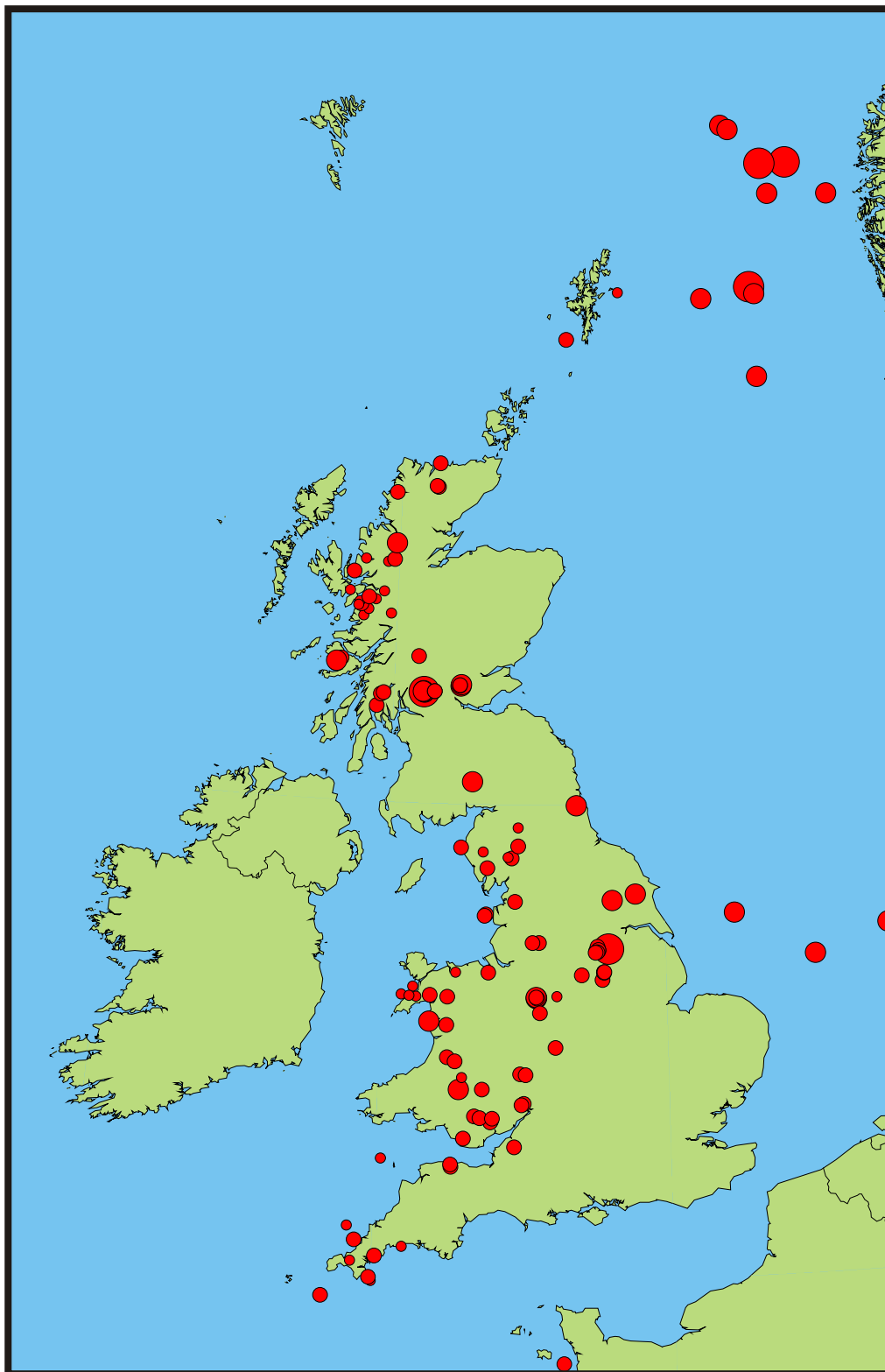




British Geological Survey

**BULLETIN OF BRITISH
EARTHQUAKES 2003**



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BRITISH GEOLOGICAL SURVEY

REPORT CR/04/074N

Bulletin of British Earthquakes 2003

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Table 1. Catalogue of events in chronological order: 2003.

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

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

1 Introduction

The British Geological Survey's (BGS) Seismic Monitoring and Information Service operates a nationwide network of seismograph stations in the United Kingdom (UK). The whole of the UK, including coastal waters, is covered within the limits of the detection capabilities of the seismograph network. Location accuracy is extended in offshore areas through data exchange with neighbouring countries. Seismic phase data, location details and magnitudes are presented in this Bulletin for all earthquakes detected and located by BGS during 2003 in Tables 1 and 2, together with maps showing the larger magnitude events since 1979 ($ML > 2.5$) and since 1970 ($ML > 3.5$). The bulletin covers all of the UK land mass and its coastal waters including the North Sea to 800 kmE and 1500 kmN.

All events believed to be of true tectonic origins are included. Coalfield events are also included. These are small events occurring near coal workings that are believed to be caused by the redistribution of stress as the coal is extracted and, in some cases by collapse in old workings. They are indicated by C/F in the comments column of Tables 1, 2.

Acoustic disturbances, such as sonic booms from supersonic aircraft, are included when they are felt. The air-borne 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 local people. 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 Summary of 2003 Seismicity

There were 146 earthquakes located by the monitoring network during the year (Figure 1), with 32 of them having magnitudes of 2.0 ML or greater. Ten events with a magnitude of 2.0 ML or greater were reported, together with a further 14 smaller ones, bringing the total to 24 felt earthquakes in 2003.

The largest onshore earthquake had a magnitude of 3.2 ML and occurred near Aberfoyle on 20 June (Appendix 4), at a depth of 5.2 km. BGS received reports, via the Police and residents of the Aberfoyle area, such as, "the whole house shook" and "there was a rumble like thunder". This event was followed by two aftershocks on the same day with magnitudes of 2.8 and 2.5 ML. Reports were also received for both of these events with intensities of 3 EMS.

The largest offshore earthquake occurred in the Northern North Sea on 15 December, with a magnitude of 3.9 ML. It was located approximately 265 km east of Lerwick, Shetland

Islands. A further 14 events occurred in the North Sea and surrounding waters during the year, with magnitudes ranging between 0.3 and 3.0 ML. The earthquake with a magnitude of 0.3 ML was detected approximately 30 km east of Yell, Shetland Islands on 30 June. On 23 July, an earthquake with a magnitude of 1.2 ML was located approximately 25 km west of Sumburgh Head in the West Fair Isle Basin.

An earthquake with a magnitude of 1.4 ML occurred in the Manchester area on 5 January. The BGS received one report for this event from a resident of Manchester, who described, "felt a slight shudder" indicating an intensity of 2 EMS. This earthquake locates in the same general area as the series of events that occurred throughout late 2002.

On 12 January, an earthquake with a magnitude of 2.4 ML, occurred near Blackford, Tayside. Reports such as, "there was the usual heavy sudden bang followed immediately by the shaking of the bedroom walls and the shuddering of the floor" and "there was a rumble like a heavy lorry passing", indicate an intensity of at least 3 EMS. A further eight earthquakes were detected in the Blackford area during 2003, with magnitudes ranging from 0.7 – 2.2 ML. Three of these further events were reported by local residents. This is an area that has continued to be active in recent years; 49 events occurred in 1997, of which five were felt by local residents; 10 events occurred in 1998, of which 2 were felt by local residents, 3 events occurred in 1999, 4 events occurred in 2000, of which 3 were felt, 3 events occurred in 2001, of which all were felt and 4 events occurred in 2002, of which one was felt. These are all in the same general area as the magnitude 3.2 ML Ochil Hills earthquake in 1979, which had a maximum intensity of 5 EMS.

An earthquake with a magnitude of 1.5 ML occurred on 22 February, near Inveraray, Strathclyde. Reports received from Furnace and Cairndow describing, "a loud bang", "a 300 year old house shaking" and "a trolley rattling", indicate an intensity of 3 EMS.

A magnitude 2.1 ML earthquake occurred on 3 March, with a location on the Isle of Mull, Strathclyde region. BGS received one report for this event from the Isle of Mull, describing, "I heard a loud roar and things rattled on the walls", indicating an intensity of 3 EMS. A further event occurred on the Isle of Mull on 17 February with a magnitude of 1.9 ML.

Six events occurred during 2003, in the Newcastle-Under-Lyme region of Staffordshire, with magnitudes ranging from 1.4 – 2.3 ML. No reports were received for any of these events.

A magnitude 3.1 ML earthquake occurred on 19 August, near Doncaster, South Yorkshire. BGS received reports, via residents of Retford, Nottinghamshire, such as, "the whole house shook", "the sensation woke me from sleep" and "the radiators rattled", indicating an intensity of 4 EMS. This event is the largest in the area since the magnitude 3.2 ML East Retford earthquake on 22 March 1984, which was felt with intensities of 3 EMS.

An earthquake with a magnitude of 2.1 ML occurred near Loch Fannich, Highland on 11 November. BGS received a single report for this earthquake from a resident of Achanalt which described, "I heard a loud deep explosion and the house shook" indicating an intensity of 2 EMS.

Three events occurred in the Caernarvon Bay area of Gwynedd, on 18 April, 2 June and 23 August, with magnitudes of 0.4, 0.9 and 0.6 ML, respectively.

Near Pontypool, Gwent, three events occurred throughout the year, with magnitudes of 1.1, 1.6 and 1.5 ML, respectively.

The coalfield areas of Yorkshire, Nottinghamshire and Mid Glamorgan continued to experience shallow earthquake activity that is believed to be mining induced. Some, 16 coalfield events, with magnitudes ranging between 0.9 and 1.8 ML, were detected during the year. Local residents reported six of these events. Of these 16 events, 10 events were located in the Maltby area of South Yorkshire, with magnitudes ranging between 1.0 and 1.5 ML.

3 The BGS UK Seismograph Network

Operational seismograph stations in December 2003 are shown in Figure 2. The UK seismograph network consists of a number of sub-networks, which, in turn, consist of up to ten 'outstation' vertical seismometers radio-linked over distances of up to 100 km to a central site. Here, the data, along with that from a local 3-component set of two horizontal and one vertical seismometer, are recorded digitally with the SEISLOG data acquisition system (Utheim and Havskov, 1993). The system records data continuously, but also creates event-triggered files. The sub-networks are accessed for data transfer from Edinburgh several times a day through Internet or dial-up modems. Once transferred, the events are analysed to provide rapid response for location and magnitude. At a number of sites, low-gain vertical seismometers are installed to extend the dynamic range of the system (by 34 db) to stronger motions, and low frequency microphones are used to aid the discrimination of sonic booms. In addition, strong motion accelerometers have been installed at locations throughout the country and record accelerations up to 0.1g. A number of broadband seismic stations provide data with a larger dynamic range and over a wider frequency band.

The detection capabilities of a network depend upon station distribution, instrument sensitivity and background noise levels. Figure 3 shows the magnitude detection thresholds for seismograph stations operational in December 2003. The contours illustrate the lower threshold magnitude for an earthquake to significantly exceed 4 nanometers of noise (average) at 10 Hz on at least four seismographs. These detection levels hold true only if all stations are continuously monitored. Small events in unmonitored areas may go undetected unless they are felt and reported to BGS by local inhabitants, but detection capabilities by this process are 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, waves, traffic and livestock vary considerably with time (typically 0.5 to 15 nanometers, 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 4 shows only earthquakes with magnitude 2.5 ML or greater, in the period 1979 to 2003. The data set is considered complete for these magnitudes in all localities onshore. Seismicity for the period 1970 to 2003 is shown in Figure 5 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 dataset is likely to be complete for such magnitudes.

4 Hypocentre Parameters and Their Errors

4.1 EPICENTRE 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 HYPO71 (Lee and Lahr, 1975) 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 velocity through the earth can be modelled.

4.2 DEPTH DETERMINATION

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. Constraints on the depth can usually only be imposed when a station is very near the epicentre and even then the accuracy depends on the velocity model.

The best depth determinations have been obtained when an earthquake or earthquake series occurred almost beneath a network. For events at larger distances, and where the error columns (ERH and ERZ), in the tables, are blank, the depth errors can be up to tens of kilometres. The quality factor of the event, as listed in the tables (SQD), is an indication of the depth error. As a general guide only, A*A, A*B, B*A and possibly B*B class events, have reliable depths.

4.3 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 by the earthquake on a Wood-Anderson seismograph and A₀ is that for a 'standard' magnitude zero earthquake at the same distance. The A₀ term is thus a distance correction factor tabulated by Richter out 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, A₀, strictly only applies to California, the formula is still used world-wide today. The ML magnitudes in this bulletin have been calculated according to Richter by 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 was not possible, the mean of the magnitudes from a number of verticals has been used. Ground motion registered at a seismograph varies with site conditions, 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.

4.4 INTENSITY

Intensity is a measure of the effect of the shaking on people, structures and objects. It decreases with distance from a maximum value (Imax) usually found close to the epicentre. The maximum felt intensity is quoted, where known, on the European Macroseismic Scale (EMS), (Grünthal, 1998).

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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, negative longitude indicates west.
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+ 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 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.
DM	Epicentral distance in kilometres to the closest station.
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.
SQD	S is quality factor ascribed to RMS, D is quality ascribed to number and distribution of stations.

