

December 2023 Monthly Weather Report

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

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UK overview

The cold snap in late November extended through the first week of December, with some very hard frosts (-4.7°C at Culdrose, Cornwall on 2nd and -12.5°C at Altnaharra, Sutherland on 3rd). Snow caused significant disruption across northern England on 3rd, with parts of the Lake District badly affected (for example the Ambleside area). The cold weather was swept away on 9th to 10th by storms Elin and Fergus which brought very wet, windy and disruptive weather - but much milder Atlantic air, including some exceptionally mild nights. Thereafter the weather continued very mild through most of the month, except across the far north, dull and wet at times with persistent rain from a succession of Atlantic fronts and mounting rainfall accumulations. The UK recorded its highest daily minimum temperature on record on Christmas Day with 12.4°C at Exeter Airport and East Malling, Kent. The month ended with a spell of very unsettled, turbulent weather. Storm Gerrit on 27th to 29th brought further strong winds and heavy rain, with significant disruptive snow falls across Highland Scotland and winds gusting at over 70Kt (81mph) at a number of stations. The year closed out with yet another Atlantic low pressure system bringing further very wet and windy weather. Overall, Scotland bore the brunt of the worst of the weather over the course of the month.

Temperatures for December were above average across the whole of the UK except northern Scotland, with anomalies mostly around 1.5 to 2.0°C . This was the fifth / equal-fifth warmest December for England and Wales in respective series from 1884. It was a particularly mild December for the southern half of England and Wales with minimum temperature anomalies of over 2.5°C , and very few frosts after the first week of the month. This was the equal-eighth wettest December for the UK in a series from 1836, and fourth-wettest for Northern England. Parts of central and north-east England, and much of north-east Scotland recorded more than twice the normal rainfall; areas that could well have done without further rain after a very wet October (the wettest on record for eastern Scotland). Apart from north-west Scotland, this was a dull month, with less than two-thirds of normal sunshine for the UK overall - representing less than one hour per day on average in most areas. Southern England provisionally recorded a mere 26.6 hours, only 50% of the 1991-2020 long term average.

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

Weather impacts

- **Heavy snow affects Cumbria and parts of Derbyshire.**
- **Strong winds and heavy rain including storm Gerrit cause fallen trees, flooding, travel disruption, and power cuts.**
- **A mini-tornado hits part of Greater Manchester.**

Heavy snow fell across Cumbria and parts of Derbyshire in early December. A major incident was declared in Cumbria with a large number of roads closed including the M6 for a time. Several rest centres were opened to accommodate stranded travellers and residents without power.

Storms Elin and Fergus brought wet and windy weather to the UK on 9th and 10th December, but the worst weather impacts occurred across the Republic of Ireland. On the 10th and 11th heavy rain caused disruption to rail services in Yorkshire. On 12th, there were reports of flooded roads and vehicles stranded in floodwater in south London. Heavy rain affected several major roads in Scotland on the 16th.

Wet and windy weather brought widespread impacts to the UK on 21st. This system was named storm Pia by the Danish Meteorological Service. In Scotland some bridges were closed to high-sided vehicles, there was some disruption to rail and ferry services, and schools were closed in Shetland. Fallen trees blocked roads in many areas including Northern Ireland, parts of North Wales and north-west England. On the 22nd overnight snow resulted in school closures in Shetland, and disruption to rail services in the north of Scotland. Snow and rain also caused some travel disruption on the A9.

On the 27th Storm Gerrit brought widespread impacts across the UK, particularly travel disruption after Christmas. In Scotland the A82 was closed at a number of points due to flooding and fallen trees, and a major incident was declared on the A9 with cars trapped in snow. Flooding also affected roads elsewhere in Scotland. There were delays to rail services due to strong winds and speed restrictions, landslips, flooding and trees on the line. Thousands of properties experienced loss of power in both Scotland and Wales and lightning damage was sustained to the Pan Dinas monument in Aberystwyth. The M48 Severn Bridge was closed due to high winds. In Greater Manchester, around 100 homes were damaged by a mini-tornado, while flooding and landslides affected a number of major roads. In Yorkshire, sections of the M62 and A1M were closed due to flooding and there were huge crowds of stranded passengers at London King's Cross Station after the East Coast Main Line was closed north of Newcastle. In Northern Ireland a landslide closed the A2 coast road and there was flooding on other roads across the country.

The M48 Severn Crossing was closed again on 30th December due to high winds and a number of ferry services in Scotland were cancelled or suspended. There were reports of a waterspout off Isle of Wight.

Monthly extremes

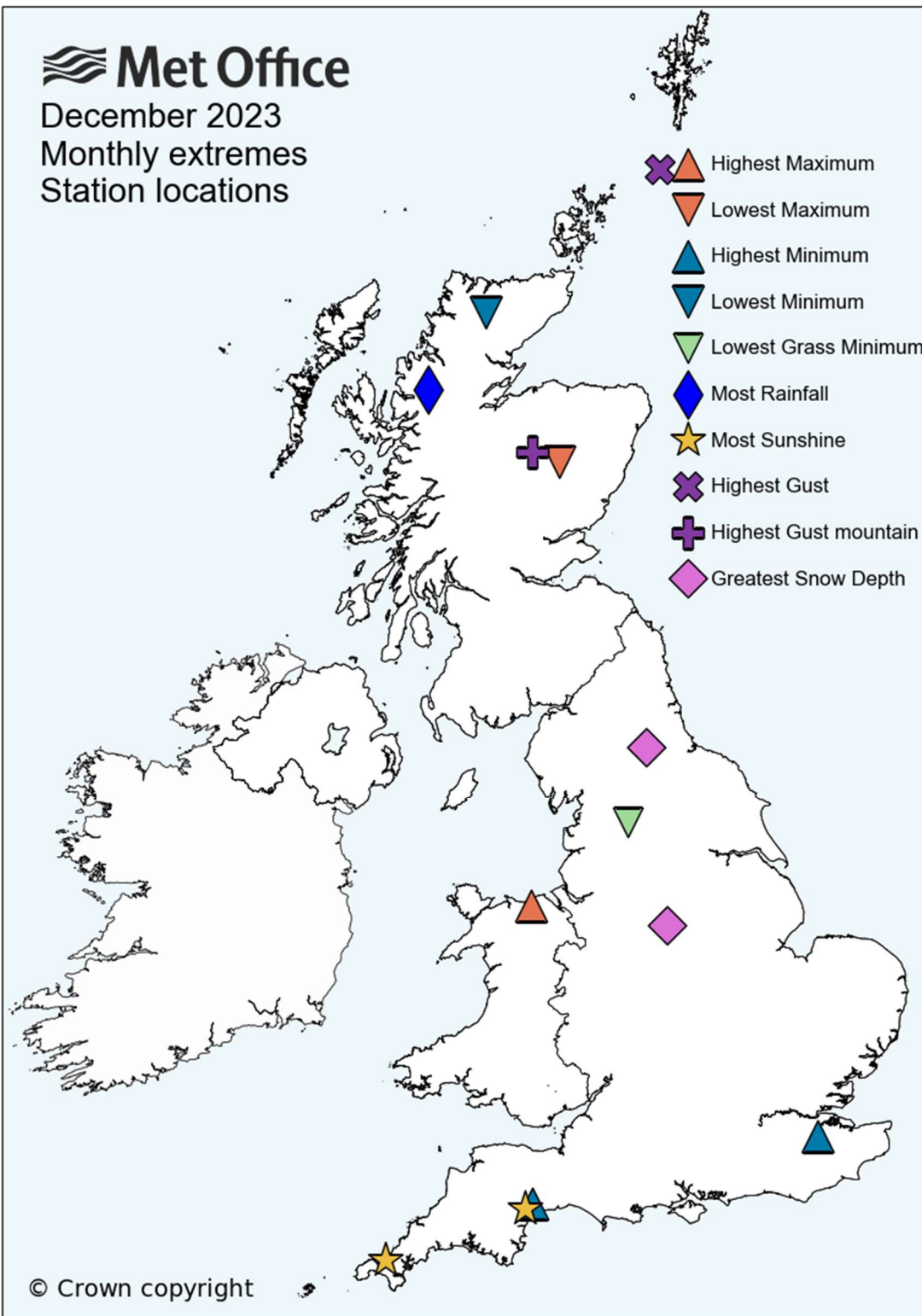
The table below lists UK monthly weather extremes recorded at individual weather stations during December 2023 from data available on 03/01/2024. The map shows the location of these stations.

