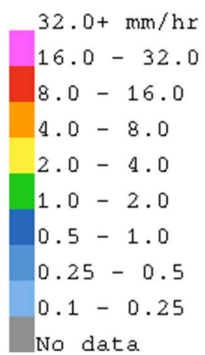
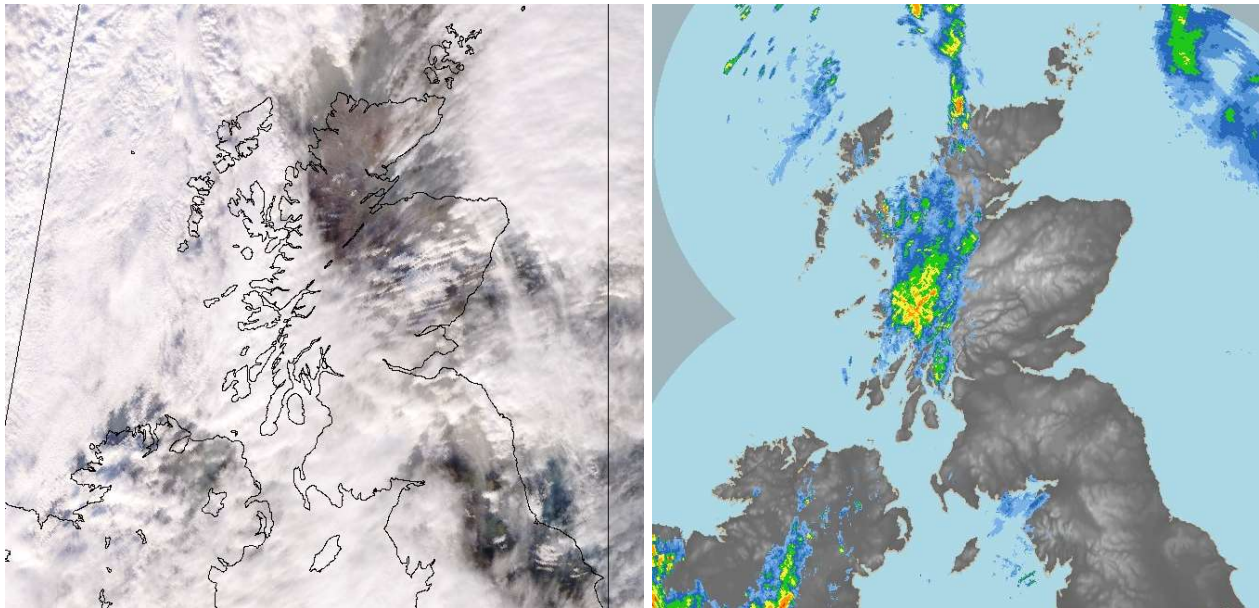


