

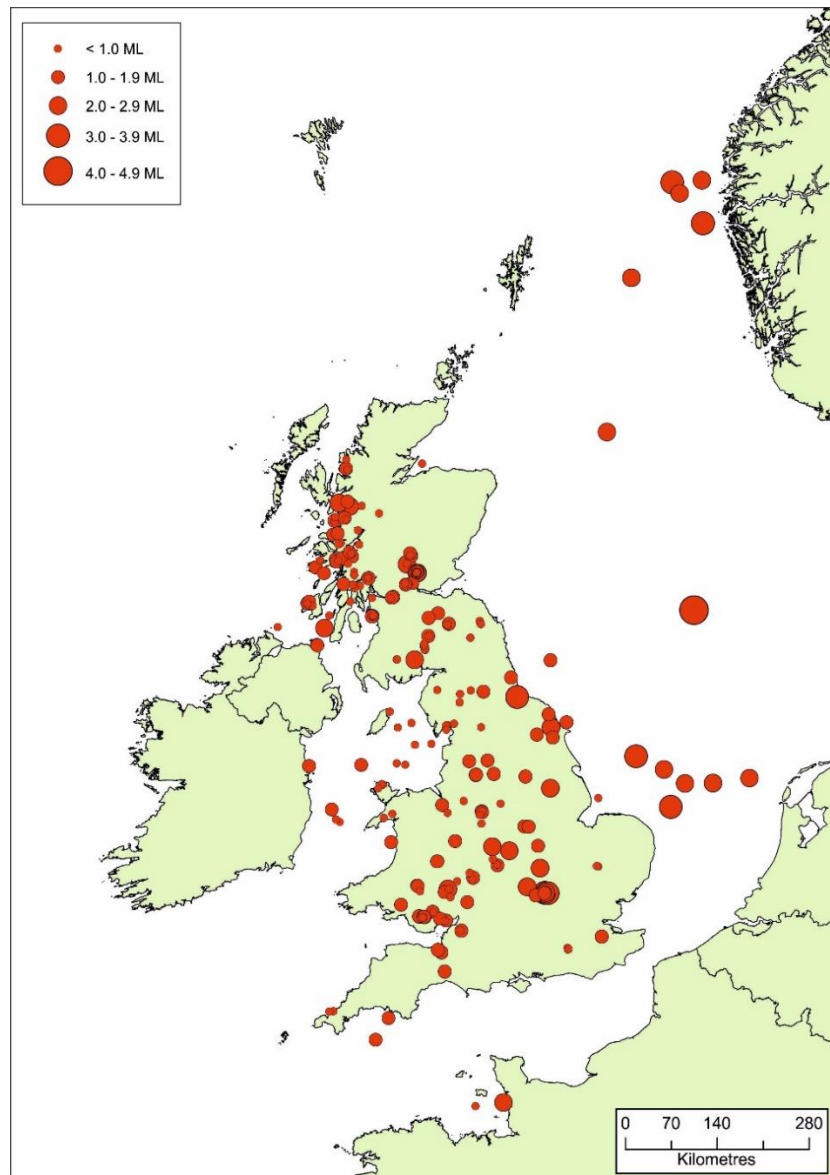
BRITISH GEOLOGICAL SURVEY

REPORT OR/21/005

# The British Geological Survey Earthquake Bulletin for 2020

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# 1 Introduction

The British Geological Survey (BGS) through its National Earthquake Information Service operates a nationwide network of seismograph stations in the United Kingdom (UK). Earthquakes in the UK and coastal waters are detected within limits dependent on the distribution of seismograph stations. Location accuracy is improved in offshore areas through data exchange with neighbouring countries. This bulletin contains locations, magnitudes and phase data for all natural earthquakes detected and located by the BGS during 2020, listed in Tables 1 and 2. Maps showing seismic activity in 2020 (Figure 1), and the larger magnitude events since 1979 ( $ML > 2.5$ ) and since 1970 ( $ML > 3.5$ ) are also included. The bulletin covers all of the UK land mass and its coastal waters including the North Sea ( $12^{\circ}W$  to  $6^{\circ}E$  and  $48^{\circ}N$  to  $64^{\circ}N$ ).

All events believed to be of tectonic origin are included. Acoustic disturbances, such as sonic booms from supersonic aircraft, are included when they are felt. The airborne waves are readily identified by their slow travel time across an array but they are frequently mistaken as small earthquakes by the public. They are indicated by 'SONIC' in the locality column of Table 1.

Significant non-natural events, such as induced events and explosions, are also included in Table 1. Smaller events that are known, or suspected to be of explosive origin are excluded from the bulletin where possible. These include explosions due to quarrying, mining, weapon testing or disposal, naval exercises, geophysical prospecting and civil engineering. Unfortunately, identification by record character, location and time of occurrence is not always conclusive and some man-made events may be included in the bulletin or, more rarely, a small natural event may have been excluded.

## 2 The BGS UK Seismograph Network

The UK seismograph network consists of 103 (62 permanent and 41 temporary) stations with broadband, short period and strong motion accelerometers. Of the permanent sites, some 48 are equipped with broadband seismometers and 31 have strong motion accelerometers, 25 of which are co-located with broadband sensors. The remaining 8 sites are equipped with short period seismometers. Data from all stations are transferred in near real-time to the BGS offices in Edinburgh for automatic processing, analysis and archiving. Seismic events are detected using automatic processing algorithms, but they can also be extracted manually from the archive of continuous data, then analysed to determine event types, locations and magnitudes. Operational BGS seismograph stations are shown in Figure 2.

The detection capabilities of a network depend upon station distribution, instrument sensitivity and background noise levels. Figure 2 also shows the magnitude detection thresholds for the seismograph stations operational during 2020. The contours show earthquake magnitudes (ML) that can be detected. Signal amplitudes must exceed the background noise level by a factor of two at four or more stations. A noise amplitude of 10 nm (high noise) is assumed for all stations. These detection levels hold true only if all stations are operational and that noise levels do not change. Smaller events may go undetected unless they are felt and reported to BGS by local inhabitants, in which case detection can be strongly dependent on the population density.

In average noise conditions (4 nm) we expect the network to detect all events with a magnitude of approximately 1.5 ML and above. Noise sources such as wind, ocean waves and traffic vary considerably with time (typically 0.5 to 15 nanometres, at 10 Hz) causing the magnitude thresholds to increase or decrease. In conditions of high noise, 0.5 ML should be added to the contour values, causing the threshold to rise to about 2.0 ML. Normally, however, an earthquake of this size would be felt, if not detected, in the areas of poorer instrumental coverage. Therefore we expect the

bulletin to contain all earthquakes of magnitude 2.0 ML and above during periods where all stations were operational and noise levels did not exceed a threshold of 10 nm.

Given the variability in the earthquake detection threshold, as governed by ambient noise conditions and the geometry of the observing network, the bulletin is biased towards certain localities. Figure 3 shows only earthquakes with magnitude 2.5 ML or above, in the period 1979 to 2020. The data set is considered complete for these magnitudes in all localities onshore. Seismicity for the period 1970 to 2020 is shown in Figure 4 with a threshold magnitude of 3.5 ML. In the time period from 1970 to 1979, the only seismic monitoring instrumentation was the network around Edinburgh (LOWNET) and Eskdalemuir (ESK) and a station near Kyle of Lochalsh (KYL). As a result, the data set is only likely to be complete for magnitudes of 3.5 ML and above.

## 3 Earthquake Parameters and Their Errors

### HYPOCENTRE LOCATION

By accurately measuring the arrival times of at least four seismic phases at a minimum of three stations, a location can be found for an earthquake that satisfies the observed pattern of arrivals. Instrumental locations in the bulletin were obtained using the computer program HYPOCENTER (Lienert and Havskov 1995) that iteratively adjusts a trial hypocentre (latitude, longitude, depth, and origin time) until the observed and computed arrival times coincide closely.

The accuracy of locations is dependent on distances from the closest stations, the distribution of the stations around the epicentre, the resolution to which signal onsets can be timed from the records, and the accuracy with which the seismic wave velocities through the Earth are known.

The accurate determination of earthquake depth presents a more difficult problem, mainly because phase arrival patterns at the seismographs can still be satisfied for a large range of depths merely by adjusting the origin time to suit. Depth is usually only well constrained when there is a station very close to the epicentre.

The best depth determinations are obtained when an earthquake or earthquake series occurs almost beneath a network. For events at larger distances the depth errors can be many kilometres.

### MAGNITUDE

All earthquakes in the bulletin have been assigned a local magnitude (ML) as defined by Richter (1935):

$$ML = \log_{10} (A/ A_0)$$

Where  $A$  is the maximum deflection (centre to peak in mm) registered on a Wood-Anderson seismograph and  $A_0$  is that for a 'standard' magnitude zero earthquake at the same distance. The  $A_0$  term is thus a distance correction factor, tabulated by Richter to 200 km, and later adjusted to include up to 600 km. Although Richter intended his method to be an approximate quantification of earthquake size and his attenuation term,  $A_0$ , strictly only applies to California, the formula is still used worldwide today. The ML magnitudes in this bulletin have been calculated according to Richter's formula after converting the output of the BGS instruments to an equivalent Wood-Anderson deflection. Ideally, the measurements are made on two horizontal instruments and averaged but, if this is not possible, the mean of the magnitudes from a number of verticals are used. Ground motion registered at a seismograph varies with site conditions, distance and direction from the earthquake, and the nature of the ray path. Consequently, it is important to take the mean from a good distribution of stations. The resulting error on magnitudes quoted in the bulletin will normally be less than 0.4 ML.

## INTENSITY

Intensity is a measure of the effect of the shaking produced by an earthquake on people, structures and objects. It decreases with distance from a maximum value ( $I_{\max}$ ) usually found close to the epicentre. The maximum felt intensity is quoted, where known, with reference to the European Macroseismic Scale (EMS), (Grünthal, 1998).

## FOCAL MECHANISM

Earthquake focal mechanisms provide information on the fault geometry and type of faulting that caused the earthquake, and can be used to better understand tectonic processes occurring within the Earth's crust. Calculating them involves mapping directions where the initial motion of the seismic P-waves is up (compressional) or down (dilatational) on a spherical projection. This results in distinctive “beach-ball” diagrams that show two shaded quadrants and two white quadrants that represent upward and downward initial motions. The dividing lines between the quadrants on the “beach-ball” define the orientation of the fault planes and the directions of slip. It is not possible to determine which of the two possible fault planes shown in the mechanism is the actual fault, so *a priori* information such as aftershock distribution is sometimes used to infer the causative fault. The strike and dip describe the orientation of the fault, and the rake describes the direction of slip ( $-90^\circ$  for thrust or reverse faulting,  $90^\circ$  for normal faulting and  $0^\circ$  or  $180^\circ$  for strike-slip). The axes of maximum and minimum compression are denoted by black and white squares, respectively. The grid search method of Snoke *et al.* (1984) is used to determine the best-fitting fault plane solutions.

## 4 Summary of 2020 Seismicity

There were 431 earthquakes located by the BGS seismic monitoring network during the year, with 35 having magnitudes of 2.0 ML or above, eight having magnitudes of 3.0 ML or above and one having a magnitude of 4.0 ML or above. Some 17 events with a magnitude of 2.0 ML or above were reported felt, together with a further 22 smaller ones, giving a total of 39 felt earthquakes in 2020.

Of the 431 earthquakes located, some 164 of them were events with magnitudes between -1.3 ML and 1.7 ML, that occurred near the village of Carharrack, Cornwall. These were recorded by a local network belonging to the United Downs Deep Geothermal Project (UDDGP) and are a consequence of testing of their wells, which are intended for geothermal energy production. The largest two occurred at 11:44 UTC on 30 September and 10:46 UTC on 8 December with magnitudes of 1.6 ML and 1.7 ML, respectively. The 30 September event was felt in Carharrack, Lanner, Ponsanooth and Penryn. Reports described, “felt a short rumble”, “there was a loud noise like a bang”, “the walls rattled” and “it felt like a blast at the local quarry”, indicating an intensity of around 3 EMS. The 8 December event was reported felt by a single resident in Carharrack, who described “a moderate shaking”, indicating an intensity of 2 EMS.

The largest onshore earthquake in 2020 was a magnitude 3.5 ML event, that occurred on 8 September, at 08:45 UTC, near Leighton Buzzard, Bedfordshire (Figure 5). The BGS received over 1,950 reports, via online macroseismic questionnaires, of the earthquake being felt. Most reports were from towns, villages and hamlets in the counties of Bedfordshire, Buckinghamshire and Hertfordshire, with the majority coming from within around 25 km of the epicentre. Typical reports described, “the house had one dramatic shake”, “all the windows rattled”, “there was a heavy vibration”, “felt like the whole house was shaking” and “it was like a large explosion”. A maximum intensity of 6 EMS was assigned to this event (Figure 6). A further five events were detected in the same area during September 2020. The first of these occurred on 13 September, at 23:20 UTC, with a magnitude of 2.1 ML, and was felt, with a maximum intensity of 3 EMS, in an



area within around 5 km of the epicentre. Another two occurred on 14 and 15 September, at 06:11 UTC and 03:28 UTC, with magnitudes of 1.3 ML and 1.1 ML, respectively. Neither of these were reported felt. On 22 September at 08:32 UTC, a magnitude 3.0 ML event occurred (Figure 7). The BGS received some 500 reports, via online macroseismic questionnaires, of it being felt. Most reports were from within around 20 km of the epicentre. A maximum intensity of 4 EMS was assigned to this event. Later that day, at 12:39 UTC, a magnitude 2.1 ML event occurred and was felt with a maximum intensity of 3 EMS in an area within around 5 km of the epicentre. There is relatively little significant historical seismicity in this locality. An earthquake with a magnitude of 2.0 ML was recorded near Dunstable on 15 July 2010 and one with a magnitude of 2.2 ML occurred near Brackley, 30 km west of Leighton Buzzard, on 4 April 2020. Neither of these were reported felt. The closest event, with a similar magnitude (3.4 ML), was near Oxford on 6 November 1764, and was widely felt in Oxfordshire, Wiltshire and Berkshire.

The largest offshore earthquake in 2020 was a magnitude 4.0 ML event, that occurred on 22 February, at 18:43 UTC, in the Central North Sea, approximately 270 km northeast of Scarborough, North Yorkshire and 340 km west of Esbjerg, Denmark (Figure 8). This event locates approximately 100 km WNW of the magnitude 4.0 ML Central North Sea earthquake, on 18 October 1994, that was felt in the Dan gas and oil field and 150 km WNW of the magnitude 4.0 ML Central North Sea earthquake, on 7 July 1993, that was felt in the Gorm gas and oil field. A further sixteen earthquakes occurred in the Norwegian/North Sea areas during the year, with magnitudes between 0.9 ML and 3.5 ML.

On 7 January at 10:36 UTC, an earthquake with a magnitude of 2.3 ML occurred near the remote hamlet of Arnisdale, Highland. It was reported felt by two residents in Camusbane, Arnisdale (approximately 4 km from the epicentre), who described “a weak trembling” and “we thought it was thunder”, indicating an intensity of 2 EMS.

An earthquake with a magnitude of 3.1 ML occurred on 23 January, at 05:57 UTC, near the market town of Stockton-on-Tees, County Durham (Figure 9). The BGS received over 840 reports via online macroseismic questionnaires, of the earthquake being felt. The majority of the reports received were from residents in Stockton-on-Tees, Billingham, Norton, Middlesbrough, Wolviston, Thornaby and Hartlepool. Typical reports described, “woke me up”, “felt like someone had crashed into the house with a car”, “single shock and felt like an explosion nearby”, “it felt like the house was lifting from its foundations”, “it was over in a second or two but the shaking was severe” and “the whole wardrobe was shaking”. A maximum intensity of 5 EMS was assigned for this event (Figure 10). This earthquake locates approximately 50 km NNE of the magnitude 3.6 ML Ripon, North Yorkshire event on 3 January 2011, which was widely felt, with a maximum intensity of 5 EMS over an area extending approximately 25 km to the north and 40 km to the southwest of the epicentre. It also locates around 20 km ENE of the magnitude 3.1 ML Newton Aycliffe, County Durham earthquake on 15 September 2018, which was not reported felt. A focal mechanism calculated for the event shows strike slip faulting on fault planes that strike either NNE-SSW or ESE-WNW (Figure 11).

An earthquake with a magnitude of 2.2 ML occurred, at 11:53 UTC, on 31 January, near the town of Northampton, Northamptonshire. It was felt by a single resident in Kettering, who described “a weak shaking”, indicating an intensity of 2 EMS.

On 3 February at 00:36 UTC, an earthquake with a magnitude of 1.7 ML occurred on the Isle of Islay, Argyll & Bute. It was felt on the island by a single resident in Port Charlotte, who reported, “sound and vibration was like a large goods train approaching and then passing” and by another in Bruichladdich, who reported a “weak shaking”. An intensity of 3 EMS was assigned for this event. A further five events with magnitudes between 0.8 ML and 1.6 ML were detected on the island between 4 January and 27 March. None were reported felt.

An earthquake with a magnitude of 1.5 ML occurred on 16 March at 22:01 UTC, with a location near the hamlet of Kentra on the Ardnamurchan peninsula, Highland. It was felt by a few

residents in the villages and hamlets of Acharacle, Glenborrodale, Resipole, Mingarry, Gobsheallach, Kilchoan and Salen. Typical reports described, “a loud rumbling”, “sounded like a large vehicle on the road outside”, “a very distinct shaking” and “sounded like an explosion”. A maximum intensity of 3 EMS was assigned for this event. This event locates approximately 6 km south of the magnitude 4.0 ML Moidart earthquake on 4 August 2017, which was felt widely across the region, from Inverness to the northeast, to Glasgow in the south and Islay to the west, with a maximum intensity of 5 EMS.

On 24 March, at 17:19 UTC, an earthquake with a magnitude of 2.3 ML occurred approximately 4 km north of the village of Pontrilas, Herefordshire. The BGS received no reports that it was felt. The depth of the earthquake (around 16 km) probably contributed to the lack of reports. Historically, the largest earthquake to have occurred, within 10 km, was the magnitude 5.2 ML Hereford earthquake on 6 October 1863, which was felt throughout most of England and Wales, and caused minor damage in Hereford, Ross-on-Wye, Hay-on-Wye, Monmouth and Abergavenny.

An earthquake with a magnitude of 1.8 ML occurred on 14 May, at 22:53 UTC, near the settlement of Croggan on the Isle of Mull, Argyll & Bute. It was felt by residents on the Isle of Mull, on the Isle of Lismore, on the Isle of Seil, on the Isle of Kerrera, on Easdale Island and in Kilmelford, Kilmore and Oban. Reports described, “a long rumble like a passing truck”, “the floor vibrated”, “a slight rattling of the window frames”, “heard a rumble like thunder” and “felt a slight shake then heard a bang”. A maximum intensity of 3 EMS was assigned for this earthquake. A further six events occurred on the Isle of Mull during the year with two of them reported as felt. The two felt events, both with magnitudes of 1.4 ML, occurred on 6 April and 1 May with intensities of 2 EMS and 3 EMS, respectively. The magnitude 1.8 ML event, on 14 May, locates approximately 9 km SSW of the magnitude 4.1 ML Oban earthquake of 29 September 1986, which was felt over an area of around 30,000 km<sup>2</sup> with a maximum intensity of 5 EMS. It also locates around 35 km northwest of the magnitude 5.2 ML Argyll earthquake on 28 November 1880, the largest recorded Scottish earthquake, which was felt all along the west coast of Scotland, east as far as Perthshire, throughout the Inner and Outer Hebrides and in Northern Ireland.

On 4 June, at 12:48 UTC, a magnitude 2.1 ML earthquake occurred near the market town of Walsall, West Midlands. It was felt, by three people, in a single household in Walsall, who reported, “it sounded like an explosion” and was also felt by a single resident, in Great Wyrley, Staffordshire, who felt “a weak rumble”, indicating an intensity of 2 EMS. This event locates approximately 18 km east of the magnitude 4.7 ML Dudley earthquake on 22 September 2002, which was felt over most of England and Wales with a maximum intensity of 5 EMS.

A magnitude 2.2 ML earthquake occurred at 14:22 UTC on 6 June, near the village of Comrie, Perth & Kinross (Figure 12). The BGS received over 200 reports, via online macroseismic questionnaires, of the earthquake being felt. The reports received were from residents in Comrie, Crieff, St Fillans and surrounding villages and hamlets. Typical reports described, “sounded like an explosion”, “sounded like a large heavy vehicle passing by”, “there was a really loud bang and the light fitting rattled”, “all the windows shook” and “people ran into street to see what was going on”. A maximum intensity of 4 EMS was assigned for this event. This is the largest event in the region (within 10 km) since a magnitude 2.2 ML earthquake on 14 December 1987, which was felt with intensities of at least 3 EMS in Comrie and Crieff. The area around Comrie has experienced a number of earthquake sequences or “swarms” in the past. For example, from 1788 to 1801 and 1839 to 1846. However, there has been relatively little seismicity in more recent times. The largest of all these was a magnitude 4.8 ML earthquake that occurred on 23 October 1839 and was felt over most of Scotland. It was also felt just across the English border, making it one of very few Scottish earthquakes to be felt in England. Significant damage was reported in Comrie and the surrounding area.

On 10 July, at 16:22 UTC, an earthquake with a magnitude of 2.0 ML occurred near the town of Nuneaton, Warwickshire. The BGS received no reports that it was felt. This earthquake locates

approximately 25 km NNE of the magnitude 4.2 ML Warwick event on 23 September 2000, which was widely felt (up to 150 km away) with a maximum intensity of 5 EMS.

A magnitude 2.6 ML earthquake occurred at 17:41 UTC on 21 August, with an epicentre on the Island of Skye, around 35 km SE of Portree, the largest settlement on the island. The BGS received some 37 reports, via online macroseismic questionnaires, of the earthquake being felt. The reports received were all from within 20 km of the earthquake location. Typical reports described, “the walls and floor shook”, “was like the door banging”, “all the windows rattled”, “beams in the house creaked” and “sounded like thunder followed by a rumbling”, indicating an intensity of at least 3 EMS.

A magnitude 2.8 ML earthquake occurred at 02:39 UTC on 16 September, with a location in the Channel Islands region, approximately 30 km ESE of Jersey (Figure 13). It was reported felt by a single resident in St Helier, Jersey, who described “thought it was a low rumble of thunder”. It was also reported felt in several locations in the Manche département of France. An intensity of 3 EMS was assigned for this event. It locates approximately 33 km ENE of the magnitude 3.5 ML St Aubins Bay earthquake on 30 April 1990, which was felt throughout the Channel Islands with a maximum intensity of 5 EMS. Historically, the largest earthquakes to have occurred in the region (within 10 km) were the Channel Islands earthquakes on 30 July 1926 and 17 February 1927, with magnitudes of 5.5 ML and 5.4 ML, respectively. Both these earthquakes were felt throughout the Channel Islands, in northwest France and along the south coast of England and caused much damage in Jersey.

A swarm of thirty-three earthquakes, ten of which were felt by local residents, were detected in the Blackford area, Perth & Kinross during 2020 with magnitudes ranging between 0.3 ML and 2.5 ML. The largest, magnitude 2.5 ML, occurred on 4 October at 18:43 UTC (Figure 14). The BGS received 85 reports, via online macroseismic questionnaires of it being felt. Reports were from residents in Blackford, Auchterarder, Dunning, Braco, Aberuthven, Gleneagles and Glendevon. Typical reports described, “windows rattled”, “sounded like some sort of explosion”, “heard a loud bang”, “we felt a thud, like it was coming from under the house” and “felt like someone falling upstairs”. A maximum intensity of 3 EMS was assigned for this event. There have been other distinct swarms immediately around Blackford. Between 1977 and the end of 1980 there were nine events with magnitudes greater than 2.0 ML. The largest was on 19 February 1979 and had a magnitude of 3.2 ML. It was strongly felt, with a maximum intensity of 5 EMS and reportedly caused damage to the Glen Devon dam in the Ochil Hills. Over 191 smaller events were recorded in this 4-year period. A total of 58 earthquakes were recorded between July 1997 and March 1998. Three of these had magnitudes greater than 2.0 ML. Between August 2000 and December 2005 a further five events with magnitudes larger than 2.0 ML were recorded. Many of these earthquakes were felt locally.

An earthquake with a magnitude of 1.7 ML occurred on 7 October, at 08:35 UTC, close to the village of Eddleston in the Scottish Borders. It was reported felt by a single resident in Lyne Station, a small hamlet around 6 km SSW of Eddleston, who described “some items on desk top vibrated at the same time as a weak rumbling was heard”, indicating an intensity of 2 EMS.

On 8 October at 04:24 UTC, a magnitude 2.3 ML earthquake occurred near Sherburn, North Yorkshire. It was not reported felt, perhaps because of the relatively deep focus of around 19 km.

On 21 October at 02:49 UTC, an earthquake with a magnitude of 2.5 ML occurred near the village of Scampton, in the West Lindsey district of Lincolnshire (Figure 15) It was felt by several residents in North Hykeham, RAF Digby, Lincoln, Market Rasen, Waddington, Scunthorpe, Collingham, Grimsby and Broughton. Reports described, “a weak shaking”, “sounded like low flying plane overhead” and “felt a slight rumble”. A maximum intensity of 3 EMS was assigned for this event. This earthquake locates approximately 16 km WSW of the magnitude 5.2 ML Market Rasen event on 27 February 2008, which was widely felt (with a maximum intensity of 6 EMS) across England and Wales and caused damage to chimneys and masonry over a widespread area. It also locates around 30 km north of the magnitude 4.2 ML Lincoln earthquake on 1 August 1755.

A magnitude 2.0 ML earthquake occurred at 12:58 UTC on 24 October, with a location near Dumfries, Dumfries & Galloway (Figure 16). It was felt by several people in Dumfries, Thornhill, Castle Douglas, New Galloway and surrounding villages within around 20 km of the epicentre. Typical reports described, “we felt a weak shaking and heard a low rumbling noise”, “we felt a slight bump”, “a really unusual, deep vibration” and “a slight rumble like thunder”. A maximum intensity of 3 EMS was assigned for this event. This event locates within 8 km of both the magnitude 3.5 ML Dumfries earthquake on 26 December 2006 and the magnitude 3.0 ML Dumfries earthquake on 13 May 2001, which were both felt throughout Dumfries & Galloway, with a maximum intensity of 5 EMS.

A magnitude 2.4 ML earthquake occurred at 06:52 UTC on 25 December, with an offshore location approximately 16 km from Kilchenzie on the Kintyre peninsula, Argyll & Bute. It was reported felt on the peninsula, in Kilchenzie and Machrihanish. Reports described, “a weak rumbling” and “it was like a large wood lorry rumbling past the house”. A maximum intensity of 3 EMS was assigned for this event. This is the largest event to occur in this region of Argyll & Bute (within 50 km) since a magnitude 2.5 ML Islay earthquake on 20 June 2014, which was felt by many residents on the island, with a maximum intensity of 3 EMS. It also locates approximately 45 km WNW of the magnitude 4.0 ML Arran earthquake on 4 March 1999, which was widely felt (up to 150 km away) with a maximum intensity of 5 EMS. Historically, the largest earthquake on the peninsula, with a magnitude of 3.2 ML, occurred on 15 July 1889 and was felt over almost the whole peninsula.

On 31 December, at 11:18 UTC, an earthquake with a magnitude of 1.9 ML occurred near the village of Skirling, Scottish Borders. The BGS received over 90 reports, via online macroseismic questionnaires, of the earthquake being felt in Skirling, Biggar, Symington, Broughton, Stobo, Walston, Dolphinton, Elsrickle, West Linton, Blyth Bridge, Romannobridge, Carnwath and Peebles. Typical reports described, “there was a loud bang and the room shuddered”, “we thought snow was falling from the roof”, “heard a loud rumbling noise” and “all the windows rattled”, indicating an intensity of at least 3 EMS.

## 5 UK Seismicity Statistics

Figure 17 shows a histogram of mainland UK earthquakes above magnitude 2.0 detected each year in different magnitude ranges. This shows significant variation across the 50 years of modern instrumental monitoring. In the first few years of the 1970s, instrumental coverage across the UK was sparse and relatively few events were detected although more events were detected in the second half of the decade. The annual catalogues are thought to be complete at magnitude 3.5 ML or greater for 1970 to 1978, and for magnitude 2.5 ML and greater from 1979. Almost all of the earthquakes above 2.5 ML would be felt by people. Some of the peaks seen in Figure 17 have obvious explanations:

- In 1980, there was a continuing long aftershock sequence of the Carlisle earthquake of 26 December 1979 (4.7 ML). The largest two (both 3.8 ML) occurred in January and December 1980, the latter almost one year later than the mainshock. A local, temporary station was installed in a Longtown church three days after the mainshock, followed by three more distant stations in 1980.
- The largest instrumentally recorded earthquake onshore UK occurred on the Lleyn Peninsula, Gwynedd in 1984 (19 July) with a magnitude of 5.4 ML. A multi-station monitoring network was installed, shortly afterwards, across North Wales. The aftershock sequence continued for more than a year and confirmed that the activity was relatively deep for UK earthquakes, at around 20 km.

- The high peak in 2002 is dominated by an earthquake sequence near Manchester, which started on 19 October 2002 and continued until January 2003. Some 53 events above magnitude 2.0 ML were recorded and 37 were felt, the largest with a magnitude of 3.9 ML. Temporary stations were deployed to record the smaller events.
- The peak in 2014, is the result of an extended coal-mining induced series of earthquakes near New Ollerton, Nottinghamshire, which were studied with a temporary mobile network of monitoring stations. Some 65 events were felt, of which ten were magnitude 2.0 ML or greater.
- In 1974-75, there are clear peaks in earthquakes with magnitudes of 3.0 ML and greater during this period; around half of them were centred near Kintail, NW Scotland. There were few monitoring stations in the UK at this time, so it is not known whether they were accompanied by many or a few smaller magnitude events.
- The Bishops Castle, Shropshire, earthquake in April 1990 (5.1 ML) and the Market Rasen, Lincolnshire earthquake in February 2008 (5.2 ML), both showed very limited aftershock sequences despite being well monitored. The former had seven aftershocks (all less than or equal to 1.5 ML and none felt) and the latter had eleven aftershocks, with magnitudes ranging between 0.6 ML and 2.8 ML, (the largest felt locally).
- The year 2016 is quite remarkable for producing the fewest earthquakes in the whole 49 year series, in all magnitude ranges above 2.0 ML, with a total of only three events in the 2.0 ML - 2.9 ML range and none above that.

Figures 18 and 19 show the statistics for all earthquakes known to be felt from 1979 to 2020, including those below magnitude 2.0 ML. As might be expected, Figure 18 shows three of the same peaks as for the event occurrences seen in Figure 17; namely the 1984 Lleyn, 2002 Manchester and 2014 New Ollerton events. However, there were many events felt with magnitudes below 2.0 ML, and these were mainly related to coal mining.

Figure 19 shows the split between the number of felt events in coalfield areas (most of them mining-induced), and those which are natural earthquakes. It can be seen that the coalfield event distribution across the 40 years (1979 - 2020), largely mirrors the distribution of smaller events (2.0 ML or less) in Figure 18. As UK mining-induced events almost always occur within one km of the surface, they are felt at low magnitudes as they are close to the communities exposed. Natural earthquakes in the UK are generally in the depth range 3-20 km. By the year 2000, deep coal mining across the UK was tailing off and the upsurge in the mining-induced events in 2014 was associated with the Thoresby mine at New Ollerton, Nottinghamshire, which closed in 2015. The lack of mining events in 1984 is caused by the general miners' strike that year.

