

October 2023 Monthly Weather Report

This document provides a summary of the UK's weather and climate statistics for October 2023.

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UK overview

The first half of October mostly comprised a north-south contrast in weather across the UK. England and Wales were generally nearer the influence of high pressure over the near-continent, with a particularly warm and sunny spell of weather from 6th to 10th. Temperatures reached the low 20s °C widely across England and Wales with 25°C in the south-east on 7th, 8th, 9th and 10th, more than 8°C above average for the time of year. This was the most significant spell of October warmth since 2011. However, Scotland missed out on most of the warmth but instead borne the brunt of Atlantic frontal systems and associated rainfall. This included some exceptionally wet weather on 6th and 7th from an 'atmospheric river' event. Scotland overall received 64.1mm in these two days, making this its wettest 2-day period on record. Fronts sweeping across the UK from 12th to 13th brought widespread wet and cooler weather to the UK more generally, and a final end to any lingering late summer warmth. The second half of the month was unsettled and very wet at times. Widespread, prolonged and heavy rainfall from storm Babet from 18th to 21st caused brought serious flooding problems to many areas, with eastern Scotland worst affected. This, together with some very strong winds, brought atrocious weather conditions with 150 to 200mm of rain falling in the wettest areas. The Met Office issued two red warnings for rain in this area, and the county of Angus recorded its wettest day on record in a series from 1891. More widely, England and Wales also provisionally recorded its third-wettest 3-day period on record.

Temperatures for October overall were near average in Scotland but above normal elsewhere, particularly across southern England with anomalies of 1.5 to 2°C. This was provisionally the equal-sixth wettest October on record for the UK in a series from 1836, while eastern Scotland had its wettest October on record. In Scotland, Angus, Dundee, Fife and Kincardineshire recorded their wettest October, in England Staffordshire, Nottinghamshire and the Isle of Wight, and in Northern Ireland counties Armagh and Down, with well over twice the October average rainfall. It was a rather dull month, with 92% of average sunshine hours. Northern England was particularly dull with 78%.

Reference climatology used for calculating anomalies is the period 1991-2020 unless otherwise stated.

Weather impacts

- **Severe and widespread flooding, including Scotland's wettest 2-day period on record and storm Babet.**

Thunderstorms crossing the east of England on the 1st resulted in power cuts to thousands of properties, some flooding, and in Hertford two people were struck by lightning. In Scotland, flooding affected the West Highland Line on the 4th, and on 6th there was localized disruption from flooding in parts of Lancashire.

The heavy and persistent rainfall from 6th to 7th across Scotland caused widespread flood impacts. In Argyll, the A83 was closed due to a landslip with ten people airlifted from their vehicles and several other major trunk roads were also closed. Rail services across Scotland were severely affected with many trains cancelled. Flooding affected a number of properties, including in Dumbarton, while at Inverary, bales of silage were washed away by the River Aray. Scottish farmers reported the loss of several million pounds worth of unharvested vegetables damaged by floodwaters. Over 50 flood warnings were issued across Scotland, including severe flood warnings for parts of Aviemore and Perth. Many sports events were also cancelled.

Localized flooding on 12th and 13th affected parts of South Wales and Swindon (Wiltshire), with flooded roads and rail services affected.

Storm Babet on 18th to 21st resulted in the most severe and widespread disruptive weather impacts of 2023 so far. Multiple severe flood warnings were issued by the Environment Agency (EA) and the Scottish Environment Protection Agency (SEPA). At least seven people were reported to have died as a result of the storm. In Scotland, hundreds of homes and businesses were flooded with the town of Brechin severely affected after defences were overtopped by the river South Esk. The main A90 trunk road was closed between Forfar and Brechin after storm Babet damaged a bridge, and schools across Angus were closed. Multiple fallen trees also resulted in road closures in the area. Scottish farmers were reported to have lost crops, with some sheep also washed away by floodwater, and around 30,000 homes in northern Scotland lost power during the storm. Over 1000 homes in England were also affected by flooding across Yorkshire, the East Midlands and the Humber area. In Chesterfield (Derbyshire), around 400 homes were flooded while 500 homes were evacuated in Retford (Nottinghamshire) and widespread flooding affected other areas such as the Stafford and Wrexham areas, while Derby's Museum of Making was flooded. In Suffolk, a major incident was declared due to flooding. Rail services on the East Coast were severely affected due to flooded lines and Kings Cross station in London was temporarily closed due to concerns with overcrowding. Other rail services in Scotland and northern

England were cancelled or severely disrupted. Leeds Bradford airport closed after an aircraft skidded off the runway during the storm. 45 workers were airlifted off a North Sea drilling platform after it lost anchors during the storm. Sections of railings were destroyed at Sunderland's pier by large waves.

Flooding problems continued for the remainder of the month across parts of southern and eastern England, eastern Scotland and, especially, southern and eastern parts of Northern Ireland from prolonged wet weather. Roads were flooded on 23rd to 24th in parts of Nottinghamshire and Norfolk, while on 25th, flooding occurred in Hampshire and on the Isle of Wight. In Northern Ireland, there were major problems in counties Antrim, Armagh and Down, with properties flooded in Newry, Portadown, Downpatrick and Camlough and roads blocked by floodwater. Downpatrick (County Down) was particularly badly affected by flood damage. Flooding problems also continued in Scotland with some roads and rail lines closed on 29th and the Perth area affected.