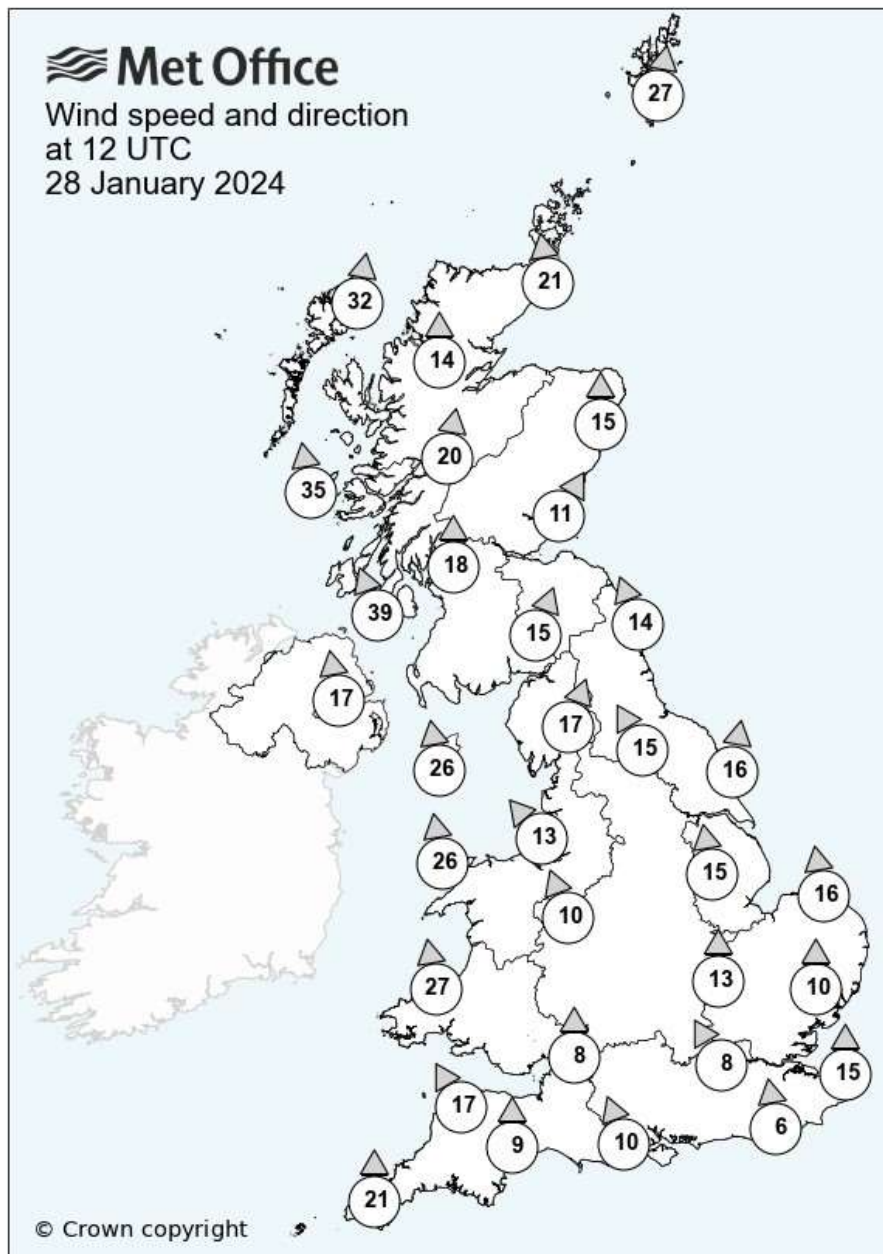


The visible satellite image at 1203UTC 28 January 2024 shows cloud cover breaking up across northern Scotland in a strong southerly flow. Image copyright Met Office / NOAA / NASA (left).

