

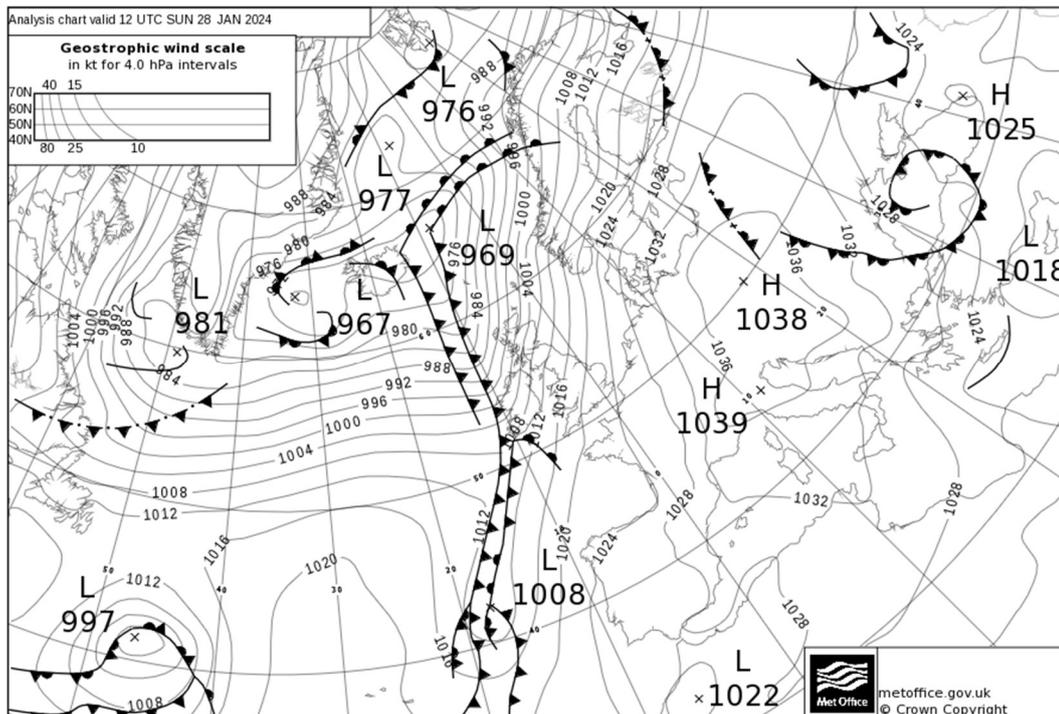
## UK January temperature record, 28 January 2024

On 28 January 2024 parts of north-west Scotland recorded exceptionally high January temperatures due to a localised Foehn effect. This effect causes a marked contrast in temperature across a mountainous area, with cooler, moister conditions on the windward side and warmer, drier conditions on the leeward side where the air dries out as it is forced up and over the higher ground. The Foehn effect is the primary cause of highly localised temperature extremes in winter months for parts of Scotland and Wales (rather than in the milder south of England). Achfary (Sutherland) recorded a daily maximum temperature of 19.9°C, 13.0°C above the January 1991-2020 long term average for maximum temperature for this station and exceeding the previous UK January temperature record by a very large margin of 1.6°C. Kinlochewe (Wester Ross) recorded 19.6°C, also beating the previous record.

While the primary cause of this temperature record was the Foehn effect, this was also against a backdrop of increasing mean and maximum temperatures more generally as the UK's climate continues to warm. Since 2011, the UK has recorded its highest maximum temperature on record for six of the 12 months of the year – January (2024), February (2019), July (2022), October (2011), November (2015), December (2019). In contrast, none of the UK's lowest minimum temperatures on record for the 12 months of the year have occurred this century.