Highest Maximum	16.1°C on 23rd at Rhyl No 2 (Clwyd, 77mAMSL)
Lowest Maximum	-4.0°C on 2nd at Balmoral (Aberdeenshire, 283mAMSL)
Highest Minimum	12.4°C on 25th at East Malling (Kent, 33mAMSL) and Exeter Airport No 2 (Devon, 27mAMSL)
Lowest Minimum	-12.5°C on 3rd at Altnaharra No 2 (Sutherland, 81mAMSL)
Lowest Grass Minimum	-15.1°C on 2nd at Bank Newton No 2 (North Yorkshire, 128mAMSL)
Most Rainfall	118.8mm on 16th at Kinlochewe (Ross & Cromarty, 25mAMSL)
Most Sunshine	7.3hr on 1st at Camborne (Cornwall, 87mAMSL) and Exeter Airport No 2 (Devon, 27mAMSL)
Highest Gust	77Kt 89mph on 27th at Fair Isle (Shetland, 57mAMSL)
Highest Gust (mountain*)	101Kt 116mph on 21st at Cairngorm Summit (Inverness-shire, 1237mAMSL)
Greatest Snow Depth at 0900 UTC	11cm on 3rd at Copley (Durham, 253mAMSL) and Middleton, Hillside (Derbyshire, 295mAMSL)

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

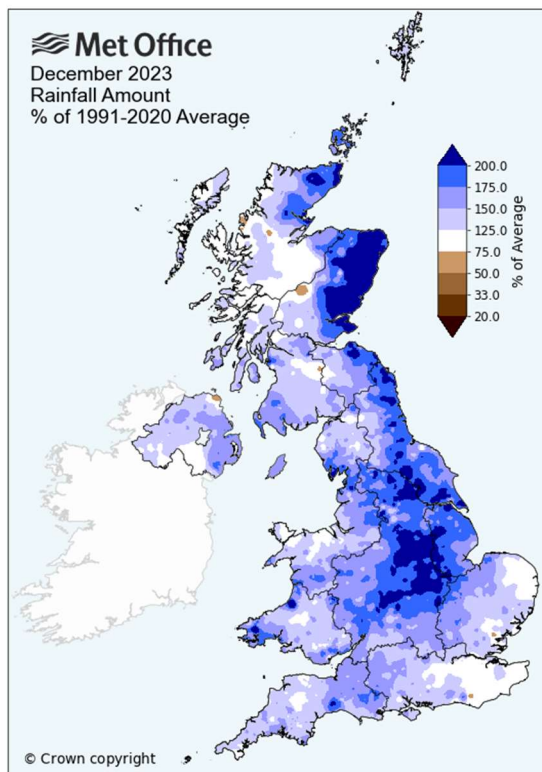
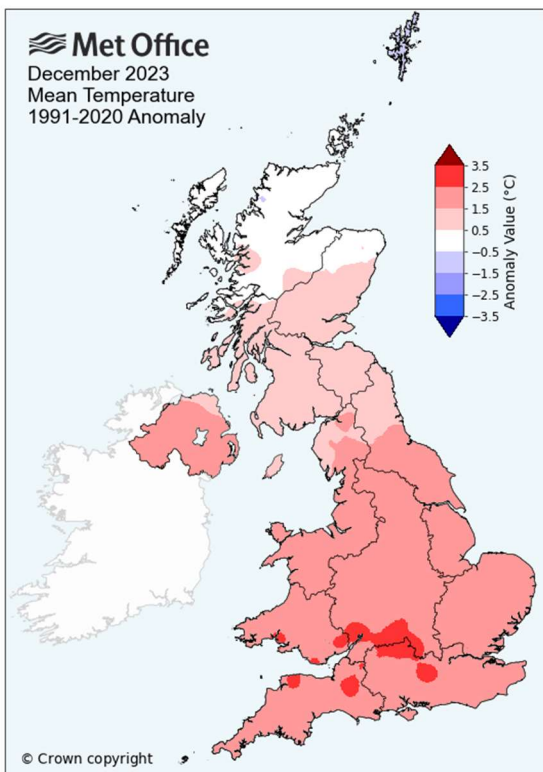
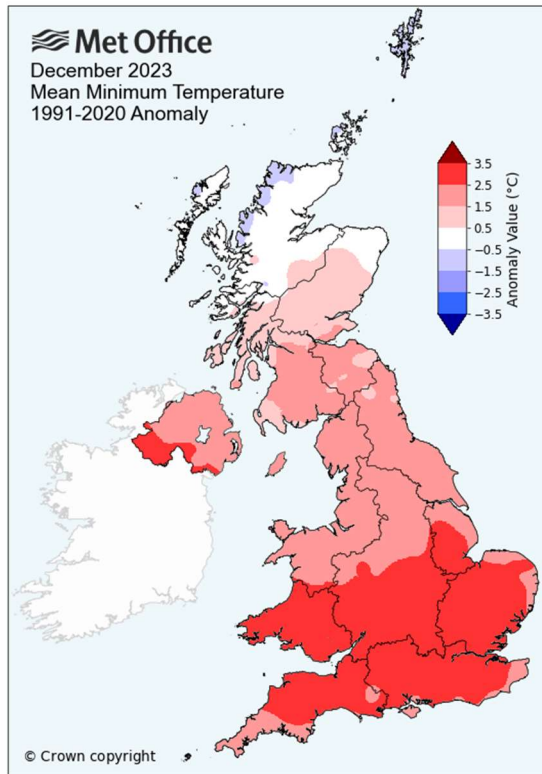
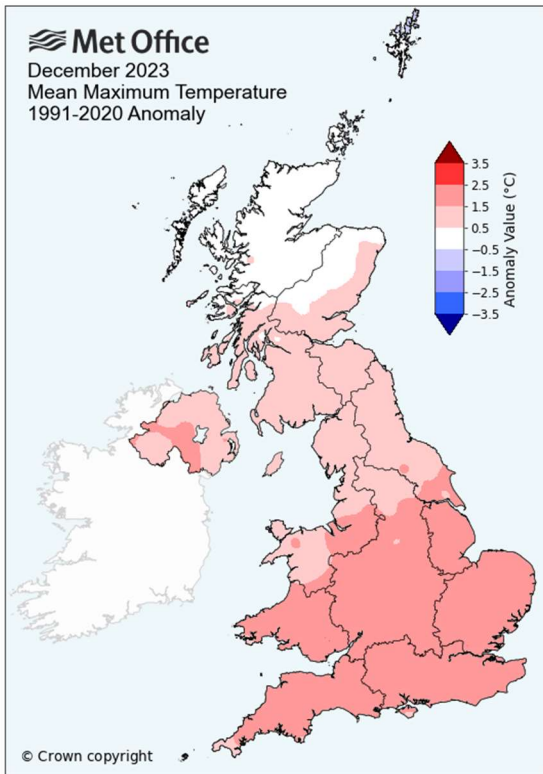
*Mountain stations are above 500mAMSL.