# Acknowledgements

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Jersey Water  
Scottish & Southern Energy plc  
Scottish Power  
Scottish Water  
China General Nuclear  
BRBGenCo  
Natural Environment Research Council

Exchange of data with UK and European agencies, has contributed to the accuracy of location of some of these events and to the determination of their magnitudes. They include:

Atomic Weapons Establishment (Blacknest, UK)  
Centre Seismologique Euro-Mediterranean (Bruyères-le-Châtel, France)  
Dublin Institute for Advanced Studies (Dublin, Ireland)  
Institute de Physique du Globe (Paris, France)  
Koninklijk Nederlands Meteorologisch Instituut (Ae de Bilt, Netherlands)  
Laboratoire de Detection et de Geophysique (Bruyères-le-Châtel, France)  
NORSAR (Oslo, Norway)  
Réseau National de Surveillance Sismique (Strasbourg, France)  
Royal Observatory of Belgium (Brussels, Belgium)  
University of Bergen (Bergen, Norway)  
United Downs Deep Geothermal Project (UDDGP, UK)

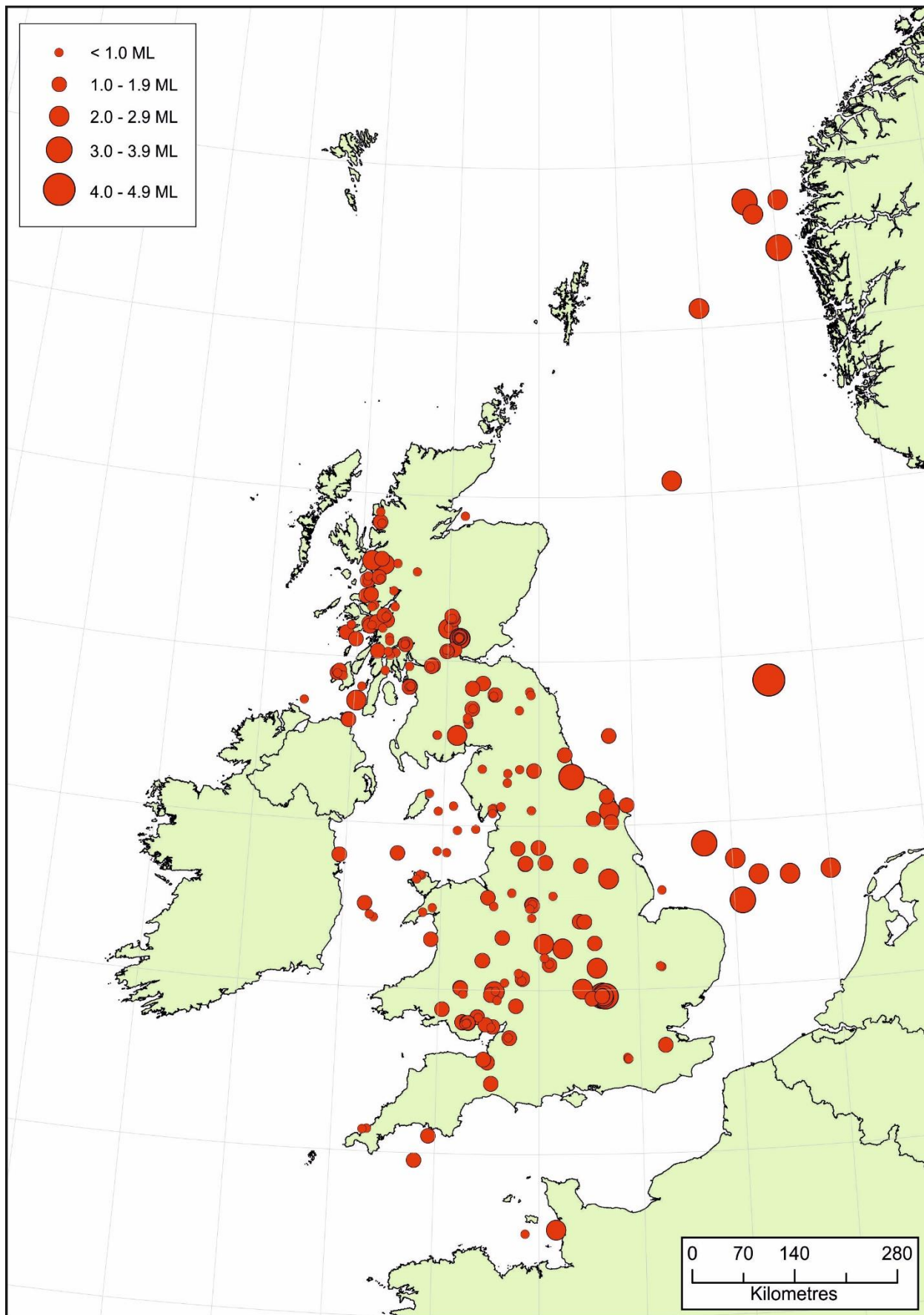
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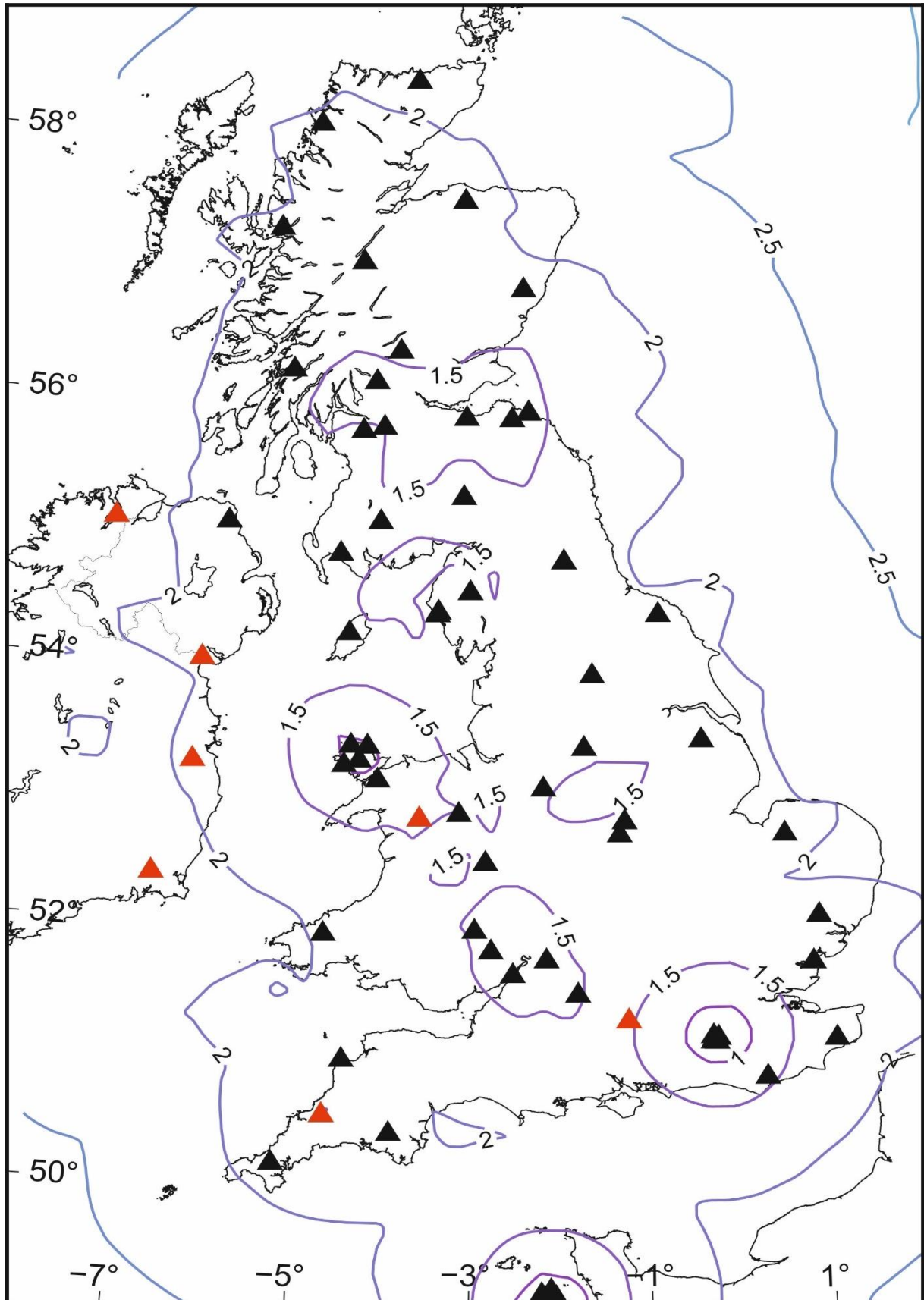
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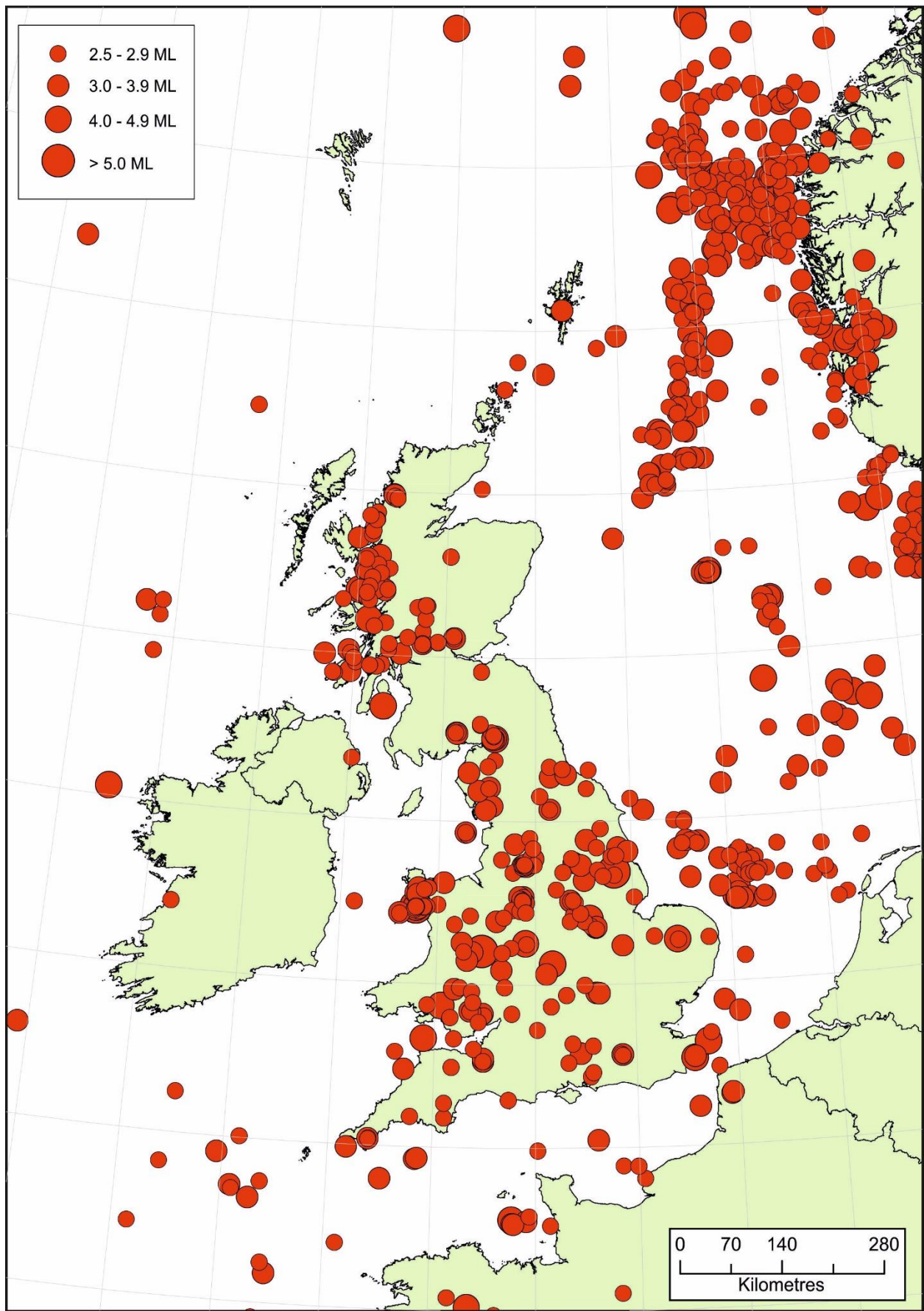


**Figure 1. Epicentres of earthquakes in 2020 as listed in Table 1.**

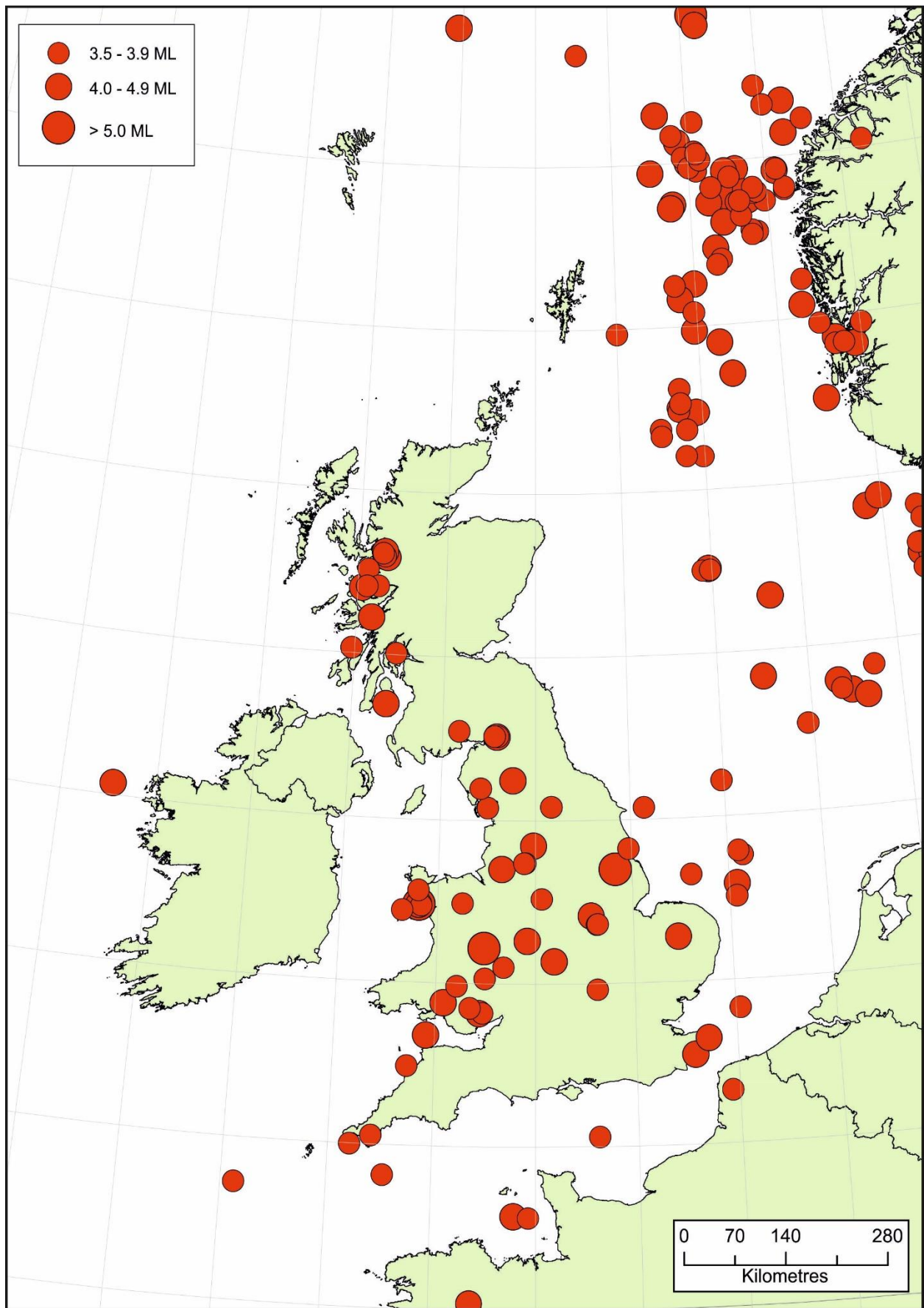




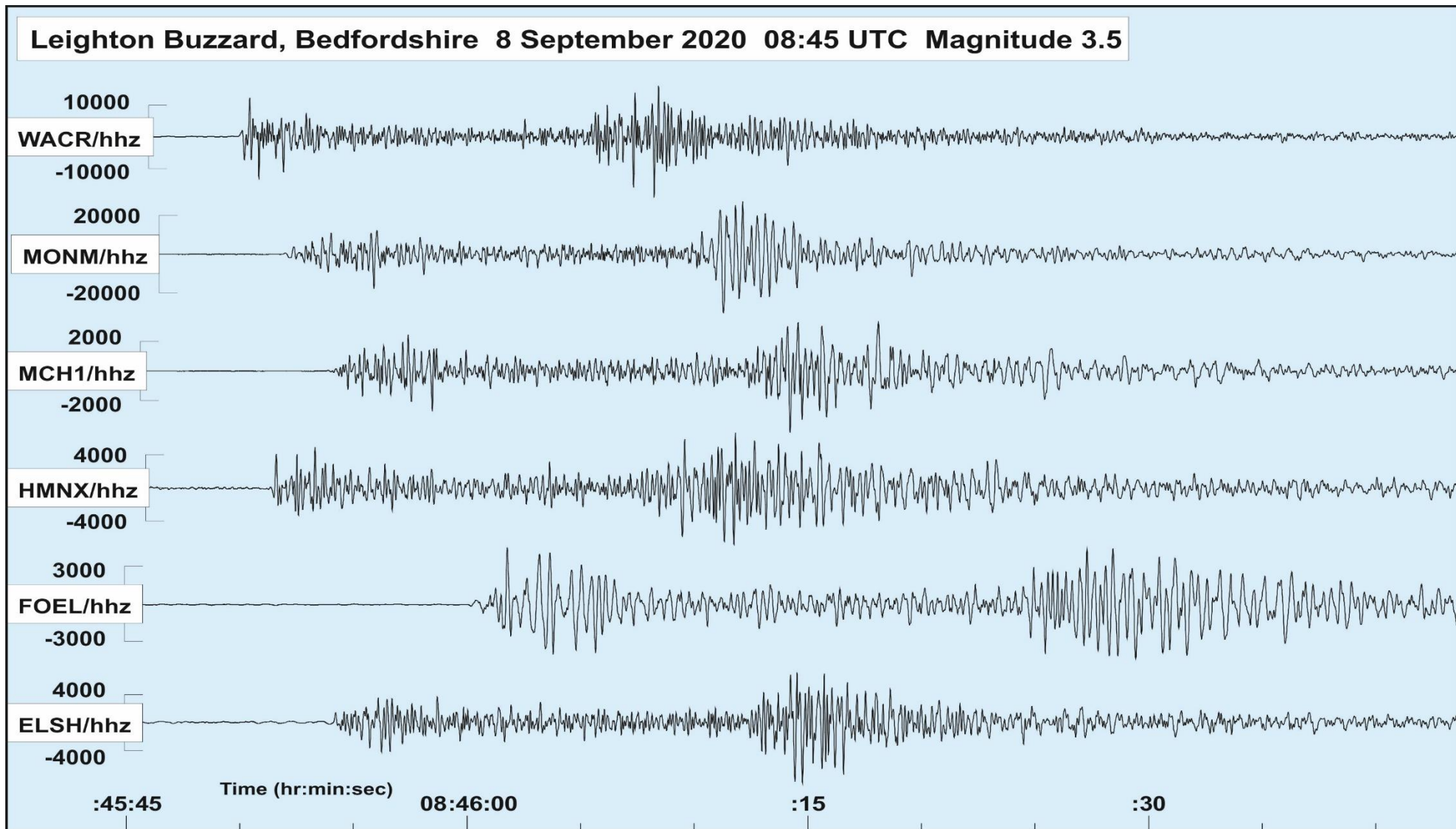
**Figure 2. Detection capability of the network during 2020. The contours show earthquake magnitudes (ML) that can be detected. Signal amplitudes must exceed the background noise level by a factor of two at four or more stations. A noise amplitude of 10 nm (high noise) is assumed for all stations. Black triangles show stations operated by BGS. Red triangles show stations operated by partner agencies that are incorporated into our real time data acquisition and contribute to our detection and location capability.**



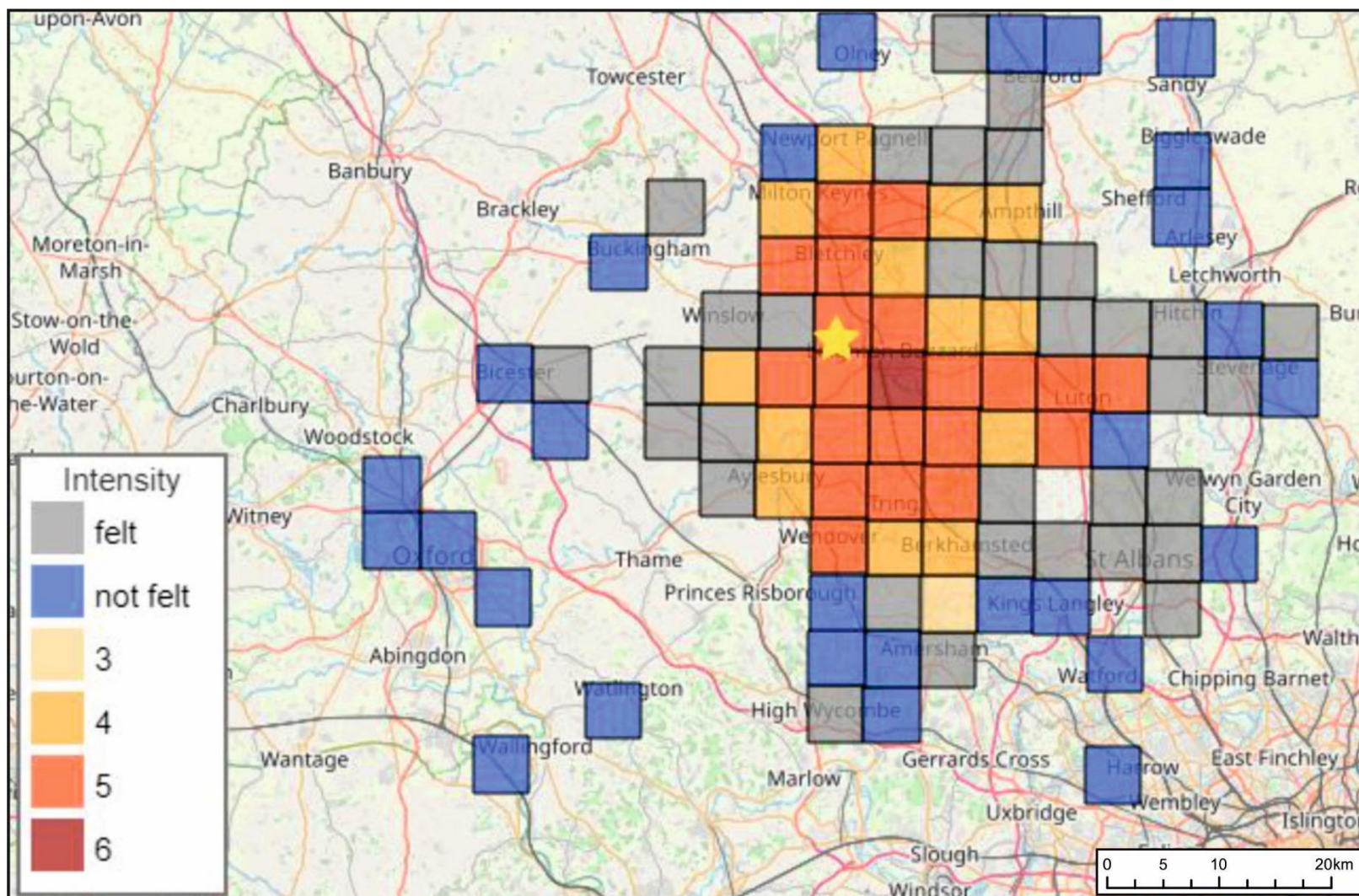
**Figure 3. Epicentres of earthquakes with magnitudes of 2.5 ML and above, in the period 1979 to 2020.**



**Figure 4. Epicentres of earthquakes with magnitudes of 3.5 ML and above, in the period 1970 to 2020.**



**Figure 5. Seismograms of the ground displacements from the magnitude 3.5 ML Leighton Buzzard, Bedfordshire earthquake, 8 September 2020, recorded by BGS seismograph stations.**



**Figure 6.** Macroseismic intensities (EMS) for the magnitude 3.5 ML Leighton Buzzard, Bedfordshire earthquake on 8 September 2020. The yellow star shows the epicentre. Intensities are calculated in 5 km grid squares from over 1,950 reports from people who felt the earthquake. A minimum of five observations are needed in any grid square to calculate a value of intensity, otherwise the value is calculated as ‘Felt’ but no intensity is calculated (grey squares). Blue squares indicate that any reports from these locations suggested that the earthquake was ‘Not Felt’.

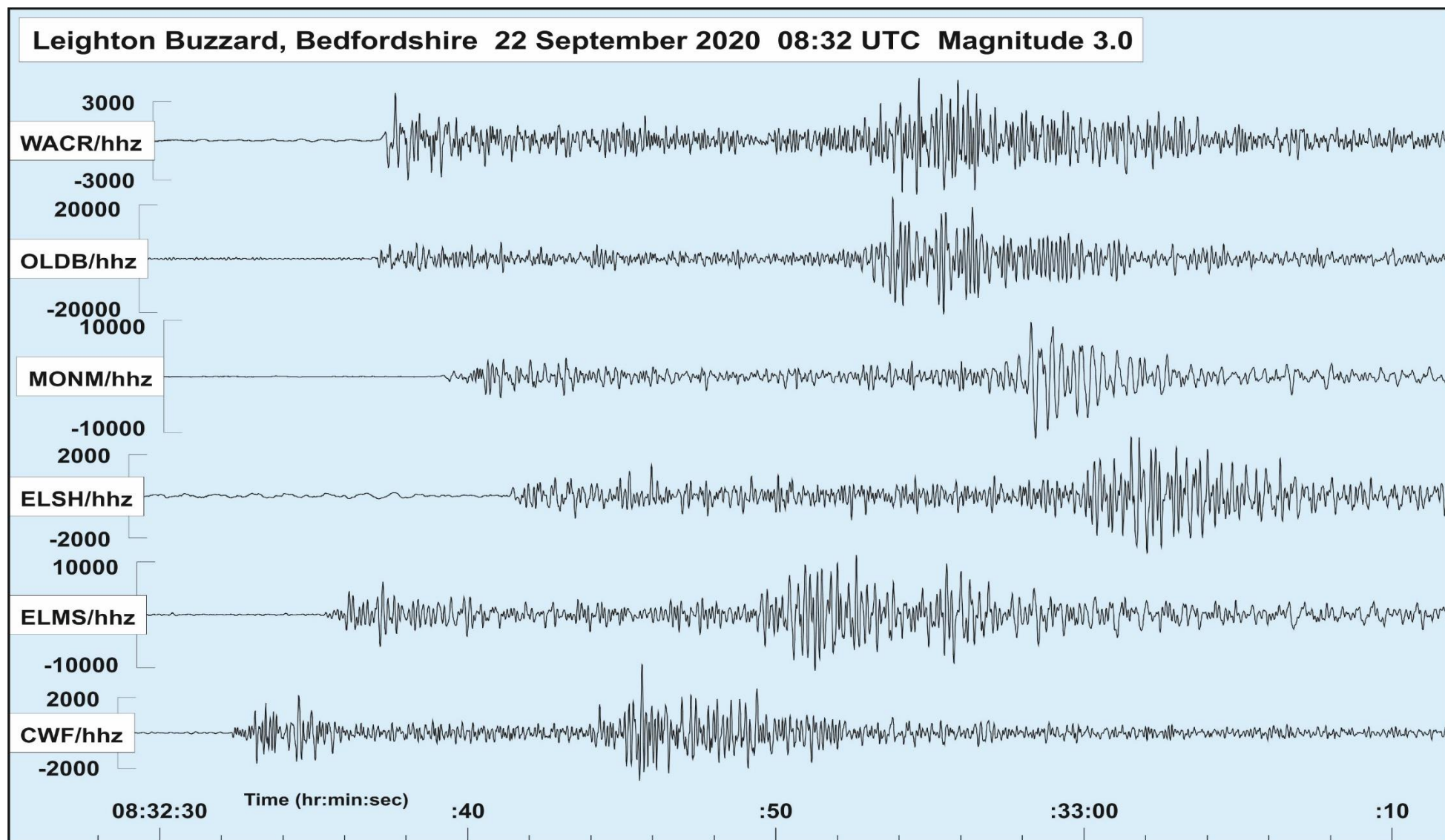
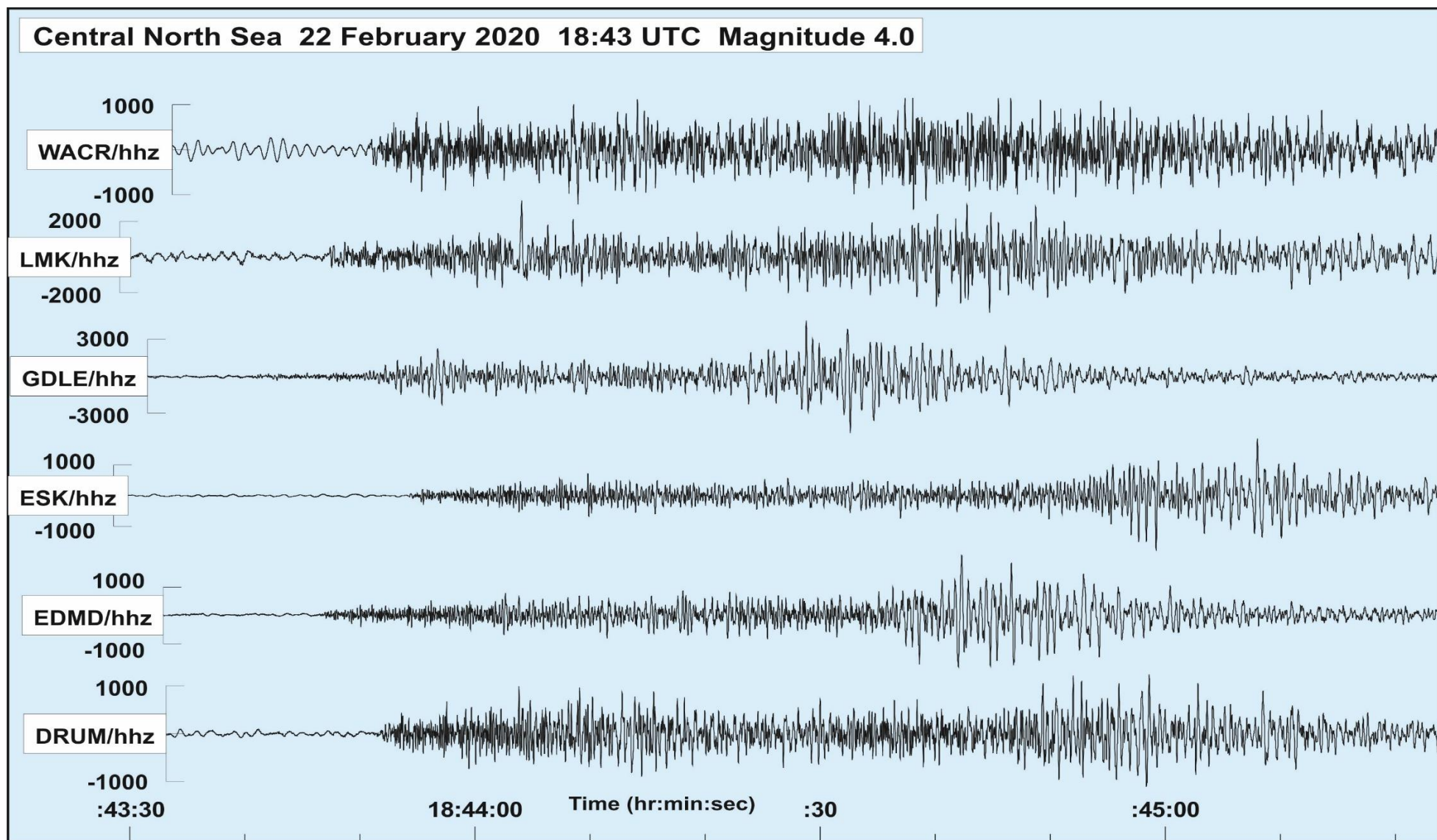
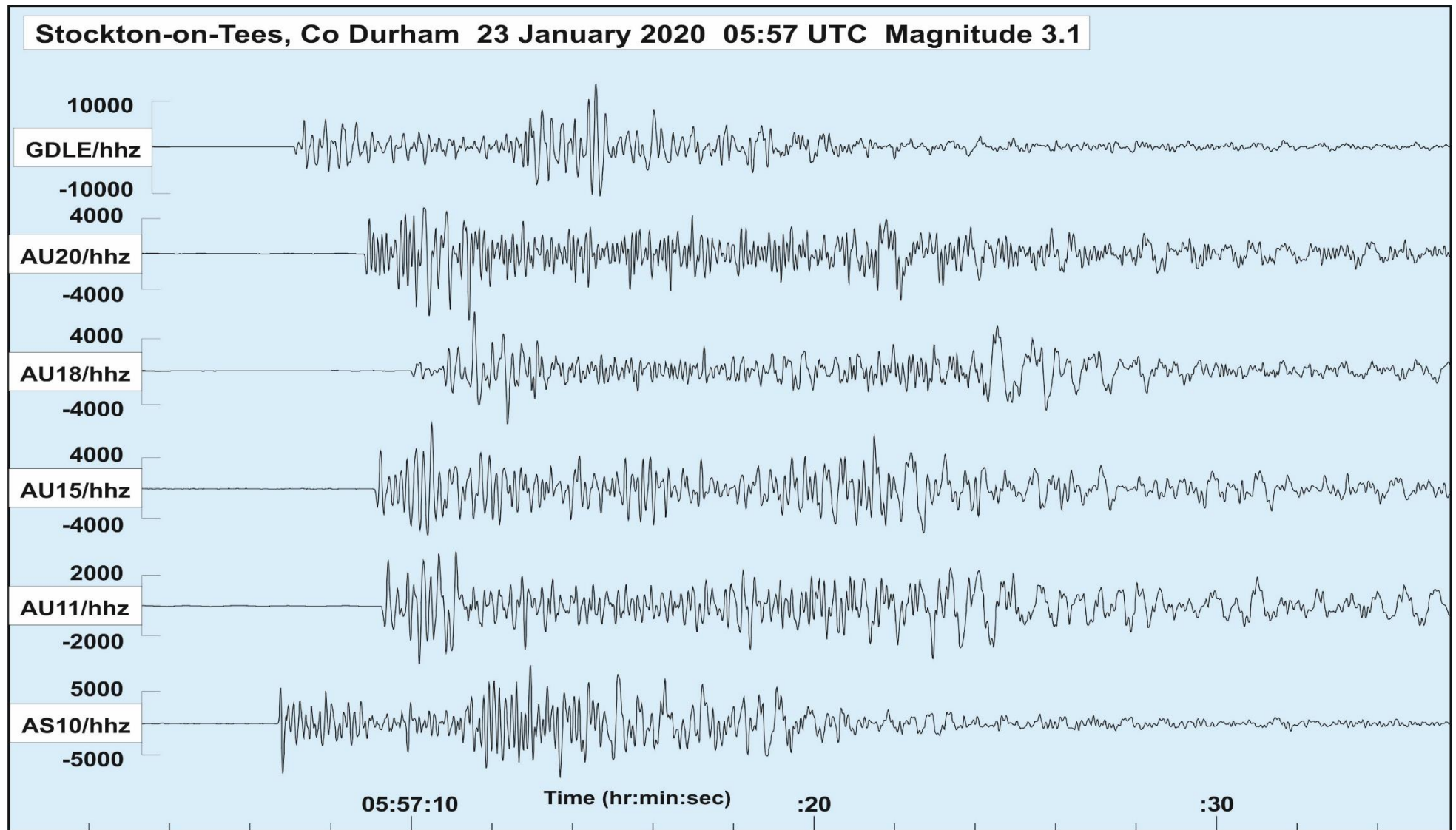


Figure 7. Seismograms of the ground displacements from the magnitude 3.0 ML Leighton Buzzard, Bedfordshire earthquake, 22 September 2020, recorded by BGS seismograph stations.

