

## **Prolonged spell of low temperatures, December 2022**

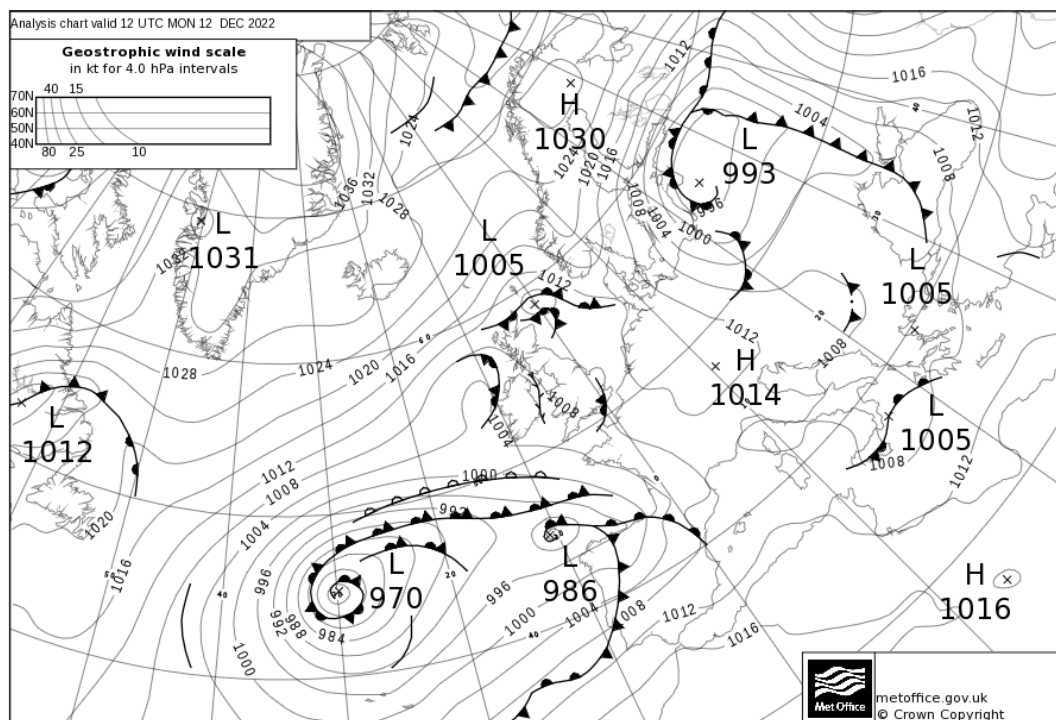
**The UK experienced a prolonged spell of low temperatures accompanied by snowfalls from 8 to 18 December 2022 as an Arctic Maritime airmass brought hard frosts, with daytime temperatures struggling to rise above freezing and accompanied by widespread lying snow (although generally not deep). Daily minimum temperatures fell widely to between -5°C and -10°C across the UK on several nights – with hard frosts even in cities and coastal areas, and some locations below -10°C. On 12 December Braemar recorded a daily maximum temperature of -9.3°C, the UK’s lowest maximum (excluding mountain stations) since December 2010. This was one of the most significant spells of low winter temperatures to affect the UK since the exceptional December of 2010.**

### **Impacts**

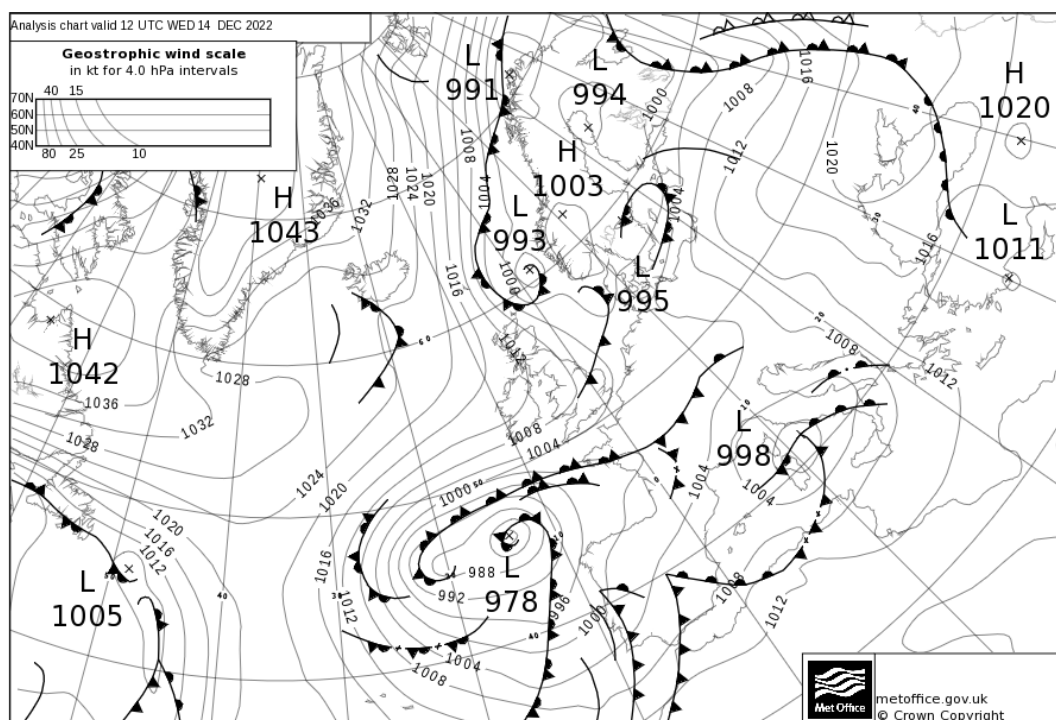
The prolonged spell of low temperatures resulted in ice forming on many inland lakes and waterways. Tragically four children died when they fell through the ice of a lake near Solihull, Birmingham on 11 December. Snowfalls in Shetland resulted in disruption to power supplies with several thousand properties losing electricity supplies for several days and a major incident declared. Widespread snow and icy conditions made difficult driving conditions. There was significant transport disruption in London on 12 December following snow overnight, with train services and London Underground affected and delays or cancellations at Heathrow, Gatwick and London City airports. On 12 December many roads in the south-east were blocked in places by snow and accidents, including the M25, while schools were closed in Cornwall and the Scottish Highlands, rail services were disrupted, and several hundred flights were cancelled. After the thaw set in, some areas experienced water supply problems, and a number of schools were closed due to leaking or burst pipes.

