CHMI**

The largest water reserves in the snow cover during the 2024/25 winter were on 13 January 2025, with a total amount of 0.899 billion m³, which corresponds to 11.4 mm of runoff height. In terms of comparison with evaluated winter seasons since 1980, this amount represented 87% of the long-term average for the second week of the year. The largest snow cover lay on 13 January across almost the entire territory of the Czech Republic, most in the Krkonoše Mountains 50 to 137 cm, in the Šumava 40 to 113 cm, in the Hrubý Jeseník 50 to 106 cm, in the Jizera Mountains 50 to 96 cm, in the Beskydy Mountains 30 to 93 cm and in the Orlické Mountains 40 to 72 cm.

The largest values of average monthly discharges in the main river basins were recorded in October (149% Q_{X}) and in November (164% Q_{XI}) in the Olše basin.

Overall, the smallest value of average monthly discharge (16% Q_{VIII}) was recorded in August in the Lužnice basin.

In terms of the number of profiles where hydrological drought conditions – Q_{355d} – were indicated in 2025, the period from the second half of June to mid-September was evaluated as hydrologically the driest. Overall, the largest number of profiles (232) with an indication of hydrological drought was recorded on 27 August 2025.

Surface water quality

In 2025, the limits for nutrients (particularly total phosphorus), organic pollution indicators, and polycyclic aromatic hydrocarbons (PAHs) were most frequently exceeded in surface waters. The highest proportion of profiles with deteriorated water quality was recorded in the sub-basins of the Lower Vltava and Dyje.

Nutrients and organic pollution indicators

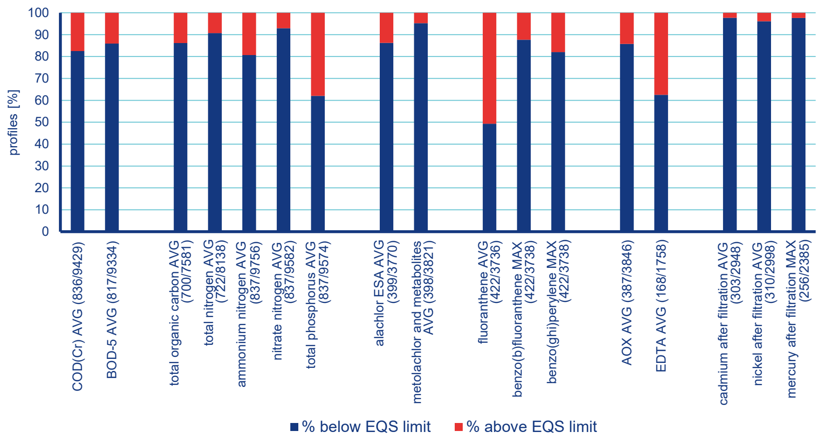
Among nutrients, total phosphorus most frequently exceeded the limit value (38% of profiles). Ammonia nitrogen and chemical oxygen demand by dichromate (COD_{Cr}) were present in concentrations exceeding the limit in just under 20% of profiles. Total and nitrate nitrogen exceeded the limit value in up to 10% of profiles. The limit for total organic carbon (TOC), which expresses the total content of organic substances in water, was exceeded in 14% of profiles. The main sources of this group of indicators are primarily wastewater and agriculture.

Pesticides

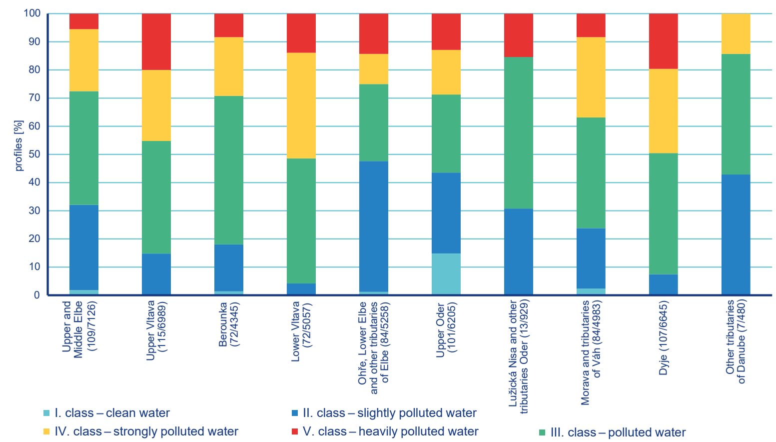
Among pesticide substances, the metabolite of the herbicide alachlor—alachlor ESA (14% of profiles, used in the Czech Republic until 2007 primarily in rapeseed cultivation)—was most frequently found in concentrations exceeding the limit. Metolachlor and its metabolites (used in corn cultivation) were found in concentrations exceeding the limit in just under 5% of profiles.