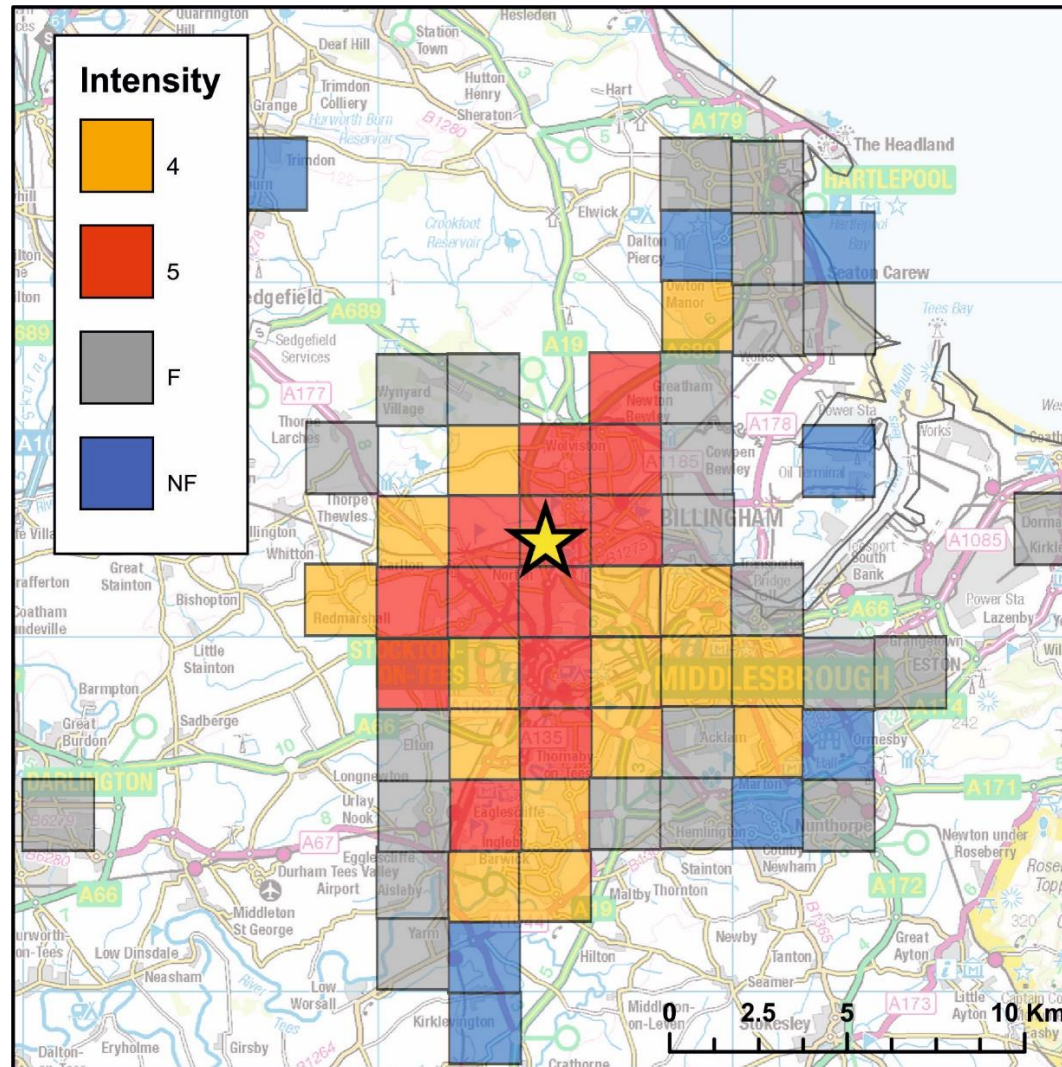


**Figure 8. Seismograms of the ground displacements from the magnitude 4.0 ML Central North Sea earthquake, 22 February 2020, recorded by BGS seismograph stations.**

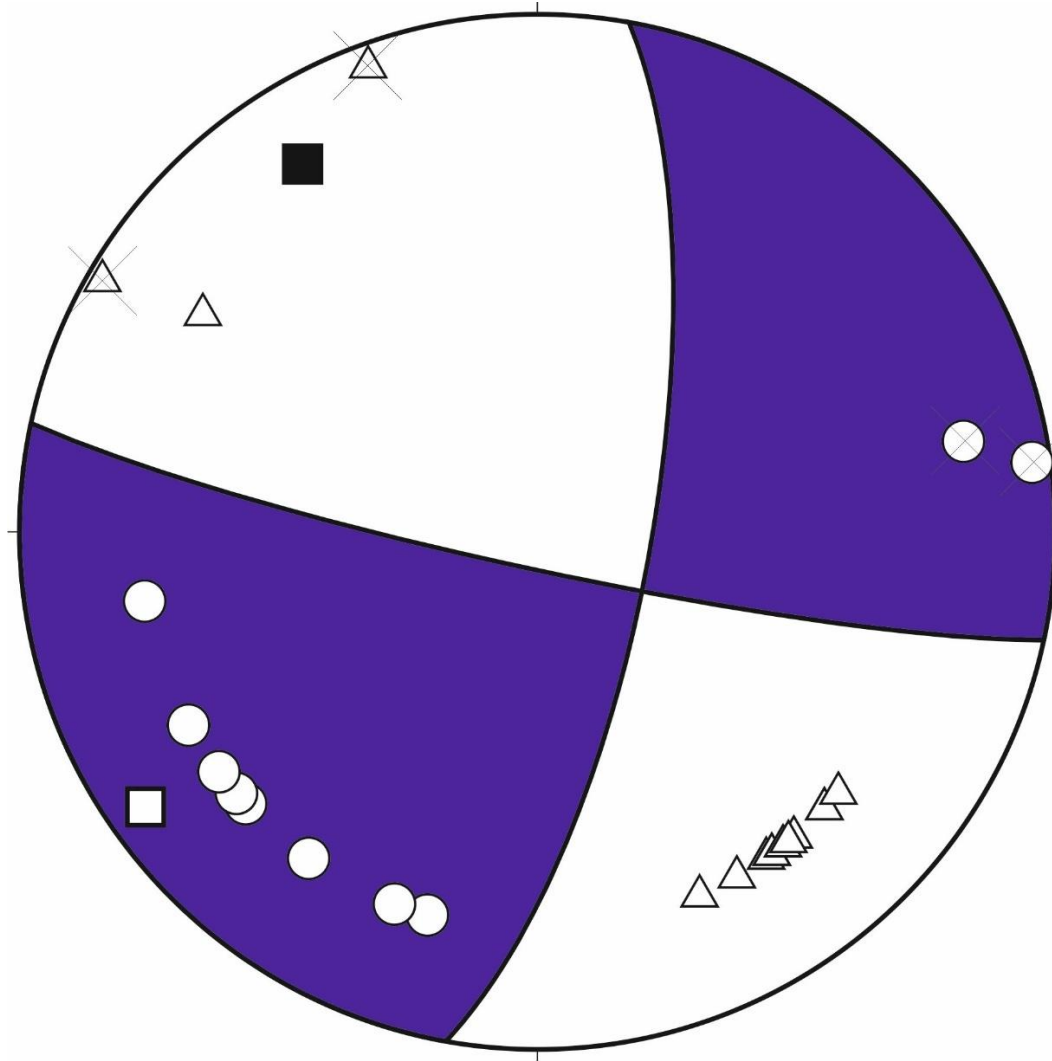


**Figure 9. Seismograms of the ground displacements from the magnitude 3.1 ML Stockton-on-Tees, County Durham earthquake, 23 January 2020, recorded by BGS seismograph stations.**





**Figure 10. Macroseismic intensities for the magnitude 3.1 ML Stockton-on-Tees, County Durham earthquake on 23 January 2020. The yellow star shows the epicentre. Intensities are calculated in 2 km grid squares from over 840 reports from people who felt the earthquake. A minimum of five observations are needed in any grid square to calculate a value of intensity, otherwise the value is calculated as ‘Felt’ but no intensity is calculated (grey squares). Blue squares indicate that any reports from these locations suggested that the earthquake was ‘Not Felt’.**



**Figure 11. Lower hemisphere, equal projection of the focal mechanism for the Stockton-on-Tees, County Durham earthquake on 23 January 2020. The blue shaded areas show areas of compressional first motion. The white circles and triangles show measured compressional and dilatational first motions, respectively. Black crosses show SH/V amplitude ratios. The black and white squares show the orientations of the axes of maximum (P) and minimum (T) compression, respectively (Snoke et al., 1984).**

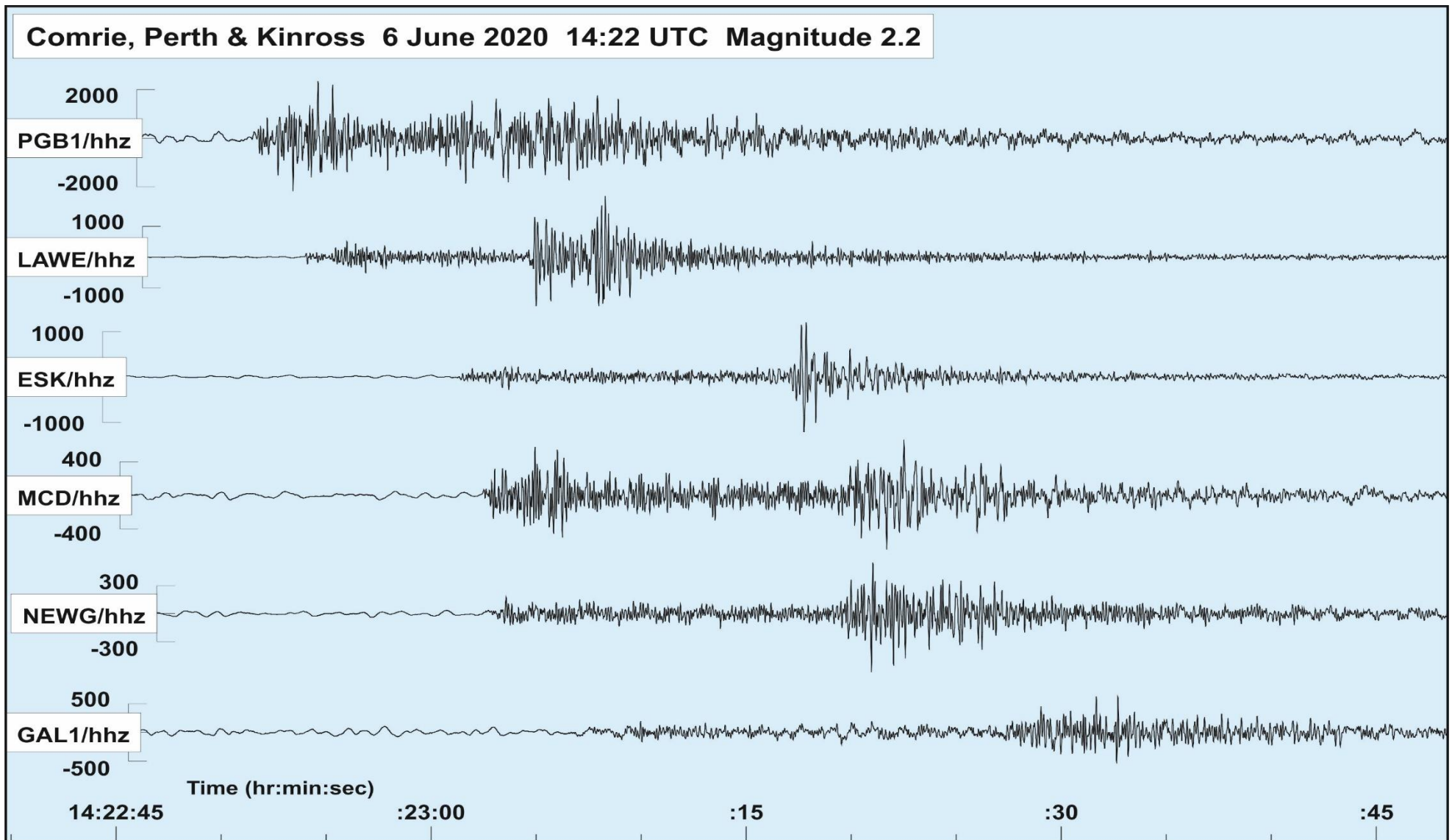
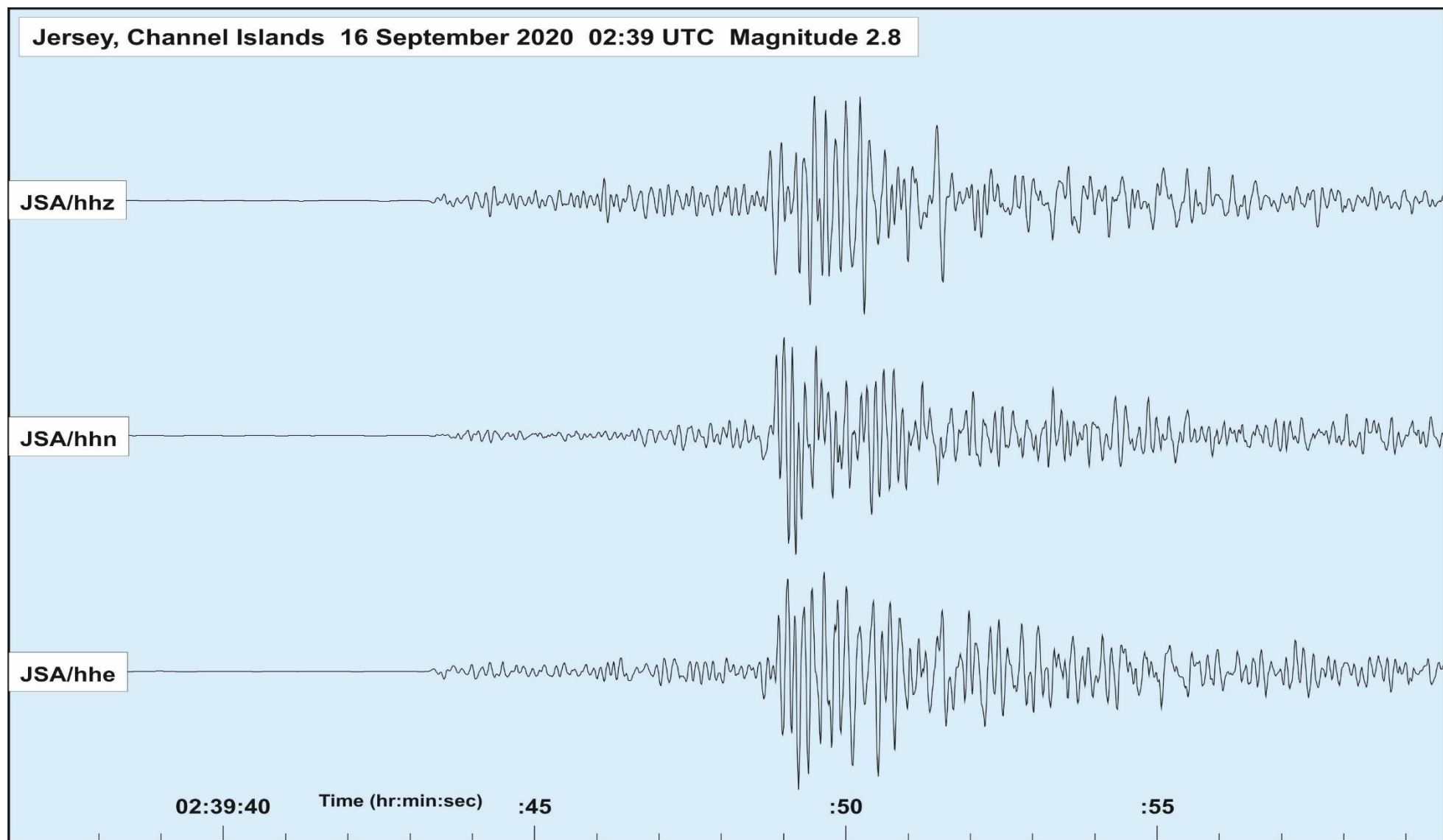


Figure 12. Seismograms of the ground displacements from the magnitude 2.2 ML Comrie, Perth & Kinross earthquake, 6 June 2020, recorded by BGS seismograph stations.



**Figure 13. Seismograms of the ground displacements from the magnitude 2.8 ML Jersey, Channel Islands earthquake, 16 September 2020, recorded by BGS seismograph stations.**

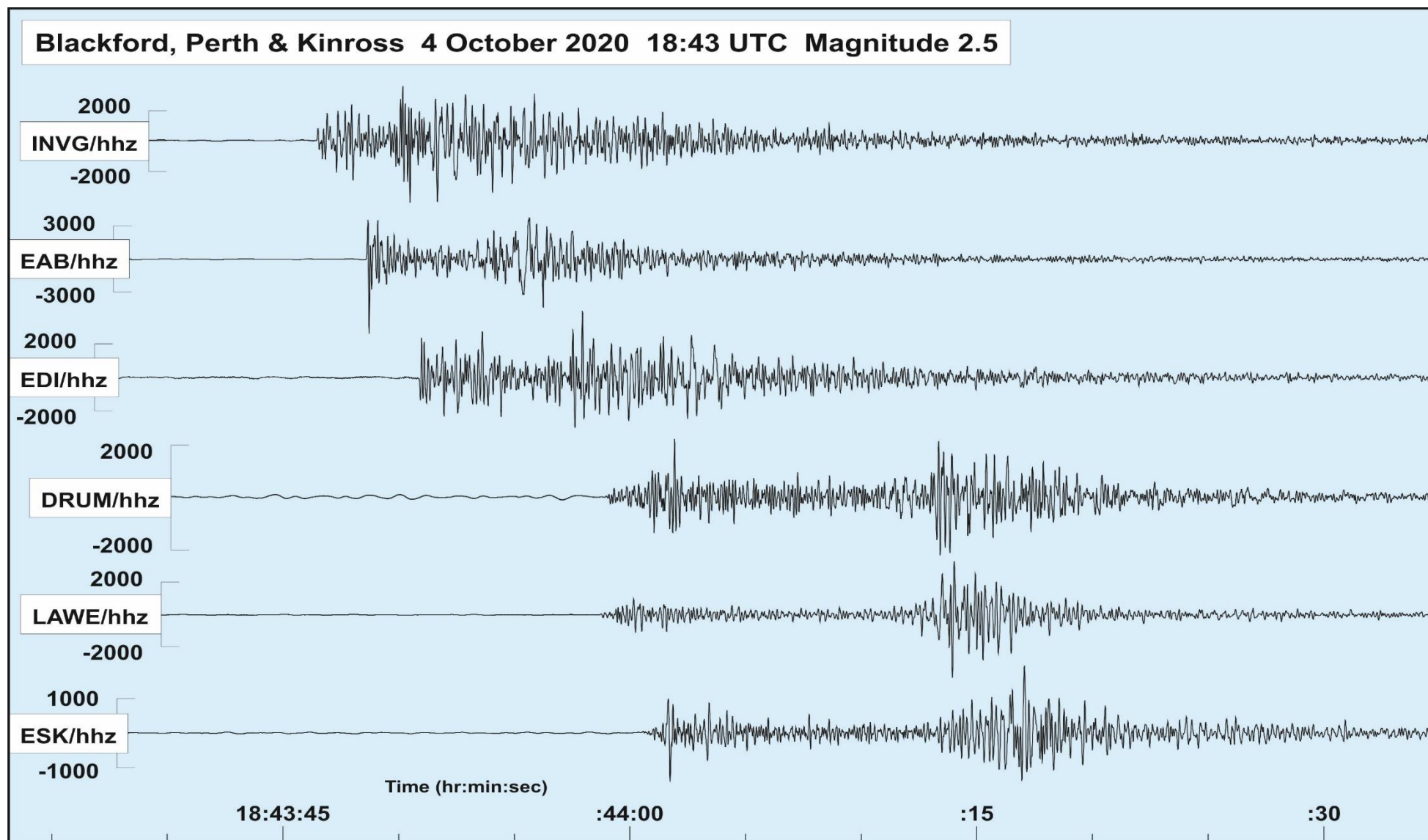


Figure 14. Seismograms of the ground displacements from the magnitude 2.5 ML Blackford, Perth & Kinross earthquake, 4 October 2020, recorded by BGS seismograph stations.

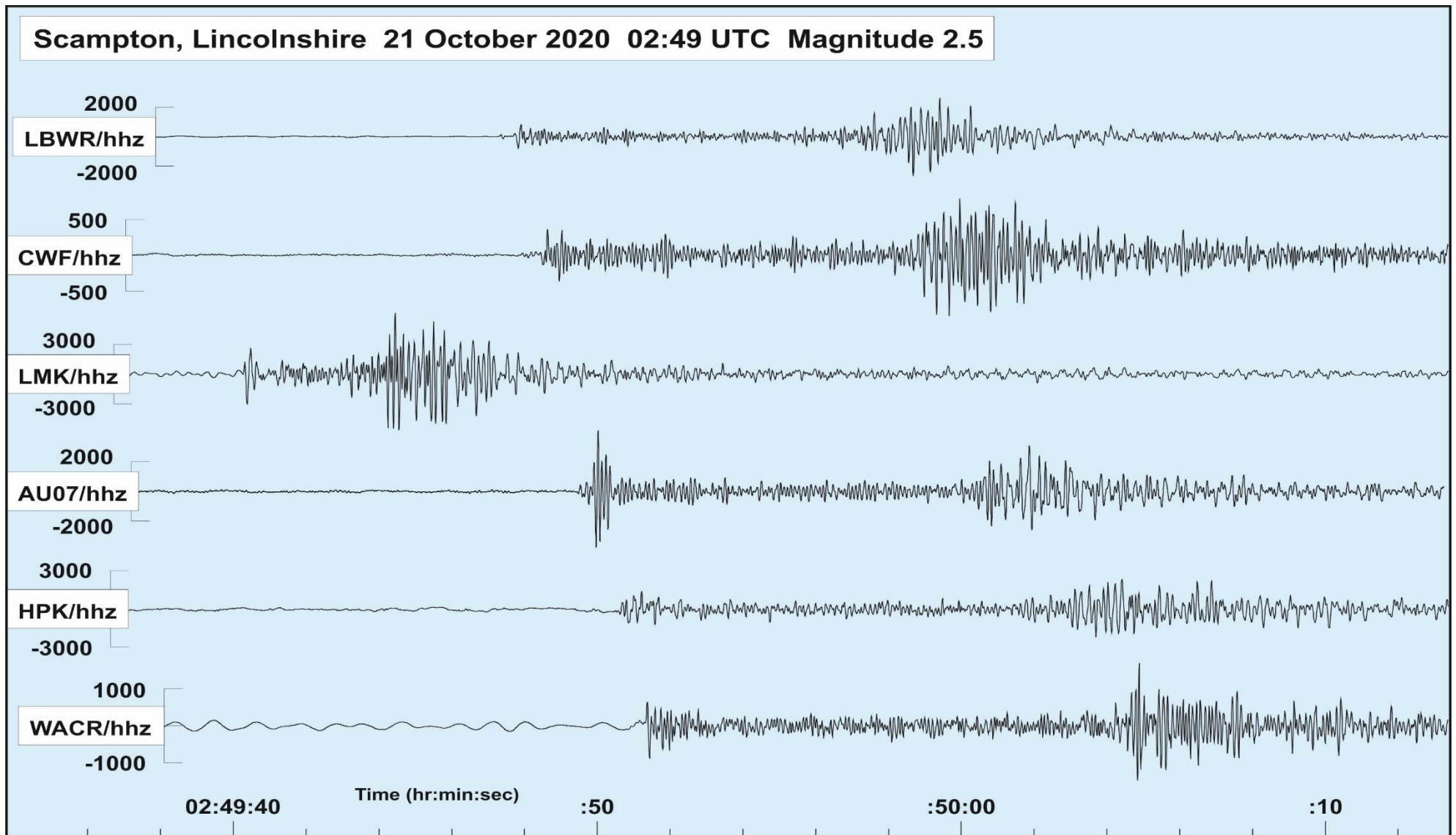
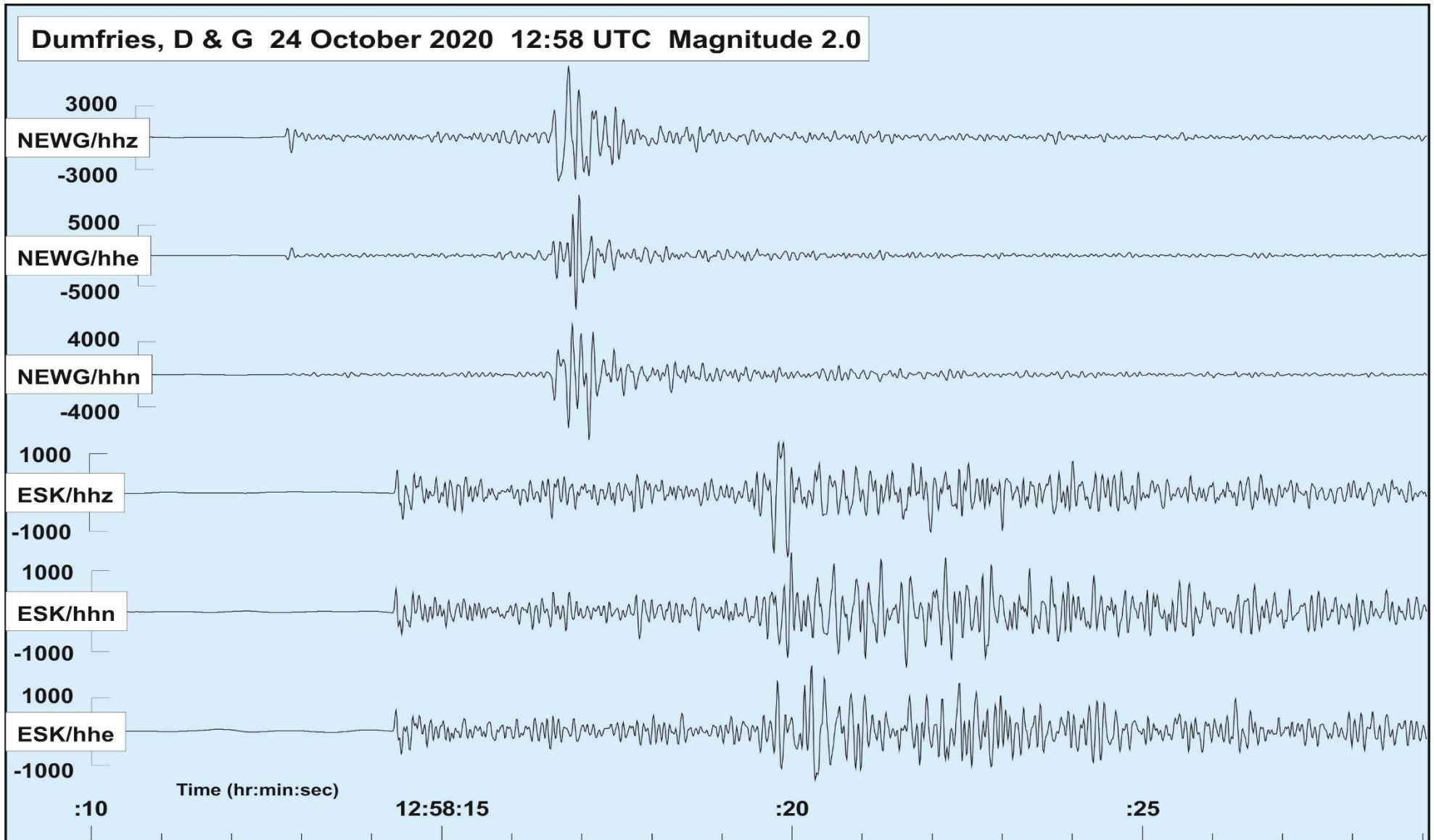


Figure 15. Seismograms of the ground displacements from the magnitude 2.5 ML Scampton, Lincolnshire earthquake, 21 October 2020, recorded by BGS seismograph stations.



**Figure 16. Seismograms of the ground displacements from the magnitude 2.0 ML Dumfries, Dumfries & Galloway earthquake, 24 October 2020, recorded by BGS seismograph stations.**

## MAGNITUDE BY YEAR MAINLAND UK EARTHQUAKES (1970 - 2020)

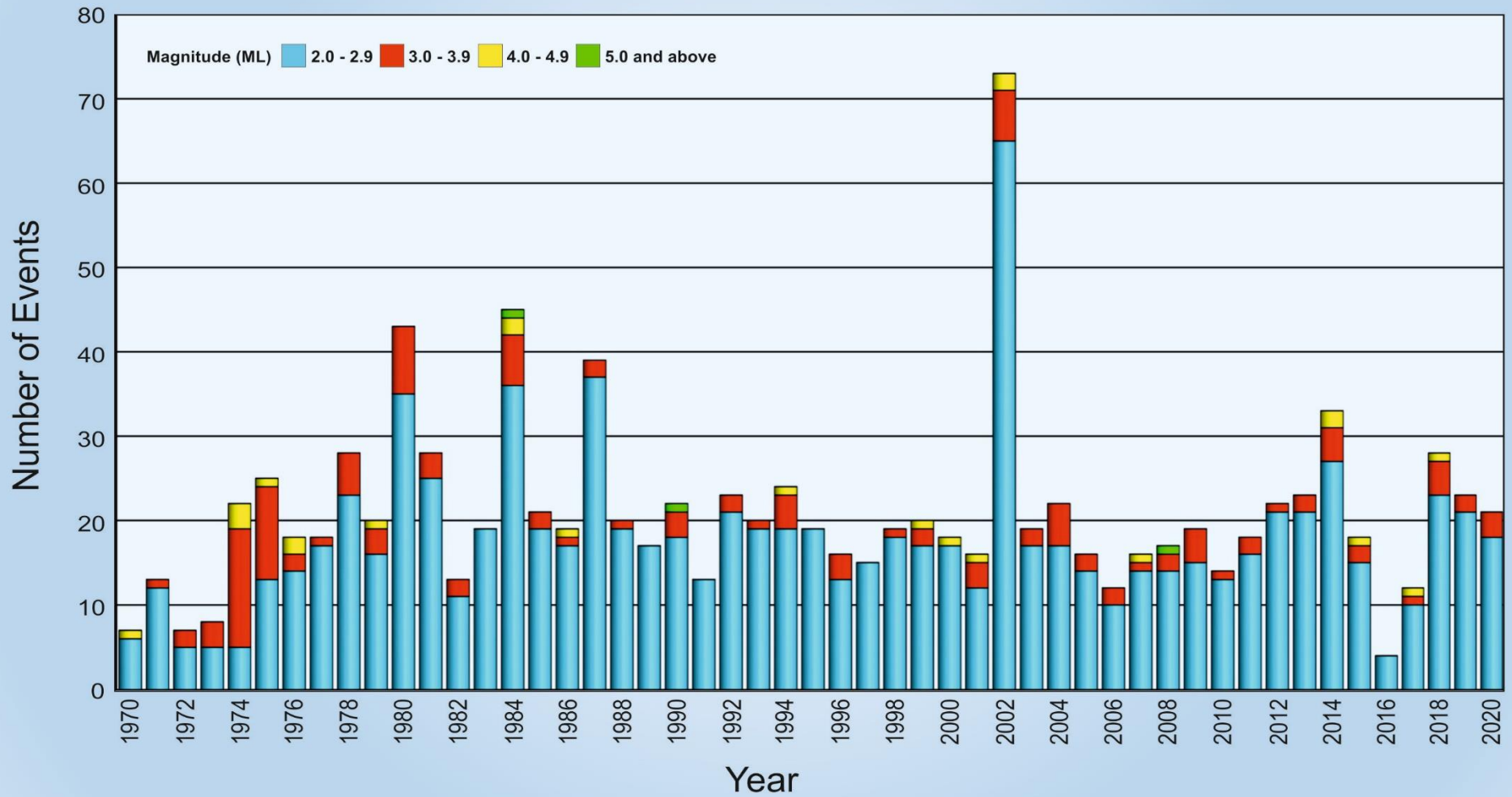


Figure 17. Histogram showing the number of mainland UK events, magnitude 2.0 ML or greater, detected 1970-2020.



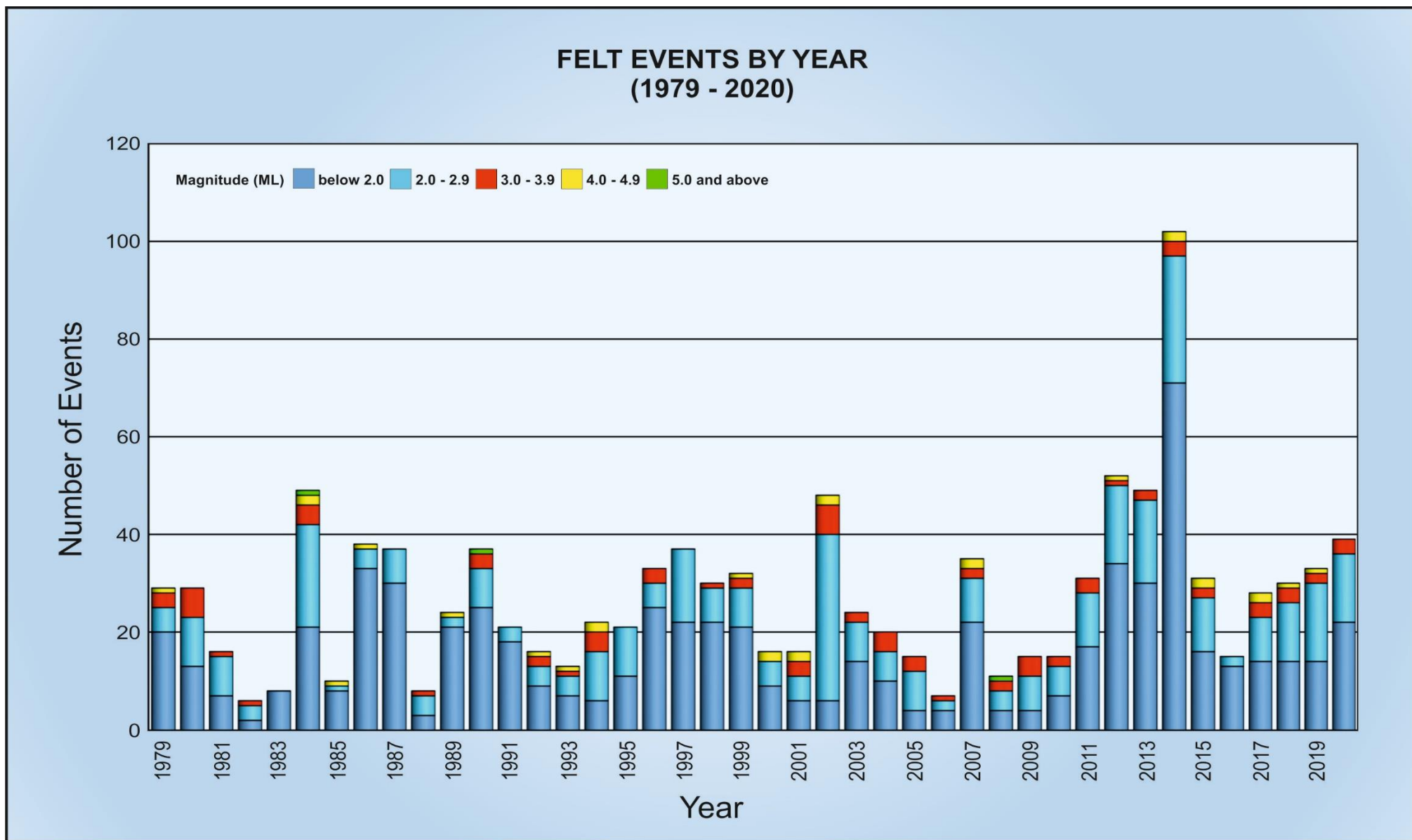


Figure 18. Histogram showing the number of felt events, 1979-2020.

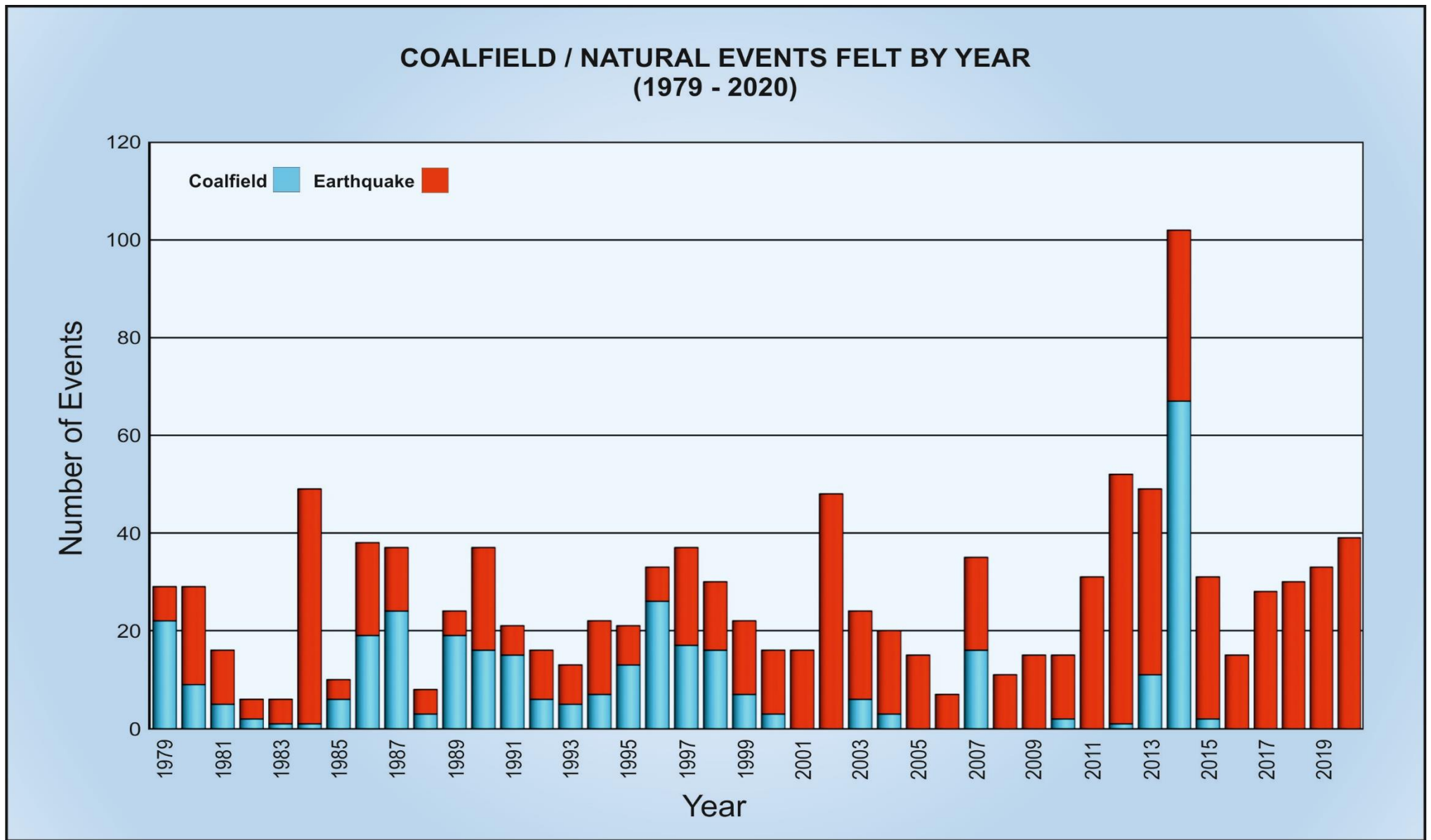


Figure 19. Histogram showing the split between the number of felt events in coalfield areas and those which are natural earthquakes, 1979-2020.