December 2023
Monthly extremes
Station locations

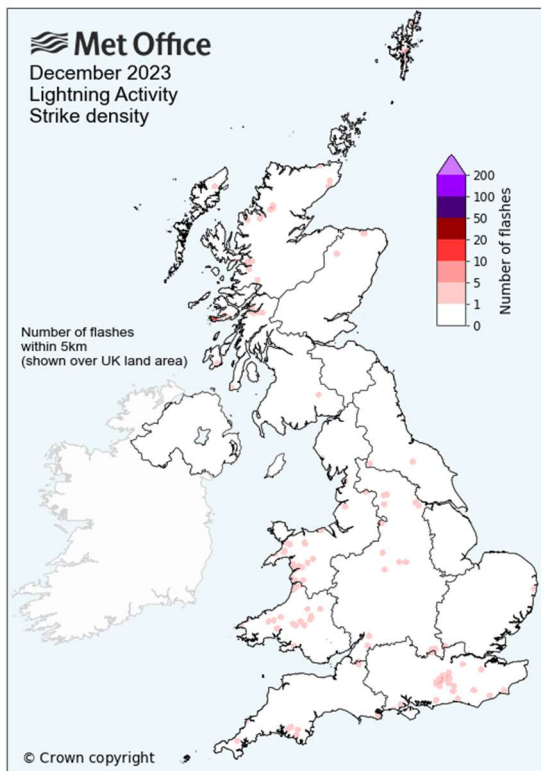
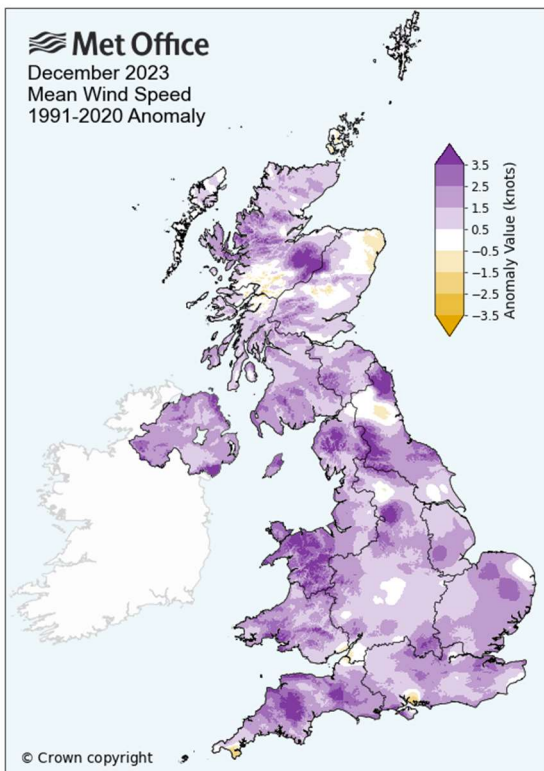
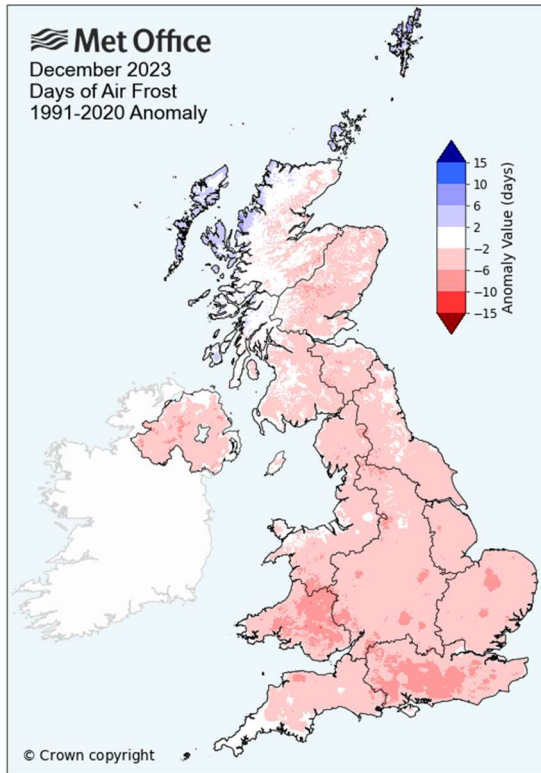
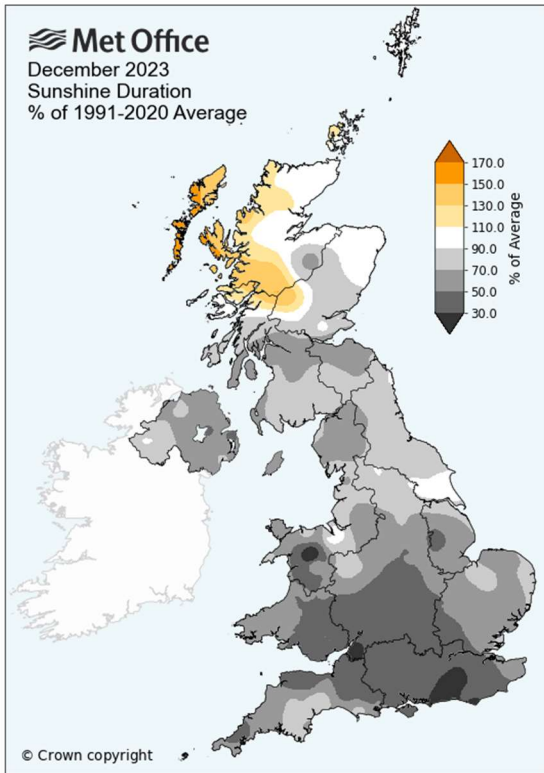


Monthly maps

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



These maps show monthly sunshine, monthly air frost and monthly windspeed for December 2023 as anomalies relative to the December 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 December 2023 for max, min and mean temperature, rainfall, sunshine and windspeed as actual values and anomalies relative to the December 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	8.3	1.3	15	126	140
England	9.4	1.8	7	134	140
Wales	9.2	1.6	6	135	140
Scotland	6.2	0.4	46	95	140
Northern Ireland	8.9	1.4	13	128	140
Central England	9.5	1.9	8	139	146

Mean minimum temperature

Region	Mintemp (°C)	1991-2020 Anomaly (°C)	Rank - warmest	Rank - coldest	Series length (yrs)
UK	3.3	1.9	10	131	140
England	4.3	2.4	5	136	140
Wales	4.7	2.6	7	134	140
Scotland	1.0	0.7	45	96	140
Northern Ireland	4.2	2.3	5	136	140
Central England	4.5	2.3	9	138	146

Mean temperature

Region	Meantemp (°C)	1991-2020 Anomaly (°C)	Rank - warmest	Rank - coldest	Series length (yrs)
UK	5.8	1.6	11	130	140
England	6.8	2.1	5	136	140
Wales	7.0	2.1	5	136	140
Scotland	3.6	0.6	43	98	140
Northern Ireland	6.5	1.8	8	133	140
Central England	7.0	2.1	15	351	365

Rainfall

Region	Rainfall (mm)	% of 1991-2020 Average	Rank - wettest	Rank - driest	Series length (yrs)
UK	188.6	148	9	180	188
England	145.0	158	11	178	188
Wales	258.1	147	18	171	188
Scotland	246.0	141	12	177	188
Northern Ireland	169.6	140	13	176	188
EWP (England and Wales)	161.3	156	14	245	258