Monthly extremes

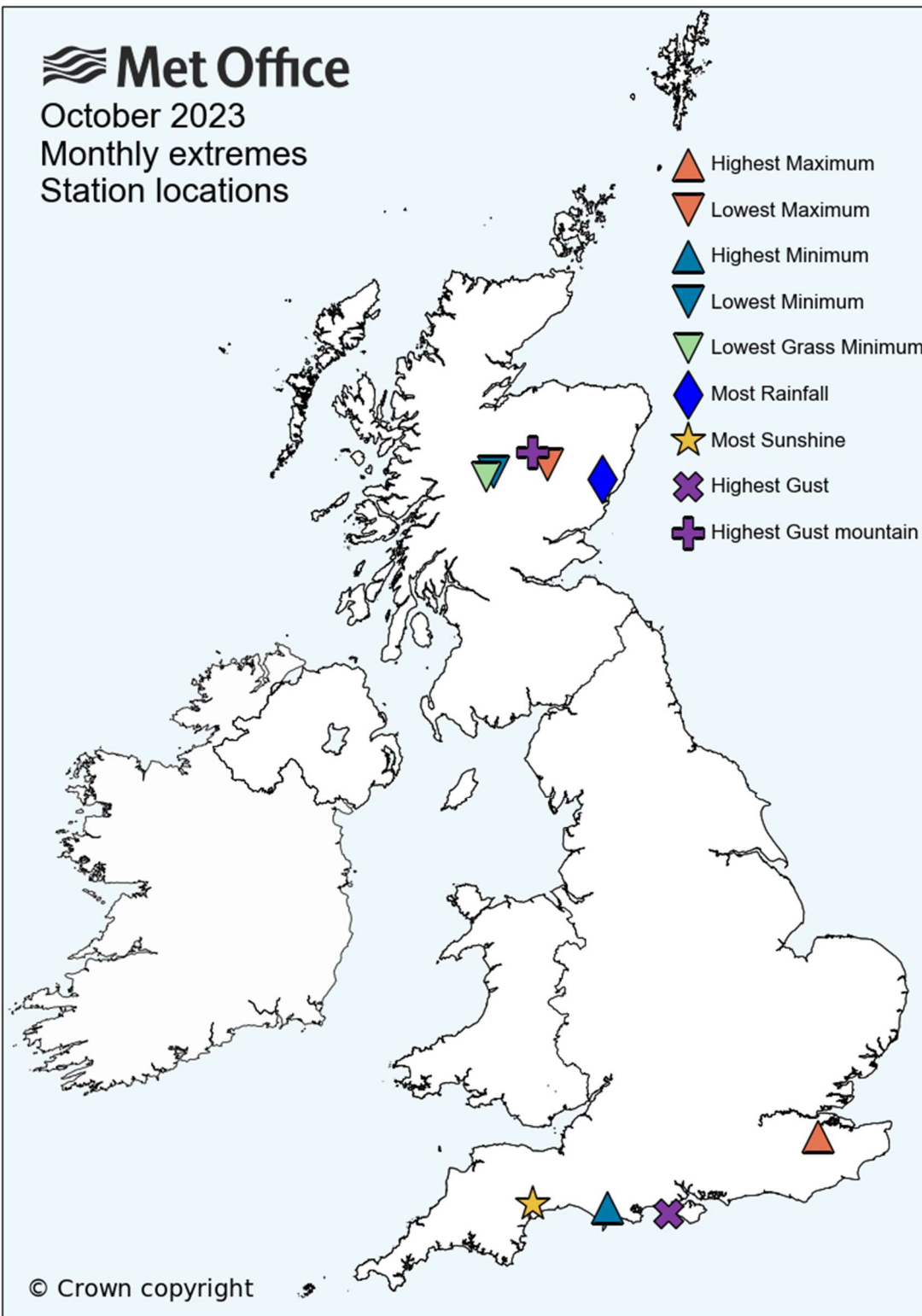
The table below lists UK monthly weather extremes recorded at individual weather stations during October 2023 from data available on 02/11/2023. The map shows the location of these stations.

Highest Maximum	26.1°C on 9th at East Malling (Kent, 33mAMSL)
Lowest Maximum	5.4°C on 20th at Braemar No 2 (Aberdeenshire, 327mAMSL)
Highest Minimum	17.1°C on 13th at Kingston Maurward (Dorset, 73mAMSL)
Lowest Minimum	-5.5°C on 31st at Dalwhinnie No 2 (Inverness-shire, 351mAMSL)
Lowest Grass Minimum	-10.4°C on 31st at Dalwhinnie No 2 (Inverness-shire, 351mAMSL)
Most Rainfall	129.5mm on 19th at Fettercairn, Glensaugh No 2 (Kincardineshire, 171mAMSL)
Most Sunshine	10.1hr on 8th at Exeter Airport No 2 (Devon, 27mAMSL)
Highest Gust	75Kt 86mph on 29th at Wight: Needles Old Battery (Isle Of Wight, 80mAMSL)
Highest Gust (mountain*)	105Kt 121mph on 19th at Cairngorm Summit (Inverness-shire, 1237mAMSL)
Greatest Snow Depth at 0900 UTC	No non-zero values.

mAMSL refers to station elevation in metres above mean sea level.

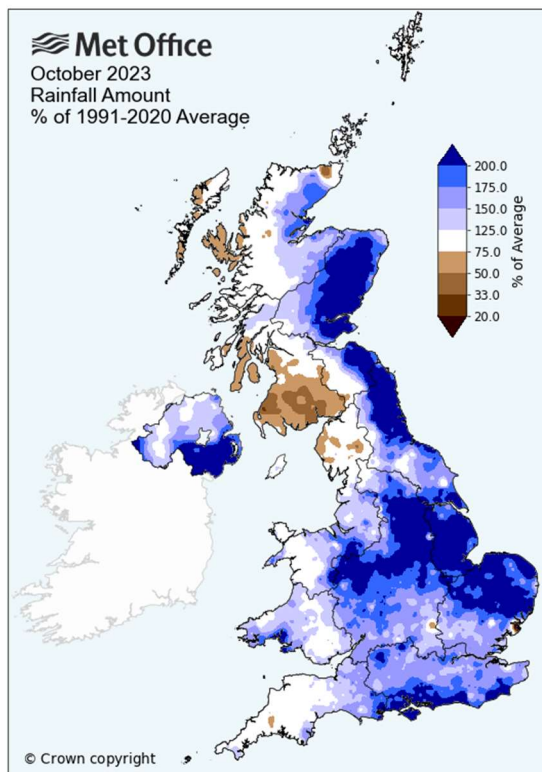
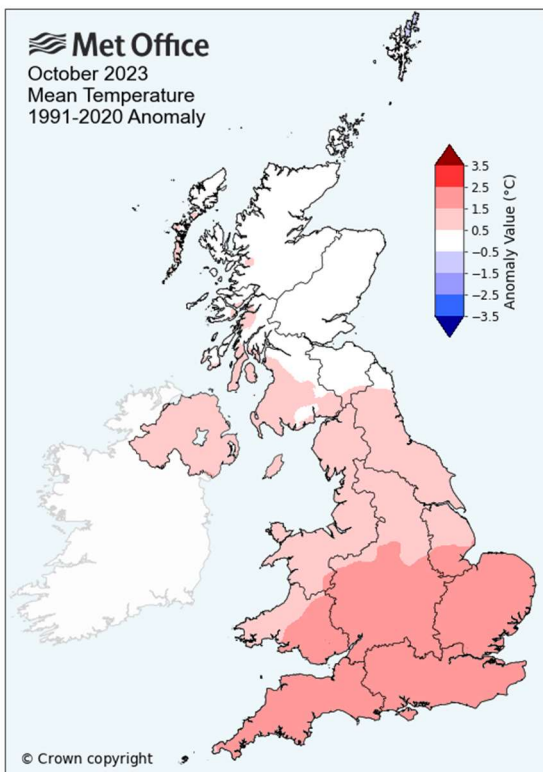
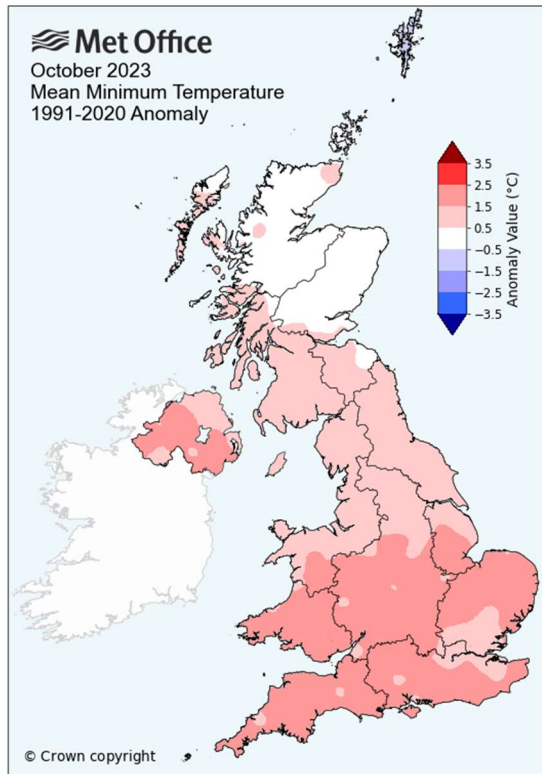
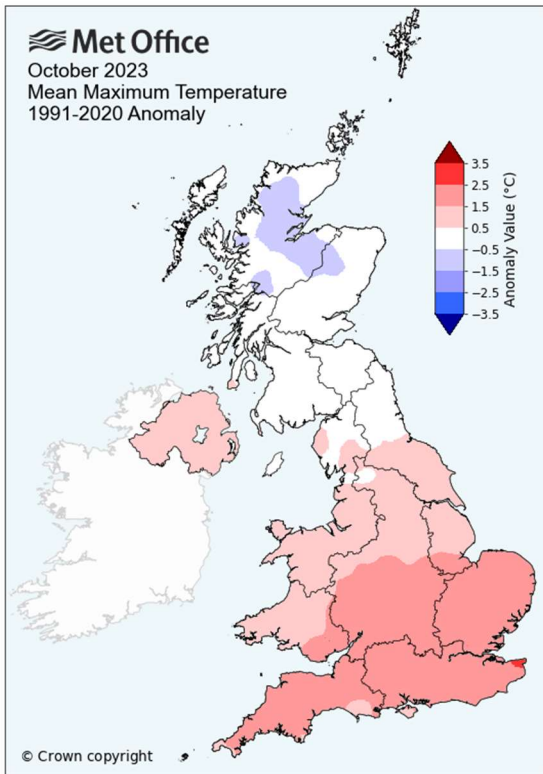
*Mountain stations are above 500mAMSL.