**TABLE 1 : CATALOGUE OF EVENTS : 2020**

YearMoDy	HrMnSecs	Lat	Lon	kmE	kmN	Dep	Mag	Locality	Int	No	Gap	RMS	ERH	ERZ	Comments
20200101	172835.5	51.60	-3.52	295.1	190.5	5.6	1.5	OGMORE VALE, BRIDGEND		9	131	0.40	3.40	9.50	
20200101	194343.7	52.09	-2.68	353.2	243.6	4.2	0.4	HEREFORD, HEREFORDSHIRE		5	145	0.10	2.64	5.50	
20200103	030919.6	49.91	-4.39	228.6	3.4	8.0	1.8	ENGLISH CHANNEL		11	182	0.20	9.56	2.40	55KM SSW PLYMOUTH
20200104	044014.5	52.99	-4.17	254.5	345.6	5.3	0.9	DOLBENMAEN, GWYNEDD		8	135	0.10	3.44	6.90	
20200104	091415.8	56.29	-3.71	293.9	712.2	2.6	0.9	BLACKFORD, PERTH/KINROSS		6	100	0.30	3.05	5.80	
20200104	215522.0	55.77	-6.33	128.3	661.9	6.3	0.8	ISLAY, ARGYLL & BUTE		3	237	0.00	1.92	3.20	
20200105	092640.9	49.03	-2.26	381.1	-96.6	5.0	0.8	JERSEY, CHANNEL ISLANDS		5	185	0.10	4.07	0.00	15KM SSW JERSEY
20200105	165755.7	51.60	-3.51	295.2	189.8	5.7	1.5	OGMORE VALE, BRIDGEND		10	132	0.40	2.90	7.80	
20200106	023508.7	51.60	-3.52	294.5	190.4	4.8	1.8	OGMORE VALE, BRIDGEND		10	131	0.40	3.41	9.30	
20200106	035623.0	51.12	-3.01	329.4	136.1	3.5	1.4	BRIDGWATER, SOMERSET		6	201	0.20	2.41	1.90	
20200107	103646.3	57.14	-5.48	189.4	811.0	6.4	2.3	ARNISDALE, HIGHLAND	2	7	147	0.30	5.06	3.70	FELT ARNISDALE
20200108	210032.9	52.12	-2.34	376.9	247.0	7.8	0.8	MALVERN, WORCESTERSHIRE		6	117	0.30	3.89	7.80	
20200111	171330.9	53.38	-4.41	239.9	390.3	16.0	0.9	BODEWRYD, ANGLESEY		3	153	0.00	0.98	0.60	
20200115	202748.0	54.35	-0.57	492.9	496.2	24.1	1.9	FYLINGDALES, N YORKSHIRE		11	229	0.10	3.27	1.50	
20200117	074543.0	56.13	-3.86	284.2	695.0	7.8	1.0	TULLIBODY, CLACKS		4	138	0.10	2.28	5.90	
20200121	115909.1	56.11	-4.02	274.4	692.3	7.7	1.1	CAMBUSBARRON, STIRLING		6	114	0.30	4.03	7.30	
20200122	172520.2	56.10	-4.01	274.7	691.6	7.8	0.6	CAMBUSBARRON, STIRLING		5	152	0.20	2.97	6.90	
20200123	055700.3	54.59	-1.31	444.3	522.3	4.6	3.1	STOCKTON, COUNTY DURHAM	5	42	178	0.10	1.49	1.40	FELT STOCKTON...
20200124	005920.1	56.93	-5.85	165.8	788.7	5.9	0.7	ARISAIG, HIGHLAND		5	177	0.40	0.87	4.30	
20200126	154822.2	56.93	-5.85	165.7	789.1	6.8	1.1	ARISAIG, HIGHLAND		5	177	0.30	7.38	9.60	
20200126	222719.5	55.24	-6.11	138.7	601.2	3.9	1.0	FAIR HEAD, CO ANTRIM		6	122	0.10	2.12	5.00	OFFSHORE LOCATION
20200129	072741.1	55.23	-6.10	139.5	600.4	4.9	1.1	FAIR HEAD, CO ANTRIM		6	121	0.10	2.72	3.60	OFFSHORE LOCATION
20200131	115333.8	52.27	-0.83	479.8	264.1	7.4	2.2	NORTHAMPTON, NORTHANTS	2	10	141	0.20	1.84	3.30	FELT KETTERING
20200201	011939.4	53.31	3.16	743.8	392.1	10.0	2.7	SOUTHERN NORTH SEA		5	307	0.50	8.65	0.00	130KM NE LOWESTOFT
20200201	012028.4	53.31	3.16	743.8	392.1	10.0	2.9	SOUTHERN NORTH SEA		5	307	0.50	8.65	0.00	130KM NE LOWESTOFT
20200203	003610.4	55.80	-6.36	127.0	664.6	7.5	1.7	ISLAY, ARGYLL & BUTE	3	8	151	0.40	5.68	1.40	FELT ISLAY
20200205	173835.1	52.85	-5.36	173.8	333.8	8.5	0.9	IRISH SEA		7	100	0.20	2.30	8.90	70KM SW HOLYHEAD
20200207	031137.4	56.12	-3.97	277.7	693.9	7.6	0.4	CAMBUSBARRON, STIRLING		7	72	0.20	2.10	5.40	
20200207	150452.4	53.34	2.52	701.1	391.7	10.0	2.4	SOUTHERN NORTH SEA		7	297	0.40	2.83	0.00	90KM NE CROMER
20200213	084413.7	56.46	-5.37	192.5	735.1	7.2	1.2	CONNEL, ARGYLL & BUTE	2	4	165	0.20	3.40	2.80	FELT BARCALDINE
20200213	191303.3	53.02	-5.56	161.2	352.6	10.4	1.0	IRISH SEA		5	230	0.10	3.89	4.40	65KM WSW HOLYHEAD
20200217	084105.0	56.97	-5.56	183.8	791.8	7.3	0.9	LOCH NEVIS, HIGHLAND		4	179	0.20	5.95	8.90	
20200219	212719.3	55.77	-6.26	132.6	660.7	7.9	0.8	ISLAY, ARGYLL & BUTE		4	146	0.10	2.19	3.40	
20200220	032741.5	53.52	-1.14	457.3	402.4	6.6	1.4	DONCASTER, S YORKSHIRE		14	155	0.20	1.92	4.80	
20200220	132231.1	55.80	-6.40	124.4	664.8	7.4	1.0	ISLAY, ARGYLL & BUTE		3	243	0.30	4.37	9.90	
20200220	135057.0	55.82	-6.35	127.6	666.6	7.1	1.6	ISLAY, ARGYLL & BUTE		7	152	0.50	6.40	0.40	
20200222	184302.2	55.68	3.00	714.4	654.2	11.3	4.0	CENTRAL NORTH SEA		27	249	0.40	1.09	6.90	270KM NE SCARBOROUGH
20200303	203354.2	52.83	-1.17	455.7	326.6	6.5	1.1	EAST LEAKE, NOTTS		7	234	0.20	5.51	1.70	
20200312	232535.7	53.54	-2.28	381.2	404.5	13.4	1.3	PRESTWICH, GTR MAN		7	171	0.10	0.99	1.90	
20200312	232620.8	53.54	-2.28	381.4	404.8	12.9	1.6	PRESTWICH, GTR MAN		9	108	0.10	1.14	2.40	
20200314	041910.5	52.14	-2.33	377.1	248.8	5.4	1.7	MALVERN, WORCESTERSHIRE		12	94	0.30	2.51	4.30	
20200315	051149.2	60.24	1.95	618.8	1156.9	10.6	2.0	NORTHERN NORTH SEA		6	139	0.30	6.70	7.00	170KM EAST LERWICK

**TABLE 1 : CATALOGUE OF EVENTS : 2020**

YearMoDy	HrMnSecs	Lat	Lon	kmE	kmN	Dep	Mag	Locality	Int	No	Gap	RMS	ERH	ERZ	Comments
20200316	220100.9	56.75	-5.87	163.4	768.6	7.2	1.5	KENTRA, HIGHLAND	3	5	220	0.40	2.12	3.40	FELT ACHARACLE...
20200317	014210.4	54.21	-2.94	338.7	479.9	4.8	0.4	CARTMEL, CUMBRIA		3	272	0.20	7.46	5.70	
20200322	031009.2	54.21	-2.95	338.2	480.2	5.1	0.1	CARTMEL, CUMBRIA		5	170	0.20	2.56	3.00	
20200324	005844.8	53.02	-2.92	338.2	347.3	7.2	0.6	MARCHWEIL, WREXHAM		7	134	0.40	3.76	2.40	5KM SE WREXHAM
20200324	170132.6	51.99	-2.86	340.8	232.7	15.2	0.5	PONTRILAS, HEREFORDSHIRE		5	117	0.10	1.97	1.60	5KM NORTH PONTRILAS
20200324	171920.1	51.98	-2.89	339.2	232.3	16.1	2.3	PONTRILAS, HEREFORDSHIRE		15	80	0.20	2.64	1.70	4KM NORTH PONTRILAS
20200327	032527.7	53.35	4.00	799.3	400.1	10.0	2.8	SOUTHERN NORTH SEA		18	282	0.50	3.63	0.00	175KM NE LOWESTOFT
20200327	054010.1	55.79	-6.39	124.8	664.0	7.4	0.8	ISLAY, ARGYLL & BUTE		5	207	0.30	9.88	5.00	
20200327	112702.6	54.53	-2.67	356.8	515.0	12.6	0.4	SHAP, CUMBRIA		4	156	0.20	3.26	3.90	
20200328	160946.1	50.86	-2.94	333.9	106.9	9.1	1.3	CHARD, SOMERSET		5	209	0.20	8.63	6.00	
20200401	061921.2	54.19	-2.97	337.0	478.0	6.5	0.3	CARTMEL, CUMBRIA		5	180	0.30	3.83	0.00	
20200404	152817.1	52.01	-1.13	460.0	235.4	4.6	2.2	BRACKLEY, NORTHANTS		15	84	0.40	3.41	7.30	
20200406	025107.3	54.21	-2.97	336.5	479.4	7.5	0.8	CARTMEL, CUMBRIA		8	149	0.20	2.14	5.50	
20200406	212717.2	56.29	-6.26	136.7	718.9	8.3	1.4	MULL, ARGYLL & BUTE	2	9	167	0.30	5.50	6.40	FELT MULL
20200409	005700.1	51.67	-3.20	317.0	197.4	3.3	0.7	BLACKWOOD, CAERPHILLY		4	207	0.10	1.92	2.40	
20200411	114129.2	55.25	-3.50	304.8	596.0	2.4	0.3	ST ANN'S, D & G		6	94	0.50	8.21	3.40	
20200411	145531.5	51.95	-3.51	296.5	229.1	14.9	0.7	SENNYBRIDGE, POWYS		9	109	0.30	2.77	2.40	
20200411	175353.2	53.39	-4.43	238.1	390.8	12.6	0.2	LLANFECHHELL, ANGLESEY		4	188	0.10	4.22	1.00	
20200412	053014.2	55.23	-3.51	304.2	594.2	2.5	0.8	ST ANN'S, D & G		6	107	0.50	8.14	8.70	
20200412	075256.4	55.24	-3.52	303.4	594.8	2.5	0.8	ST ANN'S, D & G		8	82	0.40	3.44	4.20	
20200412	135312.3	53.94	-3.69	288.8	450.3	7.8	0.9	IRISH SEA		8	89	0.40	3.64	2.90	42KM WEST FLEETWOOD
20200412	144244.0	52.27	0.47	568.4	266.0	7.4	0.7	NEWMARKET, SUFFOLK		3	176	0.10	0.86	1.80	
20200414	180103.1	57.76	-3.69	299.5	875.9	2.6	0.7	MORAY FIRTH		5	136	0.20	3.13	4.40	12KM EAST BALINTORE
20200415	040741.3	52.27	0.44	566.5	266.9	4.7	0.4	NEWMARKET, SUFFOLK		3	176	0.10	2.16	5.00	
20200415	160422.8	55.09	-4.18	261.0	579.7	9.3	0.6	DALRY, D & G		8	72	0.30	3.50	2.60	
20200416	061137.4	57.64	-5.59	185.6	866.9	2.6	0.7	TALLADALE, HIGHLAND		4	196	0.40	1.59	3.30	6KM SW TALLADALE
20200416	120750.5	57.65	-5.64	183.0	867.7	2.4	1.6	SHIELDAIG, HIGHLAND		6	203	0.50	4.44	5.70	5KM SSE SHIELDAIG
20200417	130135.5	53.05	-2.14	390.7	349.9	2.5	1.7	BAGNALL, STAFFORDSHIRE		12	86	0.30	1.94	2.10	
20200417	171138.5	55.27	-3.54	302.5	598.7	2.4	0.5	BEATTOCK, D & G		6	188	0.30	3.66	0.00	
20200419	174541.4	54.23	-3.79	283.0	483.6	7.7	0.2	IRISH SEA		7	197	0.30	3.72	7.60	
20200420	011927.2	55.23	-3.52	303.5	594.4	2.5	0.3	ST ANN'S, D & G		8	63	0.50	4.62	5.50	
20200422	225932.8	56.63	-5.20	203.6	753.6	10.7	0.6	DUROR, HIGHLAND		5	145	0.40	6.63	0.20	
20200423	053049.8	53.03	2.16	679.0	356.1	10.0	3.3	SOUTHERN NORTH SEA		23	232	0.50	9.80	0.00	65KM NNE LOWESTOFT
20200425	041152.6	53.96	-3.31	314.1	452.0	2.5	0.8	IRISH SEA		13	70	0.50	4.29	4.90	18KM WNW FLEETWOOD
20200426	063752.5	55.65	-5.85	157.9	645.9	6.9	0.6	GIGHA, ARGYLL & BUTE		5	187	0.50	6.61	5.50	OFFSHORE LOCATION
20200427	170203.9	52.93	-4.36	241.1	339.7	10.7	0.7	LLANARMON, GWYNEDD		4	189	0.10	1.25	1.20	
20200429	001125.6	51.17	-0.26	521.9	142.9	3.1	-0.3	NEWDIGATE, SURREY		5	143	0.00	0.45	0.40	
20200501	035259.9	56.41	-5.76	168.0	730.8	2.7	1.4	MULL, ARGYLL & BUTE	3	9	147	0.30	5.59	5.40	FELT MULL...
20200505	043526.2	51.67	-3.22	315.7	197.1	3.9	1.3	BLACKWOOD, CAERPHILLY		4	207	0.10	1.80	2.00	
20200506	051216.0	52.36	-3.14	322.6	273.9	8.5	1.5	KNIGHTON, POWYS		7	90	0.20	3.28	6.00	
20200508	222519.8	57.78	-5.63	184.0	882.4	7.5	0.7	POOLEWE, HIGHLAND		5	211	0.30	1.72	1.20	
20200509	191743.7	51.15	-3.09	323.7	139.6	7.8	1.4	CANNINGTON, SOMERSET		8	152	0.20	4.02	5.80	

**TABLE 1 : CATALOGUE OF EVENTS : 2020**

YearMoDy	HrMnSecs	Lat	Lon	kmE	kmN	Dep	Mag	Locality	Int	No	Gap	RMS	ERH	ERZ	Comments
20200510	035518.5	53.20	0.52	568.5	370.0	9.3	0.9	SOUTHERN NORTH SEA		4	228	0.10	4.25	3.30	14KM NE SKEGNESS
20200513	092406.4	51.67	-3.22	315.4	197.1	3.6	1.1	BLACKWOOD,CAERPHILLY		4	207	0.10	1.72	1.90	
20200513	121110.2	55.94	-4.32	255.3	673.7	7.7	1.3	MILNGAVIE,E DUNB'SHIRE		8	117	0.20	2.75	3.10	
20200514	035254.7	54.16	-4.10	262.6	476.3	9.1	0.5	IRISH SEA		9	106	0.30	2.39	0.50	20KM ESE LAXEY,IOM
20200514	095910.5	56.37	-5.46	186.6	724.5	4.5	0.9	KILBRIDE,ARGYLL & BUTE		4	191	0.10	5.77	6.70	
20200514	212128.0	54.23	-2.80	348.1	482.3	2.9	0.4	MILNTHORPE,CUMBRIA		4	193	0.20	2.48	5.90	
20200514	225302.7	56.38	-5.74	169.3	727.3	11.7	1.8	MULL,ARGYLL & BUTE	3	12	173	0.30	4.48	3.70	FELT MULL...
20200514	235555.4	51.76	-3.92	267.3	208.3	10.1	1.0	GARNSWLLT,SWANSEA		9	92	0.30	2.62	4.40	5KM EAST GARNSWLLT
20200515	013203.3	55.09	-0.51	495.3	578.2	8.9	1.6	CENTRAL NORTH SEA		13	286	0.50	8.34	0.00	60KM ENE SUNDERLAND
20200515	180134.3	56.08	-5.14	204.3	691.6	11.3	0.6	DUNANS,ARGYLL & BUTE		5	171	0.10	2.00	4.80	
20200523	125059.0	56.43	-5.61	177.7	732.2	2.5	1.1	MULL,ARGYLL & BUTE		5	212	0.10	3.53	4.50	
20200524	151656.9	51.16	-0.25	522.4	141.3	2.4	0.6	NEWDIGATE,SURREY		4	176	0.00	0.45	0.50	
20200524	173620.9	51.90	-0.94	473.1	222.5	8.8	1.6	QUANTON,BUCKS		9	138	0.30	3.02	5.50	
20200527	090425.0	56.28	-3.72	293.3	711.6	2.5	0.7	BLACKFORD,PERTH/KINROSS		7	98	0.30	3.36	3.40	
20200529	171905.4	52.88	-2.14	390.4	331.2	10.6	0.8	STONE,STAFFORDSHIRE		6	106	0.20	2.34	6.00	
20200531	211539.9	53.15	-1.71	419.6	361.2	7.0	0.7	GRATTON,DERBYSHIRE		7	109	0.30	3.61	1.60	
20200602	055119.9	55.67	-4.82	222.4	645.1	7.7	0.8	ARDROSSAN,AYRSHIRE		7	100	0.20	3.54	7.70	
20200603	183806.4	55.66	-4.81	223.1	644.4	7.7	1.4	ARDROSSAN,AYRSHIRE		11	99	0.30	3.01	0.40	
20200604	002721.9	55.66	-4.81	223.3	644.9	7.7	1.1	ARDROSSAN,AYRSHIRE		11	99	0.20	2.34	0.20	
20200604	124816.0	52.56	-1.90	406.6	296.1	7.9	2.1	WALSALL,WEST MIDLANDS	3	9	128	0.30	3.54	5.20	FELT WALSALL...
20200604	173122.0	55.67	-4.79	224.6	645.0	7.4	0.8	ARDROSSAN,AYRSHIRE		7	98	0.30	4.68	4.20	
20200604	190552.4	55.67	-4.79	224.8	645.9	8.2	0.5	ARDROSSAN,AYRSHIRE		6	153	0.40	7.60	3.00	
20200606	141936.0	53.64	-4.92	206.6	419.5	5.6	1.0	IRISH SEA		7	109	0.40	3.28	8.80	35KM NW ANGLESEY
20200606	142239.2	56.39	-4.01	276.1	723.8	2.8	2.2	COMRIE,PERTH & KINROSS	4	9	117	0.20	2.64	2.90	FELT COMRIE...
20200607	040232.0	52.57	-0.88	476.2	297.3	8.0	1.0	GOADBY,LEICESTERSHIRE		5	189	0.50	8.96	0.40	
20200607	115236.3	55.57	-2.98	338.4	631.1	5.3	0.7	YARROWFORD,BORDERS		6	215	0.20	4.30	8.50	
20200608	191554.9	51.58	-3.47	297.9	187.9	11.1	0.8	HENDREFORGAN,RHONDDA CT		6	137	0.20	2.88	4.40	
20200611	061343.4	51.81	-2.46	368.6	212.2	7.3	1.0	NEWNHAM,GLOUCESTERSHIRE		5	179	0.10	1.77	1.80	
20200611	102743.8	55.67	-4.80	223.7	645.2	7.7	1.2	ARDROSSAN,AYRSHIRE		9	98	0.30	3.70	6.90	
20200613	124704.5	55.66	-4.82	222.5	644.6	8.1	1.2	ARDROSSAN,AYRSHIRE		9	100	0.30	3.09	4.30	
20200616	021311.8	53.05	-2.13	391.4	350.1	3.2	0.9	STOKE-ON-TRENT,STAFFS		8	87	0.20	1.79	1.30	
20200617	055429.5	51.55	-2.94	334.9	183.5	20.7	0.8	GOLDCLIFF,NEWPORT		6	146	0.20	3.98	4.50	
20200626	004019.1	53.72	-2.43	371.4	425.0	8.4	1.3	BELTHORN,LANCASHIRE		9	94	0.20	2.08	2.30	
20200626	061107.8	51.55	-2.92	336.1	183.8	22.0	1.1	GOLDCLIFF,NEWPORT		7	146	0.20	3.69	4.60	
20200701	042121.1	56.21	-6.04	149.8	709.7	10.9	1.7	MULL,ARGYLL & BUTE		10	154	0.30	6.26	5.80	OFFSHORE LOCATION
20200701	143651.0	52.31	-1.79	414.2	267.6	7.7	1.2	HENLEY,WARWICKSHIRE		8	169	0.20	2.73	6.10	
20200701	163740.7	55.63	-2.19	387.9	637.7	4.3	0.9	BRANXTON,NORTHUMBERLAND		7	222	0.30	6.13	5.80	
20200703	183745.7	54.69	-3.20	322.4	533.2	8.4	0.4	BASSENTHWAITE,CUMBRIA		7	78	0.20	2.51	6.00	
20200704	133730.1	55.92	-4.35	253.2	672.7	3.9	1.2	BEARSDEN,E DUNB'SHIRE		8	87	0.40	4.27	6.30	
20200707	193912.8	55.58	-2.97	338.7	632.5	4.5	0.8	YARROWFORD,BORDERS		7	204	0.20	5.36	3.80	
20200708	024151.8	55.60	-2.17	389.2	633.6	4.0	0.7	HOWTEL,NORTHUMBERLAND		7	222	0.40	8.95	7.00	
20200708	204001.8	55.59	-2.95	339.9	633.2	3.8	1.0	YARROWFORD,BORDERS		7	226	0.30	2.44	8.10	

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YearMoDy	HrMnSecs	Lat	Lon	kmE	kmN	Dep	Mag	Locality	Int	No	Gap	RMS	ERH	ERZ	Comments
20200710	143612.0	51.58	-3.05	327.0	186.8	20.3	1.6	ROGERSTONE, NEWPORT		7	137	0.30	4.28	5.90	
20200710	162249.2	52.51	-1.52	432.3	290.3	9.3	2.0	NUNEATON, WARWICKSHIRE		10	179	0.30	3.27	4.90	
20200718	015805.7	54.86	-1.45	435.3	551.7	13.8	1.2	NEWBOTTLE, TYNE & WEAR		12	205	0.20	5.45	3.60	
20200718	065156.6	53.33	-4.50	233.2	384.9	11.4	0.8	ANGLESEY, GWYNEDD		6	121	0.30	6.53	3.30	
20200719	204044.7	56.64	-5.66	175.5	755.9	8.6	0.9	STRONTIAN, HIGHLAND		5	201	0.20	3.61	7.80	8KM SW STRONTIAN
20200721	020510.1	54.64	-2.66	357.7	527.5	12.2	0.1	PENRITH, CUMBRIA		5	131	0.20	3.47	0.00	
20200724	063820.7	53.19	-2.56	362.9	365.6	7.7	0.8	WINSFORD, CHESHIRE		8	131	0.20	3.09	8.50	
20200727	040530.6	56.20	-4.94	217.8	704.8	8.6	0.1	LOCH GOIL, ARGYLL/BUTE		4	142	0.30	9.16	4.90	
20200729	231556.4	60.90	4.06	728.3	1239.5	10.0	3.1	NORTHERN NORTH SEA		8	315	0.30	2.28	0.20	300KM ENE LERWICK
20200730	020013.6	56.20	-4.94	217.8	704.3	8.7	0.5	LOCH GOIL, ARGYLL/BUTE		3	193	0.40	1.67	1.00	
20200730	032425.8	56.39	-6.15	143.9	729.7	7.2	0.8	MULL, ARGYLL & BUTE		5	197	0.40	9.75	2.90	
20200730	050033.1	56.19	-4.94	217.8	703.6	8.5	0.2	LOCH GOIL, ARGYLL/BUTE		3	196	0.40	8.86	0.00	
20200731	112923.5	56.18	-4.94	217.5	702.1	8.4	1.3	LOCH GOIL, ARGYLL/BUTE		8	81	0.50	4.86	8.50	
20200731	113708.3	56.21	-4.95	217.1	705.4	7.4	0.5	LOCH GOIL, ARGYLL/BUTE		3	190	0.30	9.39	7.60	
20200801	111810.2	56.26	-5.30	195.7	712.4	4.4	0.7	DALAVICH, ARGYLL & BUTE		3	173	0.20	1.00	1.00	
20200802	142150.0	50.22	-5.17	173.6	40.8	4.6	-0.9	CARHARRACK, CORNWALL		6	128	0.00	0.95	0.50	GEOTHERMAL
20200802	142640.0	50.22	-5.17	173.7	40.9	4.7	-0.4	CARHARRACK, CORNWALL		7	83	0.00	0.45	0.40	GEOTHERMAL
20200802	143333.6	50.23	-5.17	174.0	41.1	4.5	-0.6	CARHARRACK, CORNWALL		6	119	0.00	0.89	0.60	GEOTHERMAL
20200802	144535.5	50.22	-5.17	173.8	40.8	4.7	-0.5	CARHARRACK, CORNWALL		7	86	0.00	0.45	0.30	GEOTHERMAL
20200802	144549.0	50.22	-5.17	173.9	40.9	4.5	-0.9	CARHARRACK, CORNWALL		5	174	0.00	0.22	0.20	GEOTHERMAL
20200802	144906.0	50.22	-5.17	173.8	40.9	4.6	-0.9	CARHARRACK, CORNWALL		6	121	0.00	0.36	0.30	GEOTHERMAL
20200802	144948.9	50.22	-5.17	173.7	40.9	4.7	0.2	CARHARRACK, CORNWALL		8	84	0.00	0.36	0.30	GEOTHERMAL
20200802	145134.4	50.23	-5.17	173.9	41.0	4.6	-1.0	CARHARRACK, CORNWALL		4	175	0.00	0.41	0.30	GEOTHERMAL
20200802	145137.9	50.22	-5.17	173.8	40.9	4.6	-0.5	CARHARRACK, CORNWALL		6	129	0.00	0.45	0.30	GEOTHERMAL
20200802	145357.1	50.22	-5.17	173.6	40.9	4.7	-0.0	CARHARRACK, CORNWALL		7	82	0.00	0.45	0.30	GEOTHERMAL
20200802	150417.8	50.22	-5.17	173.6	40.8	4.7	-0.7	CARHARRACK, CORNWALL		5	97	0.00	0.58	0.50	GEOTHERMAL
20200802	150525.0	50.22	-5.17	173.7	40.9	4.7	-0.8	CARHARRACK, CORNWALL		6	83	0.00	0.36	0.40	GEOTHERMAL
20200802	150527.0	50.22	-5.17	173.6	40.9	4.6	-0.4	CARHARRACK, CORNWALL		7	81	0.00	0.36	0.30	GEOTHERMAL
20200802	150904.1	50.22	-5.17	173.7	40.9	4.8	-0.1	CARHARRACK, CORNWALL		7	84	0.00	0.36	0.30	GEOTHERMAL
20200802	151253.1	50.22	-5.17	173.8	40.9	4.8	-0.7	CARHARRACK, CORNWALL		6	122	0.00	0.54	0.40	GEOTHERMAL
20200802	151324.7	50.22	-5.17	173.8	40.7	4.9	-0.8	CARHARRACK, CORNWALL		6	160	0.00	0.67	0.30	GEOTHERMAL
20200802	151359.9	50.22	-5.17	173.7	40.8	4.5	-1.1	CARHARRACK, CORNWALL		6	125	0.00	0.54	0.50	GEOTHERMAL
20200802	151403.6	50.22	-5.18	173.5	40.8	4.6	-0.7	CARHARRACK, CORNWALL		5	170	0.00	0.73	0.40	GEOTHERMAL
20200802	151440.3	50.22	-5.17	173.8	40.9	4.8	-0.2	CARHARRACK, CORNWALL		6	124	0.00	0.54	0.40	GEOTHERMAL
20200802	152806.5	50.22	-5.17	173.6	40.9	4.5	-0.5	CARHARRACK, CORNWALL		6	129	0.00	0.41	0.30	GEOTHERMAL
20200802	152808.9	50.22	-5.18	173.4	40.9	4.6	-0.8	CARHARRACK, CORNWALL		6	131	0.00	0.95	0.60	GEOTHERMAL
20200802	152815.4	50.22	-5.17	173.8	40.9	4.8	-0.4	CARHARRACK, CORNWALL		7	85	0.00	0.54	0.40	GEOTHERMAL
20200802	153704.0	50.22	-5.17	173.6	40.9	4.7	-0.4	CARHARRACK, CORNWALL		7	81	0.00	0.45	0.40	GEOTHERMAL
20200802	171709.8	50.22	-5.17	173.7	40.8	4.7	-0.9	CARHARRACK, CORNWALL		6	124	0.00	0.67	0.50	GEOTHERMAL
20200802	232543.5	50.22	-5.17	173.7	40.9	4.8	-0.0	CARHARRACK, CORNWALL		7	83	0.00	0.36	0.30	GEOTHERMAL
20200803	050229.7	50.23	-5.17	174.0	41.2	4.3	-0.3	CARHARRACK, CORNWALL		7	85	0.00	0.45	0.30	GEOTHERMAL
20200803	204137.1	50.22	-5.17	173.6	40.9	4.5	-0.9	CARHARRACK, CORNWALL		6	84	0.00	0.45	0.40	GEOTHERMAL

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YearMoDy	HrMnSecs	Lat	Lon	kmE	kmN	Dep	Mag	Locality	Int	No	Gap	RMS	ERH	ERZ	Comments
20200804	032702.5	50.23	-5.17	173.6	41.0	4.6	-1.0	CARHARRACK, CORNWALL		8	78	0.00	0.58	0.50	GEOTHERMAL
20200804	040254.3	56.19	-4.95	217.1	703.3	8.9	0.6	LOCH GOIL, ARGYLL/BUTE		4	141	0.30	5.69	6.70	
20200805	225724.4	56.04	-5.26	197.0	687.8	2.9	0.7	LOCHGAIR, ARGYLL & BUTE		5	134	0.10	2.68	5.20	5KM ESE LOCHGAIR
20200806	234540.3	55.92	-4.37	252.1	672.1	4.9	0.7	BEARSDEN, E DUNB'SHIRE		4	192	0.10	1.88	1.90	
20200807	062234.8	52.02	-3.58	291.8	237.0	14.1	1.1	TIRABAD, POWYS		5	155	0.10	1.49	1.60	6KM SE TIRABAD
20200808	110941.7	51.59	-3.40	302.7	189.1	2.1	1.0	TONYREFAIL, RHONDDA CT		5	150	0.20	5.59	3.30	
20200809	020424.9	54.04	-0.49	498.5	461.3	20.6	1.2	DRIFFIELD, E YORKSHIRE		9	167	0.20	3.23	2.30	
20200809	080815.1	56.21	-5.29	196.2	707.0	4.6	0.0	EREDINE, ARGYLL & BUTE		3	215	0.10	1.00	1.00	
20200812	001412.5	52.32	-1.79	414.4	269.1	7.0	0.9	HENLEY, WARWICKSHIRE		6	168	0.10	2.02	3.50	
20200812	043522.4	51.88	-2.83	342.7	220.2	18.7	0.9	CROSS ASH, MONMOUTHSHIRE		7	106	0.10	3.00	1.20	
20200814	035242.3	52.99	-2.18	387.8	344.2	13.7	0.7	STOKE-ON-TRENT, STAFFS		6	104	0.30	3.28	3.60	
20200816	151550.5	54.15	-2.97	336.8	473.5	4.1	0.5	FLOOKBURGH, CUMBRIA		6	160	0.10	1.30	1.90	
20200817	060718.5	52.83	-1.08	462.1	326.3	7.1	1.2	WYSALL, NOTTINGHAMSHIRE		9	132	0.20	1.84	2.10	
20200819	134819.4	52.21	-2.40	372.3	256.8	8.2	0.9	WHITBOURNE, HEREF		6	110	0.20	2.91	9.10	
20200819	221208.9	56.83	-5.25	201.8	775.1	13.6	0.6	DUISKY, HIGHLAND		5	148	0.30	4.74	5.20	
20200820	012915.5	56.40	-5.70	172.0	729.3	2.5	0.9	MULL, ARGYLL & BUTE		5	231	0.10	4.52	2.10	
20200820	161219.9	52.02	-3.56	292.8	236.7	13.9	1.2	TIRABAD, POWYS		6	155	0.20	2.16	2.00	7KM SE TIRABAD
20200821	064211.4	56.13	-4.03	274.0	695.4	6.9	0.7	GARGUNNOCK, STIRLING		6	152	0.10	1.26	1.20	
20200821	174152.3	57.18	-5.77	172.4	816.5	7.9	2.6	SKYE, HIGHLAND	3	12	196	0.40	1.95	2.50	FELT SKYE...
20200823	231334.7	56.19	-4.94	217.7	703.6	7.8	0.2	LOCH GOIL, ARGYLL/BUTE		3	195	0.40	1.09	8.50	
20200824	051553.0	55.85	-5.36	189.7	667.2	14.1	0.6	TARBERT, ARGYLL & BUTE		6	148	0.30	3.89	4.60	
20200826	222451.8	50.28	-5.31	164.4	47.5	7.6	-0.1	PORTREATH, CORNWALL		9	318	0.00	1.08	0.90	OFFSHORE LOCATION
20200828	101955.6	56.52	-5.44	188.5	741.7	4.5	1.0	BENDERLOCH, ARGYLL/BUTE	2	4	177	0.30	4.58	8.50	FELT ACHNACROISH
20200830	181019.9	51.59	-3.42	301.6	189.2	2.5	1.3	TONYREFAIL, RHONDDA CT	3	10	119	0.30	2.36	0.00	FELT TONYREFAIL
20200830	201455.1	56.09	-5.31	194.3	693.3	5.6	0.6	LOCHGAIR, ARGYLL & BUTE		4	139	0.10	5.51	9.40	3KM NE LOCHGAIR
20200831	003950.1	51.59	-3.42	301.8	189.4	2.0	0.8	TONYREFAIL, RHONDDA CT		8	113	0.20	2.50	0.00	
20200831	011638.5	50.21	-4.13	248.2	36.2	10.9	1.7	ENGLISH CHANNEL		15	106	0.30	4.46	6.40	18KM SOUTH PLYMOUTH
20200831	124038.1	55.09	-4.17	261.2	580.0	9.4	0.5	DALRY, D & G		7	73	0.30	3.98	3.20	
20200901	084606.4	55.92	-4.83	222.9	672.8	15.6	0.6	INVERKIP, INVERCLYDE		6	142	0.20	2.37	2.90	
20200902	152902.3	56.29	-3.75	291.5	712.3	8.3	1.3	BLACKFORD, PERTH/KINROSS	3	7	114	0.30	4.11	6.00	FELT BLACKFORD
20200903	010403.0	56.27	-3.74	292.3	709.9	2.7	0.4	BLACKFORD, PERTH/KINROSS		6	93	0.10	2.34	4.30	
20200904	043807.7	51.42	-2.59	359.2	168.8	5.7	1.0	BRISTOL, CITY OF BRISTOL		7	229	0.30	4.88	4.10	
20200906	025511.0	56.53	-5.35	194.1	742.1	9.5	0.8	BARCALDINE, ARGYLL/BUTE		5	162	0.20	3.11	4.10	
20200906	104411.8	51.59	-3.41	302.2	189.2	2.2	1.4	TONYREFAIL, RHONDDA CT		9	114	0.20	2.77	0.00	
20200908	084528.9	51.93	-0.74	486.8	226.1	10.0	3.5	LEIGHTON BUZZARD, BEDS	6	40	76	0.70	5.64	0.00	FELT LEIGHTON...
20200910	082151.4	55.29	-3.52	303.7	600.5	7.7	0.8	BEATOCK, D & G		8	190	0.20	3.66	6.70	
20200912	231401.7	51.59	-3.43	301.0	189.0	2.2	0.8	TONYREFAIL, RHONDDA CT		6	153	0.30	8.74	6.10	
20200913	080931.0	56.50	-3.91	282.6	736.2	6.2	1.2	AUCHNACLOICH, P & K		7	83	0.20	3.69	3.00	
20200913	105839.5	56.18	-4.95	217.2	702.6	7.9	0.6	LOCH GOIL, ARGYLL/BUTE		4	143	0.20	4.00	2.20	
20200913	125851.4	56.18	-4.94	217.3	702.8	7.7	0.5	LOCH GOIL, ARGYLL/BUTE		4	142	0.30	1.01	0.40	
20200913	143419.6	56.28	-3.75	291.9	711.4	7.9	1.2	BLACKFORD, PERTH/KINROSS		6	188	0.10	4.75	6.50	
20200913	143806.7	56.29	-3.73	292.7	712.3	6.5	1.1	BLACKFORD, PERTH/KINROSS		6	99	0.20	3.00	4.60	

