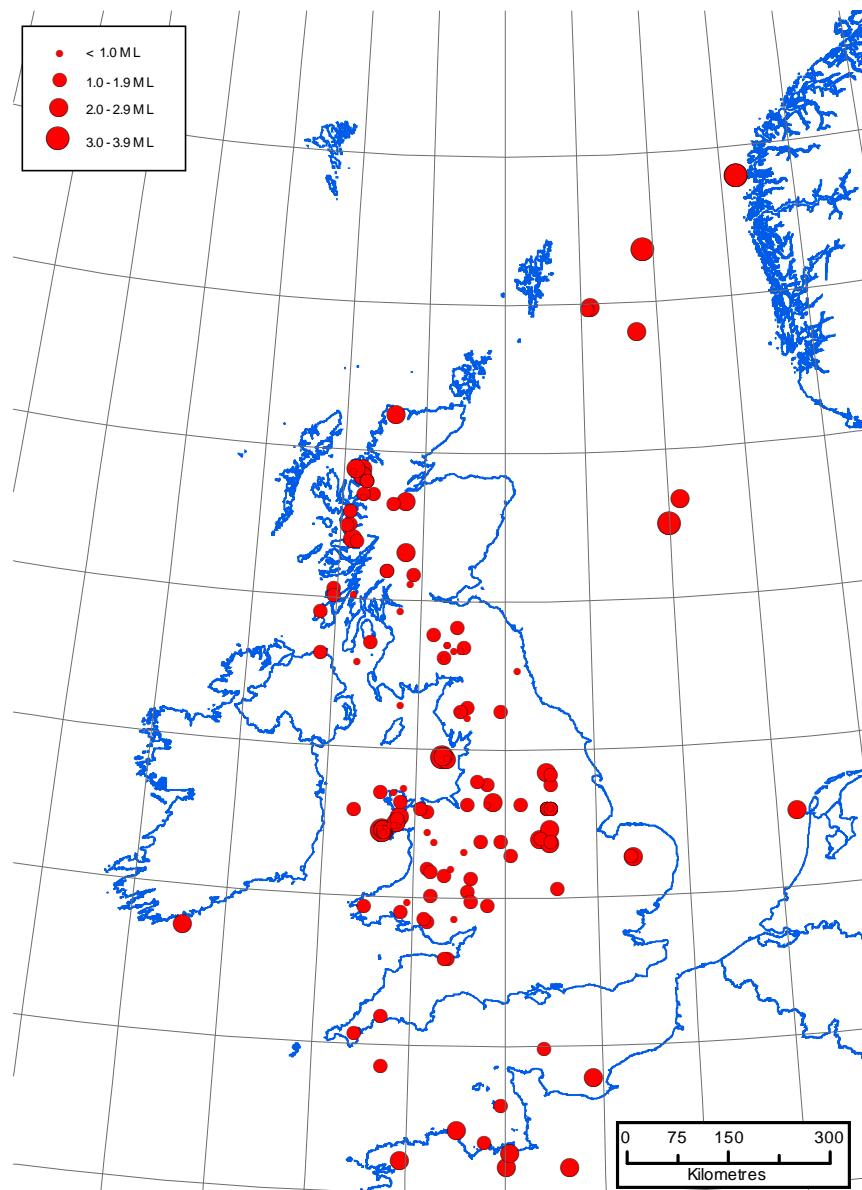


Bulletin of British Earthquakes 2013

D D Galloway (Editor)

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FIGURES

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Table 1. Catalogue of events in chronological order: 2013.

Table 2. Phase data of the earthquakes in Table 1.

Table 3. Geographic coordinates and instrumentation of BGS seismograph stations.

Table 4. Depth / crustal velocity models used in earthquake locations.

1 Introduction

The British Geological Survey's (BGS) Seismic Monitoring and Information Service operate 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 earthquakes detected and located by the BGS during 2013, listed in Tables 1 and 2. Maps showing seismic activity in 2013 (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 ($11^{\circ}W$ to $6^{\circ}E$ and $47^{\circ}N$ to $65^{\circ}N$).

All events believed to be of true tectonic origin are included. Coalfield events are also 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 or by their signature on a microphone, but they are frequently mistaken as small earthquakes by the public. They are indicated by 'SONIC' in both the locality and comments column of Table 1.

Significant non-natural events, such as explosions, which received media attention or were greater than magnitude 2.5 ML or felt by local residents, 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 just over 100 stations with broadband, short period and/or strong motion accelerometers. Some 39 sites are equipped with broadband seismometers and 29 have strong motion accelerometers, 22 of which are co-located with broadband sensors. The remaining sites are equipped with short period seismometers. Data from nearly all stations are transferred in near real-time to the BGS offices in Edinburgh for automatic processing, analysis and archival. Seismic events are detected using automatic processing algorithms, but can also be extracted manually from our 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 in December 2013. The contours illustrate the lower threshold magnitude for an earthquake to significantly exceed 4 nanometres of noise (average) at 10 Hz on at least four seismographs. These detection levels hold true only if data from all stations are continuously monitored. 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.

The whole of the UK is covered by the seismograph network for approximately magnitude 1.5 ML, and above, at times of average ambient noise levels. 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, 0.8 ML should be added to the contour values, causing the threshold to rise to about 2.3 ML. Normally, however, an earthquake of this size would be felt, if not detected, in the areas of poorer instrumental coverage. The bulletin can, therefore, be assumed to be complete for all earthquakes of magnitude 2.3 ML and above.

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 greater, in the period 1979 to 2013. The data set is considered complete for these magnitudes in all localities onshore. Seismicity for the period 1970 to 2013 is shown in Figure 4 with a threshold magnitude of 3.5 ML. This is the period covered by BGS instrumentation that, in the early years, only consisted of the network around Edinburgh (LOWNET) and Eskdalemuir (ESK) and a station near Kyle of Lochalsh (KYL). The data set is likely to be complete for such magnitudes.

3 Earthquake Parameters and Their Errors

HYPOCENTRE LOCATION

By accurately timing the signal onsets 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 errors 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 the 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, 1993).

4 Summary of 2013 Seismicity

There were 158 earthquakes located by the BGS seismic monitoring network during the year, with 36 having magnitudes of 2.0 ML or greater and seven having magnitudes of 3.0 ML or greater. Nineteen events with a magnitude of 2.0 ML or greater were reported felt, together with a further 30 smaller ones, bringing the total to 49 felt earthquakes in 2013.

The largest offshore earthquake of the year occurred on the Norwegian Coast on 22 March, with a magnitude of 3.7 ML. It was located approximately 340 km ENE of Lerwick, Shetland Islands. A further nine events occurred in the North Sea and surrounding waters during the year with magnitudes ranging between 1.6 and 3.5 ML. The BGS received no felt reports for any of these events.

The largest 'onshore' earthquake, with a magnitude of 3.8 ML, occurred on 29 May at 03:16 UTC and located approximately 2 km off the northern coast of the Llyn Peninsula, Gwynedd, approximately 21 km WSW of the magnitude 5.4 ML Llyn earthquake that occurred on 19 July 1984, the biggest ever recorded onshore in the UK. The estimated area over which an earthquake with a magnitude of 3.8 ML, and depth of 10 km, would be felt (at intensity 2 EMS) was calculated to be a distance of up to 150 km from the epicentre. Analysis of the results from an automatic online questionnaire survey agrees with this. Over 480 reports were received, the majority of which came from within a 50 km radius of the epicentre, from Abersoch, Caernarfon, Bangor, Holyhead and their surrounding hamlets. A little further afield, reports were received from Conwy and Rhyl areas (75-100 km to the northeast of the epicentre), whilst a scattering of reports were received from near Cardigan and Fishguard (85-100 km to the south), from Liverpool, Southport, Blackpool and Oldham (100-140 km to the northeast), from the Isle of Man (150 km to the north), from near Newry, Northern Ireland (170 km to the northwest) and from towns down the east coast of Ireland from Dublin to Gorey, Co. Wexford (110-120 km to the west). Most people described having been awoken from their sleep by the moderate shaking strength of the earthquake, which had a trembling effect. The sound strength was also described as moderate. Reports received described "windows and crockery rattled", "the bed was shaking, too scared to look at anything else", "loud rumbling sound woke me, then we noticed sound of mirror rattling on bedside cabinet", "gradually grew louder like the classic underground train passing sensation" and "woke the household and many neighbours". Three aftershocks were recorded on 29, 30 and 31 May, with magnitudes of 1.7, 0.8 and 1.4 ML respectively, all of which were reported as having been felt by a few residents in Bryncroes and Aberdaron, Gwynedd.

A further seven earthquakes occurred in and around the Lleyn Peninsula during the year. Three of them occurred on 26 June, at 22:28:01s, 22:28:29s and 22:30 UTC with magnitudes of 2.7, 2.4 and 1.2 ML, respectively. The first two of these events, around 28 seconds apart, were felt throughout north Gwynedd, in Pwllheli, Caernarfon, Bangor, Menai Bridge, Blaenau Ffestiniog, Bodorgan and Holyhead and the third was felt by a single resident in Bryn croes, Gwynedd. The other four events occurred on 22 March (magnitude 2.2 ML, not reported felt), on 31 March (magnitude 0.5 ML, not reported felt), on 1 July (magnitude 0.6 ML, reported felt by a single resident in Aberdaron, Gwynedd) and 6 December (magnitude 0.8 ML, not reported felt).

On 18 January, at 05:20 UTC, a magnitude 2.9 ML earthquake occurred near Loughborough, Leicestershire, at a depth of 14 km. The BGS received several reports from residents in the Loughborough and surrounding areas which described, “a rumble and a loud bang”, “bed rattled and the books fell off the shelf”, “sounded like a train or lorry crashing into the house” and “the windows vibrated and rattled”. Data from some 240 questionnaires, collected online, were used to determine how widely the earthquake was felt. Of these 240 reports, the majority came from an area within a 25 km radius of the epicentre, namely from the towns of Loughborough, Derby, Leicester and Nottingham. Several other reports were received from beyond this area with the furthest afield being from near Buxton (60 km to the NNW), from near Warwick (55 km to the southeast) and from Corby (50 km to the SSE). The felt area was elongated in a NNW-SSE direction, with the long axis being about 120 km and the short axis being about 65 km. A further three events were detected in the same region during the following weeks, one on 21 January (magnitude 1.4 ML) and two on 4 February (magnitudes 1.6 ML and 2.4 ML). The 21 January event and the larger event on 4 February were both felt by a few residents in the Loughborough area. These four events locate approximately 20 km WSW of the magnitude 4.1 ML Melton Mowbray earthquake, which occurred on 28 October 2001 and was felt throughout Leicestershire, Lincolnshire, Warwickshire, Yorkshire, Shropshire and Nottinghamshire with a maximum intensity of 5 EMS.

An earthquake with a magnitude of 2.4 ML occurred on 31 January, near Laig, Highland. A single report was received for this event, from a resident in Eriboll, describing “felt like a distant rumble with a faint sound”, indicating an intensity of 2 EMS.

On 7 February, at 22:41 UTC, an earthquake, with a magnitude of 2.3 ML, was detected in the Caernarfon Bay, Gwynedd area. Data from over 200 questionnaires, collected online, were used to determine the felt area. The majority of the reports came from populated areas up to 30 km northeast of the epicentre, particularly from the towns of Caernarfon and Bangor and their surrounding hamlets. Further afield, several reports were received from the Isle of Anglesey to the north, from the Lleyn Peninsula to the south, from Blaenau Ffestiniog to the east and from Porthmadog to the southeast. Reports described “just heard loud rumbling”, “at first I thought it was thunder”, “roar didn’t last very long but it was loud” and “shaking came from underneath my feet”. Three minutes later (at 22:44 UTC) another event, with a magnitude of 1.9 ML, occurred in the same region and was felt over the same general area. Both these events were assigned an intensity of 3 EMS.

A magnitude 2.5 ML earthquake occurred on 27 February, with a location near Cotgrave, Nottinghamshire. The BGS received reports from residents in Nottingham, West Bridgford, Long Eaton, Ruddington, Ravenshead, Keyworth, Beeston, Cropwell Bishop and Besthorpe (Nottinghamshire), from Loughborough, Queniborough, Quorn, Thorpe Satchville, Sileby, Markfield, Mountsorrel, Shepshed and Ashby Folville (Leicestershire) and from Derby (Derbyshire) that typically described “a roaring noise, followed by the house shaking and the windows rattling”, indicating an intensity of at least 3 EMS. An aftershock, with a magnitude of 1.3 ML, was recorded the following day. These events are located approximately 18 km southwest of the magnitude 5.3 ML Derby earthquake which occurred on 11 February 1957 and caused widespread damage to chimneys and roofs in the Derby, Nottingham and Loughborough areas and was felt over the whole of the English Midlands with a maximum intensity of 6 EMS.

Four earthquakes occurred near Gairloch, Highland during the year. They occurred on 24 March (magnitude 2.0 ML), on 15 May (magnitude 2.8 ML) and on 16 July at 04:04 UTC and 06:35 UTC (magnitudes 2.8 ML and 0.7 ML, respectively). All four were reported felt. The magnitude 2.8 ML events and the magnitude 2.0 ML event were reported felt by several residents in Gairloch and Poolewe and their surrounding hamlets, with intensities of 3 EMS. The magnitude 0.7 ML event was felt by residents in Gairloch only. Reports described “a strong reverberation through the floor of the house”, “long subsonic rumble lasting a few seconds”, “the wooden floor shook beneath my feet”, “the glasses, jars, crockery on the shelves all rattled” and “my dog rushed to the door, quite perturbed”.

An earthquake with a magnitude of 2.9 ML, occurred on 18 May, with a location approximately 4 km northeast of Acharacle, Highland. Data from some 70 questionnaires, collected online, were used to determine how widely the earthquake was felt. The majority of these reports were from Acharacle and Strontian and their surrounding villages and hamlets, up to 15 km to the north and northwest of the epicentre. A cluster of reports were also received from the Kilchoan area (25 km to the WSW) and some single reports were received from Glenfinnan (20 km to the northeast) and from the Island of Lismore (30 km to the SSW). Reports described “large, deep, very, very loud explosive bang”, “we thought it was an aeroplane crashing, it was stronger than thunder”, “floor trembled and we felt the vibration through the sofa on which we were sitting”, “started with a loud crack followed by rumbling” and “thought it was a military jet passing over”, indicating an intensity of at least 3 EMS. This event locates approximately 6 km southeast of the magnitude 3.5 ML Glenuig, Highland earthquake on 23 January 2011 and approximately 12 km WSW of the magnitude 3.5 ML Glenfinnan, Highland earthquake on 10 October 2008, which were both felt in the epicentral area with intensities of at least 4 EMS.

On 25 August (09:58 UTC), an earthquake with a magnitude of 3.3 ML, occurred in the Irish Sea, approximately 25 km WNW of Fleetwood, Lancashire. The felt area of this event was derived from over 60 reports received from an online questionnaire survey. Almost all the reports came from within a distance of up to 40 km from the epicentre, namely from the coastal towns of Fleetwood, Blackpool, Poulton-Le-Fylde and Thornton-Cleveleys (Lancashire) and from Barrow-in-Furness (Cumbria). Further single reports were received from the Isle of Man (80 km to the northwest), from Anglesey (80 km to the southwest) and from near Liverpool (50 km to the SSE). Reports described “sat at the computer and the desk moved”, “the sofa shook and keys were swinging in the door”, “felt a vibration through my chair” and “a pair of heavy wood and glass doors rattled”, indicating an intensity of at least 3 EMS. This event was preceded, on the same day, by a magnitude 2.5 ML event at 05:37 UTC and a magnitude 0.9 ML event at 07:13 UTC and followed a week later (on 31 August) by a magnitude 2.6 ML event. Both the magnitude 2.5 ML event and the magnitude 2.6 ML event were felt, in Fleetwood, Blackpool and Thornton-Cleveleys with intensities of at least 3 EMS. Historically, the largest event to have occurred in this area was the magnitude 5.0 ML Irish Sea earthquake on 17 March 1843, which was felt throughout most of Northern England, in Southern Scotland, in North Wales and along the east coast of Ireland from Belfast to Dublin. The only damage reported was from Castletown in the Isle of Man, where ceilings were damaged. It was quite strongly felt in Lancashire and along the east coast of Cumbria; there are reports of objects falling, furniture moving, considerable alarm, but no damage. It was also felt on board ships in the Irish Sea.