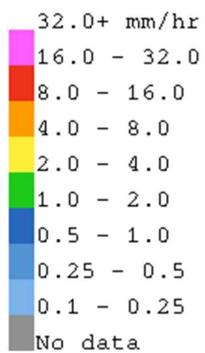
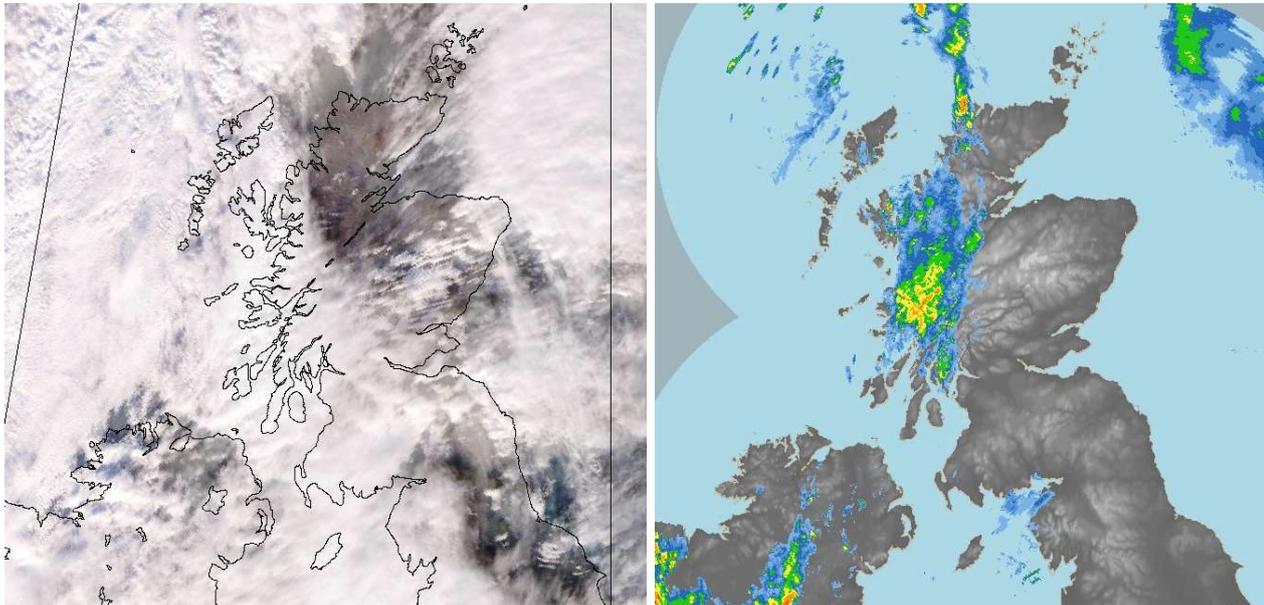
### Weather data

The analysis chart at 1200UTC 28 January 2024 shows the UK in a south-westerly flow, located in the 'warm sector' between warm and cold fronts, with an associated low pressure centre over Iceland. Typically, a warm sector would be associated with low cloud and patchy light rain.