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YearMoDy	HrMnSecs	Lat	Lon	kmE	kmN	Dep	Mag	Locality	Int	No	Gap	RMS	ERH	ERZ	Comments
20200913	232052.6	51.91	-0.71	488.8	224.4	10.0	2.1	LEIGHTON BUZZARD,BEDS	3	19	49	0.70	5.54	0.00	FELT LEIGHTON...
20200914	061126.4	51.92	-0.73	487.3	226.0	10.0	1.3	LEIGHTON BUZZARD,BEDS		7	181	0.90	1.19	0.00	
20200914	163748.4	56.28	-3.75	292.0	711.5	7.7	1.4	BLACKFORD, PERTH/KINROSS		10	96	0.30	2.75	0.60	
20200915	032846.0	51.92	-0.74	486.6	225.9	10.0	1.1	LEIGHTON BUZZARD,BEDS		7	181	0.90	1.48	0.00	
20200916	023936.4	49.08	-1.67	424.0	-91.1	14.7	2.8	JERSEY, CHANNEL ISLANDS	3	15	205	0.20	6.91	5.00	FELT JERSEY...
20200917	173142.2	53.59	-6.13	126.7	417.8	17.8	1.1	SKERRIES,COUNTY DUBLIN		10	141	0.20	6.17	6.40	
20200919	233357.3	50.27	-5.39	158.1	47.0	7.8	0.7	PORTREATH,CORNWALL		12	270	0.10	1.86	1.00	OFFSHORE LOCATION
20200922	083215.9	51.92	-0.68	490.8	225.4	10.0	3.0	LEIGHTON BUZZARD,BEDS	4	20	173	0.70	8.15	0.00	FELT LEIGHTON...
20200922	123921.8	51.93	-0.71	488.5	226.6	10.0	2.1	LEIGHTON BUZZARD,BEDS	3	13	139	0.40	4.25	0.00	FELT LEIGHTON...
20200922	184602.1	54.38	-4.30	250.3	500.7	8.2	0.7	IRISH SEA		8	102	0.30	5.27	9.10	8KM NE RAMSEY,IOM
20200923	222041.1	57.20	-5.55	185.6	818.3	4.3	1.0	GLENELG,HIGHLAND		5	163	0.20	0.87	6.70	
20200924	111145.7	53.12	-3.04	330.5	359.0	7.7	1.7	HOPE, FLINTSHIRE		11	89	0.40	3.69	9.40	
20200928	045406.3	56.27	-3.73	292.6	710.4	2.5	2.3	BLACKFORD, PERTH/KINROSS	3	15	92	0.30	2.95	4.80	FELT BLACKFORD...
20200929	144833.9	50.22	-5.17	173.6	40.9	4.4	-0.8	CARHARRACK,CORNWALL		6	93	0.00	0.45	0.40	GEOTHERMAL
20200929	152348.6	50.22	-5.17	173.7	40.9	4.6	-0.3	CARHARRACK,CORNWALL		8	83	0.00	0.45	0.40	GEOTHERMAL
20200929	152410.5	50.23	-5.17	173.6	41.0	4.6	-0.9	CARHARRACK,CORNWALL		7	94	0.00	0.54	0.50	GEOTHERMAL
20200929	152820.2	50.22	-5.17	173.8	40.9	4.9	-0.9	CARHARRACK,CORNWALL		6	123	0.00	0.63	0.50	GEOTHERMAL
20200929	153237.0	50.22	-5.17	173.6	40.8	4.2	-0.7	CARHARRACK,CORNWALL		6	127	0.00	0.58	0.50	GEOTHERMAL
20200929	153655.3	50.22	-5.17	173.6	40.9	4.8	-0.3	CARHARRACK,CORNWALL		7	128	0.00	0.50	0.40	GEOTHERMAL
20200929	155733.5	50.23	-5.17	173.8	41.3	4.3	-1.0	CARHARRACK,CORNWALL		4	299	0.00	0.94	0.70	GEOTHERMAL
20200929	160504.9	50.22	-5.17	173.7	40.9	4.6	-0.8	CARHARRACK,CORNWALL		7	125	0.00	0.54	0.40	GEOTHERMAL
20200929	165549.2	50.23	-5.17	173.6	41.0	4.8	-0.3	CARHARRACK,CORNWALL		7	108	0.00	0.36	0.30	GEOTHERMAL
20200929	165802.9	50.22	-5.18	173.1	40.9	4.3	-0.9	CARHARRACK,CORNWALL		7	103	0.10	1.22	1.50	GEOTHERMAL
20200929	172826.4	50.23	-5.17	173.6	41.0	4.7	-0.1	CARHARRACK,CORNWALL		6	129	0.00	0.36	0.30	GEOTHERMAL
20200929	175309.3	50.22	-5.17	173.8	40.9	4.9	-1.3	CARHARRACK,CORNWALL		5	155	0.00	0.54	0.30	GEOTHERMAL
20200929	175400.3	50.23	-5.17	173.6	41.0	4.8	-0.6	CARHARRACK,CORNWALL		7	107	0.00	0.45	0.40	GEOTHERMAL
20200929	180132.0	50.22	-5.17	173.6	40.9	4.8	-0.7	CARHARRACK,CORNWALL		6	127	0.00	0.36	0.30	GEOTHERMAL
20200929	180440.6	50.23	-5.17	173.6	41.0	4.9	-0.4	CARHARRACK,CORNWALL		6	128	0.00	0.54	0.30	GEOTHERMAL
20200929	180557.4	50.22	-5.18	173.4	40.0	4.8	-1.3	CARHARRACK,CORNWALL		6	159	0.10	0.51	2.20	GEOTHERMAL
20200929	181902.6	50.22	-5.17	173.6	40.9	4.9	-0.7	CARHARRACK,CORNWALL		6	124	0.00	0.36	0.30	GEOTHERMAL
20200929	183541.3	50.22	-5.17	173.7	40.9	4.8	-0.6	CARHARRACK,CORNWALL		8	83	0.00	0.36	0.30	GEOTHERMAL
20200929	183602.5	50.22	-5.17	173.6	40.9	4.9	-0.9	CARHARRACK,CORNWALL		7	110	0.00	0.45	0.40	GEOTHERMAL
20200929	184821.6	50.23	-5.17	173.6	41.0	4.8	0.0	CARHARRACK,CORNWALL		7	108	0.00	0.22	0.20	GEOTHERMAL
20200929	192726.5	50.23	-5.17	173.6	41.0	4.8	-0.9	CARHARRACK,CORNWALL		7	108	0.00	0.45	0.40	GEOTHERMAL
20200929	192743.3	50.22	-5.17	174.0	40.1	4.8	-0.9	CARHARRACK,CORNWALL		4	281	0.00	0.86	0.40	GEOTHERMAL
20200929	195901.5	50.23	-5.17	173.6	41.0	4.9	-0.7	CARHARRACK,CORNWALL		7	109	0.00	0.36	0.30	GEOTHERMAL
20200930	043326.5	50.22	-5.17	173.6	40.9	4.4	-0.8	CARHARRACK,CORNWALL		8	80	0.00	0.22	0.30	GEOTHERMAL
20200930	083553.6	50.22	-5.17	173.8	40.8	4.5	-0.5	CARHARRACK,CORNWALL		7	123	0.00	0.67	0.50	GEOTHERMAL
20200930	084453.9	50.23	-5.17	173.6	41.0	4.8	0.6	CARHARRACK,CORNWALL		8	79	0.00	0.45	0.40	GEOTHERMAL
20200930	085226.6	50.23	-5.17	173.6	41.1	4.8	-0.5	CARHARRACK,CORNWALL		7	129	0.00	0.76	0.50	GEOTHERMAL
20200930	090248.6	50.23	-5.17	173.8	41.0	4.4	-0.1	CARHARRACK,CORNWALL		8	83	0.00	0.36	0.30	GEOTHERMAL
20200930	095053.6	50.22	-5.17	174.2	40.8	4.9	-0.5	CARHARRACK,CORNWALL		8	101	0.00	0.89	0.70	GEOTHERMAL



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YearMoDy	HrMnSecs	Lat	Lon	kmE	kmN	Dep	Mag	Locality	Int	No	Gap	RMS	ERH	ERZ	Comments
20200930	095155.4	50.23	-5.19	172.6	41.3	4.2	-0.4	CARHARRACK, CORNWALL		8	92	0.10	1.39	1.30	GEOTHERMAL
20200930	095159.4	50.22	-5.17	173.8	40.9	4.9	-0.1	CARHARRACK, CORNWALL		8	85	0.00	0.45	0.40	GEOTHERMAL
20200930	095356.3	50.23	-5.17	173.6	41.0	4.7	-0.6	CARHARRACK, CORNWALL		7	86	0.00	0.45	0.40	GEOTHERMAL
20200930	100039.0	50.22	-5.17	173.6	40.8	4.8	-0.7	CARHARRACK, CORNWALL		5	134	0.20	0.51	0.00	GEOTHERMAL
20200930	101458.5	50.22	-5.17	173.8	40.8	4.6	-0.2	CARHARRACK, CORNWALL		7	123	0.00	0.54	0.40	GEOTHERMAL
20200930	101530.7	50.22	-5.17	173.7	40.8	4.5	-0.2	CARHARRACK, CORNWALL		7	125	0.00	0.54	0.40	GEOTHERMAL
20200930	101651.3	50.23	-5.17	173.6	41.0	4.9	-0.6	CARHARRACK, CORNWALL		7	92	0.00	0.54	0.40	GEOTHERMAL
20200930	101904.2	50.22	-5.18	173.2	40.9	4.3	-0.1	CARHARRACK, CORNWALL		8	70	0.10	1.48	1.50	GEOTHERMAL
20200930	102025.5	50.22	-5.17	173.6	40.9	4.7	-0.5	CARHARRACK, CORNWALL		8	81	0.00	0.45	0.40	GEOTHERMAL
20200930	102028.7	50.23	-5.17	173.6	41.0	4.8	-0.3	CARHARRACK, CORNWALL		8	81	0.00	0.45	0.30	GEOTHERMAL
20200930	102328.8	50.22	-5.17	173.6	40.9	4.7	-0.4	CARHARRACK, CORNWALL		8	80	0.00	0.36	0.30	GEOTHERMAL
20200930	102547.9	50.22	-5.18	173.3	40.9	4.2	-0.6	CARHARRACK, CORNWALL		8	74	0.10	1.21	1.10	GEOTHERMAL
20200930	103007.1	50.23	-5.17	173.6	41.1	4.5	-0.5	CARHARRACK, CORNWALL		8	78	0.00	0.36	0.30	GEOTHERMAL
20200930	104007.3	50.23	-5.17	173.6	41.1	4.8	-0.5	CARHARRACK, CORNWALL		7	94	0.00	0.54	0.40	GEOTHERMAL
20200930	104702.5	50.23	-5.18	172.9	41.0	4.2	-0.6	CARHARRACK, CORNWALL		8	69	0.10	1.25	1.20	GEOTHERMAL
20200930	105057.9	50.23	-5.17	174.0	41.2	4.1	-0.7	CARHARRACK, CORNWALL		8	83	0.00	0.45	0.40	GEOTHERMAL
20200930	110241.4	50.23	-5.17	173.8	41.0	4.7	-0.4	CARHARRACK, CORNWALL		8	83	0.10	1.25	1.00	GEOTHERMAL
20200930	111039.4	50.22	-5.17	173.6	40.9	4.8	0.2	CARHARRACK, CORNWALL		8	80	0.00	0.58	0.50	GEOTHERMAL
20200930	111447.7	50.22	-5.17	173.6	40.9	4.9	0.2	CARHARRACK, CORNWALL		8	80	0.00	0.45	0.40	GEOTHERMAL
20200930	111935.6	50.22	-5.17	173.7	40.9	4.8	0.9	CARHARRACK, CORNWALL		8	82	0.00	0.45	0.40	GEOTHERMAL
20200930	112210.0	50.22	-5.17	173.6	40.9	4.6	0.0	CARHARRACK, CORNWALL		8	79	0.00	0.85	0.70	GEOTHERMAL
20200930	113920.4	50.22	-5.17	173.8	40.8	4.9	-0.5	CARHARRACK, CORNWALL		7	85	0.10	0.86	0.70	GEOTHERMAL
20200930	114007.4	50.22	-5.17	173.8	40.9	4.7	-0.2	CARHARRACK, CORNWALL		8	83	0.00	0.36	0.30	GEOTHERMAL
20200930	114335.0	50.22	-5.17	173.8	40.9	4.7	-0.1	CARHARRACK, CORNWALL		9	84	0.00	0.36	0.30	GEOTHERMAL
20200930	114401.5	50.23	-5.17	173.6	41.0	4.8	1.6	CARHARRACK, CORNWALL	3	12	79	0.00	0.36	0.30	GEOTHERMAL
20200930	115707.3	50.23	-5.17	173.6	41.0	4.9	1.3	CARHARRACK, CORNWALL		8	80	0.00	0.45	0.30	GEOTHERMAL
20200930	120332.5	50.23	-5.17	174.0	41.1	4.7	-0.4	CARHARRACK, CORNWALL		8	88	0.00	0.58	0.50	GEOTHERMAL
20200930	120434.5	50.23	-5.17	173.7	41.1	4.6	-0.3	CARHARRACK, CORNWALL		8	80	0.00	0.22	0.20	GEOTHERMAL
20200930	121006.9	50.23	-5.18	173.1	41.4	4.3	-0.7	CARHARRACK, CORNWALL		6	104	0.00	0.76	0.70	GEOTHERMAL
20200930	121447.6	50.23	-5.17	173.6	41.0	4.8	-0.7	CARHARRACK, CORNWALL		7	93	0.00	0.54	0.40	GEOTHERMAL
20200930	122851.2	50.22	-5.17	173.7	40.9	4.8	-0.7	CARHARRACK, CORNWALL		7	91	0.00	0.54	0.40	GEOTHERMAL
20200930	123457.1	50.23	-5.17	173.6	41.0	4.8	-0.4	CARHARRACK, CORNWALL		8	81	0.00	0.45	0.30	GEOTHERMAL
20200930	124050.7	50.23	-5.17	173.6	41.1	4.9	-0.3	CARHARRACK, CORNWALL		8	77	0.00	0.45	0.40	GEOTHERMAL
20200930	124832.8	50.23	-5.17	173.6	41.1	4.8	-0.6	CARHARRACK, CORNWALL		7	87	0.00	0.54	0.50	GEOTHERMAL
20200930	125627.8	50.22	-5.17	173.8	40.9	4.9	-0.5	CARHARRACK, CORNWALL		8	83	0.00	0.36	0.30	GEOTHERMAL
20200930	132430.9	50.23	-5.17	173.6	41.0	4.8	0.6	CARHARRACK, CORNWALL		8	81	0.00	0.36	0.30	GEOTHERMAL
20200930	133250.5	50.23	-5.17	173.6	41.1	4.8	-0.8	CARHARRACK, CORNWALL		7	105	0.00	0.36	0.30	GEOTHERMAL
20200930	135100.8	50.23	-5.17	173.6	41.0	4.7	-0.4	CARHARRACK, CORNWALL		8	77	0.00	0.36	0.30	GEOTHERMAL
20200930	135212.1	50.23	-5.17	173.6	41.0	4.6	0.2	CARHARRACK, CORNWALL		8	78	0.00	0.45	0.30	GEOTHERMAL
20200930	154226.9	50.22	-5.17	173.8	40.9	4.9	-0.5	CARHARRACK, CORNWALL		8	83	0.00	0.45	0.40	GEOTHERMAL
20200930	184956.0	50.23	-5.17	173.6	41.0	4.8	0.6	CARHARRACK, CORNWALL		8	78	0.00	0.36	0.30	GEOTHERMAL
20200930	193822.7	50.23	-5.17	173.6	41.0	4.9	-0.2	CARHARRACK, CORNWALL		8	78	0.00	0.36	0.30	GEOTHERMAL

**TABLE 1 : CATALOGUE OF EVENTS : 2020**

YearMoDy	HrMnSecs	Lat	Lon	kmE	kmN	Dep	Mag	Locality	Int	No	Gap	RMS	ERH	ERZ	Comments
20201001	010134.7	50.22	-5.17	173.6	40.9	4.5	-0.8	CARHARRACK, CORNWALL		8	81	0.00	0.45	0.40	GEOTHERMAL
20201001	042849.6	50.23	-5.17	173.6	41.0	4.9	-0.6	CARHARRACK, CORNWALL		8	79	0.00	0.45	0.40	GEOTHERMAL
20201002	094434.9	50.23	-5.17	173.8	41.0	4.9	-0.3	CARHARRACK, CORNWALL		7	114	0.00	0.73	0.40	GEOTHERMAL
20201002	104431.2	50.23	-5.17	173.6	41.0	4.8	0.4	CARHARRACK, CORNWALL		8	79	0.00	0.45	0.30	GEOTHERMAL
20201002	121359.7	50.23	-5.17	173.6	41.1	5.0	-0.1	CARHARRACK, CORNWALL		8	78	0.00	0.45	0.40	GEOTHERMAL
20201004	184341.8	56.27	-3.75	291.5	710.5	6.7	2.5	BLACKFORD, PERTH/KINROSS	3	12	91	0.20	2.91	5.00	FELT BLACKFORD...
20201004	210134.2	56.29	-3.77	290.7	711.8	2.6	0.8	BLACKFORD, PERTH/KINROSS	2	6	114	0.20	4.48	8.50	FELT BLACKFORD
20201004	215242.2	55.42	-3.44	309.0	615.1	6.1	1.0	GLENBRECK, BORDERS		10	103	0.30	5.24	7.60	
20201005	032534.8	53.55	2.06	668.9	413.2	10.0	2.6	SOUTHERN NORTH SEA		21	263	0.50	9.75	0.00	85KM NE CROMER
20201006	051616.9	61.49	4.14	726.5	1304.7	10.0	2.2	NORWEGIAN SEA		5	177	0.40	2.45	0.00	325KM ENE LERWICK
20201007	083505.8	55.73	-3.21	324.0	649.3	6.2	1.7	EDDLESTON, BORDERS	2	12	150	0.40	7.12	7.40	FELT EDDLESTON
20201008	042433.6	54.18	-0.53	496.3	476.8	19.5	2.3	SHERBURN, N YORKSHIRE		26	155	0.40	4.57	2.60	
20201009	073354.0	56.29	-3.76	291.0	712.6	7.7	0.6	BLACKFORD, PERTH/KINROSS		7	145	0.20	2.92	3.40	
20201010	062331.6	56.28	-3.75	291.9	711.2	5.2	1.5	BLACKFORD, PERTH/KINROSS	3	12	91	0.40	2.78	4.30	FELT BLACKFORD...
20201010	062844.7	56.28	-3.75	291.5	711.1	7.7	1.8	BLACKFORD, PERTH/KINROSS	3	12	91	0.40	2.72	4.10	FELT BLACKFORD...
20201010	073101.1	56.28	-3.75	291.5	711.2	7.5	0.8	BLACKFORD, PERTH/KINROSS		8	95	0.30	2.75	8.00	
20201011	171133.3	52.60	-4.18	252.2	302.6	7.5	1.8	TONFANAU, GWYNEDD		17	60	0.40	2.91	7.50	OFFSHORE LOCATION
20201012	221551.4	56.62	-5.72	172.0	753.7	8.1	0.8	CLAGGAN, HIGHLAND		4	209	0.50	5.27	0.50	
20201013	215922.5	53.55	-1.86	409.1	406.1	11.1	1.2	MELTHAM, WEST YORKSHIRE	3	7	132	0.20	3.08	3.80	FELT MELTHAM...
20201013	224908.4	56.29	-3.75	291.8	712.4	7.7	1.0	BLACKFORD, PERTH/KINROSS		10	98	0.30	3.08	9.80	
20201014	040623.6	56.28	-3.76	291.2	711.6	7.5	0.4	BLACKFORD, PERTH/KINROSS		8	95	0.30	5.09	7.90	
20201014	172906.9	57.16	-5.19	207.1	812.1	6.2	0.8	LOCH CLUANIE, HIGHLAND		6	119	0.50	8.06	7.90	
20201015	053322.2	56.29	-3.75	291.8	712.1	7.5	0.5	BLACKFORD, PERTH/KINROSS		6	115	0.20	2.97	7.70	
20201015	224539.1	51.42	-2.60	358.1	169.8	11.0	0.9	BRISTOL, CITY OF BRISTOL		8	183	0.20	3.19	3.60	
20201016	054226.5	61.49	3.29	681.3	1301.3	18.9	3.5	NORWEGIAN SEA		15	180	0.50	0.75	6.40	285KM ENE LERWICK
20201017	153935.7	56.26	-3.78	289.7	708.8	2.6	0.7	BLACKFORD, PERTH/KINROSS		7	149	0.30	4.29	5.40	
20201017	190035.5	56.30	-3.78	290.0	713.4	11.9	0.4	BLACKFORD, PERTH/KINROSS		8	98	0.40	4.22	4.40	
20201018	095034.0	56.27	-3.76	291.1	710.0	4.2	0.9	BLACKFORD, PERTH/KINROSS		9	90	0.30	3.81	5.30	
20201018	101448.5	56.27	-3.75	291.6	710.1	2.5	0.8	BLACKFORD, PERTH/KINROSS	2	9	126	0.30	4.13	3.30	FELT BLACKFORD
20201019	074651.6	56.29	-3.75	291.6	712.2	7.4	0.6	BLACKFORD, PERTH/KINROSS		6	114	0.20	1.80	0.00	
20201019	091634.3	56.28	-3.79	289.1	711.0	2.5	0.5	BLACKFORD, PERTH/KINROSS		4	206	0.10	2.20	1.90	
20201021	024934.5	53.35	-0.57	495.4	384.9	24.0	2.5	SCAMPTON, LINCOLNSHIRE	3	17	77	0.40	3.85	2.40	FELT NORTH HYKEHAM...
20201023	225605.6	50.22	-5.17	173.7	40.9	5.0	-0.7	CARHARRACK, CORNWALL		8	83	0.00	0.58	0.50	GEOTHERMAL
20201024	125806.9	55.10	-3.75	288.1	579.5	11.4	2.0	DUMFRIES, D & G	3	14	51	0.30	3.58	7.60	FELT DUMFRIES...
20201024	212312.6	54.67	-2.10	393.2	530.9	6.6	1.5	NEWBIGGIN, COUNTY DURHAM		14	81	0.30	2.30	4.10	
20201026	053548.7	55.42	-3.42	310.2	615.2	8.3	0.9	GLENBRECK, BORDERS		8	106	0.20	3.32	6.90	
20201026	130343.8	50.23	-5.17	173.6	41.0	4.8	0.2	CARHARRACK, CORNWALL		8	77	0.00	0.36	0.30	GEOTHERMAL
20201026	182849.5	50.23	-5.17	173.6	41.0	4.7	-0.7	CARHARRACK, CORNWALL		8	76	0.00	0.36	0.30	GEOTHERMAL
20201027	001251.1	54.19	-2.16	389.7	477.2	5.9	0.7	BUCKDEN, N YORKSHIRE		10	65	0.20	1.86	2.30	
20201027	130649.8	50.23	-5.18	173.1	41.0	4.4	-0.5	CARHARRACK, CORNWALL		7	104	0.10	1.30	0.90	GEOTHERMAL
20201027	135550.9	50.22	-5.17	173.9	40.9	5.2	0.2	CARHARRACK, CORNWALL		8	89	0.10	1.70	1.30	GEOTHERMAL
20201027	141756.2	50.22	-5.17	173.7	40.9	4.9	1.0	CARHARRACK, CORNWALL		8	82	0.00	0.45	0.40	GEOTHERMAL

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YearMoDy	HrMnSecs	Lat	Lon	kmE	kmN	Dep	Mag	Locality	Int	No	Gap	RMS	ERH	ERZ	Comments
20201027	141846.0	50.23	-5.17	173.6	41.0	4.7	0.7	CARHARRACK, CORNWALL		8	80	0.00	0.45	0.40	GEOTHERMAL
20201027	185340.3	52.40	-1.88	407.9	277.7	7.9	0.9	HOLLYWOOD, WORCS		6	150	0.30	4.17	0.20	
20201030	113822.4	50.23	-5.18	173.5	41.0	4.8	-0.5	CARHARRACK, CORNWALL		8	76	0.00	0.36	0.30	GEOTHERMAL
20201030	114037.3	50.22	-5.17	173.6	40.9	5.4	-0.6	CARHARRACK, CORNWALL		7	109	0.10	3.23	1.40	GEOTHERMAL
20201030	114202.0	50.23	-5.17	173.6	41.1	4.8	-0.5	CARHARRACK, CORNWALL		8	78	0.00	0.45	0.40	GEOTHERMAL
20201030	182632.5	56.29	-3.75	291.8	712.3	7.1	0.5	BLACKFORD, PERTH/KINROSS		8	98	0.30	3.38	7.30	
20201031	204634.1	50.22	-5.17	173.8	40.9	4.4	-0.8	CARHARRACK, CORNWALL		8	85	0.00	0.45	0.30	GEOTHERMAL
20201103	222054.5	58.16	1.09	581.9	923.7	26.9	2.7	CENTRAL NORTH SEA		15	157	0.40	8.45	5.30	220KM NE ABERDEEN
20201105	032616.7	53.73	-2.01	399.1	426.3	2.5	1.2	HEBDEN BRIDGE, W YORKS		10	107	0.50	4.98	7.40	
20201105	140601.1	50.23	-5.17	173.6	41.0	4.5	-0.8	CARHARRACK, CORNWALL		8	80	0.00	0.45	0.40	GEOTHERMAL
20201105	160445.8	50.22	-5.17	173.7	40.9	4.8	-0.5	CARHARRACK, CORNWALL		18	46	0.00	0.22	0.20	GEOTHERMAL
20201106	150151.4	50.23	-5.17	173.7	41.0	4.7	-0.1	CARHARRACK, CORNWALL		18	45	0.00	0.22	0.20	GEOTHERMAL
20201106	151444.3	50.23	-5.17	173.6	41.0	4.7	0.6	CARHARRACK, CORNWALL		19	45	0.00	0.22	0.20	GEOTHERMAL
20201106	152249.8	50.23	-5.17	173.6	41.1	5.0	-0.2	CARHARRACK, CORNWALL		19	43	0.00	0.36	0.20	GEOTHERMAL
20201107	032324.4	53.03	-2.14	390.9	348.2	2.8	1.3	STOKE-ON-TRENT, STAFFS		12	86	0.50	4.39	7.30	
20201107	062320.6	50.23	-5.18	173.5	41.1	5.1	-0.6	CARHARRACK, CORNWALL		17	50	0.00	0.36	0.30	GEOTHERMAL
20201107	080139.1	54.24	-0.16	519.8	484.2	4.6	1.3	SOUTHERN NORTH SEA		12	247	0.30	7.21	5.10	9KM OFFSHORE FILEY
20201109	012120.2	56.77	-5.75	170.6	770.3	2.7	1.1	DALNABRECK, HIGHLAND		7	207	0.50	4.38	6.90	
20201109	140556.4	50.23	-5.17	173.6	41.1	5.0	-0.7	CARHARRACK, CORNWALL		19	44	0.00	0.36	0.20	GEOTHERMAL
20201109	153550.6	50.23	-5.17	173.6	41.1	5.0	0.2	CARHARRACK, CORNWALL		19	42	0.00	0.36	0.20	GEOTHERMAL
20201109	154134.9	50.23	-5.17	173.6	41.1	5.0	-0.6	CARHARRACK, CORNWALL		19	43	0.00	0.36	0.20	GEOTHERMAL
20201109	164332.1	50.23	-5.17	173.6	41.1	5.0	0.2	CARHARRACK, CORNWALL		19	44	0.00	0.32	0.20	GEOTHERMAL
20201110	161459.7	50.23	-5.17	173.6	41.1	5.0	-0.2	CARHARRACK, CORNWALL		18	43	0.00	0.36	0.20	GEOTHERMAL
20201110	163735.6	50.23	-5.17	173.6	41.1	5.0	-0.4	CARHARRACK, CORNWALL		18	43	0.00	0.36	0.20	GEOTHERMAL
20201110	164536.6	50.23	-5.17	173.6	41.1	5.1	0.0	CARHARRACK, CORNWALL		19	43	0.00	0.36	0.30	GEOTHERMAL
20201110	171536.9	50.23	-5.17	173.6	41.1	5.1	-0.4	CARHARRACK, CORNWALL		19	43	0.00	0.36	0.20	GEOTHERMAL
20201110	171945.4	50.23	-5.17	173.6	41.1	5.1	-0.4	CARHARRACK, CORNWALL		19	44	0.00	0.36	0.20	GEOTHERMAL
20201110	172608.2	50.23	-5.17	173.6	41.1	5.0	-0.8	CARHARRACK, CORNWALL		19	43	0.00	0.36	0.20	GEOTHERMAL
20201110	185130.4	50.23	-5.17	173.6	41.1	5.1	-0.8	CARHARRACK, CORNWALL		19	43	0.00	0.36	0.20	GEOTHERMAL
20201110	185336.7	50.23	-5.17	173.6	41.1	4.9	-1.0	CARHARRACK, CORNWALL		8	76	0.00	0.45	0.40	GEOTHERMAL
20201110	202130.7	50.23	-5.17	173.6	41.1	4.9	0.1	CARHARRACK, CORNWALL		8	78	0.00	0.36	0.30	GEOTHERMAL
20201110	221448.9	50.23	-5.17	173.8	41.0	5.0	-1.1	CARHARRACK, CORNWALL		8	82	0.00	0.45	0.30	GEOTHERMAL
20201110	230450.0	50.23	-5.17	173.6	41.1	4.9	-0.8	CARHARRACK, CORNWALL		8	76	0.00	0.45	0.40	GEOTHERMAL
20201111	064815.3	56.29	-3.76	290.8	712.6	7.4	0.7	BLACKFORD, PERTH/KINROSS		6	211	0.20	3.40	0.00	
20201111	123556.8	50.23	-5.17	173.6	41.1	5.1	-0.5	CARHARRACK, CORNWALL		7	92	0.00	0.76	0.60	GEOTHERMAL
20201111	142528.9	50.22	-5.17	173.6	40.9	4.6	-0.5	CARHARRACK, CORNWALL		8	81	0.00	0.58	0.50	GEOTHERMAL
20201111	154429.9	50.23	-5.17	173.6	41.1	4.9	0.0	CARHARRACK, CORNWALL		7	93	0.00	0.67	0.40	GEOTHERMAL
20201111	233811.9	56.09	-5.54	179.5	693.7	6.0	1.4	CRINAN, ARGYLL & BUTE		6	159	0.30	8.77	8.00	
20201112	165506.9	50.23	-5.18	173.5	41.0	4.8	0.7	CARHARRACK, CORNWALL		8	76	0.00	0.36	0.30	GEOTHERMAL
20201112	184752.6	56.27	-3.76	290.9	710.1	2.7	0.3	BLACKFORD, PERTH/KINROSS		4	182	0.20	3.38	4.30	
20201113	022335.7	50.23	-5.18	173.5	41.0	4.3	-0.2	CARHARRACK, CORNWALL		8	76	0.00	0.58	0.50	GEOTHERMAL
20201113	160659.3	50.23	-5.17	173.6	41.0	4.6	-0.5	CARHARRACK, CORNWALL		7	86	0.00	0.45	0.40	GEOTHERMAL

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20201114	100920.0	54.69	-2.40	374.0	532.6	3.4	0.8	GARRIGILL,CUMBRIA		9	97	0.20	2.56	3.90	8KM SOUTH GARRIGILL
20201116	063156.5	52.64	-2.74	350.1	304.5	9.3	1.2	DORRINGTON,SHROPSHIRE	2	5	134	0.10	2.62	6.50	FELT STAPLETON
20201117	033823.6	56.29	-3.75	291.7	712.5	7.5	0.9	BLACKFORD,PERTH/KINROSS		8	98	0.40	5.13	3.60	
20201117	034228.0	56.29	-3.75	291.8	712.1	8.9	0.7	BLACKFORD,PERTH/KINROSS		7	97	0.30	4.30	3.40	
20201117	143817.9	61.34	3.48	692.8	1284.9	16.0	2.5	NORWEGIAN SEA		5	171	0.40	8.36	6.70	285KM ENE LERWICK
20201121	162310.5	56.28	-3.76	291.3	711.2	7.7	0.9	BLACKFORD,PERTH/KINROSS	2	7	95	0.20	2.16	0.00	FELT BLACKFORD
20201121	215600.6	56.28	-3.75	291.8	711.6	7.5	0.7	BLACKFORD,PERTH/KINROSS		7	97	0.30	2.80	8.00	
20201122	050639.0	57.07	-4.74	234.0	800.5	6.8	0.9	INVERGARRY,HIGHLAND		6	117	0.40	3.94	0.00	
20201122	225754.9	56.98	-5.60	181.3	793.7	7.6	1.3	LOCH NEVIS,HIGHLAND		5	184	0.30	1.08	8.80	
20201123	011912.8	51.94	-2.96	334.1	227.1	8.6	1.3	CLODOCK,HEREFORDSHIRE	2	9	88	0.30	4.57	6.10	FELT CLODOCK
20201125	185647.2	51.16	-0.25	522.2	141.0	2.5	0.3	NEWDIGATE,SURREY		4	184	0.00	0.36	0.40	
20201125	233931.8	50.22	-5.17	173.6	40.9	4.6	-0.3	CARHARRACK,CORNWALL		8	80	0.00	0.45	0.40	GEOTHERMAL
20201127	032235.2	56.27	-3.75	291.9	710.4	6.2	2.0	BLACKFORD,PERTH/KINROSS	3	13	91	0.30	2.61	4.10	FELT BLACKFORD...
20201201	101424.1	50.22	-5.17	173.6	40.9	4.6	-0.4	CARHARRACK,CORNWALL		7	93	0.00	0.45	0.40	GEOTHERMAL
20201201	101433.5	50.22	-5.17	173.6	40.9	4.6	-1.0	CARHARRACK,CORNWALL		7	94	0.00	0.67	0.50	GEOTHERMAL
20201201	101652.4	50.22	-5.17	173.6	40.9	4.6	0.0	CARHARRACK,CORNWALL		8	81	0.00	0.36	0.30	GEOTHERMAL
20201201	152455.3	50.22	-5.17	173.6	40.9	4.7	0.9	CARHARRACK,CORNWALL		8	80	0.00	0.36	0.30	GEOTHERMAL
20201201	152519.5	50.22	-5.17	173.7	40.9	4.6	-0.3	CARHARRACK,CORNWALL		8	82	0.00	0.36	0.30	GEOTHERMAL
20201201	152624.2	50.23	-5.17	173.8	41.0	4.4	-0.5	CARHARRACK,CORNWALL		8	83	0.00	0.36	0.30	GEOTHERMAL
20201204	153707.4	50.23	-5.17	173.6	41.0	4.7	-0.3	CARHARRACK,CORNWALL		8	78	0.00	0.54	0.40	GEOTHERMAL
20201207	082917.3	55.45	-7.07	79.3	628.5	6.9	0.5	INSHTRAHULL,CO DONEGAL		3	195	0.10	2.64	5.40	OFFSHORE LOCATION
20201208	102937.5	50.22	-5.17	173.7	40.9	4.6	-0.8	CARHARRACK,CORNWALL		8	82	0.00	0.36	0.30	GEOTHERMAL
20201208	103522.6	50.22	-5.17	173.6	40.9	4.5	-0.5	CARHARRACK,CORNWALL		8	81	0.00	0.45	0.30	GEOTHERMAL
20201208	104400.3	50.23	-5.17	173.6	41.0	4.8	0.7	CARHARRACK,CORNWALL		8	78	0.00	0.45	0.30	GEOTHERMAL
20201208	104409.5	50.23	-5.17	173.6	41.0	4.8	0.1	CARHARRACK,CORNWALL		8	78	0.00	0.36	0.30	GEOTHERMAL
20201208	104615.1	50.23	-5.17	173.6	41.0	4.8	1.7	CARHARRACK,CORNWALL	2	11	79	0.00	0.36	0.30	GEOTHERMAL
20201208	104726.4	50.23	-5.17	173.6	41.0	4.9	-0.3	CARHARRACK,CORNWALL		7	94	0.00	0.54	0.40	GEOTHERMAL
20201208	104731.7	50.22	-5.18	173.3	40.8	4.6	-0.8	CARHARRACK,CORNWALL		7	103	0.10	1.08	0.00	GEOTHERMAL
20201208	110454.8	50.23	-5.17	173.6	41.0	4.9	-0.2	CARHARRACK,CORNWALL		8	79	0.00	0.45	0.30	GEOTHERMAL
20201208	212550.4	50.23	-5.17	173.6	41.0	4.9	-0.8	CARHARRACK,CORNWALL		8	79	0.00	0.45	0.30	GEOTHERMAL
20201209	232923.7	55.31	-3.54	302.6	602.8	7.5	0.2	BEATTOCK,D & G		4	203	0.30	8.92	3.00	
20201211	041327.2	52.88	-5.45	167.8	337.6	8.2	0.6	IRISH SEA		7	83	0.30	4.53	8.70	40KM EAST WICKLOW
20201214	144947.6	56.29	-3.75	291.6	711.8	8.6	1.2	BLACKFORD,PERTH/KINROSS	3	9	96	0.30	3.86	5.50	FELT BLACKFORD...
20201215	032917.7	56.28	-3.75	291.7	711.3	7.7	0.5	BLACKFORD/PERTH/KINROSS		8	95	0.30	3.08	0.80	
20201216	004903.7	51.16	-0.24	523.1	141.6	2.0	0.0	NEWDIGATE,SURREY		4	185	0.00	0.45	0.30	
20201216	011457.7	56.99	-5.84	166.9	795.3	6.5	0.5	MALLAIG,HIGHLAND		4	214	0.40	5.23	4.90	
20201216	165717.8	55.41	-2.42	373.5	612.4	12.2	0.8	CAMPTOWN,BORDERS		4	292	0.40	2.88	0.80	
20201217	061438.2	56.54	-3.94	280.8	740.0	2.5	1.1	KENMORE,PERTH/KINROSS		8	172	0.40	7.63	6.30	5KM SSE KENMORE
20201218	112038.1	50.22	-5.17	173.6	40.9	4.7	-0.1	CARHARRACK,CORNWALL		8	78	0.00	0.36	0.30	GEOTHERMAL
20201218	112220.2	50.23	-5.17	173.6	41.1	4.9	0.0	CARHARRACK,CORNWALL		8	76	0.00	0.45	0.40	GEOTHERMAL
20201218	112554.1	50.23	-5.17	173.6	41.0	4.6	0.4	CARHARRACK,CORNWALL		8	77	0.00	0.58	0.50	GEOTHERMAL
20201218	112732.5	50.23	-5.18	173.5	41.2	4.8	-0.3	CARHARRACK,CORNWALL		7	102	0.00	0.67	0.50	GEOTHERMAL

**TABLE 1 : CATALOGUE OF EVENTS : 2020**

YearMoDy	HrMnSecs	Lat	Lon	kmE	kmN	Dep	Mag	Locality	Int	No	Gap	RMS	ERH	ERZ	Comments
20201218	130553.1	50.23	-5.17	173.6	41.0	5.1	-0.4	CARHARRACK,CORNWALL		8	80	0.00	0.50	0.40	GEOTHERMAL
20201219	002628.8	51.31	0.49	573.3	160.2	2.4	1.8	AYLESFORD,KENT		11	93	0.30	2.77	4.50	
20201219	115018.2	56.52	-3.92	281.6	737.6	4.0	0.8	KENMORE,PERTH/KINROSS		6	170	0.40	6.26	5.60	
20201219	212810.5	54.08	-0.86	474.4	465.4	24.1	1.8	WESTOW,NORTH YORKSHIRE		15	113	0.20	3.61	2.10	
20201220	211322.2	53.74	1.43	626.2	432.8	11.1	3.3	SOUTHERN NORTH SEA		29	219	0.50	2.19	4.00	100KM EAST GRIMSBY
20201222	184332.3	56.51	-5.39	191.2	740.3	4.5	0.8	BENDERLOCH,ARGYLL/BUTE		4	275	0.20	3.96	7.50	
20201225	004117.4	53.66	-3.91	274.0	420.3	3.1	0.1	IRISH SEA		6	125	0.40	5.44	4.20	40KM NE AMLWCH
20201225	065220.4	55.47	-5.95	150.5	627.1	7.2	2.4	KINTYRE,ARGYLL & BUTE	3	14	135	0.30	3.76	5.80	FELT KILCHENZIE...
20201229	074602.2	53.68	-4.10	261.1	422.4	7.9	0.4	IRISH SEA		7	108	0.20	3.23	5.70	33KM NNE AMLWCH
20201230	231505.3	56.40	-4.00	276.6	724.8	4.5	0.2	COMRIE,PERTH & KINROSS		5	198	0.10	1.30	0.90	
20201231	111812.0	55.66	-3.44	309.6	642.1	7.4	1.9	SKIRLING,BORDERS	3	16	129	0.40	6.55	0.30	FELT SKIRLING...











