European Summer 2026: Records, Extremes and Context

Summer 2026 was marked by an exceptional persistence of heat across Europe, accompanied by severe dry conditions, low river flows and wildfire activity.

Exceptional heat across Europe during summer 2026

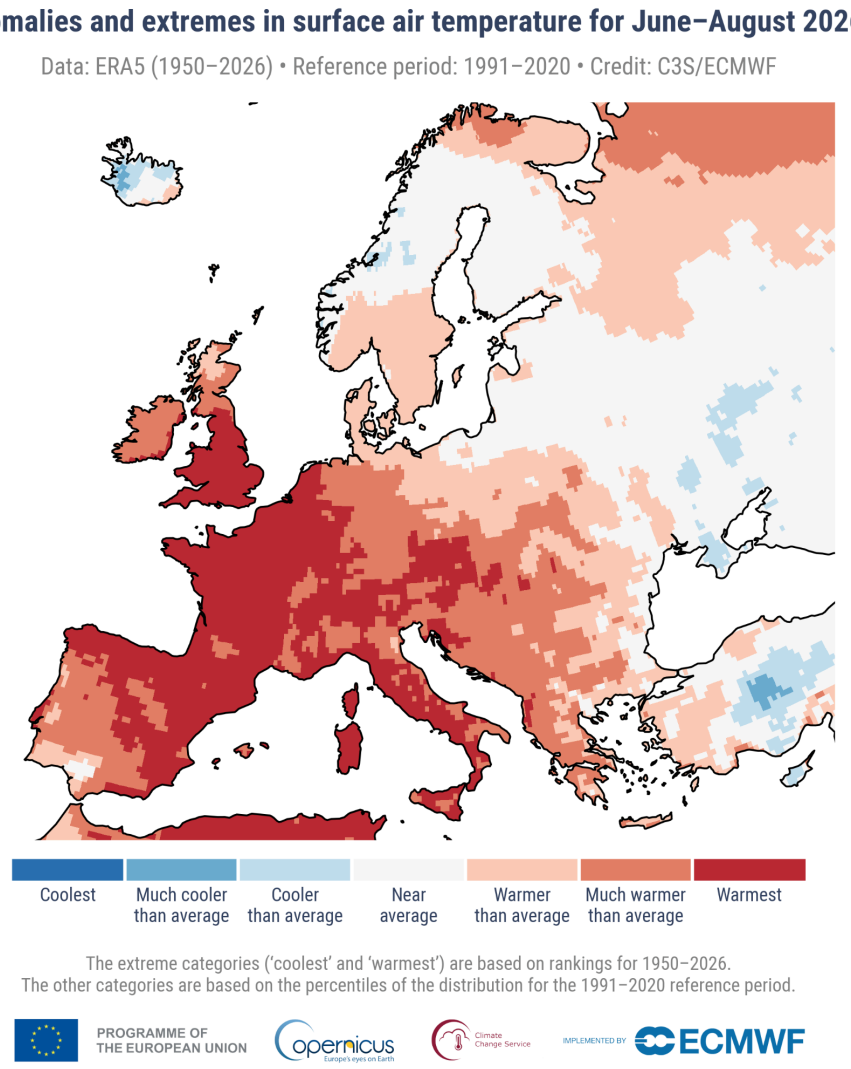


Figure 1. Anomalies and extremes in surface air temperature for summer (June to August) 2026. The extreme categories ('coolest' and 'warmest') are based on rankings for 1950–2026. The other categories describe how the temperatures compare to their distribution during the 1991–2020 reference period. 'Much cooler/warmer than average' - cooler/warmer than 90% of temperatures. 'Cooler/warmer than average' - than 66% of temperatures. 'Near average' - within the middle 33%. Data: ERA5. Credit: C3S/ECMWF.

- Summer 2026 was exceptionally warm across much of Europe, with the most pronounced conditions in western Europe, where repeated heatwaves occurred from May to September (see ‘Exceptional heatwaves in western Europe)’. Averaged over European land, summer 2026 (June–August) was 1.17°C warmer than the 1991–2020 average, making it the **third-warmest summer for Europe** in the ERA5 dataset. Only 2024 (+1.55°C) and 2022 (+1.34°C) were warmer.

- Seasonal summer average temperatures were **much warmer than average over 41% of European land**, mainly in western and central Europe, and reached **record highs over 22% of the land area**. Seasonal records were set across virtually all of England, Wales and Belgium, as well as large parts of France, Spain, Italy, Switzerland and Austria.

- **Record-hot summers were reported across several countries**, including France, the UK, Ireland, the Netherlands, Belgium, Spain and Austria.

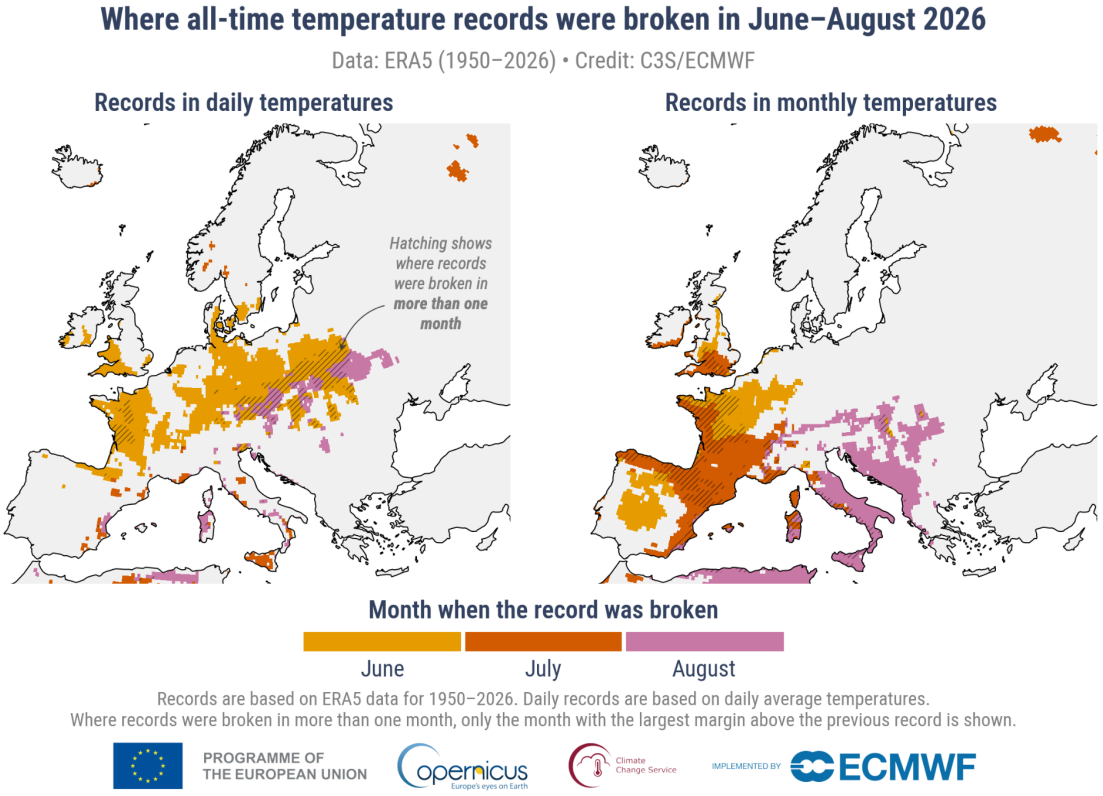


Figure 2. Maps showing where all-time surface air temperature records were broken between June and August 2026 for daily average temperatures (left) and monthly average temperatures (right). Colours indicate the month in which the record was broken. Where records were broken in more than one month, only the month with the largest margin above the previous record is shown. Records are identified by comparison with the corresponding highest values during 1950–2025. Data source: ERA5. Credit: C3S/ECMWF.

- The record-high summer temperatures in Europe reflected the **persistence of heat and repeated heatwaves** during much of the season.
- Large parts of western, central and eastern Europe broke all-time records for monthly or daily average temperature at some point during the summer.
- Many of these records, especially for daily average temperature, occurred in June rather than at the height of summer, during an exceptionally intense heatwave.
- **Monthly average temperatures reached all-time records over 22% of European land, and daily averages over 18% of land**, with some areas breaking records in more than one month.
- **All together, 37% of European land experienced an all-time record in daily, monthly or seasonal average temperature during summer 2026**, highlighting the broad geographical footprint of exceptional heat.
- Large parts of Europe experienced more ‘summer days’ than average, with the strongest positive anomalies observed in western and southwestern Europe. France, Germany and the Benelux countries, parts of the Iberian Peninsula, Italy, the Balkans and Eastern Europe which saw up to 40 additional ‘summer days’ (see graphics gallery).

Exceptionally warm seas around Europe

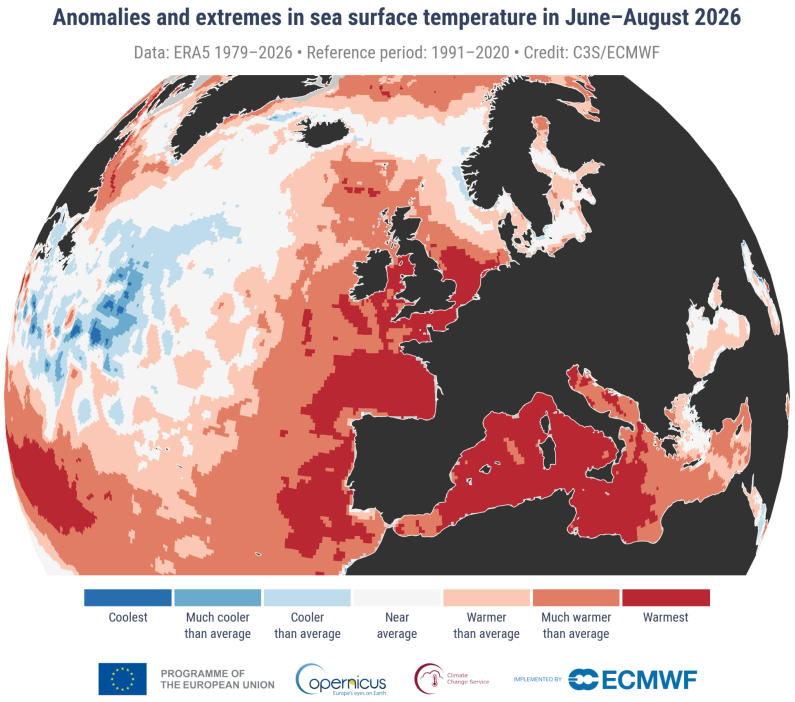


Figure 3. Anomalies and extremes in sea surface temperature for summer (June-August) 2026. Colour categories refer to the percentiles of the temperature distributions for the 1991–2020 reference period. The extreme (“coolest” and “warmest”) categories are based on rankings for the period 1979–2026. Values are calculated only for the ice-free oceans. Data source: ERA5. Credit: C3S/ECMWF.

Record-high SSTs around western Europe

- **56% of the European ocean domain was much warmer than average during summer 2026, with 22% experiencing record-high summer SSTs**. Record-high SSTs were concentrated around western Europe, including the southern North Sea, English Channel, Irish Sea, Bay of Biscay, waters west of Portugal and the western Mediterranean.
- Area-averaged daily SSTs reached record highs during August in both the **Bay of Biscay** (22.6°C on 13 August) and the **western Mediterranean** (29.4°C on 15 August). In the western Mediterranean, large parts of the basin also exceeded 30°C in July, August and even September.

Links with the heat over land

- The exceptionally warm seas were caused by the same atmospheric conditions that contributed to heatwaves over adjacent land areas: clear skies increased solar heating, while light winds reduced mixing with cooler water below.
- In turn, the warmer than average seas helped sustain high temperatures, particularly along coasts, limiting nighttime cooling and resulting in tropical nights. Higher SSTs also increased evaporation and humidity, further increasing heat stress.
- The record-high SSTs coincided with strong-to-extreme marine heatwave conditions across several European seas, including extreme conditions in parts of the Bay of Biscay in July.

Contrasting pattern in the North Atlantic

- In contrast, **a large area farther west in the North Atlantic remained cooler than average**. This broadly corresponds to the subpolar gyre and includes the area sometimes called the North Atlantic “cold blob”.
- These cool SST anomalies had persisted since at least December 2025. North Atlantic SST patterns can influence atmospheric circulation and may have influenced conditions conducive to European blocking.

Widespread and prolonged heat stress

Europe was impacted by both widespread and prolonged heat stress throughout summer 2026.

- Heat stress is the leading cause of weather-related mortality globally.
- Recent research shows that climate change has intensified heat stress worldwide, including in Europe, where heat stress has become more severe and more frequent, and occurs over an increasingly long season of the year.

- The summer 2026 heatwaves highlighted the importance of considering factors beyond air temperature when assessing heat stress. For example, humid conditions during the late-June heatwave in western Europe pushed feels-like temperatures (Universal Thermal Climate Index, UTCI) several degrees above air temperatures. In parts of the UK and Ireland on 24 June, the difference was often around 5°C and reached 9°C in some places. In August, despite higher air temperatures, feels-like temperatures were only around 2°C higher, partly due to lower humidity than the heatwave in June.
- Low wind conditions and clear skies generally associated with heatwaves can also increase levels of ozone near the surface, allowing for accumulation of precursor pollutants and more efficient chemical reactions that generate ozone near the surface. In summer 2026, successive heatwaves coincided with several episodes of extreme ground-level ozone pollution across Europe, with maximum 8-hour daily averages regularly exceeding the European Environment Agency guideline of 120 micrograms per cubic metre of air (µg/m3), contributing to potentially adverse health impacts, including respiratory disease and mortality, as data from the Copernicus Atmosphere Monitoring Service (CAMS) show.

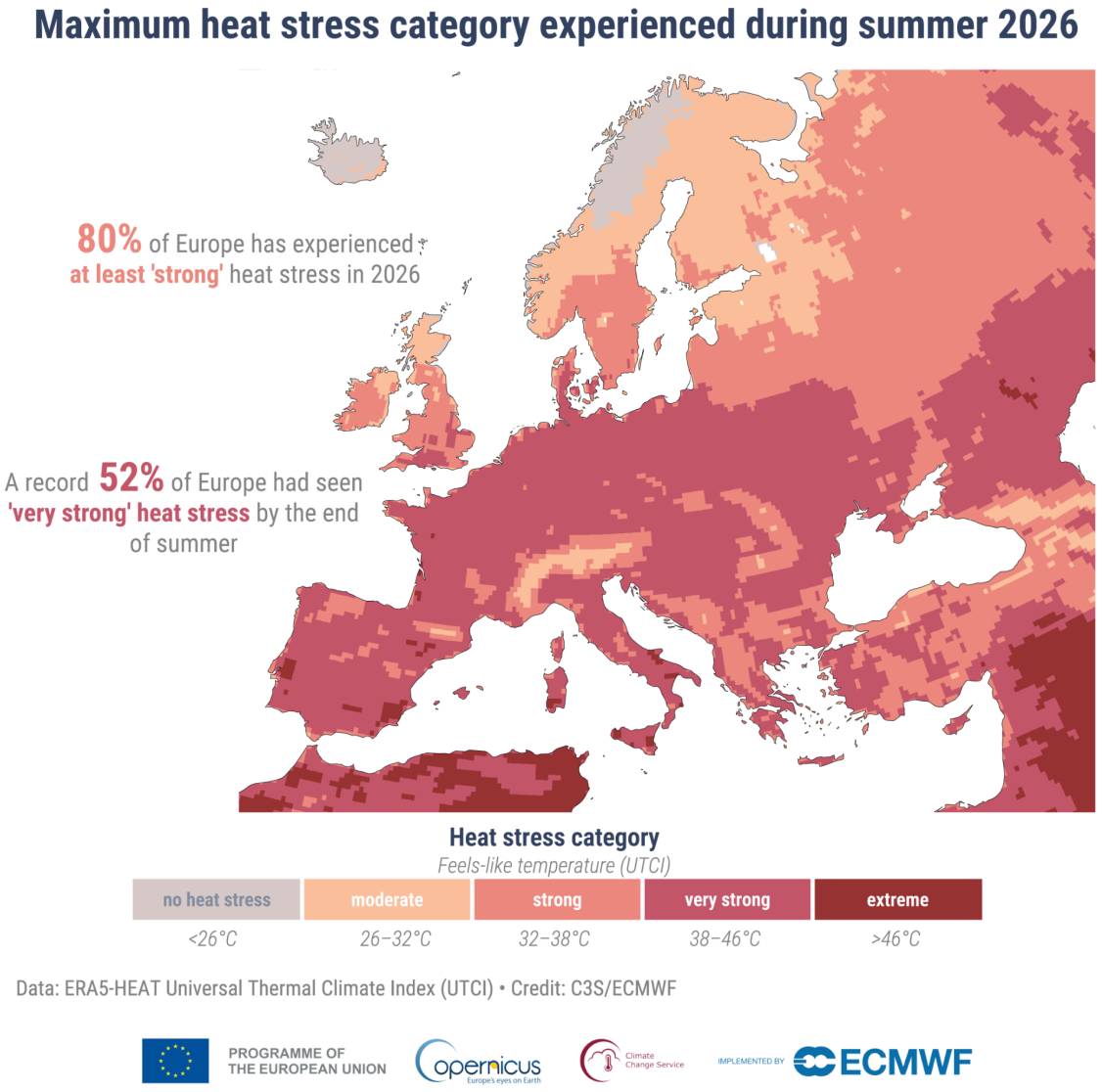


Figure 4. Most severe category of heat stress experienced during summer (June to August) 2026, based on the seasonal maximum feels-like temperature (Universal Thermal Climate Index, UTCI). Data: ERA5-HEAT. Credit: C3S/ECMWF.