## Weather data

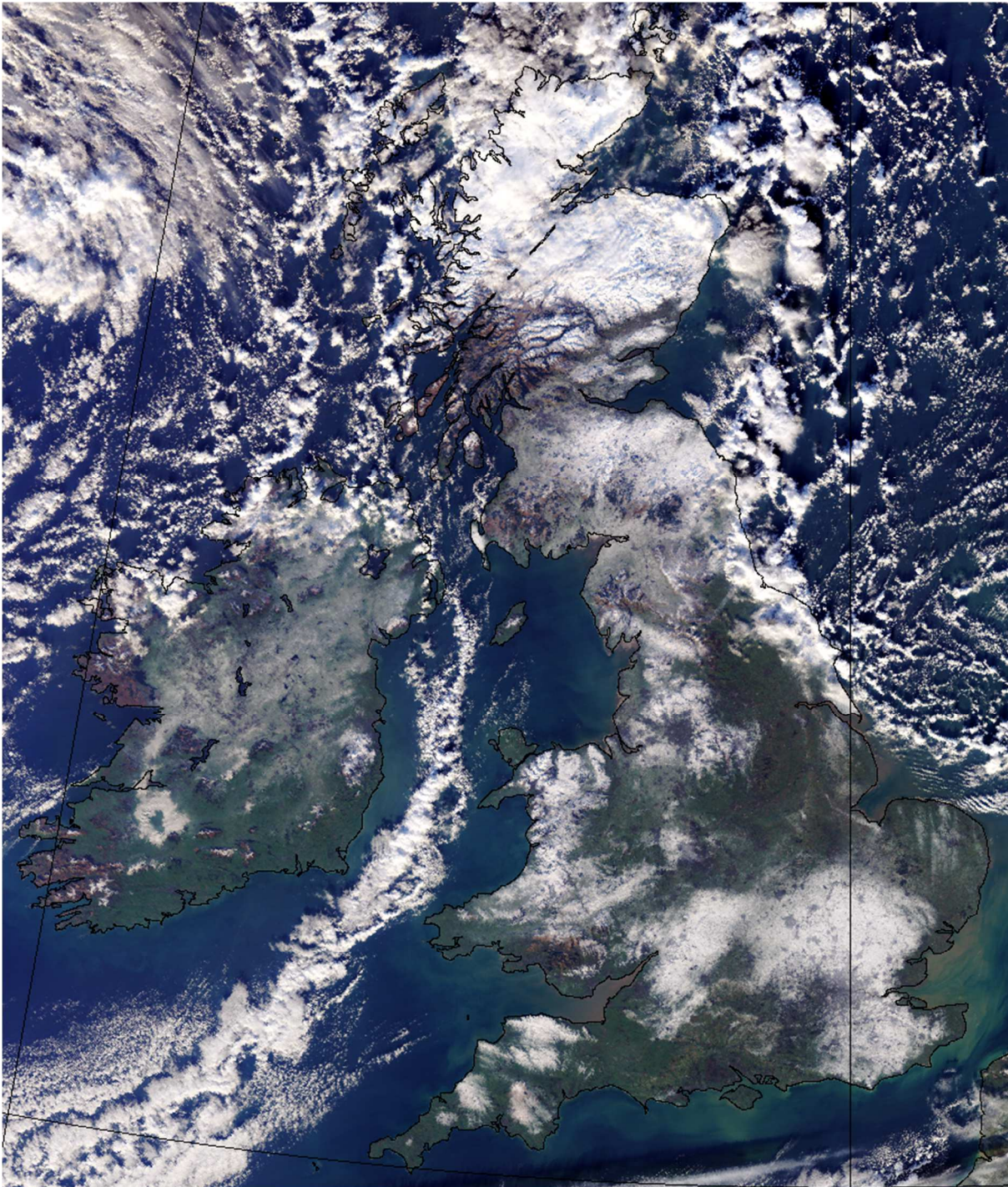
The analysis chart at 1200UTC 12 December 2022 shows the UK situated in a cold airmass with areas of high pressure to the north across Iceland and northern Scandinavia and low pressure with milder conditions to the south-west over the Bay of Biscay. The frontal system across the south-east brought lying snow to much of London overnight 11th to 12th.



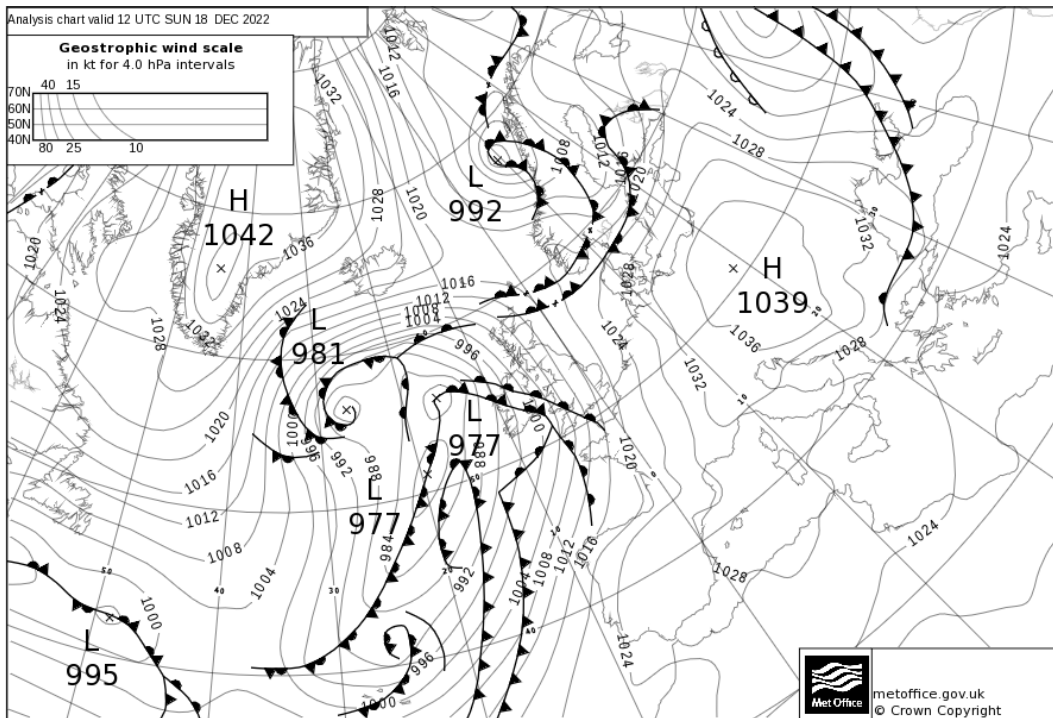
The analysis chart at 1200 UTC 14 December 2022 shows the UK in a cold northerly airstream of Arctic Maritime air bringing clear, cold conditions to much of the UK but with North Sea coasts and northern Scotland at risk of wintry showers, and milder Atlantic air and associated fronts constrained further south.