Sunshine

Region	Sunshine (hours)	% of 1991-2020 Average	Rank - sunniest	Rank - dullest	Series length (yrs)
UK	27.9	65	107	8	114
England	29.7	58	107	8	114
Wales	21.9	53	112	3	114
Scotland	26.9	91	66	49	114
Northern Ireland	25.1	66	104	11	114

Windspeed

Region	Windspeed (knots)	1991-2020 Anomaly (knots)	Rank - windiest	Rank - calmest	Series length (yrs)
UK	11.7	1.6	14	42	55
England	10.7	1.7	9	47	55
Wales	13.6	2.4	10	46	55
Scotland	12.8	1.2	22	34	55
Northern Ireland	11.4	2.0	7	49	55

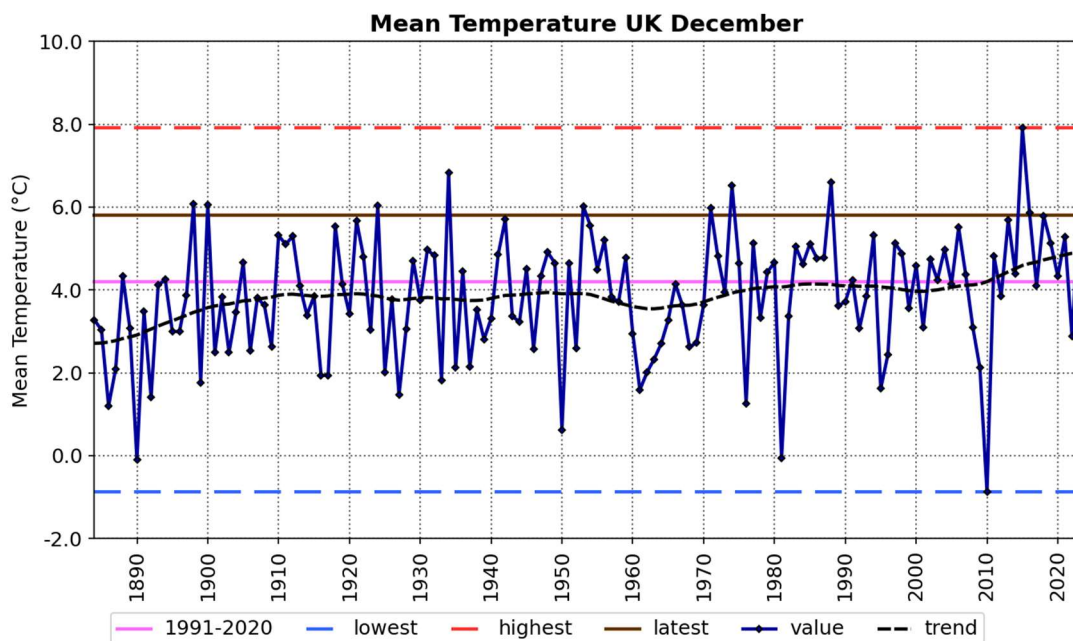
Monthly time-series

These charts show time-series for the UK for December 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.

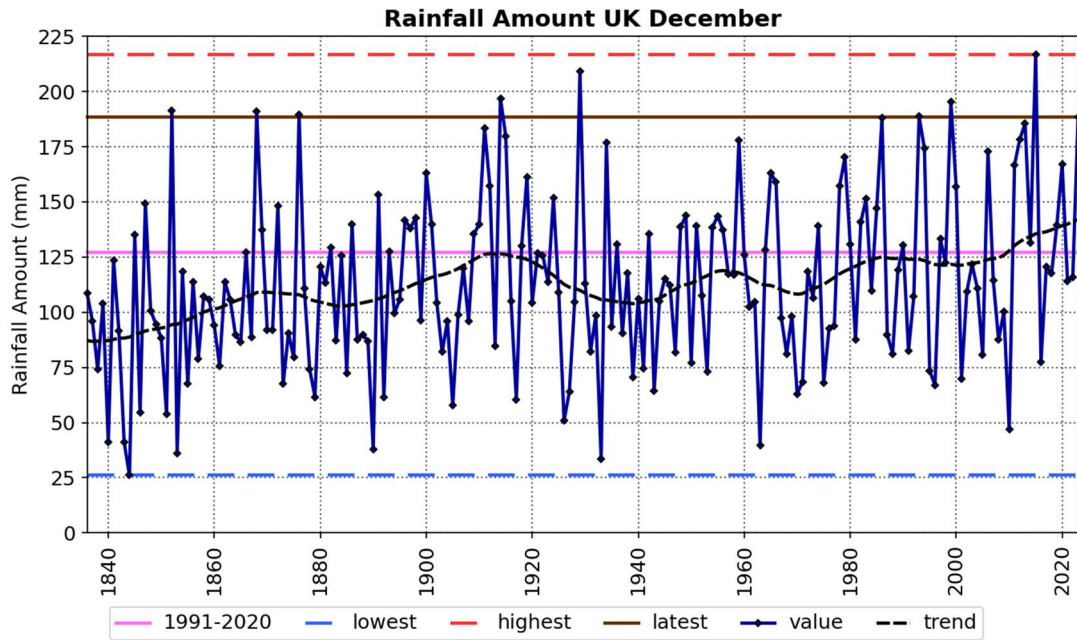


Source: HadUK-Grid 01/01/2024 10:42

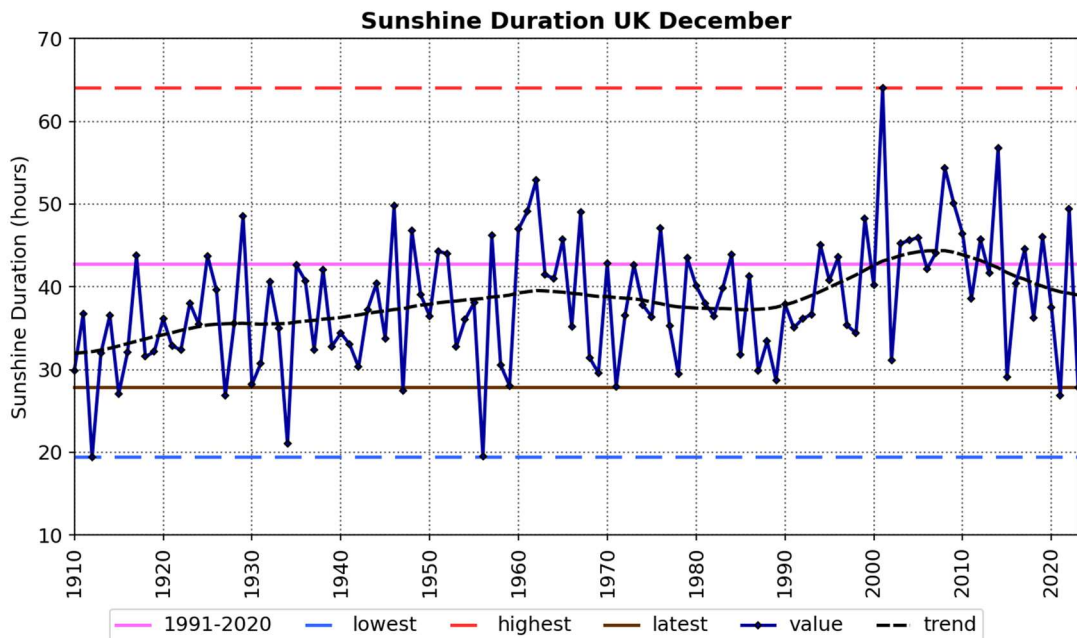
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Period	1961-1990	1991-2020	2014-2023	2023
Meantemp (°C)	3.8	4.2	5.2	5.8