Locality abbreviations

Sonic	Sonic boom	N Yorkshire	North Yorkshire
Expl	Explosion	Notts	Nottinghamshire
D & G	Dumfries and Galloway	Lincs	Lincolnshire
Gtr	Greater	N'umberlnd	Northumberland
Her & Worcs	Hereford and Worcester	Staffs	Staffordshire
S'Clyde	Strathclyde	Leics	Leicestershire
S Yorkshire	South Yorkshire	W Mids	West Midlands
New-U-Lyme	Newcastle-Under-Lyme	Salop	Shropshire
Penin	Peninsula		

Comments abbreviations

Sonic	Sonic boom
Expl	Explosion
C/F	Coalfield type event
...	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, 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.
Quality	Solution quality of hypocentre averaged from QS and QD. A, excellent; B, good; C, fair; D, poor
RMS	Root Mean Square of the travel time residuals in seconds.
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	Station component S=short period 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.
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

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.

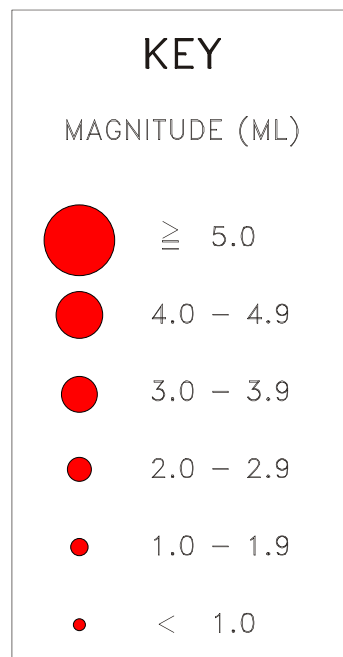
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A complete description of the EMS-98 scale is given in: Grunthal, G., (Ed) 1998. European Macroseismic scale 1998. Cahiers du Centre European de Geodynamique et de Seismologie. Vol 15.

Appendix 4 Significant earthquakes in 2003

THE ABERFOYLE EARTHQUAKE, 20 JUNE 2003

The largest onshore earthquake had a magnitude of 3.2 ML and occurred near Aberfoyle on 20 June, at a depth of 5.2 km. BGS received reports, via the Police and residents of the Aberfoyle area, such as, "the whole house shook" and "there was a rumble like thunder". This event was followed by two aftershocks on the same day with magnitudes of 2.8 and 2.5 ML. Reports were also received for both of these events with intensities of 3 EMS. Figure 6 shows a seismogram recorded for the largest earthquake. There were a total of 11 earthquakes detected in the Aberfoyle earthquake sequence during 2003, with locations approximately 3.5 km southwest of the village of Aberfoyle. A total of 8 of the events were reported by local residents. Visual inspection of the seismograms recorded from the earthquakes in the sequence indicated a high degree of similarity between the individual events. The similarity of recordings suggested that the events were located within a small source volume and the result of similar source mechanisms, and was used to obtain consistent phase arrival times. It was found that the earthquakes were confined to a zone approximately 1000 m long and 200 m wide striking in SW-NE. This falls into the Highland Boundary Fault Zone (HBFZ), which presents a major tectonic boundary extending across the entire width of Central Scotland in NE-SW direction. Due to the similarities in the waveform signals, a joint focal mechanism based on first motion polarities was determined through a grid-search (Snoke et al., 1984) for the events in the sequence. Polarity readings from 13 stations were used (Figure 7). The first nodal plane strikes WSW-ENE and dips to the NW with both left-lateral and normal movement. The second nodal plane strikes NNW-SSE and dips eastward with both right-lateral and normal movement. The alignment of the epicentre locations in SW-NE direction suggests that the first nodal plane was the actual fault plane. This fault plane follows the strike direction of the HBFZ. However, the P axis points SSW, in disagreement with the regional stress pattern possibly indicating local variation from the regional stress pattern.



KEY TO EPICENTRE MAPS

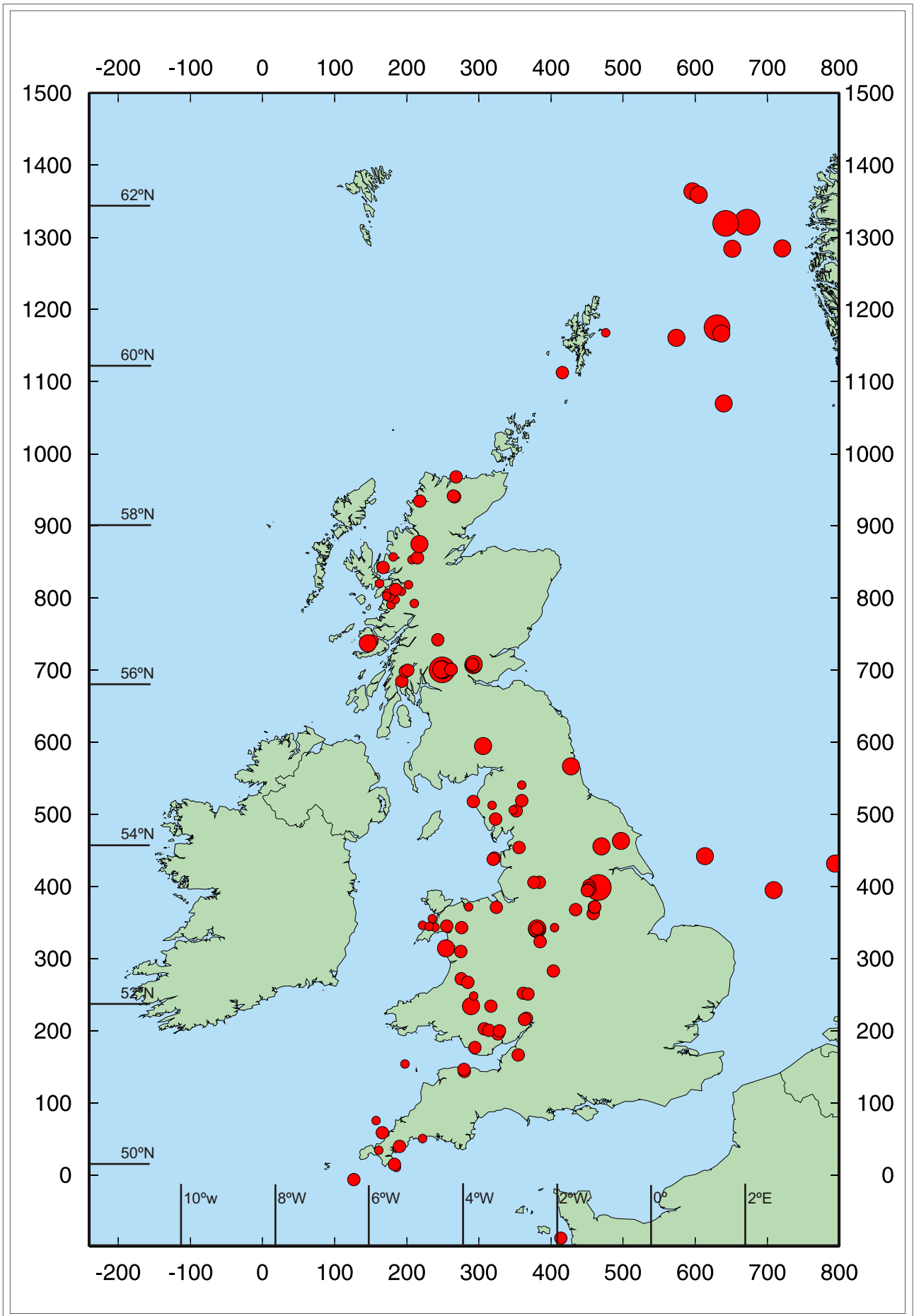


Figure 1. Epicentres of all UK earthquakes located in 2003.

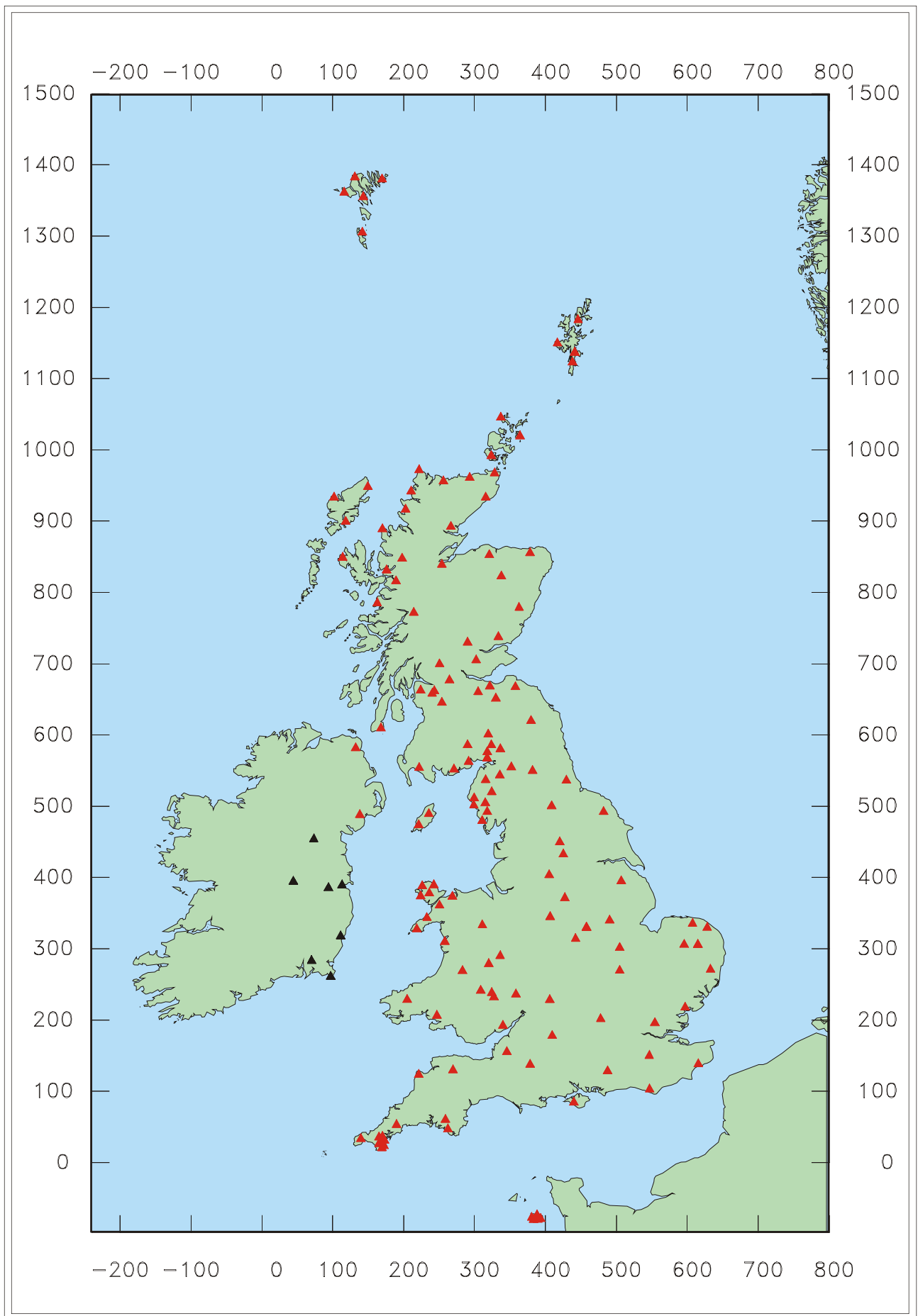


Figure 2. Seismograph network operational in December 2003. Colour coding shows the rapid access stations (red) and DIAS stations (black).