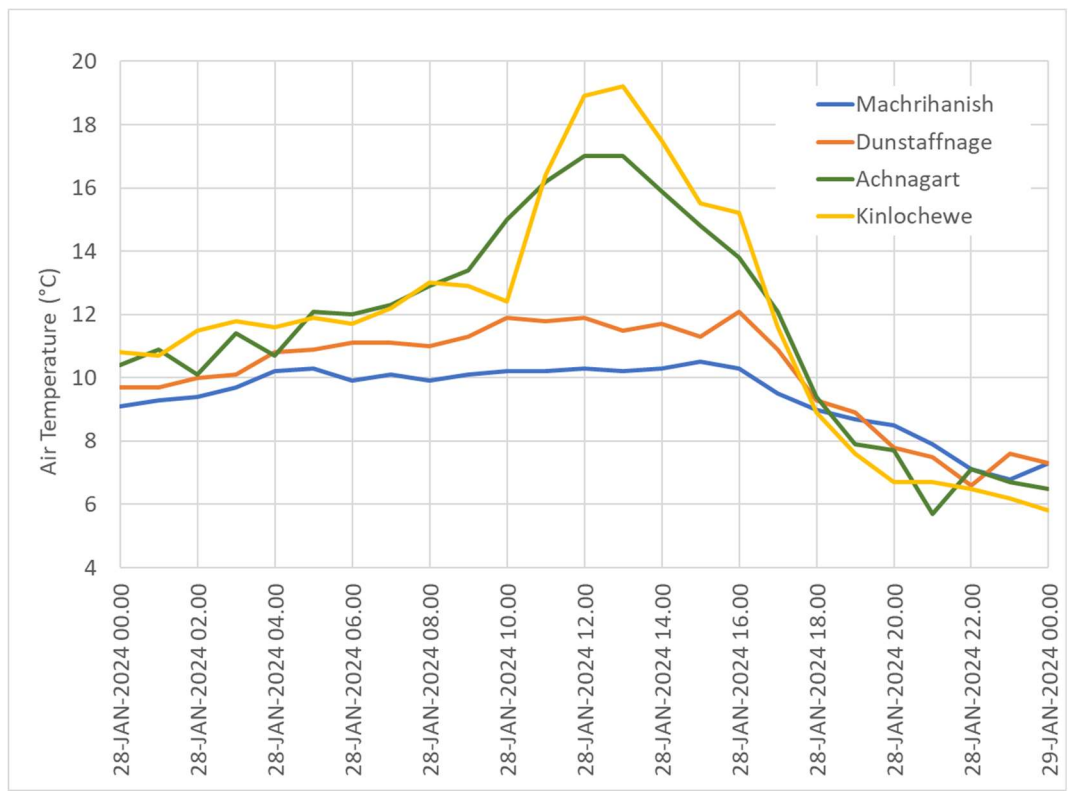
The rain-radar image at 1300UTC 28 January 2024 shows rain further south across western Scotland on the windward side of the mountains with a south-westerly flow (right)