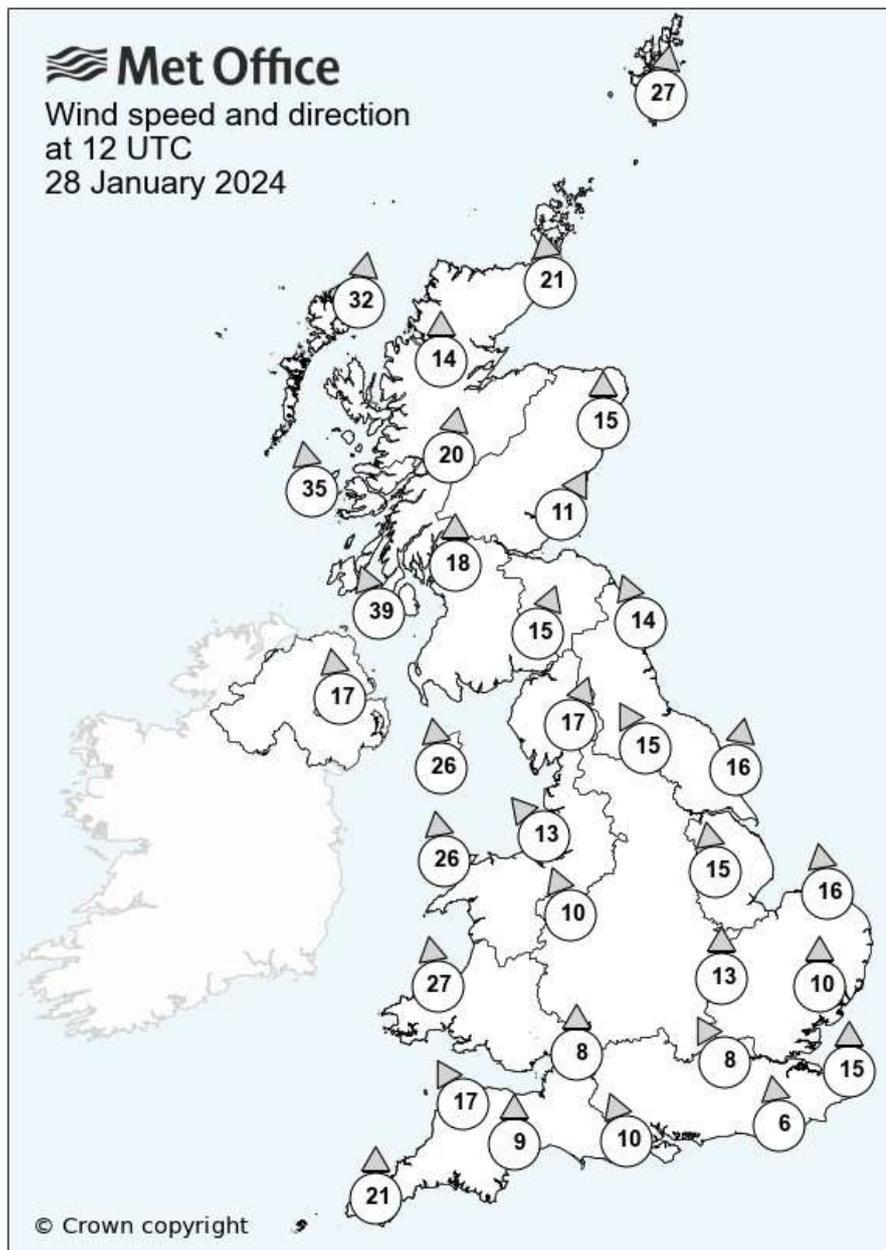


The visible satellite image at 1203UTC 28 January 2024 shows cloud cover breaking up across northern Scotland in a strong southerly flow. Image copyright Met Office / NOAA / NASA (left).

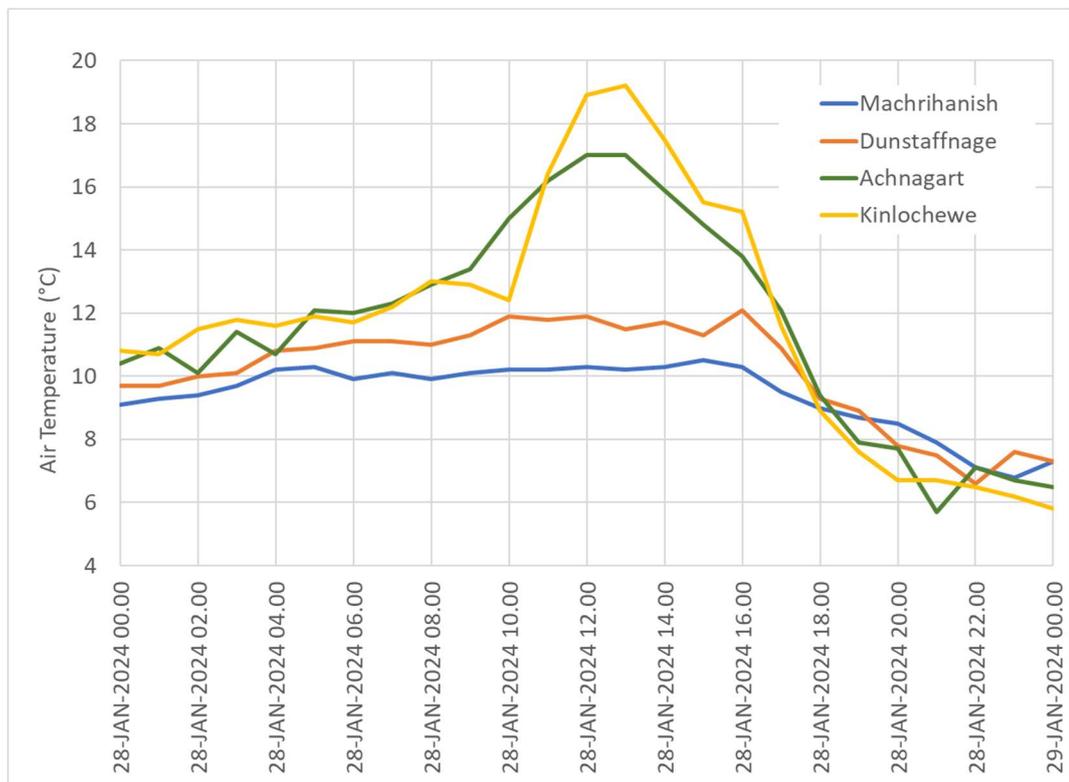
The rain-radar image at 1300UTC 28 January 2024 shows rain further south across western Scotland on the windward side of the mountains with a south-westerly flow (right)