The satellite image on 15 December 2022 shows a cloud-free UK with the exception of some North Sea and northern coastal areas affected by wintry showers. A line of convection runs down the Irish Sea. Areas of lying snow are prominent across the south-east and central southern England, the south-west moors, many upland areas of Wales and north-west England and parts of Scotland (especially the north-east). London and Manchester are clearly visible. Image copyright Met Office / NOAA / NASA.

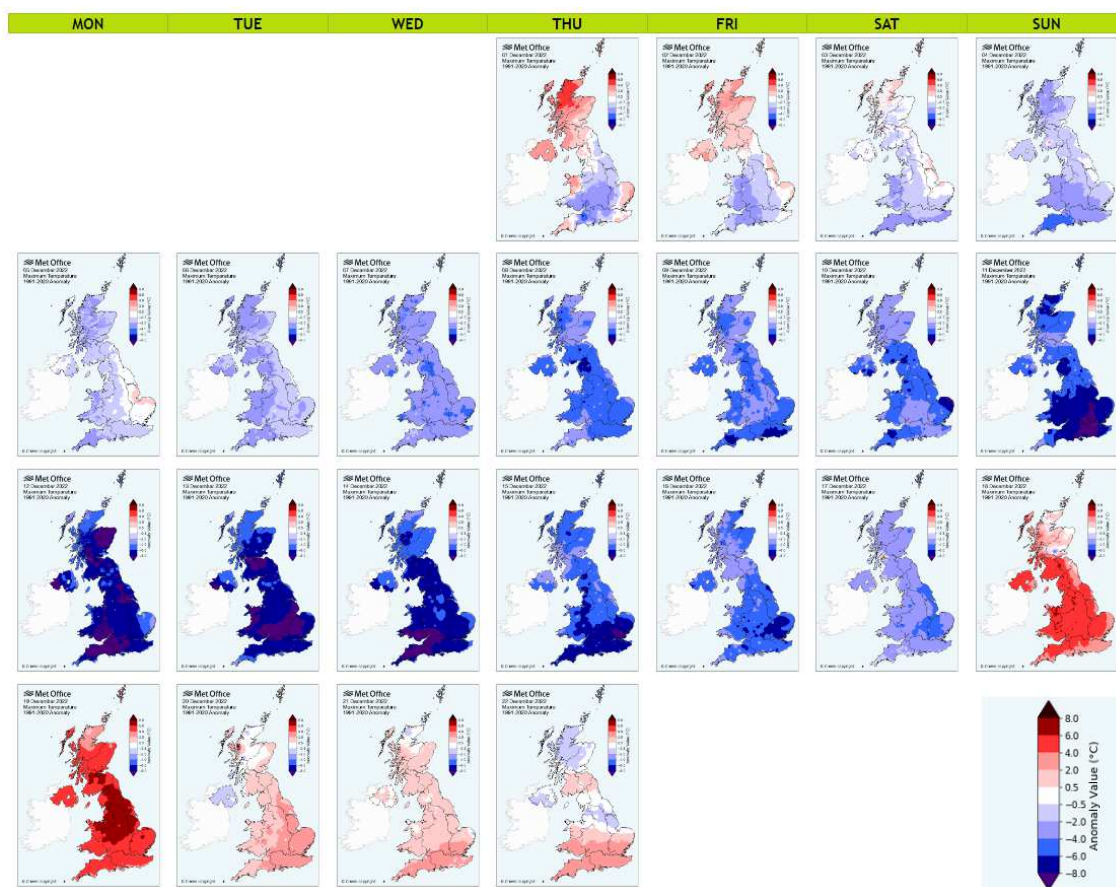


The analysis chart at 1200 UTC 18 December 2022 shows the dramatic change in conditions with the cold airmass pushed to the east with frontal systems bringing much milder air from the far south-west, resulting in a rapid thaw.