October 2023
Monthly extremes
Station locations

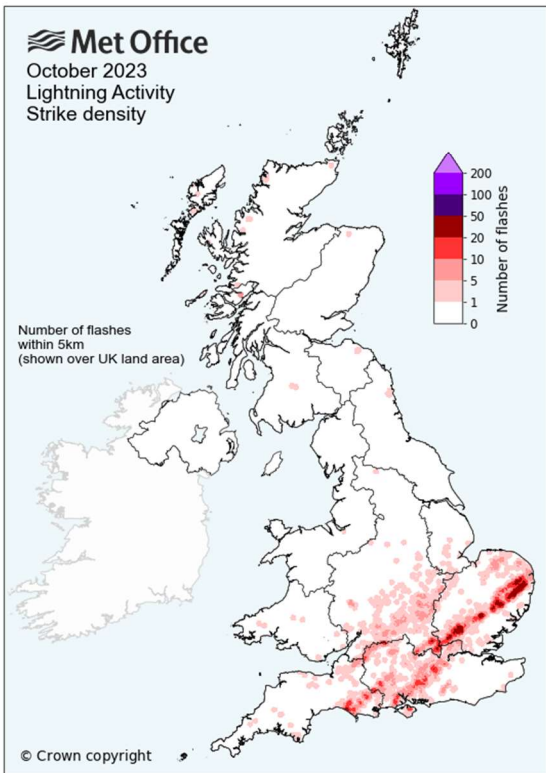
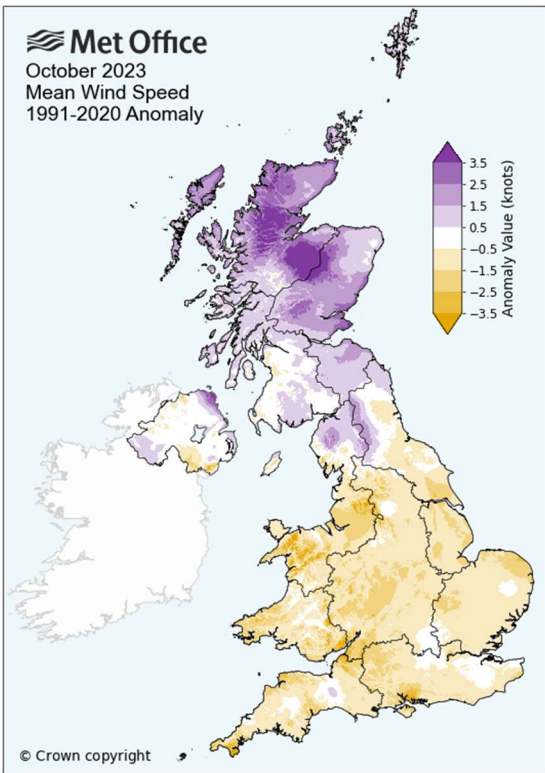
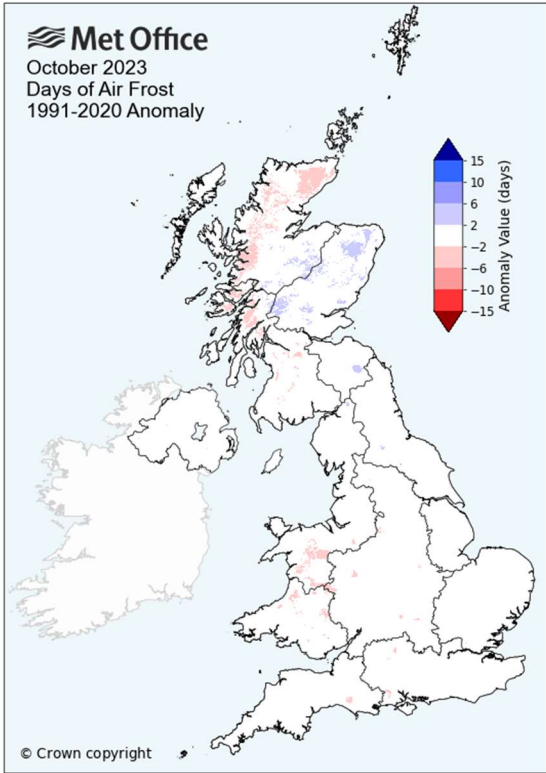
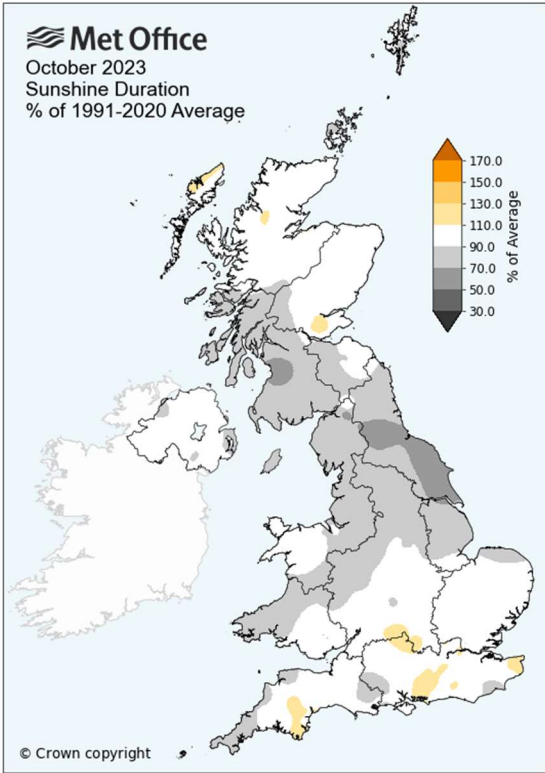


Monthly maps

These maps show monthly average daily maximum, monthly average daily minimum and monthly mean temperature and monthly rainfall for October 2023 as anomalies relative to the October 1991-2020 long term average.