An earthquake with a magnitude of 2.7 ML occurred on 27 August, with a location in Glen Lyon, Perth and Kinross, approximately 20 km north of Killin. The BGS received several reports from residents in Glenlyon, Bridge of Balgie, Dall, Camghouran, Lawers and Inverar, which described “a loud bang and a rumbling noise”, “we felt the house shaking” and “we all heard the windows rattling quite loudly”, indicating an intensity of at least 3 EMS. This is the largest event in the region since the magnitude 2.7 ML Killin earthquake in January 2005, some 17 km to the SSW, which was felt throughout the region with a maximum intensity of 4 EMS.

On 4 October, an earthquake with a magnitude of 2.4 ML occurred close to the village of Drumnadrochit, Highland. It was felt by many residents in Drumnadrochit, Dores, Westhill, Erroglie, Brinmore, Farr, Scaniport, Culduthel, Torness and Inverfarigaig. Reports received described “a loud rumble for a few seconds”, “sounded like a really strong gust of wind”, “was like something heavy falling on the ceiling or a gas bottle exploding” and “it was best described by the whole family as being like an explosion”. This is an area which has experienced a number of earthquakes in the historical past. In particular between 1768 and 1901 when a number of earthquakes occurred near Inverness, with magnitudes between 3.1 and 5.1 ML. The magnitude 5.1 event, on 13 August 1816, was the largest and severest of the known Inverness earthquakes. It caused considerable damage in Inverness, and could have caused many injuries but for the time of day, when the streets were empty. The epicentre was probably southwest of Inverness itself. The felt area covers almost all of Scotland; but no damage was reported from anywhere other than Inverness.

A magnitude 2.3 ML earthquake occurred on 4 December, with an epicentre in the Celtic Sea, approximately 60 km SSW of Cork, Ireland and 275 km northwest of St Ives, Cornwall. The BGS received a few reports from residents in Timoleague, Courtmacsherry and Clonakilty, Co. Cork, Ireland describing, “we were outside in the farmyard when we heard a loud noise and the shed creaked” and “all the windows shook”. An intensity of 3 EMS was assigned to this event. This is an area that has experienced little seismicity in both the historical and instrumental periods, with only one event located, since 1970, within a 100 km radius of this event.

The coalfield areas of Nottinghamshire and North and South Yorkshire continued to experience shallow earthquake activity that is believed to be mining induced. The largest coalfield event, with a magnitude of 2.1 ML and a depth of 1.4 km, occurred near Hensall, North Yorkshire on 19 February. The BGS received reports from several residents in Hensall who described “all the doors and windows rattled and the ceiling creaked”, “we thought that it was a heavy lorry crashing into the side of our house” and “it felt like a large explosion from underground”, indicating an intensity of at least 3 EMS. In South Yorkshire, two coalfield events on 26 June and 26 September, with magnitudes of 1.9 ML and 1.7 ML, respectively, occurred near Doncaster. The magnitude 1.9 ML event was felt (intensity 2 EMS) by a single resident in Fosterhouses who described “a slight tremor”. In Nottinghamshire, some, eighteen events, with magnitudes between 0.9 and 1.8 ML, were recorded in the New Ollerton area, during the year. The BGS received reports, for nine of these events, via residents in New Ollerton, typically describing “the sofa started shaking”, “we experienced a definite side to side motion”, “the house started to shake” and “we heard a faint rumbling”.

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Figure 1. Epicentre map of earthquakes in 2013 as listed in Table 1.

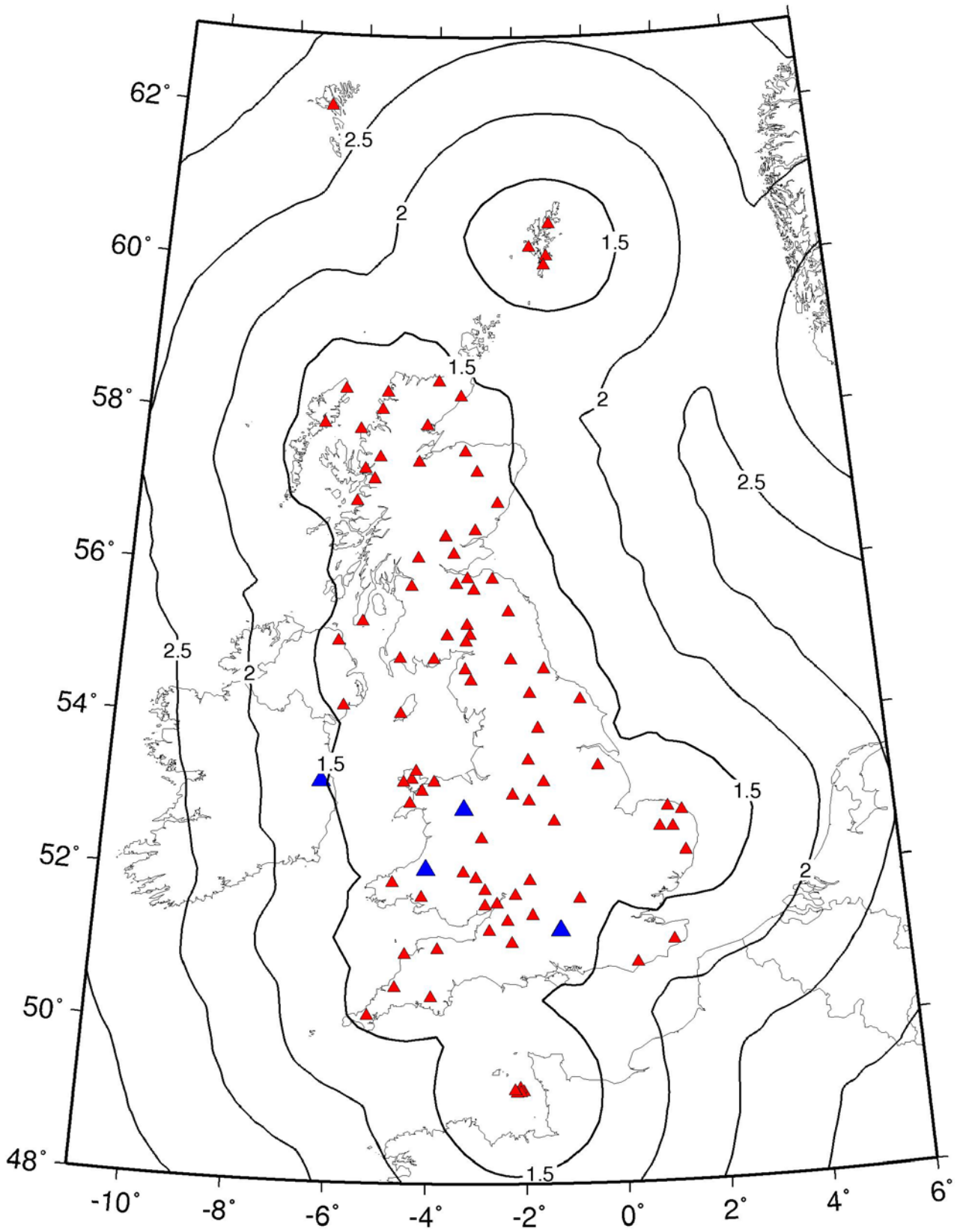


Figure 2. Seismograph stations operated by BGS during 2013 (red) along with station operated by other agencies in the British Isles and used for automatic detection (blue). The contours show earthquake detection capability in terms of Richter local magnitude (ML) calculated for average background noise conditions (4nm) where the detection criterion is that the signal has to exceed 4nm at 10Hz at 4 stations.

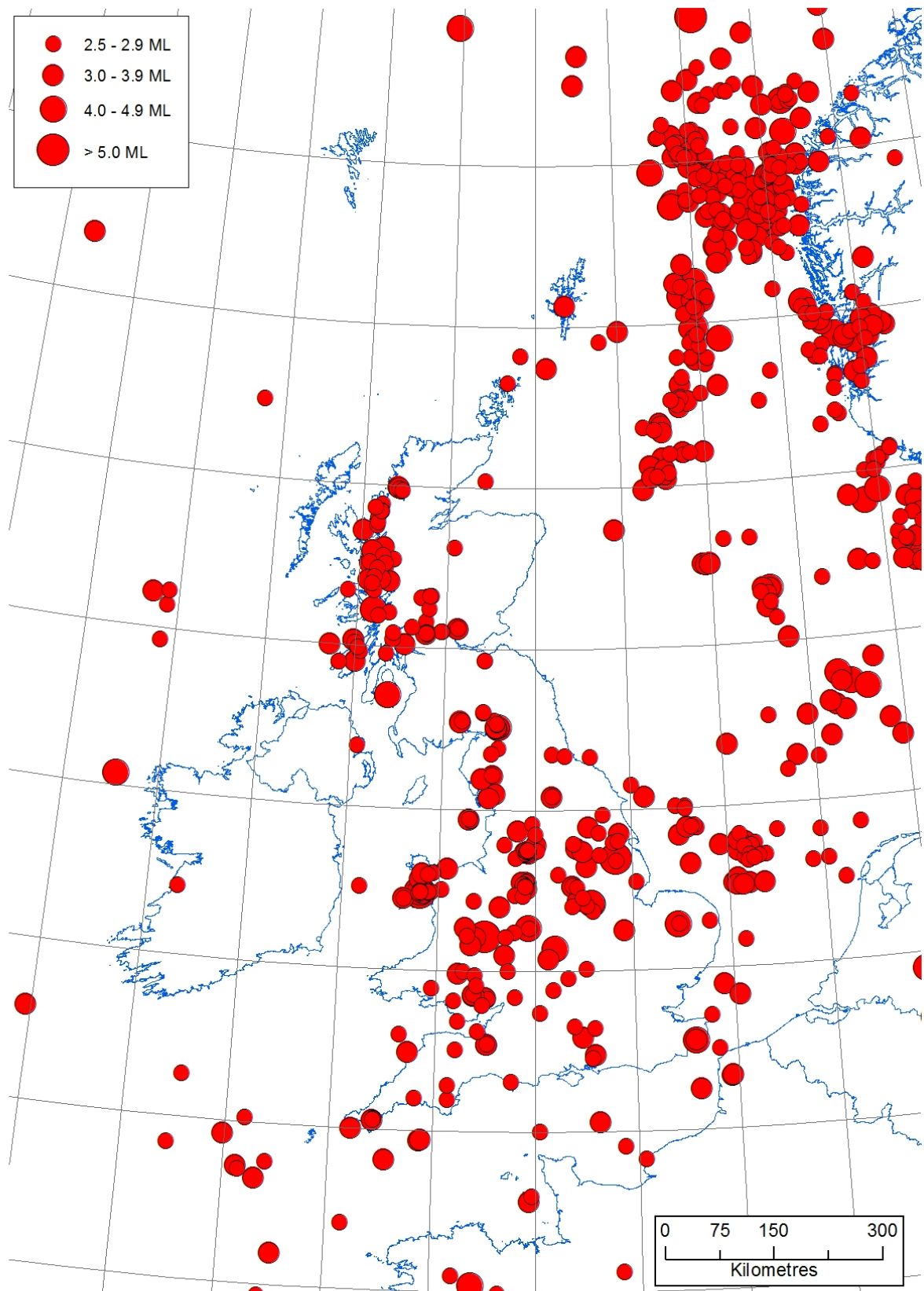


Figure 3. Epicentres of earthquakes with magnitudes of 2.5 ML and above, in the period 1979 to 2013.



Figure 4. Epicentres of earthquakes with magnitudes of 3.5 ML and above, in the period 1970 - 2013.

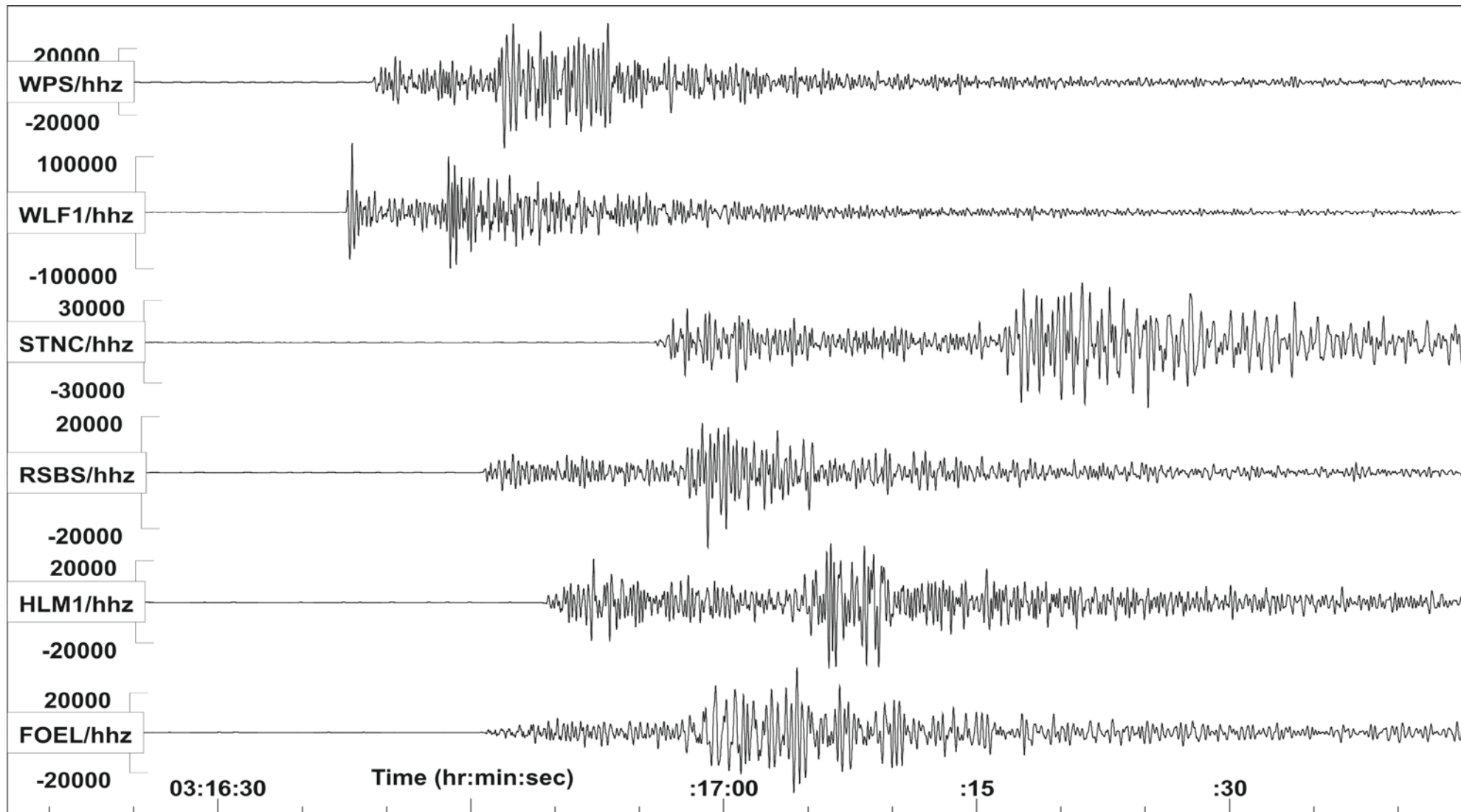


Figure 5. Seismograms of the ground displacement from the magnitude 3.8 ML Lleyn Peninsula earthquake, 29 May 2013, recorded by BGS seismograph stations.