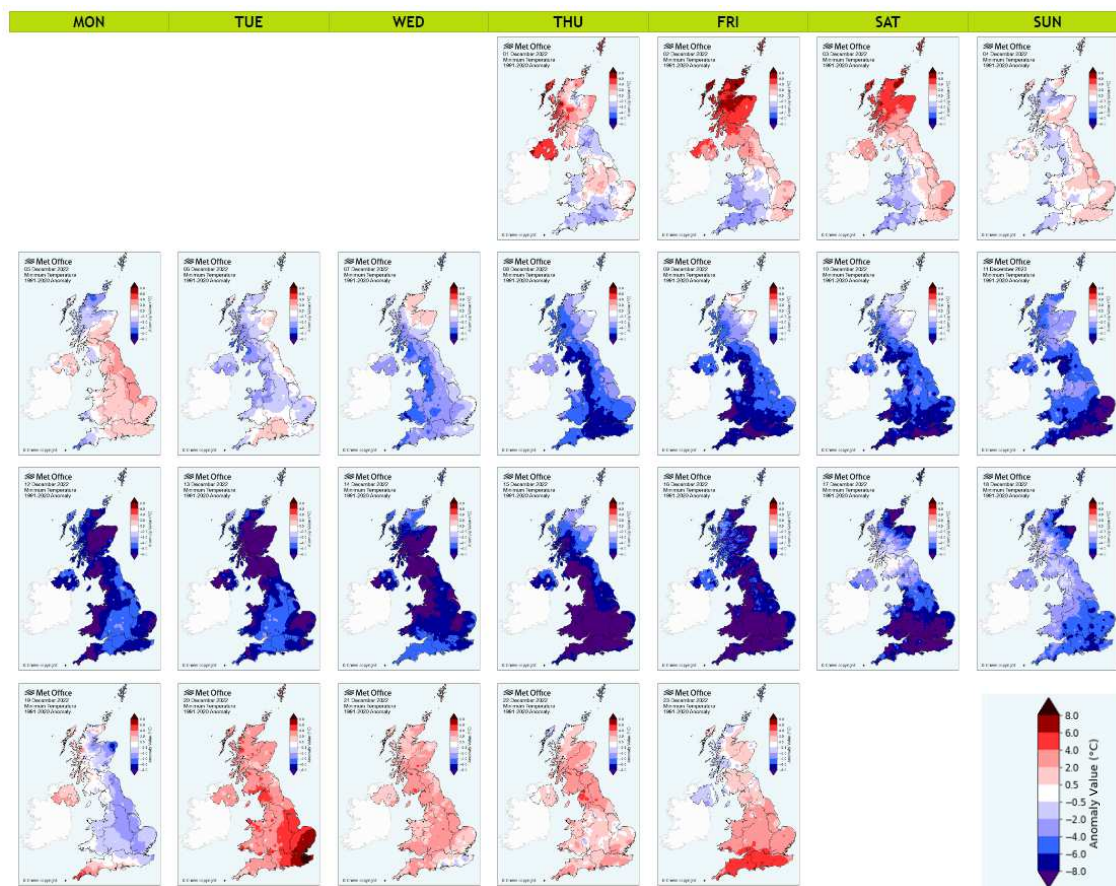


The panels of maps below show daily maximum and minimum temperatures from the start of December through this spell as anomalies relative to the 1991-2020 December long term average. Daily maximum temperatures were below average across the UK from 6 to 17 December, with the coldest days from Sunday 11th to Wednesday 14th, with temperatures in some areas more than 8°C below normal for the time of year – typically around -1°C compared to the December average of 7°C. Daily minimum temperatures were at their lowest from 8 to 17 December, again with some locations more than 8°C below normal for the time of year and a run of widespread hard frosts.

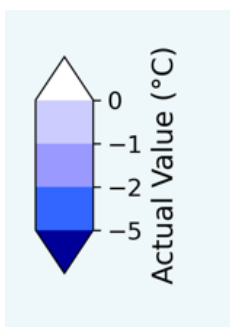
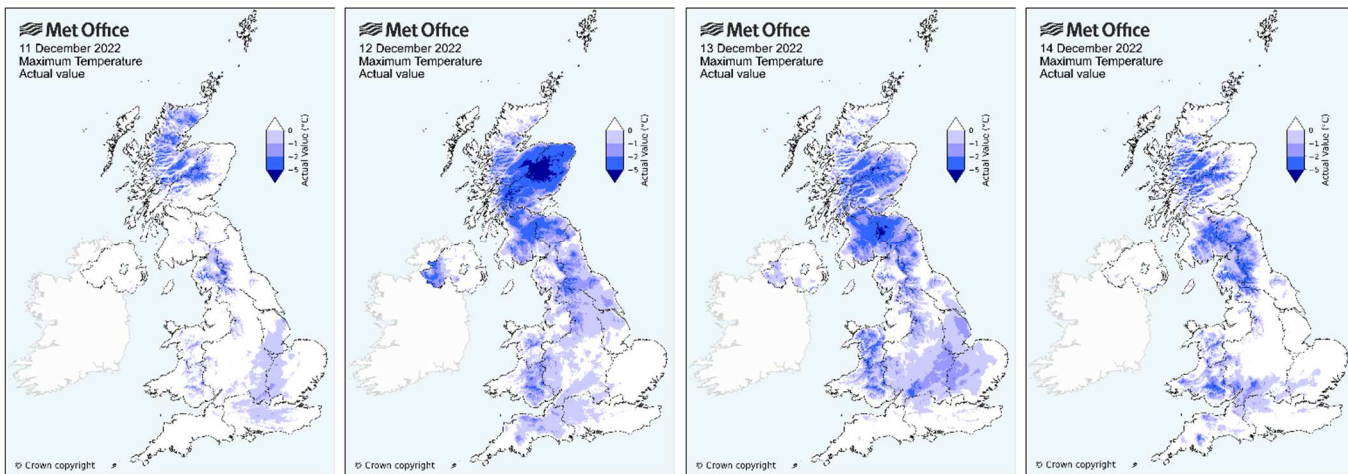
## Daily maximum temperature anomalies for 1 to 22 December 2022 – calendar view



## Daily minimum temperature anomalies for 1 to 23 December 2022 – calendar view



The maps below show daily maximum temperatures from 11 to 14 December, indicating the extent of 'ice days' – i.e. where the temperature remains below freezing all day. It is unusual for 'ice days' to cover such a large spatial extent of the country. On 12 December the UK area-average maximum temperature was 0°C, and the 12th and 13th were the UK's coldest days since 28 February and 1 March 2018 (the 'Beast from the East').

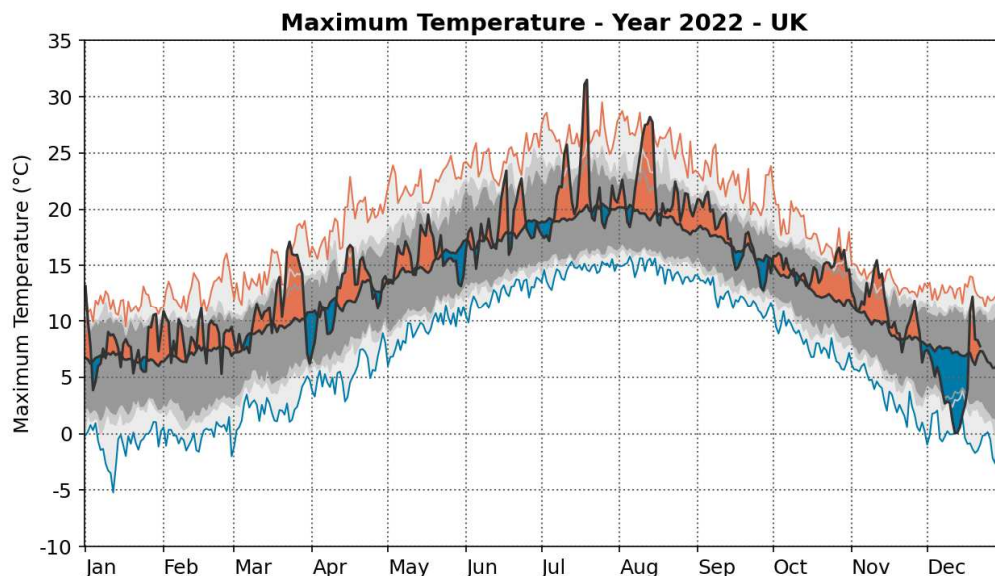


The chart below shows UK area-average daily maximum temperatures for 2022, showing the spell of low temperatures in early December followed by the dramatic rise in temperature from 17th to 18th. This spell was in marked contrast to the persistent above average temperatures experienced through much of the autumn and generally above average temperatures for the majority of the year.