These maps show monthly sunshine, monthly air frost and monthly windspeed for October 2023 as anomalies relative to the October 1991-2020 long term average, plus a map showing lightning activity as the number of strikes within a 5km radius of any land location.



Monthly climate statistics - actuals and anomalies

These tables show the UK and national climate statistics for October 2023 for max, min and mean temperature, rainfall, sunshine and windspeed as actual values and anomalies relative to the October 1991-2020 long term average. The position of the value within the full series (in both ascending and descending order) is shown in the two 'Rank' columns. Central England Temperature (CET) and England & Wales Precipitation (EWP) are also included.

Mean maximum temperature

Region	Maxtemp (°C)	1991-2020 Anomaly (°C)	Rank - warmest	Rank - coldest	Series length (yrs)
UK	14.0	0.9	18	123	140
England	15.6	1.5	10	131	140
Wales	14.5	1.2	11	130	140
Scotland	11.1	-0.2	60	81	140
Northern Ireland	13.9	1.0	16	125	140
Central England	15.7	1.5	10	137	146

Mean minimum temperature

Region	Mintemp (°C)	1991-2020 Anomaly (°C)	Rank - warmest	Rank - coldest	Series length (yrs)
UK	7.6	1.1	15	126	140
England	8.6	1.5	11	130	140
Wales	8.5	1.6	13	128	140
Scotland	5.6	0.4	37	104	140
Northern Ireland	7.9	1.5	12	129	140
Central England	8.6	1.3	14	133	146

Mean temperature

Region	Meantemp (°C)	1991-2020 Anomaly (°C)	Rank - warmest	Rank - coldest	Series length (yrs)
UK	10.8	1.0	16	125	140
England	12.1	1.5	13	128	140
Wales	11.5	1.4	15	126	140
Scotland	8.3	0.2	45	96	140
Northern Ireland	10.9	1.3	13	128	140
Central England	12.1	1.4	17	349	365

Rainfall

Region	Rainfall (mm)	% of 1991-2020 Average	Rank - wettest	Rank - driest	Series length (yrs)
UK	171.5	140	7	182	188
England	147.2	163	8	181	188
Wales	208.6	132	32	157	188
Scotland	198.7	118	36	153	188
Northern Ireland	191.8	168	5	184	188
EWP (England and Wales)	177.3	172	4	255	258

Sunshine

Region	Sunshine (hours)	% of 1991-2020 Average	Rank - sunniest	Rank - dullest	Series length (yrs)
UK	84.8	92	74	41	114
England	94.8	92	66	49	114
Wales	82.8	90	75	40	114
Scotland	69.4	93	65	50	114
Northern Ireland	80.1	94	71	44	114

Windspeed

Region	Windspeed (knots)	1991-2020 Anomaly (knots)	Rank - windiest	Rank - calmest	Series length (yrs)
UK	9.2	-0.1	33	23	55
England	7.3	-1.0	49	7	55
Wales	8.7	-1.4	47	9	55
Scotland	12.6	1.7	14	42	55
Northern Ireland	8.8	0.2	32	24	55

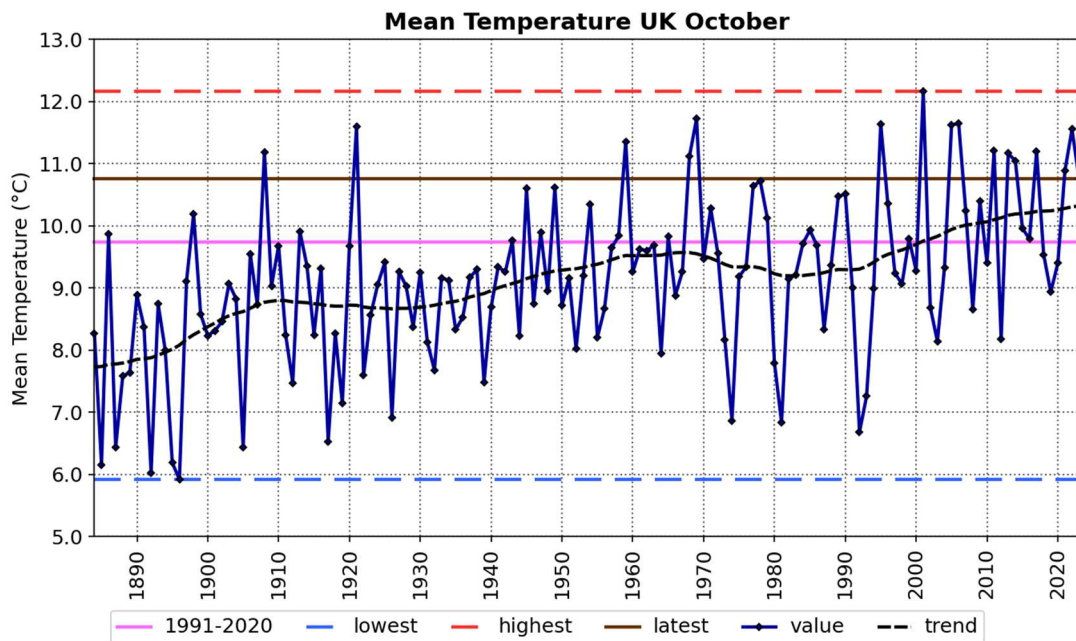
Monthly time-series

These charts show time-series for the UK for October for monthly mean temperature (from 1884), monthly rainfall (from 1836) and monthly sunshine (from 1919). The brown line shows the latest (2023) value. The hatched black line is a smoothing filter which shows the long-term trend. The tables below show statistics for the latest year, latest 10 years 2014-2023, the most recent 30-year climate reference period 1991-2020 and the 30-year baseline climate reference period 1961-1990.