Heavy metals, PAHs and other pollutants

Among heavy metals, dissolved nickel, cadmium and mercury most frequently exceeded the limits (>2% of profiles), while lead exceeded the limit in less than 1%. Among PAHs, the very low limits for fluoranthene (50% of profiles), benzo[*ghi*]perylene and benzo[*b*]fluoranthene, all associated with combustion, were most frequently exceeded. Among other pollutants, EDTA (used in laundry and dishwashing detergents), AOX and bisphenol A most frequently exceeded the limits.



Frequency of profiles exceeding the prescribed limit (EQS – environmental quality standard) pursuant to Government Regulation No. 401/2015 Coll. for selected indicators in 2025 (on the X-axis in parentheses: number of evaluated profiles/number of samples used for evaluation).



Basic classification of monitoring sites in individual sub-basins according to ČSN 75 7221 in 2025, based on water quality indicators: BOD_5, COD, $N\text{-}NO_3^-$, $N\text{-}NH_4^+$, total P (on the X-axis in parentheses: number of assessed sites/number of samples used for assessment).

Grounwater quality

In 2025, the most commonly detected pollutants in groundwater were those associated with agricultural production—pesticides and nitrogen substances.

Pesticides, nitrogen substances

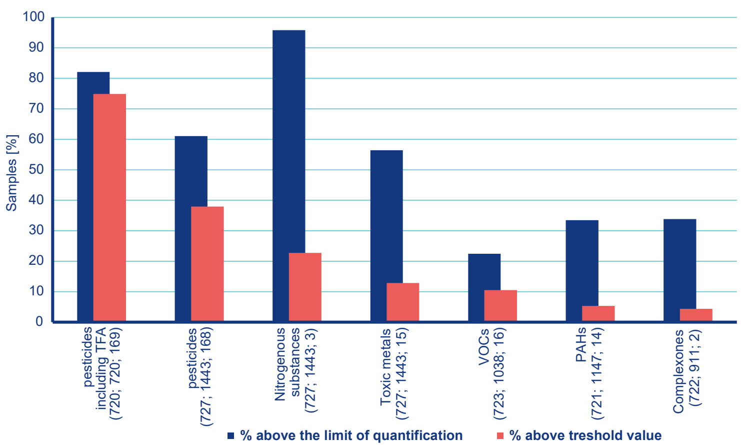
More frequently than the pesticides themselves, metabolites resulting from the breakdown of active ingredients in crop protection products for crops such as sugar beets, rapeseed, corn, cereals, etc., were detected in groundwater. The most problematic is trifluoroacetic acid (TFA), with >70% of groundwater samples exceeding the limit concentrations. This is a globally problematic pollutant formed by the breakdown of fluorine-containing substances. Another significant source of groundwater pollution linked to agricultural production is nitrogen substances, with concentrations exceeding the limit in > 10% of samples.

Toxic metals

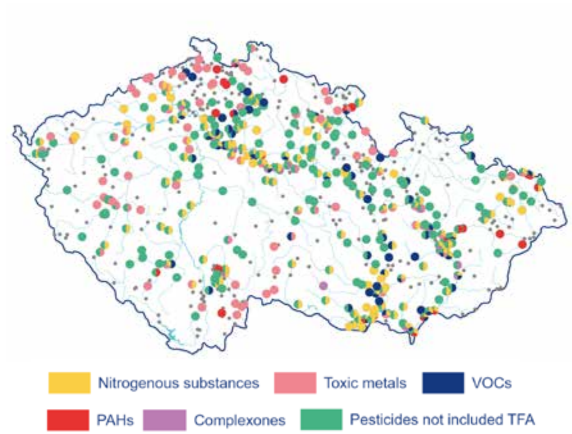
The most frequently detected toxic metals in concentrations exceeding the limit were arsenic, cobalt, and cadmium (> 3% of samples). Sources may include both natural rock weathering and anthropogenic pollution, particularly metal-containing agrochemicals, industrial emissions, fossil fuel combustion, transportation emissions, or the use of sewage sludge.