Met Office

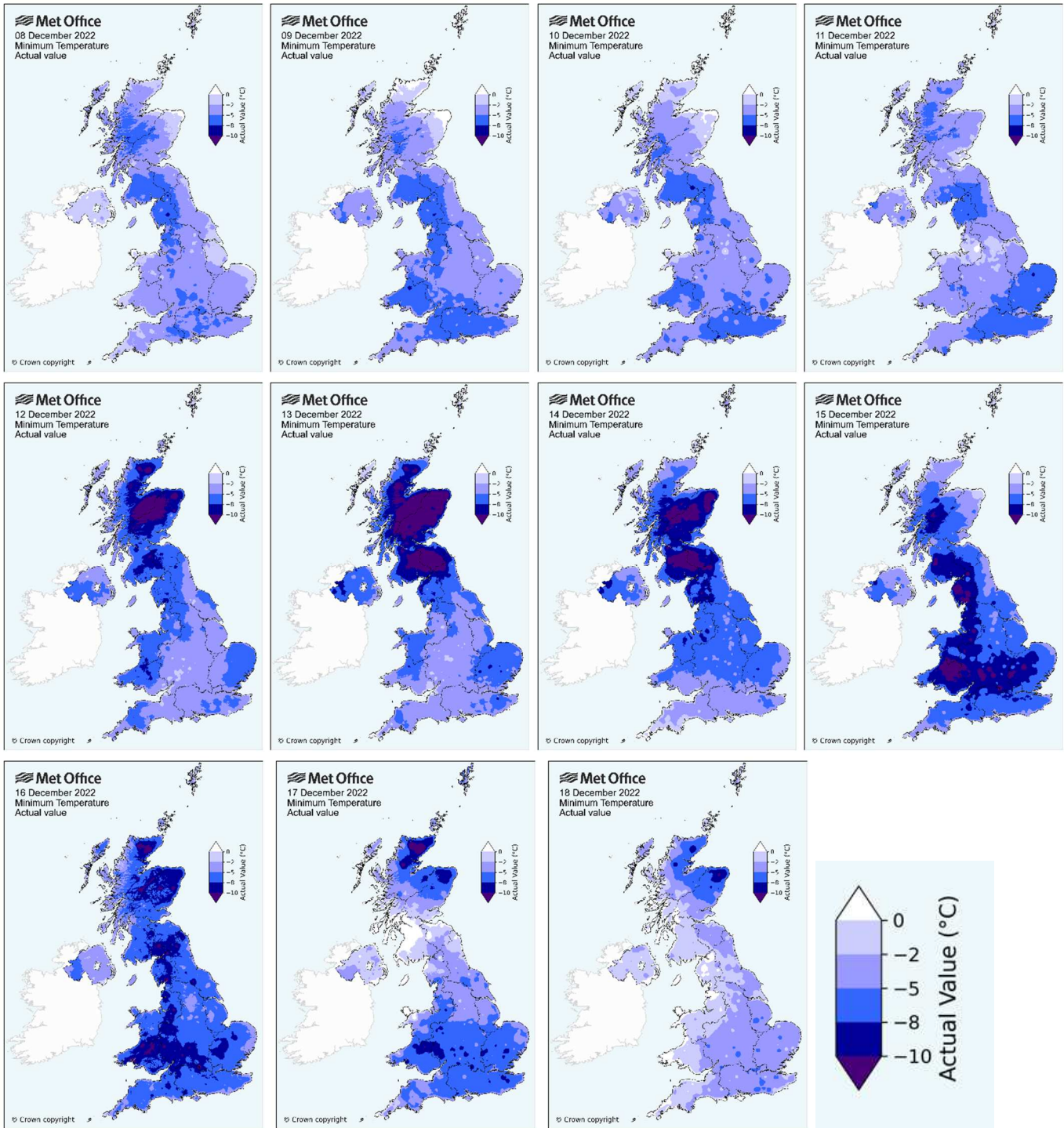
Source: HadUK-Grid 23/12/2022 11:26

© Crown copyright



— 1991-2020 — lowest — 5% — 10% — 90% — 95% — highest — 2022

The maps below show daily minimum temperatures from 8 to 18 December, showing the widespread run of hard frosts, even across southern parts of the UK. The lowest minimum temperatures were on 15 and 16 December with  $-5^{\circ}\text{C}$  across the whole country, with the exception of Northern Ireland and some coastal fringes. Factors contributing to the particularly low temperatures during the second half of this spell were the clear skies, long nights at the darkest time of year, with the lowest temperatures tending to coincide with areas of lying snow. On 16 December the UK area-average minimum temperature was  $-6.5^{\circ}\text{C}$ , the equal-lowest value (with 11 February 2021) since December 2010 – 11 nights in December 2010 being significantly colder).