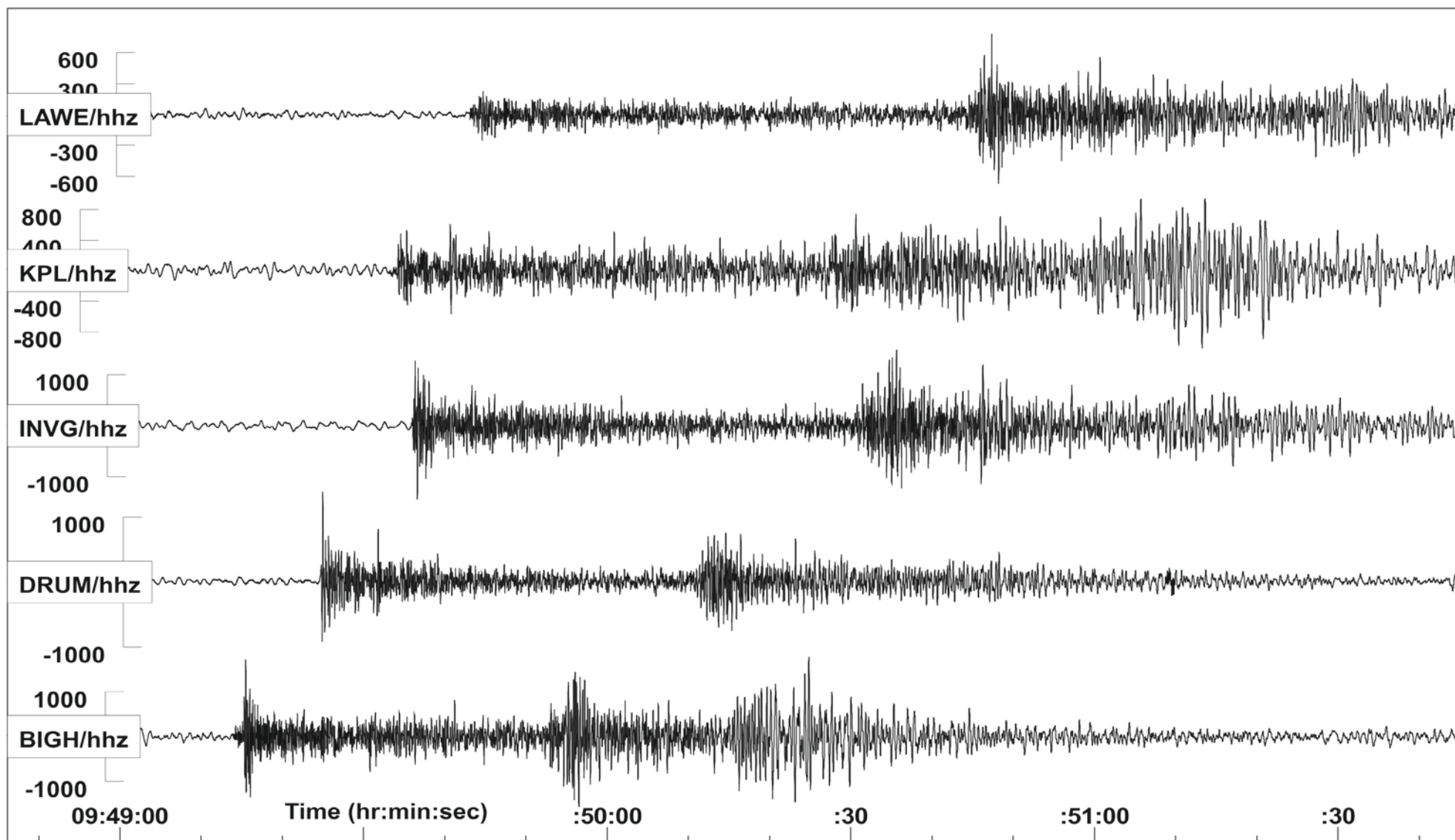


Figure 6. Seismograms of the ground displacement from the magnitude 3.4 ML Northern North Sea earthquake, 1 December 2013, recorded by BGS seismograph stations.

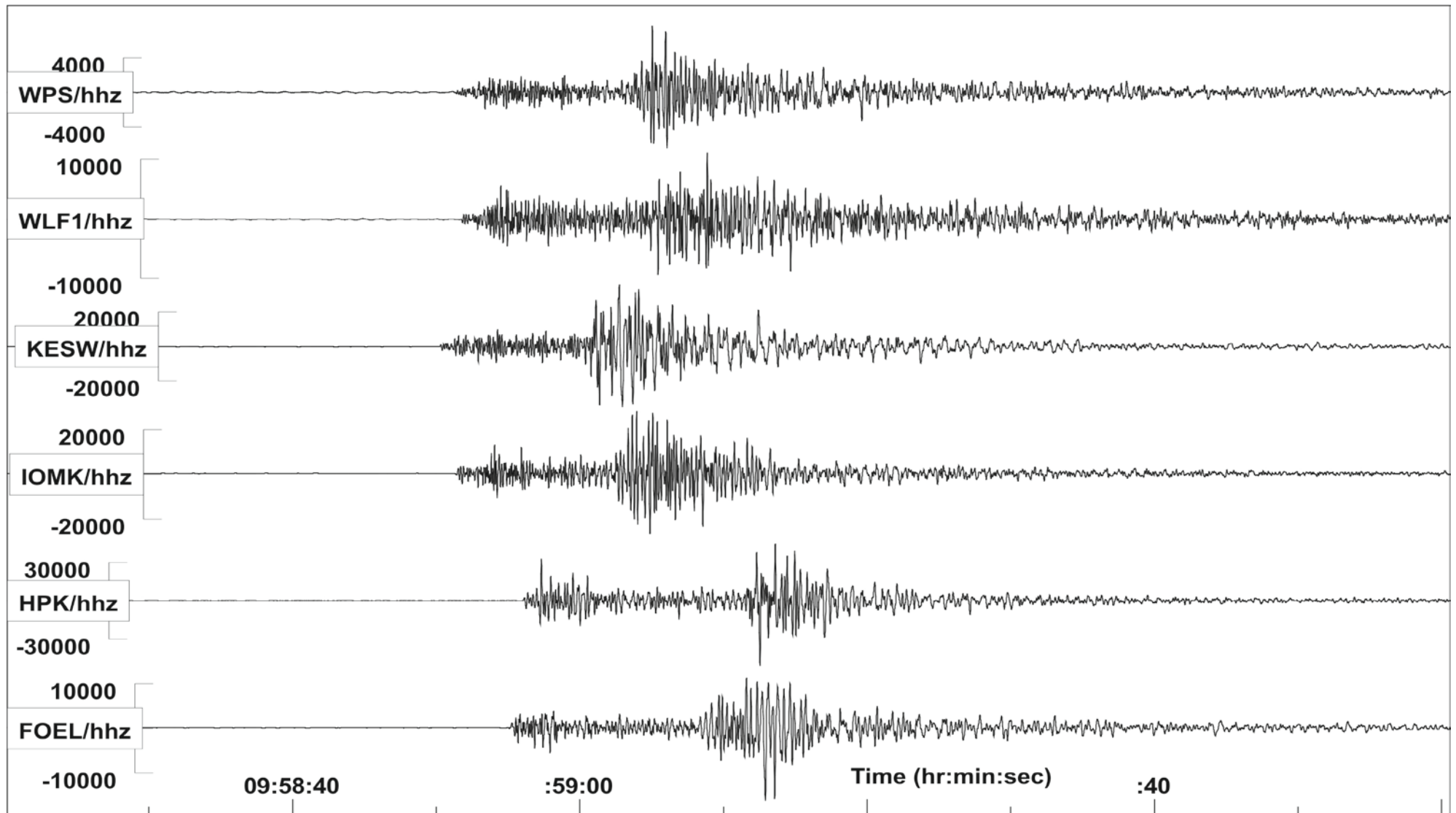


Figure 7. Seismograms of the ground displacement from the magnitude 3.3 ML Irish Sea earthquake, 25 August 2013, recorded by BGS seismograph stations.

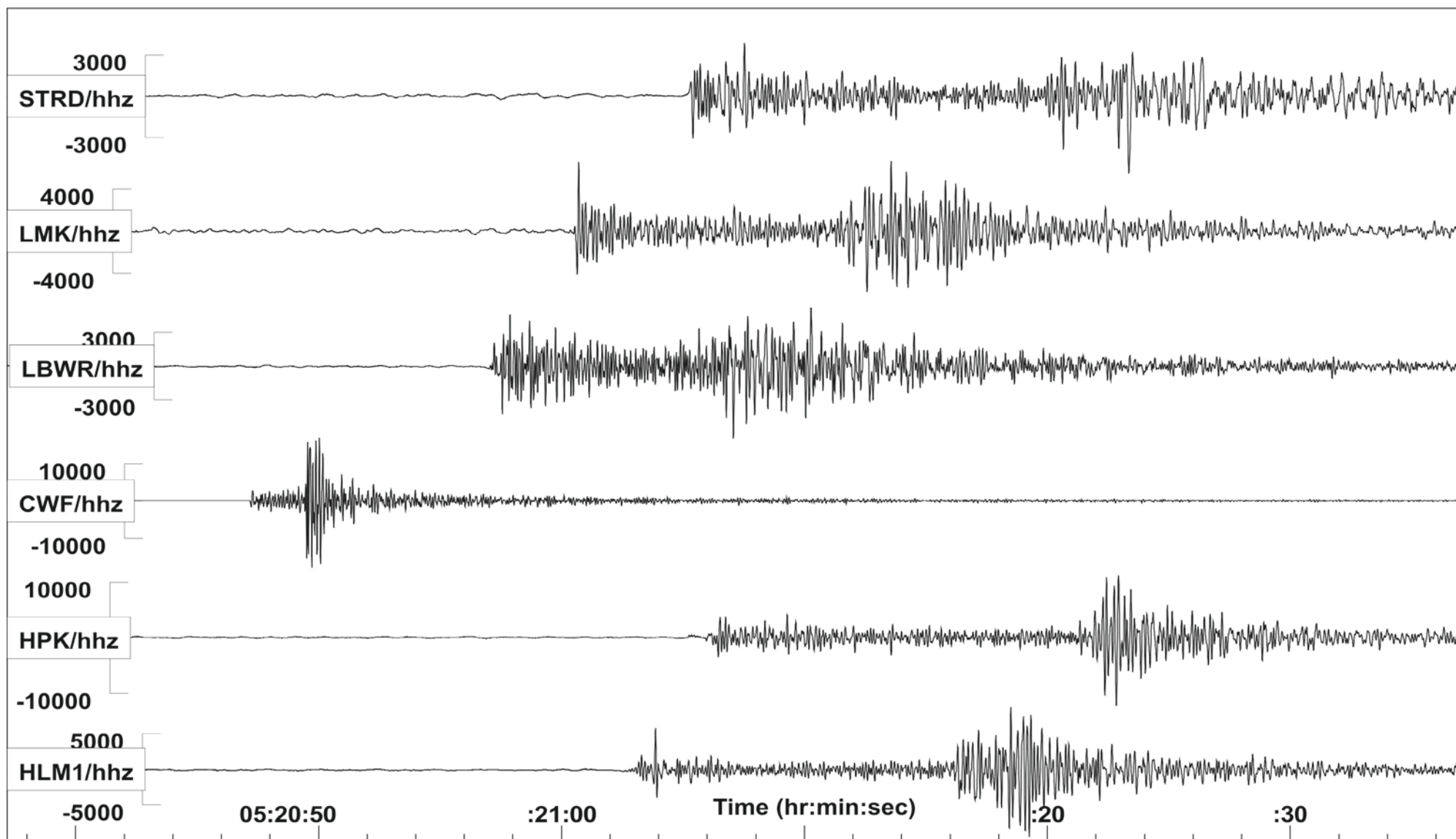


Figure 8. Seismograms of the ground displacement from the magnitude 2.9 ML Loughborough, Leicestershire earthquake, 18 January 2013, recorded by BGS seismograph stations.

TABLE 1 : CATALOGUE OF EVENTS : 2013

YearMoDy	HrMnSecs	Lat	Lon	kmE	kmN	Dep	Mag	Locality	Int	No	Gap	RMS	ERH	ERZ	Comments
20130101	082709.9	56.05	-4.29	257.6	686.4	7.3	0.7	BALFRON, STIRLING		4	172	0.20	2.46	0.00	
20130105	231500.2	53.02	4.41	830.0	366.1	5.0	2.7	SOUTHERN NORTH SEA		7	320	0.40	9.93	0.00	
20130112	035903.1	53.20	-1.02	465.3	367.7	1.1	1.4	NEW OLLERTON, NOTTS	3	8	219	0.50	6.38	0.00	C/F, FELT N OLLERTON
20130114	100902.9	53.19	-1.03	465.1	366.7	1.1	1.8	NEW OLLERTON, NOTTS	3	8	219	0.60	1.53	0.00	C/F, FELT N OLLERTON
20130114	135124.3	49.96	-1.19	458.0	6.8	5.0	1.9	ENGLISH CHANNEL		5	290	0.10	3.45	0.00	70KM SOUTH OF I.O.W
20130118	052044.4	52.80	-1.25	450.6	322.9	13.5	2.9	LOUGHBOROUGH, LEICS	4	19	102	0.20	2.47	1.80	FELT LEICESTERSHIRE...
20130119	145907.6	53.13	-4.33	244.5	361.4	11.8	0.7	CAERNARFON, GWYNEDD		5	201	0.10	5.45	6.60	
20130121	114004.1	52.80	-1.26	450.1	322.8	11.2	1.4	LOUGHBOROUGH, LEICS	2	5	113	0.30	3.88	3.20	FELT LOUGHBOROUGH
20130131	041607.8	58.47	-4.75	239.8	956.2	2.1	2.4	LAIG, HIGHLAND	3	9	202	0.50	3.52	6.10	FELT ERIBOLL
20130131	093809.8	53.23	-1.69	421.0	370.3	12.2	1.6	BAKEWELL, DERBYSHIRE		5	152	0.10	2.66	1.40	
20130204	105156.8	52.75	-1.04	464.5	317.2	2.8	1.6	LOUGHBOROUGH, LEICS		6	294	0.60	3.84	0.00	
20130204	105159.0	52.75	-1.04	464.5	317.2	2.8	2.4	LOUGHBOROUGH, LEICS	2	9	122	0.30	3.41	3.80	FELT LOUGHBOROUGH
20130207	224104.1	53.06	-4.37	240.9	353.8	16.7	2.3	CAERNARFON BAY, GWYNEDD	3	19	159	0.20	2.77	3.00	FELT GWYNEDD
20130207	224454.5	53.05	-4.37	241.3	352.6	14.0	1.9	CAERNARFON BAY, GWYNEDD	3	15	160	0.20	2.95	1.90	FELT GWYNEDD
20130208	180422.7	51.68	-3.66	285.0	199.4	3.1	1.1	MAESTEG, BRIDGEND		6	144	0.40	4.33	3.30	8KM NORTH OF MAESTEG
20130209	201355.6	53.51	-2.44	371.1	401.0	12.2	1.7	LEIGH, GTR MANCHESTER		12	74	0.20	1.80	2.70	
20130209	215056.8	51.15	-3.25	312.9	139.5	7.9	1.1	WATCHET, SOMERSET		7	219	0.20	3.92	8.30	6KM SE OF WATCHET
20130209	215120.5	51.16	-3.27	311.1	141.5	4.0	1.1	WATCHET, SOMERSET		6	216	0.30	6.74	9.30	6KM SE OF WATCHET
20130212	191907.9	52.77	-3.58	293.3	319.8	20.3	0.9	LLANWDDYN, POWYS		7	93	0.10	1.84	1.70	8KM WNW OF LLANWDDYN
20130213	103735.8	53.20	-1.02	465.3	367.9	1.2	1.5	NEW OLLERTON, NOTTS	3	5	226	0.10	1.12	0.00	C/F, FELT N OLLERTON
20130214	174019.9	55.14	-5.45	180.3	587.8	7.5	0.9	NORTH CHANNEL		5	179	0.40	5.96	1.40	30KM WNW BALLANTRAE
20130215	123535.2	48.33	-0.76	492.3	-173.5	5.7	2.2	NORTHWEST FRANCE		5	356	0.40	4.34	0.00	140KM SE OF JERSEY
20130216	064542.9	52.56	0.75	586.2	299.9	9.1	1.4	WATTON, NORFOLK		3	303	0.20	1.37	3.90	5KM WEST OF WATTON
20130216	070250.8	56.05	-5.63	174.1	689.9	3.6	0.8	TAYVALLICH, ARGYLL/BUTE		6	250	0.20	4.05	0.00	
20130217	022926.5	53.24	-2.86	342.8	371.7	11.3	1.0	ELLESMERE PORT, CHESHIRE		5	135	0.10	4.12	5.30	
20130219	035239.4	53.68	-1.11	458.5	421.2	1.3	2.1	HENSALL, N YORKSHIRE	3	8	163	0.40	3.89	0.00	C/F, FELT HENSALL
20130220	114155.4	48.37	-1.96	403.0	-170.0	4.1	2.4	NORTHWEST FRANCE		5	354	0.10	9.69	0.00	90KM SOUTH OF JERSEY
20130225	073717.8	52.39	-3.70	284.3	278.1	5.8	1.4	LLANGURIG, POWYS		9	102	0.10	1.30	3.30	
20130227	101331.4	55.37	-3.00	336.4	609.0	4.3	1.7	HAWICK, BORDERS	2	18	110	0.40	4.27	0.00	FELT HAWICK
20130227	235701.9	52.90	-1.04	464.7	334.1	7.9	2.5	COTGRAVE, NOTTS	3	15	100	0.30	1.94	4.00	FELT NOTTS...
20130228	005229.3	52.90	-1.06	463.0	333.8	8.5	1.3	COTGRAVE, NOTTS		4	240	0.20	5.90	3.00	
20130304	032604.5	64.51	-4.21			10.0	3.5	NORWEGIAN SEA		15	313	0.30	2.45	0.00	300KM NE OF TORSHAVN
20130306	131613.7	48.41	-4.11	243.6	-164.0	8.2	2.2	NORTHWEST FRANCE		4	304	0.40	5.01	0.00	165KM SW OF JERSEY
20130308	235116.0	56.20	-4.25	260.4	703.5	5.1	0.5	CALLANDER, STIRLING		4	171	0.10	2.33	2.00	
20130310	211829.3	57.00	-5.79	169.5	795.8	7.5	1.8	MALLAIG, HIGHLAND	2	12	187	0.60	6.14	7.20	FELT MALLAIG
20130315	104351.0	57.01	1.97	640.9	798.4	14.2	3.1	CENTRAL NORTH SEA		22	274	0.30	8.12	3.20	250KM EAST ABERDEEN
20130316	070325.3	52.54	0.79	589.1	297.7	4.9	2.1	WATTON, NORFOLK		4	199	0.10	8.98	5.40	4KM SW OF WATTON
20130319	010046.3	52.88	-2.29	380.2	331.6	9.9	0.9	STONE, STAFFORDSHIRE		5	149	0.10	1.34	2.50	
20130321	041348.1	54.54	-2.88	342.9	516.2	3.0	1.2	GLENRIDDING, CUMBRIA	2	10	102	0.30	3.83	6.60	FELT GLENRIDDING
20130322	103243.4	61.58	4.47	743.2	1317.3	15.0	3.7	NORWEGIAN COAST		10	170	0.70	2.30	3.20	340KM ENE OF LERWICK