- In total**, a record 52% of Europe was affected by 'very strong' heat stress by the end of summer 2026.** Previously the most widespread occurrence of this category of heat stress was 46% in 2010, and 43% in 2024.
    - 4% of Europe was affected by 'extreme' heat stress, on par with 2024 and below 2023 (7%), 2021 (6%), 2025 and 2017 (both 5%).
    - 80% of Europe was affected by at least 'strong' heat stress in 2026. The largest area affected was 87%, in 2025.
- **2026 saw a record-high number of days during summer with at least 'very strong' heat stress**, averaged over Europe, followed by 2024 and 2025.

    - For days with at least ‘strong’ heat stress and days with ‘extreme’ heat stress, 2026 saw the second-highest number of days with these categories of heat stress *(after 2023 for ‘extreme’ heat stress, and after 2024 for ‘strong’ heat stress)*

- Much of southern and central Europe saw many more days than average with at least ‘strong’ heat stress.
- **Anomalies in the number of heat stress days were largest across France, Italy and northeastern Spain.** Much of this region saw 25–35 more days than average with at least ‘strong’ heat stress, with some areas seeing up to 45 more days than average with ‘very strong’ heat stress.
- Parts of Italy and southern Spain saw at least ‘strong’ heat stress on almost every day of the summer. Some locations saw feels-like temperatures reach 48–49°C (exceeding the ‘extreme’ heat stress threshold).

- In summer 2026, 'tropical nights’ were observed around the Mediterranean, across the Iberian Peninsula, France, parts of eastern Europe and as far north as northern Germany, the Netherlands, and southern parts of the UK.
- **Much of France and southern Spain saw 10–20 more ‘tropical nights’ than average, while northeastern Spain and parts of Italy saw 30–45 more than average** – some coastal locations saw over 70 and as high as 88 tropical nights in total over the summer.
- The above-average number of tropical nights is linked to the record-breaking SSTs in the Mediterranean and the coastal northeastern Atlantic (see ‘*Exceptionally warm seas around Europe*’).

From a wet winter to persistent summer dryness

Rainfall remained below average across large parts of Europe

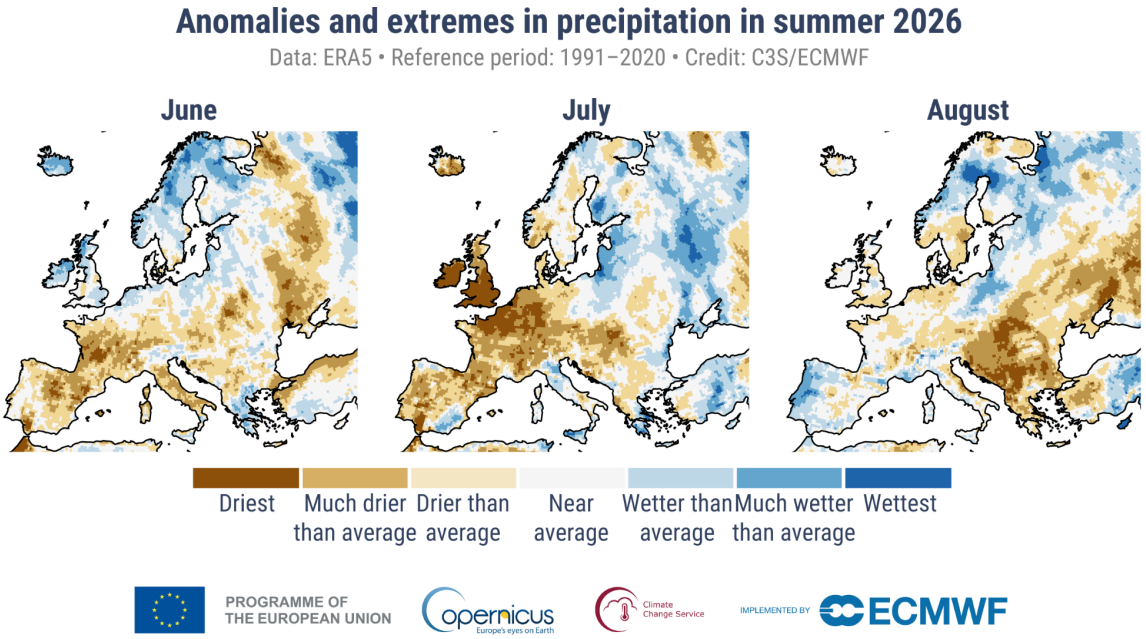


Figure 5. Anomalies and extremes in average precipitation for June, July and August 2026. The extreme categories ('wettest' and 'driest') are based on rankings for 1979–2026. The other categories describe how precipitation compares to the distribution during the 1991–2020 reference period. 'Much wetter/drier than average' - wetter/drier than 90% of precipitation values. 'Wetter/drier than average' - than 66% of precipitation values. 'Near average' - within the middle 33%. Data: ERA5. Credit: C3S/ECMWF.

- Summer 2026 was characterised by **much wetter-than-average to record low precipitation in much of western, central and southeastern Europe**.
- These regions experienced **fewer 'wet days' than average** with deficits of up to about 15 fewer wet days (see Graphics Gallery)
- In contrast, eastern and northeastern Europe generally showed above-average 'wet days', up to around 20 additional 'wet days' in northern Scandinavia.
- High temperatures likely amplified drying through increased evaporative demand, contributing to widespread lower-than-average surface soil moisture.
- June was exceptionally dry across much of Europe, with much below average low-rainfall and soil moisture observed across large parts of western, central and eastern Europe.
- July saw dry conditions persisting and intensifying across much of western and central Europe, with widespread record-low surface soil moisture.
- In August, the most pronounced precipitation and surface soil moisture deficits were concentrated in southeastern Europe. Record-low soil moisture was observed across a large area spanning Slovakia, Hungary, western Ukraine, Romania, and much of the Balkans.

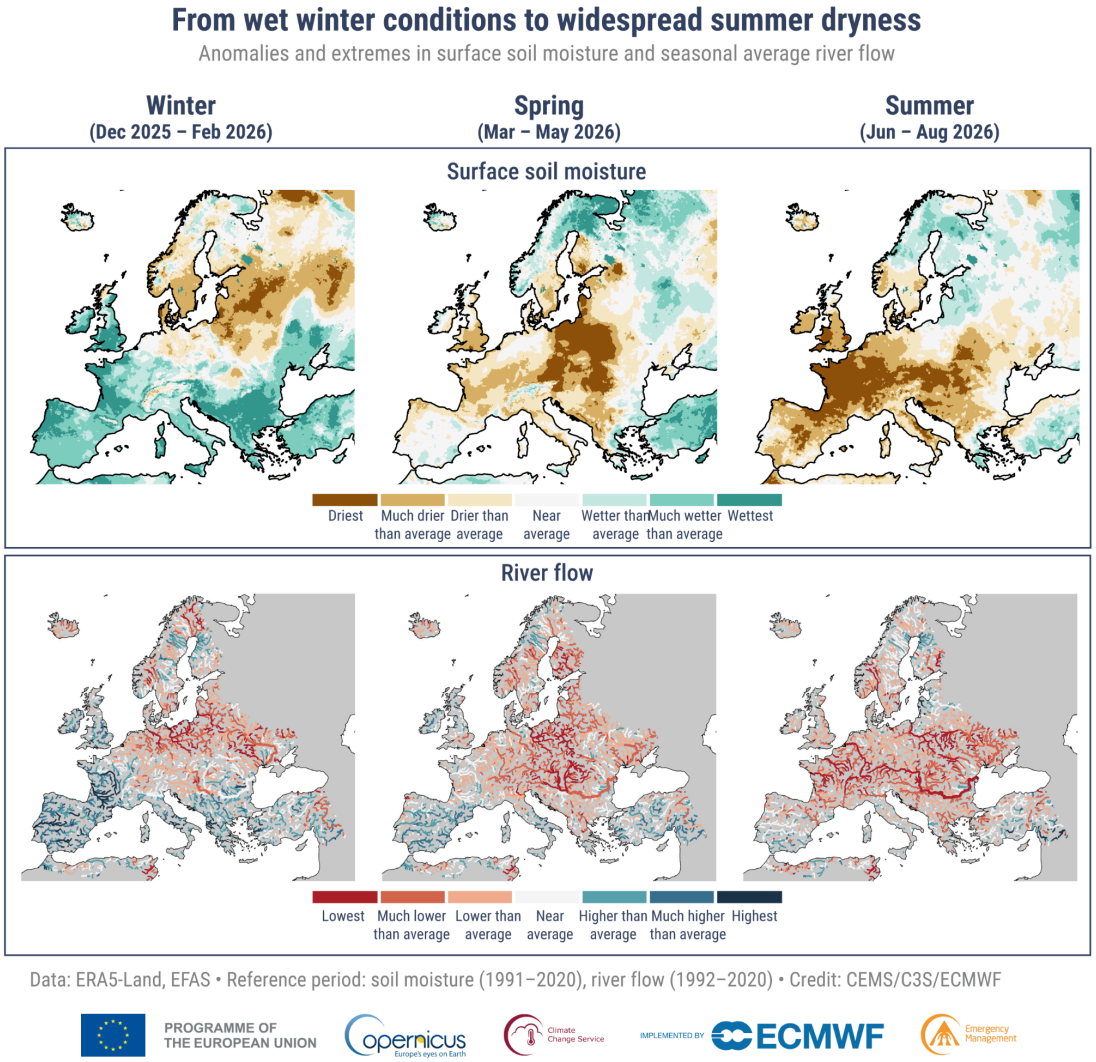


Figure 6. Anomalies and extremes in average surface soil moisture and river flow for winter (December 2025-February 2026), spring (March-May 2026) and summer (June-August 2026). The extreme categories ('wettest'/'highest' and 'driest''/lowest') are based on rankings for 1979–2026 for surface soil moisture and 1992-2026 for river flow. 'Much wetter/drier/higher/lower than average' indicates values within the highest or lowest 10% of the distribution during the 1991–2020 reference period; 'wetter/drier/higher/lower than average' indicates values within the highest or lowest 33%; and 'near average' indicates values within the middle 33%. Data: ERA5-Land (surface soil moisture), EFAS (river flow). Credit: CEMS/C3S/ECMWF.

The paths leading to summer dryness differed across the continent.

- Much of western Europe and Italy transitioned from a very wet winter to a dry spring, before developing severe surface soil moisture deficits throughout the summer.
- In contrast, parts of central and eastern Europe experienced dry conditions during spring, which subsequently intensified through summer.

Widespread meteorological drought by late summer

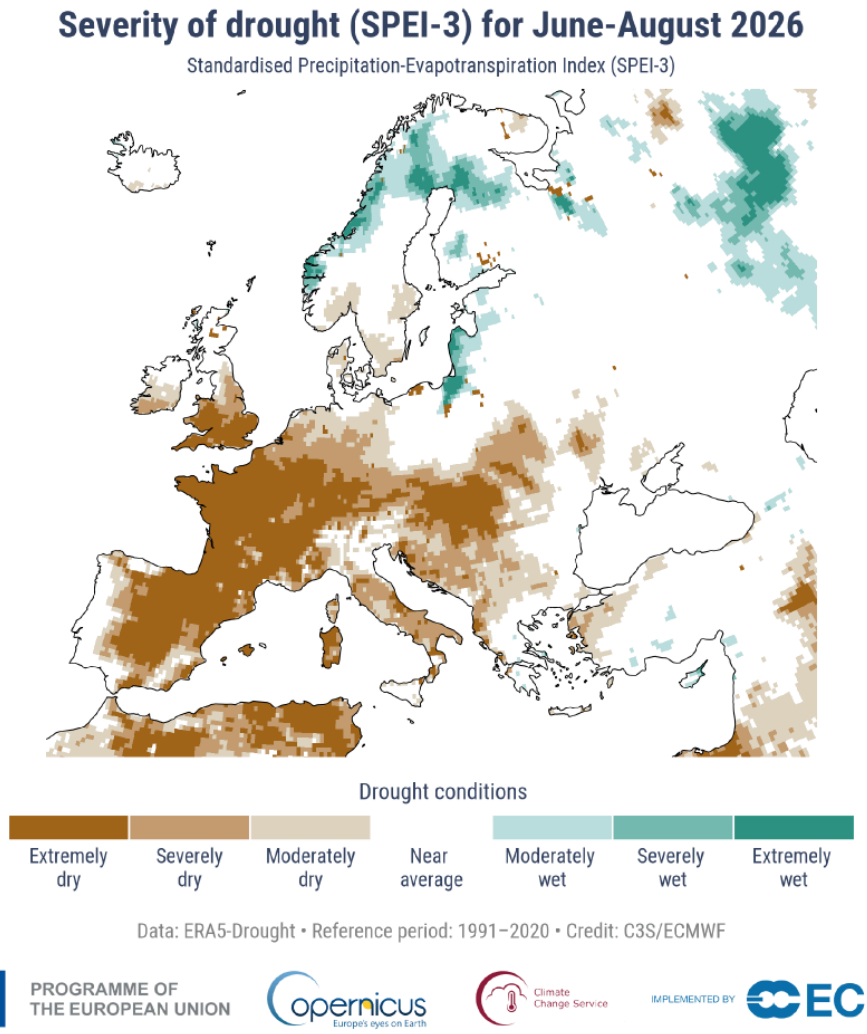


Figure 7. Severity of drought for June-August 2026., based on the Standardized Precipitation Evapotranspiration Index (SPEI-3), accumulated over the period June-to-August 2026. Colour categories are based on the number of standard deviations relative to the 1991–2020 reference period. Values between -1 and 1 are generally considered average, while values outside this range indicate either drier-than-average or wetter-than-average conditions. "Extremely wet" corresponds to values above 2.0, "Extremely dry" to values below -2.0. Data: ERA5-Drought. Credit: C3S/ECMWF.

- **By late summer, meteorological drought conditions**, as indicated by the Standardized Precipitation Evapotranspiration Index (SPEI-3), **affected large parts of Europe**, particularly western and central Europe, the Balkans and northwestern Türkiye.

- These findings are broadly consistent with the European Drought Observatory's end-of-summer assessment, which reported persistent 'alert' conditions across large parts of western and southern Europe. 'Alert' conditions indicate that combined deficits in precipitation and soil moisture are affecting vegetation and crops.