Volatile organic compounds, polycyclic aromatic hydrocarbons, complexones

Among volatile organic compounds (VOCs), concentration limits were exceeded primarily for toluene and 1,2-cis-dichloroethene, which is formed as a byproduct in the production of vinyl chloride – used to manufacture PVC plastic – and is also a breakdown product of other chlorinated hydrocarbons. Among polycyclic aromatic hydrocarbons (PAHs), limit exceedances were demonstrated primarily for phenanthrene and chrysene, which originate from combustion processes. Among the complexing agents, the best known and most widely used is ethylenediaminetetraacetic acid (EDTA) and its salts, which are used in detergents, in the paper industry, and as preservatives in cosmetics. The limit for groundwater was exceeded in 40 of the samples collected.



Frequency of indicator values from the main groups in groundwater samples in 2025. The number of monitored sites, the number of samples analyzed, and the number of indicators in the group are shown in parentheses.



Exceedance of threshold values for pollutants (nitrogenous substances, toxic metals, pesticides - metabolite TFA not included, VOCs, PAHs, complexones) in groundwater.

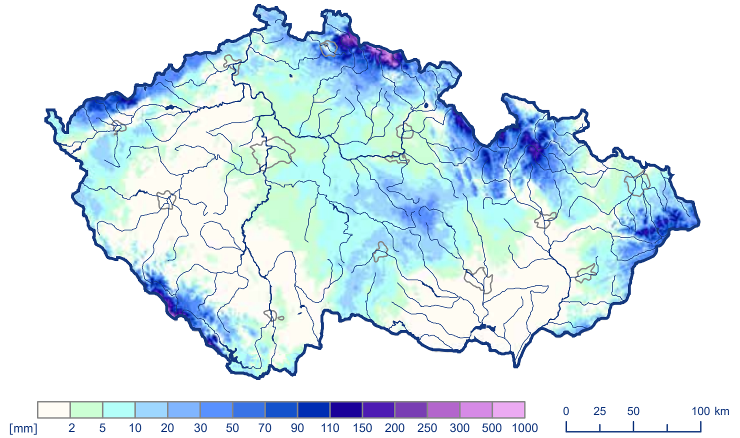
Snow

Snow storage in winter 2024/2025 was average relative to the 1991–2020 reference period during the second half of November and the first half of December. Following a pre-Christmas thaw, it fell below average and, except for the first three weeks of January, remained well below average after the New Year. At the start of winter 2025/2026, snow storage was average at the end of November. After a subsequent thaw, snow melted across most of the country, and storage was well below average by the end of December 2025.

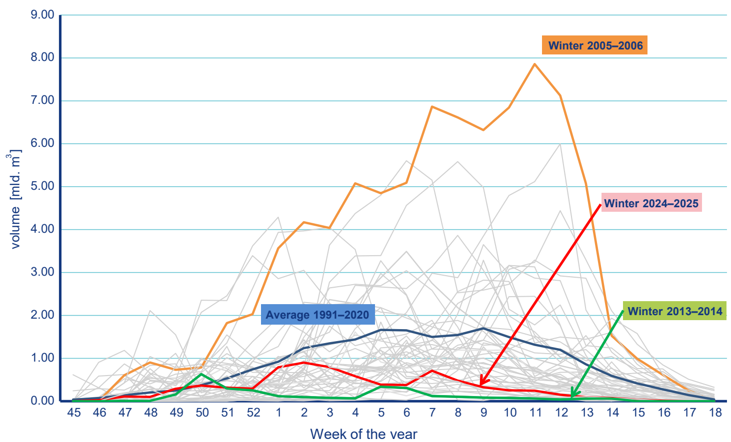
Snow Storage Development

Snow storage began to build in the second half of November 2024. A December maximum of 0.36 billion m³ was reached on 16 December (runoff depth 4.6 mm; 117% of the weekly average). Accumulation increased in the first half of January, when snow covered most of the Czech Republic. The seasonal maximum occurred on 13 January 2025 (0.9 billion m³; 11.4 mm). Storage was below average from the second half of January to mid-March (17–59% of average). Gradual melting continued from mid-March, and by the second half of April snow remained only at the highest elevations.