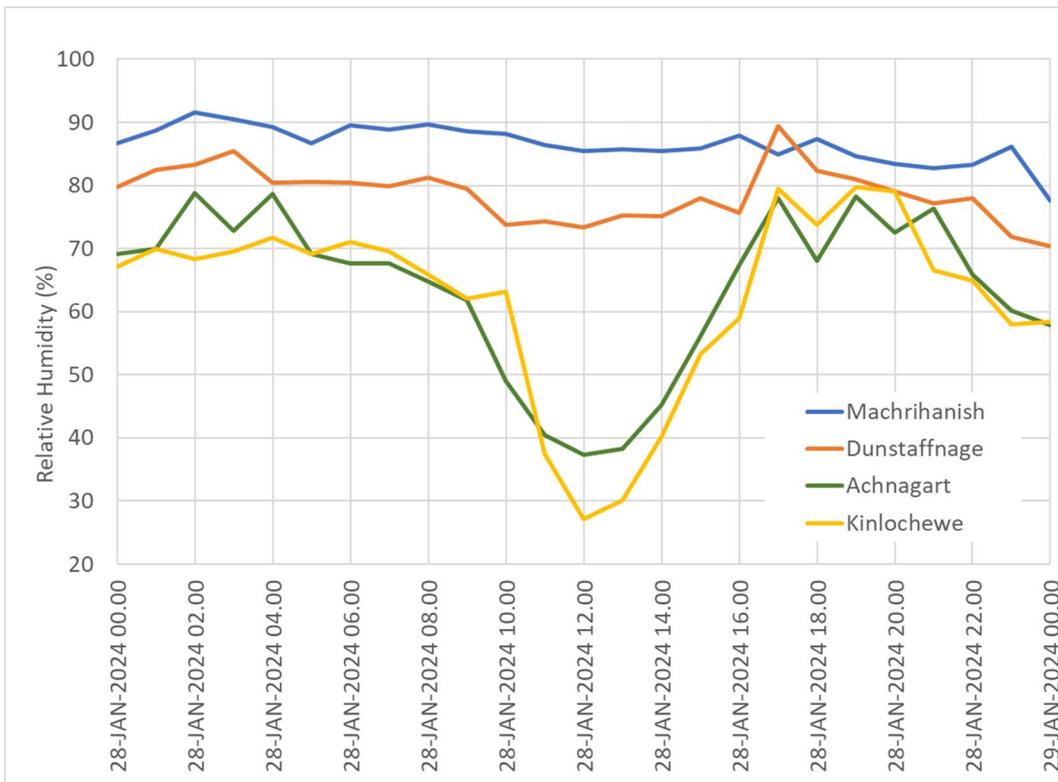


The chart below shows hourly mean wind speed and direction in the hour to 1200UTC on 28 January 2024. At surface level, wind speeds were in a southerly direction at around 15 to 20Kt (17 to 23mph) but exceeding 30Kt (35mph) to the west of the Scottish mainland, with surface winds backed southerly rather than south-westerly due to frictional effects. Winds were extremely strong across Scotland's mountain summits, gusting to 99Kt (114mph) at Cairngorm Summit (1237masl), 97Kt (112mph) at Aonach Mor – east of Ben Nevis (1130masl) and 89Kt (102mph) at Bealach na Ba, Wester Ross (773masl).