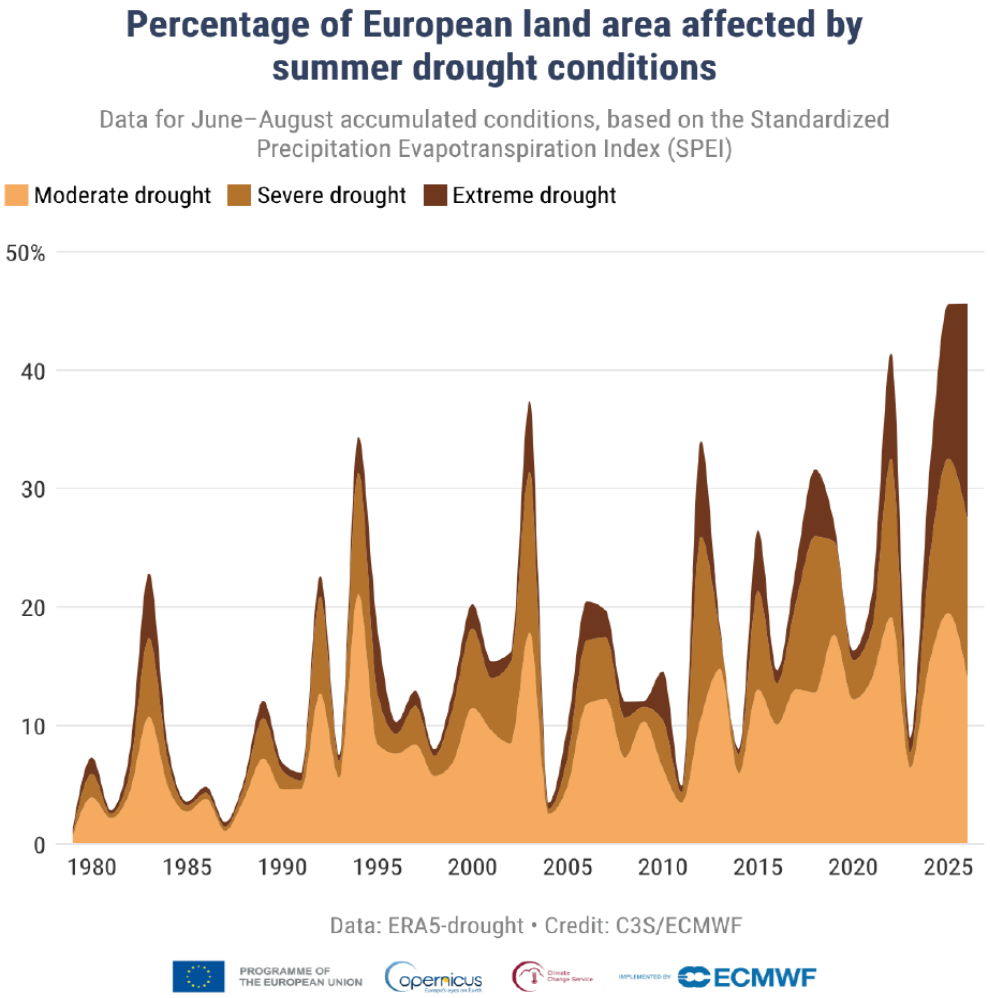


Figure 8. Percentage of European land affected by moderate, severe and extreme SPEI-3 drought conditions in August (representing June-August accumulated conditions). Colour categories are based on the number of standard deviations relative to the 1991–2020 reference period. Values between -1 and 1 are generally considered average, while values outside this range indicate either drier-than-average or wetter-than-average conditions. "Extreme" corresponds to values below -2.0. Data: ERA5-Drought. Credit: C3S/ECMWF.

- **Areas affected by drought increased substantially over recent decades.** While the total area affected by summer drought conditions in 2026 was very similar to that in 2025, the proportion affected by extreme drought conditions was substantially larger in 2026.
- **Around 46% of the European land experienced drought conditions at the end of August 2026**; of the affected area, around 40% was classified as under extreme drought.

Exceptional wildfire activity

- Persistent dryness and repeated heatwaves contributed to an **exceptionally active wildfire season** across parts of Europe. According to the European Forest Fires Information System (EFFIS), **by 2 September, around 653,1100 ha had burned across the EU**, almost twice the 2006–2025 average for the same point in the year. Spain fires accounted for half of the total burned area, while exceptional fire activity also affected France, Portugal and Italy.
- **The severe fire season reflected not only summer heatwaves, but also the preceding hydroclimatic conditions.** Above-average winter and early-spring rainfall promoted vigorous vegetation growth in some regions, increasing fuel availability. Subsequent drying and repeated heatwaves transformed this additional biomass into highly combustible fuel, leading to large and rapidly spreading fires.
- Spain was particularly affected, with approximately 295,894 ha burned by 2 September. During the early-July heatwave, exceptionally high fire-weather danger and critically low fuel moisture contributed to extensive burning across parts of the Iberian Peninsula.
- France also experienced an exceptional fire season with around 96,743 ha burned by 2 September, around 6.5 times the long-term annual average for France.
- Data from the Copernicus Atmospheric Monitoring Service (CAMS) show that **wildfire emissions** across parts of Europe, including Spain, France, Italy, Belgium and the United Kingdom, **were among the highest of the past two decades** and reflected the widespread nature of the fire activity. **The total emission for the European Union and the UK was around half of the corresponding estimate for 2025** (see Graphics Gallery)**.**

Exceptionally low river flows across Europe

All results presented in this section are based on simulated river discharge from the European Flood Awareness System (EFAS), part of the Copernicus Emergency Management Service (CEMS), over the period 1992–2026

Most severe low-flow conditions for Europe

- Summer 2026 saw the most severe low-flow conditions for Europe as a whole in the EFAS record beginning in 1992, with a **record 67% of the**

European river network experiencing below-average flows and an exceptionally large share in the lowest flow categories. Other major low-flow summers, notably 2022, 2025 and 2003, followed closely. **Since the mid-2010s, there are signs of an emerging shift towards more widespread below-average summer flows across Europe**, particularly in eastern Europe.

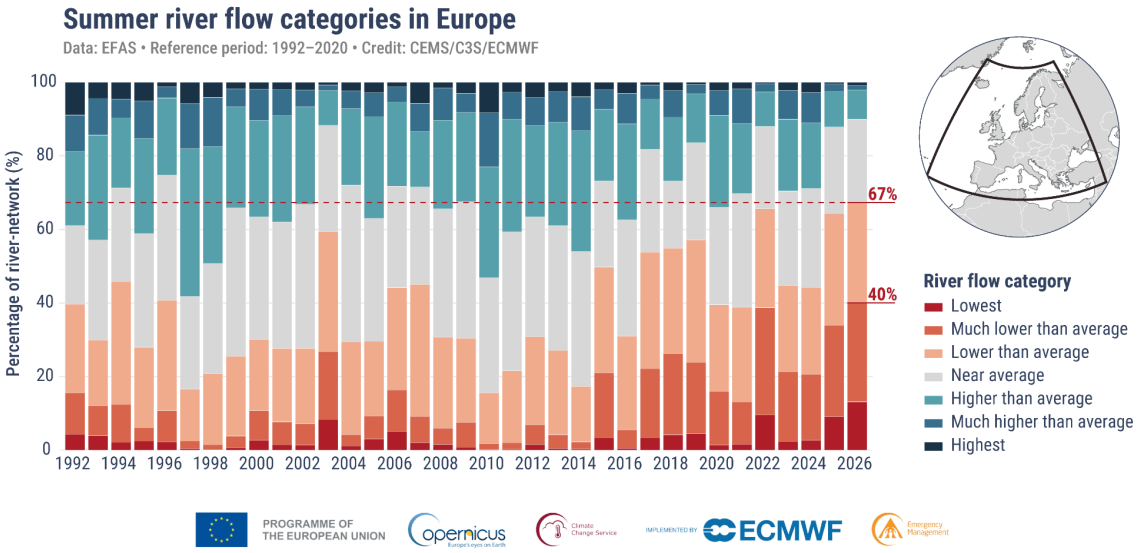


Figure 9. Percentage of the European river network in each river flow category for summer (June-August), from 1992 to 2026. The extreme categories ('highest' and 'lowest') are based on rankings for 1992-2026. The other categories describe how river flow compares to the distribution during the 1992-2020 reference period. 'Much higher/lower than average' – higher/lower than 90% of river flow values. 'Higher/lower than average' – than 66% of river flow values. 'Near average' – within the middle 33%. The percentages are calculated by aggregating all river-network pixels within the EFAS domain with an upstream drainage area greater than 1000 km². Data: EFAS. Credit: CEMS/C3S/ECMWF.

- **In summer 2026,record-low flows occurred simultaneously across many of Europe's major rivers.** At their outlets, the Loire, Seine, Rhine, Glomma, Vistula and Danube all experienced their lowest summer-average flow in the record since 1992. Record-low conditions also affected substantial reaches of other major rivers during the season, including the Rhône in July and the Po, Dniester and Elbe in August, while large stretches of the Dnieper experienced record-low flows over the summer as a whole.

- The combined magnitude of the low flows was substantial. **Across 12 major European river systems** (the Loire, Seine, Rhine, Glomma, Vistula, Danube, Po, Garonne-Dordogne, Rhône, Dnieper, Oder and Elbe) **the integrated**

summer discharge deficit relative to the 1992-2020 mean was about 69 km³, the largest in the record since 1992 for these 12 rivers, equivalent in volume to almost two years of water supplied for public use across the EU, according to estimates from the European Environment Agency.

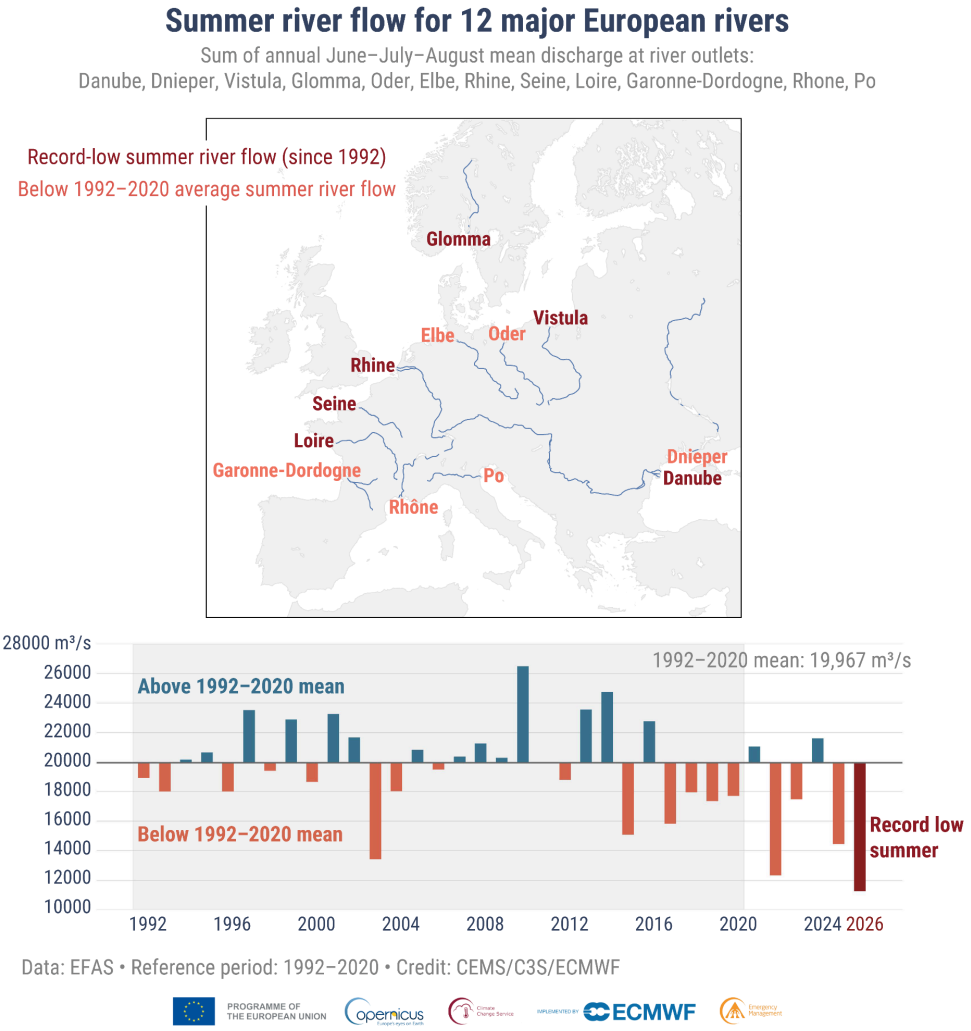


Figure 10. Summer (June-August) mean river flow from 12 major European rivers, from 1992 to 2026, calculated as the sum of mean discharge at the river outlets shown on the map. Bars show years above or below the 1992-2020 mean and are coloured according to the legend. The colours of the river names on the map indicate whether summer 2026 flows were below average or record-low (since 1992), according to the legend.. Data: EFAS. Credit: CEMS/C3S/ECMWF.

- Below-average summer flows affected a large part of Europe. **The most extensive and severe deficits formed a broad belt across central Europe, extending from western Europe into eastern Europe.** Compared with the severe low-flow summer of 2022, low flows in 2026 were more extensive and severe across central and eastern Europe, particularly in Poland, Ukraine and

Belarus, as well as in western France, and affected larger parts of Scandinavia.

- **Low-flow conditions intensified and became more widespread as the summer progressed.** The proportion of the European river network with below-average monthly flows increased from 58% in June to 66% in July, before declining slightly to 62% in August. However, the proportion experiencing flows in the two lowest categories rose from 30% in June to around 40% in July and remained at this level in August. I

- **The prolonged and widespread low-flow conditions affected many sectors across Europe.** Low river levels disrupted navigation and freight transport, energy production, irrigation and other water uses, while putting additional pressure on aquatic ecosystems and contributing to water-use restrictions in several regions.

- **High-flow conditions were much less widespread and generally localised**. There was no widespread recovery, and flows remained well below average across much of the affected area.

Exceptionally hot summer in western Europe

- **Summer 2026 was the warmest on record for western Europe**, with an average surface air temperature of 21.69°C, or 2.54°C above the 1991–2020 average. **The previous record was set in 2003**, a summer marked by the region's most severe heatwave.

- **The 2003 and 2026 summers occurred in a very different context**. In 2003, the seasonal temperature stood out clearly from the generally cooler summers around it. By contrast, 2026 followed a prolonged period of unusually warm summers: every summer since 2015 has been warmer than average, with 2022 already approaching the 2003 record. A more detailed comparison between 2003 and 2026 is presented below.

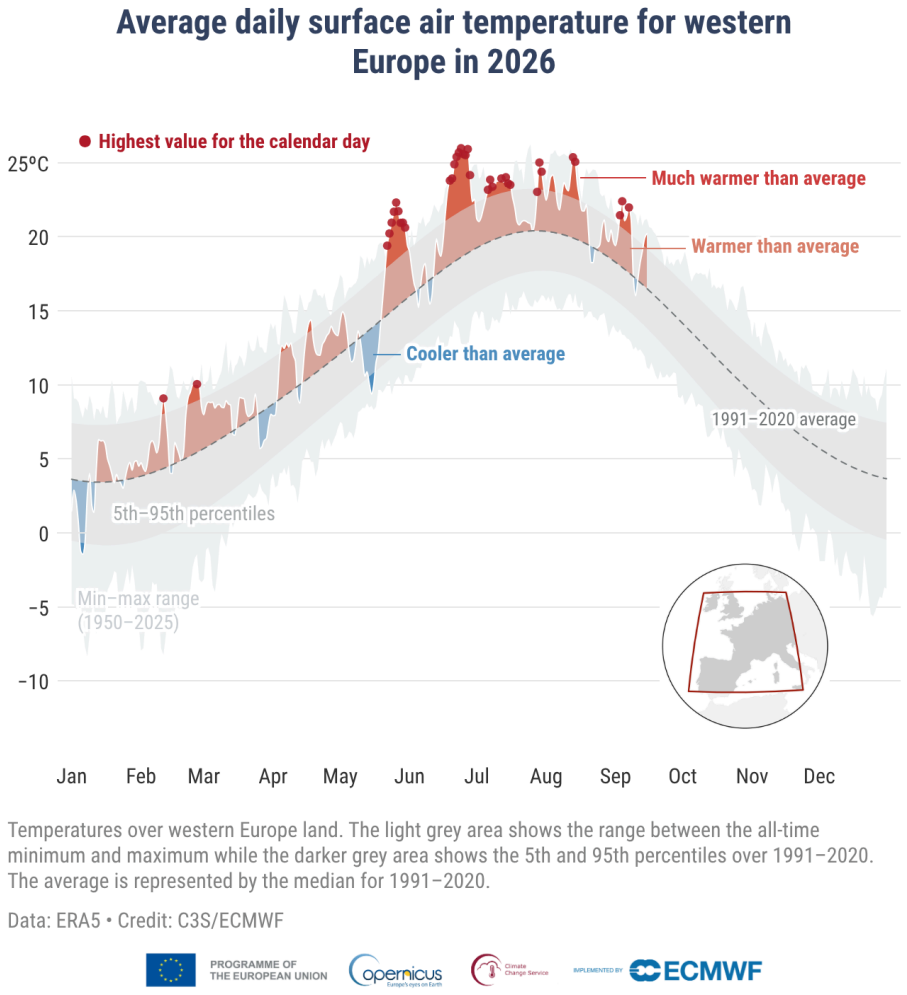


Figure 11. Daily mean surface air temperature (°C) averaged over western Europe from January to September 2026. Shading indicates days that were warmer than average (light red), much warmer than average (dark red) or cooler than average (blue), while red dots mark all-time daily maxima. The grey shading shows the 10th–90th percentile range for 1991–2020, with values outside this range considered much below or much above average. The dashed line shows the 1991–2020 median. Data: ERA5. Credit: C3S/ECMWF.