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YearMoDy	HrMnSecs	Lat	Lon	kmE	kmN	Dep	Mag	Locality	Int	No	Gap	RMS	ERH	ERZ	Comments
20130322	125759.9	52.97	-4.46	235.0	343.9	12.9	2.2	LLEYN PENINSULA		11	156	0.30	3.42	3.20	5KM NE OF NEFYN
20130322	135221.5	61.62	4.47	742.9	1320.9	6.3	3.5	NORWEGIAN COAST		6	171	0.40	6.67	7.60	345KM ENE OF LERWICK
20130324	220233.7	57.72	-5.55	188.8	875.0	7.5	2.0	GAIRLOCH,HIGHLAND	3	10	219	0.40	9.77	7.20	FELT GAIRLOCH...
20130328	000553.3	54.57	-4.42	243.7	521.9	10.1	0.4	IRISH SEA		3	243	0.30	8.25	3.30	
20130328	202534.3	52.75	-2.12	391.6	317.1	7.5	1.6	PENKRIDGE,STAFFS		10	90	0.30	2.33	6.20	
20130331	080017.1	52.98	-4.39	239.7	345.3	10.9	0.5	LLEYN PENINSULA		4	298	0.20	3.17	2.80	
20130402	073440.1	55.37	-3.40	311.4	609.0	4.1	0.8	MOFFAT,D & G		3	307	0.00	1.88	2.00	4KM NE OF MOFFAT
20130404	183951.1	54.51	-2.09	394.3	512.4	8.5	1.1	BOWES,COUNTY DURHAM		3	266	0.40	3.76	2.80	
20130405	234950.5	55.87	-4.47	245.4	666.3	7.0	0.5	PAISLEY,RENFREWSHIRE		5	165	0.10	2.83	2.10	
20130406	175043.1	55.37	-3.38	312.7	609.5	4.7	0.3	MOFFAT,D & G		3	311	0.10	3.38	0.00	5KM NE OF MOFFAT
20130407	080812.1	51.69	-3.77	277.9	200.7	9.2	1.2	NEATH,NEATH PORT TALBOT		6	109	0.30	3.32	4.50	
20130410	015849.7	52.27	-2.77	347.3	263.8	2.5	1.0	YARPOLE,HEREFORDSHIRE		4	197	0.20	6.05	2.60	
20130419	182100.0	54.43	-2.89	342.5	504.6	4.9	0.7	KENTMERE,CUMBRIA		3	217	0.10	1.22	0.00	
20130420	113208.6	52.56	-1.89	407.5	296.3	8.0	1.3	WALSALL,WEST MIDLANDS		7	129	0.50	6.50	3.90	
20130425	214009.0	53.45	-4.25	250.6	397.6	17.4	0.6	ANGLESEY,NORTH WALES		5	228	0.00	1.75	1.20	OFFSHORE LOCATION
20130426	194212.0	56.36	-4.17	265.6	720.9	2.7	1.1	COMRIE,PERTH/KINROSS		5	160	0.20	5.08	1.40	10KM WEST OF COMRIE
20130428	025424.1	55.23	-3.42	309.4	594.4	3.5	0.7	JOHNSTONEBRIDGE,D & G		3	231	0.20	3.77	0.00	
20130428	175610.9	55.24	-3.43	309.3	594.8	4.1	1.1	JOHNSTONEBRIDGE,D & G		6	207	0.10	2.16	0.00	
20130429	053324.9	52.74	-2.56	362.5	316.3	3.1	1.0	TELFORD,SHROPSHIRE		4	228	0.30	2.24	7.90	9KM NW OF TELFORD
20130501	051951.8	52.08	-2.81	344.6	242.3	7.7	1.0	HEREFORD,HEREFORDSHIRE		4	185	0.10	4.42	4.40	5KM WNW OF HEREFORD
20130505	160745.1	50.39	-4.62	213.9	58.0	4.5	1.8	LOSTWITHIEL,CORNWALL	2	4	158	0.30	4.42	6.70	FELT PAR & ST NEOT
20130508	005842.9	51.91	-4.13	253.3	226.3	12.9	0.9	BRECHF,A,CARMARTHENSHIRE		4	196	0.30	2.09	3.20	
20130509	200554.1	57.58	-5.41	196.3	859.5	2.4	1.3	TORRIDON,HIGHLAND		7	192	0.30	5.46	3.20	7KM NE OF TORRIDON
20130512	022624.6	54.50	-3.11	328.4	512.5	9.8	0.7	GRASMERE,CUMBRIA		3	293	0.10	4.40	2.60	7KM NW OF GRASMERE
20130515	064300.7	57.27	-4.76	233.7	823.2	7.5	1.4	CANNICH,HIGHLAND		7	103	0.40	5.33	2.60	8KM SOUTH OF CANNICH
20130515	174348.6	57.67	-5.58	186.5	869.8	7.7	2.8	GAIRLOCH,HIGHLAND	3	18	107	0.20	2.79	4.40	FELT GAIRLOCH...
20130518	065753.0	56.78	-5.61	179.2	771.1	8.5	1.4	ACHARACLE,HIGHLAND		9	166	0.30	7.11	5.40	11KM ENE ACHARACLE
20130518	191802.8	56.78	-5.71	173.1	771.1	10.4	2.9	ACHARACLE,HIGHLAND	3	20	124	0.30	5.63	3.60	FELT ACHARACLE...
20130527	160434.2	51.88	-2.37	374.3	220.3	3.6	1.1	HUNTLEY,GLOUCESTERSHIRE		5	133	0.30	7.13	4.90	
20130529	031628.9	52.88	-4.72	217.0	335.2	10.5	3.8	LLEYN PENINSULA	4	30	159	0.40	4.12	3.10	FELT GWYNEDD...
20130529	032039.5	52.88	-4.71	218.0	334.7	9.9	1.7	LLEYN PENINSULA	2	13	179	0.20	3.94	4.70	FELT BRYNCROES...
20130529	174927.8	57.58	-5.43	194.8	859.4	2.5	1.5	TORRIDON,HIGHLAND		11	91	0.40	4.90	4.90	7KM EAST OF TORRIDON
20130529	183343.4	57.57	-5.42	195.6	858.3	2.5	1.4	TORRIDON,HIGHLAND		11	89	0.50	4.83	4.80	7KM EAST OF TORRIDON
20130530	220628.2	52.89	-4.73	216.6	336.2	11.4	0.8	LLEYN PENINSULA	2	9	193	0.20	2.69	2.60	FELT BRYNCROES...
20130531	062226.8	52.88	-4.71	217.7	335.0	9.5	1.4	LLEYN PENINSULA	2	11	180	0.20	2.56	3.30	FELT BRYNCROES...
20130531	183432.0	48.77	-0.74	492.7	-125.4	3.2	1.7	NORTHWEST FRANCE		6	345	0.10	3.80	2.50	100KM SE OF JERSEY
20130602	025657.2	56.12	-6.13	143.2	699.2	7.9	1.5	COLONSAY,ARGYLL/BUTE	2	8	193	0.30	4.55	6.30	FELT SCALASAIG
20130610	031213.3	59.93	0.20	522.7	1117.8	7.5	2.0	NORTHERN NORTH SEA		5	279	0.50	6.48	0.00	80KM ESE OF LERWICK
20130610	031315.8	59.93	0.20	522.7	1117.8	7.5	1.6	NORTHERN NORTH SEA		5	279	0.50	6.25	0.00	80KM ESE OF LERWICK
20130614	202139.7	56.99	-5.85	166.3	795.1	6.7	1.3	MALLAIG,HIGHLAND		6	216	0.20	1.05	1.30	

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20130616	225830.5	53.22	-1.06	462.7	369.8	1.2	1.2	NEW OLLERTON,NOTTS		4	221	0.20	5.41	0.00	C/F
20130623	120807.7	56.01	-6.07	146.2	687.0	8.6	1.8	JURA,ARGYLL/BUTE		8	188	0.40	9.02	2.10	
20130626	035153.8	53.53	-1.01	465.3	404.5	1.1	1.9	DONCASTER,S YORKSHIRE	2	7	144	0.50	4.77	0.00	C/F,FELT FOSTERHOUSES
20130626	195938.2	51.71	-3.14	321.4	201.7	12.5	0.9	BRYNITHEL,BLAENAU GWENT		5	201	0.10	1.50	2.40	
20130626	222801.5	52.88	-4.72	217.1	334.8	8.6	2.7	LLEYN PENINSULA	3	17	70	0.30	2.36	3.30	FELT GWYNEDD
20130626	222829.3	52.88	-4.70	218.4	334.5	8.4	2.4	LLEYN PENINSULA	3	11	179	0.40	4.34	5.70	FELT GWYNEDD
20130626	223028.1	52.88	-4.71	218.0	334.7	7.9	1.2	LLEYN PENINSULA	2	11	179	0.30	3.54	5.00	FELT BRYNCROES
20130629	143529.6	53.25	-4.35	243.2	375.6	13.5	1.0	LLANGEFNI,ANGLESEY		7	133	0.10	2.33	1.80	
20130630	121307.0	49.69	-4.56	215.2	-20.6	8.4	1.8	ENGLISH CHANNEL		6	213	0.50	9.51	3.30	60KM SE OF FALMOUTH
20130701	235835.4	52.88	-4.73	216.1	334.9	8.2	0.6	LLEYN PENINSULA	2	7	184	0.20	2.40	0.00	FELT ABERDARON
20130702	214415.3	50.13	-5.14	175.9	30.9	2.7	1.3	FALMOUTH,CORNWALL	3	3	243	0.30	9.70	4.50	FELT FALMOUTH...
20130703	213701.0	48.54	-1.89	408.3	-151.6	7.7	2.0	NORTHWEST FRANCE		6	179	0.40	7.86	5.70	75KM SSE OF JERSEY
20130706	140312.7	48.84	-2.98	328.1	-117.5	7.5	2.2	NORTHWEST FRANCE		11	180	0.40	5.25	0.00	65KM SW OF JERSEY
20130713	161835.9	55.35	-3.07	332.0	607.0	3.1	0.8	ETTRICK,BORDERS		6	174	0.10	2.38	2.30	8KM SSE OF ETTRICK
20130715	213120.4	53.16	-3.73	284.3	364.1	4.3	1.4	LLANRWST,CONWY	2	13	129	0.20	2.44	3.40	FELT LLANLLECHID
20130716	040400.9	57.72	-5.72	178.5	875.7	5.5	2.8	GAIRLOCH,HIGHLAND	3	15	117	0.20	3.13	3.30	FELT GAIRLOCH...
20130716	063550.7	57.71	-5.76	176.2	875.1	5.2	0.7	GAIRLOCH,HIGHLAND	2	4	179	0.20	5.39	0.00	FELT GAIRLOCH
20130718	001050.2	53.41	-4.46	236.8	393.1	10.9	0.8	ANGLESEY,NORTH WALES		6	104	0.10	1.90	0.70	
20130729	105031.7	53.39	-4.78	215.4	392.1	8.0	1.2	ANGLESEY,NORTH WALES		8	225	0.10	2.56	1.80	OFFSHORE LOCATION
20130731	194555.5	48.68	-2.45	366.7	-135.8	7.4	1.2	NORTHWEST FRANCE		5	349	0.00	7.71	0.00	60KM SSW OF JERSEY
20130731	220925.5	55.80	-6.38	125.2	664.7	11.3	1.7	ISLAY,ARGYLL/BUTE	3	9	153	0.20	3.53	3.70	FELT ISLAY
20130811	060506.2	53.27	-2.32	378.5	374.9	10.4	2.1	KNUTSFORD,CHESHIRE		10	89	0.30	3.22	4.40	
20130812	105218.1	55.43	-5.14	201.5	619.6	7.7	1.3	ARRAN,NORTH AYRSHIRE		5	152	0.50	6.53	2.80	
20130825	053748.3	53.86	-3.38	309.3	441.7	4.2	2.5	IRISH SEA	3	16	201	0.20	3.92	3.40	FELT FLEETWOOD...
20130825	071324.2	53.89	-3.34	311.7	444.7	5.4	0.9	IRISH SEA		9	164	0.30	5.24	5.40	
20130825	095836.5	53.88	-3.39	308.4	443.8	5.3	3.3	IRISH SEA	3	26	56	0.50	3.62	7.60	FELT FLEETWOOD...
20130827	100606.0	56.64	-4.37	254.4	752.4	2.8	2.7	GLEN LYON,PERTH/KINROSS	3	19	79	0.40	4.83	6.20	FELT GLENLYON...
20130828	142746.3	52.29	-3.36	307.4	267.1	3.7	1.3	LLANDRINDOD WELLS,POWYS		8	134	0.30	4.46	6.50	
20130831	011941.9	55.62	-3.13	328.5	636.9	4.7	1.8	PEEBLES,BORDERS	3	12	135	0.30	4.34	4.20	FELT PEEBLES...
20130831	063611.4	53.89	-3.40	307.8	444.2	10.6	2.6	IRISH SEA	3	23	88	0.40	5.61	8.30	FELT FLEETWOOD...
20130901	160715.0	57.37	-5.49	190.0	835.9	4.3	0.7	LOCHCARRON,HIGHLAND		3	145	0.10	5.94	0.00	
20130901	192848.9	57.14	-5.80	169.8	811.9	6.8	1.1	SKYE,HIGHLAND		4	217	0.30	2.01	1.40	
20130901	212847.7	52.32	-3.60	290.9	269.9	10.8	1.1	RHAYADER,POWYS		7	113	0.20	2.62	3.30	
20130903	064436.2	56.36	-4.85	223.8	722.2	3.8	1.7	DALMALLY,ARGYLL/BUTE		12	84	0.20	4.34	6.80	8KM SE OF DALMALLY
20130906	172106.7	52.96	-4.36	241.2	342.9	19.1	0.8	PWLLHELI,GWYNEDD		5	241	0.10	3.11	4.80	10KM NE OF PWLLHELI
20130909	205148.8	56.37	-4.81	226.6	723.6	7.1	1.6	TYNDRUM,STIRLING		9	89	0.60	6.21	1.50	10KM SW OF TYNDRUM
20130913	090552.1	55.55	-3.67	294.8	629.7	4.9	1.1	ABINGTON,S LANARKSHIRE		4	264	0.10	4.85	0.00	6KM NNE OF ABINGTON
20130917	032219.9	51.87	-5.03	191.4	223.0	10.3	1.0	ROCH,PEMBROKESHIRE		4	285	0.20	5.16	1.70	
20130922	230602.1	51.76	-4.25	244.6	209.6	2.7	1.4	LLANNON,CARMARTHENSHIRE		4	268	0.10	2.83	2.10	9KM WEST OF LLANNON
20130926	062112.3	53.64	-1.00	465.8	416.3	1.1	1.7	DONCASTER,S YORKSHIRE		5	163	0.40	4.94	0.00	C/F