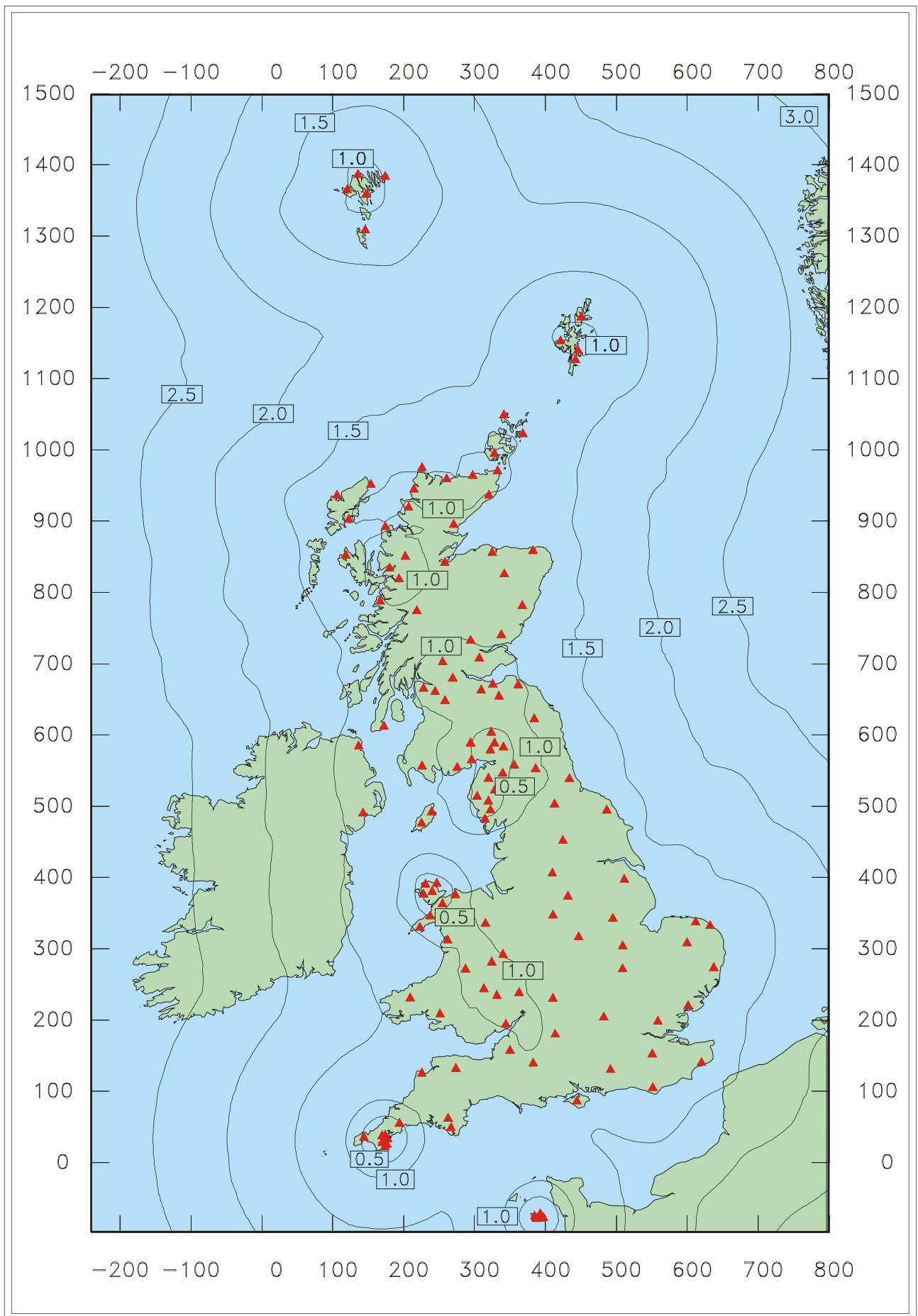


Figure 3. Earthquake detection capability in December 2003. Contour values are Richter local magnitude (ML) for 4 nanometres of noise (average) and S-wave amplitude twice that at the fourth nearest station.

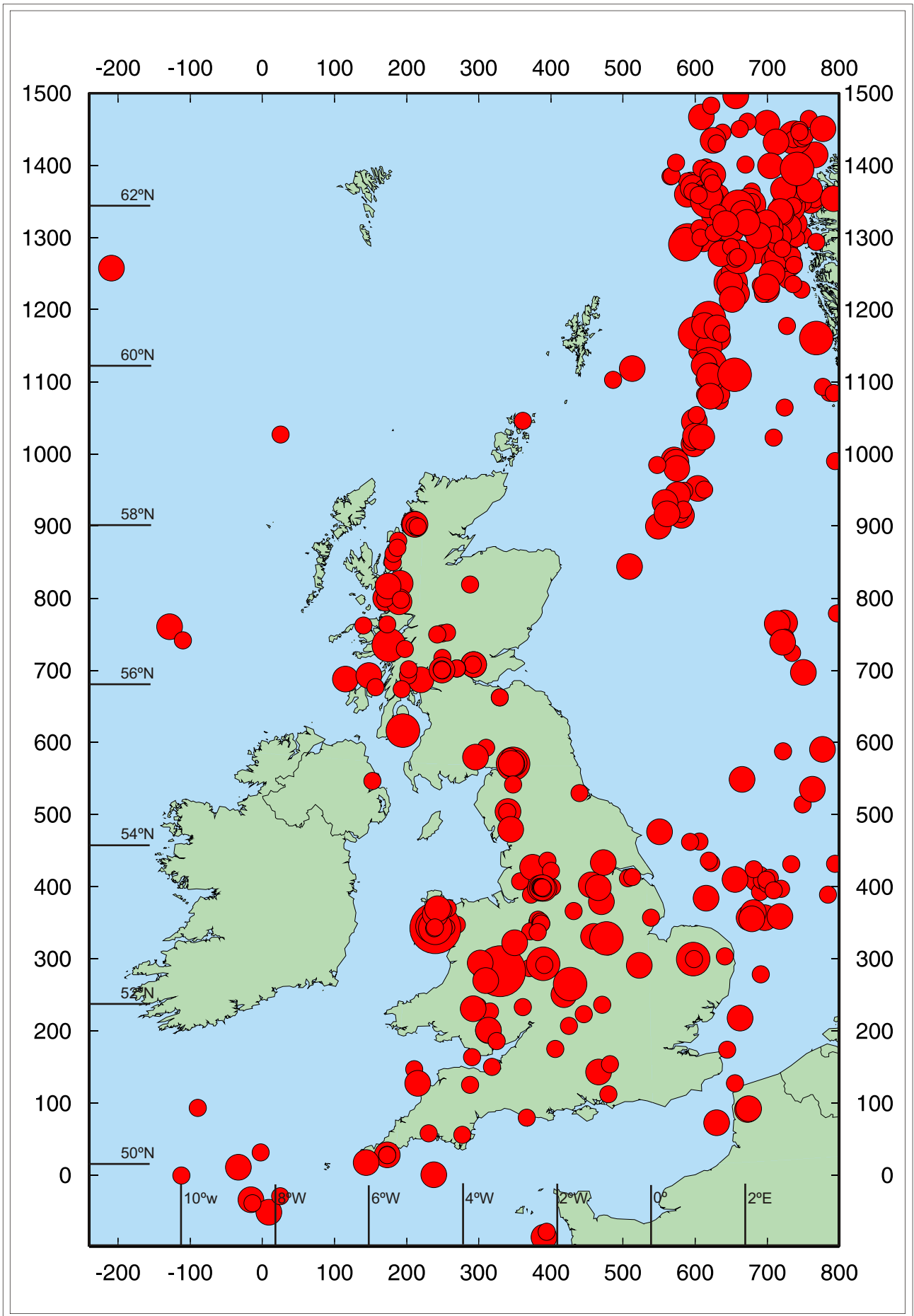


Figure 4. Epicentres of earthquakes with magnitudes 2.5 ML or greater, for the period 1979 to 2003.

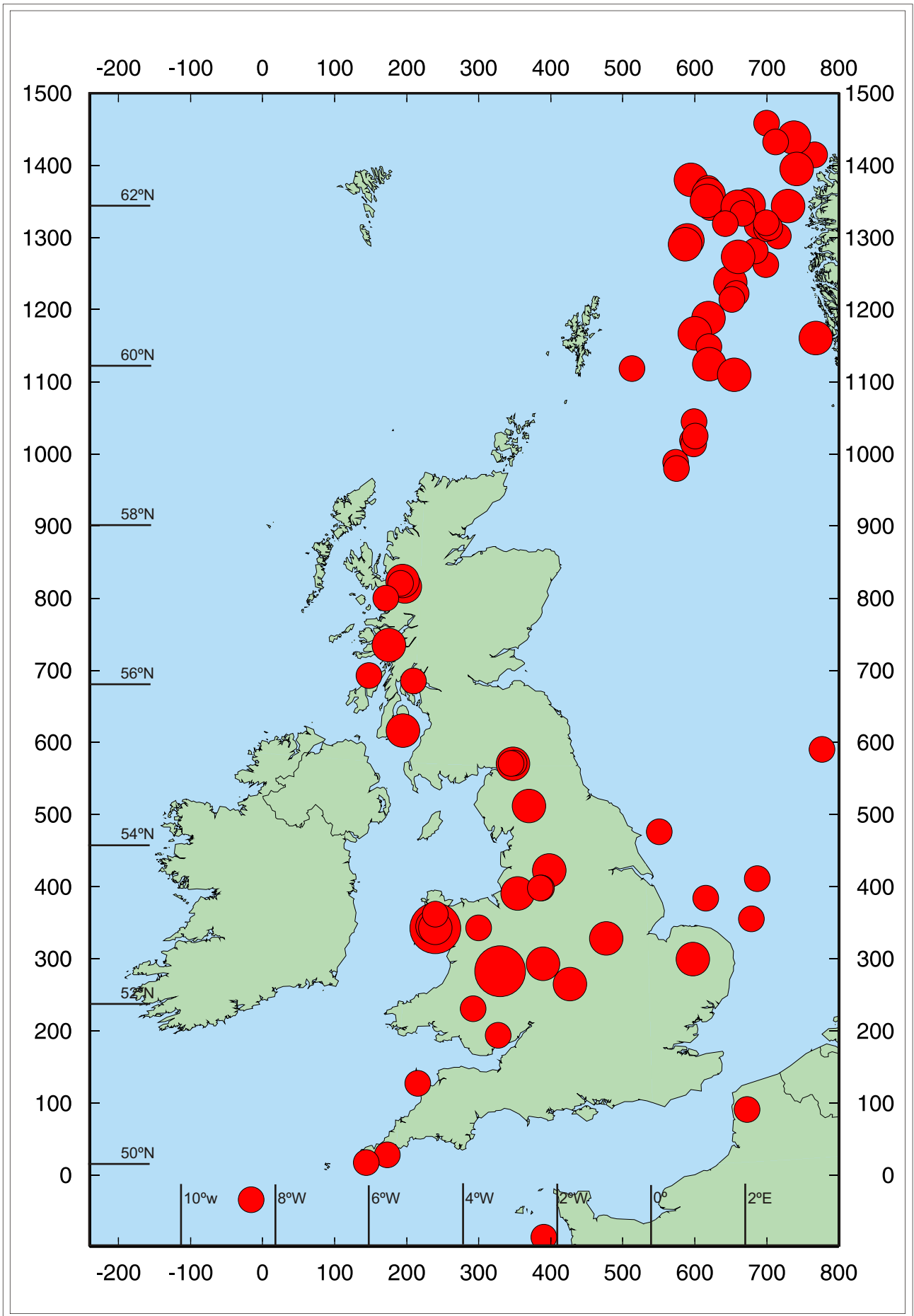


Figure 5. Epicentres of earthquakes with magnitudes 3.5 ML or greater, for the period 1970 to 2003.

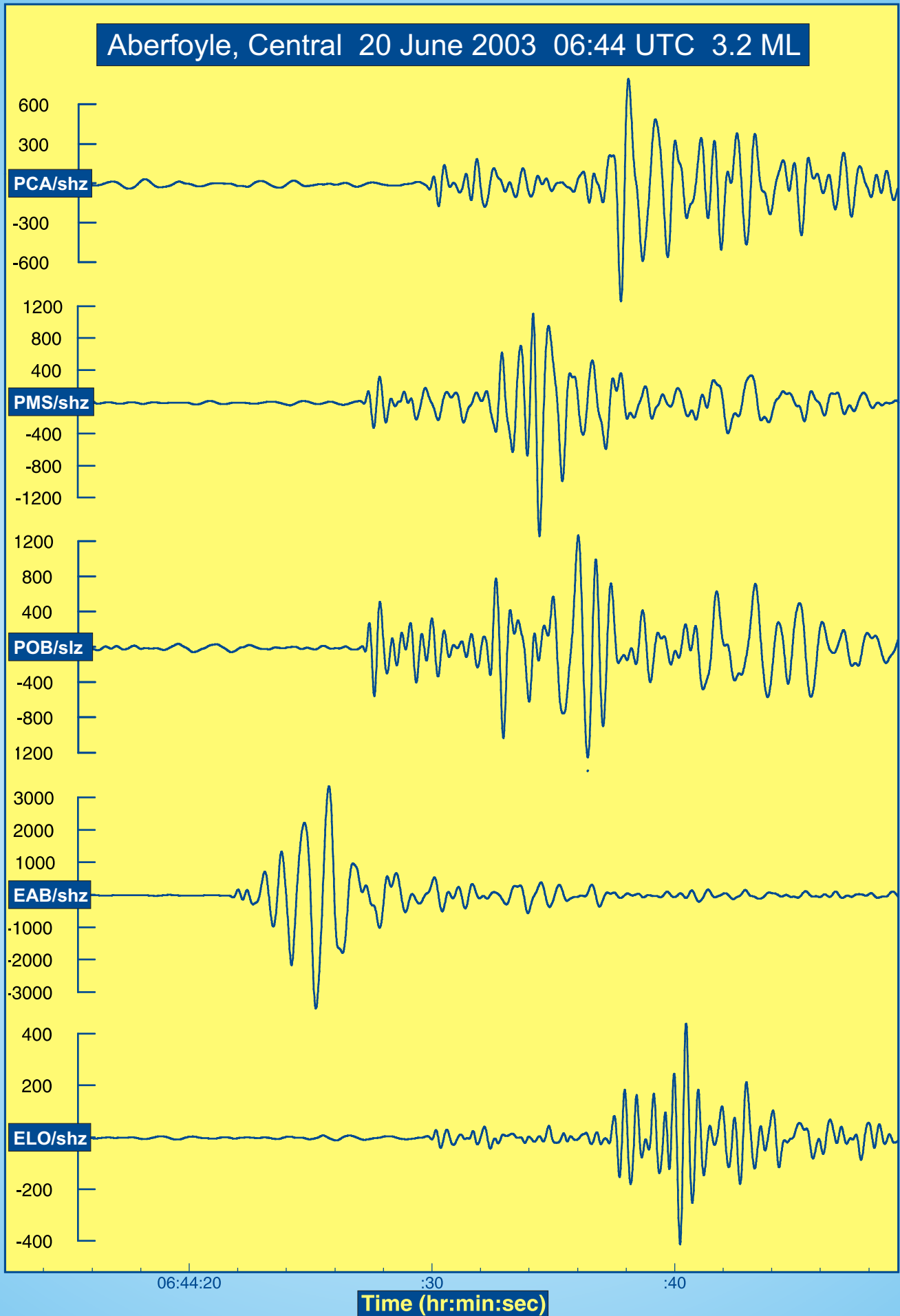


Figure 6. Seismograms of the Aberfoyle earthquake of 20 June 2003 06:44 UTC 3.2 ML recorded on the Paisley and LOWNET seismic networks.