- Daily temperatures across western Europe show exceptional warmth from May to September, extending beyond summer.
- **The most anomalous temperatures relative to the typical 1991–2020 range occurred in May and June**, highlighting the unusually early timing of the heatwaves. Daily temperatures set new records for the respective calendar dates on 9 days in May and 10 days in June, compared with previous values since 1950.
- New daily records were also set during July, August and September, including on 10 days in July, although the records were broken by smaller margins than in May and June.

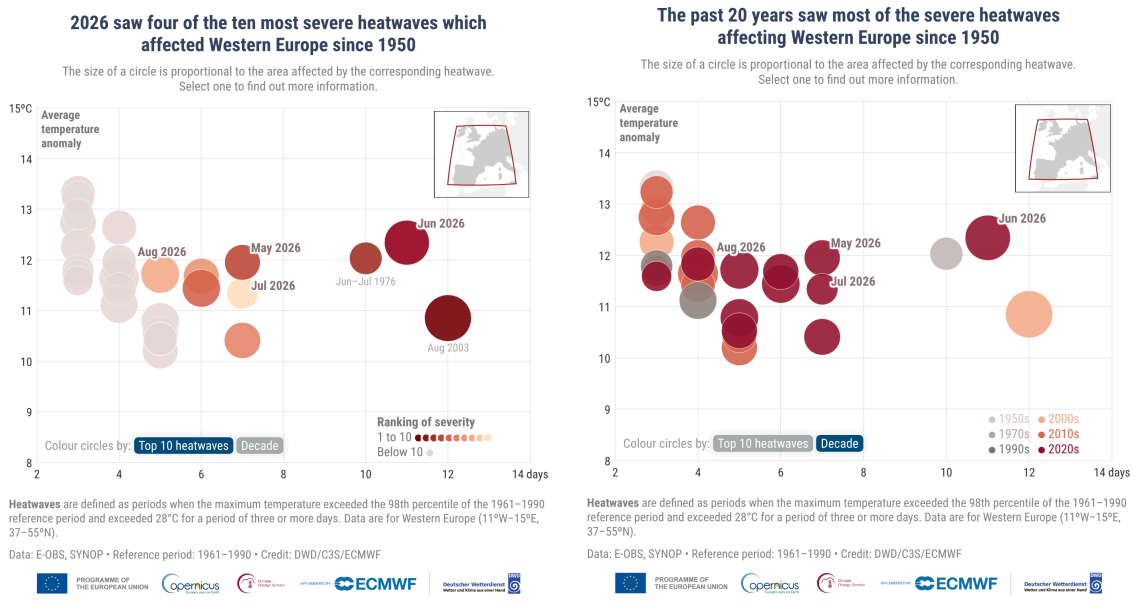


Figure 12. Heatwaves in western Europe since 1950. The circle size is proportional to the area affected by the corresponding event. The 10 most severe heatwaves are indicated by darker colours and grey indicates those with a severity ranking below 10. Severity is based on a combination of the average temperature anomaly relative to the 1961–1990 reference period, the duration and the area affected. Data: E-OBS, SYNOP. Credit: KNMI/DWD/C3S/ECMWF.

- **Between May and August 2026, western Europe experienced four of its ten most severe heatwaves since 1950**. Heatwave severity reflects a combination of duration, intensity (average temperature anomaly across the region), and affected area.

- The four events occurred on 23–29 May (7 days), 18–28 June (11 days), 6–12 July (7 days) and 11–15 August (5 days).

- **The June heatwave was the most severe of 2026 and ranked second in severity since 1950**, behind the August 2003 heatwave. It was more intense but slightly shorter than the 2003 event, which lasted 12 days. All four 2026 heatwaves were more intense than the August 2003 heatwave.

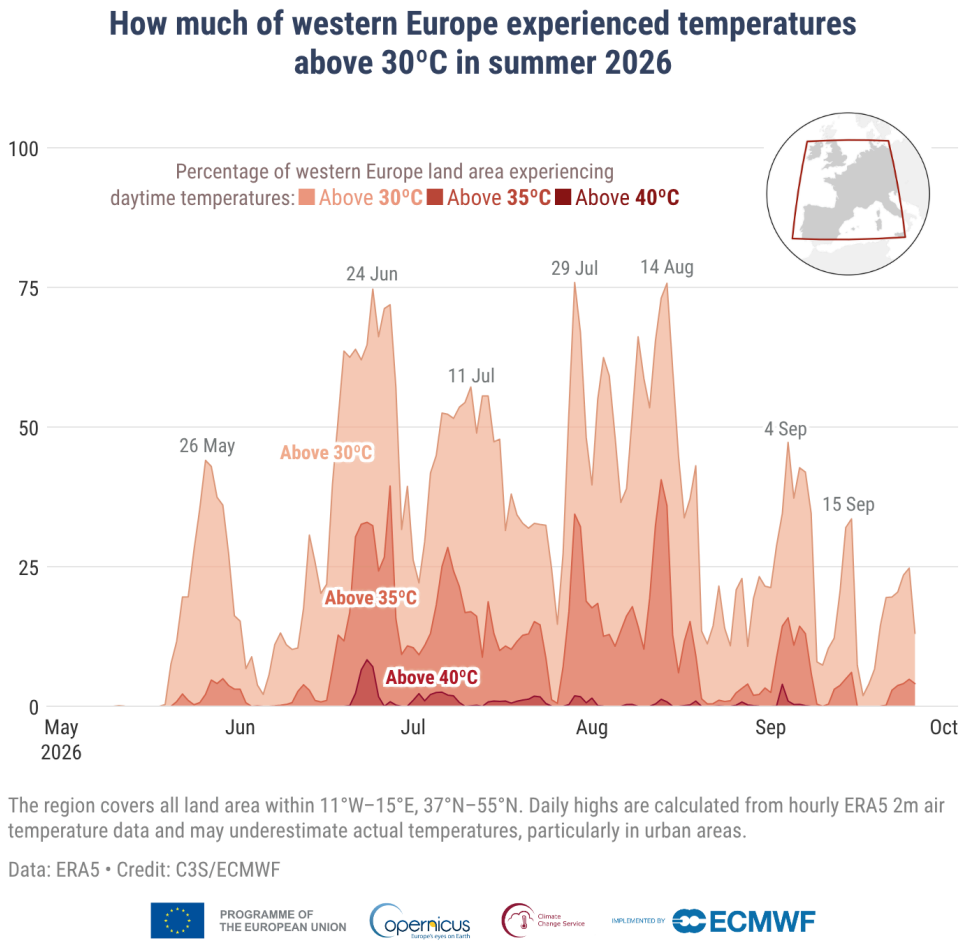


Figure 13. Daily percentage of western Europe's land area experiencing daily maximum temperatures of at least 30°C (light red), 35°C (medium red) and 40°C (dark red) between May and September 2026. The highlighted dates indicate the peaks of the heatwaves. Data source: ERA5. Credit: C3S/ECMWF.

Extent and intensity of the 2026 heatwaves

- ERA5 data show a succession of widespread heat episodes across western Europe from May to September 2026, with several distinct peaks experiencing daily maximum temperatures of at least 30°C.

- Six main peaks are evident over this period, but their timing, duration, intensity and geographical focus varied across western Europe. As a result, national meteorological agencies may identify slightly different heatwave periods in the same prolonged event.

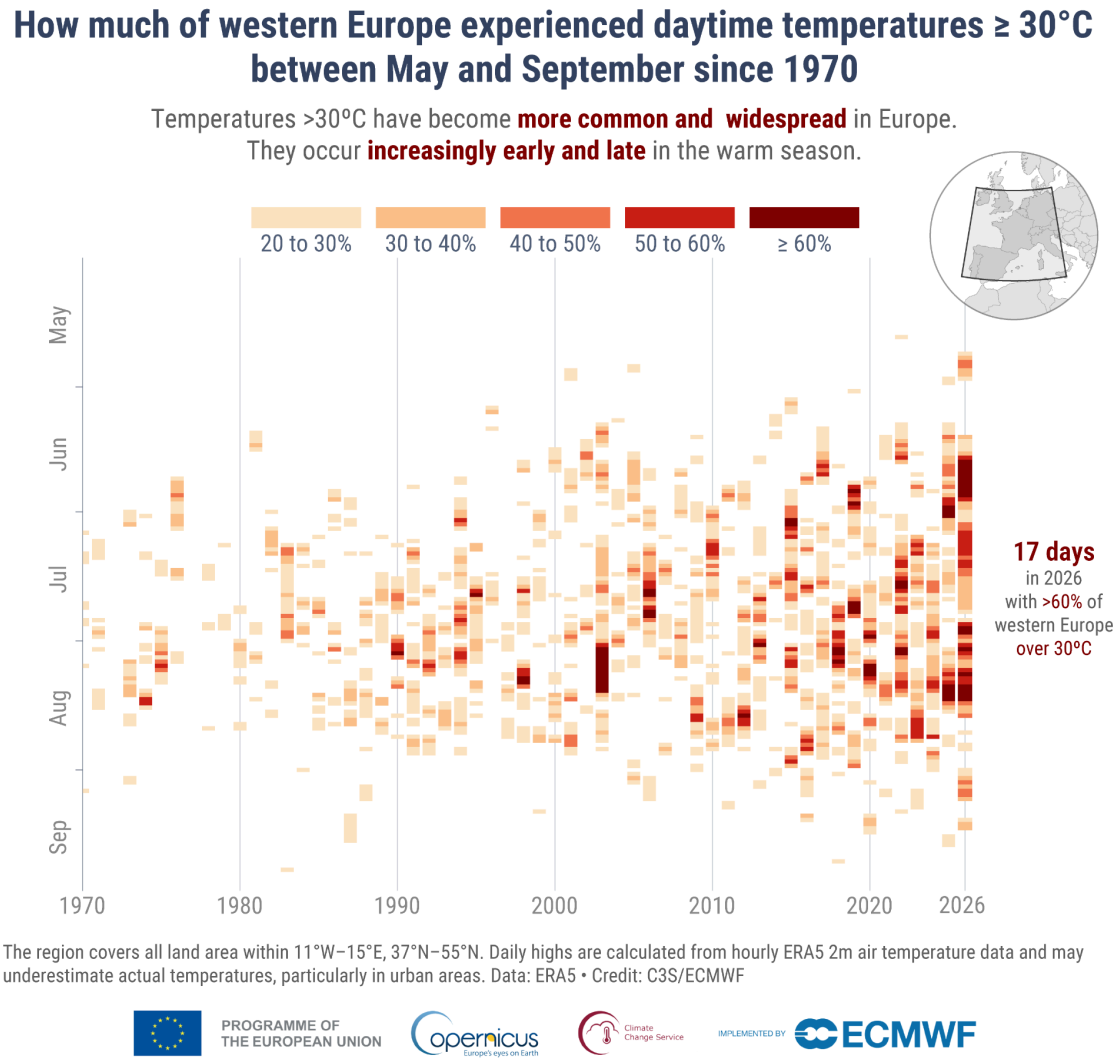
- The largest areas affected occurred **on 24 June, 29 July and 14 August, when about 75% of western Europe experienced temperatures of at least 30°C**. These peaks also saw temperatures of at least 35°C affecting more than 30% of the region.

- Significant heat also occurred outside the peak summer months. During the May and September events, temperatures reached at least 30°C across more than 40% of western Europe.

- National observations also highlight the severity of the heat. In France, around 40% of the country exceeded 40°C during the June heatwave; over the summer, 90% experienced at least one day at 35°C or higher, and 45% at 40°C or higher. In the UK, temperatures exceeded 35°C on a record nine days, and 35°C was recorded in every summer month for the first time.

Comparison with 2003

- Although the August 2003 heatwave remains western Europe's most intense, 2026 saw a much larger area reaching 30°C outside the peak summer period. In May and September 2003, temperatures above 30°C affected less than 13% of the region.



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Figure 14. Daily percentage of western Europe's land area experiencing maximum temperatures of at least 30°C between May and September, for each year from 1970 to 2026. Colours indicate the percentage of the region affected, from 20–30% (light red) to 60% or more (dark red). Data source: ERA5. Credit: C3S/ECMWF.

Longer-term context

- **Since the 1970s, 30°C heat has become more widespread across western Europe and is increasingly extending beyond the core summer months**. It was exceptionally widespread and persistent in 2026.

- The share of western Europe reaching 30°C on a summer day rose from 9% in the 1970s to 23% in the decade before 2026, peaking at 39% in 2026. Heat also lasted longer, extending from June into September, with a record 17 days in 2026 seeing over 60% of the region exceed 30°C.

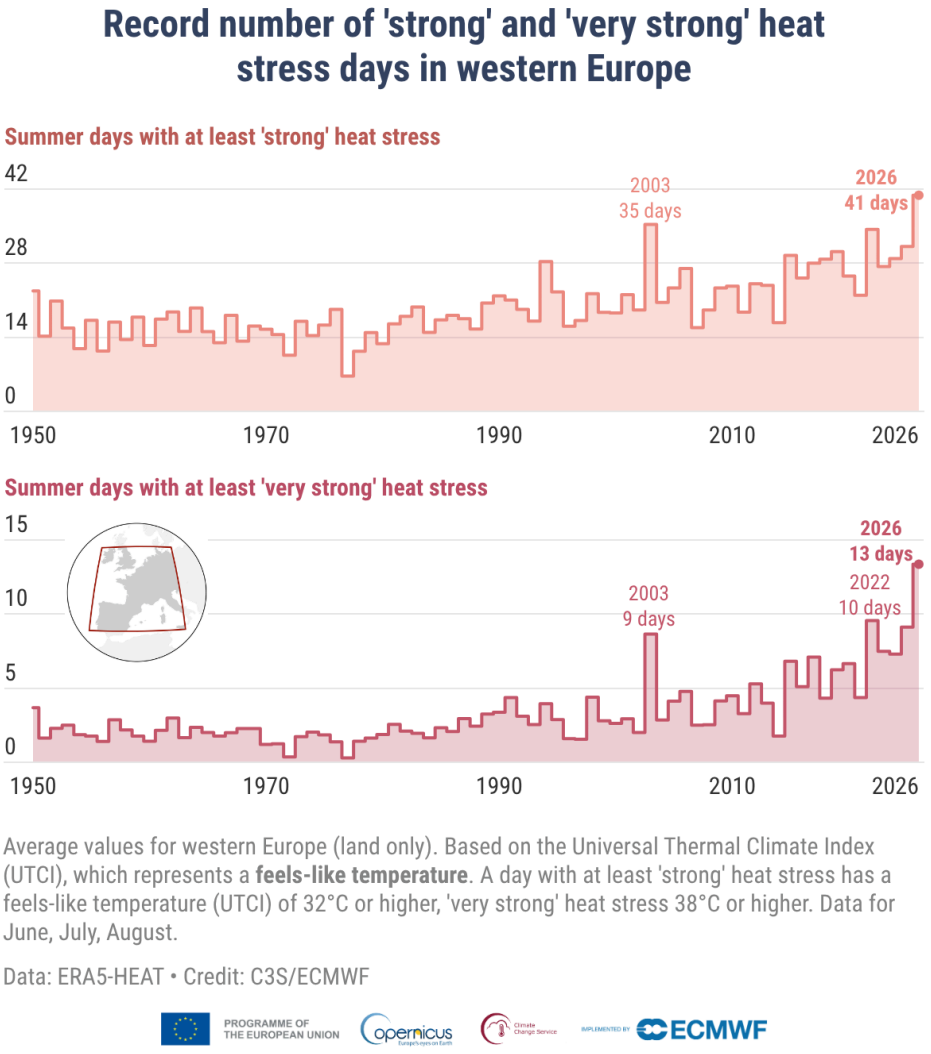


Figure 15. Average number of days with at least 'strong', or 'very strong' heat stress averaged over western Europe (land only) for summer (June to August), from 1950–2026. The thresholds for 'strong' and 'very strong' heat stress are 32°C and 38°C, based on the Universal Thermal Climate Index (UTCI). The data represent the average across western Europe; in 2026, some places within this area did not see any day with 'strong' or 'very strong' heat stress, while others saw up to a full season of 'strong' heat stress and up to 75 days with 'very strong' heat stress. To explore the number of heat stress days over summer for any location, visit Thermal Trace. Data: ERA5-HEAT. Credit: C3S/ECMWF.