At the start of winter 2025/2026, storage was 125–135% of average at the end of November. The November–December maximum occurred on 1 December (0.28 billion m³; 3.5 mm), followed by a substantial thaw. Storage was not calculated in weeks 50 and 51 because snow cover was patchy or very low. The situation improved only in the first week of 2026.



The maximum volume of water stored in snow in the Czech Republic during winter 2024/2025 occurred on 13 January 2025: 0.9 billion m³, equivalent to a runoff depth of 11.4 mm



Development of snow storage in the Czech Republic during individual winter seasons since 1980.

Photo: Adobe Stock

Phenological progression of wild plants

Photo: Adobe Stock

The onset of the main growing season in 2025 occurred between March 1 and March 31, and the end of the main growing season took place between October 14 and October 23. The main growing season lasted 200 to 245 days (in 2024, it lasted 220 to 280 days).

In January and February, plants were in a state of vegetative dormancy. This year, vegetation did not begin to awaken earlier, as it did in 2024, when the phenological pre-spring started five weeks earlier than usual. Only at the end of January did hazel trees bloom in some locations, releasing pollen into the air. However, due to significant cooling in February, pollen release stopped, and the pollen season did not begin until early March.

At first, vegetation developed under normal conditions and in some places with a delay, but marked warming in March accelerated its development. Woody plants were fully leafed by the end of April. During May, frost events again caused problems, affecting vegetation development (especially fruit trees and field crops). These occurred in two waves: from May 7 to 14 (during the "Ice Saints" period) and on May 24–25, 2025. Vegetation development remained significantly accelerated, but by mid-May it had returned to normal. Strawberries ripened in early June, and cherries began to ripen in the third decade of June. Haymaking started in mid-June.

In July and August, the cereal harvest took place (this year delayed due to a rainy July). As in 2024, a second flowering was observed in some woody plants in 2025, for example in rhododendrons and common dogwood. In many woody species, summer yellowing was observed, for example in hornbeam, hazel, birch, linden, beech, and oak. The second hay harvest took place only at the end of August, in September, and in some places even in October.

Leaf yellowing and fall began in the second half of September. The pollen season ended at the beginning of October. In October, leaf coloration and fall continued, and this year the coloration of maple leaves was less intense than in the previous year.

Phenological highlights of 2025: "St. John's shoots" on larch and alder appeared as early as May. At the end of August, elderberry and cock's-foot grass began to flower again. An above-average fruit yield was recorded (apricots, cherries, apples, plums, and sloes).

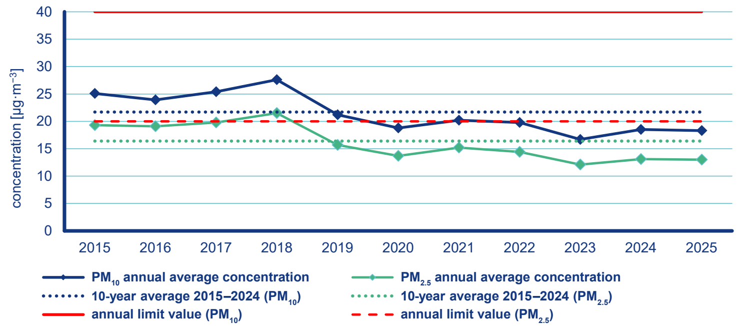
These observations demonstrate that 2025 was phenologically distinct from previous years and confirm that increasing weather extremes are having a growing impact on vegetation development!