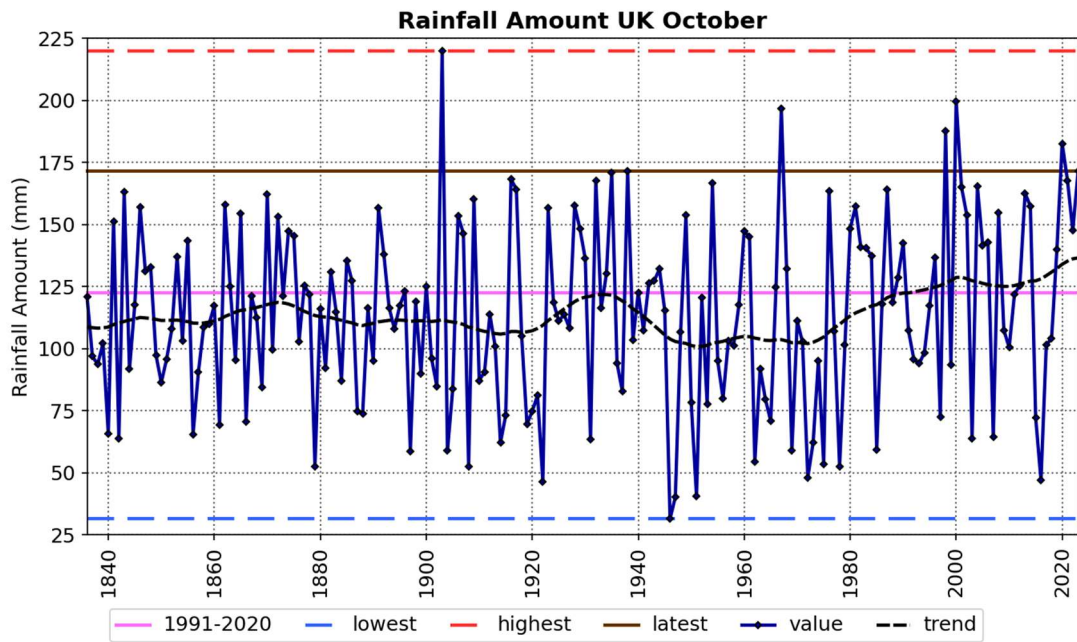


Source: HadUK-Grid 01/11/2023 10:45

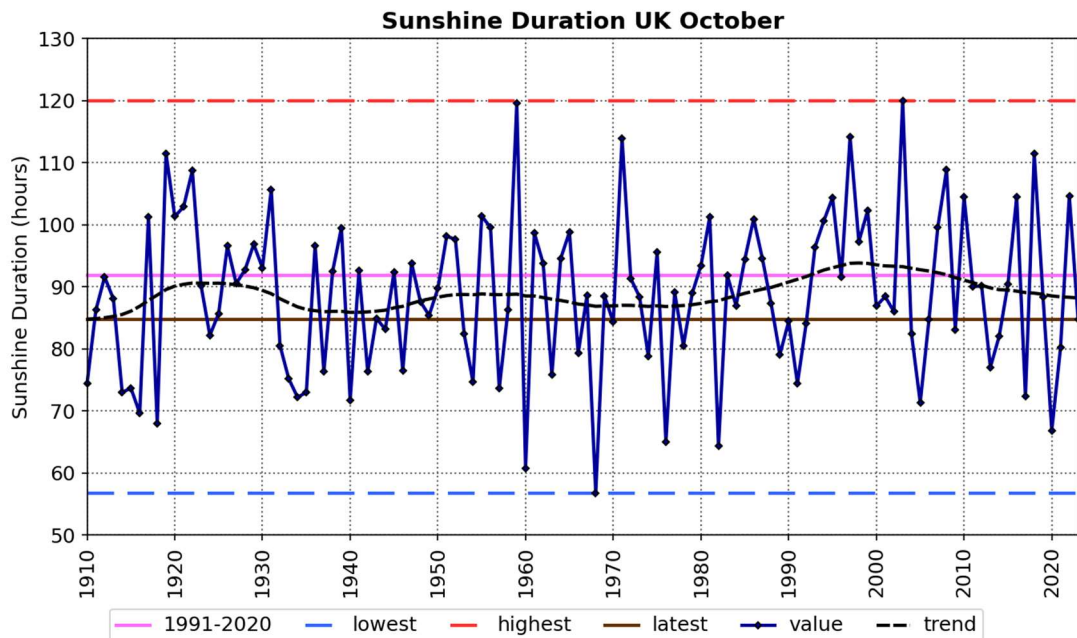
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Period	1961-1990	1991-2020	2014-2023	2023
Meantemp (°C)	9.4	9.7	10.3	10.8



Period	1961-1990	1991-2020	2014-2023	2023
Rainfall (mm)	110.3	122.6	129.1	171.5



Period	1961-1990	1991-2020	2014-2023	2023
Sunshine (hours)	87.7	91.8	88.6	84.8

Daily time-series

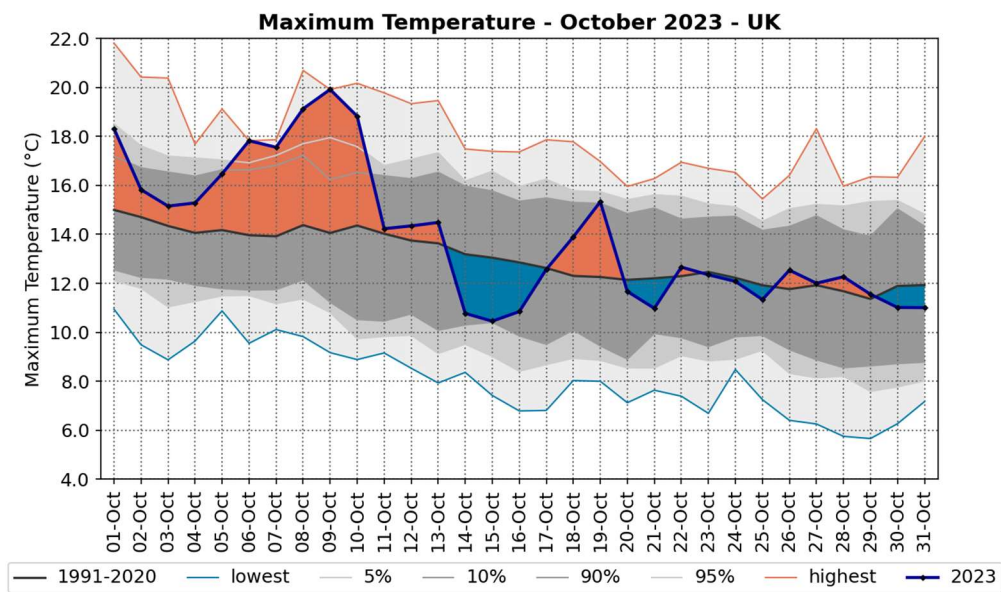
These charts show time-series of UK area-average daily maximum and daily minimum temperature and daily rainfall for each day of October 2023. The areas shaded in grey show the highest and lowest values in the daily temperature series (from 1960) and daily rainfall series (from 1891) together with percentiles and the 1991-2020 long term averages for each day. The rainfall accumulation chart shows the daily rainfall series as an accumulation through the month.

Daily maximum and daily minimum temperature



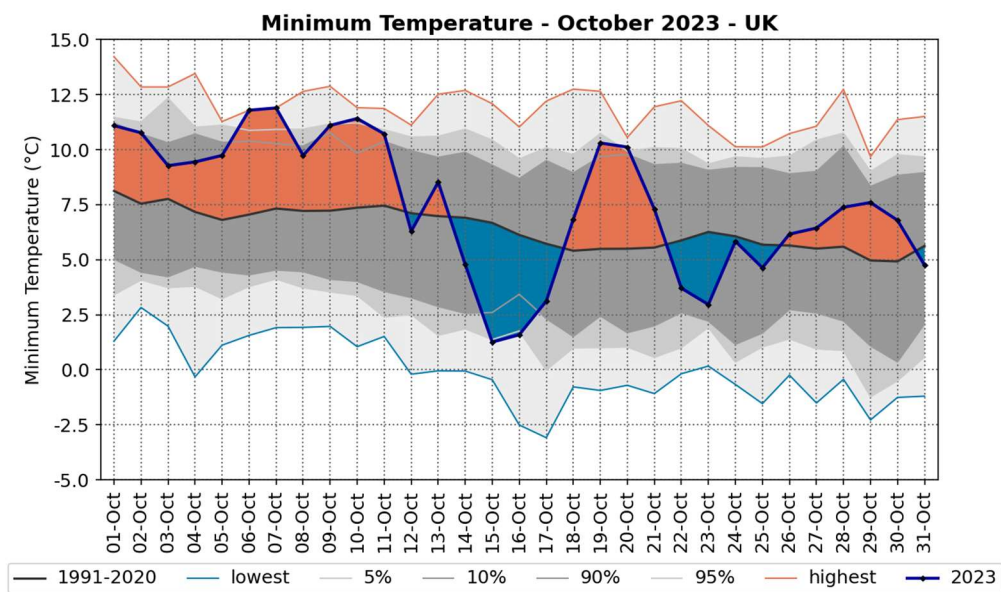
Source: HadUK-Grid 01/11/2023 10:55

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Source: HadUK-Grid 01/11/2023 10:56