TABLE 1 : CATALOGUE OF EVENTS : 2013

YearMoDy	HrMnSecs	Lat	Lon	kmE	kmN	Dep	Mag	Locality	Int	No	Gap	RMS	ERH	ERZ	Comments
20130927	030329.9	55.35	-3.22	322.8	607.1	3.2	0.6	ESKDALEMUIR,D & G		4	155	0.30	1.38	0.00	
20130929	085408.8	59.58	1.46	595.4	1081.6	17.1	2.8	NORTHERN NORTH SEA		19	137	0.30	4.33	7.70	
20130930	083218.4	53.27	-2.43	371.1	374.7	13.0	0.7	WINCHAM,CHESHIRE		5	161	0.20	3.18	3.70	
20131004	204913.8	57.34	-4.44	253.0	830.1	2.6	2.4	DRUMNADROCHIT,HIGHLAND	3	13	165	0.40	7.78	2.70	FELT DRUMNADROCHIT...
20131005	022225.2	54.50	-3.01	334.9	511.8	4.3	1.8	GRASMERE,CUMBRIA		9	267	0.00	5.59	3.40	
20131007	072509.7	57.41	-5.27	203.6	840.5	5.3	1.1	STRATHCARRON,HIGHLAND		5	155	0.30	3.89	2.20	
20131013	205401.2	53.21	-3.89	273.7	369.5	7.2	1.0	DOLGARROG,CONWY	3	9	179	0.10	2.72	2.90	FELT DOLGARROG...
20131015	114452.7	51.92	-2.78	346.1	224.9	19.6	1.0	ORCOP,HEREFORDSHIRE		4	116	0.10	3.94	3.10	
20131020	170644.6	53.55	-2.61	359.6	406.7	8.3	1.5	WIGAN,GTR MANCHESTER		9	82	0.20	2.80	6.90	
20131025	012820.8	57.59	-5.45	194.1	861.0	2.6	1.4	TORRIDON,HIGHLAND		7	198	0.50	8.86	7.40	
20131026	094513.8	55.26	-6.31	126.0	604.8	3.5	1.3	BALLINTOY,CO ANTRIM		3	240	0.20	8.81	3.30	OFFSHORE LOCATION
20131028	110919.6	57.30	2.31	659.6	831.9	9.5	2.8	CENTRAL NORTH SEA		13	257	0.30	8.55	2.60	265KM EAST ABERDEEN
20131103	233412.1	52.11	-0.86	477.8	246.8	9.7	1.2	MILTON KEYNES,BUCKS		5	169	0.20	5.87	9.90	
20131123	110016.8	52.41	-3.16	321.1	279.7	6.3	0.7	CLUN,SHROPSHIRE		5	169	0.10	2.40	5.20	8KM WEST OF CLUN
20131201	094820.6	60.73	1.69	601.0	1210.8	23.9	3.4	NORTHERN NORTH SEA		17	172	0.30	3.96	6.00	170KM ENE OF LERWICK
20131201	204536.5	55.08	-1.76	415.3	576.4	4.1	0.9	MORPETH,NORTHUMBERLAND		5	214	0.30	4.13	4.50	10KM SSW OF MORPETH
20131202	105302.4	57.41	-5.48	191.2	840.3	2.6	1.3	LOCHCARRON,HIGHLAND	2	6	170	0.30	2.00	2.60	FELT LOCHCARRON
20131204	075729.9	51.45	-8.92	-80.8	195.3	14.4	2.3	CELTIC SEA	3	6	184	0.30	5.39	1.00	FELT COUNTY CORK
20131206	052126.2	52.94	-4.52	230.8	341.3	8.8	0.8	LLEYN PENINSULA		4	261	0.30	5.54	0.00	
20131210	075708.8	53.21	-1.01	466.3	368.6	1.1	1.4	NEW OLLERTON,NOTTS		6	143	0.60	5.14	0.00	C/F
20131210	191216.3	53.21	-1.02	465.3	368.2	1.1	0.9	NEW OLLERTON,NOTTS		4	226	0.20	5.00	0.00	C/F
20131212	030112.1	53.21	-1.04	464.0	368.1	1.2	1.5	NEW OLLERTON,NOTTS	3	8	193	0.60	2.18	0.00	C/F,FELT N OLLERTON
20131212	200624.9	53.21	-1.06	462.6	368.4	1.1	1.6	NEW OLLERTON,NOTTS	3	8	108	0.30	4.75	0.00	C/F,FELT N OLLERTON
20131213	212409.1	53.21	-1.04	464.0	368.6	1.2	1.2	NEW OLLERTON,NOTTS		6	106	0.50	9.19	0.00	C/F
20131216	023159.5	53.21	-1.04	464.2	368.3	1.1	1.7	NEW OLLERTON,NOTTS	3	8	187	0.40	3.32	0.00	C/F,FELT N OLLERTON
20131217	150639.3	53.22	-1.04	463.8	369.5	1.2	1.5	NEW OLLERTON,NOTTS	3	5	223	0.50	1.79	0.00	C/F,FELT N OLLERTON
20131218	163515.0	53.21	-1.05	463.4	368.7	1.2	1.2	NEW OLLERTON,NOTTS	3	5	263	0.20	4.62	0.00	C/F,FELT N OLLERTON
20131219	093025.0	52.05	-3.66	286.3	239.9	4.5	1.9	LLANWRTYD WELLS,POWYS		9	144	0.30	2.28	1.20	
20131219	102721.8	53.22	-1.02	465.2	369.5	1.2	1.3	NEW OLLERTON,NOTTS		6	225	0.20	1.53	0.00	C/F
20131220	212317.2	53.20	-1.03	464.8	367.6	1.2	1.4	NEW OLLERTON,NOTTS		4	225	0.60	1.59	0.00	C/F
20131221	103737.7	53.15	-5.38	173.7	366.8	12.2	1.0	IRISH SEA		5	323	0.30	9.86	7.90	50KM WSW OF HOLYHEAD
20131222	101928.4	53.21	-1.00	466.4	368.5	1.1	1.1	NEW OLLERTON,NOTTS		3	267	0.40	1.46	0.00	C/F
20131226	012432.7	52.89	-3.75	282.5	334.2	11.8	0.9	BALA,GWYNEDD		8	124	0.30	4.26	1.90	10KM WSW OF BALA
20131226	013735.4	49.20	-2.07	394.8	-78.2	7.3	1.8	JERSEY,CHANNEL ISLANDS	3	8	127	0.10	0.85	0.60	FELT JERSEY
20131228	234556.9	53.19	-1.05	463.6	366.2	1.2	1.5	NEW OLLERTON,NOTTS	3	5	193	0.50	8.35	0.00	C/F,FELT N OLLERTON
20131229	151238.9	52.62	-2.92	337.9	302.9	11.5	0.9	PONTESBURY,SHROPSHIRE		5	200	0.10	4.04	1.40	
20131230	002034.9	53.22	-1.01	466.1	369.6	1.0	1.2	NEW OLLERTON,NOTTS		4	227	0.50	1.34	0.00	C/F
20131231	215325.3	53.22	-1.00	466.7	369.8	1.1	0.9	NEW OLLERTON,NOTTS		3	268	0.30	1.35	0.00	C/F

TABLE 2 : PHASE DATA

LBWR HZ 72.2 IP D 23:57 13.83 -0.21	JSA HN 167.0 IAML 13:17 08.47 43 0.36
LBWR HE 72.2 ES 23:57 23.03 0.15	JSA HE 167.0 IAML 13:17 10.64 33 0.38
LBWR HE 72.2 IAML 23:57 26.03 206 0.44	JRS EZ 172.0 EP 13:16 40.57 0.05
LBWR HN 72.2 IAML 23:57 26.14 143 0.11	JRS EE 172.0 ES 13:17 00.34 0.25
STNC HZ 81.2 EP 23:57 15.63 0.22	JDC EZ 175.0 EP 13:16 41.08 0.19
STNC HN 81.2 ES 23:57 25.06 -0.19	JDC EN 175.0 ES 13:16 59.92 -0.81
STNC HN 81.2 IAML 23:57 28.58 336 0.32	DYA HZ 226.0 EP 13:16 47.27 -0.02
STNC HE 81.2 IAML 23:57 29.21 253 0.25	DYA HE 226.0 IAML 13:17 14.43 14 0.36
WACR HZ 114.0 EP 23:57 20.58 0.11	DYA HN 226.0 IAML 13:17 15.35 21 0.22
WACR HE 114.0 ES 23:57 33.88 -0.13	
WACR HE 114.0 IAML 23:57 36.34 100 0.24	March 8 2013 Time: 23:51 16.0 UTC Magnitude: 0.5 ML
WACR HN 114.0 IAML 23:57 36.76 133 0.22	Lat: 56.204N Lon: -4.251W Depth: 5.1 km
HPK HZ 124.0 IP D 23:57 22.17 0.16	Grid Ref: 260.38 kmE 703.54 kmN RMS: 0.10 secs
HPK HE 124.0 ES 23:57 36.75 0.08	Locality: CALLANDER,STIRLING
HPK HE 124.0 IAML 23:57 38.11 187 0.20	Velocity model: Lownet Xnear: 100.0 Xfar: 200.0
HPK HN 124.0 IAML 23:57 38.74 205 0.33	STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES
HLMI HZ 132.0 EP 23:57 22.85 -0.28	EAB EZ 5.6 IP C 23:51 17.63 0.01
FOEL HZ 145.0 EP 23:57 25.25 0.13	INVG HZ 28.0 EP 23:51 21.41 0.12
STRD HZ 147.0 IP C 23:57 25.47 0.22	INVG HE 28.0 ES 23:51 25.10 -0.05
SWN1 HZ 163.0 EP 23:57 28.31 0.75	INVG HE 28.0 IAML 23:51 25.36 4 0.14
MCH1 HZ 167.0 EP 23:57 27.91 -0.21	INVG HN 28.0 IAML 23:51 25.88 3 0.51
MONM HZ 169.0 EP 23:57 28.44 0.13	PGB1 HZ 46.0 EP 23:51 23.93 -0.26
GDLE HZ 170.0 EP 23:57 27.38 -1.13	PGB1 HN 46.0 ES 23:51 30.33 0.16
WPML EZ 196.0 EP 23:57 32.92 1.11	LAWE HZ 71.5 EP 23:51 28.19 0.06
LPW BZ 224.0 EP 23:57 35.92 0.75	LAWE HN 71.5 ES 23:51 36.93 -0.04
KESW HZ 232.0 EP 23:57 34.81 -1.48	LAWE HN 71.5 IAML 23:51 40.92 4 0.11
	LAWE HE 71.5 IAML 23:51 41.11 8 0.19
February 28 2013 Time: 00:52 29.3 UTC Magnitude: 1.3 ML	March 10 2013 Time: 21:18 29.3 UTC Magnitude: 1.8 ML
Lat: 52.898N Lon: -1.063W Depth: 8.5 km	Lat: 56.996N Lon: -5.795W Depth: 7.5 km
Grid Ref: 463.02 kmE 333.84 kmN RMS: 0.20 secs	Grid Ref: 169.53 kmE 795.81 kmN RMS: 0.60 secs
Locality: COTGRAVE,NOTTS	Locality: MALLAIG,HIGHLAND
Velocity model: Lownet Xnear: 100.0 Xfar: 200.0	Velocity model: Lownet Xnear: 150.0 Xfar: 300.0
STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES	Comment: FELT MALLAIG Intensity: 2
CWF HZ 24.2 EP 00:52 33.87 -0.08	STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES
CWF HE 24.2 ES 00:52 37.47 0.12	KPL HZ 39.2 IP D 21:18 36.15 -0.05
CWF HN 24.2 IAML 00:52 37.66 51 0.10	KPL HE 39.2 ES 21:18 41.18 -0.08
CWF HE 24.2 IAML 00:52 37.74 52 0.07	KPL HE 39.2 IAML 21:18 41.50 44 0.20
LBWR HZ 71.4 EP 00:52 41.07 -0.20	KPL HN 39.2 IAML 21:18 41.91 31 0.20
LBWR HE 71.4 ES 00:52 50.09 0.07	KAC EZ 63.5 IP D 21:18 40.05 0.04
LBWR HE 71.4 IAML 00:52 52.83 15 0.10	LAWE HZ 85.5 EP 21:18 43.14 -0.26
LBWR HN 71.4 IAML 00:52 53.27 14 0.09	LAWE HN 85.5 ES 21:18 52.90 -0.81
HPK HE 124.0 ES 00:53 03.88 0.14	LAWE HE 85.5 IAML 21:18 53.10 47 0.12
HPK HE 124.0 IAML 00:53 05.04 14 0.20	LAWE HN 85.5 IAML 21:18 53.45 40 0.36
HPK HN 124.0 IAML 00:53 05.57 16 0.30	MDO EZ 99.7 EP 21:18 45.74 0.08
HLMI HZ 130.0 EP 00:52 50.37 0.26	INVG HZ 125.0 EP 21:18 49.72 0.24
HLMI HE 130.0 ES 00:53 05.06 -0.25	INVG HN 125.0 ES 21:19 04.24 0.02
HLMI HE 130.0 IAML 00:53 05.93 3 0.12	INVG HN 125.0 IAML 21:19 05.18 24 0.40
HLMI HN 130.0 IAML 00:53 06.98 4 0.33	INVG HE 125.0 IAML 21:19 08.13 24 0.14
March 4 2013 Time: 03:26 04.5 UTC Magnitude: 3.5 ML	EAB EZ 127.0 EP 21:18 50.27 0.46
Lat: 64.514N Lon: -4.213W Depth: 10.0 km	MCD EZ 167.0 EP 21:18 55.34 -0.14
Grid Ref:	MCD EN 167.0 ES 21:19 14.54 -0.07
Locality: NORWEGIAN SEA	MCD EN 167.0 IAML 21:19 17.01 15 0.13
Velocity model: North Sea Xnear: 400.0 Xfar: 600.0	MCD EE 167.0 IAML 21:19 17.27 33 0.20
Comment: 300KM NE OF TORSHAVN	EDU EZ 177.0 EP 21:18 58.19 1.33
STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES	EDI HN 200.0 IAML 21:19 25.58 17 0.34
SOFL HZ 306.0 EP 03:26 46.79 -0.13	EDI HE 200.0 IAML 21:19 27.43 15 0.36
SOFL HE 306.0 ES 03:27 17.99 0.08	BIGH HZ 201.0 EP 21:18 58.24 -1.50
SOFL HE 306.0 IAML 03:27 19.39 198 0.55	BIGH HN 201.0 IAML 21:19 27.56 12 0.16
SOFL HN 306.0 IAML 03:27 21.37 147 0.45	BIGH HE 201.0 IAML 21:19 28.50 12 0.22
LRW HZ 512.0 EP 03:27 13.36 0.71	DRUM HZ 202.0 EP 21:18 59.32 -0.51
LRW HE 512.0 ES 03:28 02.00 -0.41	CLGH HZ 214.0 EP 21:19 02.96 1.57
LRW HN 512.0 IAML 03:28 04.49 56 0.20	
LRW HE 512.0 IAML 03:28 04.51 43 0.29	March 15 2013 Time: 10:43 51.0 UTC Magnitude: 3.1 ML
BIGH HZ 671.0 EP 03:27 31.97 -0.37	Lat: 57.014N Lon: 1.968W Depth: 14.2 km
BIGH HN 671.0 IAML 03:28 38.30 16 0.26	Grid Ref: 640.86 kmE 798.41 kmN RMS: 0.30 secs
BIGH HE 671.0 IAML 03:28 42.43 12 0.29	Locality: CENTRAL NORTH SEA
MCD EZ 774.0 EP 03:27 45.51 0.37	Velocity model: North Sea Xnear: 400.0 Xfar: 600.0
KAC EZ 784.0 EP 03:27 45.95 -0.40	Comment: 250KM EAST ABERDEEN
MDO EZ 788.0 EP 03:27 46.37 -0.54	STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES
KPL HZ 803.0 EP 03:27 48.03 -0.71	DRUM HZ 271.0 EP 10:44 29.34 0.52
DRUM HZ 852.0 EP 03:27 54.56 -0.27	DRUM HN 271.0 ES 10:44 56.43 0.02
INVG HZ 901.0 EP 03:28 00.52 -0.39	DRUM HN 271.0 IAML 10:45 12.96 78 0.42
LAWE HZ 922.0 EP 03:28 02.99 -0.50	DRUM HE 271.0 IAML 10:45 13.18 78 0.44
EAB EZ 927.0 EP 03:28 04.07 -0.14	ESY EZ 308.0 EP 10:44 33.27 -0.09
EDI HZ 959.0 EP 03:28 07.93 -0.14	EDU EZ 309.0 EP 10:44 33.78 0.28
ESY EZ 962.0 EP 03:28 08.54 0.08	MCD EE 321.0 IAML 10:45 24.24 94 0.48
ESK HZ 1026.0 EP 03:28 16.05 -0.40	MCD EN 321.0 IAML 10:45 34.21 96 0.72
EDMD HZ 1086.0 EP 03:28 23.35 -0.50	GDLE HZ 337.0 EP 10:44 37.25 0.20
	GDLE HE 337.0 IAML 10:45 35.72 90 0.34
March 6 2013 Time: 13:16 13.7 UTC Magnitude: 2.2 ML	GDLE HN 337.0 IAML 10:45 36.87 228 0.38
Lat: 48.405N Lon: -4.113W Depth: 8.2 km	EBL EZ 339.0 EP 10:44 37.13 -0.13
Grid Ref: 243.64 kmE -163.98 kmN RMS: 0.40 secs	EDI HZ 340.0 EP 10:44 37.26 -0.11
Locality: NORTHWEST FRANCE	EDI HE 340.0 ES 10:45 11.44 0.23
Velocity model: Lownet Xnear: 500.0 Xfar: 1000.0	EDI HE 340.0 IAML 10:45 38.27 64 0.58
Comment: 165KM SW OF JERSEY	EDI HN 340.0 IAML 10:45 39.66 70 0.80
STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES	EDMD HZ 346.0 EP 10:44 37.64 -0.39
JSA HZ 167.0 EP 13:16 39.65 -0.21	EDMD HN 346.0 IAML 10:45 31.58 56 0.28
JSA HN 167.0 ES 13:16 59.49 0.54	EDMD HE 346.0 IAML 10:45 32.72 69 0.32