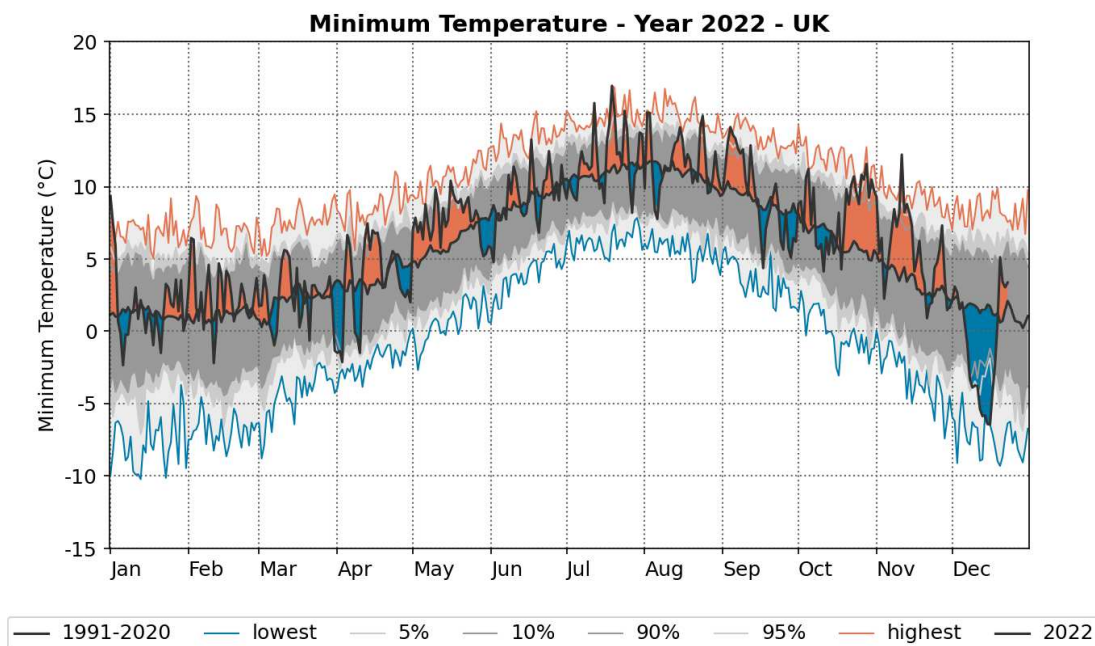


The chart below shows UK area-average daily minimum temperatures for 2022, with a run of ten days below  $-3^{\circ}\text{C}$  and five days from 12th to 16th below  $-5^{\circ}\text{C}$ .