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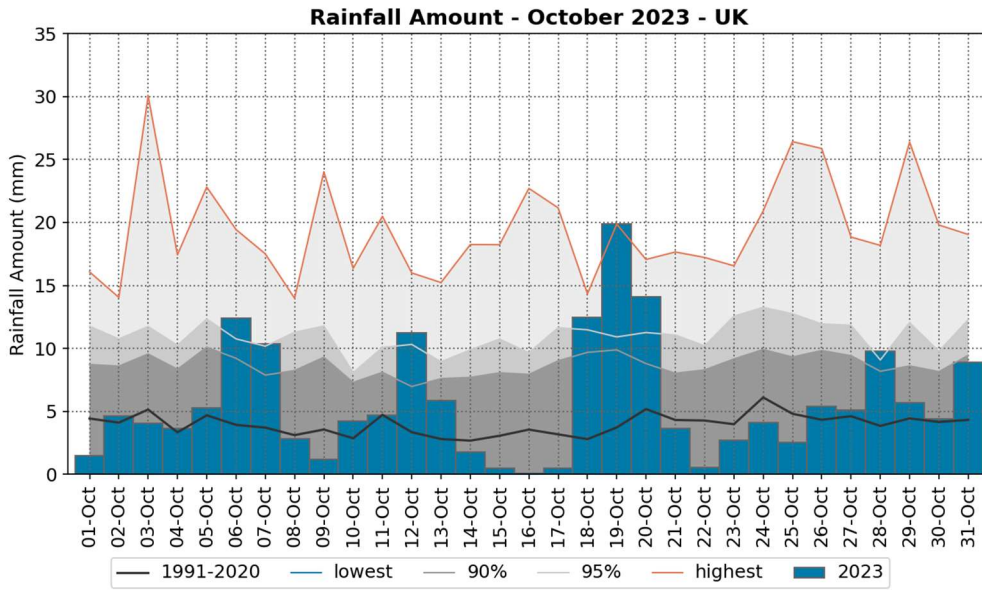


Daily rainfall and rainfall accumulation

 Met Office

Source: HadUK-Grid 01/11/2023 10:56

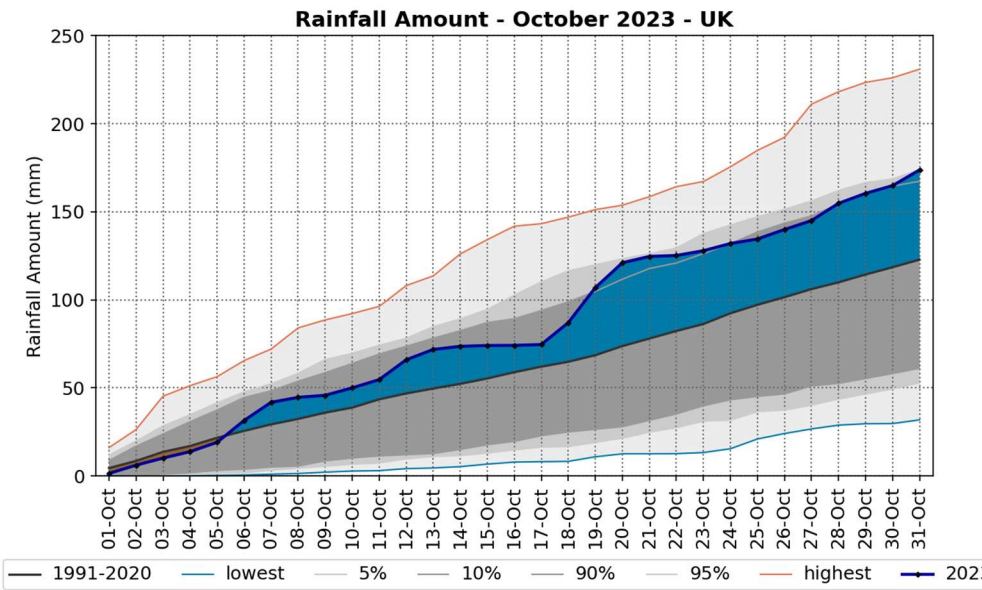
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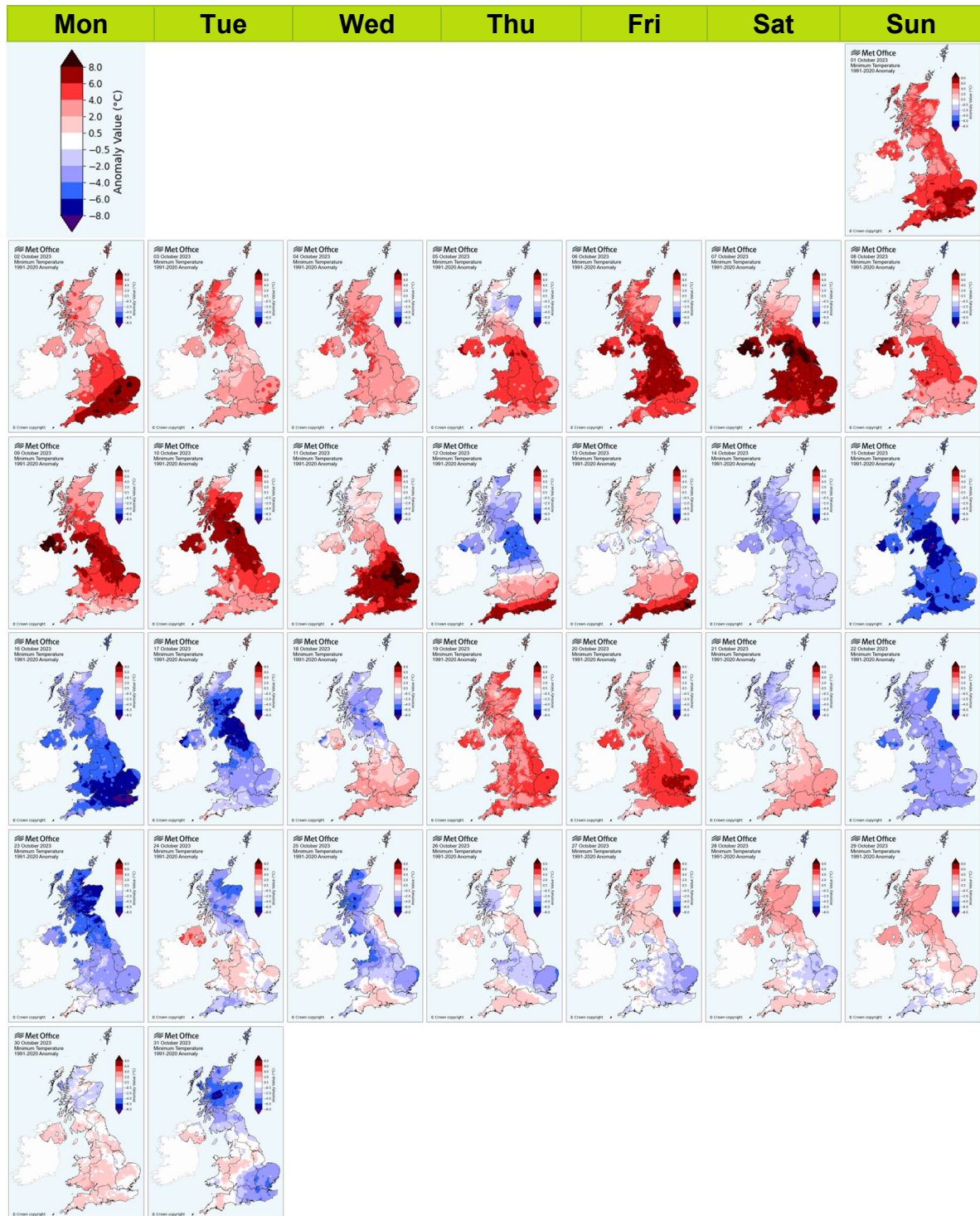
Source: HadUK-Grid 01/11/2023 10:58