- **2026 saw a record-breaking number of days with at least 'strong' and 'very strong' heat stress in western Europe, by a large margin.**
    - Averaged across western Europe, there were 41 days recording at least 'strong' heat stress; this is 5 days more than in 2003.
    - There was an average of 13 days with 'very strong' heat stress; around 4 more days than in 2022 and 2025.

Atmospheric circulation: persistent high-pressure conditions

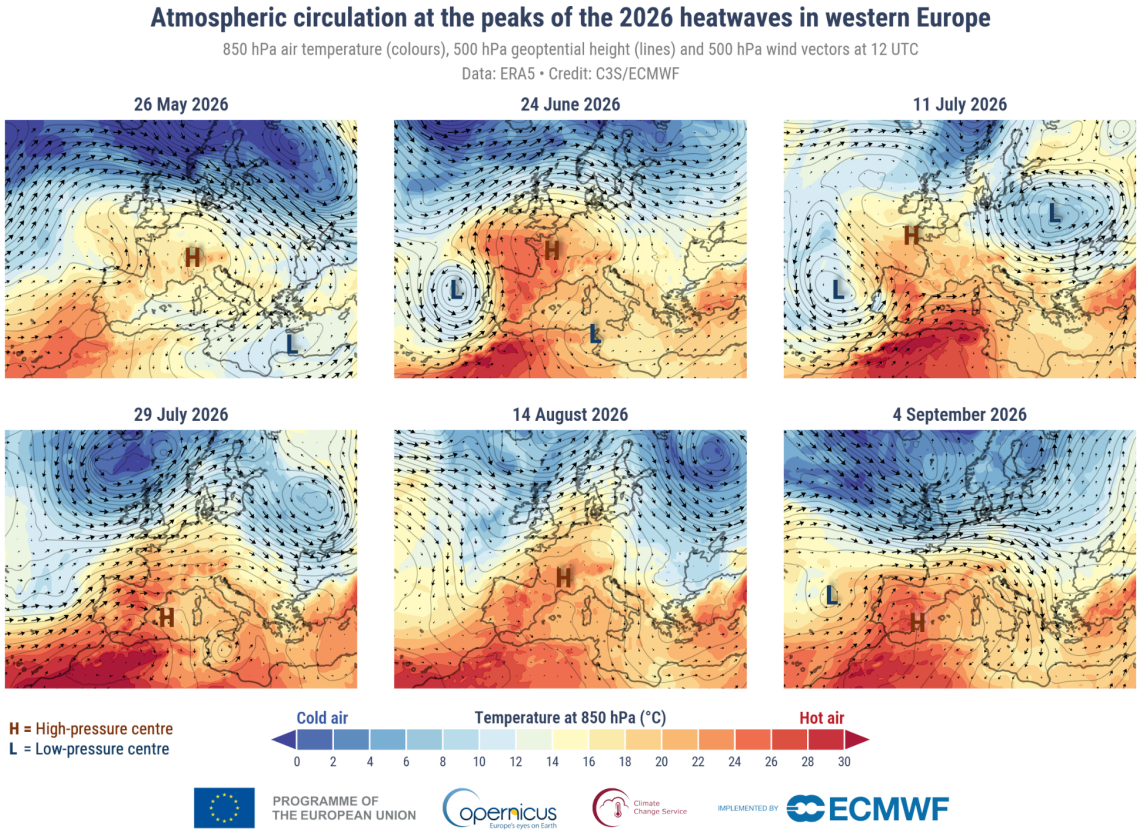


Figure 16. Maps showing the large-scale atmospheric circulation and temperature at the peak of the heatwaves in western Europe observed between May and September 2026. The colour contours show the temperature at 850 hPa (about 1,500 metres above sea level). The line contours represent geopotential height at 500 hPa, while the vectors show the wind field at 500 hPa. The 500 hPa level is about 5,500 metres above sea level. The "L" and "H"

indicate the locations of low- and high-pressure centres, respectively. Data source: ERA5. Credit: C3S/ECMWF.

- From May to September 2026, western Europe experienced **repeated blocking high-pressure systems** that disrupted the jet stream and diverted Atlantic storms. These conditions created persistent “heat domes”, with clear skies and strong sunshine allowing heat to build, while dry soils further intensified temperatures.

- **Warm air from subtropical regions, sometimes reinforced by low pressure west of Iberia**, fuelled the major heatwave peaks on 24 June and 11 July. The same patterns, together with low rainfall in preceding months, also contributed to prolonged drought, low soil moisture and reduced river flows across parts of Europe.

- The causes of their unusual persistence remain under investigation, including possible influences from North Atlantic sea surface temperature patterns.

This seasonal review was prepared by C3S, with input from colleagues across the broader Copernicus (CEMS, CAMS) and NMHS community, particularly KNMI and DWD, within the framework of C3S funding.

Datasets, glossary and methodology

Datasets used

All air surface temperature and SST estimates in this report, unless otherwise specified, as well as precipitation, are based on the ERA5 reanalysis dataset.
ERA5 reanalysis: Data | Documentation

Other datasets (and associated variables) used were:
ERA5-Land (surface soil moisture): Data | Documentation.
ERA5-Heat (heat stress): Data and documentation and Thermal Trace application.
ERA5-Drought (meteorological drought SPEI-1 and SPEI-3): Data | Documentation.
Copernicus Emergency Management Service (CEMS) European Flood Awareness System (EFAS) (river flow): Data | Documentation
Copernicus Emergency Management Service (CEMS) European Forest Fire Information System (EFFIS): Data
E-OBS in situ gridded dataset (E-OBS climate indices 'summer days', 'wet days', heatwave severity): Data | Documentation
Copernicus Atmosphere Monitoring Service (CAMS) Global Fire Assimilation System (GFAS) v1.2 Data | Documentation.

Definitions

*'**Summer days**' (SU) are defined as days with maximum air temperature above 25°C.*
*'**Wet days**' (R1mm) are defined as days with total precipitation amount equal to or exceeding 1 mm.*
*'**Tropical nights**' are defined as days when the minimum air temperature does not drop below 20°C.*

Heat stress (UTCI)

Thermal comfort including heat stress, can be monitored using indices such as the Universal Thermal Climate Index (UTCI), which considers temperature, humidity, wind speed, sunshine and heat emitted by the surroundings, and how the human body responds to different thermal environments. It can be used to infer weather-induced outdoor thermal stress in humans by classifying UTCI values into ten different heat and cold stress categories, with units of °C representing a 'feels-like temperature'. The information on feels-like temperature and heat stress presented here are provided in part by Thermal Trace, an application for monitoring and exploring heat and cold stress data worldwide.

SPEI

Standardized Precipitation Evapotranspiration Index (SPEI) is an index used to identify timing and severity of drought events. It quantifies how much precipitation (water supply) and temperature-driven potential evapotranspiration (water demand), accumulated over a certain time window (e.g. 1 month for SPEI-1, 3 months for SPEI-3), deviate from the long-term average.

Domains used for spatial averaging

Europe, 25° W–40° E, 34° N–72° N, over (land surfaces only).

European oceans, 25° W–40° E, 34° N–72° N, (over oceans only).

Western Europe, 11°W–15°E, 37°–55°N .

Methodology to assess the severity of heatwaves

For a given location, heatwave conditions are defined as periods of at least three days when maximum temperatures exceed both 28°C and the 98th percentile of the 1961–1990 reference period. A regional heatwave is identified when the affected area covers more than 20% of the region. Severity combines duration, intensity and area affected, where intensity is measured by the average temperature anomaly relative to 1961–1990. Using this methodology for western Europe, 29 heatwaves were identified between 1950 and 2026.

Supplementary figures

Temperature

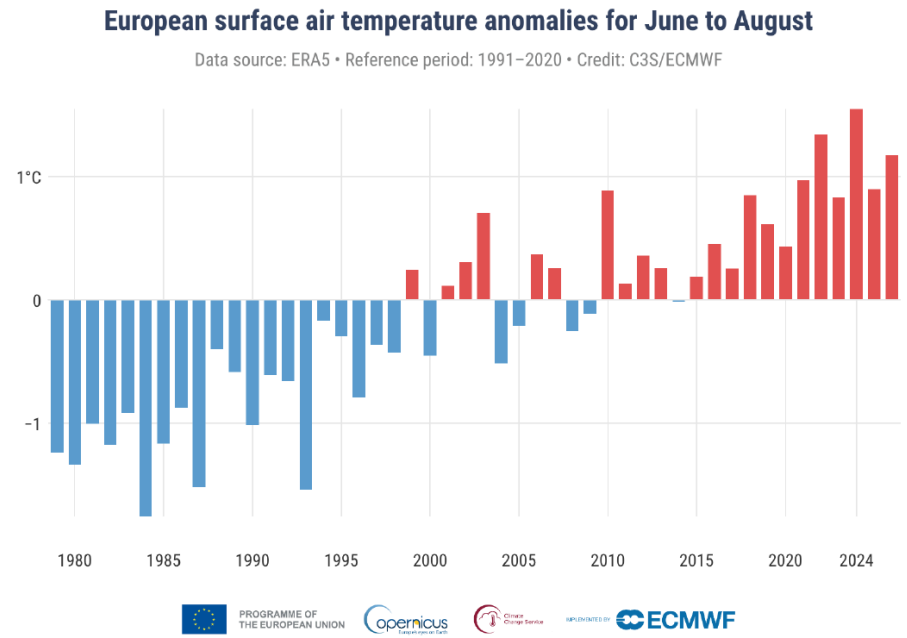


***Figure S1**. European-mean surface air temperature anomalies relative to 1991–2020 for each boreal summer (June to August) from 1979 to 2026. Data source: ERA5. Credit: C3S/ECMWF.*

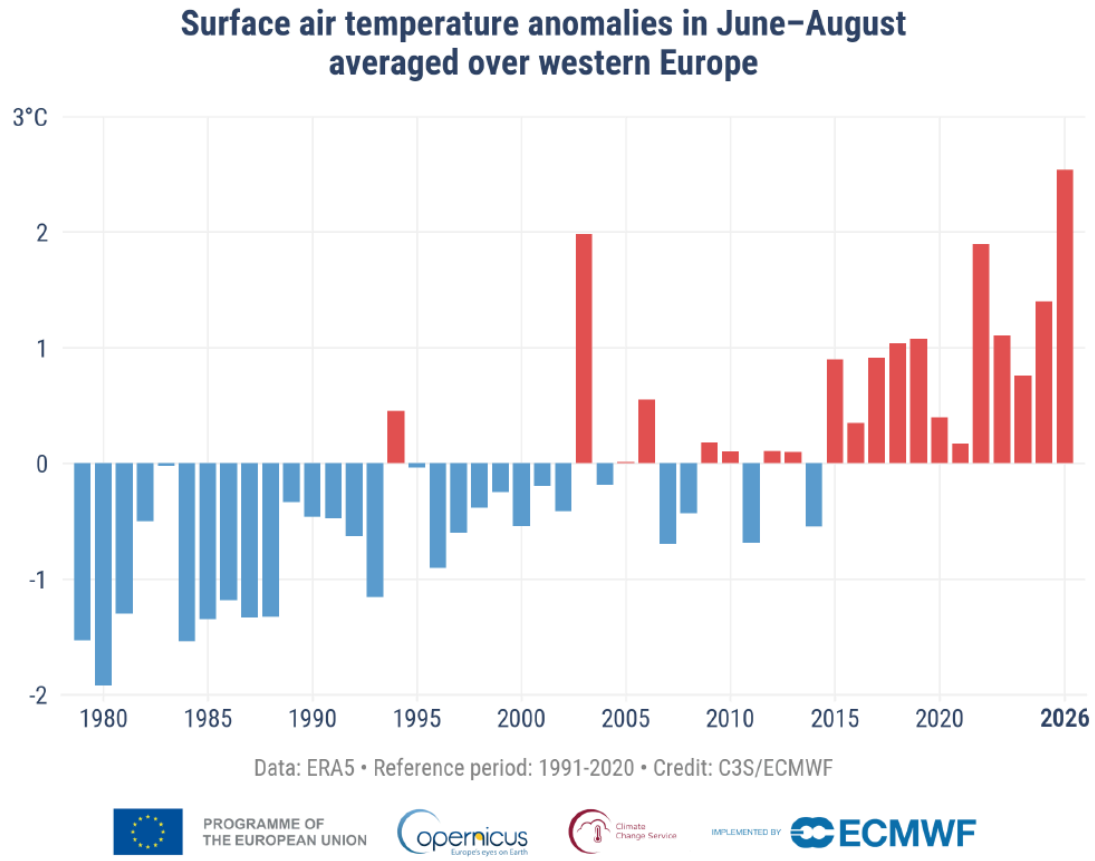


***Figure S2**. Surface air temperature anomalies relative to 1991–2020 averaged over western Europe for each boreal summer (June to August) from 1979 to 2026. Data source: ERA5. Credit: C3S/ECMWF.*