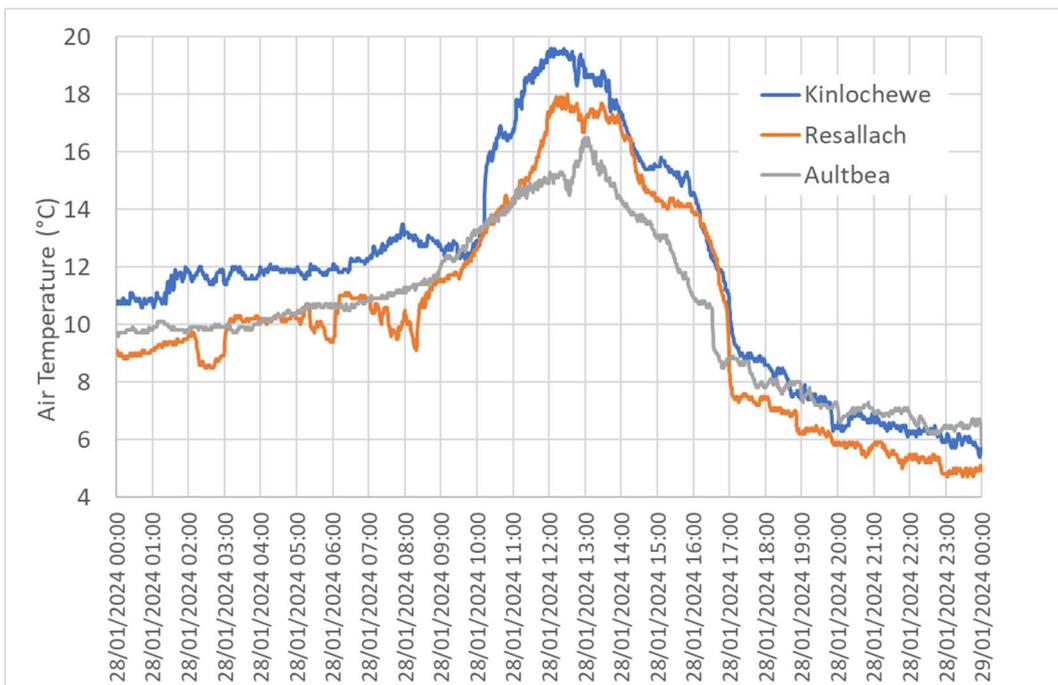


The charts below show hourly air temperature (top) and hourly relative humidity (bottom) at four stations across western Scotland from south to north: Machrihanish (Argyll, near Mull of Kintyre), Dunstaffnage (Argyll, near Oban), Achnagart (Highland, south-east of Kyle of Lochalsh), and Kinlochewe (Wester Ross, north-east of Torridon). These show that while air temperature and humidity at Machrihanish and Dunstaffnage, on the windward side of the mountains, remained broadly flat over this period, Achnagart and Kinlochewe on the leeward side experienced a dramatic rise in temperature and corresponding fall in relative humidity due to the Foehn effect caused by the mountains of the West Highlands. This effect was more pronounced at Kinlochewe where the relative humidity fell to below 30% i.e. indicating extremely dry air. This station is located around 30 miles further north than Achnagart with a mountainous area in between. Temperatures then fell and humidity rose as a rain-bearing front moved through from the west.