FAULT PLANE SOLUTION : ABERFOYLE EARTHQUAKE OF 20 JUNE 2003

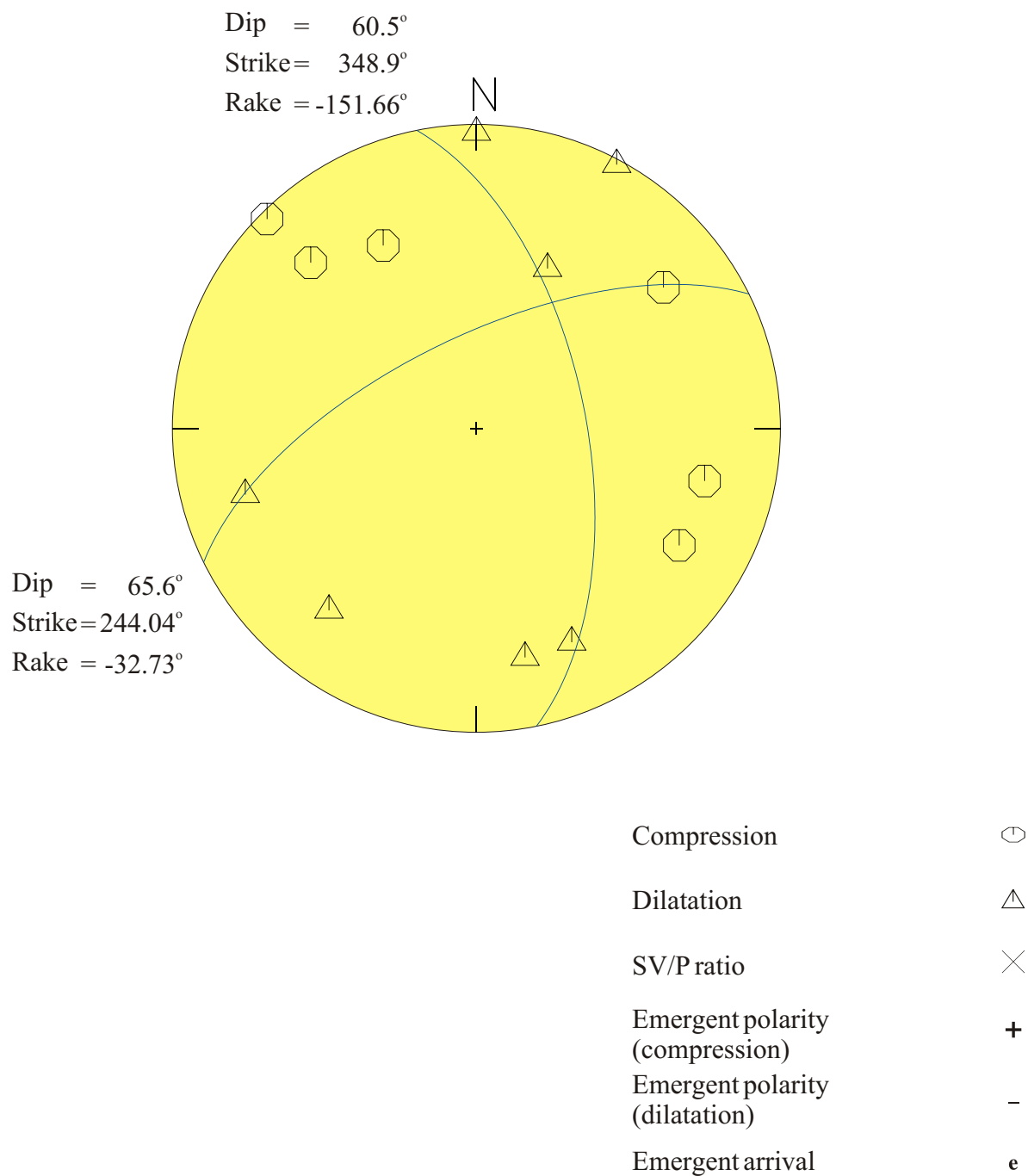


Figure 7. Equal area projection of the upper lower hemisphere for the Aberfoyle earthquake 20 June 2003 06:44 UTC 3.2 ML. The axes of maximum and minimum compressive stress are denoted by P and T respectively.

TABLE 1: CATALOGUE OF EVENTS LISTED CHRONOLOGICALLY: 2003

YearMoDy	HrMnSecs	Lat	Lon	kmE	kmN	Dep	Mag	Locality	Int	No	DM	Gap	RMS	ERH	ERZ	SQD	Comments
20030105	201838.2	53.55	-2.25	383.8	405.9	5.0	1.4	MANCHESTER AREA	2+	7	26	228	0.16	2.20	3.00	B*D	FELT MANCHESTER
20030106	213605.7	53.63	3.96	793.7	431.4	15.0	2.7	SOUTHERN NORTH SEA		8	90	330	0.29				D*D
20030112	054153.1	56.24	-3.74	292.1	706.9	4.7	2.4	BLACKFORD, TAYSIDE	3+	12	15	103	0.07	0.30	0.70	A*C	FELT BLACKFORD
20030114	050159.2	49.95	-4.99	185.5	10.2	14.9	0.3	OFF LIZARD POINT		9	17	333	0.04	1.20	0.30	B*D	15KM SE OF LIZARD POINT
20030117	120234.2	53.23	-3.13	324.3	371.0	5.4	1.2	MOLD, CLWYD		9	52	302	0.09	2.10	18.20	C*D	
20030118	025940.6	52.98	-4.15	255.5	345.0	15.7	1.2	PORTHMADOG, GWYNEDD	2+	14	18	76	0.10	0.50	1.20	A*B	FELT HARLECH
20030121	014055.8	51.67	-3.06	326.9	197.5	9.4	1.6	PONTYPOOL, GWENT		7	37	177	0.06	0.90	13.80	C*C	
20030123	173431.7	51.72	-3.34	307.7	202.9	10.3	1.5	MERTHYR TYDFIL, M GLAMORGAN		8	38	101	0.09	1.10	22.60	C*C	
20030125	192059.4	51.67	-3.05	327.3	197.3	3.2	1.5	PONTYPOOL, GWENT		10	17	82	0.12	0.70	1.50	A*C	
20030130	003514.1	56.25	-3.76	291.2	707.7	5.8	1.6	BLACKFORD, TAYSIDE	2+	11	25	111	0.10	0.70	1.80	A*C	FELT GLENDEVON
20030204	161959.7							SONIC-NORTH WALES	3+							*	SONIC-FELT NORTH WALES...
20030206	035135.8	56.01	-5.32	193.1	684.7	6.7	1.3	LOCH FYNE, STRATHCLYDE		6	40	305	0.07	10.70	26.20	D*D	
20030207	174040.2	50.21	-4.97	187.9	38.7	7.2	0.6	FALMOUTH, CORNWALL		12	12	315	0.03	0.40	0.70	A*D	7KM NE OF FALMOUTH
20030207	181529.7	50.22	-4.94	190.0	39.5	5.5	1.1	FALMOUTH, CORNWALL		14	14	206	0.05	0.60	1.20	A*D	7KM NE OF FALMOUTH
20030208	032115.8	52.97	-4.39	239.4	343.5	22.9	0.8	PWLLHELI, GWYNEDD		10	3	133	0.04	0.50	0.40	A*B	8KM N OF PWLLHELI
20030217	234714.9	56.49	-6.03	151.8	740.6	8.1	1.9	MULL, STRATHCLYDE		15	49	214	0.14	1.40	1.50	B*D	
20030219	223457.7	53.16	-1.12	458.7	362.6	0.8	1.0	MANSFIELD, NOTTS	2+	7	29	169	0.05	0.50	1.20	A*C	C/F, FELT MANSFIELD
20030221	110313.2	54.33	-3.18	323.2	493.7	2.9	1.1	DUNNERDALE, CUMBRIA		15	1	186	0.12	0.90	0.20	A*D	
20030221	112606.6	52.96	-2.29	380.5	340.6	3.9	2.0	NEWCASTLE-U-LYME, STAFFS		7	31	153	0.08	1.00	1.80	A*C	
20030222	112408.6	52.97	-2.28	381.0	341.5	5.3	2.3	NEWCASTLE-U-LYME, STAFFS		9	30	120	0.09	0.60	1.50	A*C	
20030222	223113.1	56.13	-5.25	198.0	698.0	6.6	1.5	INVERARAY, STRATHCLYDE	3+	9	45	203	0.15	2.30	2.90	B*D	FELT FURNACE & CAIRNDOW
20030223	025929.2	52.97	-2.27	382.0	341.7	2.7	1.4	NEWCASTLE-U-LYME, STAFFS		5	29	195	0.01	0.30	0.50	A*D	
20030223	082914.7	58.33	-4.28	266.4	940.0	7.6	1.7	STRATHNAVER, HIGHLAND		15	39	99	0.41	1.50	13.60	C*C	
20030224	032102.0	58.34	-4.31	264.9	941.2	8.2	1.6	STRATHNAVER, HIGHLAND		18	39	100	0.36	1.30	9.90	C*C	
20030301	000704.1	53.24	-1.10	460.3	371.9	2.9	1.0	WORKSOP, NOTTS	2+	6	29	218	0.24	5.40	6.90	D*D	C/F, FELT EDWINSTOWE
20030301	020144.0	52.97	-2.29	380.5	341.7	3.9	2.2	NEWCASTLE-U-LYME, STAFFS		7	31	162	0.08	0.70	1.40	A*C	
20030301	172643.0	52.33	-3.83	275.5	271.8	14.4	1.8	DEVIL'S BRIDGE, DYFED		10	47	108	0.21	1.40	2.20	B*C	
20030303	085741.0	56.46	-6.12	145.9	737.3	7.9	2.1	ISLE OF MULL, S'CLYDE	3+	10	54	196	0.15	2.10	2.20	B*D	FELT ISLE OF MULL
20030305	001252.7	52.96	-2.28	381.5	340.7	4.7	1.7	NEWCASTLE-U-LYME, STAFFS		6	30	160	0.08	1.70	2.60	B*C	
20030305	195559.5	52.16	-2.56	361.5	251.6	19.9	1.0	LEOMINSTER, HER & WOR		6	14	227	0.06	1.10	2.00	B*D	9KM S OF LEOMINSTER
20030306	012748.1	49.11	-1.81	413.5	-87.4	12.1	1.4	SE OF JERSEY, CHANNEL ISLES		5	19	351	0.02	4.50	3.90	C*D	20KM SE OF JERSEY
20030308	105900.2	52.98	-2.29	380.4	342.0	2.6	1.9	NEWCASTLE-U-LYME, STAFFS		7	31	140	0.06	0.80	1.50	A*C	
20030308	214812.1	53.84	-3.19	321.5	439.3	10.6	1.6	IRISH SEA		16	43	85	0.23	0.90	15.70	C*C	9KM W OF BLACKPOOL
20030316	000721.2	56.26	-3.74	292.0	708.7	3.1	0.9	BLACKFORD, TAYSIDE	2+	10	15	107	0.05	0.30	0.80	A*C	FELT BLACKFORD
20030317	102414.2	51.65	-3.06	326.6	195.4	5.0	1.1	CWMBRAN, GWENT		7	18	248	0.10	1.00	1.90	B*D	
20030324	123044.7	52.44	-1.95	403.5	282.5	15.5	1.6	BIRMINGHAM, W MIDLANDS		10	53	98	0.12	0.70	1.10	A*D	
20030325	045559.1	54.54	-3.66	292.9	517.5	3.0	0.7	OFF WHITEHAVEN, CUMBRIA		16	11	95	0.19	0.50	1.10	B*C	5KM OFFSHORE
20030327	225430.3	53.21	-1.07	462.1	368.8	0.7	0.9	WORKSOP, NOTTS	2+	7	31	185	0.21	2.60	1.60	C*D	C/F, FELT EDWINSTOWE
20030328	204714.7	54.55	-3.67	292.2	517.9	2.5	1.2	OFF WHITEHAVEN, CUMBRIA		15	12	95	0.08	0.30	0.50	A*C	5KM OFFSHORE
20030329	025136.6	54.76	-2.63	359.5	540.5	10.7	0.8	PENRITH, CUMBRIA		13	17	163	0.09	0.40	1.60	A*C	10KM NE OF PENRITH
20030402	210713.1	56.95	-5.65	177.9	790.0	5.2	0.8	LOCH MORAR, HIGHLAND		5	11	228	0.09	1.10	1.10	B*D	
20030403	102100.0	0.00	0.00			0.0		SONIC-HUMBERSIDE	2+							*	SONIC-FELT BRIDLINGTON
20030407	052809.7	60.39	2.18	630.2	1174.7	8.6	3.0	NORTHERN NORTH SEA		19	59	147	0.43	2.60	3.70	C*D	
20030409	215850.5	61.36	2.70	651.3	1284.1	9.4	2.4	NORTHERN NORTH SEA		16	16	176	0.18	1.00	2.50	B*D	
20030412	104637.5	54.50	-3.27	318.1	512.6	12.3	0.8	BUTTERMERE, CUMBRIA		15	6	119	0.13	0.60	1.00	A*B	5KM S OF BUTTERMERE
20030414	143548.3	51.70	-3.25	313.9	200.7	2.1	1.4	BARGOED, MID GLAMORGAN		5	31	255	0.04	1.20	1.40	B*D	C/F
20030418	030128.7	49.99	-5.03	183.0	14.7	25.6	1.2	OFF LIZARD PT, CORNWALL		7	12	323	0.01	0.50	0.30	A*D	13KM NE OF LIZARD POINT
20030418	113524.0	53.07	-4.45	235.7	355.2	3.9	0.4	CAERNARVON BAY, GWYNEDD		4	10	168	0.01	0.00	0.00	A*D	
20030419	070022.1	57.55	-5.66	181.1	856.9	12.5	0.6	LOCH TORRIDON, HIGHLAND		4	22	286	0.09	0.00	0.00	A*D	
20030421	230812.1	60.29	1.15	573.9	1160.4	15.5	2.0	NORTHERN NORTH SEA		5	30	348	0.27				D*D
20030422	235258.9	53.83	-3.22	319.9	437.4	8.2	1.1	IRISH SEA		7	86	189	0.21	2.80	7.10	C*D	11KM WEST OF BLACKPOOL
20030508	180954.2	56.54	-4.55	243.3	741.7	6.7	1.7	NW OF KILLIN, CENTRAL		7	41	163	0.12	1.40	17.90	C*C	15KM NW OF KILLIN
20030508	193824.1	51.99	-3.62	289.0	234.2	7.3	2.3	LLANDOVERY, POWYS		24	26	68	0.17	0.50	2.20	B*C	15KM EAST OF LLANDOVERY