# TABLE 2 : PHASE DATA

February 1 2020	Time: 01:19 39.4 UTC	Magnitude: 2.7 ML	
Lat: 53.314	Lon: 3.163	Depth: 10.0 km	
Grid Ref: 743.81 kmE 392.14 kmN		RMS: 0.50 secs	
Locality: SOUTHERN NORTH SEA			
Velocity model: North Sea	Xnear: 400.0	Xfar: 600.0	
Comment: 130KM NE LOWESTOFT			
STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES			
WACR HZ 182.0 EP 01:20 05.73		-0.79	
WACR HN 182.0 ES 01:20 26.41		0.07	
WACR HN 182.0 IAML 01:20 33.31	67	0.22	
WACR HE 182.0 IAML 01:20 34.81	59	0.24	
ELMS HZ 200.0 EP 01:20 08.77			0.04
ELMS HN 200.0 ES 01:20 30.24			0.08
ELMS HE 200.0 IAML 01:20 40.24	104	0.18	
ELMS HN 200.0 IAML 01:20 40.42	103	0.16	
BRAD CZ 233.0 EP 01:20 13.12			0.34
BRAD CN 233.0 IAML 01:20 51.68	41	0.46	
BRAD CE 233.0 IAML 01:20 52.36	54	0.30	
LMK HZ 233.0 EP 01:20 13.51			0.73
LMK HE 233.0 IAML 01:20 48.41	84	0.40	
LMK HN 233.0 IAML 01:20 48.53	93	0.38	
CWF HZ 307.0 EP 01:20 21.50			-0.48
CWF HN 307.0 IAML 01:21 08.68	18	0.36	
CWF HE 307.0 IAML 01:21 14.48	12	0.36	
February 1 2020	Time: 01:20 28.4 UTC	Magnitude: 2.9 ML	
Lat: 53.314	Lon: 3.163	Depth: 10.0 km	
Grid Ref: 743.81 kmE 392.14 kmN		RMS: 0.50 secs	
Locality: SOUTHERN NORTH SEA			
Velocity model: North Sea	Xnear: 400.0	Xfar: 600.0	
Comment: 130KM NE LOWESTOFT			
STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES			
WACR HZ 182.0 EP 01:20 54.73		-0.79	
WACR HN 182.0 ES 01:21 15.41		0.07	
WACR HE 182.0 IAML 01:21 24.26	81	0.15	
WACR HN 182.0 IAML 01:21 25.16	112	0.30	
ELMS HZ 200.0 EP 01:20 57.77			0.04
ELMS HN 200.0 ES 01:21 19.24			0.08
ELMS HE 200.0 IAML 01:21 27.84	148	0.26	
ELMS HN 200.0 IAML 01:21 35.07	144	0.28	
LMK HZ 233.0 EP 01:21 02.51			0.73
LMK HN 233.0 IAML 01:21 44.04	98	0.28	
LMK HE 233.0 IAML 01:21 43.79	102	0.30	
BRAD CZ 233.0 EP 01:21 02.12			0.34
BRAD CN 233.0 IAML 01:21 35.84	61	0.62	
BRAD CE 233.0 IAML 01:21 32.04	53	0.23	
CWF HZ 307.0 EP 01:21 10.50			-0.48
February 3 2020	Time: 00:36 10.4 UTC	Magnitude: 1.7 ML	
Lat: 55.797	Lon: -6.357	Depth: 7.5 km	
Grid Ref: 126.96 kmE 664.56 kmN		RMS: 0.40 secs	
Locality: ISLAY, ARGYLL & BUTE			
Velocity model: Lownet	Xnear: 125.0	Xfar: 259.0	
Comment: FELT ISLAY		Intensity: 3	
STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES			
LAWE HZ 78.9 EP 00:36 23.09		-0.38	
LAWE HE 78.9 ES 00:36 32.79		-0.25	
LAWE HN 78.9 IAML 00:36 33.97	38	0.18	
LAWE HE 78.9 IAML 00:36 36.13	43	0.20	
CLGH HZ 81.0 EP 00:36 24.20			0.38
CLGH HE 81.0 ES 00:36 32.80			-0.85
CLGH HE 81.0 IAML 00:36 35.25	33	0.23	
CLGH HN 81.0 IAML 00:36 36.03	32	0.28	
IDGL HZ 109.0 EP 00:36 28.19			0.05
IDGL HN 109.0 ES 00:36 41.16			0.06
IDGL HE 109.0 IAML 00:36 42.08	17	0.30	
IDGL HN 109.0 IAML 00:36 42.66	30	0.14	
PGB1 HZ 117.0 EP 00:36 29.65			0.18
PGB1 HN 117.0 ES 00:36 43.41			0.00
PGB1 HN 117.0 IAML 00:36 44.43	72	0.24	
PGB1 HE 117.0 IAML 00:36 45.32	50	0.18	
GAL1 HZ 147.0 EP 00:36 34.24			0.48
GAL1 HE 147.0 ES 00:36 51.00			0.17
GAL1 HE 147.0 IAML 00:36 51.34	9	0.32	
GAL1 HN 147.0 IAML 00:36 52.59	7	0.18	
NEWG HZ 154.0 EP 00:36 35.08			0.28
NEWG HN 154.0 IAML 00:36 55.14	11	0.22	
NEWG HE 154.0 IAML 00:36 55.84	8	0.14	
INVG HZ 160.0 EP 00:36 36.23			0.59
INVG HN 160.0 IAML 00:36 56.74	8	0.17	
INVG HE 160.0 IAML 00:36 57.10	12	0.22	
KPL HZ 177.0 EP 00:36 37.45			-0.38
February 5 2020	Time: 17:38 35.1 UTC	Magnitude: 0.9 ML	
Lat: 52.854	Lon: -5.360	Depth: 8.5 km	
Grid Ref: 173.81 kmE 333.83 kmN		RMS: 0.20 secs	
Locality: IRISH SEA			
Velocity model: Lownet	Xnear: 100.0	Xfar: 200.0	
Comment: 70KM SW HOLYHEAD			
STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES			
WLF1 HZ 80.7 EP 17:38 48.52			0.06
WLF1 HN 80.7 ES 17:38 57.91			-0.31
WLF1 HN 80.7 IAML 17:38 58.42	12	0.21	
February 7 2020	Time: 03:11 37.4 UTC	Magnitude: 0.4 ML	
Lat: 56.122	Lon: -3.968	Depth: 7.6 km	
Grid Ref: 277.67 kmE 693.88 kmN		RMS: 0.20 secs	
Locality: CAMBUSBARRON, STIRLING			
Velocity model: Lownet	Xnear: 500.0	Xfar: 1000.0	
STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES			
INVG HZ 34.3 EP 03:11 43.62			0.02
INVG HN 34.3 ES 03:11 48.02			-0.12
INVG HE 34.3 IAML 03:11 48.10	2	0.07	
INVG HN 34.3 IAML 03:11 48.16	1	0.12	
PGB1 HZ 47.2 EP 03:11 45.56			-0.02
PGB1 HN 47.2 ES 03:11 51.70			0.13
PGB1 HE 47.2 IAML 03:11 53.13	7	0.64	
PGB1 HN 47.2 IAML 03:11 53.86	7	0.44	
EDI HN 53.4 ES 03:11 52.96			-0.24
EDI HN 53.4 IAML 03:11 53.09	3	0.22	
EDI HE 53.4 IAML 03:11 53.53	2	0.24	
LAWE HN 90.2 ES 03:12 02.96			-0.11
LAWE HE 90.2 IAML 03:12 03.88	1	0.38	
LAWE HN 90.2 IAML 03:12 04.33	1	0.18	
ESK HZ 102.0 EP 03:11 54.31			0.28
ESK HN 102.0 IAML 03:12 09.08	1	0.35	
ESK HE 102.0 IAML 03:12 09.19	1	0.10	
NEWG HZ 113.0 EP 03:11 56.01			0.23
NEWG HE 113.0 ES 03:12 08.91			-0.29
NEWG HE 113.0 IAML 03:12 11.18	1	0.13	
NEWG HN 113.0 IAML 03:12 11.68	1	0.15	
DRUM HN 127.0 ES 03:12 12.96			0.13
DRUM HN 127.0 IAML 03:12 14.26	3	0.47	
DRUM HE 127.0 IAML 03:12 15.58	3	0.63	
February 7 2020	Time: 15:04 52.4 UTC	Magnitude: 2.4 ML	
Lat: 53.336	Lon: 2.523	Depth: 10.0 km	
Grid Ref: 701.06 kmE 391.69 kmN		RMS: 0.40 secs	
Locality: SOUTHERN NORTH SEA			
Velocity model: North Sea	Xnear: 400.0	Xfar: 600.0	
Comment: 90KM NE CROMER			
STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES			
WACR HZ 144.0 EP 15:05 14.14			-0.69
WACR HE 144.0 ES 15:05 30.47			-0.73
WACR HN 144.0 IAML 15:05 32.36	67	0.18	
WACR HE 144.0 IAML 15:05 34.26	50	0.22	
ELMS HZ 173.0 EP 15:05 18.64			0.26
ELMS HE 173.0 ES 15:05 37.46			0.11
ELMS HN 173.0 IAML 15:05 39.53	62	0.27	
ELMS HE 173.0 IAML 15:05 41.43	95	0.36	
LMK HN 190.0 ES 15:05 40.88			-0.17
LMK HN 190.0 IAML 15:05 46.02	86	0.68	
LMK HE 190.0 IAML 15:05 46.35	64	0.35	
BRAD CZ 209.0 EP 15:05 23.19			0.34
BRAD CE 209.0 ES 15:05 44.96			-0.12
BRAD CE 209.0 IAML 15:05 52.00	28	0.51	
BRAD CN 209.0 IAML 15:05 57.35	36	0.65	
HLM1 HE 375.0 ES 15:06 21.57			0.81
HLM1 HN 375.0 IAML 15:06 37.99	7	0.42	
HLM1 HE 375.0 IAML 15:06 38.39	7	0.48	
MONM HN 398.0 ES 15:06 25.67			0.03
MONM HE 398.0 IAML 15:06 28.22	8	0.22	
MONM HN 398.0 IAML 15:06 28.30	11	0.22	
MCH1 HE 402.0 ES 15:06 26.79			0.16
MCH1 HN 402.0 IAML 15:06 28.75	5	0.26	
MCH1 HE 402.0 IAML 15:06 28.96	6	0.22	
February 13 2020	Time: 08:44 13.7 UTC	Magnitude: 1.2 ML	
Lat: 56.462	Lon: -5.369	Depth: 7.2 km	
Grid Ref: 192.46 kmE 735.06 kmN		RMS: 0.20 secs	
Locality: CONNELL, ARGYLL & BUTE			
Velocity model: Lownet	Xnear: 500.0	Xfar: 1000.0	
Comment: FELT BARCALDINE		Intensity: 2	
STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES			





















# TABLE 2 : PHASE DATA

May 10 2020                      Time: 03:55 18.5 UTC                      Magnitude: 0.9 ML Lat: 53.200                      Lon: 0.523                      Depth: 9.3 km Grid Ref: 568.50 kmE 369.99 kmN                      RMS: 0.10 secs Locality: SOUTHERN NORTH SEA Velocity model: Lownet Xnear: 500.0 Xfar: 1000.0 Comment: 14KM NE SKEGNESS										AP12    HN    57.0    IAML                      03:53    12.87                      2    0.15 KESW    HZ    80.3    EP    03:53    08.25                      0.16 KESW    HN    80.3    ES    03:53    17.70                      -0.14 KESW    HE    80.3    IAML    03:53    18.82                      3    0.24 KESW    HN    80.3    IAML    03:53    19.53                      2    0.18 GAL1    HZ    87.5    EP    03:53    09.60                      0.42 GAL1    HN    87.5    ES    03:53    19.73                      0.02 GAL1    HE    87.5    IAML    03:53    20.06                      2    0.22 GAL1    HN    87.5    IAML    03:53    20.72                      2    0.14 WLF1    HZ    99.2    EP    03:53    11.29                      0.31 WLF1    HE    99.2    ES    03:53    22.51                      -0.33 WLF1    HE    99.2    IAML    03:53    22.96                      4    0.34 WLF1    HN    99.2    IAML    03:53    23.82                      2    0.19 NEWG    HZ    106.0    EP    03:53    12.62                      0.50 NEWG    HE    106.0    ES    03:53    24.27                      -0.53 NEWG    HN    106.0    IAML    03:53    25.48                      1    0.06 NEWG    HE    106.0    IAML    03:53    25.54                      2    0.20 AR09    HZ    109.0    EP    03:53    12.67                      0.13 AR09    HN    109.0    ES    03:53    25.54                      0.00 CWF    HN    133.0    IAML    03:55    55.68                      2    0.11 CWF    HE    133.0    IAML    03:55    55.93                      1    0.14 ESK    HN    141.0    ES    03:53    33.36                      -0.15 ESK    HE    141.0    IAML    03:53    34.93                      1    0.18 ESK    HN    141.0    IAML    03:53    34.94                      2    0.14									
May 13 2020                      Time: 09:24 06.4 UTC                      Magnitude: 1.1 ML Lat: 51.666                      Lon: -3.224                      Depth: 3.6 km Grid Ref: 315.36 kmE 197.12 kmN                      RMS: 0.10 secs Locality: BLACKWOOD, CAERPHILLY Velocity model: Lownet Xnear: 50.0 Xfar: 120.0 Comment:										May 14 2020                      Time: 09:59 10.5 UTC                      Magnitude: 0.9 ML Lat: 56.365                      Lon: -5.456                      Depth: 4.5 km Grid Ref: 186.56 kmE 724.54 kmN                      RMS: 0.10 secs Locality: KILBRIDE, ARGYLL & BUTE Velocity model: Lownet Xnear: 100.0 Xfar: 200.0 Comment:									
STAT    CO    DIST    PHAS    WT    P    HrMn    SECS    AMPL    PERI    RES MONM    HZ    34.8    EP    09:24    12.76                      -0.07 MONM    HN    34.8    ES    09:24    17.55                      0.06 MONM    HE    34.8    IAML    09:24    17.74                      52    0.20 MONM    HN    34.8    IAML    09:24    18.42                      42    0.20 MCH1    HZ    40.0    EP    09:24    13.73                      0.02 MCH1    HN    40.0    ES    09:24    19.01                      -0.02 MCH1    HN    40.0    IAML    09:24    19.27                      20    0.28 MCH1    HE    40.0    IAML    09:24    19.28                      30    0.26 STRD    HZ    74.4    EP    09:24    19.16                      0.04 STRD    HN    74.4    ES    09:24    28.34                      -0.04 STRD    HN    74.4    IAML    09:24    28.62                      16    0.19 STRD    HE    74.4    IAML    09:24    28.62                      10    0.17 RSBS    HZ    110.0    EP    09:24    25.15                      0.56 RSBS    HN    110.0    IAML    09:24    42.92                      2    0.06 RSBS    HE    110.0    IAML    09:24    43.76                      3    0.06										STAT    CO    DIST    PHAS    WT    P    HrMn    SECS    AMPL    PERI    RES LAWE    HZ    12.2    IP    D    09:59    13.02                      -0.03 LAWE    HN    12.2    ES    09:59    14.87                      -0.07 LAWE    HE    12.2    IAML    09:59    15.07                      103    0.10 LAWE    HN    12.2    IAML    09:59    15.11                      98    0.22 EAB    HZ    72.0    EP    09:59    22.81                      0.09 EAB    HE    72.0    ES    09:59    31.70                      0.02 EAB    HE    72.0    IAML    09:59    34.81                      6    0.05 EAB    HN    72.0    IAML    09:59    34.92                      3    0.07 INVG    HZ    87.5    EP    09:59    25.22                      0.10 INVG    HN    87.5    ES    09:59    35.72                      -0.11 INVG    HE    87.5    IAML    09:59    38.26                      5    0.10 INVG    HN    87.5    IAML    09:59    38.30                      4    0.10 KPL    HZ    109.0    EP    09:59    28.57                      0.14 KPL    HN    109.0    ES    09:59    41.40                      -0.15 KPL    HN    109.0    IAML    09:59    43.78                      2    0.17 KPL    HE    109.0    IAML    09:59    44.33                      3    0.16									
May 13 2020                      Time: 12:11 10.2 UTC                      Magnitude: 1.3 ML Lat: 55.935                      Lon: -4.317                      Depth: 7.7 km Grid Ref: 255.28 kmE 673.75 kmN                      RMS: 0.20 secs Locality: MILNGAVIE, E DUNB'SHIRE Velocity model: Lownet Xnear: 80.0 Xfar: 160.0 Comment:										May 14 2020                      Time: 21:21 28.0 UTC                      Magnitude: 0.4 ML Lat: 54.234                      Lon: -2.796                      Depth: 2.9 km Grid Ref: 348.12 kmE 482.34 kmN                      RMS: 0.20 secs Locality: MILNTHORPE, CUMBRIA Velocity model: Lownet Xnear: 100.0 Xfar: 200.0 Comment:									
STAT    CO    DIST    PHAS    WT    P    HrMn    SECS    AMPL    PERI    RES GGERF    CZ    12.0    EP    12:11    12.70                      -0.17 GGERF    CN    12.0    IAML    12:11    14.53                      51    0.21 GGERF    CE    12.0    IAML    12:11    14.69                      140    0.35 EAB    HZ    28.2    EP    12:11    15.50                      0.07 EAB    HE    28.2    ES    12:11    19.31                      0.03 EAB    HE    28.2    IAML    12:11    19.52                      46    0.10 EAB    HN    28.2    IAML    12:11    19.60                      48    0.12 INVG    HZ    57.3    EP    12:11    19.98                      0.03 INVG    HE    57.3    ES    12:11    26.97                      -0.12 INVG    HE    57.3    IAML    12:11    27.50                      11    0.15 INVG    HN    57.3    IAML    12:11    29.90                      5    0.18 LAWE    HZ    76.4    EP    12:11    23.19                      0.31 LAWE    HN    76.4    ES    12:11    31.91                      -0.26 LAWE    HN    76.4    IAML    12:11    35.03                      32    0.22 LAWE    HE    76.4    IAML    12:11    35.15                      19    0.23 NEWG    HZ    91.2    EP    12:11    25.26                      0.09 NEWG    HE    91.2    ES    12:11    35.91                      -0.22 NEWG    HE    91.2    IAML    12:11    36.12                      9    0.20 NEWG    HN    91.2    IAML    12:11    38.68                      15    0.26 ESK    HZ    98.2    EP    12:11    26.46                      0.18 ESK    HE    98.2    IAML    12:11    41.06                      11    0.16 ESK    HN    98.2    IAML    12:11    41.24                      15    0.26 GAL1    HZ    122.0    EP    12:11    30.33                      0.45 GAL1    HE    122.0    IAML    12:11    45.87                      17    0.18 GAL1    HN    122.0    IAML    12:11    46.28                      7    0.15 CLGH    HZ    148.0    EP    12:11    33.86                      0.20 CLGH    HN    148.0    IAML    12:11    52.91                      8    0.14 CLGH    HE    148.0    IAML    12:11    53.69                      7    0.15										STAT    CO    DIST    PHAS    WT    P    HrMn    SECS    AMPL    PERI    RES AQ12    HZ    22.7    EP    21:21    32.55                      0.19 AQ12    HN    22.7    ES    21:21    35.39                      -0.18 AQ12    HN    22.7    IAML    21:21    35.52                      7    0.08 AQ12    HE    22.7    IAML    21:21    35.52                      12    0.08 AR09    HZ    23.2    EP    21:21    32.57                      0.11 AR09    HN    23.2    ES    21:21    35.56                      -0.17 AR09    HN    23.2    IAML    21:21    35.89                      23    0.10 AR09    HE    23.2    IAML    21:21    36.04                      22    0.07 AP12    HZ    31.8    EP    21:21    33.88                      0.01 AP12    HN    31.8    ES    21:21    37.99                      -0.18 AP12    HE    31.8    IAML    21:21    38.07                      2    0.14 AP12    HN    31.8    IAML    21:21    38.09                      2    0.08 KESW    HZ    44.2    EP    21:21    36.20                      0.21									
May 14 2020                      Time: 03:52 54.7 UTC                      Magnitude: 0.5 ML Lat: 54.164                      Lon: -4.104                      Depth: 9.1 km Grid Ref: 262.65 kmE 476.31 kmN                      RMS: 0.30 secs Locality: IRISH SEA Velocity model: Lownet Xnear: 100.0 Xfar: 200.0 Comment: 20KM ESE LAXEY, IOM										May 14 2020                      Time: 22:53 02.7 UTC                      Magnitude: 1.8 ML Lat: 56.382                      Lon: -5.738                      Depth: 11.7 km Grid Ref: 169.26 kmE 727.34 kmN                      RMS: 0.30 secs Locality: MULL, ARGYLL & BUTE Velocity model: Lownet Xnear: 100.0 Xfar: 200.0 Comment: FELT MULL...                      Intensity: 3									
STAT    CO    DIST    PHAS    WT    P    HrMn    SECS    AMPL    PERI    RES IOMK    HZ    32.0    EP    03:53    00.72                      0.13 IOMK    HN    32.0    ES    03:53    04.61                      -0.25 IOMK    HN    32.0    IAML    03:53    05.04                      4    0.07 IOMK    HE    32.0    IAML    03:53    05.07                      4    0.08 WIM    EZ    37.3    EP    03:53    01.33                      -0.11 AP12    HZ    57.0    EP    03:53    04.30                      -0.16 AP12    HN    57.0    ES    03:53    11.48                      -0.08 AP12    HE    57.0    IAML    03:53    12.85                      2    0.10										STAT    CO    DIST    PHAS    WT    P    HrMn    SECS    AMPL    PERI    RES LAWE    HZ    25.0    IP    C    22:53    07.50                      -0.01 LAWE    HN    25.0    ES    22:53    10.67                      -0.38 LAWE    HN    25.0    IAML    22:53    10.76                      241    0.08 LAWE    HE    25.0    IAML    22:53    10.93                      186    0.12 EAB    HZ    89.4    EP    22:53    17.51                      0.08 EAB    HN    89.4    ES    22:53    28.56                      0.34 EAB    HN    89.4    IAML    22:53    30.27                      50    0.11 EAB    HE    89.4    IAML    22:53    30.40                      57    0.18 INVG    HZ    105.0    EP    22:53    19.67                      -0.10 INVG    HE    105.0    ES    22:53    31.99                      -0.27 INVG    HN    105.0    IAML    22:53    33.66                      28    0.12 INVG    HE    105.0    IAML    22:53    33.72                      25    0.12 KPL    HZ    107.0    EP    22:53    20.07                      0.08 KPL    HE    107.0    ES    22:53    32.53                      -0.11 KPL    HE    107.0    IAML    22:53    34.85                      38    0.24 KPL    HN    107.0    IAML    22:53    35.06                      26    0.18 GGERF    CZ    112.0    EP    22:53    21.34                      0.60 GGERF    CE    112.0    IAML    22:53    36.15                      13    0.27 GGERF    CN    112.0    IAML    22:53    36.19                      18    0.22 CLGH    HZ    147.0    EP    22:53    25.66                      -0.08 CLGH    HN    147.0    ES    22:53    42.41                      -0.18									