Period	1961-1990	1991-2020	2014-2023	2023
Rainfall (mm)	114.2	127.2	138.9	188.6



Period	1961-1990	1991-2020	2014-2023	2023
Sunshine (hours)	38.5	42.7	39.5	27.9

Daily time-series

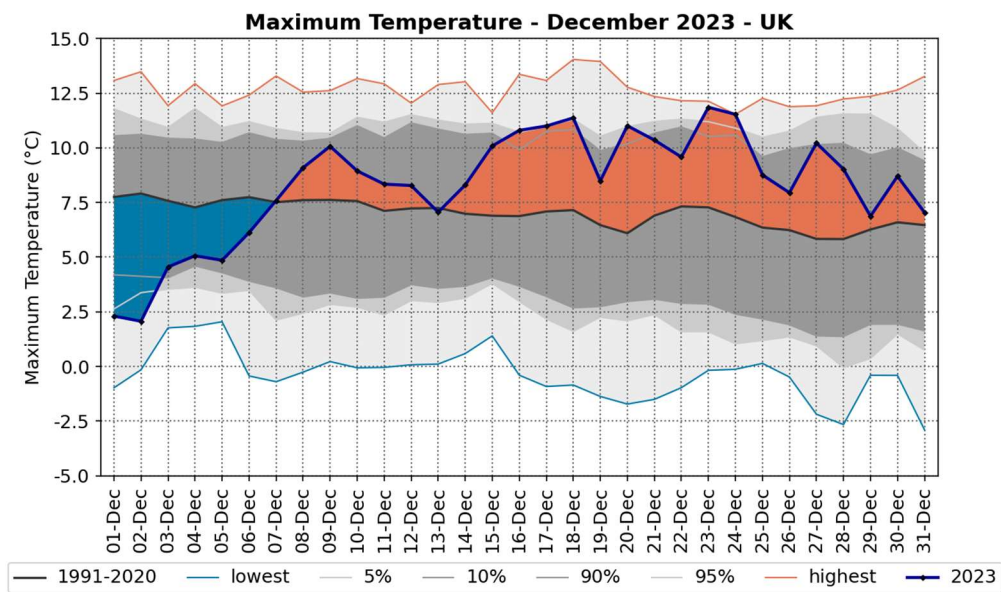
These charts show time-series of UK area-average daily maximum and daily minimum temperature and daily rainfall for each day of December 2023. The areas shaded in grey show the highest and lowest values in the daily temperature series (from 1960) and daily rainfall series (from 1891) together with percentiles 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



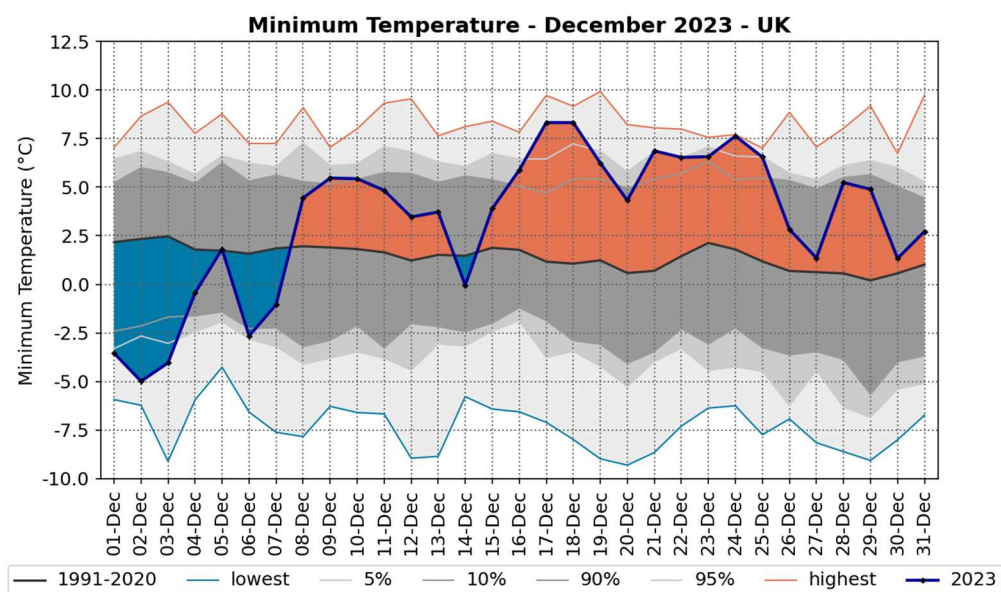
Source: HadUK-Grid 01/01/2024 10:53

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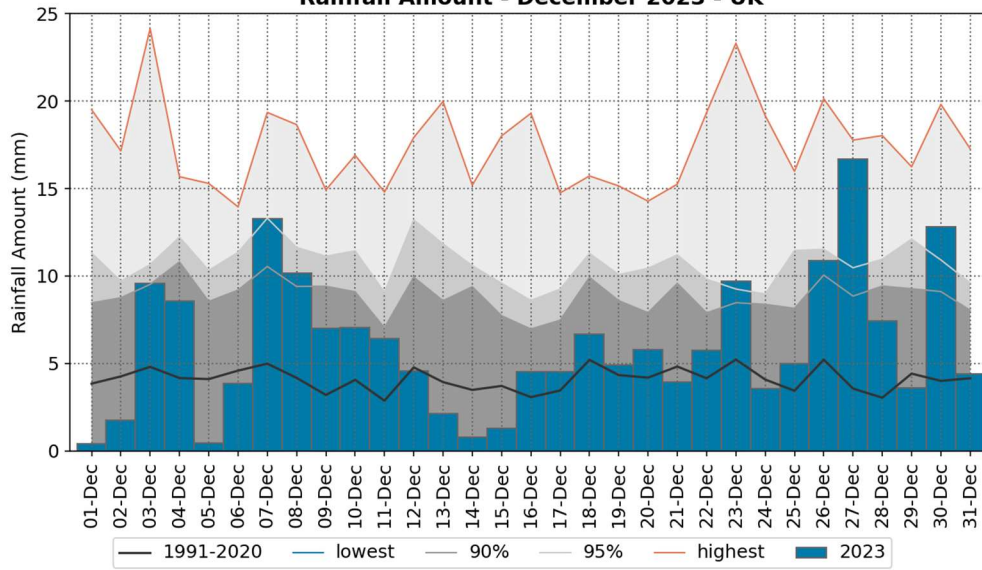
Daily rainfall and rainfall accumulation

Met Office

Source: HadUK-Grid 01/01/2024 10:54

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Rainfall Amount - December 2023 - UK