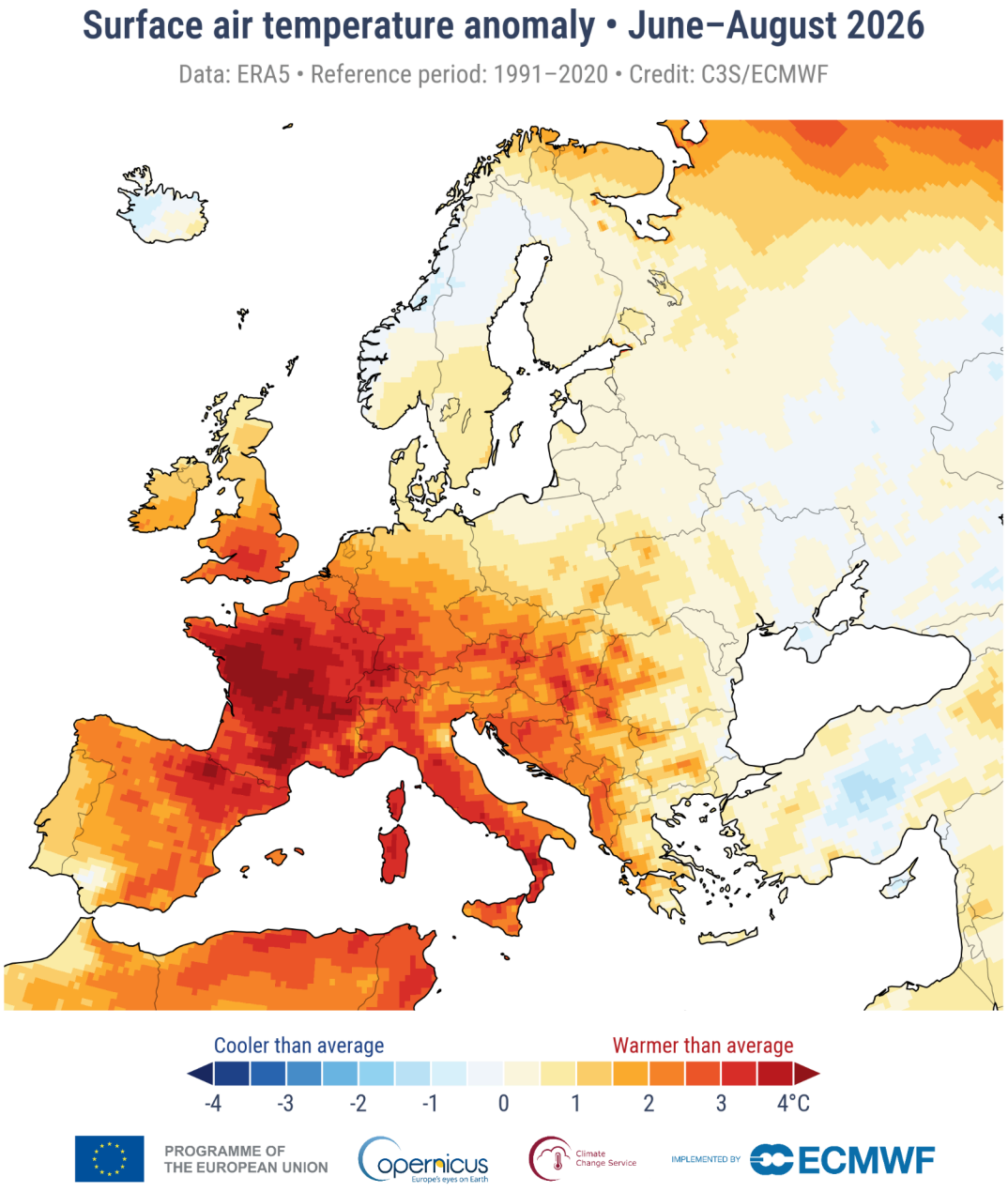


***Figure S3**. European mean surface air temperature anomalies relative to 1991–2020 for each summer (June to August) from 1979 to 2026. Data source: ERA5. Credit: C3S/ECMWF.*

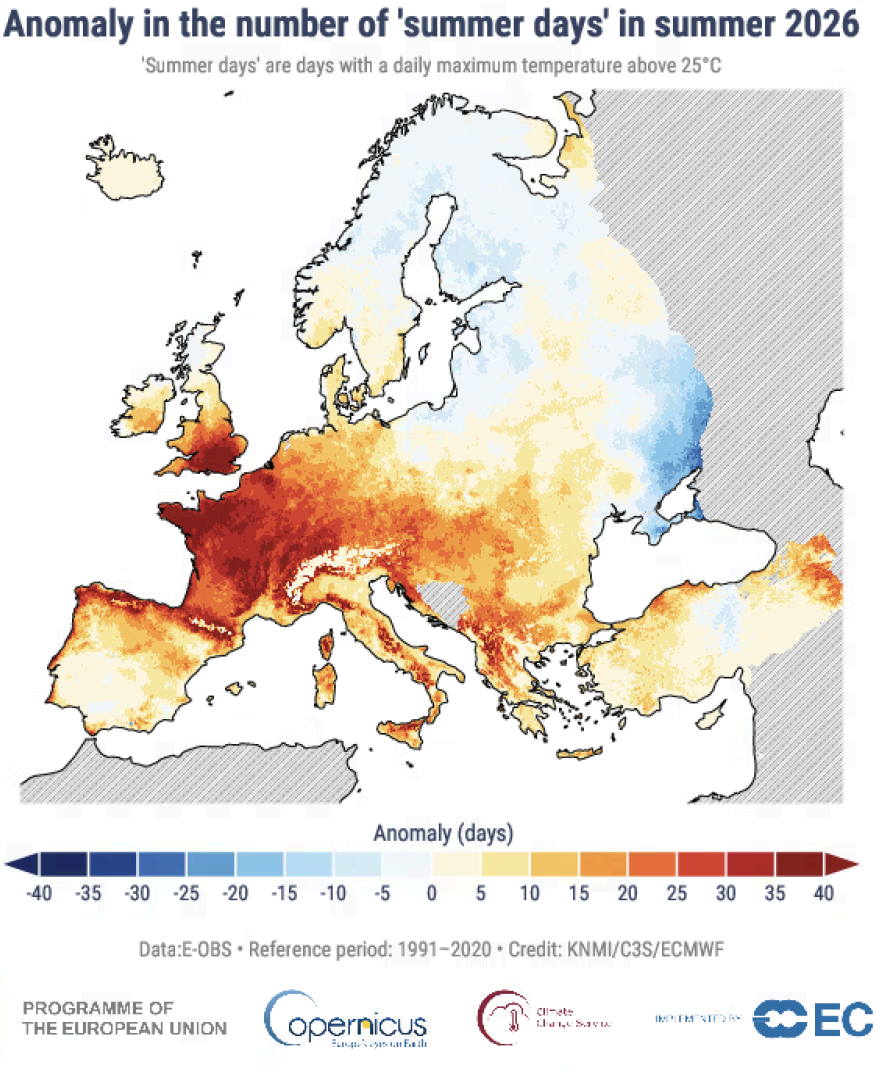


***Figure S4**. Anomaly in the number of 'summer days', days when the daily maximum temperature is above 25°C, for summer (June to August) 2026, relative to the average for the 1991–2020 reference period. Grey shading denotes areas with insufficient data coverage. Data source: E-OBS. Credit: KNMI/C3S/ECMWF.*

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Heat stress

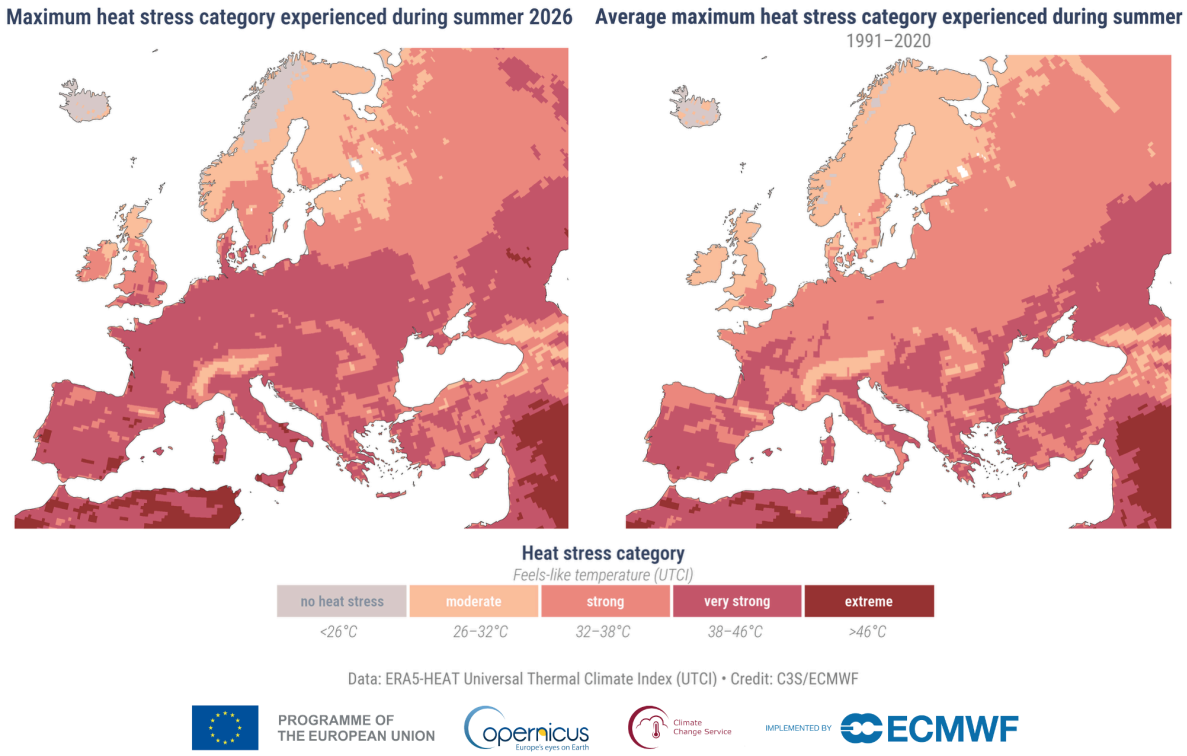


***Figure S5**. Most severe category of heat stress experienced during summer (June to August) 2026 (left), and the average maximum heat stress category experienced during summer (June to August), based on the 1991–2020 reference period (right). Maximum heat stress category is based on the seasonal maximum feels-like temperature (Universal Thermal Climate Index, UTCI). Data: ERA5-HEAT. Credit: C3S/ECMWF.*

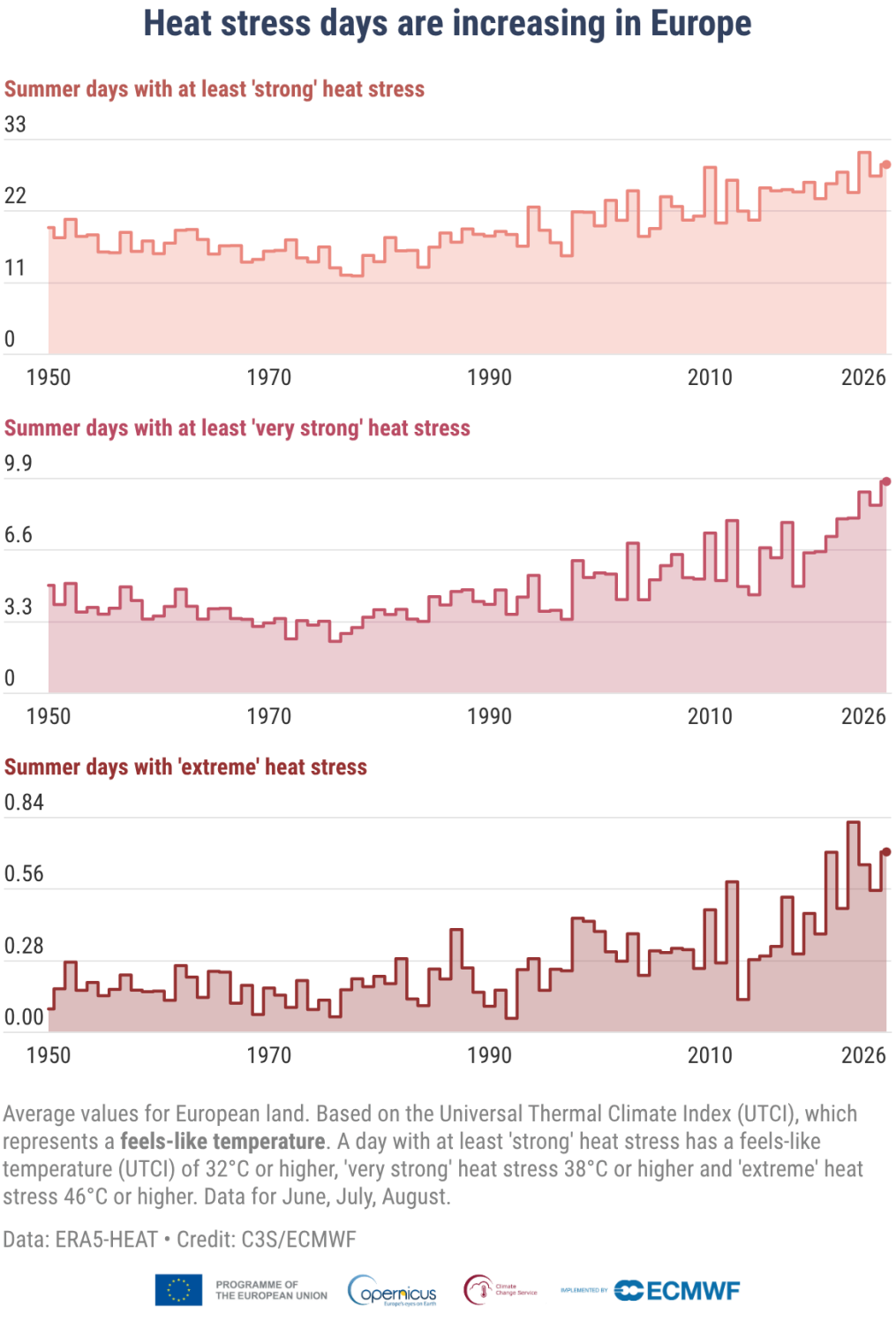


***Figure S6**. Average number of days with at least 'strong', 'very strong' or 'extreme' heat stress averaged over European land for summer (June to August), from 1950–2026. The thresholds for 'strong', 'very strong' and 'extreme' heat stress are 32°C, 38°C and 46°C, respectively, based on the Universal Thermal Climate Index (UTCI). Data: ERA5-HEAT. Credit: C3S/ECMWF.*

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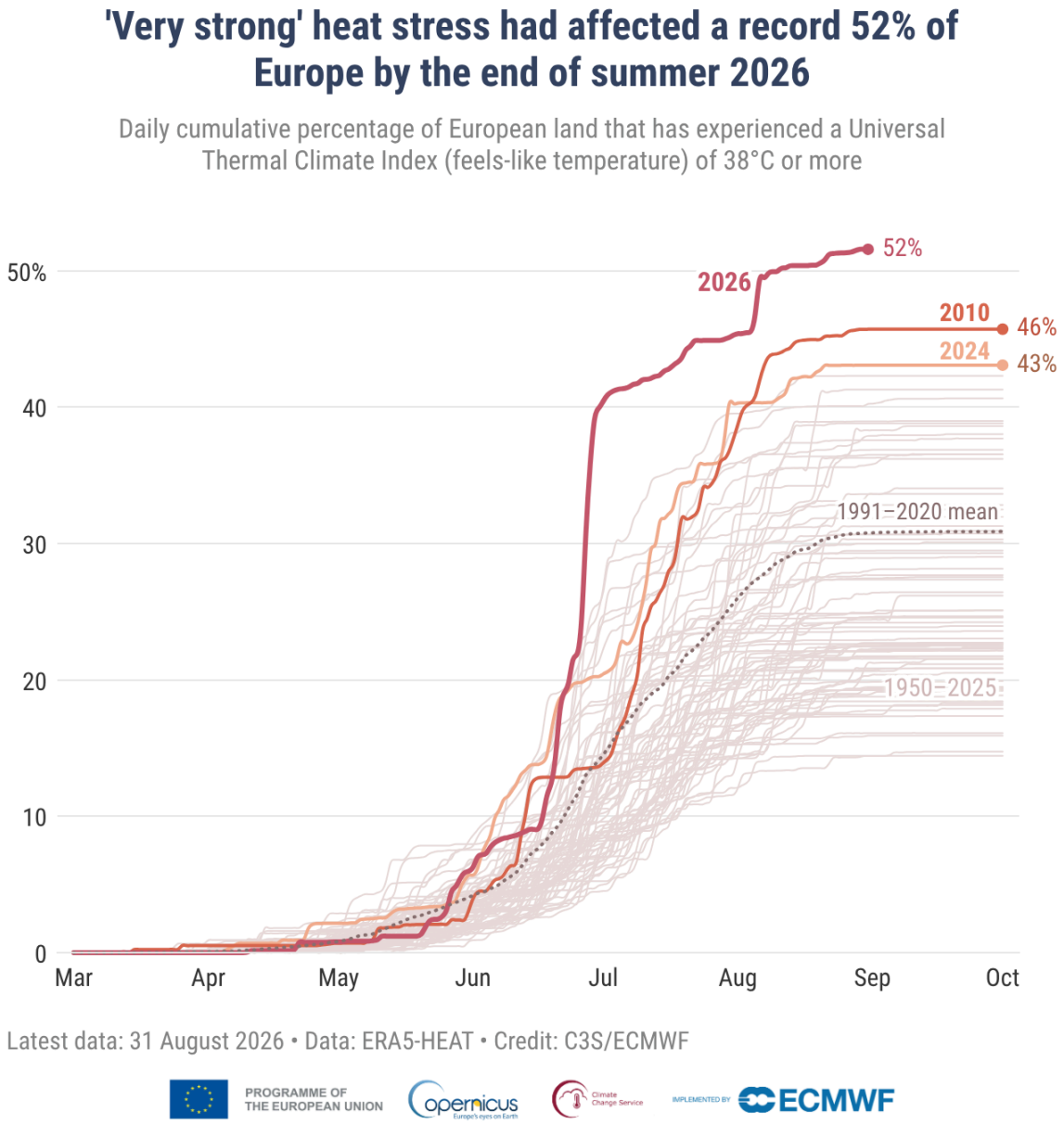