# TABLE 2 : PHASE DATA

DRUM	HE	232.0	IAML	04:22	29.34	10	0.16			July 4 2020	Time: 13:37 30.1 UTC	Magnitude: 1.2 ML																																																																																																																																																																																																																																																																																																																																																																																																																																														
										Lat: 55.925	Lon: -4.349	Depth: 3.9 km																																																																																																																																																																																																																																																																																																																																																																																																																																														
										Grid Ref: 253.24 kmE 672.70 kmN		RMS: 0.40 secs																																																																																																																																																																																																																																																																																																																																																																																																																																														
										Locality: BEARSDEN, E DUNB'SHIRE																																																																																																																																																																																																																																																																																																																																																																																																																																																
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<table border="0" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>STAT</th> <th>CO</th> <th>DIST</th> <th>PHAS</th> <th>WT</th> <th>P</th> <th>HrMn</th> <th>SECS</th> <th>AMPL</th> <th>PERI</th> <th>RES</th> <th>AMPL</th> <th>PERI</th> <th>RES</th> </tr> </thead> <tbody> <tr><td>GGERF</td><td>CZ</td><td>12.2</td><td>EP</td><td></td><td></td><td>13:37</td><td>32.63</td><td></td><td></td><td></td><td></td><td></td><td>0.02</td></tr> <tr><td>GGERF</td><td>CN</td><td>12.2</td><td>ES</td><td></td><td></td><td>13:37</td><td>34.26</td><td></td><td></td><td></td><td></td><td></td><td>-0.21</td></tr> <tr><td>GGERF</td><td>CN</td><td>12.2</td><td>IAML</td><td></td><td></td><td>13:37</td><td>34.52</td><td>162</td><td>0.18</td><td></td><td></td><td></td><td></td></tr> <tr><td>GGERF</td><td>CE</td><td>12.2</td><td>IAML</td><td></td><td></td><td>13:37</td><td>34.64</td><td>206</td><td>0.26</td><td></td><td></td><td></td><td></td></tr> <tr><td>PGB1</td><td>HZ</td><td>15.1</td><td>IP</td><td></td><td>C</td><td>13:37</td><td>33.21</td><td></td><td></td><td></td><td></td><td></td><td>0.07</td></tr> <tr><td>PGB1</td><td>HE</td><td>15.1</td><td>ES</td><td></td><td></td><td>13:37</td><td>35.13</td><td></td><td></td><td></td><td></td><td></td><td>-0.26</td></tr> <tr><td>PGB1</td><td>HN</td><td>15.1</td><td>IAML</td><td></td><td></td><td>13:37</td><td>35.57</td><td>245</td><td>0.26</td><td></td><td></td><td></td><td></td></tr> <tr><td>PGB1</td><td>HE</td><td>15.1</td><td>IAML</td><td></td><td></td><td>13:37</td><td>35.80</td><td>194</td><td>0.35</td><td></td><td></td><td></td><td></td></tr> <tr><td>EAB</td><td>HZ</td><td>29.4</td><td>IP</td><td></td><td>D</td><td>13:37</td><td>35.84</td><td></td><td></td><td></td><td></td><td></td><td>0.27</td></tr> <tr><td>INVG</td><td>HZ</td><td>59.1</td><td>EP</td><td></td><td></td><td>13:37</td><td>40.28</td><td></td><td></td><td></td><td></td><td></td><td>-0.09</td></tr> <tr><td>INVG</td><td>HN</td><td>59.1</td><td>ES</td><td></td><td></td><td>13:37</td><td>47.55</td><td></td><td></td><td></td><td></td><td></td><td>-0.34</td></tr> <tr><td>INVG</td><td>HE</td><td>59.1</td><td>IAML</td><td></td><td></td><td>13:37</td><td>47.95</td><td>7</td><td>0.16</td><td></td><td></td><td></td><td></td></tr> <tr><td>INVG</td><td>HN</td><td>59.1</td><td>IAML</td><td></td><td></td><td>13:37</td><td>51.19</td><td>5</td><td>0.13</td><td></td><td></td><td></td><td></td></tr> <tr><td>LAWE</td><td>HZ</td><td>75.3</td><td>EP</td><td></td><td></td><td>13:37</td><td>43.24</td><td></td><td></td><td></td><td></td><td></td><td>0.39</td></tr> <tr><td>LAWE</td><td>HN</td><td>75.3</td><td>ES</td><td></td><td></td><td>13:37</td><td>51.78</td><td></td><td></td><td></td><td></td><td></td><td>-0.40</td></tr> <tr><td>LAWE</td><td>HN</td><td>75.3</td><td>IAML</td><td></td><td></td><td>13:37</td><td>55.07</td><td>18</td><td>0.18</td><td></td><td></td><td></td><td></td></tr> <tr><td>LAWE</td><td>HE</td><td>75.3</td><td>IAML</td><td></td><td></td><td>13:37</td><td>55.44</td><td>12</td><td>0.11</td><td></td><td></td><td></td><td></td></tr> <tr><td>ESK</td><td>HZ</td><td>98.9</td><td>EP</td><td></td><td></td><td>13:37</td><td>46.55</td><td></td><td></td><td></td><td></td><td></td><td>0.02</td></tr> <tr><td>CLGH</td><td>HZ</td><td>146.0</td><td>EP</td><td></td><td></td><td>13:37</td><td>54.59</td><td></td><td></td><td></td><td></td><td></td><td>1.02</td></tr> <tr><td>DRUM</td><td>HZ</td><td>159.0</td><td>EP</td><td></td><td></td><td>13:37</td><td>56.80</td><td></td><td></td><td></td><td></td><td></td><td>1.30</td></tr> </tbody> </table>													STAT	CO	DIST	PHAS	WT	P	HrMn	SECS	AMPL	PERI	RES	AMPL	PERI	RES	GGERF	CZ	12.2	EP			13:37	32.63						0.02	GGERF	CN	12.2	ES			13:37	34.26						-0.21	GGERF	CN	12.2	IAML			13:37	34.52	162	0.18					GGERF	CE	12.2	IAML			13:37	34.64	206	0.26					PGB1	HZ	15.1	IP		C	13:37	33.21						0.07	PGB1	HE	15.1	ES			13:37	35.13						-0.26	PGB1	HN	15.1	IAML			13:37	35.57	245	0.26					PGB1	HE	15.1	IAML			13:37	35.80	194	0.35					EAB	HZ	29.4	IP		D	13:37	35.84						0.27	INVG	HZ	59.1	EP			13:37	40.28						-0.09	INVG	HN	59.1	ES			13:37	47.55						-0.34	INVG	HE	59.1	IAML			13:37	47.95	7	0.16					INVG	HN	59.1	IAML			13:37	51.19	5	0.13					LAWE	HZ	75.3	EP			13:37	43.24						0.39	LAWE	HN	75.3	ES			13:37	51.78						-0.40	LAWE	HN	75.3	IAML			13:37	55.07	18	0.18					LAWE	HE	75.3	IAML			13:37	55.44	12	0.11					ESK	HZ	98.9	EP			13:37	46.55						0.02	CLGH	HZ	146.0	EP			13:37	54.59						1.02	DRUM	HZ	159.0	EP			13:37	56.80						1.30																																																																																																																																								
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<table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2">July 7 2020</td> <td colspan="2">Time: 19:39 12.8 UTC</td> <td colspan="2">Magnitude: 0.8 ML</td> </tr> <tr> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2">Lat: 55.582</td> <td colspan="2">Lon: -2.972</td> <td colspan="2">Depth: 4.5 km</td> </tr> <tr> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2">Grid Ref: 338.73 kmE 632.47 kmN</td> <td colspan="2"></td> <td colspan="2">RMS: 0.20 secs</td> </tr> <tr> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2">Locality: YARROWFORD, BORDERS</td> <td colspan="2"></td> <td colspan="2"></td> </tr> <tr> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2">Velocity model: Borders Xnear: 100.0 Xfar: 200.0</td> <td colspan="2"></td> <td colspan="2"></td> </tr> <tr> <th>STAT</th> <th>CO</th> <th>DIST</th> <th>PHAS</th> <th>WT</th> <th>P</th> <th>HrMn</th> <th>SECS</th> <th>AMPL</th> <th>PERI</th> <th>RES</th> <th>AMPL</th> <th>PERI</th> <th>RES</th> </tr> <tr><td>EKA</td><td>BZ</td><td>30.1</td><td>IP</td><td></td><td>C</td><td>19:39</td><td>18.40</td><td></td><td></td><td></td><td></td><td></td><td>-0.02</td></tr> <tr><td>EKA</td><td>BZ</td><td>30.1</td><td>ES</td><td></td><td></td><td>19:39</td><td>22.28</td><td></td><td></td><td></td><td></td><td></td><td>-0.11</td></tr> <tr><td>ESK</td><td>HZ</td><td>33.0</td><td>IP</td><td></td><td>C</td><td>19:39</td><td>18.81</td><td></td><td></td><td></td><td></td><td></td><td>-0.07</td></tr> <tr><td>ESK</td><td>HE</td><td>33.0</td><td>ES</td><td></td><td></td><td>19:39</td><td>22.92</td><td></td><td></td><td></td><td></td><td></td><td>-0.25</td></tr> <tr><td>ESK</td><td>HE</td><td>33.0</td><td>IAML</td><td></td><td></td><td>19:39</td><td>23.91</td><td>14</td><td>0.10</td><td></td><td></td><td></td><td></td></tr> <tr><td>ESK</td><td>HN</td><td>33.0</td><td>IAML</td><td></td><td></td><td>19:39</td><td>23.91</td><td>14</td><td>0.10</td><td></td><td></td><td></td><td></td></tr> <tr><td>EDI</td><td>HZ</td><td>40.4</td><td>EP</td><td></td><td></td><td>19:39</td><td>20.03</td><td></td><td></td><td></td><td></td><td></td><td>-0.03</td></tr> <tr><td>EDI</td><td>HN</td><td>40.4</td><td>ES</td><td></td><td></td><td>19:39</td><td>25.00</td><td></td><td></td><td></td><td></td><td></td><td>-0.19</td></tr> <tr><td>EDI</td><td>HN</td><td>40.4</td><td>IAML</td><td></td><td></td><td>19:39</td><td>25.16</td><td>3</td><td>0.16</td><td></td><td></td><td></td><td></td></tr> <tr><td>EDI</td><td>HE</td><td>40.4</td><td>IAML</td><td></td><td></td><td>19:39</td><td>26.83</td><td>2</td><td>0.22</td><td></td><td></td><td></td><td></td></tr> <tr><td>NEWG</td><td>HZ</td><td>95.1</td><td>EP</td><td></td><td></td><td>19:39</td><td>28.75</td><td></td><td></td><td></td><td></td><td></td><td>-0.21</td></tr> <tr><td>NEWG</td><td>HE</td><td>95.1</td><td>IAML</td><td></td><td></td><td>19:39</td><td>43.41</td><td>3</td><td>0.17</td><td></td><td></td><td></td><td></td></tr> <tr><td>NEWG</td><td>HN</td><td>95.1</td><td>IAML</td><td></td><td></td><td>19:39</td><td>44.42</td><td>5</td><td>0.14</td><td></td><td></td><td></td><td></td></tr> <tr><td>PGB1</td><td>HZ</td><td>98.5</td><td>EP</td><td></td><td></td><td>19:39</td><td>29.91</td><td></td><td></td><td></td><td></td><td></td><td>0.39</td></tr> <tr><td>PGB1</td><td>HN</td><td>98.5</td><td>ES</td><td></td><td></td><td>19:39</td><td>41.66</td><td></td><td></td><td></td><td></td><td></td><td>0.30</td></tr> <tr><td>PGB1</td><td>HE</td><td>98.5</td><td>IAML</td><td></td><td></td><td>19:39</td><td>42.97</td><td>12</td><td>0.19</td><td></td><td></td><td></td><td></td></tr> <tr><td>PGB1</td><td>HN</td><td>98.5</td><td>IAML</td><td></td><td></td><td>19:39</td><td>44.19</td><td>18</td><td>0.54</td><td></td><td></td><td></td><td></td></tr> <tr><td>EAB</td><td>HZ</td><td>109.0</td><td>EP</td><td></td><td></td><td>19:39</td><td>31.24</td><td></td><td></td><td></td><td></td><td></td><td>0.00</td></tr> <tr><td>EAB</td><td>HN</td><td>109.0</td><td>ES</td><td></td><td></td><td>19:39</td><td>44.01</td><td></td><td></td><td></td><td></td><td></td><td>-0.29</td></tr> <tr><td>EAB</td><td>HE</td><td>109.0</td><td>IAML</td><td></td><td></td><td>19:39</td><td>46.91</td><td>2</td><td>0.12</td><td></td><td></td><td></td><td></td></tr> <tr><td>EAB</td><td>HN</td><td>109.0</td><td>IAML</td><td></td><td></td><td>19:39</td><td>47.28</td><td>3</td><td>0.12</td><td></td><td></td><td></td><td></td></tr> <tr><td>KESW</td><td>HZ</td><td>111.0</td><td>EP</td><td></td><td></td><td>19:39</td><td>32.07</td><td></td><td></td><td></td><td></td><td></td><td>0.53</td></tr> <tr><td>KESW</td><td>HN</td><td>111.0</td><td>IAML</td><td></td><td></td><td>19:39</td><td>47.37</td><td>1</td><td>0.23</td><td></td><td></td><td></td><td></td></tr> <tr><td>KESW</td><td>HE</td><td>111.0</td><td>IAML</td><td></td><td></td><td>19:39</td><td>48.81</td><td>2</td><td>0.31</td><td></td><td></td><td></td><td></td></tr> </table>																							July 7 2020		Time: 19:39 12.8 UTC		Magnitude: 0.8 ML												Lat: 55.582		Lon: -2.972		Depth: 4.5 km												Grid Ref: 338.73 kmE 632.47 kmN				RMS: 0.20 secs												Locality: YARROWFORD, BORDERS																Velocity model: Borders Xnear: 100.0 Xfar: 200.0						STAT	CO	DIST	PHAS	WT	P	HrMn	SECS	AMPL	PERI	RES	AMPL	PERI	RES	EKA	BZ	30.1	IP		C	19:39	18.40						-0.02	EKA	BZ	30.1	ES			19:39	22.28						-0.11	ESK	HZ	33.0	IP		C	19:39	18.81						-0.07	ESK	HE	33.0	ES			19:39	22.92						-0.25	ESK	HE	33.0	IAML			19:39	23.91	14	0.10					ESK	HN	33.0	IAML			19:39	23.91	14	0.10					EDI	HZ	40.4	EP			19:39	20.03						-0.03	EDI	HN	40.4	ES			19:39	25.00						-0.19	EDI	HN	40.4	IAML			19:39	25.16	3	0.16					EDI	HE	40.4	IAML			19:39	26.83	2	0.22					NEWG	HZ	95.1	EP			19:39	28.75						-0.21	NEWG	HE	95.1	IAML			19:39	43.41	3	0.17					NEWG	HN	95.1	IAML			19:39	44.42	5	0.14					PGB1	HZ	98.5	EP			19:39	29.91						0.39	PGB1	HN	98.5	ES			19:39	41.66						0.30	PGB1	HE	98.5	IAML			19:39	42.97	12	0.19					PGB1	HN	98.5	IAML			19:39	44.19	18	0.54					EAB	HZ	109.0	EP			19:39	31.24						0.00	EAB	HN	109.0	ES			19:39	44.01						-0.29	EAB	HE	109.0	IAML			19:39	46.91	2	0.12					EAB	HN	109.0	IAML			19:39	47.28	3	0.12					KESW	HZ	111.0	EP			19:39	32.07						0.53	KESW	HN	111.0	IAML			19:39	47.37	1	0.23					KESW	HE	111.0	IAML			19:39	48.81	2	0.31				
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| |      |    |       |      |    |   |       |       |      |      | July 8 2020                                      |      | Time: 02:41 51.8 UTC |       | Magnitude: 0.7 ML |  | |------|----|-------|------|----|---|-------|-------|------|------|--|------|----------------------|-------|-------------------|--| |      |    |       |      |    |   |       |       |      |      | Lat: 55.596                                      |      | Lon: -2.172          |       | Depth: 4.0 km     |  | |      |    |       |      |    |   |       |       |      |      | Grid Ref: 389.16 kmE 633.61 kmN                  |      |                      |       | RMS: 0.40 secs    |  | |      |    |       |      |    |   |       |       |      |      | Locality: HOWTEL, NORTHUMBRLAND                  |      |                      |       |                   |  | |      |    |       |      |    |   |       |       |      |      | Velocity model: Borders Xnear: 100.0 Xfar: 200.0 |      |                      |       |                   |  | | STAT | CO | DIST  | PHAS | WT | P | HrMn  | SECS  | AMPL | PERI | RES  | AMPL | PERI                 | RES   |                   |  | | ESK  | HZ | 72.4  | EP   |    |   | 02:42 | 03.99 |      |      |  |      |                      | -0.23 |                   |  | | ESK  | HN | 72.4  | ES   |    |   | 02:42 | 13.22 |      |      |  |      |                      | 0.15  |                   |  | | ESK  | HN | 72.4  | IAML |    |   | 02:42 | 14.31 | 2    | 0.11 |  |      |                      |       |                   |  | | ESK  | HE | 72.4  | IAML |    |   | 02:42 | 14.38 | 2    | 0.11 |  |      |                      |       |                   |  | | EDI  | HZ | 73.4  | EP   |    |   | 02:42 | 04.18 |      |      |  |      |                      | -0.18 |                   |  | | EDI  | HN | 73.4  | EP   |    |   | 02:42 | 13.19 |      |      |  |      |                      |       |                   |  | | EDMD | HZ | 86.2  | EP   |    |   | 02:42 | 07.29 |      |      |  |      |                      | 0.87  |                   |  | | EDMD | HN | 86.2  | ES   |    |   | 02:42 | 16.18 |      |      |  |      |                      | -0.64 |                   |  | | EDMD | HN | 86.2  | IAML |    |   | 02:42 | 19.05 | 3    | 0.16 |  |      |                      |       |                   |  | | EDMD | HE | 86.2  | IAML |    |   | 02:42 | 20.07 | 4    | 0.12 |  |      |                      |       |                   |  | | KESW | HZ | 127.0 | EP   |    |   | 02:42 | 13.20 |      |      |  |      |                      | 0.10  |                   |  | | KESW | HE | 127.0 | IAML |    |   | 02:42 | 30.67 | 1    | 0.15 |  |      |                      |       |                   |  | | KESW | HN | 127.0 | IAML |    |   | 02:42 | 30.98 | 1    | 0.13 |  |      |                      |       |                   |  | | NEWG | HZ | 141.0 | EP   |    |   | 02:42 | 15.03 |      |      |  |      |                      | -0.08 |                   |  | | NEWG | HE | 141.0 | ES   |    |   | 02:42 | 31.84 |      |      |  |      |                      | 0.16  |                   |  | | NEWG | HE | 141.0 | IAML |    |   | 02:42 | 32.55 | 1    | 0.24 |  |      |                      |       |                   |  | | NEWG | HN | 141.0 | IAML |    |   | 02:42 | 34.25 | 1    | 0.12 |  |      |                      |       |                   |  | | PGB1 | HN | 147.0 | ES   |    |   | 02:42 | 33.28 |      |      |  |      |                      | 0.23  |                   |  | | PGB1 | HN | 147.0 | IAML |    |   | 02:42 | 34.46 | 6    | 0.20 |  |      |                      |       |                   |  | | PGB1 | HE | 147.0 | IAML |    |   | 02:42 | 34.62 | 6    | 0.32 |  |      |                      |       |                   |  | | INVG | HZ | 149.0 | EP   |    |   | 02:42 | 15.68 |      |      |  |      |                      | -0.45 |                   |  | | | | | | | | | | | | | |
| |      |    |      |      |    |   |       |       |      |      | July 8 2020                                      |      | Time: 20:40 01.8 UTC |       | Magnitude: 1.0 ML |  | |------|----|------|------|----|---|-------|-------|------|------|--|------|----------------------|-------|-------------------|--| |      |    |      |      |    |   |       |       |      |      | Lat: 55.589                                      |      | Lon: -2.953          |       | Depth: 3.8 km     |  | |      |    |      |      |    |   |       |       |      |      | Grid Ref: 339.94 kmE 633.23 kmN                  |      |                      |       | RMS: 0.30 secs    |  | |      |    |      |      |    |   |       |       |      |      | Locality: YARROWFORD, BORDERS                    |      |                      |       |                   |  | |      |    |      |      |    |   |       |       |      |      | Velocity model: Borders Xnear: 100.0 Xfar: 200.0 |      |                      |       |                   |  | | STAT | CO | DIST | PHAS | WT | P | HrMn  | SECS  | AMPL | PERI | RES  | AMPL | PERI                 | RES   |                   |  | | EKA  | BZ | 31.3 | IP   |    | C | 20:40 | 07.55 |      |      |  |      |                      | -0.09 |                   |  | | EKA  | BZ | 31.3 | ES   |    |   | 20:40 | 11.40 |      |      |  |      |                      | -0.36 |                   |  | | | | | | | | | | | | | |



















# TABLE 2 : PHASE DATA

<p>MONM HN 50.2 ES 23:14 17.61            MONM HN 50.2 IAML 23:14 19.03            MONM HE 50.2 IAML 23:14 22.08            MCH1 HZ 52.5 EP 23:14 10.74            MCH1 HE 52.5 ES 23:14 17.84            MCH1 HN 52.5 IAML 23:14 18.24            MCH1 HE 52.5 IAML 23:14 18.30            STRD HZ 89.5 EP 23:14 17.08            HTL HZ 100.0 EP 23:14 18.54            HLML HZ 108.0 EP 23:14 20.50            HLML HE 108.0 IAML 23:14 37.80            HLML HN 108.0 IAML 23:14 37.82            CWF HZ 192.0 EP 23:14 31.93</p>	<p>7 0.30            9 0.50            -0.42            -0.20            5 0.17            5 0.14            0.18            -0.03            0.69            6 0.20            4 0.25            0.19</p>	<p>EAB HZ 38.1 IP            EAB HN 38.1 ES            EAB HE 38.1 IAML            EAB HN 38.1 IAML            EDI HZ 53.1 EP            EDI HN 53.1 ES            EDI HN 53.1 IAML            EDI HE 53.1 IAML            PGB1 HZ 69.8 EP            LAWE HZ 102.0 EP            LAWE HE 102.0 IAML            LAWE HN 102.0 IAML            DRUM HZ 104.0 EP            DRUM HN 104.0 ES            DRUM HE 104.0 IAML            DRUM HN 104.0 IAML</p>	<p>C 14:34 26.46            14:34 31.30            14:34 34.42            14:34 34.49            14:34 28.71            14:34 35.25            14:34 35.45            14:34 35.67            14:34 31.24            14:34 36.62            14:34 51.72            14:34 51.87            14:34 36.80            14:34 49.34            14:34 51.10            14:34 51.29</p>	<p>0.08            -0.05            14 0.18            24 0.44            0.05            -0.05            10 0.17            9 0.12            -0.03            0.30            14 0.22            17 0.15            0.16            0.24            36 0.22            21 0.24</p>
<p>September 13 2020 Time: 08:09 31.0 UTC Magnitude: 1.2 ML            Lat: 56.503 Lon: -3.907 Depth: 6.2 km            Grid Ref: 282.63 kmE 736.16 kmN RMS: 0.20 secs            Locality: AUCHNACLOICH, P &amp; K            Velocity model: Lownet Xnear: 100.0 Xfar: 200.0</p>		<p>September 13 2020 Time: 14:38 06.7 UTC Magnitude: 1.1 ML            Lat: 56.291 Lon: -3.733 Depth: 6.5 km            Grid Ref: 292.75 kmE 712.29 kmN RMS: 0.20 secs            Locality: BLACKFORD, PERTH/KINROSS            Velocity model: Lownet Xnear: 100.0 Xfar: 200.0</p>		
<p>STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES            INVG HZ 11.9 EP 08:09 33.71 0.04            INVG HE 11.9 ES 08:09 35.52 -0.09            INVG HE 11.9 IAML 08:09 35.75 77 0.13            INVG HN 11.9 IAML 08:09 35.75 61 0.17            EAB HZ 44.0 EP 08:09 39.09 0.27            EAB HN 44.0 IAML 08:09 45.13 14 0.11            EAB HE 44.0 IAML 08:09 45.30 9 0.15            EDI HZ 78.5 EP 08:09 44.15 0.01            EDI HN 78.5 IAML 08:09 54.39 9 0.12            EDI HE 78.5 IAML 08:09 54.52 11 0.12            LAWE HZ 96.1 EP 08:09 46.99 0.12            LAWE HN 96.1 ES 08:09 58.14 -0.30            LAWE HE 96.1 IAML 08:10 01.90 12 0.10            LAWE HN 96.1 IAML 08:10 03.26 17 0.16            DRUM HZ 98.2 EP 08:09 46.93 -0.28            DRUM HE 98.2 IAML 08:10 01.95 12 0.34            DRUM HN 98.2 IAML 08:10 02.90 22 0.10            MCD HZ 127.0 EP 08:09 51.80 0.18            MCD HE 127.0 IAML 08:10 09.39 7 0.31            MCD HN 127.0 IAML 08:10 10.75 6 0.25            KPL HZ 141.0 EP 08:09 54.05 0.38            KPL HE 141.0 IAML 08:10 11.82 8 0.26            KPL HN 141.0 IAML 08:10 12.05 9 0.30</p>	<p>0.04            -0.09            77 0.13            61 0.17            0.27            14 0.11            9 0.15            0.01            9 0.12            11 0.12            0.12            -0.30            12 0.10            17 0.16            -0.28            12 0.34            22 0.10            0.18            7 0.31            6 0.25            0.38            8 0.26            9 0.30</p>	<p>STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES            INVG HZ 24.5 IP C 14:38 11.45 -0.02            INVG HN 24.5 ES 14:38 14.74 -0.18            INVG HN 24.5 IAML 14:38 15.10 9 0.07            INVG HE 24.5 IAML 14:38 15.12 9 0.07            EAB HZ 39.2 IP C 14:38 13.57 -0.21            EAB HE 39.2 ES 14:38 18.72 -0.21            EAB HE 39.2 IAML 14:38 20.35 11 0.18            EAB HN 39.2 IAML 14:38 21.63 20 0.40            EDI HZ 53.2 EP 14:38 15.86 -0.06            EDI HN 53.2 ES 14:38 22.41 -0.21            EDI HN 53.2 IAML 14:38 22.56 8 0.15            EDI HE 53.2 IAML 14:38 24.42 11 0.32            PGB1 HZ 71.0 EP 14:38 19.15 0.45            LAWE HZ 103.0 EP 14:38 24.03 0.34            DRUM HZ 103.0 EP 14:38 23.87 0.18            DRUM HN 103.0 ES 14:38 36.03 -0.04            DRUM HN 103.0 IAML 14:38 38.42 17 0.26            LAWE HE 103.0 IAML 14:38 38.86 9 0.22            DRUM HE 103.0 IAML 14:38 38.23 26 0.24            LAWE HN 103.0 IAML 14:38 38.55 10 0.13</p>	<p>-0.02            -0.18            9 0.07            9 0.07            -0.21            -0.21            11 0.18            20 0.40            -0.06            -0.21            8 0.15            11 0.32            0.45            0.34            0.18            -0.04            17 0.26            9 0.22            26 0.24            10 0.13</p>	
<p>September 13 2020 Time: 10:58 39.5 UTC Magnitude: 0.6 ML            Lat: 56.181 Lon: -4.946 Depth: 7.9 km            Grid Ref: 217.17 kmE 702.61 kmN RMS: 0.20 secs            Locality: LOCH GOIL, ARGYLL/BUTE            Velocity model: Lownet Xnear: 100.0 Xfar: 200.0</p>		<p>September 13 2020 Time: 23:20 52.6 UTC Magnitude: 2.1 ML            Lat: 51.911 Lon: -0.709 Depth: 10.0 km            Grid Ref: 488.79 kmE 224.44 kmN RMS: 0.70 secs            Locality: LEIGHTON BUZZARD, BEDS            Velocity model: Lownet Xnear: 100.0 Xfar: 200.0            Comment: FELT LEIGHTON... Intensity: 3</p>		
<p>STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES            LAWE HZ 29.5 IP C 10:58 45.12 0.17            LAWE HN 29.5 ES 10:58 48.71 -0.21            LAWE HN 29.5 IAML 10:58 48.85 11 0.13            LAWE HE 29.5 IAML 10:58 49.06 10 0.13            EAB HZ 37.8 IP C 10:58 46.65 0.38            EAB HE 37.8 ES 10:58 51.13 -0.07            EAB HE 37.8 IAML 10:58 51.46 7 0.08            EAB HN 37.8 IAML 10:58 51.71 8 0.10            PGB1 HN 50.2 ES 10:58 54.33 -0.18            INVG HZ 62.2 EP 10:58 50.30 0.25            INVG HN 62.2 ES 10:58 57.41 -0.34            INVG HN 62.2 IAML 10:59 02.10 4 0.17            INVG HE 62.2 IAML 10:59 02.33 3 0.19</p>	<p>0.17            -0.21            11 0.13            10 0.13            0.38            -0.07            7 0.08            8 0.10            -0.18            0.25            -0.34            4 0.17            3 0.19</p>	<p>STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES            BUW HZ 66.2 EP 23:21 02.66 -1.06            BUW HN 66.2 ES 23:21 11.13 -0.73            BUW HE 66.2 IAML 23:21 13.76 145 0.43            BUW HN 66.2 IAML 23:21 14.62 113 0.31            WOL BZ 75.5 EP 23:21 04.17 -0.98            WOL BN 75.5 ES 23:21 13.94 -0.39            WOL BN 75.5 IAML 23:21 19.46 36 0.31            WOL BE 75.5 IAML 23:21 19.66 31 0.36            BRDL HZ 86.1 EP 23:21 07.11 0.33            BRDL HE 86.1 ES 23:21 18.46 1.30            BRDL HE 86.1 IAML 23:21 23.08 50 0.21            BRDL HN 86.1 IAML 23:21 23.52 50 0.27            SWN1 HZ 87.5 IP C 23:21 06.62 -0.39            SWN1 HE 87.5 ES 23:21 18.04 0.48            SWN1 HE 87.5 IAML 23:21 20.61 22 0.25            SWN1 HN 87.5 IAML 23:21 23.70 47 0.24            STRD HZ 101.0 EP 23:21 08.81 -0.35            STRD HN 101.0 ES 23:21 23.07 1.80            STRD HE 101.0 IAML 23:21 26.19 38 0.13            STRD HN 101.0 IAML 23:21 26.19 38 0.12            CWF HZ 101.0 IP D 23:21 08.52 -0.55            BRAD CZ 113.0 EP 23:21 10.60 -0.28            BRAD CN 113.0 ES 23:21 24.38 0.13            BRAD CE 113.0 IAML 23:21 25.99 50 0.19            BRAD CN 113.0 IAML 23:21 26.38 47 0.19            ELMS HZ 118.0 EP 23:21 11.57 -0.11            WACR HZ 128.0 IP D 23:21 13.52 0.40            OLDB HE 130.0 ES 23:21 28.80 0.29            OLDB HE 130.0 IAML 23:21 31.47 100 0.16            OLDB HN 130.0 IAML 23:21 31.66 221 0.42            MONM HZ 145.0 EP 23:21 15.37 -0.07            MONM HE 145.0 ES 23:21 32.25 0.12            MONM HN 145.0 IAML 23:21 34.71 90 0.36            MONM HE 145.0 IAML 23:21 34.88 69 0.34            ELSH HZ 154.0 EP 23:21 17.63 0.91            MCH1 HZ 158.0 EP 23:21 17.56 0.23            HLML HZ 163.0 EP 23:21 18.03 -0.10            STNC HZ 166.0 EP 23:21 18.96 0.49            LMK HZ 174.0 EP 23:21 20.99 1.56            FOEL HZ 201.0 EP 23:21 24.29 1.35            HPK HZ 236.0 EP 23:21 29.92 2.72            RSBS HZ 278.0 EP 23:21 32.67 0.25</p>	<p>-0.21            0.38            -0.07            0.08            0.10            -0.18            0.25            -0.34            0.17            0.19            -1.06            -0.73            145 0.43            113 0.31            -0.98            -0.39            36 0.31            31 0.36            0.33            1.30            50 0.21            50 0.27            -0.39            0.48            22 0.25            47 0.24            -0.35            1.80            38 0.13            38 0.12            -0.55            -0.28            0.13            50 0.19            47 0.19            -0.11            0.40            0.29            100 0.16            221 0.42            -0.07            0.12            90 0.36            69 0.34            0.91            0.23            -0.10            0.49            1.56            1.35            2.72            0.25</p>	
<p>September 13 2020 Time: 12:58 51.4 UTC Magnitude: 0.5 ML            Lat: 56.183 Lon: -4.944 Depth: 7.7 km            Grid Ref: 217.31 kmE 702.82 kmN RMS: 0.30 secs            Locality: LOCH GOIL, ARGYLL/BUTE            Velocity model: Lownet Xnear: 100.0 Xfar: 200.0</p>		<p>September 13 2020 Time: 14:34 19.6 UTC Magnitude: 1.2 ML            Lat: 56.283 Lon: -3.746 Depth: 7.9 km            Grid Ref: 291.92 kmE 711.42 kmN RMS: 0.10 secs            Locality: BLACKFORD, PERTH/KINROSS            Velocity model: Lownet Xnear: 50.0 Xfar: 100.0</p>		
<p>STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES            LAWE HZ 29.5 IP C 12:58 56.94 0.13            LAWE HN 29.5 ES 12:59 00.54 -0.24            LAWE HN 29.5 IAML 12:59 00.62 8 0.12            LAWE HE 29.5 IAML 12:59 00.68 8 0.30            EAB HZ 37.7 IP C 12:58 58.47 0.36            EAB HE 37.7 ES 12:59 02.96 -0.06            EAB HE 37.7 IAML 12:59 03.27 6 0.09            EAB HN 37.7 IAML 12:59 03.32 6 0.09            PGB1 HN 50.3 ES 12:59 06.22 -0.17            INVG HZ 62.0 EP 12:59 02.25 0.37            INVG HN 62.0 ES 12:59 09.17 -0.38            INVG HN 62.0 IAML 12:59 13.85 4 0.18            INVG HE 62.0 IAML 12:59 14.15 3 0.12</p>	<p>0.13            -0.24            8 0.12            8 0.30            0.36            -0.06            6 0.09            6 0.09            -0.17            0.37            -0.38            4 0.18            3 0.12</p>	<p>STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES            INVG HZ 24.4 IP C 14:34 24.34 0.09            INVG HN 24.4 ES 14:34 27.55 -0.11            INVG HN 24.4 IAML 14:34 27.98 13 0.08            INVG HE 24.4 IAML 14:34 27.99 14 0.09</p>	<p>0.09            -0.11            13 0.08            14 0.09</p>	



# TABLE 2 : PHASE DATA

September 19 2020 Time: 23:33 57.3 UTC Magnitude: 0.7 ML										HLM1 HZ 165.0 EP 08:32 41.69 0.08									
Lat: 50.273 Lon: -5.395 Depth: 7.8 km										AS02 HZ 202.0 IP C 08:32 47.93 1.64									
Grid Ref: 158.12 kmE 47.03 kmN RMS: 0.10 secs										FOEL HZ 203.0 EP 08:32 47.52 1.14									
Locality: PORTREATH,CORNWALL										AS07 HZ 273.0 EP 08:32 55.87 0.69									
Velocity model: Cornwall Xnear: 100.0 Xfar: 200.0										DYA HZ 281.0 EP 08:32 56.27 0.15									
Comment: OFFSHORE LOCATION										HTL HZ 284.0 EP 08:32 56.23 -0.20									
STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES										AQ12 HZ 313.0 EP 08:33 00.13 0.02									
GEL06 CZ 12.5 IP D 23:33 59.76 -0.09										AP12 HZ 318.0 IP 08:33 00.93 0.24									
GEL06 CN 12.5 ES 23:34 01.89 0.05										SBD BZ 318.0 EP 08:33 00.01 -0.69									
GEL06 CN 12.5 IAML 23:34 02.06 29 0.15										SBD BN 318.0 IAML 08:33 50.70 42 0.35									
GEL06 CE 12.5 IAML 23:34 02.23 25 0.04										SBD BE 318.0 IAML 08:33 50.74 41 0.38									
GEL09 CZ 14.3 IP D 23:34 00.04 -0.08										CCA1 HZ 373.0 EP 08:33 06.93 -0.62									
GEL09 CN 14.3 ES 23:34 02.32 0.01										September 22 2020 Time: 12:39 21.8 UTC Magnitude: 2.1 ML									
GEL09 CN 14.3 IAML 23:34 02.41 24 0.09										Lat: 51.930 Lon: -0.712 Depth: 10.0 km									
GEL09 CE 14.3 IAML 23:34 02.48 17 0.09										Grid Ref: 488.55 kmE 226.55 kmN RMS: 0.40 secs									
GEL05 CZ 15.3 IP D 23:34 00.26 -0.02										Locality: LEIGHTON BUZZARD,BEDS									
GEL05 CN 15.3 ES 23:34 02.63 0.03										Velocity model: Lownet Xnear: 100.0 Xfar: 150.0									
GEL05 CE 15.3 IAML 23:34 02.73 42 0.06										Comment: FELT LEIGHTON... Intensity: 3									
GEL05 CN 15.3 IAML 23:34 02.75 38 0.04										STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES									
CCA1 HZ 15.3 IP D 23:34 00.23 -0.05										WOL BZ 77.2 EP 4 12:39 35.19 0.52									
CCA1 HN 15.3 ES 23:34 02.64 0.04										WOL BN 77.2 IAML 12:39 46.38 23 0.25									
CCA1 HN 15.3 IAML 23:34 02.74 26 0.06										WOL BE 77.2 IAML 12:39 51.58 30 0.50									
CCA1 HE 15.3 IAML 23:34 02.75 26 0.08										SWN1 HZ 88.4 EP 12:39 35.88 -0.53									
GEL04 CZ 15.4 IP D 23:34 00.22 -0.06										CWF HZ 98.7 EP 12:39 37.83 -0.19									
GEL04 CE 15.4 ES 23:34 02.60 0.01										CWF HN 98.7 ES 12:39 49.45 -0.39									
GEL04 CE 15.4 IAML 23:34 02.69 26 0.09										CWF HE 98.7 IAML 12:39 51.32 50 0.16									
GEL04 CN 15.4 IAML 23:34 02.72 65 0.05										CWF HN 98.7 IAML 12:39 51.73 32 0.21									
GEL07 CZ 17.0 IP C 23:34 00.53 -0.01										STRD HZ 101.0 EP 12:39 39.07 0.64									
GEL07 CN 17.0 ES 23:34 03.13 0.08										STBN CZ 107.0 EP 12:39 39.69 0.36									
GEL07 CN 17.0 IAML 23:34 03.41 11 0.08										STBN CE 107.0 ES 12:39 52.34 0.23									
GEL07 CE 17.0 IAML 23:34 03.69 7 0.09										STBN CN 107.0 IAML 12:39 53.92 36 0.24									
GEL01 CZ 18.1 IP D 23:34 00.66 -0.04										STBN CE 107.0 IAML 12:39 54.40 40 0.32									
GEL01 CN 18.1 ES 23:34 03.40 0.05										BRAD CZ 113.0 EP 12:39 40.30 0.09									
GEL01 CE 18.1 IAML 23:34 03.49 9 0.16										BRAD CE 113.0 ES 12:39 53.47 -0.17									
GEL01 CN 18.1 IAML 23:34 03.63 8 0.11										BRAD CN 113.0 IAML 12:39 54.80 55 0.26									
GEL03 CN 18.6 ES 23:34 03.55 0.05										BRAD CE 113.0 IAML 12:39 55.26 49 0.18									
GEL03 CN 18.6 IAML 23:34 03.72 38 0.09										WACR HZ 127.0 EP 12:39 42.77 0.58									
GEL02 CZ 18.6 IP D 23:34 00.75 -0.04										OLDB HZ 130.0 EP 12:39 42.63 -0.01									
GEL02 CN 18.6 ES 23:34 03.48 -0.03										MONM HZ 144.0 EP 12:39 44.76 0.08									
GEL02 CN 18.6 IAML 23:34 03.61 25 0.10										MONM HE 144.0 ES 12:40 01.57 0.21									
GEL02 CE 18.6 IAML 23:34 03.87 22 0.08										MONM HN 144.0 IAML 12:40 03.98 86 0.36									
GEL03 CZ 18.6 IP D 23:34 00.80 0.01										MONM HE 144.0 IAML 12:40 04.14 57 0.33									
GEL03 CE 18.6 IAML 23:34 03.68 33 0.09										ELSH HZ 155.0 EP 12:39 47.22 1.06									
SBD BZ 59.9 EP 23:34 07.70 -0.09										MCH1 HZ 157.0 EP 12:39 46.76 0.22									
SBD BE 59.9 IAML 23:34 16.05 4 0.11										MCH1 HE 157.0 ES 12:40 05.02 0.44									
SBD BN 59.9 IAML 23:34 17.69 5 0.10										MCH1 HE 157.0 IAML 12:40 07.00 34 0.27									
HTL HZ 103.0 EP 23:34 14.49 0.18										MCH1 HN 157.0 IAML 12:40 07.73 37 0.15									
DYA HZ 106.0 EP 23:34 14.98 0.24										HLM1 HZ 162.0 EP 12:39 47.25 0.00									
DYA HN 106.0 ES 23:34 27.99 -0.21										HLM1 HE 162.0 ES 12:40 06.07 0.25									
DYA HE 106.0 IAML 23:34 29.31 2 0.15										HLM1 HN 162.0 IAML 12:40 08.45 29 0.21									
DYA HN 106.0 IAML 23:34 29.63 4 0.19										HLM1 HE 162.0 IAML 12:40 08.45 42 0.31									
										FOEL HZ 200.0 EP 12:39 53.24 1.21									
September 22 2020 Time: 08:32 15.9 UTC Magnitude: 3.0 ML										September 22 2020 Time: 18:46 02.1 UTC Magnitude: 0.7 ML									
Lat: 51.919 Lon: -0.679 Depth: 10.0 km										Lat: 54.380 Lon: -4.305 Depth: 8.2 km									
Grid Ref: 490.84 kmE 225.37 kmN RMS: 0.70 secs										Grid Ref: 250.32 kmE 500.74 kmN RMS: 0.30 secs									
Locality: LEIGHTON BUZZARD,BEDS										Locality: IRISH SEA									
Velocity model: Lownet Xnear: 100.0 Xfar: 150.0										Velocity model: Lownet Xnear: 100.0 Xfar: 200.0									
Comment: FELT LEIGHTON... Intensity: 4										Comment: 8KM NE RAMSEY,IOM									
STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES										STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES									
BUW HZ 68.1 IP C 08:32 26.42 -0.87										IOMK HZ 21.6 EP 18:46 06.27 -0.08									
BUW HN 68.1 ES 08:32 34.93 -0.70										IOMK HN 21.6 ES 18:46 09.15 -0.29									
BUW HE 68.1 IAML 08:32 37.56 1404 0.43										IOMK HN 21.6 IAML 18:46 09.29 9 0.09									
BUW HN 68.1 IAML 08:32 38.47 1118 0.42										IOMK HE 21.6 IAML 18:46 09.59 6 0.06									
WOL BZ 77.2 IP C 08:32 27.92 -0.78										GAL1 HZ 60.1 EP 18:46 12.60 0.29									
WOL BE 77.2 ES 08:32 37.50 -0.58										GAL1 HE 60.1 ES 18:46 19.48 -0.26									
WOL BN 77.2 IAML 08:32 43.23 341 0.24										GAL1 HE 60.1 IAML 18:46 19.71 8 0.18									
WOL BE 77.2 IAML 08:32 43.47 329 0.36										GAL1 HN 60.1 IAML 18:46 20.09 5 0.11									
BRDL HZ 86.2 EP 08:32 30.68 0.60										AP12 HN 68.0 ES 18:46 21.56 -0.32									
BRDL HE 86.2 ES 08:32 41.40 0.93										AP12 HN 68.0 IAML 18:46 22.50 4 0.27									
BRDL HE 86.2 IAML 08:32 46.93 540 0.23										AP12 HE 68.0 IAML 18:46 22.89 3 0.04									
BRDL HN 86.2 IAML 08:32 47.24 523 0.28										KESW HZ 81.2 EP 18:46 16.03 0.43									
SWN1 HZ 89.7 IP C 08:32 30.38 -0.26										KESW HN 81.2 ES 18:46 25.43 -0.01									
SWN1 HE 89.7 ES 08:32 42.00 0.57										KESW HN 81.2 IAML 18:46 27.02 3 0.23									
SWN1 HN 89.7 IAML 08:32 47.50 419 0.21										KESW HE 81.2 IAML 18:46 27.30 3 0.12									
SWN1 HE 89.7 IAML 08:32 50.10 301 0.50										NEWG HZ 82.2 EP 18:46 16.00 0.27									
CWF HZ 101.0 IP D 08:32 32.33 -0.04										NEWG HE 82.2 ES 18:46 25.46 -0.21									
CWF HN 101.0 ES 08:32 44.15 -0.27										NEWG HE 82.2 IAML 18:46 27.86 6 0.15									
CWF HE 101.0 IAML 08:32 45.80 368 0.20										NEWG HN 82.2 IAML 18:46 27.86 4 0.16									
CWF HN 101.0 IAML 08:32 45.93 240 0.20										AQ12 HN 101.0 ES 18:46 30.60 -0.21									
STRD HZ 103.0 EP 08:32 32.59 -0.19										AQ12 HN 101.0 IAML 18:46 31.67 6 0.07									
STRD HN 103.0 ES 08:32 46.87 1.74										AQ12 HE 101.0 IAML 18:46 32.30 4 0.09									
STRD HN 103.0 IAML 08:32 51.59 277 0.25										WLF1 HZ 122.0 EP 18:46 22.36 0.55									
STRD HE 103.0 IAML 08:32 52.19 396 0.41										ESK HZ 126.0 EP 18:46 22.59 0.13									
OLDB HZ 132.0 EP 08:32 37.01 0.06																			
OLDB HE 132.0 ES 08:32 52.40 0.06																			
OLDB HN 132.0 IAML 08:32 55.49 2183 0.41										September 23 2020 Time: 22:20 41.1 UTC Magnitude: 1.0 ML									
OLDB HE 132.0 IAML 08:32 56.61 820 0.39										Lat: 57.205 Lon: -5.550 Depth: 4.3 km									
HMNX HZ 137.0 EP 08:32 38.45 0.88										Grid Ref: 185.61 kmE 818.26 kmN RMS: 0.20 secs									
ELSH HZ 152.0 IP C 08:32 41.36 1.53										Locality: GLENELG,HIGHLAND									
MCH1 HZ 160.0 EP 08:32 41.20 0.29										Velocity model: Lownet Xnear: 100.0 Xfar: 200.0									
MCH1 HE 160.0 ES 08:32 59.35 0.16										STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES									
MCH1 HN 160.0 IAML 08:33 01.52 300 0.25										KPL HZ 16.2 EP 22:20 44.43 0.13									
MCH1 HE 160.0 IAML 08:33 01.79 341 0.44										KPL HN 16.2 ES 22:20 46.49 -0.17									