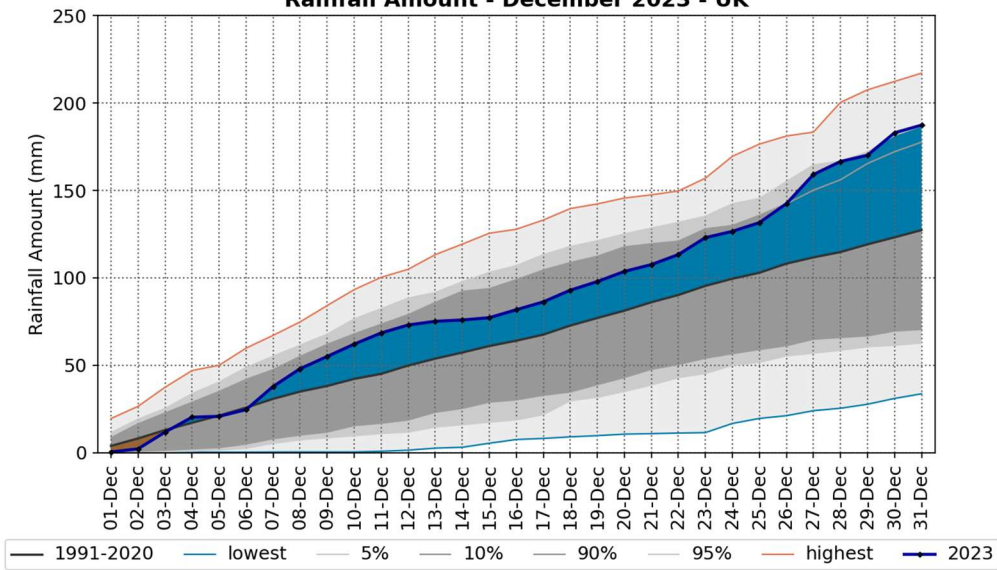


Met Office

Source: HadUK-Grid 01/01/2024 10:56

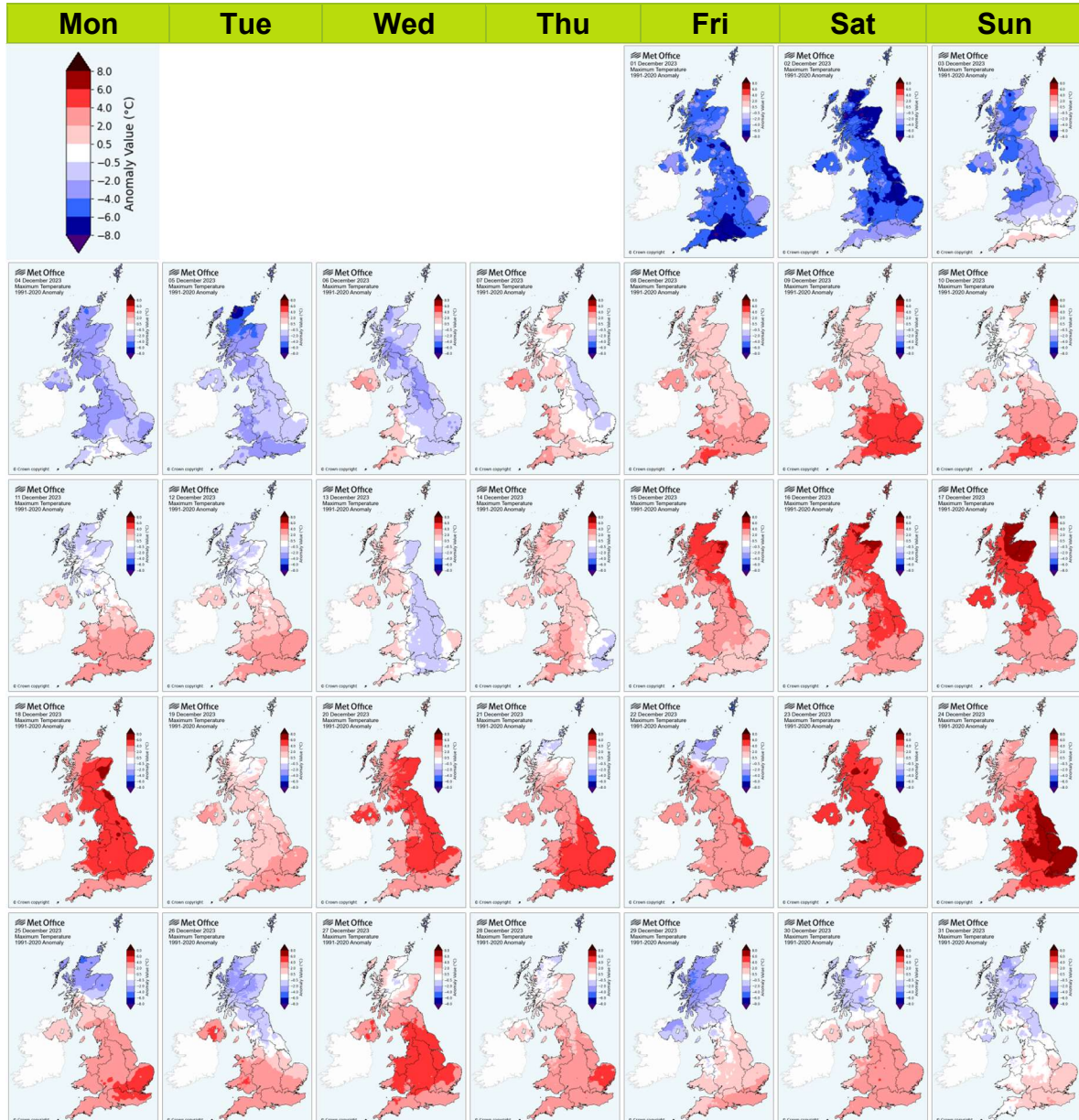
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Rainfall Amount - December 2023 - UK



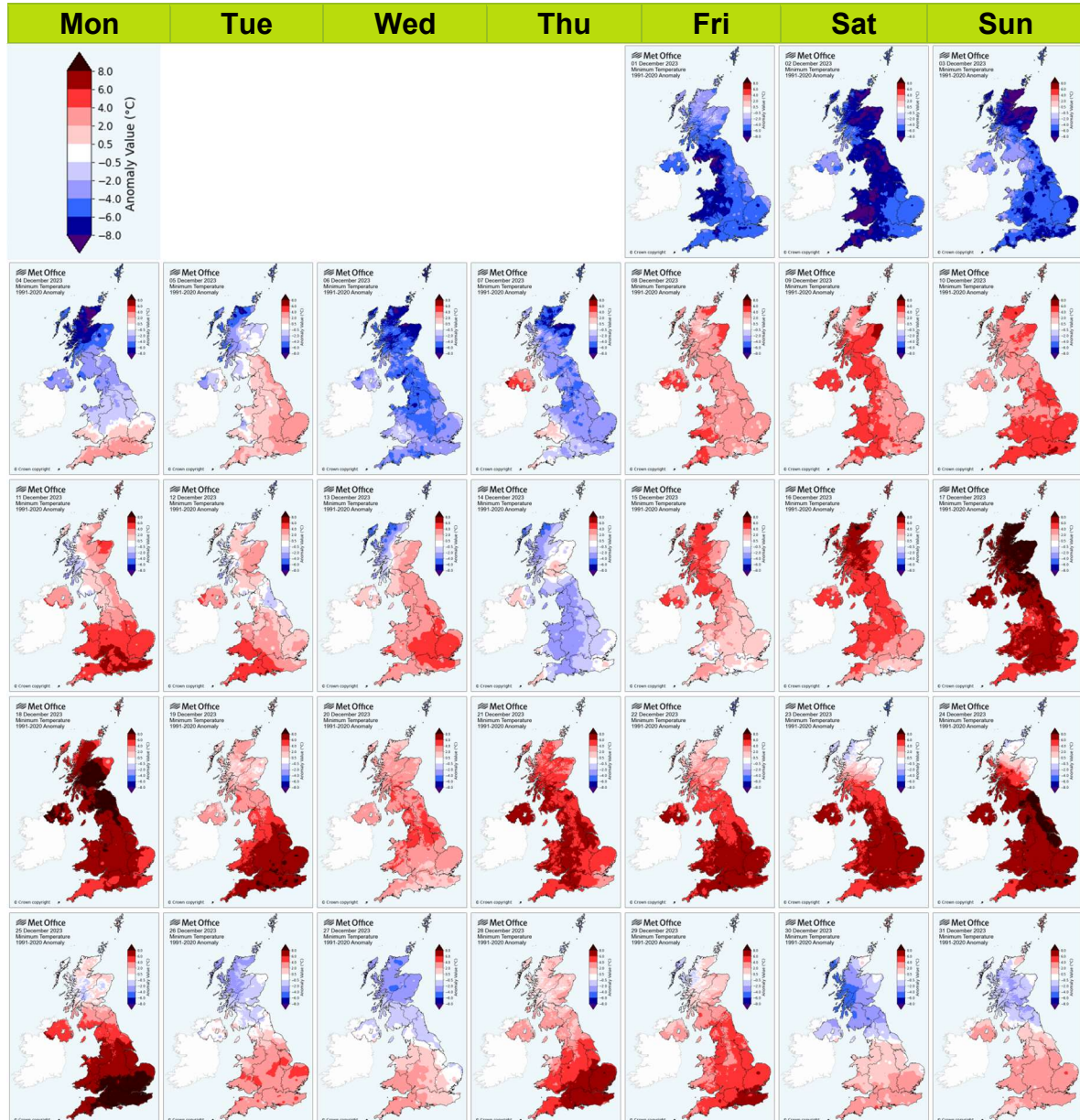
Daily maximum temperature maps - calendar view