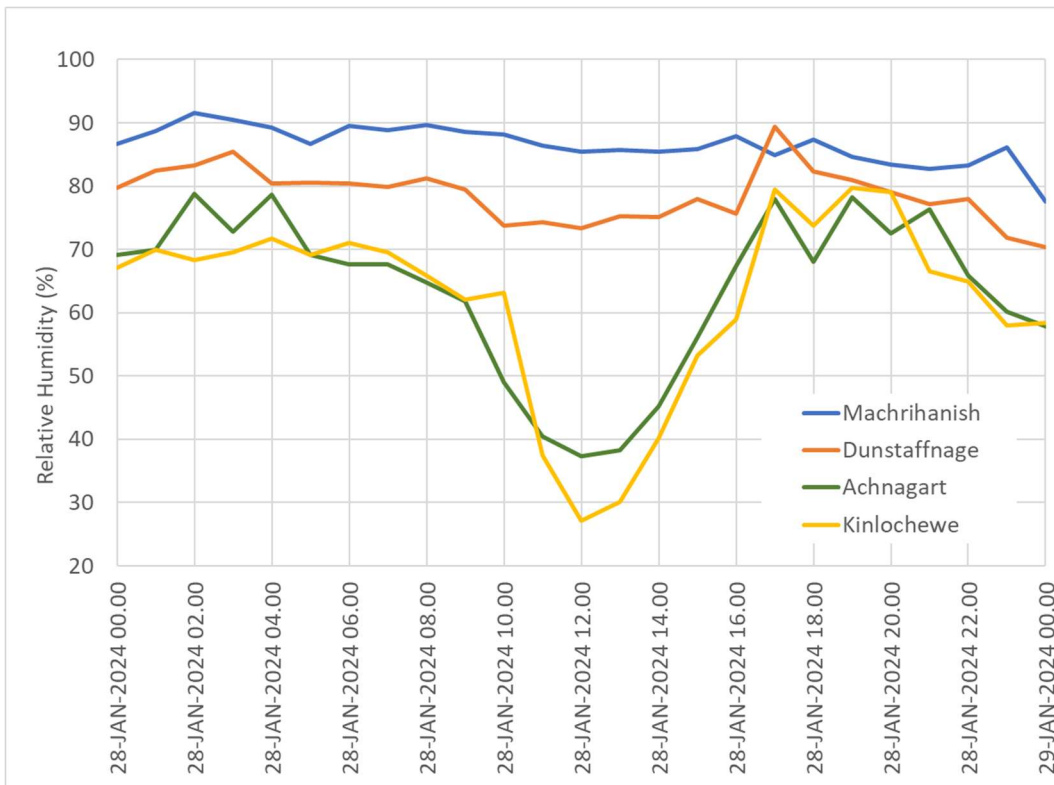


The chart below shows hourly mean wind speed and direction in the hour to 1200UTC on 28 January 2024. At surface level, wind speeds were in a southerly direction at around 15 to 20Kt (17 to 23mph) but exceeding 30Kt (35mph) to the west of the Scottish mainland, with surface winds backed southerly rather 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).

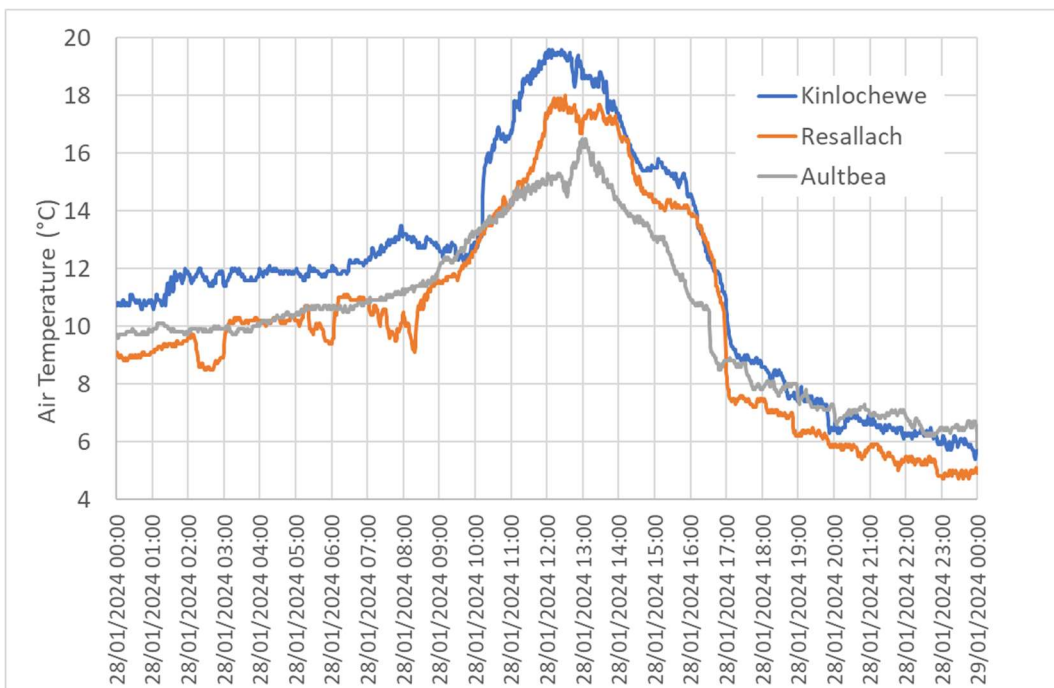


The charts below show hourly air temperature (top) and hourly relative humidity (bottom) at four stations across western Scotland from south to north: Machrihanish (Argyll, near Mull of Kintyre), Dunstaffnage (Argyll, near Oban), Achnagart (Highland, south-east of Kyle of Lochalsh), and Kinlochewe (Wester 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.