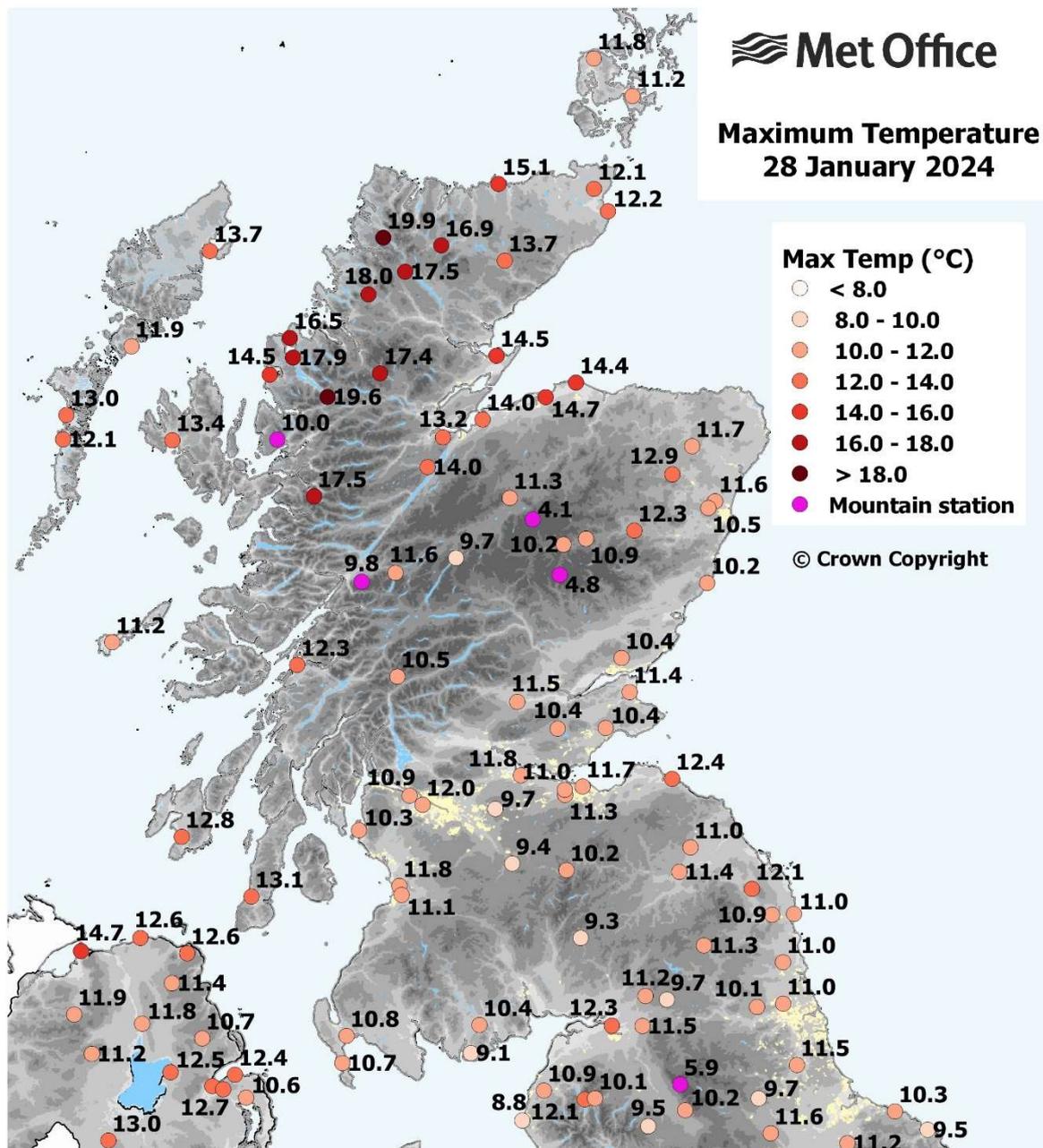




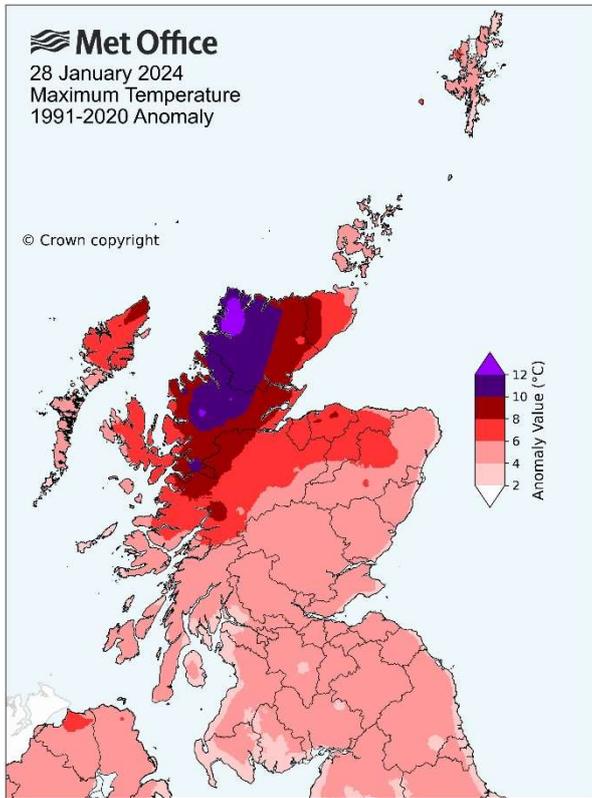
The chart below shows minute-level air temperature data for three of the stations across north-west Scotland, Kinlochewe (19.6°C), Resallach (18.0°C), and Aultbea (16.5°C). These illustrate the dramatic rise in air temperature – at Kinlochewe this corresponded to over 6°C within the space of 2 hours, with a corresponding dramatic drop during the evening.