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



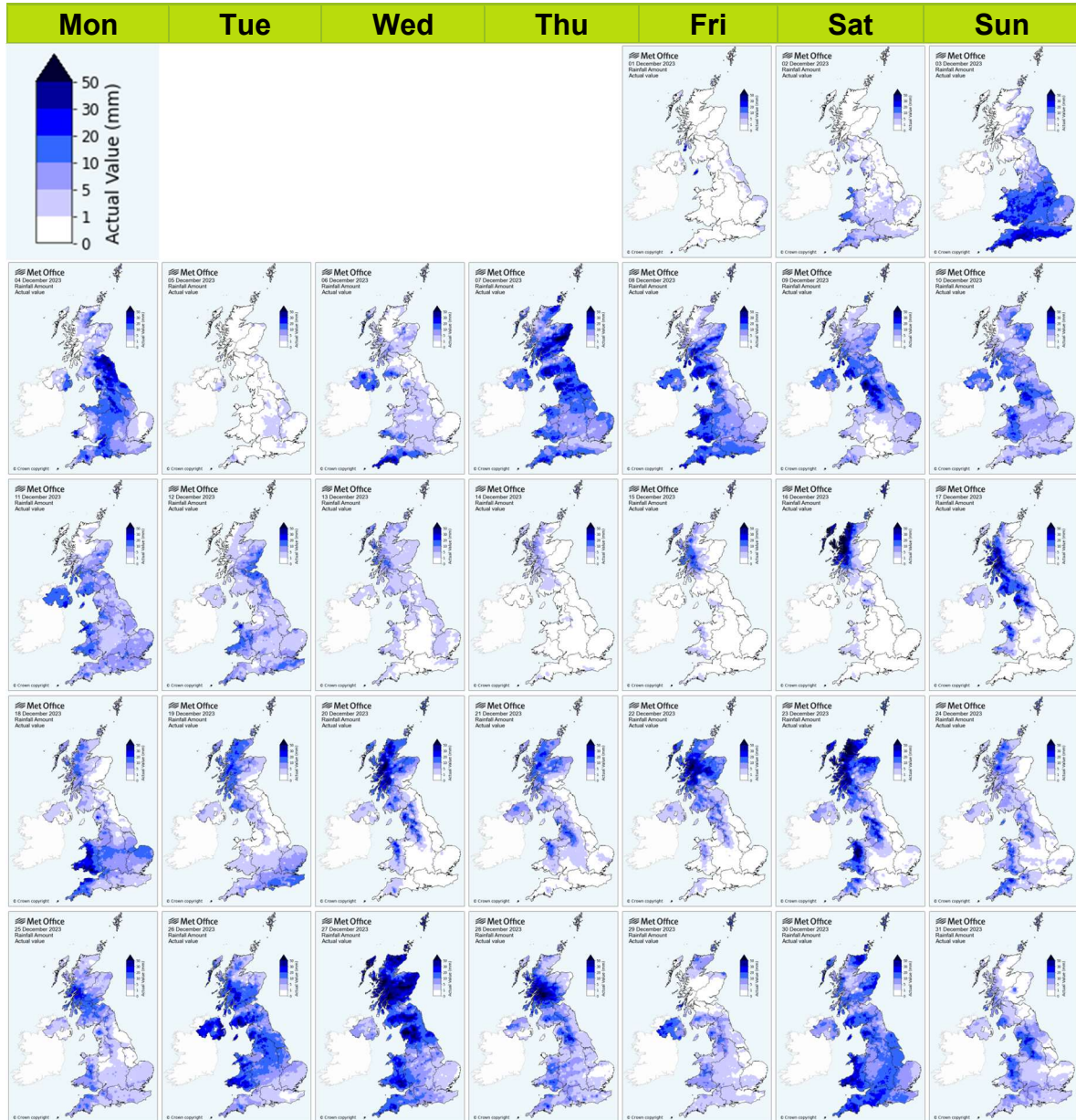
Daily minimum temperature maps - calendar view

These maps show daily minimum temperatures for each day of December 2023 as anomalies relative to the December 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.



Daily rainfall maps - calendar view

These maps show daily rainfall for each day of December 2023 as daily totals. The daily rainfall is the total from 0900UTC on the day in question to 0900UTC the following day.