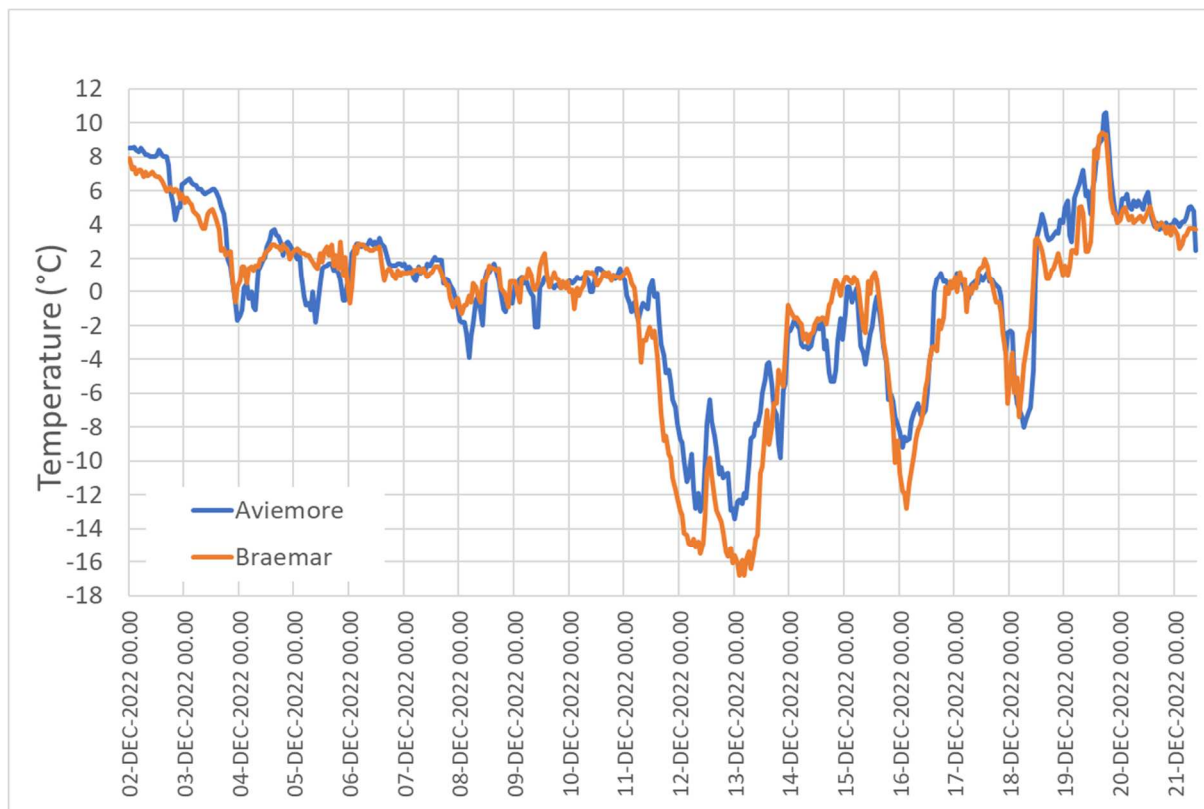


Source: HadUK-Grid 23/12/2022 11:26

© Crown copyright

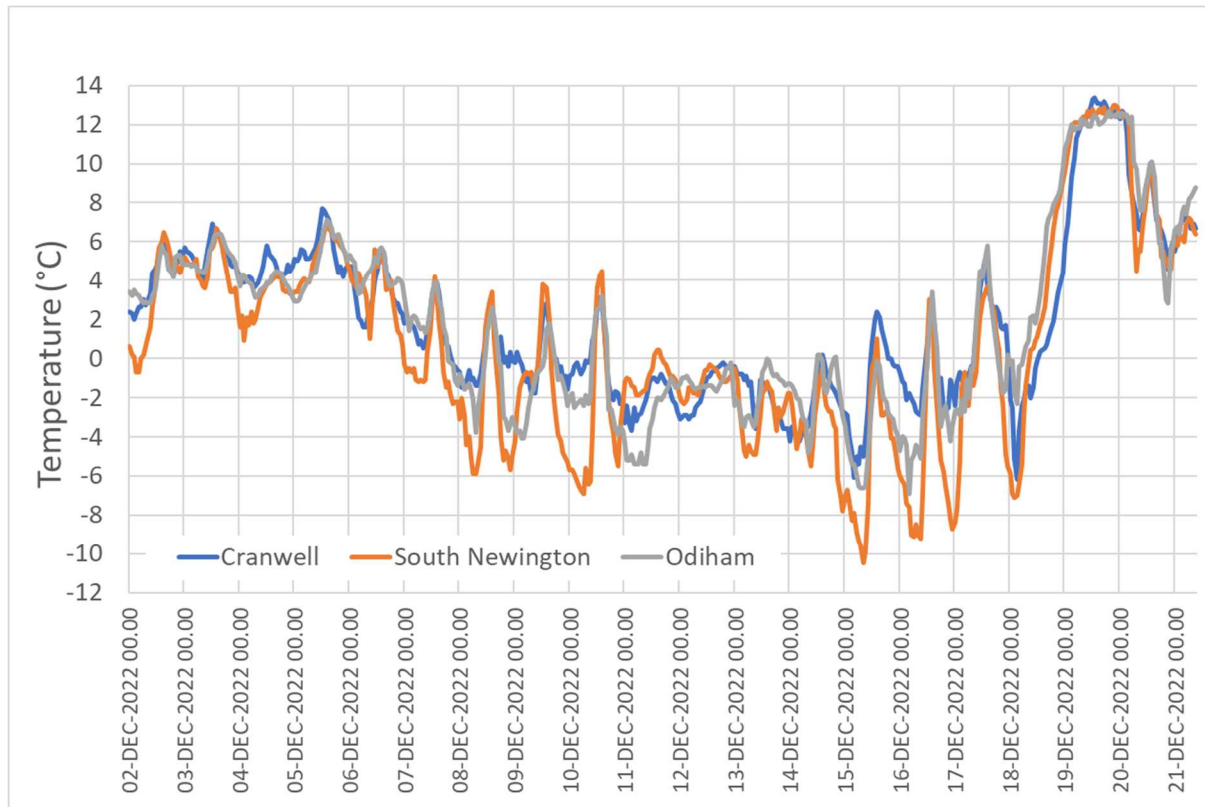


The chart below shows hourly air temperature from 2 to 21 December 2022 at Aviemore (Inverness-shire) and Braemar (Aberdeenshire). From 4 to 11 December, temperatures at both locations remained close to freezing before falling below  $-10^{\circ}\text{C}$  on 11 to 12 December. Braemar recorded a daily maximum temperature of  $-9.3^{\circ}\text{C}$  on 12th – the UK’s lowest value of this spell and the lowest maximum since December 2010. Braemar also recorded the UK’s lowest daily minimum of  $-17.3^{\circ}\text{C}$  on 13th – notably low but not exceptional and not as low as February 2021, when this station recorded  $-23.0^{\circ}\text{C}$ .



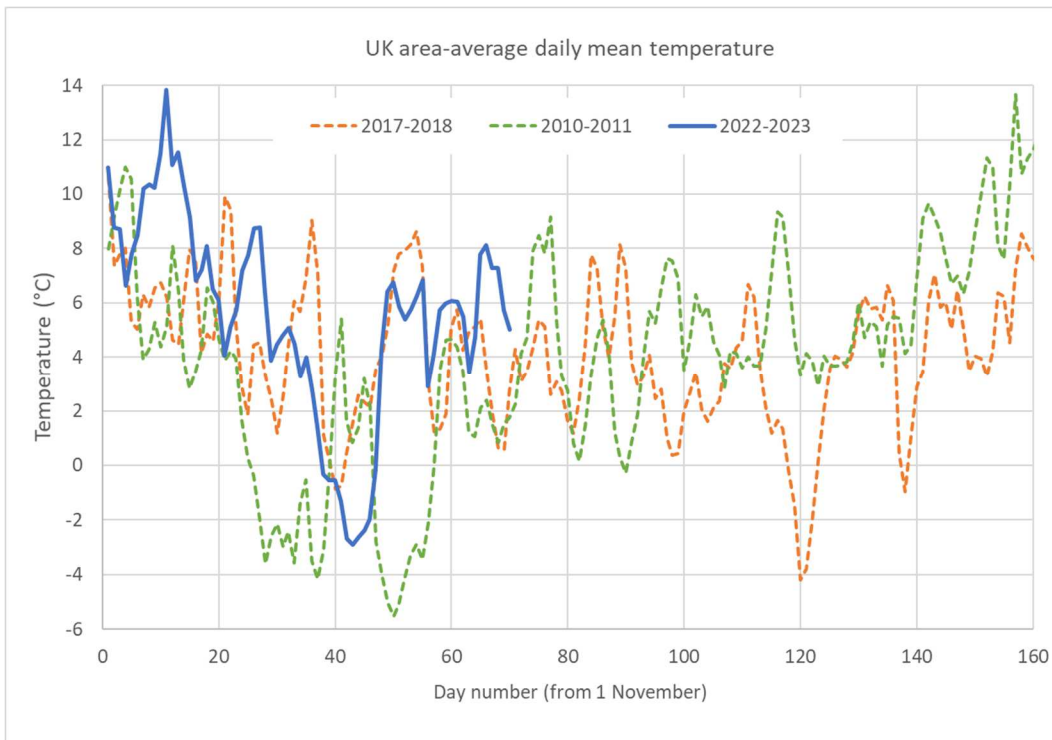


The chart below shows hourly air temperature from 2 to 21 December at Cranwell (Lincolnshire), South Newington (Oxfordshire) and Odiham (Hampshire). Daily maximum temperatures struggled to rise above freezing from 11th to 13th, with a run of hard frosts. On 15 December South Newington recorded a minimum of  $-11.1^{\circ}\text{C}$  and temperatures across many areas fell widely to  $-5$  to  $-10^{\circ}\text{C}$ , including in London, with  $-7.6^{\circ}\text{C}$  at Kew Gardens. Coastal areas also recorded some very hard frosts with  $-9.4^{\circ}\text{C}$  at Pembrey Sands (Carmarthenshire) on 16th. Many stations recorded their lowest December daily maximum and daily minimum temperatures since December 2010. Temperatures at these stations then rose dramatically on 18 December – for example at South Newington an increase of over  $17^{\circ}\text{C}$  within 24 hours with the marked change of air mass across the UK.