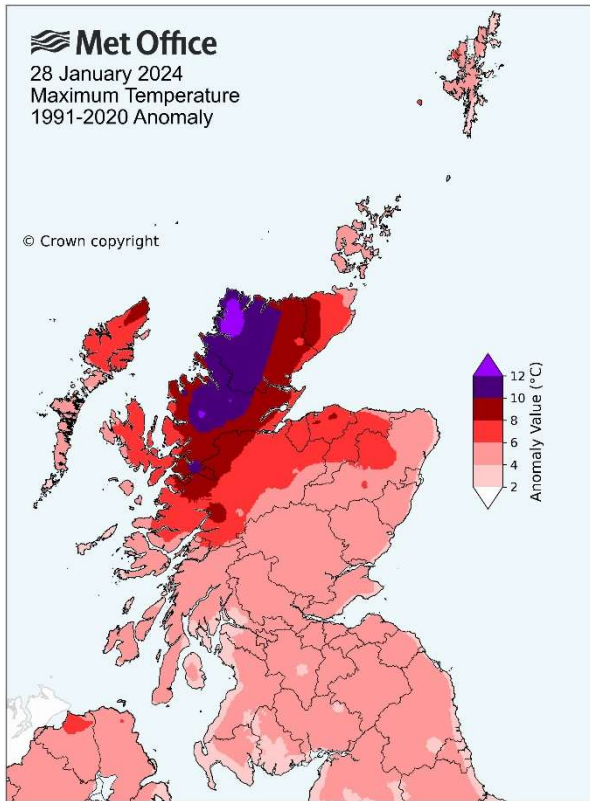




The chart below shows minute-level air temperature data for three of the stations across north-west Scotland, Kinlochewe (19.6°C), Resallach (18.0°C), and Aultbea (16.5°C). These illustrate the dramatic rise in air temperature – at Kinlochewe this corresponded to over 6°C within the space of 2 hours,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

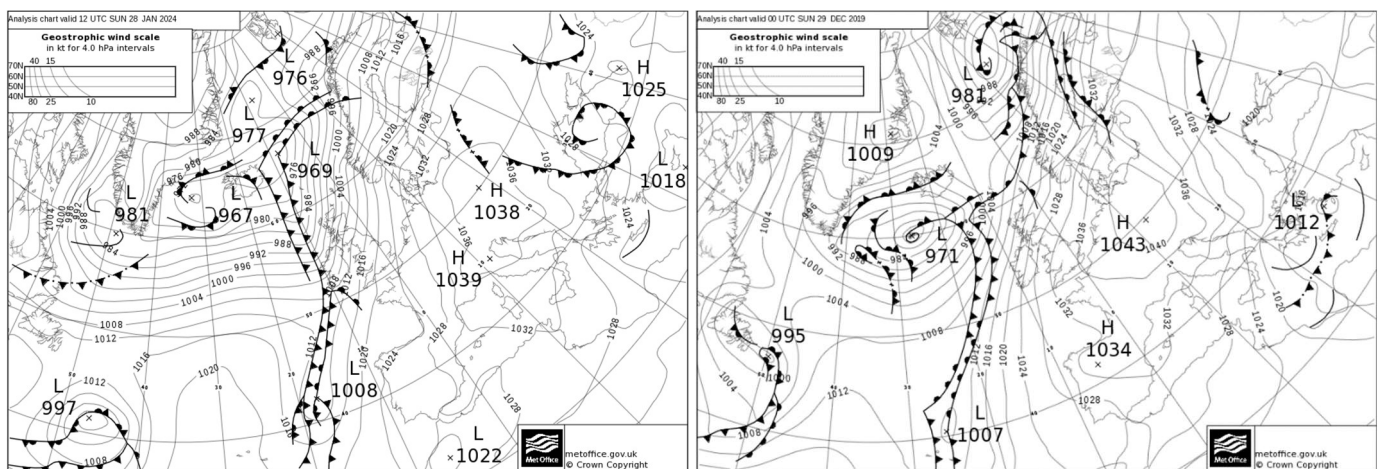






Only three years previously, this same station, Achfary, set a new UK December temperature record of 18.7°C on 28 December 2019. This was also caused by the Foehn effect, but a key difference being that the maximum occurred overnight 28 to 29 December, rather than in the middle of the day. The analysis 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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