Linden. Photo: Adobe Stock

Birch. Photo: Adobe Stock

Particles PM_{10} and $PM_{2.5}$

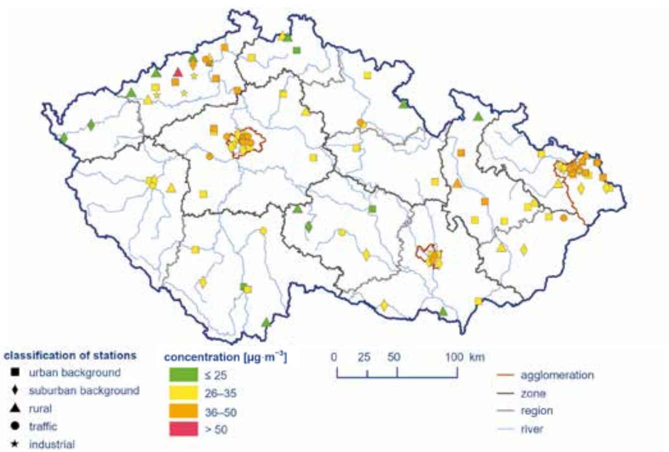
In 2025, the 24-hour PM_{10} air quality limit (50 μg·m⁻³, max. 35 exceedances per calendar year) was exceeded at only one station – the rural background station in Lom, in the Ústí nad Labem Region. The annual PM_{10} limit (40 μg·m⁻³) was not exceeded at any station,extending the uninterrupted period without exceedances that has lasted since 2019. The air quality limit for the annual average concentration of $PM_{2.5}$ (20 μg·m⁻³) was also not exceeded at any station in 2025. This marked the third time since its introduction in 2005 (tightened in 2020); the limit was not exceeded for the first time in 2023.



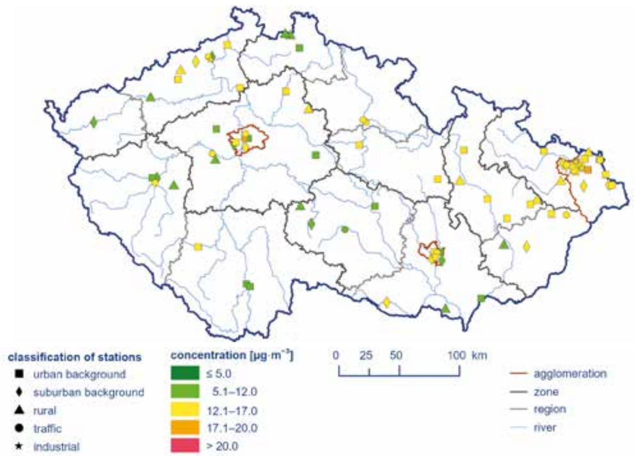
Annual average concentrations of PM_{10} and $PM_{2.5}$ (averages for all AIM stations), 2015–2025.

The trend in annual average concentrations of PM_{10} and $PM_{2.5}$ particulate matter was assessed for the period 2015–2025. At the beginning of the period, concentrations declined, but this was followed by an increase in 2017 and 2018. In 2019 and 2020, concentrations declined again, with the most pronounced decrease recorded between 2018 and 2019. Since 2019, concentrations have remained at a lower level. In the currently assessed year 2025, higher concentrations were recorded compared to the historical low reached in 2023.

Particulate matter (a mixture of solid and liquid atmospheric particles with an aerodynamic diameter of less than 10 μm – PM_{10} – or 2.5 μm – $PM_{2.5}$) has a wide range of effects on the cardiovascular and respiratory systems and is carcinogenic to humans.



36th highest 24-hour average PM_{10} concentration at AIM monitoring stations, 2025.

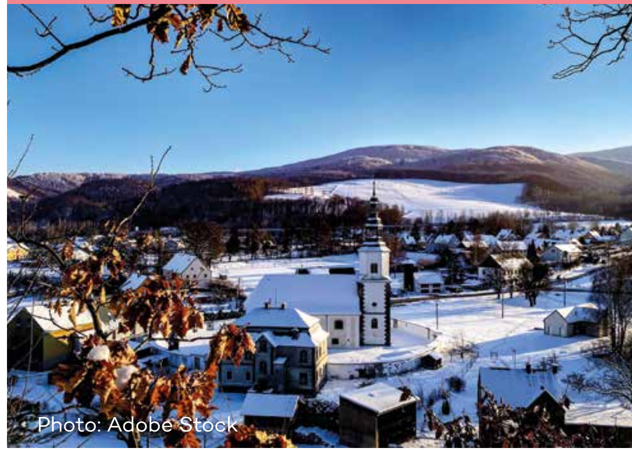


Annual average $PM_{2.5}$ concentrations at AIM monitoring stations, 2025.