***Figure S7**. Daily cumulative percentage of European land that experienced a Universal Thermal Climate Index ('feels-like' temperature) of 38°C or higher, or at least 'very strong' heat stress, for each year from 1950 to 2026. Data represents an increasing total through the year, not the area simultaneously affected on a given day. Data: ERA5-HEAT. Credit: C3S/ECMWF.*

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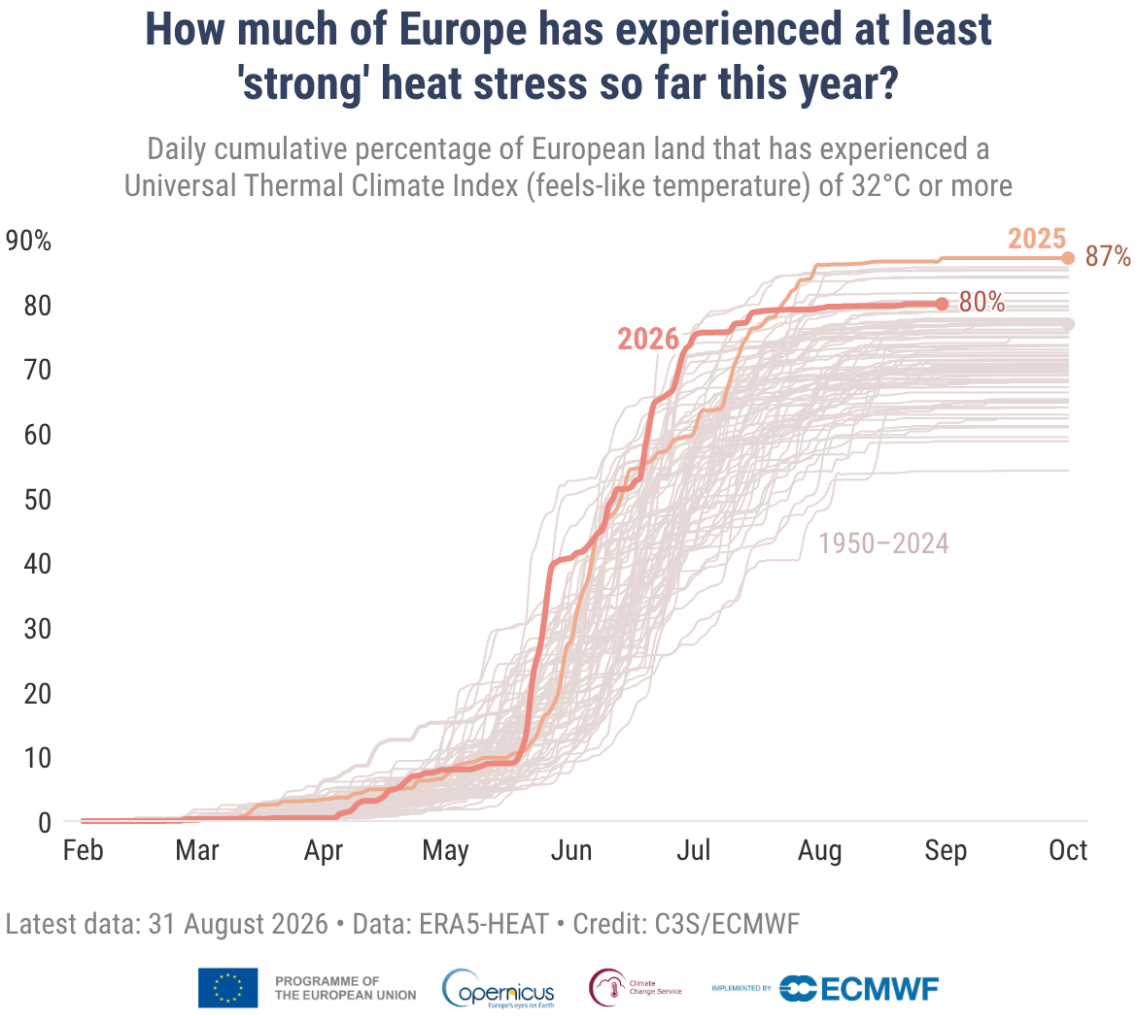


Figure S8. *Daily cumulative percentage of European land that experienced a Universal Thermal Climate Index ('feels-like' temperature) of 32°C or higher, or at least 'strong' heat stress, for each year from 1950 to 2026. Data represents an increasing total through the year, not the area simultaneously affected on a given day. Data: ERA5-HEAT. Credit: C3S/ECMWF.*

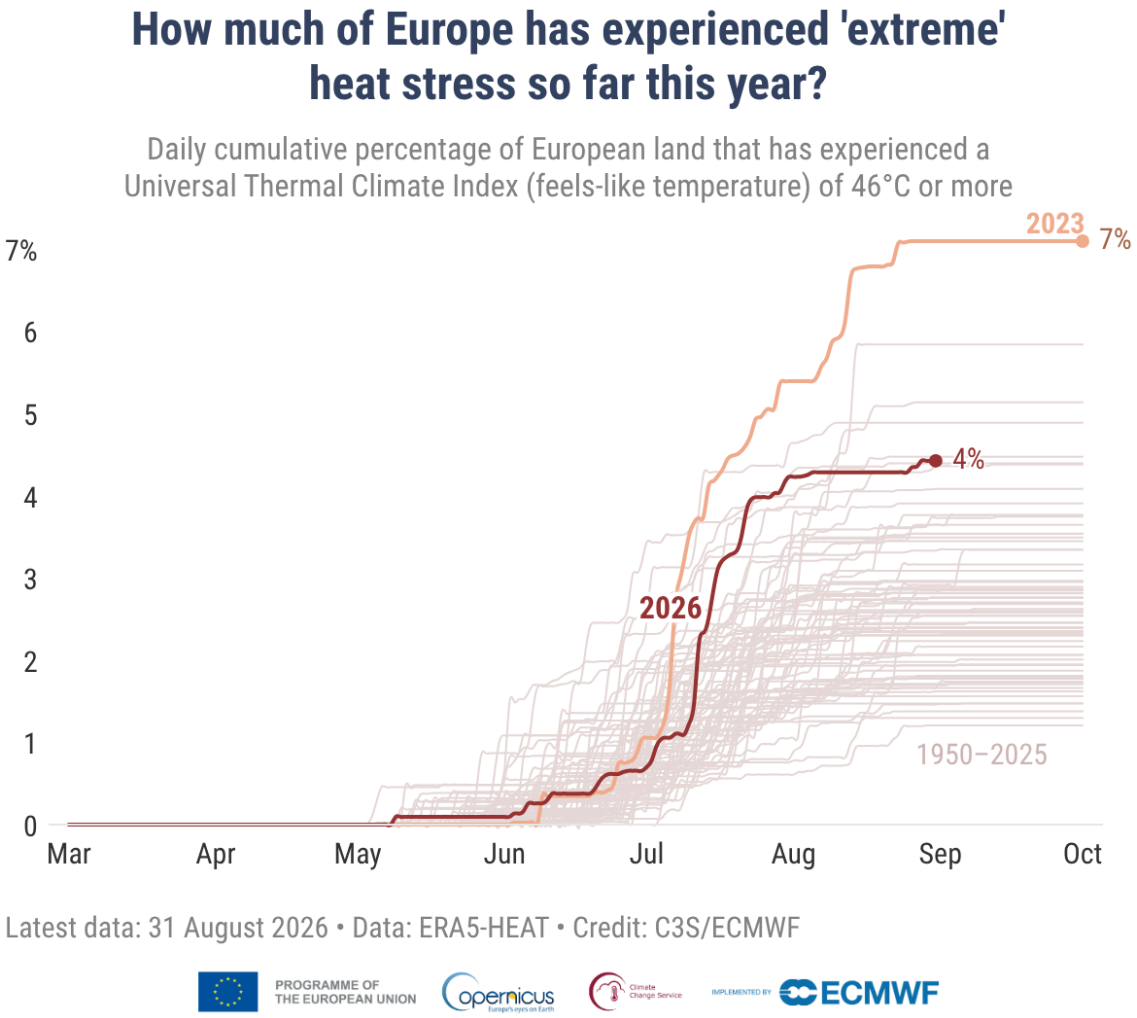


***Figure S9**. Daily cumulative percentage of European land that experienced a Universal Thermal Climate Index ('feels-like' temperature) of 46°C, or 'extreme' heat stress, for each year from 1950 to 2026. Data represents an increasing total through the year, not the area simultaneously affected on a given day. Data: ERA5-HEAT. Credit: C3S/ECMWF.*

Sea surface temperature

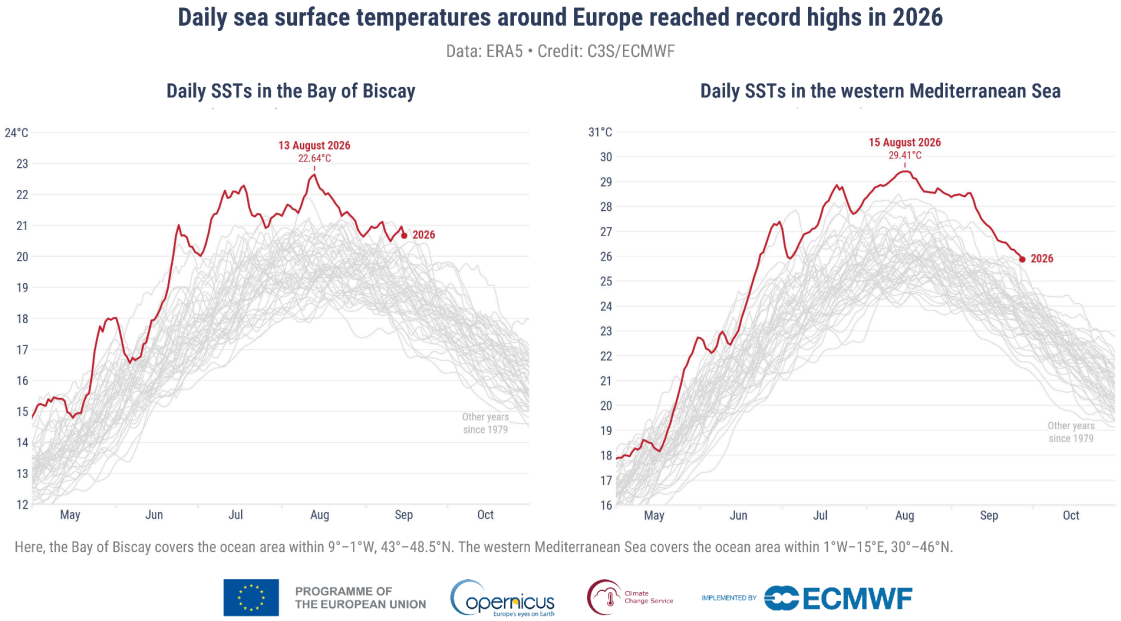


***Figure S10**. Daily sea surface temperatures averaged over the Bay of Biscay (left) and the western Mediterranean Sea (right) for 2026 (red) and all other years since 1979 (grey). Data source: ERA5. Credit: C3S/ECMWF.*

Wet and dry conditions

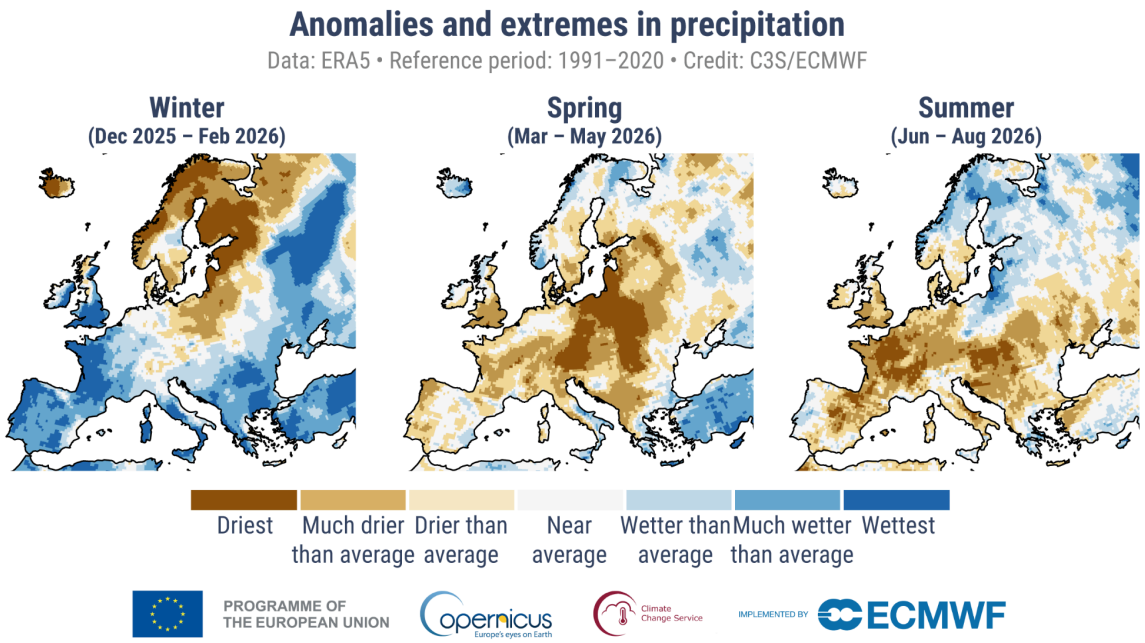


***Figure S11**. Anomalies and extremes in precipitation for winter (December 2025-February 2026), spring (March-May 2026) and summer (June-August 2026).The extreme categories ('wettest' and 'driest') are based on rankings for 1979–2025. The other categories describe how the seasonal averages compare to their distribution during the 1991–2020 reference period. 'Much wetter/drier than average' - wetter/drier than 90% of seasonal values. 'Wetter/drier than average' - than 66% of seasonal values. 'Near average' - within the middle 33%. Data: ERA5. Credit: C3S/ECMWF.*

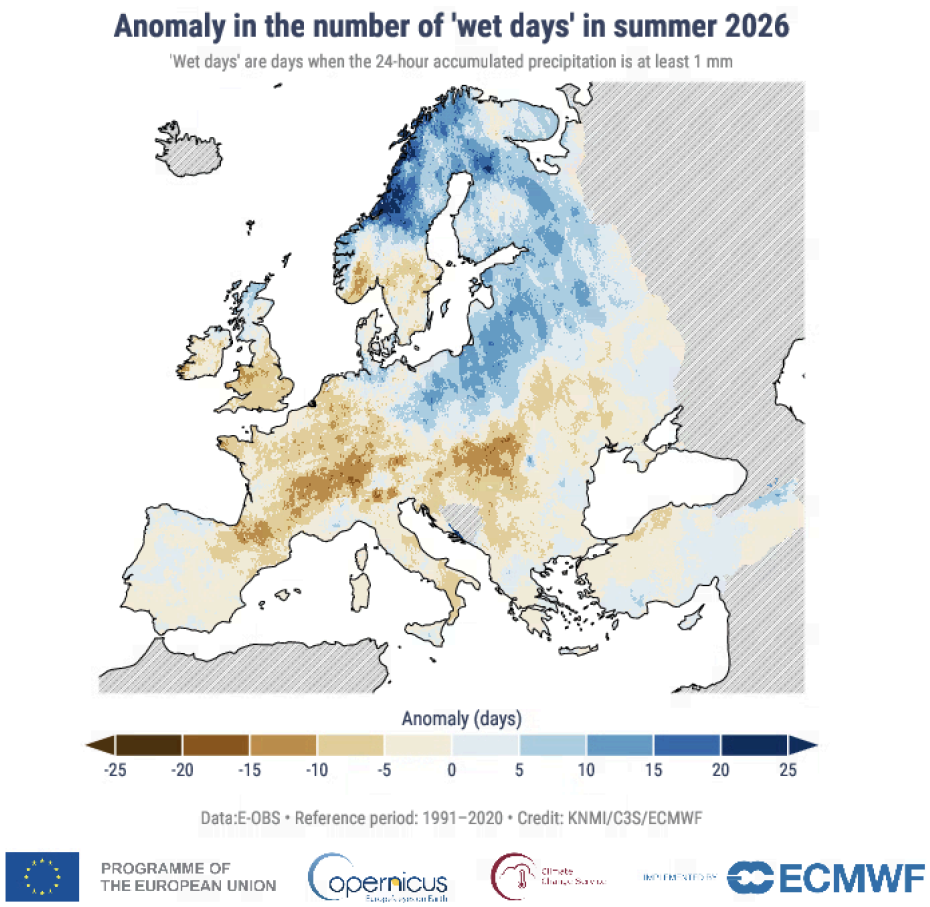


***Figure S12**. Anomaly in the number of 'wet days', days when the 24-hour accumulated precipitation is at least 1 mm, for June to August 2026, relative to the average for the 1991–2020 reference period. Grey shading denotes areas with insufficient data coverage. Data: E-OBS. Credit: C3S/ECMWF/KNMI.*