TABLE 2 : PHASE DATA

MCH1 HE 44.9 ES 16:04 48.44 0.14											Locality: LLEYN PENINSULA										
MCH1 HE 44.9 IAML 16:04 48.59 23 0.16											Velocity model: Lleyn Xnear: 80.0 Xfar: 200.0										
MCH1 HN 44.9 IAML 16:04 48.61 29 0.12											Comment: FELT BRYNCROES...										
HLML HZ 79.0 EP 16:04 47.25 -0.45											Intensity: 2										
HLML HN 79.0 ES 16:04 57.45 -0.07											STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES										
HLML HE 79.0 IAML 16:04 57.90 6 0.13											YRC EZ 42.3 EP C 03:20 46.84 0.06										
HLML HN 79.0 IAML 16:04 58.43 5 0.12											YRC EZ 42.3 ES 03:20 51.80 0.06										
CWF HZ 120.0 EP 16:04 54.55 0.55											YLL EZ 46.2 EP 03:20 47.49 0.08										
CWF HN 120.0 IAML 16:05 09.95 3 0.17											WLF1 HZ 50.1 EP C 03:20 48.01 -0.04										
CWF HE 120.0 IAML 16:05 09.98 4 0.12											WLF1 HZ 50.1 AMPG 03:20 48.14 780 0.11										
											WLF1 HN 50.1 ES 03:20 53.64 -0.24										
May 29 2013 Time: 03:16 28.9 UTC Magnitude: 3.8 ML											WLF1 HZ 50.1 AMSG 03:20 53.76 713 0.15										
Lat: 52.883N Lon: -4.720W Depth: 10.5 km											WLF1 HE 50.1 IAML 03:20 54.28 51 0.20										
Grid Ref: 217.00 kmE 335.23 kmN RMS: 0.40 secs											WLF1 HN 50.1 IAML 03:20 58.51 54 0.17										
Locality: LLEYN PENINSULA											WPS HZ 59.7 EP C 03:20 49.85 0.25										
Velocity model: Lleyn Xnear: 250.0 Xfar: 300.0											WPS HZ 59.7 AMPG 03:20 49.95 68 0.10										
Comment: FELT GWYNEDD...											WPS HZ 59.7 AMSG 03:20 56.75 269 0.07										
											WPS HE 59.7 IAML 03:20 58.19 20 0.24										
											WPS HN 59.7 IAML 03:20 59.31 29 0.19										
STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES											WME EZ 63.6 IP C 03:20 50.08 -0.18										
YRC EZ 42.1 IP C 03:16 36.39 0.16											LLW BZ 70.1 EP D 03:20 51.47 0.15										
YLL EZ 46.7 IP C 03:16 37.24 0.25											LLW BE 70.1 IAML 03:20 59.99 64 0.36										
WLF1 HZ 50.1 IP C 03:16 37.53 -0.01											LLW BN 70.1 IAML 03:21 00.17 76 0.18										
WLF1 HE 50.1 ES 03:16 43.10 -0.28											FOEL HZ 101.0 EP D 03:20 56.24 0.08										
WLF1 HN 50.1 IAML 03:16 43.70 4556 0.19											FOEL HZ 101.0 AMPG 03:20 56.42 42 0.15										
WLF1 HE 50.1 IAML 03:16 47.92 6019 0.31											FOEL HN 101.0 ES 03:21 07.57 0.07										
WPS HZ 59.5 IP C 03:16 39.07 0.02											FOEL HZ 101.0 AMSG 03:21 07.72 144 0.08										
WPS HZ 59.5 AMPG 03:16 39.31 5060 0.14											FOEL HE 101.0 IAML 03:21 08.68 23 0.22										
WPS HE 59.5 ES 03:16 46.51 0.58											FOEL HN 101.0 IAML 03:21 09.16 22 0.10										
WPS HZ 59.5 AMSG 03:16 46.66 40143 0.10											RSBS HZ 103.0 EP C 03:20 56.14 -0.27										
WME EZ 63.6 IP C 03:16 39.58 -0.16											RSBS HZ 103.0 AMPG 03:20 56.37 86 0.12										
LLW BZ 71.1 EP D 03:16 41.02 0.09											RSBS HN 103.0 ES 03:21 08.03 0.10										
LLW BN 71.1 ES 03:16 49.14 0.06											RSBS HZ 103.0 AMSG 03:21 08.38 286 0.06										
LLW BN 71.1 IAML 03:16 49.78 6005 0.25											HML1 HZ 130.0 EP D 03:20 59.82 -0.70										
LLW BE 71.1 IAML 03:16 50.03 6504 0.42											HML1 HE 130.0 AMSG 03:21 00.66 82 0.10										
FOEL HZ 102.0 IP D 03:16 45.80 0.04											HML1 HE 130.0 AMSG 03:21 00.66 76 0.11										
FOEL HZ 102.0 AMPG 03:16 45.97 2058 0.14											WIM EZ 141.0 EP C 03:21 02.42 0.12										
FOEL HN 102.0 ES 03:16 56.95 -0.24											MCH1 HZ 152.0 EP D 03:21 04.12 0.29										
FOEL HZ 102.0 AMSG 03:16 57.47 9053 0.25											MCH1 HE 152.0 AMSG 03:21 22.33 540 0.09										
FOEL HT 102.0 AMSG 03:16 57.62 20503 0.83											MCH1 HE 152.0 IAML 03:21 23.36 18 0.17										
FOEL HE 102.0 AMSG 03:16 57.62 21892 0.79											MCH1 HN 152.0 IAML 03:21 24.42 26 0.16										
FOEL HE 102.0 AMSG 03:16 57.84 20513 0.12											MONM HZ 174.0 EP D 03:21 07.39 0.86										
FOEL HE 102.0 IAML 03:16 58.86 2806 0.34											KESW HZ 218.0 EP C 03:21 11.98 -0.07										
FOEL HN 102.0 IAML 03:16 59.81 3212 0.35																					
RSBS HZ 104.0 IP C 03:16 45.67 -0.25											May 29 2013 Time: 17:49 27.8 UTC Magnitude: 1.5 ML										
RSBS HZ 104.0 AMPG 03:16 45.91 4129 0.17											Lat: 57.578N Lon: -5.433W Depth: 2.5 km										
RSBS HE 104.0 ES 03:16 57.53 0.07											Grid Ref: 194.77 kmE 859.38 kmN RMS: 0.40 secs										
RSBS HZ 104.0 AMSG 03:16 57.80 12522 0.22											Locality: TORRIDON, HIGHLAND										
RSBS HN 104.0 IAML 03:16 59.83 855 0.18											Velocity model: Lownet Xnear: 100.0 Xfar: 200.0										
RSBS HE 104.0 IAML 03:17 02.13 832 0.54											Comment: 7KM EAST OF TORRIDON										
HML1 HZ 131.0 EP D 03:16 49.35 -0.78											STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES										
HML1 HN 131.0 ES 03:17 04.22 -0.32											KAC EZ 11.9 EP 17:49 30.05 -0.27										
HML1 HN 131.0 IAML 03:17 06.63 1841 0.53											KPL HZ 29.7 EP 17:49 33.61 0.31										
HML1 HE 131.0 IAML 03:17 07.89 1383 0.47											KPL HN 29.7 ES 17:49 36.91 -0.41										
WIM EZ 141.0 IP C 03:16 51.68 0.01											KPL HN 29.7 IAML 17:49 37.47 18 0.07										
MCH1 HZ 153.0 IP D 03:16 53.46 0.08											KPL HE 29.7 IAML 17:49 37.51 24 0.10										
MCH1 HN 153.0 IAML 03:17 13.02 2070 0.44											RRR SZ 38.3 EP 17:49 34.93 0.16										
MCH1 HE 153.0 IAML 03:17 14.96 1810 0.45											RRR SN 38.3 ES 17:49 39.47 -0.39										
STNC HZ 170.0 IP C 03:16 55.80 0.24											RRR SE 38.3 IAML 17:49 40.61 43 0.30										
MONM HZ 175.0 EP 03:16 56.82 0.74											RRR SN 38.3 IAML 17:49 40.71 47 0.28										
LBWR HZ 209.0 EP C 03:17 00.64 0.29											MDO EZ 65.9 EP 17:49 38.80 -0.48										
LBWR HE 209.0 IAML 03:17 29.64 2071 0.50											RRH SZ 83.9 EP 17:49 42.34 0.33										
LBWR HN 209.0 IAML 03:17 30.38 2538 0.40											RSC SZ 87.2 EP 17:49 42.51 -0.01										
HTL HZ 211.0 IP C 03:17 00.72 0.14											MCD EZ 130.0 EP 17:49 49.43 0.18										
HTL HN 211.0 IAML 03:17 31.31 1979 0.45											BIGH HZ 136.0 EP 17:49 50.79 0.76										
HTL HE 211.0 IAML 03:17 32.12 1128 0.45											LAW E HZ 147.0 EP 17:49 51.85 0.25										
STRD HZ 213.0 EP 03:17 01.56 0.62											LAW E HN 147.0 ES 17:50 09.69 0.72										
KESW HZ 218.0 IP C 03:17 01.00 -0.48											LAW E HN 147.0 IAML 17:50 11.49 19 0.28										
KESW HN 218.0 ES 03:17 23.91 0.31											LAW E HE 147.0 IAML 17:50 11.68 25 0.24										
KESW HN 218.0 IAML 03:17 33.14 750 0.32											INVG HZ 153.0 EP 17:49 52.93 0.36										
KESW HE 218.0 IAML 03:17 42.40 911 0.42											INVG HE 153.0 ES 17:50 10.39 -0.27										
GALL HZ 221.0 EP 03:17 01.34 -0.50											INVG HE 153.0 IAML 17:50 11.74 12 0.33										
HPK HZ 238.0 EP C 03:17 03.85 -0.17											INVG HN 153.0 IAML 17:50 12.45 7 0.15										
CLGH HZ 261.0 IP C 03:17 06.12 -0.80											EAB EZ 168.0 EP 17:49 55.39 0.66										
CLGH HE 261.0 ES 03:17 33.07 0.32																					
CLGH HN 261.0 IAML 03:17 42.05 606 0.21											May 29 2013 Time: 18:33 43.4 UTC Magnitude: 1.4 ML										
CLGH HE 261.0 IAML 03:17 43.21 670 0.21											Lat: 57.569N Lon: -5.418W Depth: 2.5 km										
DYA HZ 278.0 EP 03:17 08.41 -0.57											Grid Ref: 195.61 kmE 858.34 kmN RMS: 0.50 secs										
EDMD HZ 283.0 EP 03:17 08.94 -0.63											Locality: TORRIDON, HIGHLAND										
ESK HZ 288.0 IP C 03:17 09.66 -0.66											Velocity model: Lownet Xnear: 100.0 Xfar: 200.0										
GDLE HZ 310.0 IP C 03:17 12.50 -0.48											Comment: 7KM EAST OF TORRIDON										
PGB1 HZ 326.0 EP 03:17 14.75 -0.30											STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES										
EDI HZ 353.0 EP 03:17 17.83 -0.51											KAC EZ 10.6 EP 18:33 45.64 -0.03										
WACR HZ 361.0 EP 03:17 19.51 0.14											KAC EZ 10.6 ES 18:33 46.88 -0.47										
ESY EZ 364.0 EP 03:17 19.37 -0.45											KPL HZ 29.2 EP 18:33 49.23 0.44										
LAW E HZ 379.0 EP 03:17 20.69 -0.87											KPL HN 29.2 ES 18:33 52.14 -0.60										
KAC EZ 515.0 EP 03:17 37.84 -0.82											KPL HE 29.2 IAML 18:33 53.20 23 0.10										
											KPL HN 29.2 IAML 18:33 53.58 16 0.18										
May 29 2013 Time: 03:20 39.5 UTC Magnitude: 1.7 ML											RRR SZ 39.6 EP 18:33 50.59 0.01										
Lat: 52.879N Lon: -4.705W Depth: 9.9 km											RRR SN 39.6 ES 18:33 55.37 -0.46										
Grid Ref: 218.00 kmE 334.74 kmN RMS: 0.20 secs																					