Benzo[*a*]pyrene

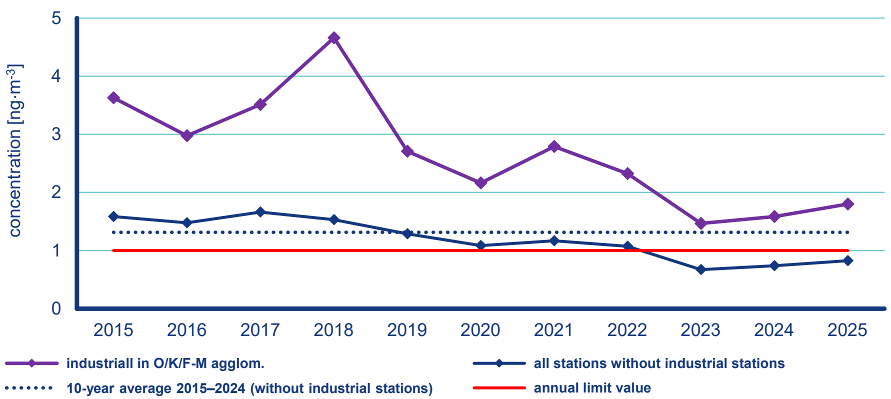
Air pollution caused by benzo[*a*]pyrene has long been one of the main challenges in the field of air quality in the Czech Republic. This pollutant is released into the air primarily from residential heating, which accounts for nearly 96% of benzo[*a*]pyrene emissions nationwide. Benzo[*a*]pyrene is a proven human carcinogen, and its annual limit value for the protection of human health (1 ng·m^{-3}) is exceeded every year at numerous locations across the Czech Republic.

In 2025, concentrations of benzo[*a*]pyrene exceeding the limit value were recorded at approximately 37.5% of monitoring stations, i.e., at 24 out of a total of 64 stations with sufficient data for evaluation. Concentrations of benzo[*a*]pyrene exceeding the limit value were detected in 7 out of 14 regions. More than half of the stations where the limit value was exceeded were located in the most polluted Moravian-Silesian Region.

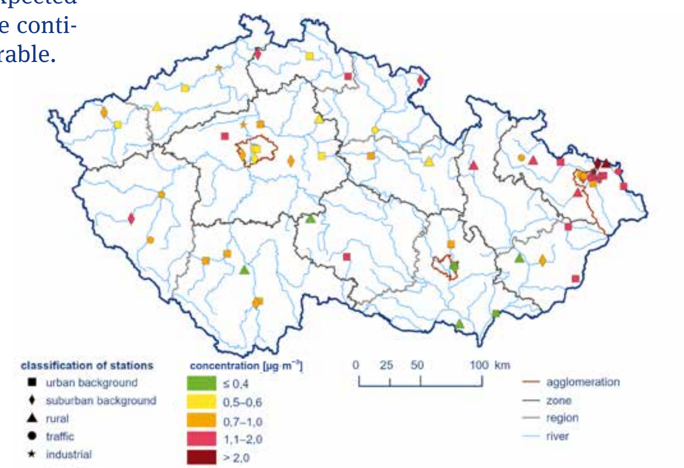


Annual average concentrations of benzo[*a*]pyrene (averaged across all stations for which measurements are available for the entire evaluation period) ranged from 0.7 ng·m^{-3} in 2023 to 1.8 ng·m^{-3} in 2017 and 2018 over the 2015–2025 period. Between 2015 and 2018, average benzo[*a*]pyrene concentrations were at higher levels. Since 2019, a downward trend has been observed: concentrations decreased to approximately 1.2 ng·m^{-3} in 2020 and remained around this level in the following years. A marked year-over-year decline occurred between 2022 and 2023, when the average concentration of benzo[*a*]pyrene fell by nearly half. In 2024 and 2025, there was a slight increase; however, the average values remain below the limit value. Compared to the 10-year average concentration across all stations (1.3 ng·m^{-3}), the annual average concentration of benzo[*a*]pyrene in 2025 was 39% lower and reached the third-lowest value in the 2015–2025 period.