TABLE 1: CATALOGUE OF EVENTS LISTED CHRONOLOGICALLY: 2003

20030509	183653.5	57.41	-5.88	167.1	842.0	5.3	1.7	APPLECROSS, HIGHLAND	10	16	191	0.16	1.40	1.60	B*D	5KM OFFSHORE	
20030510	020307.3	51.48	-3.52	294.3	176.5	7.0	1.4	COWBRIDGE, SOUTH GLAM	12	50	143	0.06	0.50	1.90	A*C		
20030514	024122.7	57.21	-5.28	202.2	818.1	7.0	0.2	SHIEL BRIDGE, HIGHLAND	3	9	327	0.17	0.00	0.00	B*D	10KM SE OF SHIEL BRIDGE	
20030516	143941.0	62.10	1.76	596.0	1363.7	10.6	2.8	NORTHERN NORTH SEA	10	82	247	0.15	3.70	3.60	C*D		
20030518	034754.2	61.31	3.99	720.6	1284.4	11.2	2.7	NORTHERN NORTH SEA	14	50	168	0.36	2.80	2.60	C*C		
20030526	131323.7	57.53	-5.22	207.1	853.0	9.7	0.6	GLEN CARRON, HIGHLAND	5	6	322	0.02	0.70	0.30	A*D		
20030531	225120.1	50.33	-4.50	222.1	50.4	11.5	0.3	ENGLISH CHANNEL	7	48	352	0.02	1.90	6.40	C*D		
20030602	205205.5	52.98	-4.65	222.0	346.2	12.6	0.9	CAERNARVON BAY, GWYNEDD	9	15	240	0.10	2.30	0.70	B*D		
20030606	064740.5	53.99	-0.93	469.9	455.6	11.3	2.3	YORK, NORTH YORKSHIRE	9	42	122	0.08	0.40	1.00	A*C		
20030607	175257.6	50.38	-5.29	166.2	58.7	11.9	1.0	OFFSHORE NEWQUAY, CORNWALL	7	22	294	0.30	2.70	3.10	C*D	18KM WEST OF NEWQUAY	
20030607	211403.8	52.00	-3.21	316.6	234.1	23.0	1.1	TALGARTH, POWYS	6	10	247	0.02	0.40	0.30	A*D		
20030615	000022.7	53.55	-2.36	376.2	405.6	8.0	1.6	BOLTON, GTR MANCHESTER	14	64	149	0.22	1.20	3.30	B*D		
20030615	124144.6	59.45	2.23	639.6	1069.6	6.8	2.1	NORTHERN NORTH SEA	11	5	305	0.36	28.90	35.30	D*D		
20030616	023835.8	52.71	-4.15	254.6	314.3	11.7	2.3	CARDIGAN BAY	16	8	123	0.23	1.80	1.00	B*B		
20030616	160956.7	54.05	-0.52	496.9	462.9	11.8	2.0	DRIFFIELD, HUMBERSIDE	11	33	187	0.21	1.40	2.80	B*D	5KM NW OF DRIFFIELD	
20030616	231834.1	54.99	-1.57	427.6	566.8	8.9	2.3	NEWCASTLE, TYNE & WEAR	14	29	213	0.21	1.40	6.50	C*D		
20030618	142143.5	62.05	1.92	604.7	1358.8	9.0	2.5	NORTHERN NORTH SEA	7	32	353	0.07			D*D		
20030620	064419.6	56.17	-4.43	249.0	700.6	5.2	3.2	ABERFOYLE, CENTRAL	3+	27	6	96	0.22	0.70	0.90	B*B	FELT ABERFOYLE...
20030620	065324.6	56.18	-4.44	248.6	701.4	5.4	2.8	ABERFOYLE, CENTRAL	3+	19	6	107	0.19	1.00	1.30	B*B	FELT ABERFOYLE...
20030620	090327.4	56.17	-4.43	249.3	699.7	4.3	2.5	ABERFOYLE, CENTRAL	3+	18	6	95	0.18	0.70	1.00	B*B	FELT ABERFOYLE...
20030623	100507.6	56.16	-4.43	248.8	699.3	3.2	1.3	ABERFOYLE, CENTRAL	14	7	96	0.12	0.50	0.90	A*B		
20030624	005951.5	54.44	-2.74	351.8	504.7	13.3	1.1	KENDAL, CUMBRIA	8	79	175	0.11	2.70	1.50	C*D		
20030624	022645.2	54.45	-2.81	347.6	506.1	4.4	0.9	KENDAL, CUMBRIA	11	41	171	0.30	4.00	8.10	C*C		
20030624	032314.7	57.02	-5.55	184.3	797.6	6.1	0.4	KNOYDART, HIGHLAND	6	20	215	0.17	3.80	3.10	C*D		
20030625	115354.8	56.16	-4.43	249.2	699.5	2.7	1.4	ABERFOYLE, CENTRAL	2+	12	6	96	0.12	0.60	1.10	A*B	FELT ABERFOYLE
20030626	095713.1	56.17	-4.44	248.5	700.0	4.4	1.5	ABERFOYLE, CENTRAL	14	7	106	0.15	0.80	0.90	A*B		
20030627	020932.2	56.17	-4.44	248.8	700.1	4.8	2.8	ABERFOYLE, CENTRAL	3+	19	6	96	0.22	0.80	1.00	B*B	FELT ABERFOYLE...
20030627	021123.1	56.17	-4.45	247.8	700.4	3.1	1.3	ABERFOYLE, CENTRAL	2+	14	7	115	0.11	0.60	0.80	A*B	FELT ABERFOYLE
20030627	031257.1	56.16	-4.43	249.4	699.5	3.1	1.3	ABERFOYLE, CENTRAL	6	6	164	0.08	1.70	1.80	B*C		
20030629	231217.7	52.98	-1.93	405.0	343.1	12.7	0.5	CHEADLE, STAFFORDSHIRE	6	7	241	0.03	0.60	0.30	A*D		
20030630	150842.2	60.39	-0.62	476.0	1167.8	9.4	0.3	OFF SHETLAND ISLES	6	31	274	0.10	3.20	23.70	C*D	30KM EAST OF YELL	
20030703	072555.9	57.07	-5.71	175.3	803.7	5.7	1.3	KNOYDART, HIGHLAND	3	18	162	0.02	0.00	0.00	A*D		
20030708	070205.1	52.67	-3.85	275.1	309.9	8.9	1.0	MACHYNLLETH, POWYS	12	13	126	0.10	0.70	1.00	A*B	8KM N OF MACHYNLLETH	
20030709	010918.5	57.10	-5.73	173.9	807.0	2.5	0.0	KNOYDART, HIGHLAND	5	21	174	0.08	0.20	0.30	A*D		
20030709	022846.8	50.53	-5.42	157.7	75.5	11.7	0.4	W OF TREVOSE HEAD, CORNWALL	12	40	216	0.21	1.70	1.80	B*D	30KM W OF TREVOSE HEAD	
20030712	083556.7	56.25	-3.74	292.0	707.5	3.9	0.7	BLACKFORD, TAYSIDE	9	15	105	0.09	0.40	1.50	A*C		
20030712	140949.7	52.12	-3.57	292.7	248.0	11.2	0.8	LLANGAMMARCH WELLS, POWYS	10	21	147	0.09	0.60	1.20	A*C		
20030712	201141.2	53.83	1.24	613.3	441.7	3.3	2.1	SOUTHERN NORTH SEA	10	5	282	0.37	6.60	5.60	D*D		
20030714	062237.6	56.15	-5.20	201.2	699.6	14.5	1.2	FURNACE, STRATHCLYDE	7	44	140	0.04	0.90	1.70	A*C		
20030719	154211.9	58.26	-5.10	218.3	934.3	4.3	1.2	KYLESTROME, HIGHLAND	9	66	230	0.16	1.40	4.30	B*D		
20030723	232032.1	59.90	-1.72	415.7	1112.3	21.2	1.2	OFF SHETLAND ISLES	8	30	160	0.06	0.90	2.60	B*C	24KM W OF SUMBURGH HEAD	
20030726	035209.0	52.29	-3.69	284.7	266.8	20.2	1.0	RHAYADER, POWYS	8	37	187	0.06	0.90	2.80	B*D		
20030802	004504.1	53.98	-2.68	355.6	454.0	7.7	1.5	LANCASTER, LANCAS	16	49	73	0.17	0.70	15.10	C*C	10KM SE OF LANCASTER	
20030803	072230.5	53.23	-3.71	285.7	371.6	13.6	0.2	CONWY, GWYNEDD	8	13	325	0.06	1.10	0.60	B*D	8KM SE OF CONWY	
20030806	234719.8	57.13	-5.42	192.8	809.3	14.1	0.0	SHIEL BRIDGE, HIGHLAND	5	9	226	0.08	2.90	3.40	C*D	10KM S OF SHIEL BRIDGE	
20030813	001549.0	52.97	-3.84	276.3	342.7	14.8	1.0	FFESTINIOG, GWYNEDD	11	29	107	0.08	0.50	3.10	B*B	6KM E OF FFESTINIOG	
20030816	165944.4	50.16	-5.34	161.4	34.4	6.0	0.8	CAMBORNE, CORNWALL	9	9	162	0.05	0.60	1.60	A*C	6KM SW OF CAMBORNE	
20030819	194618.6	53.48	-1.01	465.5	398.8	13.2	3.1	DONCASTER, S YORKSHIRE	3+	12	43	80	0.07	0.30	2.50	B*C	FELT RETFORD
20030823	033520.6	56.17	-4.43	248.8	699.7	2.8	1.5	ABERFOYLE, CENTRAL	3+	16	7	96	0.10	0.40	0.80	A*B	FELT ABERFOYLE
20030823	121828.1	52.97	-4.52	231.1	344.4	17.9	0.6	CAERNARVON BAY, GWYNEDD	7	6	223	0.07	1.40	0.90	B*D		
20030827	200403.9	57.55	-5.09	214.9	855.6	8.8	1.0	KINLOCHEWE, HIGHLAND	5	41	214	0.16	0.60	6.70	C*D	12KM SE OF KINLOCHEWE	
20030902	193203.7	51.18	-3.71	280.1	143.8	6.9	1.2	LYNTON, DEVON	9	14	155	0.11	1.70	1.60	B*C	5KM SE OF LYNTON	
20030903	212907.0	56.26	-3.73	292.7	708.4	7.4	2.2	BLACKFORD, TAYSIDE	3+	5	14	195	0.02	1.20	1.20	B*D	FELT BLACKFORD
20030914	130233.7	49.78	-5.79	126.8	-6.5	3.2	1.0	OFF LAND'S END, CORNWALL	8	45	324	0.04	1.00	15.40	C*D	30KM SW OF LAND'S END	
20030915	080048.5	56.18	-4.45	248.0	701.0	4.6	2.2	ABERFOYLE, CENTRAL	3+	13	7	208	0.09	0.60	0.50	A*D	FELT ABERFOYLE

