

The Moidart earthquakes of 4 August 2017

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Abstract/Summary

The Moidart earthquake of 4 August 2017 (4.0 ML) was the largest earthquake in Scotland for 18 years. The earthquake was felt widely across the west of Scotland. Only five other earthquakes of this size or greater have been observed in the period of instrumental recording from 1970 to present. Historical observations and instrumental recordings have been used to estimate that an earthquake of 4.0 ML or greater occurs somewhere in Scotland roughly every 8-9 years on average. The earthquake hypocentre was calculated using an iterative linearized method. The results suggest that the earthquake occurred in the mid-Crust at a depth of approximately 12 km. This is largely consistent with observed focal depths for other earthquakes in the region, which are distributed throughout the upper 20 km of the Crust. The strong similarity between the recorded ground motions from the mainshock and the four recorded aftershocks suggests that they all occurred within a small source volume, of the order of a few hundred metres in extent and had similar source mechanisms. The modelled source displacement spectra provide a good fit for the observed displacement spectra and suggest a moment magnitude (M_w) of 3.6 ± 0.1 . This is slightly less than that expected for an earthquake with a local magnitude of 4.0 ML using commonly used empirical relationships relating local and moment magnitude, which gives an expected moment magnitude of 3.7. The calculated focal mechanism suggests that the earthquake resulted from strike-slip faulting on a fault plane that strikes either SW-NE or NW-SE and dips steeply, although the dip of both fault planes is rather poorly constrained. This is in good agreement with focal mechanisms calculated for other earthquakes across the region, which all show similar solutions. Seismicity in northwest Scotland is clustered around a number of large, steeply dipping major faults that strike either NE-SW or NW-SE suggesting that earthquake activity across the region is driven by reactivation of such fault systems by deformation associated with first-order plate motions rather than deformation associated with glacioisostatic recovery. Although there are no mapped major fault systems in the immediate vicinity of the Moidart earthquake, it seems likely that the earthquake also occurred on a steeply dipping fault that strikes either NE-SW or NW-SE but remains unmapped.

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4 August 2017. image copyrightGeograph/Alan Reid. image captionThe biggest quake was centred on Moidart. The biggest earthquake to hit the Highlands in three decades has been widely felt across the region. The British Geological Survey (BGS), which recorded it at about 15:45, said it had a magnitude of 3.8 and was centred on Moidart. A smaller quake, which registered 1.5 on the Richter scale, was centred on Kingussie. It was the biggest such tremor to be felt in the region since a 4.1 magnitude earthquake in Oban in 1986. Another said: "Just experienced 2 earthquake tremors here in Scotland. Never felt anything like that, like the ground beneath us was exploding. Terrifying!" Small earthquakes are relatively common but most go unnoticed. The 2017 Ischia earthquake occurred in the island of Ischia, Campania, in southern Italy. The main shock occurred at 20:57 CEST (18:57 UTC) on 21 August 2017, and was rated 3.9 on the Moment magnitude scale. Despite of the moderate magnitude, several buildings and a church collapsed. One woman died in Casamicciola Terme, after being hit by rubble that fell from a church. Another woman died when her house collapsed. The biggest earthquake to hit the UK in 10 years was felt throughout Wales and south west of England today. Reports of tremors also came from the north west, with people claiming buildings shook in Merseyside. On February 27, 2008, an earthquake measuring 5.2 on the Richter scale hit Market Rasen in Lincolnshire. No injuries have been reported and Twitter users quickly mocked the dramatic overreaction on social media. By Sebastian Murphy-bates For Mailonline. Magnitude 3.8 tremor in Moidart area is felt widely across west of Scotland. Fri 4 Aug 2017 21:02 BST Last modified on Sat 5 Aug 2017 11:43 BST. Share on Facebook. Share on Twitter. Share via Email. The view from Croit Bheinn in the Moidart area of Scotland, where the quake was recorded. Photograph: Alamy Stock Photo. The largest earthquake to be felt in the west Highlands of Scotland in more than 30 years was recorded on Friday. The British Geological Survey (BGS) recorded the magnitude 3.8 tremor in the Moidart area just before 3.45pm. It was the biggest earthquake in the region since a magnitude 4.1 quake near Oban in September 1986, officials said. One local resident tweeted: "Think I just experienced a minor #earthquake, here on Ardnamurchan. West coast #Scotland."