Despite the gradual improvement in air quality resulting from the implementation of air quality measures (e.g., the replacement of household boilers and the transition to alternative heat sources), the limit value for benzo[*a*]pyrene is still being exceeded in some areas. Elevated concentrations can be expected primarily in municipalities with a higher proportion of solid fuel heating. For these reasons, the continuation and expansion air quality improvement measures in the coming years is more than desirable.



Annual average concentrations of benzo[*a*]pyrene in the Czech Republic, 2015–2025.



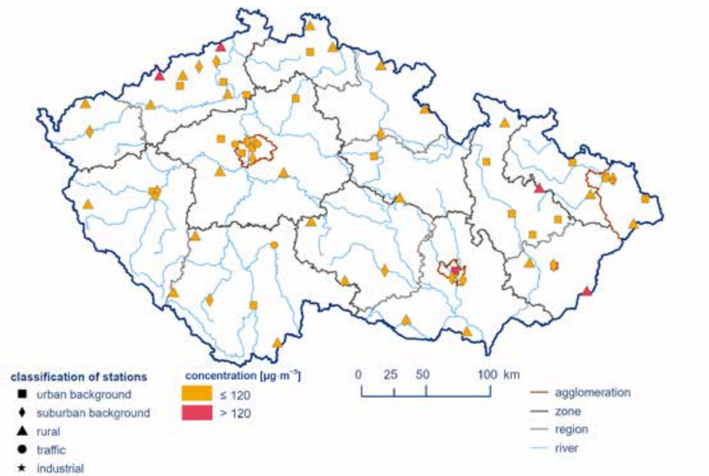
Annual average concentrations of benzo[*a*]pyrene in the Czech Republic, 2015–2025.

Ground-level ozone

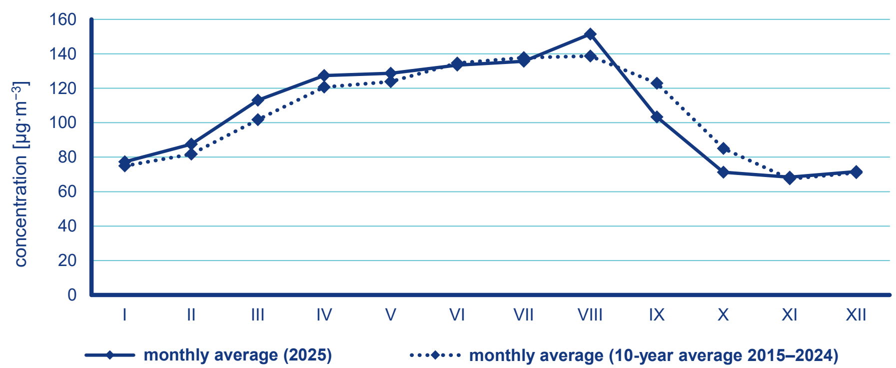
The air quality limit value for the daily maximum of the running 8-hour average of O_3 is 120 µg·m^{-3}. The legislation permits a maximum of 25 exceedances of this value per year (on average over a three-year period). The limit value for ground-level O_3 (120 µg·m^{-3}, daily maximum of the 8-hour average, permitted number of exceedances 25 times on average over three years) was exceeded at 9% of stations (i.e., 6 out of 69 stations) during the 2023–2025 period.

In 2025, the limit value was exceeded at four regional stations (Rudolice v Horách, Červená hora, Sněžník, and Štítná nad Vláří) and at two urban background stations (Zlín – ZŠ Kvítkova and Brno – Arboretum). During the assessed period of 2023–2025, the contribution of individual years to the total number of O_3 limit exceedances was approximately balanced.

Ground-level O_3 concentrations are strongly influenced by meteorological conditions, particularly during the warmer months, and unlike other pollutants, they have not shown a clear increasing or decreasing trend since 2015. The annual variation in average monthly O_3 concentrations is generally characterized by an increase in the spring and summer months due to conditions favorable for O_3 formation. The highest ground-level O_3 concentrations in 2025 were recorded in August, which was among the warmest months of the year and also had below-average precipitation. As a result of elevated O_3 concentrations, three situations were declared in mid-August in the Prague Agglomeration and in the Ústí nad Labem and Central Bohemian regions.



The 26th highest values of the maximum 8-hour daily moving average of ground-level O_3 concentrations, averaged over 3 years at AIM monitoring stations, 2023–2025.