# TABLE 2 : PHASE DATA

NEWG	HE	134.0	IAML	21:56	41.45	3	0.23					November 25 2020	Time: 18:56 47.2 UTC	Magnitude: 0.3 ML													
												Lat: 51.155	Lon: -0.252	Depth: 2.5 km													
												Grid Ref: 522.23 kmE 141.04 kmN															
												Locality: NEWDIGATE,SURREY															
												Velocity model: Surrey Xnear: 500.0 Xfar: 1000.0															
								STAT	CO	DIST	PHAS	WT	P	HrMn	SECS	AMPL	PERI	RES									
								RUSH	HZ		1.4	EP		18:56	48.10			0.03									
								RUSH	HN		1.4	ES		18:56	48.71			-0.02									
								RUSH	HE		1.4	IAML		18:56	48.94	323	0.08										
								RUSH	HN		1.4	IAML		18:56	48.95	534	0.11										
								STAN	HZ		1.7	EP		18:56	48.13			-0.01									
								STAN	HE		1.7	ES		18:56	48.84			-0.01									
								STAN	HE		1.7	IAML		18:56	48.98	338	0.10										
								STAN	HN		1.7	IAML		18:56	48.99	274	0.10										
								HORS	HZ		3.8	EP		18:56	48.51			0.01									
								HORS	HN		3.8	ES		18:56	49.48			0.00									
								HORS	HE		3.8	IAML		18:56	49.65	61	0.10										
								HORS	HN		3.8	IAML		18:56	49.66	111	0.24										
								BRDL	HZ		3.8	EP		18:56	48.48			-0.03									
								BRDL	HE		3.8	ES		18:56	49.52			0.03									
								BRDL	HN		3.8	IAML		18:56	49.65	153	0.12										
								BRDL	HE		3.8	IAML		18:56	49.70	241	0.12										
												November 27 2020				Time: 03:22 35.2 UTC				Magnitude: 2.0 ML							
																Lat: 56.274				Lon: -3.746				Depth: 6.2 km			
																				Grid Ref: 291.89 kmE 710.42 kmN							
																				Locality: BLACKFORD,PERTH/KINROSS							
																				Velocity model: Lownet Xnear: 500.0 Xfar: 1000.0							
																				Comment: FELT BLACKFORD...							
																				Intensity: 3							
								STAT	CO	DIST	PHAS	WT	P	HrMn	SECS	AMPL	PERI	RES									
								INVG	HZ		25.1	EP		03:22	40.00			-0.06									
								INVG	HE		25.1	ES		03:22	43.29			-0.29									
								INVG	HN		25.1	IAML		03:22	43.58	80	0.08										
								INVG	HE		25.1	IAML		03:22	43.60	72	0.11										
								EAB	HZ		37.9	IP	C	03:22	42.12			0.02									
								EAB	HN		37.9	ES		03:22	46.78			-0.33									
								EAB	HN		37.9	IAML		03:22	47.41	133	0.18										
								EAB	HE		37.9	IAML		03:22	48.05	113	0.26										
								EDI	HZ		52.3	IP	D	03:22	44.41			0.10									
								EDI	HN		52.3	ES		03:22	50.88			-0.04									
								EDI	HN		52.3	IAML		03:22	51.10	85	0.09										
								EDI	HE		52.3	IAML		03:22	51.29	121	0.28										
								GGERF	CZ		56.6	EP		03:22	45.20			0.24									
								GGERF	CE		56.6	ES		03:22	52.16			0.11									
								GGERF	CN		56.6	IAML		03:22	52.55	78	0.34										
								GGERF	CE		56.6	IAML		03:22	52.65	71	0.27										
								PGB1	HZ		69.0	IP	C	03:22	46.86			-0.06									
								PGB1	HN		69.0	ES		03:22	55.37			-0.07									
								PGB1	HE		69.0	IAML		03:22	57.83	199	0.24										
								PGB1	HN		69.0	IAML		03:22	58.66	126	0.19										
								LAWE	HZ		102.0	IP	C	03:22	52.19			0.11									
								LAWE	HN		102.0	ES		03:23	04.37			0.00									
								LAWE	HN		102.0	IAML		03:23	07.01	131	0.15										
								LAWE	HE		102.0	IAML		03:23	07.07	88	0.17										
								DRUM	HZ		105.0	EP		03:22	52.43			-0.08									
								DRUM	HN		105.0	ES		03:23	04.60			-0.52									
								DRUM	HE		105.0	IAML		03:23	06.78	301	0.22										
								DRUM	HN		105.0	IAML		03:23	07.08	148	0.19										
								NEWG	HZ		132.0	EP		03:22	56.95			0.31									
								NEWG	HN		132.0	ES		03:23	12.00			-0.26									
								NEWG	HN		132.0	IAML		03:23	14.51	44	0.16										
								NEWG	HE		132.0	IAML		03:23	15.47	52	0.22										
								MCD	HZ		149.0	EP		03:22	59.61			0.58									
								MCD	HN		149.0	IAML		03:23	19.62	67	0.20										
								MCD	HE		149.0	IAML		03:23	23.56	67	0.42										
								KPL	HZ		166.0	EP		03:23	01.96			0.50									
								KPL	HE		166.0	IAML		03:23	24.16	30	0.28										
								KPL	HN		166.0	IAML		03:23	25.17	35	0.28										
								GAL1	HZ		168.0	EP		03:23	01.49			-0.26									
								GAL1	HN		168.0	IAML		03:23	23.70	45	0.32										
								GAL1	HE		168.0	IAML		03:23	23.72	52	0.50										
								CLGH	HZ		199.0	EP		03:23	05.66			-0.01									
								CLGH	HN		199.0	IAML		03:23	31.51	17	0.26										
								CLGH	HE		199.0	IAML		03:23	36.41	22	0.16										
								AQ12	HZ		214.0	EP		03:23	07.57			0.02									
								AQ12	HN		214.0	IAML		03:23	38.34	15	0.16										
								AQ12	HE		214.0	IAML		03:23	42.17	21	0.30										
												December 7 2020				Time: 08:29 17.3 UTC				Magnitude: 0.5 ML							
																Lat: 55.445				Lon: -7.072				Depth: 6.9 km			
																				Grid Ref: 79.33 kmE 628.49 kmN							
																				Locality: INISHTRAHULL,CO DONEGAL							
																				Velocity model: Lownet Xnear: 100.0 Xfar: 200.0							
																				Comment: OFFSHORE LOCATION							
								STAT	CO	DIST	PHAS	WT	P	HrMn	SECS	AMPL	PERI	RES									
								IDGL	HZ		50.2	EP		08:29	26.18			0.21									
								IDGL	HN		50.2	ES		08:29	32.18			-0.12									
								IDGL	HE		50.2	IAML		08:29	33.40	2	0.29										
								IDGL	HN		50.2	IAML		08:29	33.77	2	0.16										
								CLGH	HZ		73.2	EP		08:29	29.41			-0.15									
								CLGH	HE		73.2	ES		08:29	38.61			0.09									
								CLGH	HE		73.2	IAML		08:29	42.22	3	0.19										
								CLGH	HN		73.2	IAML		08:29	42.44	3	0.12										
								LAWE	HZ		139.0	EP		08:29	39.34			-0.17									









## TABLE 2 : PHASE DATA

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December 31 2020      Time: 11:18 12.0 UTC      Magnitude: 1.9 ML
Lat: 55.664          Lon: -3.438                Depth: 7.4 km
Grid Ref: 309.55 kmE 642.10 kmN          RMS: 0.40 secs
Locality: SKIRLING,BORDERS
Velocity model: Lownet Xnear: 100.0 Xfar: 200.0
Comment: FELT SKIRLING...
Intensity: 3
STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES
EDI HZ 32.8 IP C 11:18 17.85 -0.13
EDI HN 32.8 ES 11:18 22.12 -0.21
EDI HN 32.8 IAML 11:18 22.36 265 0.13
EDI HE 32.8 IAML 11:18 22.40 359 0.25
ESK HZ 41.4 EP 11:18 19.37 0.03
ESK HN 41.4 ES 11:18 24.06 -0.63
ESK HN 41.4 IAML 11:18 24.64 65 0.11
ESK HE 41.4 IAML 11:18 25.20 76 0.17
GGERF CZ 53.1 IP C 11:18 21.23 0.13
GGERF CN 53.1 ES 11:18 27.65 -0.08
GGERF CN 53.1 IAML 11:18 27.92 54 0.07
GGERF CE 53.1 IAML 11:18 28.47 65 0.22
PGB1 HZ 67.7 EP 11:18 23.58 0.18
PGB1 HE 67.7 ES 11:18 31.53 -0.19
PGB1 HN 67.7 IAML 11:18 32.08 221 0.30
PGB1 HE 67.7 IAML 11:18 33.84 213 0.18
NEWG HZ 78.9 EP 11:18 24.92 -0.21
NEWG HE 78.9 ES 11:18 34.54 -0.17
NEWG HN 78.9 IAML 11:18 38.16 95 0.13
NEWG HE 78.9 IAML 11:18 38.63 58 0.10
EAB HZ 81.0 IP C 11:18 25.59 0.10
EAB HE 81.0 ES 11:18 35.15 -0.17
EAB HE 81.0 IAML 11:18 39.01 39 0.11
EAB HN 81.0 IAML 11:18 39.18 48 0.08
INVG HZ 93.0 EP 11:18 27.37 0.04
INVG HE 93.0 IAML 11:18 41.73 21 0.13
INVG HN 93.0 IAML 11:18 42.10 21 0.23
KESW HZ 122.0 EP 11:18 32.81 1.03
LAW E HZ 139.0 EP 11:18 34.90 0.60
AQ12 HZ 144.0 EP 11:18 35.72 0.77
DRUM HZ 151.0 EP 11:18 36.28 0.30
AR09 HZ 172.0 EP 11:18 39.26 0.25
IOMK HZ 172.0 EP 11:18 39.74 0.83
CLGH HZ 181.0 EP 11:18 41.38 1.31
MCD HZ 214.0 EP 11:18 43.87 -0.28
GDLE HZ 217.0 EP 11:18 47.64 3.08

```

TABLE 3

## GEOGRAPHIC COORDINATES OF SEISMOGRAPH STATIONS, 2020

Code	Name	Lat	Lon	E (km)	N (km)	Ht (m)	Comp
AP12	ULPHA	54.3100	-3.2670	317.66	491.23	220	BB
AQ01	HOSCAR	53.6068	-2.7944	347.53	412.54	24	BB
AQ02	BANKS	53.6905	-2.8967	340.88	421.94	17	BB
AQ03	WARTON	53.7595	-2.8866	341.65	429.61	23	BB
AQ04	BALLAM	53.7760	-2.9690	336.24	431.51	11	BB
AQ05	STAINING	53.8140	-2.9680	336.62	435.74	11	BB
AQ06	THISTLETON	53.8250	-2.9110	340.13	436.91	28	BB
AQ07	GOOSNARGH	53.8420	-2.6660	356.28	438.62	90	BB
AQ09	RAWCLIFFE	53.8846	-2.9048	340.62	443.54	7	BB
AQ10	GARSTANG	53.9150	-2.8270	345.78	446.86	22	BB
AQ12	SELSIDE	54.4370	-2.7520	351.32	504.88	389	BB
AR01	HASLINGDEN	53.7022	-2.3450	377.32	422.92	256	BB
AR05	SKIPTON	53.9910	-2.0190	398.85	454.99	259	BB
AR07	SLAIDBURN	53.9960	-2.4590	370.01	455.65	233	BB
AR09	INGLETON	54.2260	-2.4410	371.35	481.23	481	BB
AR10	KELD	54.4264	-2.2169	386.03	503.46	440	BB
AS02	UPPERMILL	53.5542	-1.9856	401.05	406.40	287	BB
AS03	WAINSTALLS	53.7674	-1.9563	402.98	430.12	376	BB
AS07	CARLTON	54.2540	-1.9380	404.14	484.26	411	BB
AS10	WINSTON	54.5520	-1.8320	410.96	517.43	156	BB
AT08	MYTON-ON-SWALE	54.0985	-1.3110	445.16	467.18	19	BB
AT10	SNILESWORTH	54.3700	-1.1760	453.63	497.48	333	BB
AT12	BISHOPTON	54.5770	-1.4480	435.78	520.34	62	BB
AU05	LAYTHAM	53.8599	-0.8741	474.15	441.00	3	BB
AU07	BIRKDALE	54.1120	-0.9590	468.15	468.96	102	BB
AU08	SOUTH WOLD	54.1238	-0.6613	487.59	470.60	175	BB
AU09	BARTON-LE-STREET	54.1460	-0.8910	472.54	472.81	103	BB
AU10	KIRBY MISPERTON 1	54.1960	-0.8180	477.21	478.45	20	BB
AU11	EAST NESS	54.1974	-0.9325	469.74	478.49	34	BB
AU13	KIRBY MISPERTON 2	54.1993	-0.7941	478.77	478.84	25	BB
AU14	KIRBY MISPERTON 3	54.2030	-0.8320	476.29	479.21	23	BB
AU15	NORMANBY	54.2285	-0.8794	473.15	482.00	60	BB
AU16	KIRBY MISPERTON 4	54.2385	-0.8125	477.49	483.18	21	BB
AU18	THORNTON DALE	54.2482	-0.7095	484.18	484.38	83	BB
AU20	PICKERING	54.2940	-0.7870	479.05	489.39	151	BB
AV06	GANTON	54.1630	-0.4820	499.21	475.20	173	BB
BIGH	UPPER BIGHOUSE	58.4932	-3.9102	288.75	957.69	70	BBSMR
BRAD	BRADWELL	51.7395	0.9045	600.63	208.53	11	BBSM
BRDL	BROAD LANE	51.1880	-0.2650	521.35	144.63	74	BB
CCA1	CARNMENELLIS	50.1866	-5.2277	169.62	36.90	210	BBSMR
CLGH	CUSHENDALL	55.0828	-6.1106	137.76	584.21	239	BBR
CWF	CHARNWOOD FST	52.7385	-1.3076	446.74	315.91	203	BBSMR
DRUM	DRUMTOCHTY	56.9123	-2.4865	370.48	780.23	208	BBSMR
DYA	YADSWORTHY	50.4353	-3.9310	262.88	61.34	292	BBR
EAB	ABERFOYLE	56.1887	-4.3386	254.97	701.95	294	BBR
EDI	EDINBURGH	55.9233	-3.1875	325.80	670.66	125	BBR
EDMD	EDMUNDBYERS	54.8312	-1.9636	402.43	548.48	337	BBSMR
ELMS	ELMSETT	52.0934	0.9895	604.88	248.11	75	BBSMR
ELSH	ELHAM	51.1482	1.1345	619.32	143.44	126	BBSMR
ESK	ESKDALEMUIR	55.3165	-3.2052	323.52	603.16	261	BBR
ESY	STONEYPATH	55.9175	-2.6141	361.62	669.55	337	1R
FOEL	FOEL WYLFA	52.8898	-3.2012	319.27	333.15	449	BBSMR
GAL1	GALLOWAY	54.8664	-4.7114	226.02	555.78	117	BBR
GAT2	GATWICK	51.1440	-0.2210	524.54	139.81	63	BB
GDLE	GLAISDALE	54.4218	-0.8157	476.94	503.57	228	BBSMR
GGERF	DALMARNOCK	55.8410	-4.2220	260.92	663.09	19	BBR
GVIE	GLENDOE VIEW	57.1010	-4.5590	245.04	804.04	663	BB
HLM1	LONG MYND	52.5184	-2.8807	340.25	291.57	429	BBR
HMNX	HERSTMONCEUX	50.8674	0.3363	564.49	110.15	26	BBR

TABLE 3

## GEOGRAPHIC COORDINATES OF SEISMOGRAPH STATIONS, 2020

Code	Name	Lat	Lon	E (km)	N (km)	Ht (m)	Comp
HORS	HORSE HILL	51.1760	-0.2090	525.29	143.39	68	BB
HPK	HAVERAH PARK	53.9581	-1.6241	424.66	451.42	233	BBSMR
HTL	HARTLAND	50.9943	-4.4849	225.64	124.66	86	BBSMR
INVG	INVERGELDIE	56.4273	-4.0452	273.96	727.99	279	BBSMR
IOMK	KIRK MICHAEL	54.2605	-4.5662	232.95	488.02	188	BBR
JDC	DAM (CREST)	49.1947	-2.0469			39	SMR
JDG	DAM (GALLERY)	49.1947	-2.0469			7	SMR
JLP	LES PLATONS	49.2486	-2.1039			129	1R
JRS	MAISON ST LOUIS	49.1922	-2.0922			56	3R
JSA	ST AUBINS	49.1878	-2.1717			39	BBR
JVM	VALLE DE LA MARE	49.2169	-2.2067			64	1R
KESW	KESWICK	54.5886	-3.1048	328.70	522.05	282	BBSMR
KPL	PLOCKTON	57.3391	-5.6527	180.21	833.50	13	BBSMR
LAWE	LOCH AWE	56.2601	-5.3990	189.58	712.71	137	BBSMR
LBWR	LADYBOWER	53.4016	-1.7248	418.40	389.45	353	BBSMR
LEWI	LEWIS	58.1446	-6.8696	113.57	927.65	69	BBR
LINV	LOCHINVER	58.1470	-5.1970	211.94	922.03	57	BBR
LMK	MARKET RASEN	53.4573	-0.3274	511.15	396.92	133	BBSMR
LRW	LERWICK	60.1360	-1.1779	445.66	1139.27	98	BBSMR
MCD	COLEBURN DISTIL	57.5828	-3.2541	325.02	855.42	293	BBR
MCH1	MICHAELCHURCH	51.9974	-2.9983	331.47	233.74	219	BBSMR
MONM	MONMOUTH	51.8396	-2.8054	344.61	215.98	145	BBR
NEWG	NEW GALLOWAY	55.1173	-4.2299	257.88	582.59	151	BBR
OLDB	OLDBURY	51.6609	-2.5514	361.95	195.94	6	BBSMR
PGB1	GLENIFFERBRAES	55.8115	-4.4837	244.38	660.37	199	BBR
RSBS	ROSEBUSH	51.9530	-4.7448	211.48	231.84	278	BBR
RUSH	RUSS HILL	51.1480	-0.2680	521.24	140.17	99	BB
SOFL	SORNFELLI	62.0689	-6.9658			721	BBR
SPK	SELLA PARK	54.4183	-3.4913	303.24	503.58	50	SM
STAN	STAN HILL	51.1690	-0.2490	522.52	142.54	87	BB
STBN	SUTTON BONINGTON	52.8375	-1.2481	450.78	326.92	40	BBR
STNC	STOKE	53.0913	-2.2062	354.95	386.19	234	BBR
STRD	STROUD	51.7763	-2.1643	388.77	208.64	200	BBR
SWN1	SWINDON	51.5137	-1.8007	413.83	179.49	192	BBSMR
TORA	TORNESS A	55.9692	-2.4037	374.80	675.20	5	SM
TORB	TORNESS B	55.9673	-2.4085	374.50	674.99	5	SM
THP	THORPE	54.4183	-3.4913	303.24	503.58	50	SM
WACR	WEST ACRE	52.7247	0.6267	577.48	317.35	66	BBSMR
WIM	ISLE OF MAN	54.1475	-4.6738	225.39	475.73	386	1R
WLF1	LLYNFAES	53.2894	-4.3966	240.27	379.65	58	BBSMR
WME	MYNDD EILIAN	53.3969	-4.3032	246.88	391.40	129	1R
WPS	CAMAES, ANGLESEY	53.4004	-4.4986	233.98	392.19	16	BBSMR
YLL	LLANBERIS	53.1402	-4.1704	254.84	362.57	159	1R
YRC	RHOSCOLYN	53.2508	-4.5753	228.21	375.77	22	1R

**Component Codes:**

- 1 Single vertical seismometer
- 3 Orthogonal set of 3 seismometers
- SM Strong motion seismometers
- BB Broadband Instruments
- R Station coordinates registered with the International Seismological Centre (ISC), England and the National Earthquake Information Centre (NEIC), USA

**TABLE 4****Depth / crustal velocity models used in earthquake locations**

<b>Structural area</b>	<b>Depth to top of layer (km)</b>	<b>P-wave velocity (km/sec)</b>	<b>Vp/Vs</b>
North Sea	0.00	6.20	1.73
	12.00	6.50	
	23.00	7.10	
	31.00	8.05	
Lownet and general UK	0.00	4.00	1.73
	2.52	5.90	
	7.55	6.45	
	18.87	7.00	
	34.15	8.00	
Borders	0.00	4.10	1.71
	3.00	5.60	
	4.10	6.15	
	17.00	6.60	
	30.00	8.00	
North Wales (Lleyn)	0.00	5.40	1.68
	2.00	6.05	
	13.00	6.50	
	25.00	6.80	
	34.00	8.00	
Mid Wales	0.00	5.40	1.72
	3.80	6.05	
	15.50	6.65	
	34.30	8.00	
Cornwall	0.00	5.50	1.77
	0.30	5.76	
	15.00	6.90	
	30.00	8.00	

**TABLE 4****Depth / crustal velocity models used in earthquake locations**

<b>Structural area</b>	<b>Depth to top of layer (km)</b>	<b>P-wave velocity (km/sec)</b>	<b>Vp/Vs</b>
Blackpool	0.00	1.80	1.72
	0.60	3.00	
	1.00	4.00	
	2.52	4.60	
	7.55	6.45	
	18.87	7.00	
	34.15	8.00	
Surrey	0.00	2.20	1.73
	0.20	2.40	
	0.40	2.60	
	0.70	2.70	
	1.20	3.10	
	1.50	3.60	
	1.80	4.70	
	2.10	5.00	
	2.40	5.50	
	7.60	6.40	
	18.90	7.00	
	34.20	8.00	



# Appendix 1 Key to Catalogue Encoding

YearMoDy	Year, month and day of event.
HrMn Secs	Time of occurrence of event in hours, mins and secs, (UTC).
Lat	Latitude of the event, positive latitude indicates North.
Lon	Longitude of the event, positive longitude indicates East.
kmE	UK National Grid Reference in kilometres east of grid origin.
kmN	UK National Grid Reference in kilometres north of grid origin.
Dep	Depth of the hypocentre in kilometres.
Mag	Richter local magnitude of the event.
Locality	A geographical indication of the epicentral area, usually the nearest town followed by the region. A key to the abbreviations used in the locality column are given below.
Int	Maximum EMS intensity. 2, 3, 4, 5 etc. describes the maximum EMS intensity produced by the event.
Comments	Additional comments about the event e.g.: C/F, see below under comments abbreviations.

The following abbreviations are extracted from the output of the location program HYPOCENTER (Leinart and Havskov, 1995)

No	Total number of P and S readings used in the event location.
Gap	Largest azimuthal separation in degrees between stations.
RMS	Root Mean Square of the travel time residuals in seconds.
ERH	Standard error of the epicentre in kilometres. When this column is blank, the error is large and indeterminate.
ERZ	Standard error of the focal depth in kilometres. When this column is blank, the error is large and indeterminate.

## Locality and Comments abbreviations

Clacks	Clackmannanshire
Co Antrim	County Antrim
Northants	Northamptonshire
S Yorkshire	South Yorkshire
Notts	Nottinghamshire
Gtr Man	Greater Manchester
D & G	Dumfries & Galloway
E Dunb'shire	East Dunbartonshire
IOM	Isle of Man
Rhondda CT	Rhondda Cynon Taff
Staffs	Staffordshire
E Yorkshire	East Yorkshire
Heref	Herefordshire
Beds	Bedfordshire
P & K	Perth & Kinross
N Yorkshire	North Yorkshire
Worcs	Worcestershire
W Yorks	West Yorkshire
Co Donegal	County Donegal
...	and felt elsewhere

## Appendix 2 Key to Phase Data Encoding

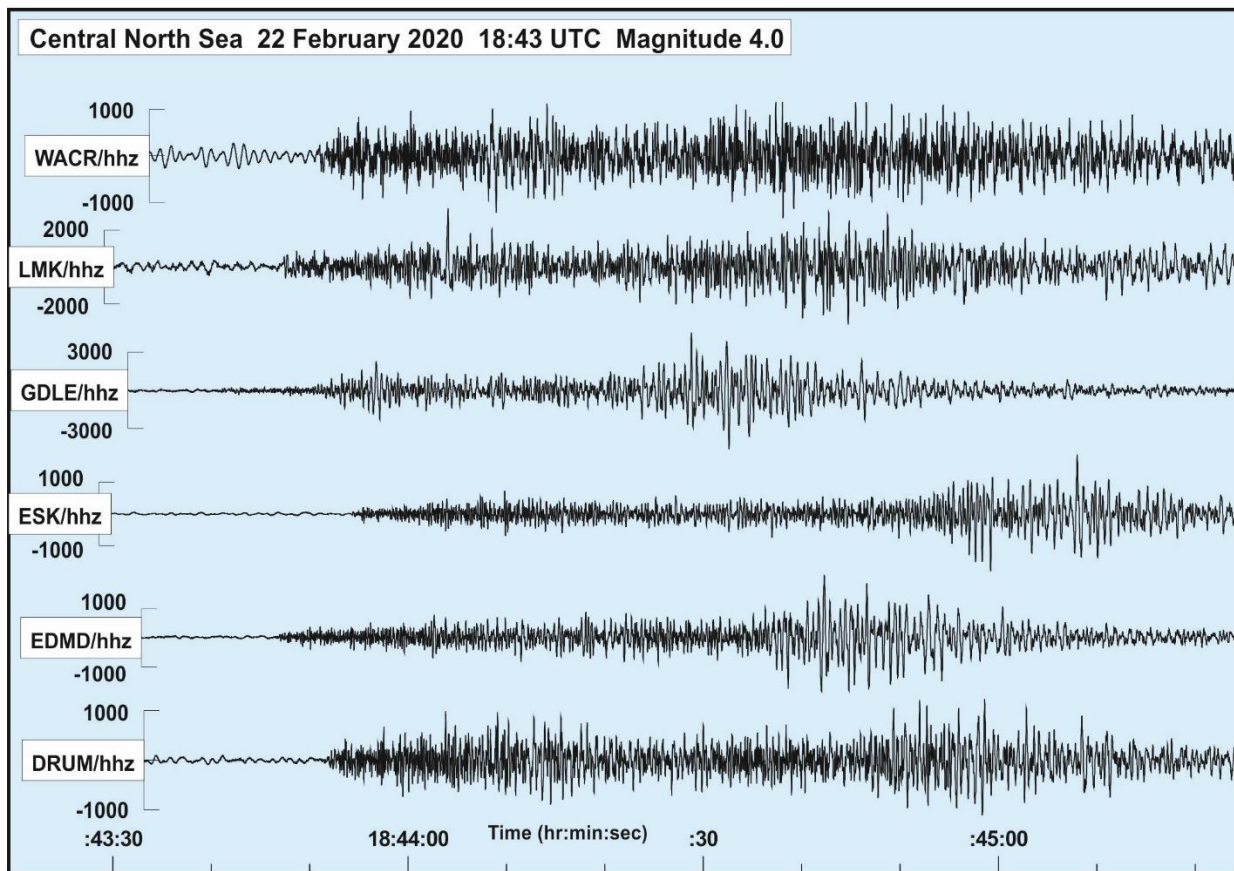
Time	Time of occurrence of event in hours, mins and secs, (UTC).
Lat	Latitude of the event, positive latitude indicates North.
Lon	Longitude of the event, positive longitude indicates East.
Depth	Depth of the hypocentre in kilometres.
Grid Ref	UK National Grid Reference in kilometres east (kmE) and kilometres north (kmN) of grid origin.
RMS	Root Mean Square of the travel time residuals in seconds.
Velocity Model	Velocity model used in location.
Magnitude	Richter local magnitude of the event.
Locality	A geographical indication of the epicentral area, usually the nearest town followed by the region.
Intensity	Maximum EMS intensity. 2, 3, 4, 5 etc. describes the maximum EMS intensity produced by the event.
Comments	Additional comments about the event e.g.: C/F see list of comments and abbreviations in Appendix 1.
STAT	Station name
CO	Z=vertical N=north south E=east west
DIST	Distance from earthquake to station (km)
PHAS	Phase identifier; the first letter characterizes onset E=emergent I=impulsive, the second indicates the phase e.g. P, S, PG, PN, IAML
WT	Weighting factor to arrival. 0 or blank=full weighting to 4=zero weighting (ignore). 9=use P S interval only for this line.
P	Polarity C=Compression/up D=Dilatation/down
HrMn	Hour, Minute of event
SECS	Seconds of event
AMPL	Amplitude centre to peak in nanometres (nm)
PERI	Period in seconds
RES	Station residual

## Appendix 3 The European Macroseismic Scale (EMS 98)

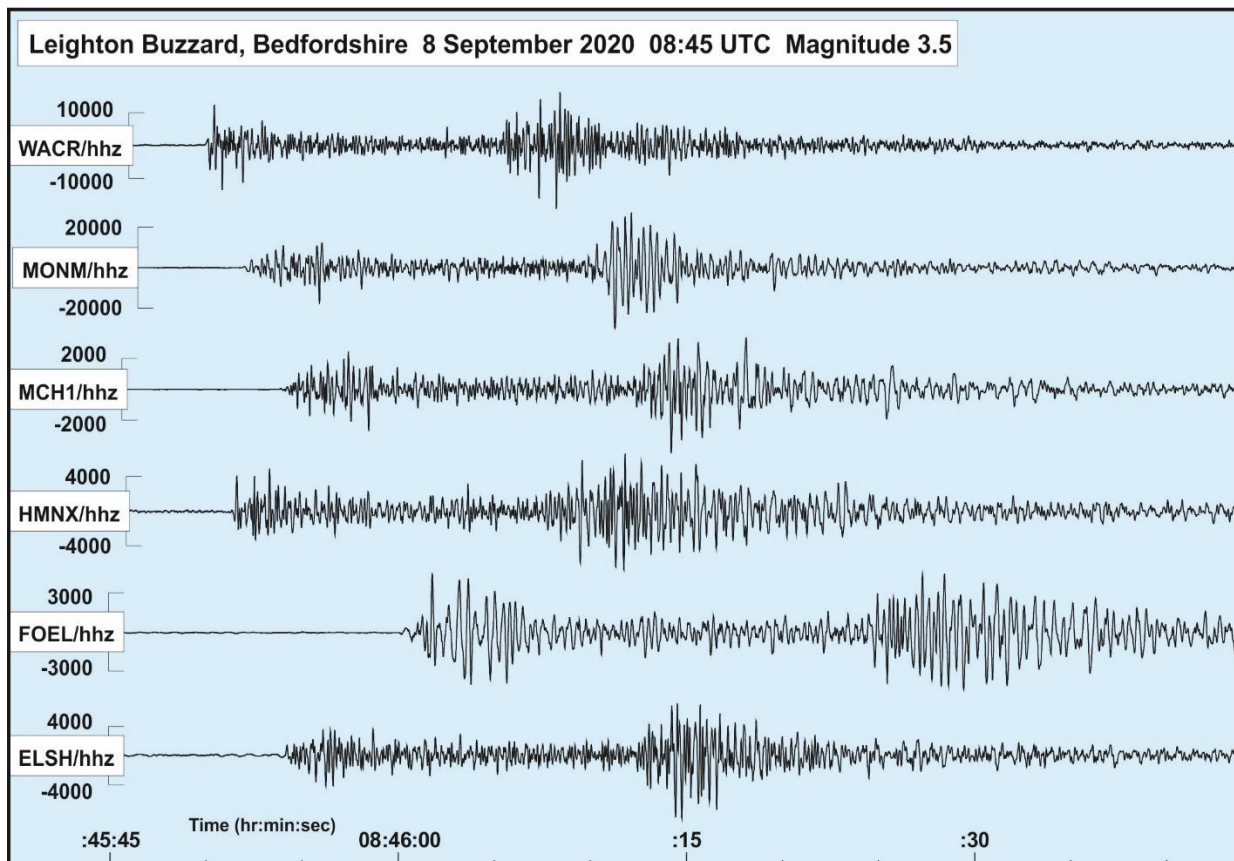
- 1 - **Not felt**  
Not felt, even under the most favourable circumstances.
- 2 - **Scarcely felt**  
Vibration is felt only by individual people at rest in houses, especially on upper floors of buildings.
- 3 - **Weak**  
The vibration is weak and is felt indoors by a few people. People at rest feel a swaying or light trembling.
- 4 - **Largely observed**  
The earthquake is felt indoors by many people, outdoors by very few. A few people are awakened. The level of vibration is not frightening. Windows, doors and dishes rattle. Hanging objects swing.
- 5 - **Strong**  
The earthquake is felt indoors by most, outdoors by few. Many sleeping people awake. A few run outdoors. Buildings tremble throughout. Hanging objects swing considerably. China and glasses clatter together. The vibration is strong. Top heavy objects topple over. Doors and windows swing open or shut.
- 6 - **Slightly damaging**  
Felt by most indoors and by many outdoors. Many people in buildings are frightened and run outdoors. Small objects fall. Slight damage to many ordinary buildings e.g.; fine cracks in plaster and small pieces of plaster fall.
- 7 - **Damaging**  
Most people are frightened and run outdoors. Furniture is shifted and objects fall from shelves in large numbers. Many ordinary buildings suffer moderate damage: small cracks in walls; partial collapse of chimneys.
- 8 - **Heavily damaging**  
Furniture may be overturned. Many ordinary buildings suffer damage: chimneys fall; large cracks appear in walls and a few buildings may partially collapse.
- 9 - **Destructive**  
Monuments and columns fall or are twisted. Many ordinary buildings partially collapse and a few collapse completely.
- 10 - **Very destructive**  
Many ordinary buildings collapse.
- 11 - **Devastating**  
Most ordinary buildings collapse.
- 12 - **Completely devastating**  
Practically all structures above and below ground are heavily damaged or destroyed.

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A complete description of the EMS-98 scale is given in: Grünthal, G., (Ed) 1998. European Macroseismic scale 1998. Cahiers du Centre European de Geodynamique et de Seismologie. Vol 15.



Seismograms of the ground displacements from the magnitude 4.0 ML Central North Sea earthquake on 22 February 2020.



Seismograms of the ground displacements from the magnitude 3.5 ML Leighton Buzzard, Bedfordshire earthquake on 8 September 2020.