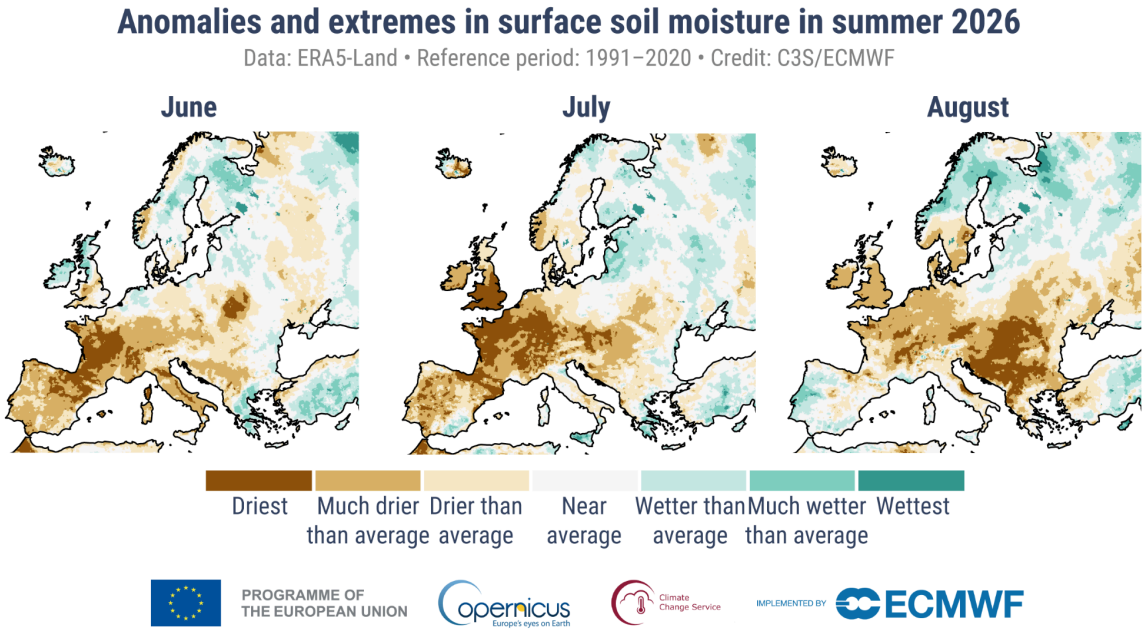


***Figure S13**. Anomalies and extremes in average surface soil moisture for June, July and August 2026. The extreme categories ('wettest' and 'driest') are based on rankings for 1979–2026. The other categories describe how surface soil moisture compares to the distribution during the 1991–2020 reference period. 'Much wetter/drier than average' - wetter/drier than 90% of surface soil moisture values. 'Wetter/drier than average' - than 66% of surface soil moisture values. 'Near average' - within the middle 33%. Data: ERA5-Land. Credit: C3S/ECMWF.*

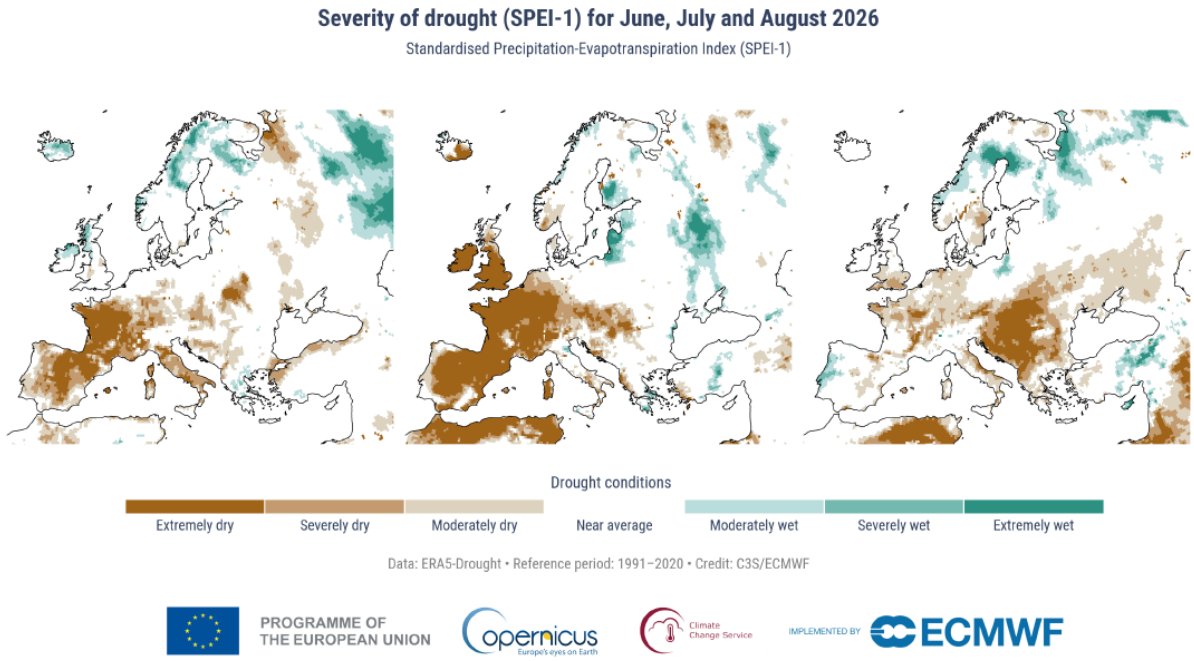


***Figure S14**. Severity of drought for June, July and August 2026, based on the monthly Standardized Precipitation Evapotranspiration Index (SPEI-1). Colour categories are based on the number of standard deviations relative to the 1991–2020 reference period. Values between -1 and 1 are generally considered normal, while values outside this range indicate either drier-than-average or wetter-than-average conditions. "Extremely wet" corresponds to values above 2.0, "Extremely dry" to values below -2.0. Data: ERA5-Drought. Credit: C3S/ECMWF.*

River flow

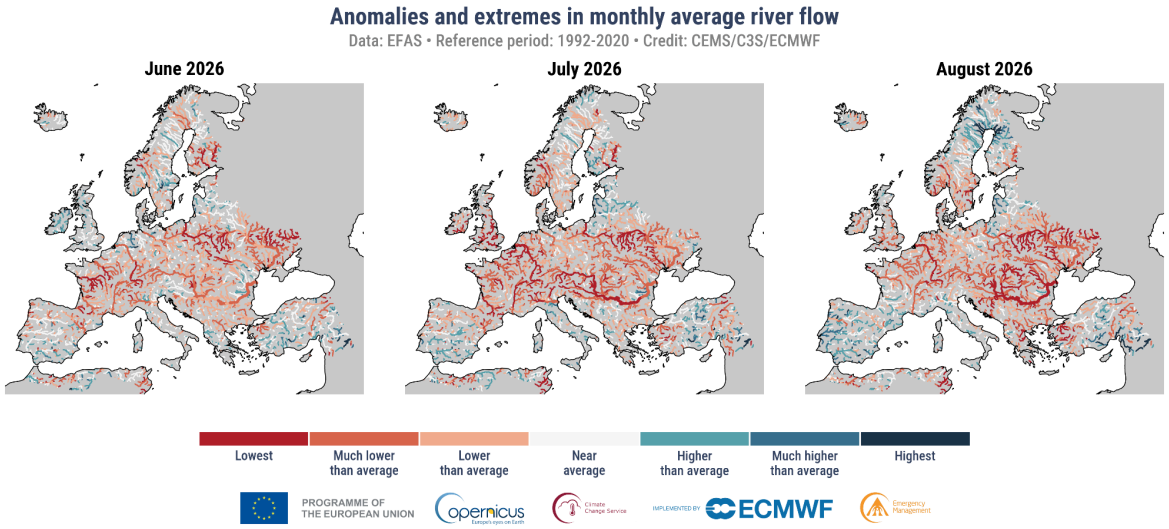


Figure S15. *Anomalies and extremes in seasonal average river flow for June, July and August 2026. The extreme categories ('highest' and 'lowest') are based on rankings for 1992-2026. The other categories describe how river flow compares to the distribution during the 1992-2020 reference period. 'Much higher/lower than average' – higher/lower than 90% of river flow values. 'Higher/lower than average' – than 66% of river flow values. 'Near average' – within the middle 33%. Only river-network pixels with an upstream drainage area greater than 1000 km² are shown. Data: EFAS. Credit: CEMS/C3S/ECMWF.*

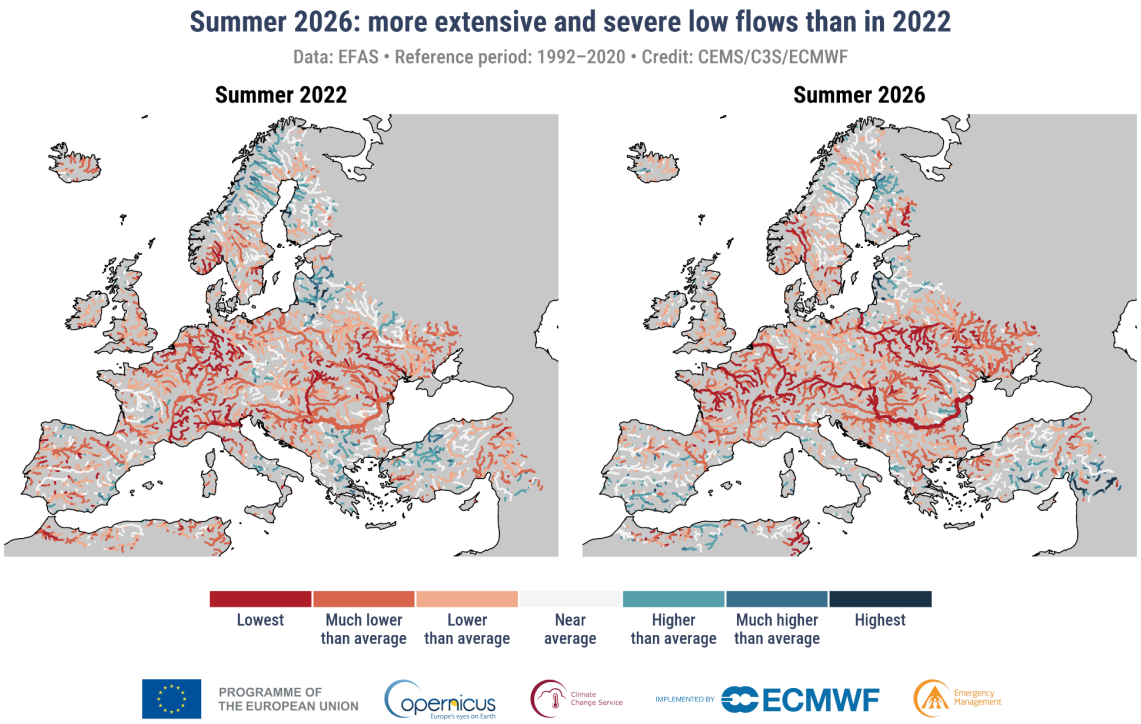


Figure S16. *Anomalies and extremes in seasonal average river flow for summer 2022 (previous severe drought in Europe) and summer 2026. The extreme categories ('highest' and 'lowest') are based on rankings for 1992-2026. The other categories describe how river flow compares to the distribution during the 1992-2020 reference period. 'Much higher/lower than average' – higher/lower than 90% of river flow values. 'Higher/lower than average' – than 66% of river flow values. 'Near average' – within the middle 33%. Only river-network pixels with an upstream drainage area greater than 1000 km² are shown. Data: EFAS. Credit: CEMS/C3S/ECMWF.*

Wildfire emissions

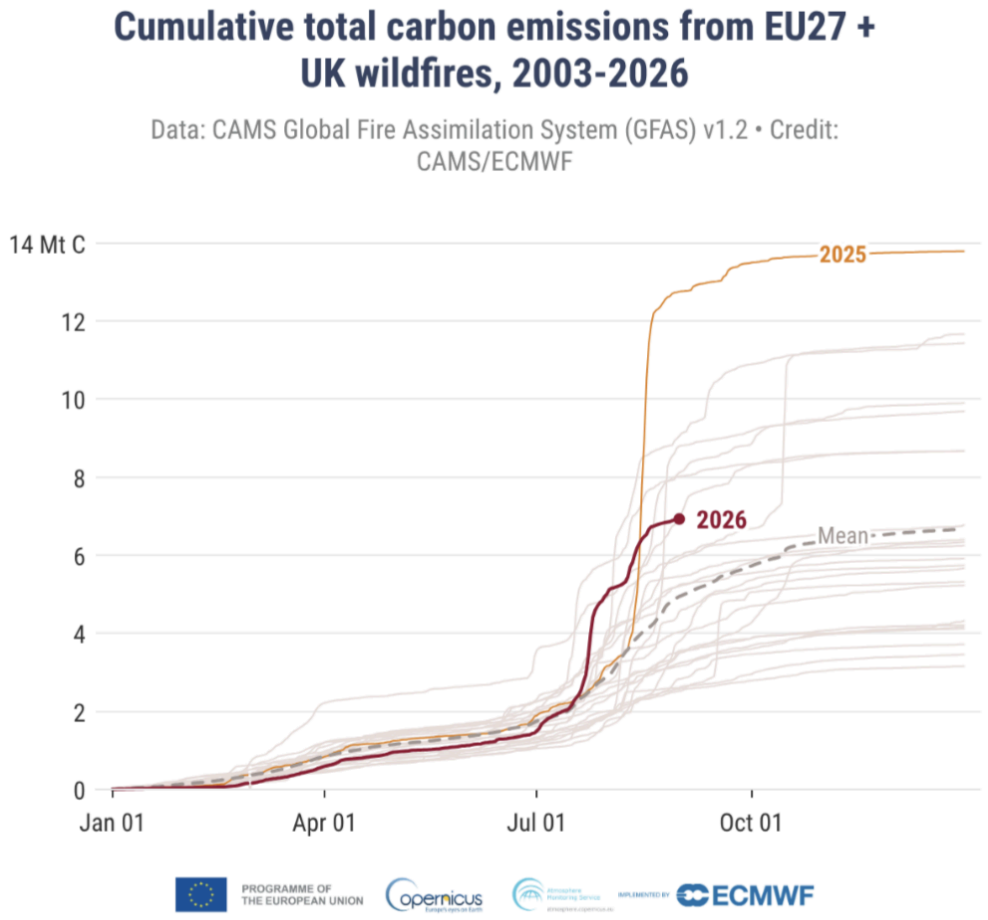


***Figure S17**. Daily cumulative total carbon emissions (MtC) from wildfires for the European Union and the UK for each year from 2003 to 2026. Data: CAMS Global Fire Assimilation System (GFAS) v1.2 • Credit: CAMS/ECMWF.*