Annual trend in average monthly O_3 concentrations (maximum daily 8-hour moving average; averages for all AIM stations), 2025.

Nitrogen dioxide


Photo: Adobe Stock

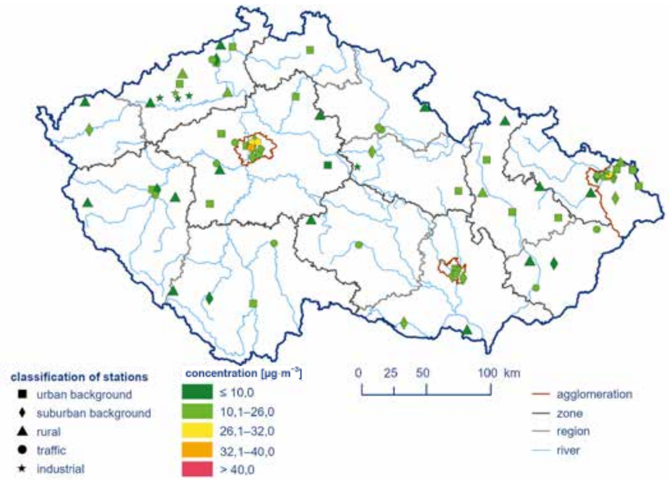
In 2025, the annual limit value (40 μg·m^{-3}) for nitrogen dioxide (NO_2) was not exceeded at any monitoring station in the Czech Republic. The annual NO_2 limit value was last exceeded in 2019.

The highest annual average NO_2 concentration (36 μg·m^{-3}) was traditionally recorded at the Prague 2 – Legerova traffic hotspot station. This station has consistently recorded the highest NO_2 concentrations in the Czech Republic due to the high traffic intensity in the immediate vicinity of the station and its location in a street canyon.

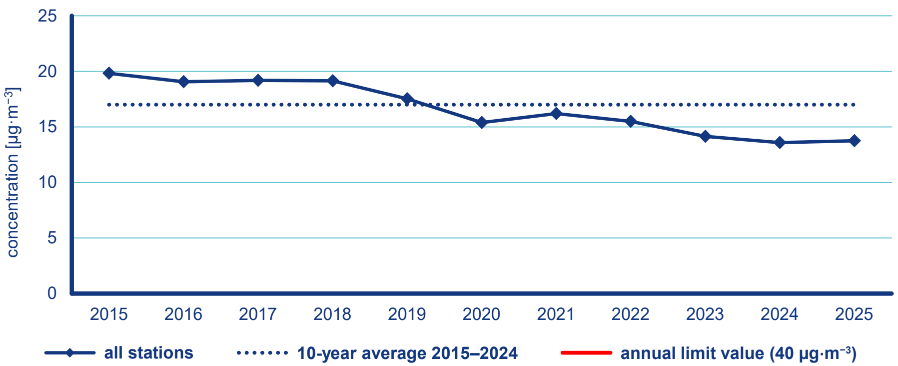
In Prague, higher annual average NO_2 concentrations were recorded at all traffic monitoring stations. A similar situation was observed in other major cities, such as Brno, Ostrava, and Ústí nad Labem. Elevated NO_2 concentrations can also be expected near roads in larger cities with heavy traffic, dense built-up areas, and extensive local transport networks, where traffic flow is often disrupted. Conversely, the lowest NO_2 concentrations are found at regional background stations, i.e., in areas far from emission sources.

The hourly NO_2 limit value (200 μg·m^{-3}, with a maximum of 18 exceedances allowed per year) was not exceeded at any station in 2025. The hourly NO_2 limit value itself was not exceeded either.

During the 2015–2025 assessment period, the highest NO_2 concentrations were recorded in 2015. Since then, NO_2 concentrations have been gradually declined, with a marked decrease occurring between 2018 and 2020. Subsequently, a slower but still noticeable decline was observed. In 2025, there was a slight year-over-year increase in NO_2 concentrations; nevertheless, this represents the second-lowest annual average NO_2 concentration for the entire assessment period (since the early 1990s).



Annual average NO_2 concentration at AIM monitoring stations, 2025.



Annual average NO_2 concentrations (averages for all AIM stations), 2015–2025.

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