TABLE 2 : PHASE DATA

STAT	CO	DIST	PHAS	WT	P	HrMn	SECS	AMPL	PERI	RES
May 30 2013 Time: 22:06 28.2 UTC Magnitude: 0.8 ML Lat: 52.892N Lon: -4.726W Depth: 11.4 km Grid Ref: 216.64 kmE 336.24 kmN RMS: 0.20 secs Locality: LLEYN PENINSULA Velocity model: LleyN Xnear: 100.0 Xfar: 200.0 Comment: FELT BRYNCROES... Intensity: 2										
RRR	SN	39.6	IAML			18:33	56.17	46	0.18	
RRR	SE	39.6	IAML			18:33	56.27	46	0.26	
MDO	EZ	64.8	EP			18:33	54.43		-0.27	
RRH	SZ	85.1	EP			18:33	58.12		0.34	
RSC	SZ	88.1	EP			18:33	58.21		-0.03	
MCD	EZ	129.0	IP	C		18:34	05.11		0.41	
BIGH	HZ	136.0	EP			18:34	06.04		0.39	
LAW	HE	146.0	EP			18:34	07.91		0.88	
LAW	HE	146.0	ES			18:34	25.08		0.79	
LAW	HN	146.0	IAML			18:34	27.19	18	0.30	
LAW	HE	146.0	IAML			18:34	27.37	24	0.24	
INV	HZ	152.0	EP			18:34	08.51		0.55	
INV	HN	152.0	ES			18:34	25.86		-0.05	
INV	HE	152.0	IAML			18:34	27.42	10	0.34	
INV	HN	152.0	IAML			18:34	28.15	7	0.18	
EAB	EZ	167.0	EP			18:34	11.06		0.94	
June 2 2013 Time: 02:56 57.2 UTC Magnitude: 1.5 ML Lat: 56.116N Lon: -6.132W Depth: 7.9 km Grid Ref: 143.18 kmE 699.16 kmN RMS: 0.30 secs Locality: COLONSAY, ARGYLL/BUTE Velocity model: Lownet Xnear: 150.0 Xfar: 300.0 Comment: FELT SCALASAIG Intensity: 2										
STAT	CO	DIST	PHAS	WT	P	HrMn	SECS	AMPL	PERI	RES
LAW	HZ	48.3	EP			02:57	05.28		-0.25	
LAW	HN	48.3	ES			02:57	11.19		-0.44	
LAW	HN	48.3	IAML			02:57	11.72	52	0.26	
LAW	HE	48.3	IAML			02:57	11.73	33	0.26	
PGB	HZ	108.0	EP			02:57	15.30		0.44	
PGB	HE	108.0	ES			02:57	27.97		0.20	
PGB	HN	108.0	IAML			02:57	30.26	16	0.12	
PGB	HE	108.0	IAML			02:57	30.32	20	0.32	
EAB	EZ	112.0	EP			02:57	15.64		0.23	
CLGH	HZ	115.0	EP			02:57	16.10		0.21	
CLGH	HE	115.0	ES			02:57	29.29		-0.27	
CLGH	HN	115.0	IAML			02:57	30.96	27	0.14	
CLGH	HE	115.0	IAML			02:57	31.37	24	0.14	
INV	HZ	134.0	EP			02:57	18.53		-0.18	
INV	HN	134.0	ES			02:57	34.54		0.11	
INV	HE	134.0	IAML			02:57	36.50	14	0.14	
INV	HN	134.0	IAML			02:57	36.96	18	0.16	
KPL	HZ	139.0	EP			02:57	19.68		0.25	
KPL	HE	139.0	ES			02:57	35.91		0.23	
KPL	HE	139.0	IAML			02:57	38.28	8	0.20	
KPL	HN	139.0	IAML			02:57	41.36	4	0.30	
KAC	EZ	162.0	EP			02:57	22.27		-0.47	
GALL	HZ	166.0	EP			02:57	22.93		-0.26	
GALL	HN	166.0	ES			02:57	42.28		0.09	
GALL	HE	166.0	IAML			02:57	44.49	4	0.20	
GALL	HN	166.0	IAML			02:57	45.33	2	0.34	
June 10 2013 Time: 03:12 13.3 UTC Magnitude: 2.0 ML Lat: 59.927N Lon: 0.195W Depth: 7.5 km Grid Ref: 522.67 kmE 1117.75 kmN RMS: 0.50 secs Locality: NORTHERN NORTH SEA Velocity model: Lownet Xnear: 500.0 Xfar: 1000.0 Comment: 80KM ESE OF LERWICK Intensity: 2										
STAT	CO	DIST	PHAS	WT	P	HrMn	SECS	AMPL	PERI	RES
LRW	HZ	80.0	IP		D	03:12	26.64		0.06	
LRW	HE	80.0	ES			03:12	36.13		-0.14	
LRW	HE	80.0	IAML			03:12	38.32	69	0.11	
LRW	HN	80.0	IAML			03:12	38.91	52	0.13	
BIGH	HZ	284.0	EP			03:12	54.32		0.20	
MCD	EZ	329.0	EP			03:13	00.78		1.00	
DRUM	HZ	370.0	EP			03:13	04.61		-0.39	
INV	HZ	463.0	EP			03:13	15.79		-0.73	
June 10 2013 Time: 03:13 15.8 UTC Magnitude: 1.6 ML Lat: 59.927N Lon: 0.195W Depth: 7.5 km Grid Ref: 522.67 kmE 1117.75 kmN RMS: 0.50 secs Locality: NORTHERN NORTH SEA Velocity model: Cornwall Xnear: 500.0 Xfar: 1000.0 Comment: 80KM ESE OF LERWICK Intensity: 2										
STAT	CO	DIST	PHAS	WT	P	HrMn	SECS	AMPL	PERI	RES
LRW	HZ	80.2	IP		D	03:12	26.64		0.07	
LRW	HE	80.2	ES			03:12	36.13		-0.15	
LRW	HN	80.2	IAML			03:13	40.57	22	0.13	
LRW	HE	80.2	IAML			03:13	40.80	26	0.14	
BIGH	HZ	284.0	EP			03:12	54.32		0.20	
MCD	EZ	329.0	EP			03:13	00.78		1.00	
DRUM	HZ	371.0	EP			03:13	04.61		-0.38	
INV	HZ	463.0	EP			03:13	15.79		-0.73	
June 14 2013 Time: 20:21 39.7 UTC Magnitude: 1.3 ML Lat: 56.988N Lon: -5.848W Depth: 6.7 km Grid Ref: 166.26 kmE 795.10 kmN RMS: 0.20 secs Locality: MALLAIG, HIGHLAND Velocity model: Lownet Xnear: 100.0 Xfar: 200.0 Comment: 100KM SE OF JERSEY Intensity: 2										
STAT	CO	DIST	PHAS	WT	P	HrMn	SECS	AMPL	PERI	RES
KPL	HZ	40.9	EP			20:21	46.95		0.05	
KPL	HE	40.9	ES			20:21	51.95		-0.20	
KPL	HN	40.9	IAML			20:21	52.23	16	0.12	
May 31 2013 Time: 18:34 32.0 UTC Magnitude: 1.7 ML Lat: 48.765N Lon: -0.739W Depth: 3.2 km Grid Ref: 492.66 kmE -125.35 kmN RMS: 0.10 secs Locality: NORTHWEST FRANCE Velocity model: Lownet Xnear: 500.0 Xfar: 1000.0 Comment: 100KM SE OF JERSEY Intensity: 2										

TABLE 2 : PHASE DATA

<p>ED1 HN 114.0 IAML 06:45 11.62 20 0.26 ED1 HE 114.0 IAML 06:45 11.70 28 0.36 KPL HZ 120.0 EP 06:44 55.89 0.02 KPL HE 120.0 ES 06:45 10.27 0.01 KPL HN 120.0 IAML 06:45 13.11 37 0.22 KPL HE 120.0 IAML 06:45 13.24 37 0.32 EBL EZ 130.0 EP 06:44 57.69 0.09 KAC EZ 130.0 EP 06:44 57.68 0.18 ESK HZ 155.0 EP 06:45 01.63 0.46 ESK HN 155.0 ES 06:45 19.75 0.31 ESK HE 155.0 IAML 06:45 22.75 11 0.24 ESK HN 155.0 IAML 06:45 23.95 11 0.26 DRUM HZ 158.0 EP 06:45 01.48 -0.04 DRUM HN 158.0 ES 06:45 19.79 -0.24 DRUM HN 158.0 IAML 06:45 22.22 28 0.40 DRUM HE 158.0 IAML 06:45 22.82 15 0.11 CLGH HZ 163.0 EP 06:45 01.82 -0.38 CLGH HN 163.0 IAML 06:45 25.19 14 0.38 CLGH HE 163.0 IAML 06:45 26.51 18 0.36</p>	<p>September 6 2013 Time: 17:21 06.7 UTC Magnitude: 0.8 ML Lat: 52.960N Lon: -4.364W Depth: 19.1 km Grid Ref: 241.23 kmE 342.94 kmN RMS: 0.10 secs Locality: PWLLHELI,GWYNEDD Velocity model: Lleyn Xnear: 50.0 Xfar: 100.0 Comment: 10KM NE OF PWLLHELI</p>	<p>Grid Ref: 191.41 kmE 222.99 kmN Locality: ROCH,PEMBROKESHIRE Velocity model: Mid Wales Xnear: 150.0 Xfar: 300.0</p>	<p>RMS: 0.20 secs STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES RSBS HZ 21.9 EP 03:22 24.29 0.20 RSBS HE 21.9 ES 03:22 26.99 -0.11 RSBS HE 21.9 IAML 03:22 27.07 47 0.07 RSBS HN 21.9 IAML 03:22 27.17 15 0.06 MCH1 HZ 140.0 EP 03:22 42.32 -0.31 MCH1 HE 140.0 ES 03:22 59.10 0.11 MCH1 HE 140.0 IAML 03:22 59.39 3 0.18 MCH1 HN 140.0 IAML 03:22 59.47 5 0.24 MONM HZ 153.0 EP 03:22 44.67 0.11 MONM HE 153.0 ES 03:23 02.32 0.01 MONM HE 153.0 IAML 03:23 03.13 3 0.50 MONM HN 153.0 IAML 03:23 03.58 3 0.24 WLF1 HE 164.0 ES 03:23 04.67 0.01</p>
<p>September 9 2013 Time: 20:51 48.8 UTC Magnitude: 1.6 ML Lat: 56.373N Lon: -4.808W Depth: 7.1 km Grid Ref: 226.61 kmE 723.61 kmN RMS: 0.60 secs Locality: TYNDRUM,STIRLING Velocity model: Lownet Xnear: 100.0 Xfar: 200.0 Comment: 10KM SW OF TYNDRUM</p>	<p>September 22 2013 Time: 23:06 02.1 UTC Magnitude: 1.4 ML Lat: 51.763N Lon: -4.252W Depth: 2.7 km Grid Ref: 244.61 kmE 209.60 kmN RMS: 0.10 secs Locality: LLANNON,CARMARTHENSHIRE Velocity model: Mid Wales Xnear: 150.0 Xfar: 300.0 Comment: 9KM WEST OF LLANNON</p>	<p>STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES MCH1 HZ 90.2 EP 23:06 17.33 -0.08 MCH1 HN 90.2 ES 23:06 28.42 -0.03 MCH1 HE 90.2 IAML 23:06 28.74 6 0.28 MCH1 HN 90.2 IAML 23:06 28.82 8 0.12 MONM HZ 100.0 EP 23:06 19.05 -0.01 MONM HN 100.0 ES 23:06 31.43 0.14 MONM HE 100.0 IAML 23:06 31.67 12 0.30 MONM HN 100.0 IAML 23:06 31.77 15 0.12 STRD HZ 144.0 EP 23:06 25.99 0.07 STRD HE 144.0 ES 23:06 42.99 -0.10 STRD HN 144.0 IAML 23:06 44.60 7 0.20 STRD HE 144.0 IAML 23:06 45.41 7 0.16 WLF1 HE 170.0 ES 23:06 49.61 0.02 WLF1 HE 170.0 IAML 23:06 51.49 8 0.14 WLF1 HN 170.0 IAML 23:06 51.50 4 0.25</p>	
<p>September 13 2013 Time: 09:05 52.1 UTC Magnitude: 1.1 ML Lat: 55.550N Lon: -3.667W Depth: 4.9 km Grid Ref: 294.84 kmE 629.74 kmN RMS: 0.10 secs Locality: ABINGTON,S LANARKSHIRE Velocity model: Lownet Xnear: 50.0 Xfar: 100.0 Comment: 6KM NNE OF ABINGTON</p>	<p>September 26 2013 Time: 06:21 12.3 UTC Magnitude: 1.7 ML Lat: 53.639N Lon: -1.004W Depth: 1.1 km Grid Ref: 465.84 kmE 416.32 kmN RMS: 0.40 secs Locality: DONCASTER,S YORKSHIRE Velocity model: Lownet Xnear: 100.0 Xfar: 200.0 Comment: C/F</p>	<p>STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES LMK HZ 49.3 EP 06:21 20.48 -0.35 LMK HE 49.3 ES 06:21 26.86 -0.23 LMK HE 49.3 IAML 06:21 30.32 81 0.45 LMK HN 49.3 IAML 06:21 30.63 120 0.25 HPK HZ 54.1 EP 06:21 21.90 0.31 HPK HN 54.1 ES 06:21 28.55 0.15 HPK HN 54.1 IAML 06:21 29.11 50 0.29 HPK HE 54.1 IAML 06:21 30.60 50 0.32 LBWR HZ 54.6 EP 06:21 21.32 -0.37 LBWR HE 54.6 ES 06:21 28.01 -0.56 LBWR HE 54.6 IAML 06:21 28.68 47 0.37 LBWR HN 54.6 IAML 06:21 29.14 66 0.36 CWF HZ 102.0 EP 06:21 29.33 0.28 CWF HN 102.0 ES 06:21 41.86 0.56 CWF HN 102.0 IAML 06:21 44.74 14 0.23 CWF HE 102.0 IAML 06:21 45.03 13 0.13 WACR HZ 149.0 EP 06:21 36.95 0.94</p>	
<p>September 17 2013 Time: 03:22 19.9 UTC Magnitude: 1.0 ML Lat: 51.866N Lon: -5.030W Depth: 10.3 km</p>	<p>September 27 2013 Time: 03:03 29.9 UTC Magnitude: 0.6 ML Lat: 55.352N Lon: -3.218W Depth: 3.2 km Grid Ref: 322.78 kmE 607.12 kmN RMS: 0.30 secs Locality: ESKDALEMUIR,D & G Velocity model: Borders Xnear: 50.0 Xfar: 150.0</p>	<p>STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES ESK HZ 4.0 EP 03:03 30.99 -0.17 ESK HN 4.0 ES 03:03 31.97 -0.09 ESK HN 4.0 IAML 03:03 32.29 119 0.10 ESK HE 4.0 IAML 03:03 32.34 71 0.10 EBL EZ 48.1 EP 03:03 38.56 0.08 KESW HZ 85.3 EP 03:03 44.26 -0.24 KESW HE 85.3 ES 03:03 55.57 0.70 KESW HE 85.3 IAML 03:03 56.91 2 0.25 KESW HN 85.3 IAML 03:03 57.60 2 0.26 GAL1 HZ 110.0 EP 03:03 48.30 -0.12</p>	
<p>STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES ESK HZ 39.1 EP 09:05 59.32 0.12 ESK HN 39.1 ES 09:06 04.38 -0.03 ESK HN 39.1 IAML 09:06 04.45 34 0.14 ESK HE 39.1 IAML 09:06 04.94 23 0.10 EBL EZ 46.4 EP 09:06 00.20 -0.16 EDI HZ 51.4 EP 09:06 01.05 -0.02 EDI HE 51.4 ES 09:06 07.77 0.12 EDI HE 51.4 IAML 09:06 08.45 12 0.22 EDI HN 51.4 IAML 09:06 11.15 10 0.20 ESY EZ 77.8 EP 09:06 05.13 -0.08</p>	<p>September 29 2013 Time: 08:54 08.8 UTC Magnitude: 2.8 ML Lat: 59.575N Lon: 1.461W Depth: 17.1 km Grid Ref: 595.44 kmE 1081.61 kmN RMS: 0.30 secs Locality: NORTHERN NORTH SEA Velocity model: North Sea Xnear: 400.0 Xfar: 600.0</p>	<p>STAT CO DIST PHAS WT P HrMn SECS AMPL PERI RES</p>	