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Daily minimum temperature maps - calendar view

These maps show daily minimum temperatures for each day of October 2023 as anomalies relative to the October 1991-2020 long term average. The daily minimum temperature is the minimum from 0900UTC the previous day to 0900UTC on the day in question. Normally, the minimum occurs in the early morning.

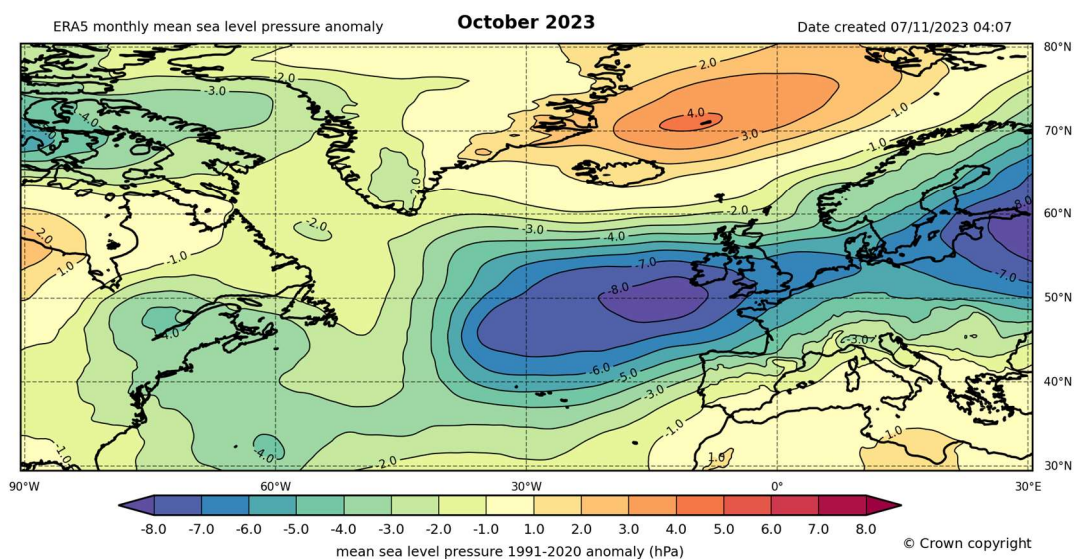
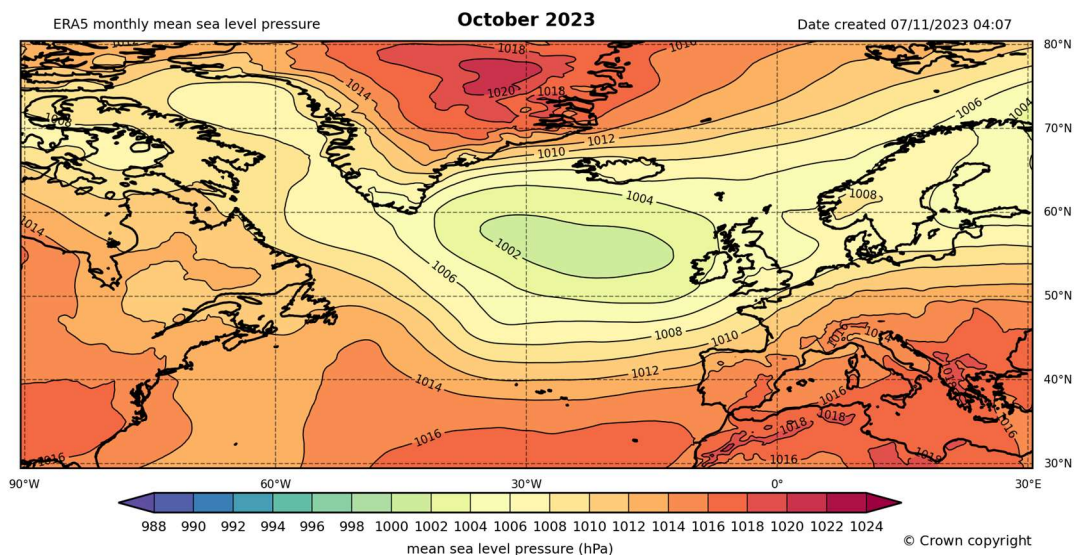


Monthly atmospheric circulation

Mean sea level pressure

These charts show the monthly mean sea level pressure for October 2023 for the UK and north Atlantic, based on the ERA5 reanalysis (Hersbach et al, 2019), both as actual values and as an anomaly relative to the October long term average. These charts provide an indication of the weather characteristics of the month overall i.e. whether the weather type has been generally settled (high pressure) or unsettled (low pressure) during the month.