There have been a number of spells of severe winter weather in the UK since December 2010. The most notable of these include February 2021, February to March 2018 (the ‘Beast from the East’), January and March 2013 and other spells such as in January 2013 and February 2012. Each of these events differs in terms of spatial extent, severity, duration and the level of weather-related impacts (particularly snow). The severity of the winter weather experienced also depends on other factors such as wind strength (wind-chill) and cloud cover. This December 2022 event was more notable for the sustained nature of the low temperatures (with hard frosts lasting for well over a week), rather than the snowfalls, which were generally unexceptional for the time of year, and conditions were mitigated to some extent by some welcome winter sunshine and relatively light winds.

The graph below compares UK area-average daily mean temperature from 1 November for winters 2022-2023, 2017-2018 and 2010-2011. Although the low temperatures were less extreme than during February to March 2018, they were longer in duration. However, neither of these spells compares in either severity or duration with December 2010. December 2022 must now also be included as one of the most significant low temperatures to affect the UK since December 2010.

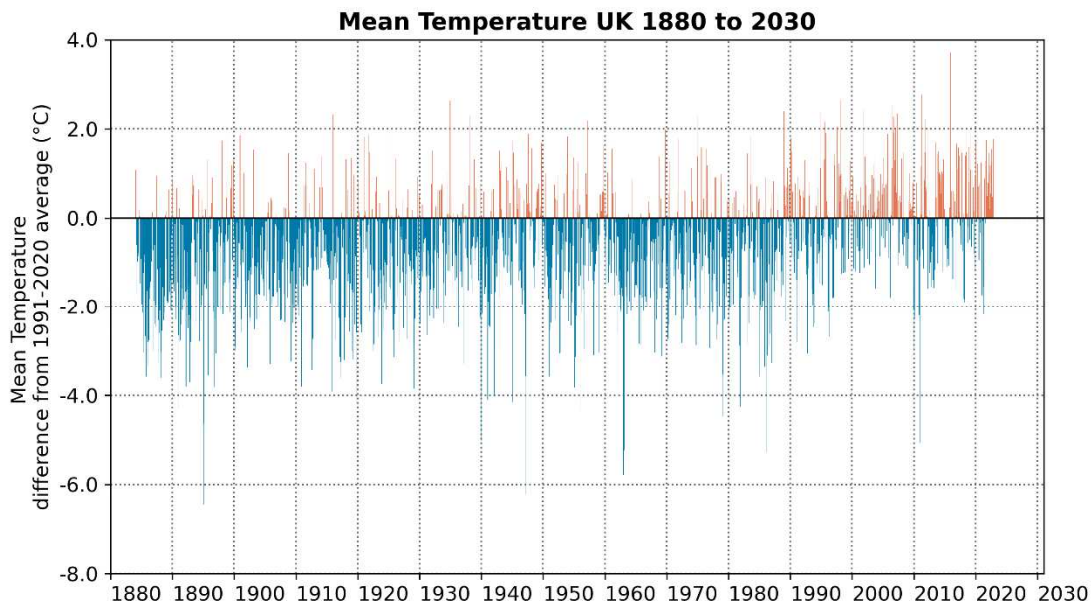


Although the UK has experienced a number of notable cold spells since 2010, the frequency, severity and duration of such spells has generally declined as a result of climate change. The chart below shows monthly mean temperature anomalies for each month of the year from 1884 to date relative to the 1991-2020 long-term average. In the last few decades as the UK's climate has warmed the number of blue bars (corresponding to colder than average months) has declined and the number of red bars (warmer than average months) increased.

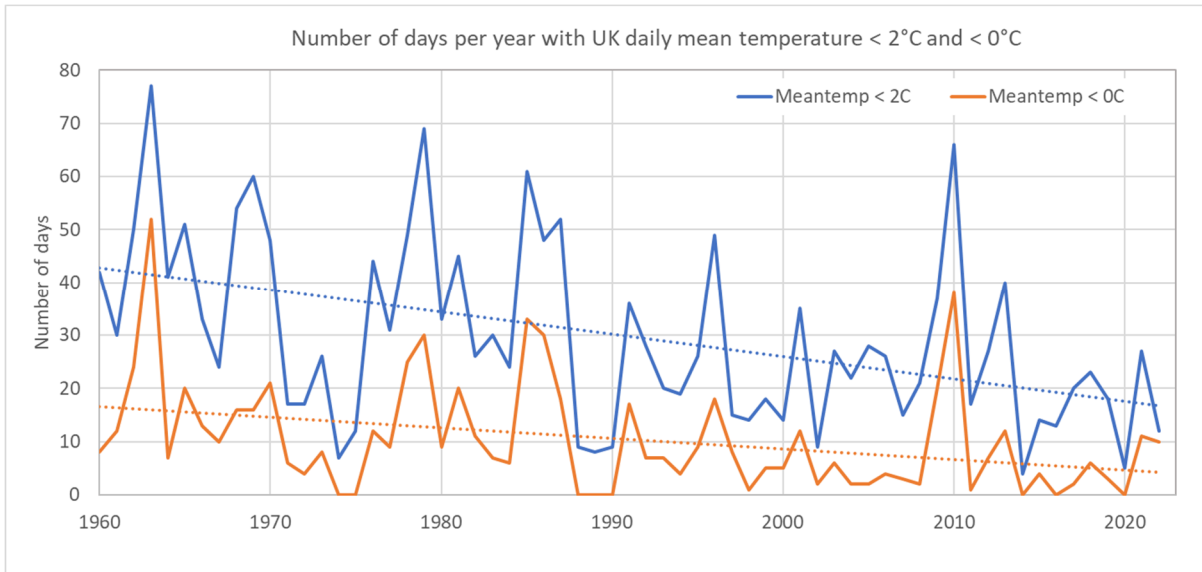


Source: HadUK-Grid 21/12/2022 17:58

© Crown copyright



The chart below counts the number of days per year from 1960 to date with a UK area-average daily mean temperature below 2°C and 0°C (indicating widespread cold conditions). The hatched lines show the linear trend. When comparing the long-term average periods 1961-1990 and 1991-2020, the number of days <2°C has decreased by a third and <0°C by a half within this thirty-year period, as summarized in the table below.



Count of days with UK area-average mean temperature < 2°C and <0°C for 30-year long term average periods.

| Period    | Meantemp < 2°C | Meantemp < 0°C |
|-----------|----------------|----------------|
| 1961-1990 | 1085           | 419            |
| 1991-2020 | 706            | 207            |

Author: Mike Kendon, Met Office National Climate Information Centre

Last updated 10/01/2023