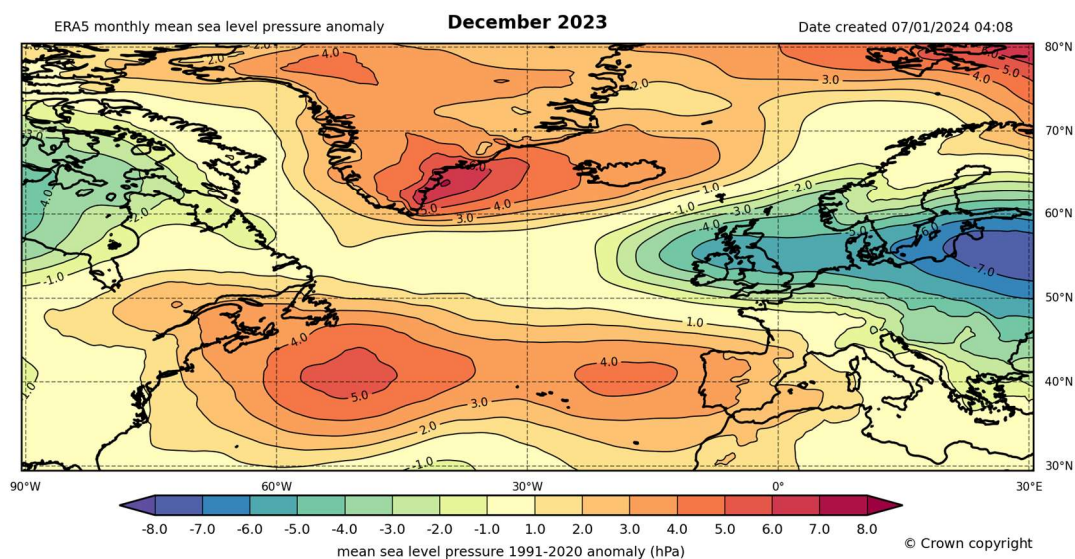
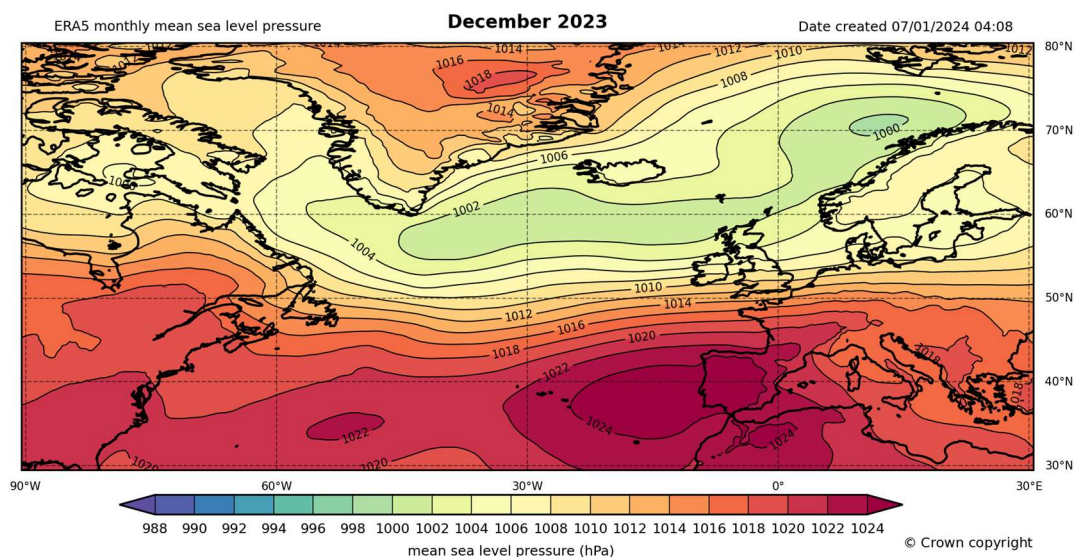


Monthly atmospheric circulation

Mean sea level pressure

These charts show the monthly mean sea level pressure for December 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 December 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.

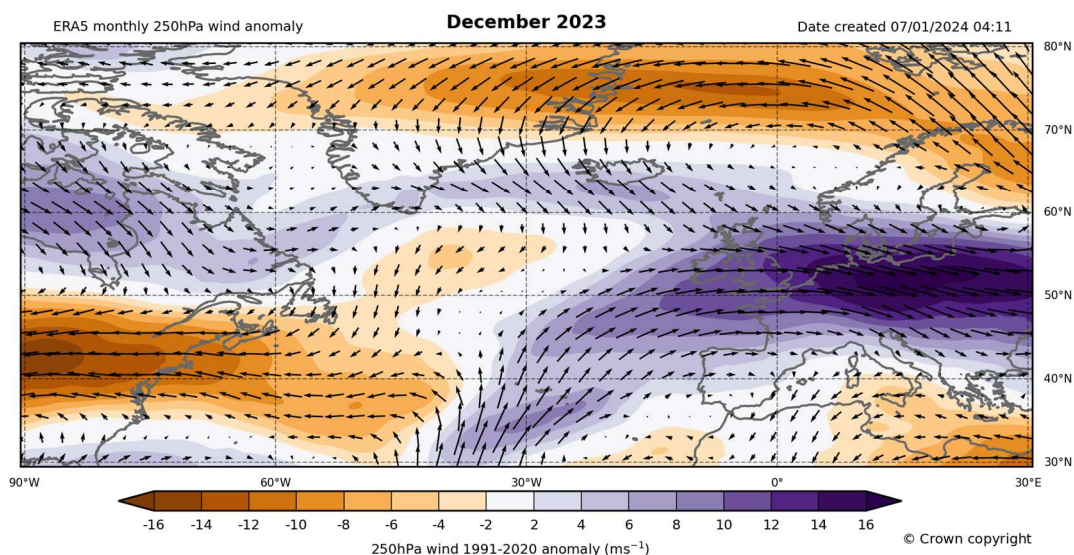
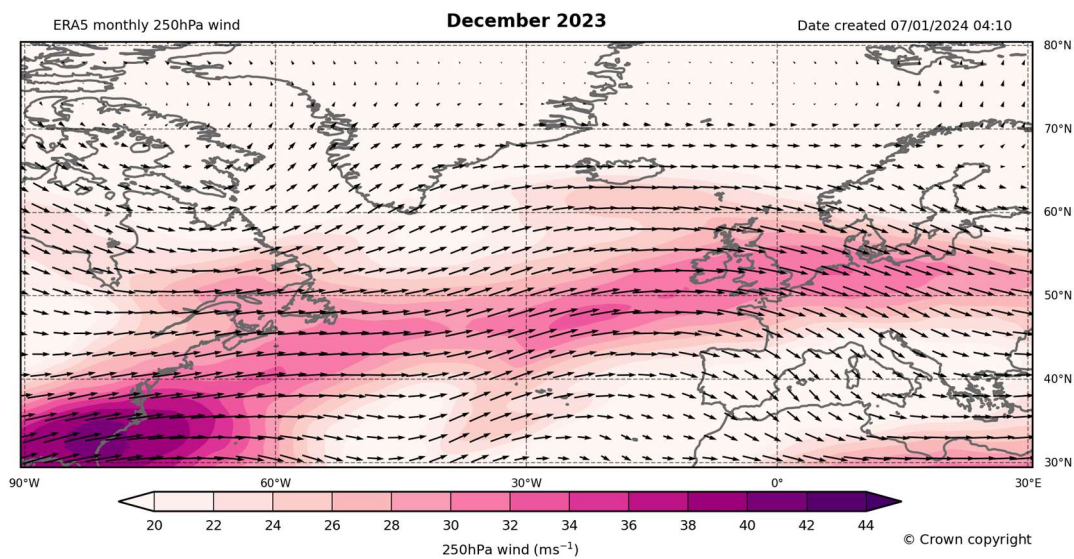
Pressure was lower than normal across much of the UK. Overall, December was characterized by a westerly Atlantic flow, and as a result was milder and wetter than average.



250hPa wind speed and direction

These charts show the monthly 250hPa wind speed and direction for December 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 December 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.

The westerly jetstream was much stronger than normal, particularly across the south of the UK, with much of the month comprising a succession of Atlantic low pressure systems.



Weather diary

- **Wet and windy but generally mild**

From the 1st to the 3rd, there was a reasonably quiet start to December with light winds, sunny days and cold nights with widespread light to moderate frosts and the bulk of any snowfall for the month coming in these first few days. However, after that, the weather pattern consisted almost entirely of Atlantic depression after Atlantic depression bringing generally mild but also wet and windy conditions to the whole of the UK.

The conveyor belt of low pressure systems off the Atlantic began in earnest on the 4th. Storms Elin and Fergus, named by the Irish Met Service, crossed the UK on the 9th and 10th. High pressure did make a brief appearance from the 14th to 18th, giving marginally more settled conditions mainly over the south, and it was in this period that Wales and Northern Ireland experienced their mildest temperatures.

The unsettled theme continued for the rest of the month. The mildest conditions for England and Wales occurred between the 23rd and the 25th, with maximum temperatures touching the mid-teens Celsius in many places. On the 27th, another winter storm, Gerrit, brought wind and rain over the whole country, with winds gusting between 80 and 90mph at the height of the storm.

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 09/01/2024 12:05. 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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