TABLE 2 : PHASE DATA

<p>JVM EZ 10.1 IP D 01:37 37.76 -0.01 JVM EZ 10.1 ES 01:37 39.47 -0.05 ROSF BZ 130.0 EP 01:37 56.62 0.24 ROSF BN 130.0 ES 01:38 12.10 0.38</p>	<p>Locality: NEW OLLERTON,NOTTS Velocity model: Lownet Xnear: 100.0 Xfar: 200.0 Comment: C/F</p>																																																																																																																																																																																																																																																																																																																																										
<p>December 28 2013 Time: 23:45 56.9 UTC Magnitude: 1.5 ML Lat: 53.189N Lon: -1.048W Depth: 1.2 km Grid Ref: 463.60 kmE 366.22 kmN RMS: 0.50 secs Locality: NEW OLLERTON,NOTTS Velocity model: Lownet Xnear: 100.0 Xfar: 200.0 Comment: C/F,FELT N OLLERTON Intensity: 3</p>	<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></tr> </thead> <tbody> <tr><td>LBWR</td><td>HZ</td><td>51.8</td><td>EP</td><td></td><td></td><td>00:20</td><td>44.57</td><td></td><td></td><td>0.04</td></tr> <tr><td>LBWR</td><td>HN</td><td>51.8</td><td>ES</td><td></td><td></td><td>00:20</td><td>51.24</td><td></td><td></td><td>-0.28</td></tr> <tr><td>LBWR</td><td>HN</td><td>51.8</td><td>IAML</td><td></td><td></td><td>00:20</td><td>53.00</td><td>22</td><td>0.24</td><td></td></tr> <tr><td>LBWR</td><td>HE</td><td>51.8</td><td>IAML</td><td></td><td></td><td>00:20</td><td>53.14</td><td>13</td><td>0.29</td><td></td></tr> <tr><td>CWF</td><td>HZ</td><td>57.0</td><td>EP</td><td></td><td></td><td>00:20</td><td>45.31</td><td></td><td></td><td>0.00</td></tr> <tr><td>CWF</td><td>HN</td><td>57.0</td><td>ES</td><td></td><td></td><td>00:20</td><td>52.51</td><td></td><td></td><td>-0.37</td></tr> <tr><td>CWF</td><td>HN</td><td>57.0</td><td>IAML</td><td></td><td></td><td>00:20</td><td>52.80</td><td>4</td><td>0.12</td><td></td></tr> <tr><td>CWF</td><td>HE</td><td>57.0</td><td>IAML</td><td></td><td></td><td>00:20</td><td>52.98</td><td>3</td><td>0.13</td><td></td></tr> <tr><td>HPK</td><td>HN</td><td>91.8</td><td>ES</td><td></td><td></td><td>00:21</td><td>02.19</td><td></td><td></td><td>-0.02</td></tr> <tr><td>HPK</td><td>HN</td><td>91.8</td><td>IAML</td><td></td><td></td><td>00:21</td><td>06.30</td><td>19</td><td>0.23</td><td></td></tr> <tr><td>HPK</td><td>HE</td><td>91.8</td><td>IAML</td><td></td><td></td><td>00:21</td><td>06.40</td><td>12</td><td>0.31</td><td></td></tr> <tr><td>HLM1</td><td>HZ</td><td>148.0</td><td>EP</td><td></td><td></td><td>00:21</td><td>00.70</td><td></td><td></td><td>1.39</td></tr> <tr><td>HLM1</td><td>HE</td><td>148.0</td><td>ES</td><td></td><td></td><td>00:21</td><td>18.07</td><td></td><td></td><td>0.98</td></tr> <tr><td>HLM1</td><td>HE</td><td>148.0</td><td>IAML</td><td></td><td></td><td>00:21</td><td>20.68</td><td>9</td><td>0.33</td><td></td></tr> <tr><td>HLM1</td><td>HN</td><td>148.0</td><td>IAML</td><td></td><td></td><td>00:21</td><td>21.71</td><td>8</td><td>0.26</td><td></td></tr> </tbody> </table>	STAT	CO	DIST	PHAS	WT	P	HrMn	SECS	AMPL	PERI	RES	LBWR	HZ	51.8	EP			00:20	44.57			0.04	LBWR	HN	51.8	ES			00:20	51.24			-0.28	LBWR	HN	51.8	IAML			00:20	53.00	22	0.24		LBWR	HE	51.8	IAML			00:20	53.14	13	0.29		CWF	HZ	57.0	EP			00:20	45.31			0.00	CWF	HN	57.0	ES			00:20	52.51			-0.37	CWF	HN	57.0	IAML			00:20	52.80	4	0.12		CWF	HE	57.0	IAML			00:20	52.98	3	0.13		HPK	HN	91.8	ES			00:21	02.19			-0.02	HPK	HN	91.8	IAML			00:21	06.30	19	0.23		HPK	HE	91.8	IAML			00:21	06.40	12	0.31		HLM1	HZ	148.0	EP			00:21	00.70			1.39	HLM1	HE	148.0	ES			00:21	18.07			0.98	HLM1	HE	148.0	IAML			00:21	20.68	9	0.33		HLM1	HN	148.0	IAML			00:21	21.71	8	0.26																																																																																																																																																											
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<p>December 29 2013 Time: 15:12 38.9 UTC Magnitude: 0.9 ML Lat: 52.620N Lon: -2.917W Depth: 11.5 km Grid Ref: 337.93 kmE 302.90 kmN RMS: 0.10 secs Locality: PONTESBURY,SHROPSHIRE Velocity model: Mid Wales Xnear: 80.0 Xfar: 200.0</p>	<p>December 31 2013 Time: 21:53 25.3 UTC Magnitude: 0.9 ML Lat: 53.221N Lon: -1.001W Depth: 1.1 km Grid Ref: 466.69 kmE 369.82 kmN RMS: 0.30 secs Locality: NEW OLLERTON,NOTTS Velocity model: Lownet Xnear: 100.0 Xfar: 200.0 Comment: C/F</p>																																																																																																																																																																																																																																																																																																																																										
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TABLE 3

GEOGRAPHIC COORDINATES OF SEISMOGRAPH STATIONS, 2013

Code	Name	Lat	Lon	E (km)	N (km)	Ht (m)	Comp
ABA1	BACONSTHORPE	52.8884	1.1453	611.58	337.00	74	1R
AEU	EAST ANGLIA	52.6202	1.2347	618.93	307.45	28	3SMLGmR
APAE	PACKWAY	52.3006	1.4782	637.12	272.68	58	1R
AWH	WHINBURGH	52.6297	0.9507	599.67	307.68	64	1R
AWI	WITTON	52.8319	1.4471	632.17	331.65	46	1R
BATH	BATH	51.4429	-2.3292	377.22	171.60	131	BBR
BBH	BRUNTSHEIL	55.1333	-2.9299	340.72	582.50	216	1R
BBO1	BOTHEL	54.7367	-3.2464	319.76	538.69	209	3R
BCC1	CHAPELCROSS	55.0153	-3.2201	321.99	569.66	138	1SMmR
BDL	DOBCROSS HALL	54.8030	-2.9385	339.68	545.76	157	1R
BHH	HOWATS HILL	55.0931	-3.2181	322.27	578.31	216	3R
BIGH	UPPER BIGHOUSE	58.4932	-3.9102	288.75	957.69	70	BBSMR
BTA	TALKIN	54.9057	-2.6844	356.12	557.00	279	3R
BWH	WARDLAW	55.1758	-3.6549	294.62	588.09	269	1R
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	BBR
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	-4.3373	254.97	702.02	279	1R
EAU	AUCHINOON	55.8454	-3.4474	309.38	662.30	359	1R
EBH	BLACK HILL	56.2476	-3.5084	306.54	707.13	375	1R
EBL	BROAD LAW	55.7723	-3.0445	334.48	653.71	436	1R
ECK	CAULDKAINE HILL	55.1810	-3.1292	328.10	588.00	351	1R
EDI	EDINBURGH	55.9233	-3.1875	325.80	670.66	125	BBR
EDMD	EDMUNDBYERS	54.8312	-1.9636	402.43	548.48	337	BBSMR
EDU	DUNDEE	56.5477	-3.0110	337.85	739.97	421	1R
ELO	LOGIEALMOND	56.4703	-3.7112	294.59	732.21	523	1R
ELSH	ELHAM	51.1482	1.1345	619.32	143.44	126	BBSMR
ESK	ESKDALEMUIR	55.3165	-3.2052	323.52	603.16	261	BBmR
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	BB3LGmR
GCD	CASTLE DOUGLAS	54.8630	-3.9403	275.48	553.76	184	1R
GDLE	GLAISDALE	54.4218	-0.8157	476.94	503.57	228	BBSMR
GMK	MULL OF KINTYRE	55.3458	-5.5934	172.19	611.64	164	1R
GMM	MTNS OF MOURNE	54.2377	-5.9498	142.66	489.67	155	1R
HEX	EXMOOR	51.0664	-3.8026	273.71	131.28	230	1R
HGH	GRAY HILL	51.6379	-2.8057	344.25	193.59	223	1R
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
HTR	TREWERN HILL	52.0785	-3.2679	313.12	243.04	337	1R
HPE	PEMBROKE	51.9372	-4.7746	209.29	230.21	349	1R
HPK	HAVERAH PARK	53.9581	-1.6241	424.66	451.42	233	BBSMR
HSA	SWANSEA	51.7500	-4.1532	251.38	207.94	293	1R
HTL	HARTLAND	50.9943	-4.4849	225.64	124.66	86	BBSMmR
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
JQE	QUEENS EAST	49.2000	-2.0383			58	1R
JRS	MAISON ST LOUIS	49.1922	-2.0922			56	3LGmR
JSA	ST AUBINS	49.1878	-2.1717			39	BBR
JVM	VALLE DE LA MARE	49.2169	-2.2067			64	1R
KAC	ACHNASHSELLACH	57.4989	-5.2988	202.36	850.19	206	1R
KBI1	BIRLEY GRANGE	53.2543	-1.5279	431.49	373.17	272	1R
KESW	KESWICK	54.5886	-3.1048	328.70	522.05	282	BBSMR
KEY2	KEYWORTH	52.8790	-1.0770	462.13	331.73	76	SMR

TABLE 3

GEOGRAPHIC COORDINATES OF SEISMOGRAPH STATIONS, 2013

Code	Name	Lat	Lon	E (km)	N (km)	Ht (m)	Comp
KPL	PLOCKTON	57.3391	-5.6527	180.21	833.50	13	BBSMLGR
KSB	SHIEL BRIDGE	57.2099	-5.4214	193.40	818.40	417	1R
KSY	SYSTON	52.9642	-0.5872	494.88	341.73	121	1R
KTG1	TILBROOK GRNGE	52.3264	-0.4019	508.90	271.06	83	1R
KUF	UFFORD	52.6170	-0.3907	508.94	303.39	38	1R
LAW	LOCH AWE	56.2601	-5.3990	189.58	712.71	137	BBSMR
LBWR	LADYBOWER	53.4016	-1.7248	418.40	389.45	353	BBSMR
LHO	HOLMEFIRTH	53.5453	-1.8548	409.62	405.44	462	1R
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	3SMLGmR
MCH1	MICHAELCHURCH	51.9974	-2.9983	331.47	233.74	219	BBSMR
MDO	DOCHFOUR	57.4409	-4.3633	258.17	841.39	415	1R
MLA1	LATHERON	58.3055	-3.3627	320.15	935.98	188	1R
MME1	MEIKLE CAIRN	57.3149	-2.9647	341.90	825.32	475	1R
MONM	MONMOUTH	51.8396	-2.8054	344.61	215.98	145	BBR
MVH1	ACHVAICH	57.9250	-4.1825	270.75	894.90	185	1R
OLDB	OLDBURY	51.6609	-2.5514	361.95	195.94	6	BBSMR
PCO1	CORRIE	55.9880	-4.1002	269.00	679.21	267	1R
PGB1	GLENIFFERBRAES	55.8115	-4.4837	244.38	660.37	199	BBR
REB	EISG-BRACHAIDH	58.1194	-5.2802	206.82	919.16	100	1R
RRH	RHENIGDALE	57.9197	-6.6881	122.43	901.86	103	1R
RRR	RUBHA REIDH	57.8577	-5.8067	174.19	891.68	61	3SMLGmR
RSBS	ROSEBUSH	51.9530	-4.7448	211.48	231.84	278	BBR
RSC	SCOURIE	58.3485	-5.1683	214.61	944.33	60	1R
RTO	TOLSTA	58.3778	-6.2092	153.95	950.93	74	1R
SAN1	SANDWICK	60.0179	-1.2392	442.41	1126.08	150	1R
SKP1	KOPHILL	51.7218	-0.8096	482.22	203.29	212	1R
SMD	MENDIPS	51.3083	-2.7170	350.03	156.88	310	1R
SOFL	SORNFELLI	62.0689	-6.9658			721	BBR
SSW	STOW-ON-WOLD	51.9667	-1.8499	410.31	229.86	291	1R
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	BB3SMLGmR
WACR	WEST ACRE	52.7247	0.6267	577.48	317.35	66	BBSMR
WAL1	WALLS	60.2564	-1.6173	421.18	1152.46	167	1R
WIM	ISLE OF MAN (South)	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
WPM1	PENMAENMAWR	53.2581	-3.9048	272.95	375.18	353	1R
WPS	CAMAES, ANGLESEY	53.4004	-4.4986	233.98	392.19	16	BBSMR
XAL	ALLENDALE	54.8617	-2.2147	386.22	551.91	458	1R
XSO	SOURHOPE	55.4924	-2.2510	384.14	622.10	516	1R
YEL1	YELL	60.5509	-1.0830	450.29	1185.55	203	1R
YLL	LLANBERIS	53.1402	-4.1704	254.84	362.57	159	1R
YRC	RHOSCOLYN	53.2508	-4.5753	228.21	375.77	22	1R
YRE	YR EIFL	52.9810	-4.4254	237.19	345.42	197	1R

Component Codes:

- 1 Single vertical seismometer
- 3 Orthogonal set of 3 seismometers
- M Low-frequency microphone
- LG Single low-gain vertical seismometer
- SM Strong motion seismometers
- BB Broadband Instrument
- 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**

Structural area	Depth to top of layer (km)	P-wave velocity (km/sec)	Vp/Vs
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	

Appendix 1 Key to Bulletin 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 eg: C/F, see below under comments abbreviations.

The following abbreviations are extracted from the output of the location program HYPO71 (Lee and Lahr, 1975)

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

C/F	Coalfield Type
Leics	Leicestershire
D & G	Dumfries and Galloway
Notts	Nottinghamshire
Bucks	Buckinghamshire
Co	County
I.O.W	Isle of Wight
...	and felt elsewhere
N,S,E,W	North, South, East, West

Appendix 2 Key to Phase Data Encoding

Time	Time of occurrence of event in hours, mins and secs, (UTC).
Lat	Latitude of the event, N indicates North.
Lon	Longitude of the event, W indicates West, E 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+ indicates felt, no macroseismic details. 3+, 4+ etc indicates felt at 3 or 4, but no survey carried out. 3, 4, 5 etc describes the maximum EMS intensity produced by the event.
Comments	Additional comments about the event eg: C/F see list of comments abbreviations below.
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 eg P, S, PG and PN. AML
WT	Hypo 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 eg; 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: Grunthal, G., (Ed) 1998. European Macroseismic scale 1998. Cahiers du Centre European de Geodynamique et de Seismologie. Vol 15.