TABLE 1: CATALOGUE OF EVENTS LISTED CHRONOLOGICALLY: 2003

20030916	001126.3	51.25	-4.90	197.8	154.0	7.4	0.8	BRISTOL CHANNEL		13	40	263	0.39	4.90	12.40	C*D	OFF LUNDY ISLAND
20030916	124601.7	56.00	-4.04	272.8	680.2	0.0	1.8	RISKEND QUARRY, KILSYTH	2+	6	4	91	0.05	0.40	0.60	A*B	FELT KILSYTH
20030919	090456.9	51.85	-2.49	366.0	217.1	8.8	1.9	DRYBROOK, GLOUCS		13	21	83	0.08	0.40	4.30	B*C	
20030922	152012.2	52.81	-2.22	385.1	323.4	9.0	1.5	STAFFORD, STAFFORDSHIRE		11	35	97	0.14	0.80	3.50	B*C	5KM W OF STAFFORD
20030924	131829.9	54.56	-2.63	359.2	518.7	8.2	1.8	PENRITH, CUMBRIA		18	31	154	0.18	0.80	25.10	C*C	8KM SE OF PENRITH
20030926	224137.4	56.24	-3.75	291.5	707.1	3.8	1.1	BLACKFORD, TAYSIDE		10	15	105	0.09	0.50	1.10	A*C	
20030926	230856.9	56.24	-3.75	291.6	707.1	3.9	0.9	BLACKFORD, TAYSIDE		8	15	105	0.07	0.40	1.20	A*C	
20030927	010803.5	56.24	-3.75	291.4	707.1	3.8	0.9	BLACKFORD, TAYSIDE		10	15	105	0.10	0.40	1.10	A*C	
20030927	045726.5	53.36	2.65	709.0	395.0	7.4	2.9	SOUTHERN NORTH SEA		12	0	316	0.40	8.10	6.50	D*D	
20031019	011323.0	61.67	3.14	671.7	1320.7	18.7	3.0	NORWEGIAN SEA		24	1	185	0.42	2.30	3.60	C*D	
20031021	065813.4	57.06	-5.76	172.2	802.8	7.2	0.9	MALLAIG, HIGHLAND		9	16	163	0.10	2.60	6.20	C*C	6KM NE OF MALLAIG
20031023	125000.0	0.00	0.00			0.0		SONIC-EAST LOTHIAN	3+							*	SONIC-FELT EAST LOTHIAN
20031030	000518.5	53.21	-1.49	434.1	367.8	13.1	1.1	CHESTERFIELD, DERBYSHIRE		8	6	99	0.09	0.70	0.90	A*B	
20031031	190451.1	56.25	-3.75	291.4	707.9	5.3	1.3	BLACKFORD, TAYSIDE		13	15	107	0.10	0.40	0.80	A*C	
20031101	092109.8	57.21	-5.93	162.6	819.8	7.0	0.7	SKYE, HIGHLAND		7	22	133	0.05	0.30	1.90	A*C	
20031106	195737.8	55.02	-1.53	429.8	569.1	0.0	1.4	EXPL-WHITLEY BAY	2+	15	31	246	0.18	2.20	1.60	B*D	FELT WHITLEY BAY
20031111	193837.7	57.72	-5.06	217.7	874.4	7.1	2.1	LOCH FANNICH, HIGHLAND	2+	17	46	74	0.25	0.50	2.40	B*C	FELT ACHANALT
20031113	022203.9	56.98	-5.12	210.4	792.5	7.4	0.7	LOCH ARKAIG, HIGHLAND		5	31	296	0.11	10.60	20.70	D*D	
20031114	203050.6	55.24	-3.48	305.8	595.4	3.2	1.0	JOHNSTONEBRIDGE, D & G		12	13	183	0.13	0.70	1.40	A*D	
20031117	105954.4	58.58	-4.26	268.4	968.0	4.6	1.9	OFF BETTYHILL, HIGHLAND		15	29	142	0.15	0.60	1.50	B*C	
20031121	205741.4	53.23	-1.10	460.1	371.1	4.2	1.7	WORKSOP, NOTTS		9	29	87	0.24	1.40	4.40	B*C	C/F, 6KM SSE OF WORKSOP
20031122	031209.9	52.15	-2.47	368.0	250.7	19.4	1.0	BROMYARD, HER & WOR		7	14	258	0.05	0.70	1.00	A*D	
20031122	190858.5	60.31	2.28	636.4	1166.4	8.4	2.7	NORTHERN NORTH SEA		10	87	322	0.25	39.10	48.10	D*D	
20031122	212248.7	51.40	-2.65	354.4	166.5	14.7	1.8	BRISTOL, AVON		13	11	85	0.16	0.80	1.50	B*A	
20031126	143710.5	51.84	-2.54	363.0	215.9	14.0	1.0	CINDERFORD, GLOUCS		8	22	221	0.06	0.60	0.60	A*D	
20031127	212718.5	57.15	-5.56	184.5	811.8	2.7	1.1	LOCH HOURN, HIGHLAND		7	11	162	0.16	1.20	9.30	C*C	
20031202	032329.9	53.47	-1.19	453.9	397.8	0.2	1.1	MALTBY, S YORKSHIRE	2+	5	33	282	0.08	6.40	6.20	D*D	C/F, FELT MALTBY
20031202	231807.8	53.47	-1.20	453.0	397.5	0.2	1.2	MALTBY, S YORKSHIRE		7	32	171	0.15	1.50	2.00	B*C	C/F
20031205	034954.8	53.46	-1.24	450.7	396.7	1.0	1.5	MALTBY, S YORKSHIRE	2+	8	30	167	0.16	1.00	1.50	B*C	C/F, FELT MALTBY
20031206	044516.0	53.45	-1.23	451.3	395.3	1.0	1.2	MALTBY, S YORKSHIRE		5	30	279	0.06	5.80	5.70	D*D	C/F
20031207	001534.5	53.51	-1.21	452.4	401.3	1.0	1.1	MALTBY, S YORKSHIRE		5	35	288	0.13	15.90	20.10	D*D	C/F
20031207	115647.6	53.46	-1.19	453.9	396.6	1.0	1.1	MALTBY, S YORKSHIRE		5	32	280	0.05	5.20	5.10	D*D	C/F
20031207	195643.5	53.47	-1.19	453.5	397.8	1.0	1.0	MALTBY, S YORKSHIRE		5	33	282	0.13	16.70	16.30	D*D	C/F
20031208	032639.3	53.45	-1.22	451.6	394.9	1.0	1.1	MALTBY, S YORKSHIRE		5	30	278	0.08	7.90	7.80	D*D	C/F
20031208	054502.7	53.45	-1.21	452.7	394.9	1.0	1.3	MALTBY, S YORKSHIRE		5	30	278	0.16	11.80	11.70	D*D	C/F
20031208	183036.8	53.42	-1.32	450.4	394.3	1.0	1.4	MALTBY, S YORKSHIRE	2+	6	38	111	0.24	1.90	3.60	B*C	C/F, FELT MALTBY
20031212	023940.5	51.69	-3.04	328.5	199.8	15.3	1.1	PONTYPOOL, GWENT		8	17	202	0.06	0.90	0.70	A*D	
20031212	141111.1	55.24	-3.48	305.8	594.9	3.3	2.0	JOHNSTONEBRIDGE, D & G		18	13	91	0.20	0.50	2.20	B*C	
20031214	194200.1	53.23	-1.09	460.9	371.3	1.3	1.8	WORKSOP, NOTTS		7	29	156	0.10	0.80	1.30	A*C	C/F, 7KM S OF WORKSOP
20031215	042823.9	61.68	2.58	642.2	1319.5	22.0	3.9	NORTHERN NORTH SEA		28	31	180	0.72	3.00	5.20	D*D	
20031218	074935.5	56.18	-4.23	261.5	700.7	4.3	1.0	THORNHILL, CENTRAL		11	7	125	0.08	0.40	0.60	A*B	5KM W OF THORNHILL
20031218	124125.6	56.18	-4.23	261.5	700.8	4.2	1.3	THORNHILL, CENTRAL		12	7	126	0.07	0.40	0.60	A*B	5KM W OF THORNHILL
20031225	221336.6	51.20	-3.73	279.5	146.3	2.5	1.7	LYNTON, DEVON		13	16	106	0.15	0.80	1.10	B*C	7KM SE OF LYNTON