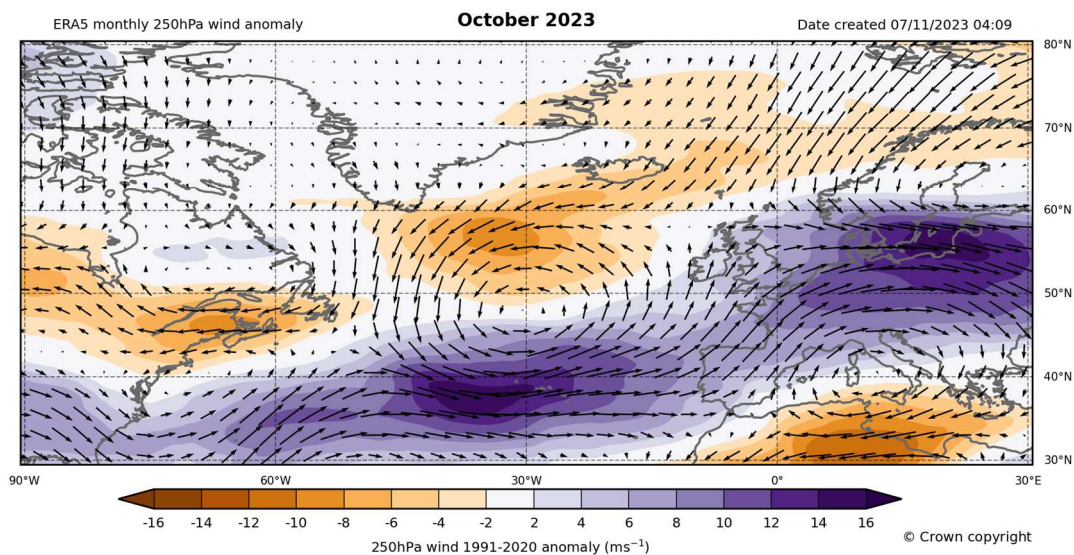
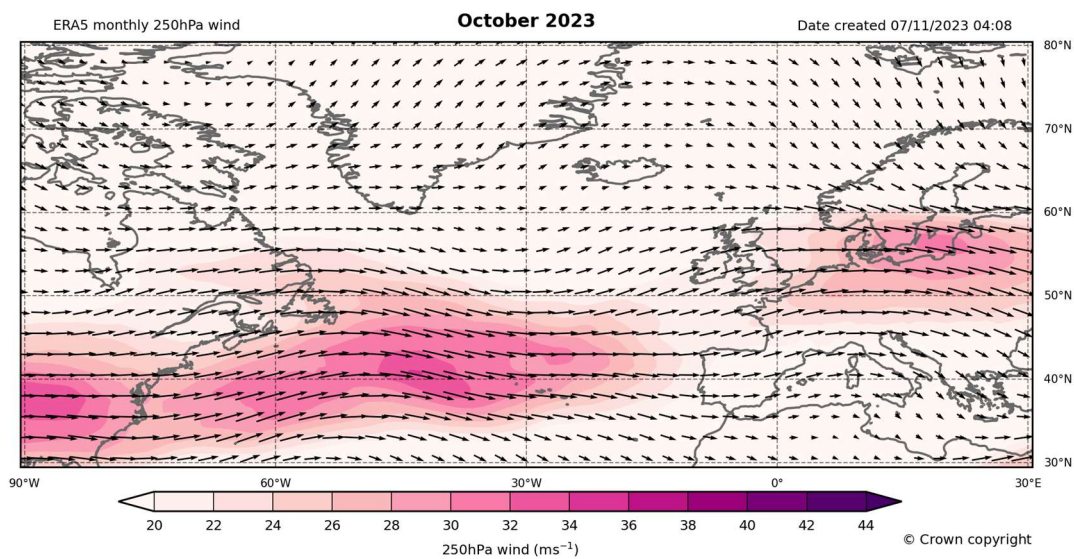
A low pressure anomaly was located to the south-west of Ireland. For October overall, the pressure was lower than normal across the UK, particularly for Wales and south-west England.



250hPa wind speed and direction

These charts show the monthly 250hPa wind speed and direction for October 2023 for the UK and north Atlantic, based on the ERA5 reanalysis (Hersbach et al, 2019), both as actual values and as an anomaly relative to the October long term average. This provides an indication of the mean strength and position of the jet stream compared to normal. The wind anomaly map shows shaded (scalar) wind speed anomalies with arrows as (vector) wind anomalies.

Overall, the jetstream was located further to the south, and stronger than normal, resulting in a wet month and mild in the south of the UK.



Weather diary

- **Generally wet and windy, autumn storms from mid-month**

The weather over the UK from the 1st to the 13th was characterised by a series of depressions from the Atlantic, producing wet and windy conditions for all parts. A system that crossed the mainland on the 5th was notable for some very high rainfall totals especially over England and Wales, 124.6mm at Mickleden Middlefell Farm in Cumbria being one of the standout totals. High pressure over the near continent did exert its influence on occasions, and particularly between the 7th and 10th where maximum temperatures were widely into the low to mid-20s Celcius.

Conditions eventually settled down from the 14th to 18th when high pressure developed over the UK. This led to some sunny but cool days and rather chilly nights, with frosts gripping most parts but particularly northern England and southern Scotland where temperatures fell to almost -5°C at times.

The second named storm of the autumn, Babet, crashed into southern England during the evening of the 18th, bringing with it very heavy and persistent rain and strong winds that were to leave their mark on central and northern parts of England and eastern Scotland. A blocking high over Scandinavia meant that the frontal systems from Babet stalled over these regions, with winds touching 75mph at times and some places receiving over a month's worth of rain in less than 48 hours. The effects from Babet finally dissipated late on the 21st.

The rest of the month reverted to type with low pressure firmly in charge, the result of which was a predominantly mild but wet month with many parts setting new monthly rainfall records.

Notes

The Met Office National Meteorological Library and Archive holds a near-continuous record of monthly weather reports from 1884, and this report forms a continuation of that series. The purpose of each report is to provide an overview of the weather conditions across the UK for that month. The emphasis is mainly based on observations from the surface network of weather stations. Climate series based on data from these stations are used to provide long term context.

This summary was produced on 07/11/2023 12:02. The statistics are a provisional assessment of the observational data available at the time of production. Ongoing data receipt and quality assurance processes may result in subsequent updates to the statistics presented.

If you have any questions or feedback about this product, spot any data errors or omissions, or wish to obtain further data, please contact the Met Office.

For historical monthly weather reports please visit the Library and Archive.

- The land-surface observations presented in this report are from the Met Office official weather station network which includes both automatic weather stations and manual climate stations operated by volunteer observers. Rainfall data are from the official registered rain-gauge network which includes rain-gauges operated by a number of key partners including the Environment Agency, Scottish Environmental Protection Agency and Northern Ireland Water.
- The observations are carefully managed such that they conform to current best-practice observational standards as defined by the World Meteorological Organization (WMO). The observations also pass through a range of quality assurance procedures at the Met Office before application for climate monitoring.
- Daily and monthly maps, monthly statistics and monthly time-series are primarily based on the HadUK-Grid dataset of 1km resolution UK gridded climate data (Hollis et al, 2019). Monthly statistics from the monthly Central England temperature series 1659 (Manley, 1974) and England and Wales precipitation series from 1766 (Wigley et al, 1984) provide long term context.
- The monthly lightning activity map is based on data from the Met Office ATDnet (Arrival Time Difference Network) system. This is an automatic lightning location network comprising around ten lightning outstation sensors located across Europe.
- The monthly maps of mean sea level pressure and 250hPa wind speed and direction are based on the ERA5 reanalysis (Hersbach et al, 2019). ERA5 is the fifth generation ECMWF reanalysis for the global climate and weather for the past 4 to 7

decades. Reanalysis combines model data with observations from across the world into a globally complete and consistent dataset using the laws of physics.

*Hersbach, H., Bell, B., Berrisford, P., Biavati, G., Horányi, A., Muñoz Sabater, J., Nicolas, J., Peubey, C., Radu, R., Rozum, I., Schepers, D., Simmons, A., Soci, C., Dee, D., Thépaut, J-N. (2019): ERA5 monthly averaged data on single levels from 1959 to present. Copernicus Climate Change Service (C3S) Climate Data Store (CDS).
<https://doi.org/10.24381/cds.f17050d7>*

*Hollis, D, McCarthy, MP, Kendon, M, Legg, T, Simpson, I. HadUK-Grid - A new UK dataset of gridded climate observations. Geosci Data J. 2019; 6: 151-159.
<https://doi.org/10.1002/gdj3.78>*

Manley, G. (1974), Central England temperatures: Monthly means 1659 to 1973. Q.J.R. Meteorol. Soc., 100: 389-405. <https://doi.org/10.1002/qj.49710042511>

Wigley, T.M.L., Lough, J.M. and Jones, P.D. (1984), Spatial patterns of precipitation in England and Wales and a revised, homogeneous England and Wales precipitation series. J. Climatol., 4: 1-25. <https://doi.org/10.1002/joc.3370040102>

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