The chart below shows daily maximum temperatures on 28 January 2024. Both Achfary and Kinlochewe exceeded the UK's previous January temperature record of 18.3°C set at Aber (Gwynedd) on 10 January 1971 and 27 January 1958, and Aboyne (Aberdeenshire) and Inchmarlo (Kincardineshire) on 26 January 2003. 19.9°C also set a new winter temperature record for Scotland.

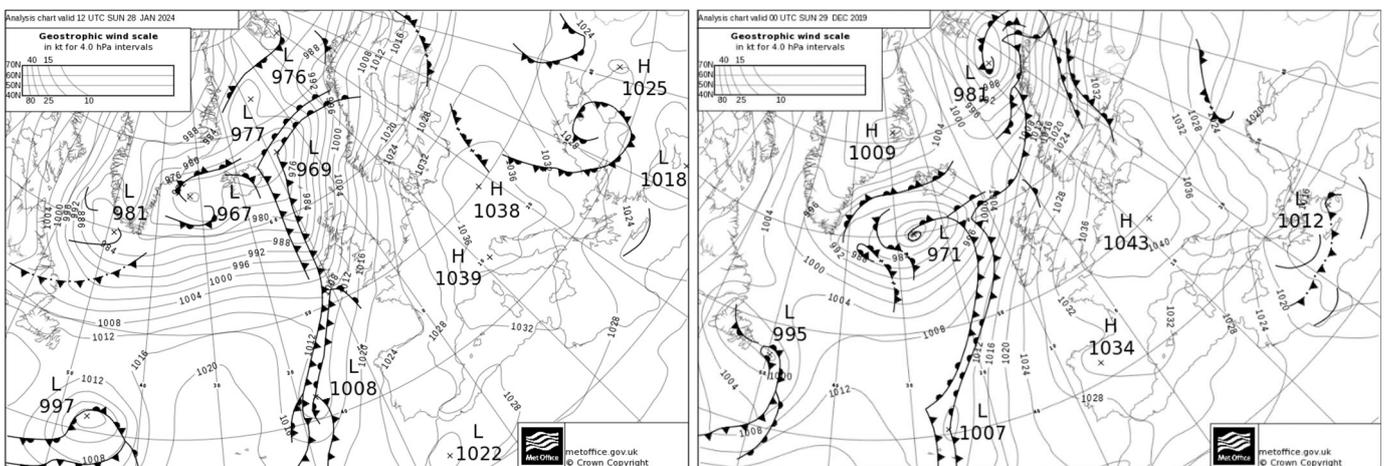


The map below shows daily maximum temperatures across Scotland on 28 January 2024 as anomalies relative to the January 1991-2020 long-term average. Temperatures were over 10°C above normal across the North-West Highlands; in places over 12°C above normal – but these unusually high temperatures for the time of year were generally confined to the far north-west.



Only three years previously, this same station, Achfary, set a new UK December temperature record of 18.7°C on 28 December 2019. This was also caused by the Foehn effect, but a key difference being that the maximum occurred overnight 28 to 29 December, rather than in the middle of the day. The analysis charts below compare the events of January 2024 and December 2023 and shows their similarity. The Foehn effect mechanism occurs relatively frequently across the mountains of North Wales as well as of Scotland. It is responsible for a weather station at Aber (Gwynedd) on the North Wales coast to the north of the mountains of Eryri (Snowdonia) holding the Welsh temperature records for both December and January.

The analysis charts of 1200UTC 28 January 2024 (left) and 0000UTC 29 January 2019 (right) each show the UK in a similar south-westerly flow, within a warm sector between warm and cold fronts, and the corresponding area of low pressure to the north-west of the UK.



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