TABLE 2: PHASE DATA 2003

<p> CWF SZ 50 EP 3 23:12 26.33 CWF SN 50 AMPL 23:12 33.33 CWF SE 50 ES 2 23:12 32.63 CWF SE 50 AMPL 23:12 33.91 KWE SZ 7 EP 2 23:12 20.28 KWE SZ 7 ES 3 23:12 22.18 KBI SZ 40 EP 2 23:12 24.82 </p>	<p> 4 0.12 4 0.14 </p>	<p> July 12 2003 Lat: 56.248N Lon: -3.743W Grid Ref: 291.98 kmE 707.49 kmN Locality: BLACKFORD,TAYSIDE </p>	<p> Time: 08:35 56.7 UTC Magnitude: 0.7 ML Depth: 3.9 km RMS: 0.09 secs Quality: B </p>
<p> June 30 2003 Lat: 60.388N Lon: -0.622W Grid Ref: 475.97 kmE 1167.81 kmN Locality: OFF SHETLAND ISLES </p>	<p> Time: 15:08 42.2 UTC Magnitude: 0.3 ML Depth: 9.4 km RMS: 0.10 secs Quality: D </p>	<p> STAT CO DIST PHAS WT P HrMn SECS LRW SN 42 ES 3 15:08 54.59 LRW SN 42 AMPL 15:08 56.14 LRW SE 42 AMPL 15:08 56.96 YEL SZ 31 IP D 15:08 47.86 YEL SZ 31 ES 3 15:08 52.10 SAN SZ 54 EP 3 15:08 52.09 WAL SZ 57 EP 2 15:08 51.97 LRW SZ 42 EP 3 15:08 49.62 </p>	<p> AMPL PERI 2 0.27 3 0.17 </p>
<p> July 3 2003 Lat: 57.070N Lon: -5.707W Grid Ref: 175.32 kmE 803.75 kmN Locality: KNOYDART,HIGHLAND </p>	<p> Time: 07:25 55.9 UTC Magnitude: 1.3 ML Depth: 5.7 km RMS: 0.02 secs Quality: C </p>	<p> STAT CO DIST PHAS WT P HrMn SECS KSB SZ 23 IP D 07:26 00.36 KSK SZ 74 EP 2 07:26 08.91 RRR SE 88 ES 2 07:26 20.80 RRR SN 88 AMPL 07:26 24.15 RRR SE 88 AMPL 07:26 24.30 KPL SZ 30 EP 2 07:26 01.66 KPL SN 30 AMPL 07:26 05.94 KPL SE 30 ES 2 07:26 05.50 KPL SE 30 AMPL 07:26 05.94 KAR SZ 18 IP D 07:25 59.54 </p>	<p> AMPL PERI 15 0.22 17 0.30 27 0.15 59 0.31 </p>
<p> July 8 2003 Lat: 52.673N Lon: -3.847W Grid Ref: 275.11 kmE 309.95 kmN Locality: MACHYNLETH,POWYS Comment: 8KM N OF MACHYNLETH </p>	<p> Time: 07:02 05.1 UTC Magnitude: 1.0 ML Depth: 8.9 km RMS: 0.10 secs Quality: B </p>	<p> STAT CO DIST PHAS WT P HrMn SECS WFB SZ 13 IP C 07:02 07.71 WFB SZ 13 ES 3 07:02 09.69 YRE SZ 52 EP 1 D 07:02 14.17 YRE SZ 52 ES 3 07:02 19.93 YLL SZ 56 EP 2 07:02 14.59 SSP SZ 57 EP 2 07:02 14.95 SSP SN 57 ES 2 07:02 21.47 SSP SN 57 AMPL 07:02 22.33 SSP SE 57 AMPL 07:02 22.47 WPM SZ 65 EP 2 07:02 16.19 HTR SZ 77 EP 2 07:02 17.91 WCB SZ 92 EP 3 07:02 21.18 WCB SE 92 ES 2 07:02 30.72 WCB SE 92 AMPL 07:02 32.04 WCB SN 92 AMPL 07:02 32.97 MCH SZ 95 EP 2 07:02 20.87 MCH SE 95 ES 2 07:02 31.50 MCH SN 95 AMPL 07:02 32.08 MCH SE 95 AMPL 07:02 35.68 HPE SZ 103 EP 3 07:02 21.66 </p>	<p> AMPL PERI 15 0.17 13 0.11 4 0.32 3 0.23 5 0.14 5 0.09 </p>
<p> July 9 2003 Lat: 57.099N Lon: -5.733W Grid Ref: 173.92 kmE 807.02 kmN Locality: KNOYDART,HIGHLAND </p>	<p> Time: 01:09 18.5 UTC Magnitude: 0.0 ML Depth: 2.5 km RMS: 0.08 secs Quality: C </p>	<p> STAT CO DIST PHAS WT P HrMn SECS KSB SZ 23 EP 2 01:09 22.86 KSB SZ 23 ES 3 01:09 25.63 KPL SZ 27 IP D 01:09 23.70 KPL SN 27 ES 2 01:09 27.18 KPL SN 27 AMPL 01:09 27.45 KPL SE 27 AMPL 01:09 27.45 KAR SZ 21 IP D 01:09 22.52 </p>	<p> AMPL PERI 2 0.16 4 0.13 </p>
<p> July 9 2003 Lat: 50.528N Lon: -5.420W Grid Ref: 157.67 kmE 75.51 kmN Locality: W OF TREVOSE HEAD,CORNWALL Comment: 30KM W OF TREVOSE HEAD </p>	<p> Time: 02:28 46.8 UTC Magnitude: 0.4 ML Depth: 11.7 km RMS: 0.21 secs Quality: C </p>	<p> STAT CO DIST PHAS WT P HrMn SECS CCA SZ 40 EP 2 02:28 54.21 CST SZ 41 EP 2 02:28 54.36 CST SZ 41 ES 3 02:28 59.85 CSA SZ 42 EP 2 02:28 54.42 CPZ SZ 43 EP 2 02:28 54.22 CR2 SN 44 ES 2 02:29 00.70 CR2 SN 44 AMPL 02:29 00.99 CCO SZ 47 EP 2 02:28 55.22 CCO SZ 47 ES 3 02:29 01.44 CBW SZ 48 EP 2 02:28 55.38 CGH SZ 56 EP 2 02:28 57.12 HTL SZ 84 EP 3 02:29 00.43 HTL SE 84 ES 2 02:29 10.65 HTL SN 84 AMPL 02:29 12.12 HTL SE 84 AMPL 02:29 12.60 </p>	<p> AMPL PERI 2 0.07 2 0.24 2 0.24 </p>
<p> July 12 2003 Lat: 52.119N Lon: -3.567W Grid Ref: 292.71 kmE 247.97 kmN Locality: LLANGAMMARCH WELLS,POWYS </p>	<p> Time: 14:09 49.7 UTC Magnitude: 0.8 ML Depth: 11.2 km RMS: 0.09 secs Quality: B </p>	<p> STAT CO DIST PHAS WT P HrMn SECS HTR SZ 21 EP 1 D 14:09 54.06 HTR SZ 21 ES 3 14:09 56.36 MCH SZ 41 IP D 14:09 56.99 MCH SN 41 ES 2 14:10 02.28 MCH SE 41 AMPL 14:10 02.44 MCH SN 41 AMPL 14:10 02.50 SSP SZ 46 IP C 14:09 57.57 SSP SN 46 ES 2 14:10 03.48 SSP SN 46 AMPL 14:10 04.07 SSP SE 46 AMPL 14:10 04.53 HSA SZ 58 EP 2 14:09 59.56 HAE SZ 71 EP 2 14:10 01.58 HGH SZ 75 EP 2 14:10 02.46 HPE SZ 85 EP 2 14:10 04.09 </p>	<p> AMPL PERI 13 0.11 14 0.14 8 0.09 6 0.14 </p>
<p> July 12 2003 Lat: 53.828N Lon: 1.241W Grid Ref: 613.29 kmE 441.72 kmN Locality: SOUTHERN NORTH SEA </p>	<p> Time: 20:11 41.2 UTC Magnitude: 2.1 ML Depth: 3.3 km RMS: 0.37 secs Quality: D </p>	<p> STAT CO DIST PHAS WT P HrMn SECS ABA SZ 105 EP 2 20:11 58.31 AWI SZ 112 EP 2 20:11 59.88 LMK SZ 112 EP 2 20:11 59.68 LMK SZ 112 ES 3 20:12 13.36 AEU SN 134 ES 3 20:12 19.17 AEU SE 134 AMPL 20:12 19.47 AEU SN 134 AMPL 20:12 20.48 KSY SZ 155 EP 2 20:12 05.47 KBI SZ 195 EP 3 D 20:12 12.72 CWF SZ 209 EP 2 20:12 13.29 CWF SN 209 ES 2 20:12 36.16 CWF SN 209 AMPL 20:12 38.10 CWF SE 209 AMPL 20:12 38.98 KWE SZ 224 EP 3 20:12 16.75 </p>	<p> AMPL PERI 40 0.10 31 0.19 20 0.19 15 0.33 </p>
<p> July 14 2003 Lat: 56.148N Lon: -5.201W Grid Ref: 201.15 kmE 699.62 kmN Locality: FURNACE,STRATHCLYDE </p>	<p> Time: 06:22 37.6 UTC Magnitude: 1.2 ML Depth: 14.5 km RMS: 0.04 secs Quality: B </p>	<p> STAT CO DIST PHAS WT P HrMn SECS PCA SZ 77 EP 2 06:22 50.62 PCA SZ 77 ES 3 06:22 59.87 PMS SZ 44 EP 1 C 06:22 45.38 PMS SZ 44 ES 3 06:22 51.00 PCO SZ 71 IP C 06:22 49.48 KPL SN 136 ES 2 06:23 15.27 KPL SN 136 AMPL 06:23 16.73 KPL SE 136 AMPL 06:23 16.81 KAR SZ 94 EP 3 06:22 52.97 KSB SZ 119 EP 3 06:22 56.40 KPL SZ 136 EP 2 06:22 59.22 GAL SN 146 ES 2 06:23 18.86 GAL SN 146 AMPL 06:23 20.00 GAL SE 146 AMPL 06:23 19.48 GCL SZ 133 EP 2 06:22 59.32 GMK SZ 93 EP 2 06:22 52.75 GAL SZ 146 EP 3 06:23 01.87 </p>	<p> AMPL PERI 6 0.20 8 0.23 2 0.12 3 0.13 </p>
<p> July 19 2003 Lat: 58.260N Lon: -5.097W Grid Ref: 218.30 kmE 934.25 kmN Locality: KYLESTROME,HIGHLAND </p>	<p> Time: 15:42 11.9 UTC Magnitude: 1.2 ML Depth: 4.3 km RMS: 0.16 secs Quality: C </p>	<p> STAT CO DIST PHAS WT P HrMn SECS ORE SN 84 AMPL 15:42 40.48 ORE SE 84 AMPL 15:42 40.53 KPL SN 108 ES 2 15:42 42.65 KPL SN 108 AMPL 15:42 43.41 KPL SE 108 AMPL 15:42 43.60 KSB SZ 119 EP 2 15:42 31.33 MCD SE 133 ES 2 15:42 50.35 KPL SZ 108 EP 2 15:42 29.73 ORE SZ 84 EP 2 15:42 26.12 MDO SZ 101 EP 2 15:42 28.34 MDO SZ 101 ES 3 15:42 40.94 MLA SZ 102 EP 3 15:42 29.13 MCD SZ 133 EP 3 15:42 34.08 </p>	<p> AMPL PERI 15 0.18 12 0.24 4 0.13 5 0.28 </p>

TABLE 2: PHASE DATA 2003

FTO	SN	498	ES	3	04:30	15.63		
FTO	SN	498	AML		04:30	16.57	32	0.39
FTO	SE	498	AML		04:30	17.87	32	0.55
MCD	SZ	563	EP	3	04:29	35.79		
MCD	SN	563	ES	3	04:30	29.03		
MCD	SE	563	AML		04:30	31.11	173	0.47
MCD	SN	563	AML		04:30	31.68	176	0.11
MVH	SZ	565	EP	3	04:29	35.97		
MDO	SZ	614	EP	3	04:29	41.94		
ELO	SZ	683	EP	3	04:29	50.84		
ESY	SZ	709	EP	3	04:29	54.56		
EDI	SZ	723	EP	3	04:29	56.03		
EDI	SE	723	ES	3	04:31	03.26		
EDI	SN	723	AML		04:31	07.89	63	0.18
EDI	SE	723	AML		04:31	08.56	74	0.38
EAB	SZ	730	EP	3	04:29	56.41		
EAU	SZ	738	EP	3	04:29	57.65		
PCO	SZ	742	EP	3	04:29	58.07		
PMS	SZ	776	EP	3	04:30	01.83		

December 18 2003 Time: 07:49 35.5 UTC Magnitude: 1.0 ML
 Lat: 56.179N Lon: -4.232W Depth: 4.3 km
 Grid Ref: 261.48 kmE 700.68 kmN RMS: 0.08 secs
 Locality: THORNHILL,CENTRAL Quality: B
 Comment: 5KM W OF THORNHILL

STAT	CO	DIST	PHAS	WT	P	HrMn	SECS	AMPL	PERI
EAB	SZ	7	IP		C	07:49	37.22		
EAB	SZ	7	ES	3		07:49	38.31		
PCO	SZ	23	IP		C	07:49	39.81		
PCO	SZ	23	ES	3		07:49	43.16		
ELO	SZ	46	IP		C	07:49	43.67		
PMS	SZ	49	IP		D	07:49	44.26		
PMS	SZ	49	ES	3		07:49	50.44		
PCA	SZ	53	IP		D	07:49	44.80		
EAU	SZ	61	IP		C	07:49	46.19		
EDI	SZ	71	EP	2		07:49	47.95		
EDI	SN	71	ES	2		07:49	56.32		
EDI	SE	71	AML			07:50	01.47	9	0.30
EDI	SN	71	AML			07:50	02.41	8	0.33

December 18 2003 Time: 12:41 25.6 UTC Magnitude: 1.3 ML
 Lat: 56.180N Lon: -4.232W Depth: 4.2 km
 Grid Ref: 261.50 kmE 700.81 kmN RMS: 0.07 secs
 Locality: THORNHILL,CENTRAL Quality: B
 Comment: 5KM W OF THORNHILL

STAT	CO	DIST	PHAS	WT	P	HrMn	SECS	AMPL	PERI
EAB	SZ	7	IP		C	12:41	27.32		
EAB	SZ	7	ES			12:41	28.40		
PCO	SZ	23	IP		C	12:41	29.96		
ELO	SZ	46	IP		C	12:41	33.77		
PMS	SZ	49	IP		D	12:41	34.38		
PMS	SZ	49	ES	3		12:41	40.52		
PCA	SZ	53	IP		D	12:41	34.95		
EAU	SZ	62	IP		C	12:41	36.28		
EDI	SZ	71	EP	2		12:41	37.95		
EDI	BZ	71	EP	2		12:41	37.98		
EDI	BN	71	ES	2		12:41	46.44		
EDI	BE	71	AML			12:41	46.71	17	0.31
EDI	BN	71	AML			12:41	52.48	14	0.31

December 25 2003 Time: 22:13 36.6 UTC Magnitude: 1.7 ML
 Lat: 51.203N Lon: -3.725W Depth: 2.5 km
 Grid Ref: 279.52 kmE 146.34 kmN RMS: 0.15 secs
 Locality: LYNTON,DEVON Quality: C
 Comment: 7KM SE OF LYNTON

STAT	CO	DIST	PHAS	WT	P	HrMn	SECS	AMPL	PERI
MCH	SE	102	AML			22:14	06.23	15	0.30
MCH	SN	102	AML			22:14	11.31	20	0.23
SWK	SZ	104	EP	2		22:13	54.30		
HPE	SZ	109	EP	3		22:13	55.22		
SSP	SZ	142	EP	2		22:14	00.03		
HAE	SZ	124	EP	2		22:13	57.36		
SSP	SN	142	AML			22:14	19.54	21	0.17
SSP	SE	142	AML			22:14	20.20	17	0.27
HTL	SE	58	AML			22:13	56.58	47	0.36
HTR	SZ	102	EP	2		22:13	53.52		
MCH	SE	102	ES	2		22:14	05.90		
MCH	SZ	102	EP	2		22:13	53.60		
HGH	SZ	80	IP		C	22:13	50.18		
SMD	SZ	71	IP		C	22:13	48.88		
HTL	SN	58	AML			22:13	56.62	30	0.24
HTL	SN	58	ES	2		22:13	54.42		
HTL	SZ	58	IP		C	22:13	46.75		
HEX	SZ	16	ES	3		22:13	41.84		
HEX	SZ	16	IP		C	22:13	39.85		

TABLE 3

GEOGRAPHIC COORDINATES OF SEISMOGRAPH STATIONS, 2003

Code	Name	Lat	Lon	KmE (km)	KmN (km)	Ht (m)	Comp
ABA	BACONSTHORPE	52.8884	1.1453	611.58	337.00	74	1
AEA	EAST ANGLIA UNIV	52.6208	1.2403	619.30	307.53	45	3M
AEU	EAST ANGLIA	52.6202	1.2347	618.93	307.45	28	SM
APA	PACKWAY	52.3006	1.4782	637.12	272.68	58	1
AWH	WHINBURGH	52.6297	0.9507	599.67	307.68	64	1R
AWI	WITTON	52.8319	1.4471	632.17	331.65	46	1
BBH	BRUNTSHEIL	55.1333	-2.9299	340.72	582.50	216	1
BBO	BOTHEL	54.7367	-3.2464	319.76	538.69	209	3
BCC	CHAPELCROSS	55.0153	-3.2201	321.99	569.66	138	1SM
BCM	CHAPELCROSS MIC	55.0151	-3.2212	321.92	569.64	78	M
BDL	DOBCROSS HALL	54.8030	-2.9385	339.68	545.76	157	1
BHH	HOWATS HILL	55.0931	-3.2181	322.27	578.31	216	3
BNA	NEW ABBEY	54.9658	-3.6242	296.03	564.68	28	1
BTA	TALKIN	54.9057	-2.6844	356.12	557.00	279	3
BWH	WARDLAW	55.1758	-3.6549	294.62	588.09	269	1
CBW	BUDOCK WATER	50.1482	-5.1144	177.53	32.29	94	1
CCA	CARMENELLIS	50.1866	-5.2277	169.62	36.90	210	1
CCO	CONSTANTINE	50.1357	-5.1957	171.66	31.14	168	1
CDU	DUNNERDALE	54.3362	-3.1952	322.30	494.08	355	1
CGH	GOONHILLY	50.0507	-5.1649	173.46	21.60	97	1
CGW	GWEEK	50.1006	-5.2228	169.56	27.32	9	1
CKE	KESWICK	54.5877	-3.1059	328.54	521.96	304	1
CMA	MANACCAN	50.0821	-5.1274	176.29	24.98	42	1
CPZ	PENZANCE	50.1566	-5.5828	144.12	34.72	199	1R
CR2	ROSEMANOWES 2	50.1667	-5.1687	173.74	34.51	143	3
CRQ	ROSEMANOWES	50.1672	-5.1726	173.46	34.57	156	SM
CSA	ST AUSTELL	50.3527	-4.8919	194.30	54.38	112	1
CSF	SCAFELL	54.4478	-3.2430	319.41	506.55	540	1
CSM	SELLAFIELD MIC	54.4183	-3.4913	303.24	503.58	50	M
CST	STITHIANS	50.1952	-5.1635	174.24	37.66	141	1
CWF	CHARNWOOD FST	52.7385	-1.3076	446.74	315.91	203	3BB
DCO	COMBE FARM	50.3201	-3.8721	266.74	48.43	117	1R
DYA	YADSWORTHY	50.4353	-3.9310	262.88	61.34	292	3RMLG
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	3BB
EDR	DRUMTOCHTY	56.9190	-2.5393	367.17	780.97	401	1R
EDU	DUNDEE	56.5477	-3.0110	337.85	739.97	421	1R
ELO	LOGIEALMOND	56.4703	-3.7112	294.59	732.21	523	1R
ESK	ESKDALEMUIR	55.3165	-3.2052	323.52	603.16	261	3RMLG
ESY	STONEYPATH	55.9175	-2.6141	361.62	669.55	337	1R
FHV	HALDARSVIK	62.2597	-7.0984	135.46	1385.95	380	1R
FSD	SUDUROY	61.5701	-6.7884	145.86	1308.06	480	1R
FSV	SVINOY	62.2598	-6.3550	173.99	1383.14	430	1R
FTO	TORSHAVN	62.0199	-6.8274	147.51	1358.21	325	3R
FVA	VAGAR	62.0575	-7.3520	120.46	1364.55	430	1R
GAL	GALLOWAY	54.8664	-4.7114	226.02	555.78	117	3MLG
GCD	CASTLE DOUGLAS	54.8630	-3.9403	275.48	553.76	184	1R
GCL	CUSHENDALL	55.0783	-6.1264	136.66	583.77	278	1R
GIM	ISLE OF MAN (North)	54.2923	-4.4672	239.44	491.35	346	3R
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
HAE	ALDERS END	52.0368	-2.5434	362.73	237.79	260	1R
HBL2	BONNYLANDS	52.0508	-3.0384	328.80	239.71	437	SM
HCG	CRAIG GOCH	52.3231	-3.6570	287.08	270.78	533	1R
HEX	EXMOOR	51.0664	-3.8026	273.71	131.28	230	1R

TABLE 3: continued

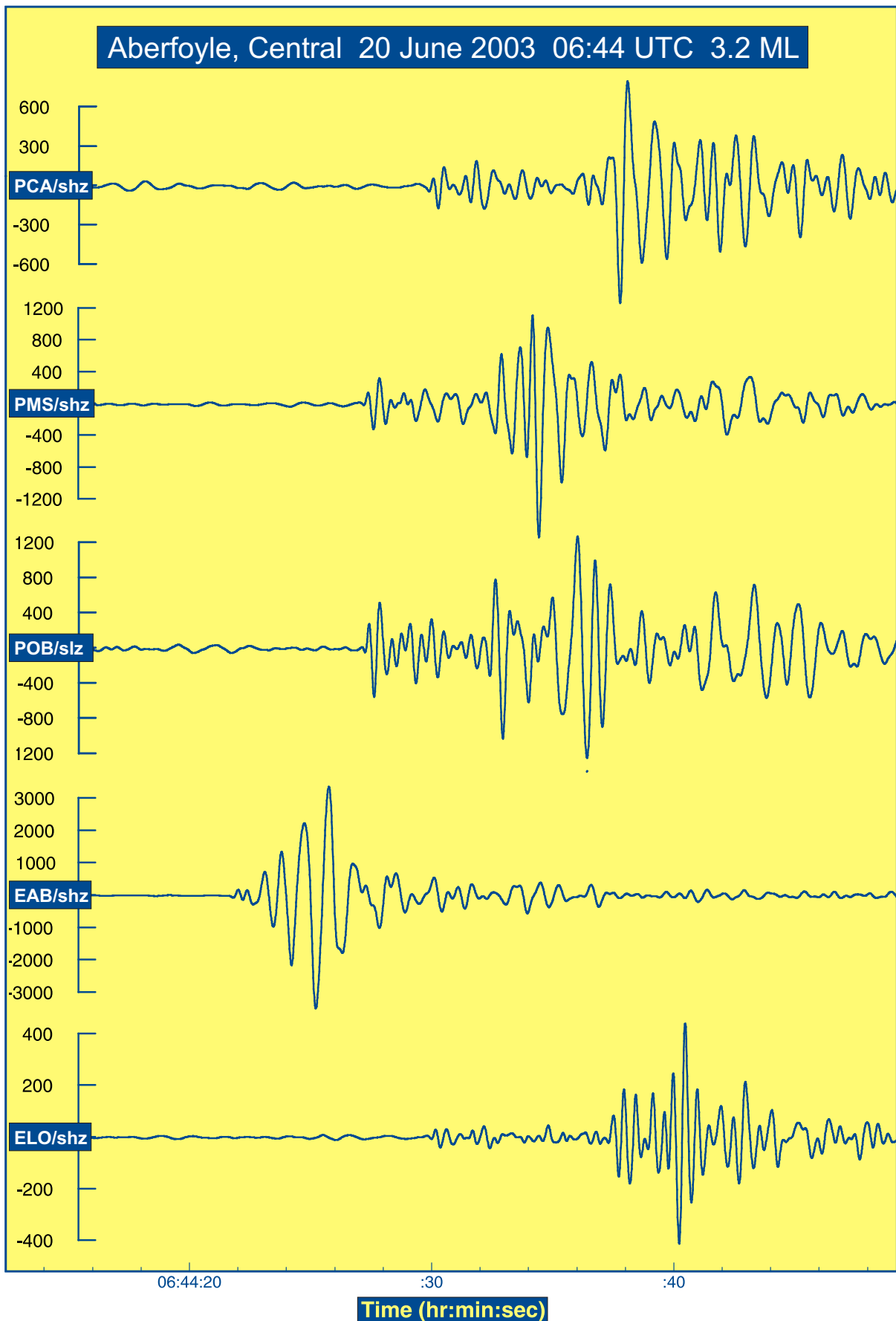
Code	Name	Lat	Lon	KmE (km)	KmN (km)	Ht (m)	Comp
HGH	GRAY HILL	51.6379	-2.8057	344.25	193.59	223	1R
HLM	LONG MYND	52.5184	-2.8807	340.25	291.57	429	1
HPE	PEMBROKE	51.9372	-4.7746	209.29	230.21	349	1R
HPK	HAVERAH PARK	53.9581	-1.6241	424.66	451.42	233	3R
HSA	SWANSEA	51.7500	-4.1532	251.38	207.94	293	1R
HTL	HARTLAND	50.9943	-4.4849	225.64	124.66	86	3RMLGSMBB
HTR	TREWERN HILL	52.0785	-3.2679	313.12	243.04	337	1R
JDC	DAM (CREST)	49.1947	-2.0469			39	SM
JDG	DAM (GALLERY)	49.1947	-2.0469			7	SM
JRS	MAISON ST LOUIS	49.1922	-2.0922			56	3RLG
JSA	ST AUBINS	49.1878	-2.1717			39	1R
JVM	VALLE D.L.MARE	49.2169	-2.2067			64	1R
KAC	ACHNASHELLACH	57.4989	-5.2988	202.36	850.19	206	1R
KAR	ARISAIG	56.9188	-5.8290	166.98	787.34	186	1
KBI	BIRLEY GRANGE	53.2543	-1.5279	431.49	373.17	272	1
KEY	KEYWORTH	52.8779	-1.0757	462.20	331.59	59	LG
KEY2	KEYWORTH (SM)	52.8790	-1.0770	462.13	331.73	76	SM
KNR	NEVIS RANGE	56.8219	-4.9714	218.68	773.97	1147	1R
KPL	PLOCKTON	57.3391	-5.6527	180.21	833.50	13	3RLGSM
KSB	SHIEL BRIDGE	57.2099	-5.4214	193.40	818.40	417	1R
KSK	SCOVAL	57.4659	-6.7002	118.21	851.46	265	1R
KSY	SYSTON	52.9642	-0.5872	494.88	341.73	121	1R
KTG	TILBROOK GRNGE	52.3264	-0.4019	508.90	271.06	83	1
KUF	UFFORD	52.6170	-0.3907	508.94	303.39	38	1R
KWE	WEAVER FARM	53.0164	-1.8412	410.65	346.61	328	1R
LCP	CASSOP	54.7370	-1.4744	433.84	538.14	185	1R
LDU	LEEDS	53.8058	-1.5540	429.37	434.51	74	MLGSM
LHO	HOLMEFIRTH	53.5453	-1.8548	409.62	405.44	462	1R
LMI	MILLOM	54.2206	-3.3070	314.79	481.35	129	3R
LMK	MARKET RASEN	53.4569	-0.3260	511.14	396.90	146	1R
LRN	RICHMOND	54.4165	-1.8007	412.93	502.37	313	1R
LRW	LERWICK	60.1360	-1.1779	445.66	1139.27	98	3RMLG
LWH	WHINNY NAB	54.3338	-0.6717	486.36	493.97	277	1R
MCD	COLEBURN DISTIL	57.5828	-3.2541	325.02	855.42	293	3RMLGSM
MCH	MICHAELCHURCH	51.9974	-2.9983	331.47	233.74	219	BBSM
MDO	DOCHFOUR	57.4409	-4.3633	258.17	841.39	415	1R
MFI	FISHRIE	57.6119	-2.2956	382.34	858.00	232	1R
MLA	LATHERON	58.3055	-3.3627	320.15	935.98	188	1
MME	MEIKLE CAIRN	57.3149	-2.9647	341.90	825.32	475	1
MVH	ACHVAICH	57.9250	-4.1825	270.75	894.90	185	1
OBR	BRABSTER	58.6142	-3.1626	332.47	970.13	89	1R
ODR	DOUNREAY	58.5822	-3.7256	299.68	967.27	100	SM
OHO	HOY	58.8322	-3.2465	328.05	994.48	172	1R
ORE	REAY	58.5480	-3.7622	297.45	963.52	100	3RMLG
OST	STRONSAY	59.0860	-2.5516	368.39	1022.20	21	1R
OTO	TONGUE	58.4953	-4.3939	260.49	958.79	338	1R
OWE	WESTRAY	59.3180	-3.0289	341.44	1048.36	87	1R
PCA	CARROT	55.7007	-4.2550	258.30	647.55	302	1
PCO	CORRIE	55.9880	-4.1002	269.00	679.21	267	1
PGB	GLENIFFERBRAES	55.8115	-4.4837	244.38	660.37	199	3
PMS	MUIRSHIEL	55.8459	-4.7452	228.15	664.82	351	1
POB	OBSERVATORY	55.8458	-4.4299	247.88	664.06	34	MLG
RCR	CAPE WRATH	58.6245	-4.9987	225.90	974.58	100	1R
REB	EISG-BRACHAIDH	58.1194	-5.2802	206.82	919.16	100	1R
RFO	FORSNAVAL	58.2133	-7.0052	106.10	935.83	195	1R
RRH	RHENIGIDALE	57.9197	-6.6881	122.43	901.86	103	1R
RRR	RUBHA REIDH	57.8577	-5.8067	174.19	891.68	61	3RMLGSM
RSC	SCOURIE	58.3485	-5.1683	214.61	944.33	60	1R
RTO	TOLSTA	58.3778	-6.2092	153.95	950.93	74	1R
SAN	SANDWICK	60.0179	-1.2392	442.41	1126.08	150	1

TABLE 3: continued

Code	Name	Lat	Lon	KmE (km)	KmN (km)	Ht (m)	Comp
SBD	BRYN DU	52.9055	-3.2585	315.37	335.01	489	1
SFH	HASELMERE	51.0604	-0.6912	491.71	129.88	260	1
SHSD	LERWICK	60.1360	-1.1779	445.66	1139.27	98	BBSM
SIW	ISLE OF WHITE	50.6711	-1.3747	444.18	85.97	162	1
SKP	KOPHILL	51.7218	-0.8096	482.22	203.29	212	1
SMD	MENDIPS	51.3083	-2.7170	350.03	156.88	310	1
SSP	STONEYPOUND	52.4177	-3.1119	324.39	280.59	428	3
SSW	STOW-ON-WOLD	51.9667	-1.8499	410.31	229.86	291	1
SWK	WARMINSTER	51.1483	-2.2471	382.72	138.87	266	1
SWN	SWINDON	51.5137	-1.8007	413.83	179.49	192	3MLGSM
TBW	BRENTWOOD	51.6549	0.2913	558.48	197.66	89	1R
TCR	COLCHESTER	51.8347	0.9212	601.24	219.20	45	1R
TEB	EASTBOURNE	50.8187	0.1457	551.13	104.39	68	1R
TFO	FOLKESTONE	51.1135	1.1409	619.81	139.66	202	3MLGSM
TSA	SEVENOAKS	51.2426	0.1561	550.48	151.53	177	1
WAL	WALLS	60.2564	-1.6173	421.18	1152.46	167	1
WCB	CHURCH BAY	53.3782	-4.5467	230.62	389.87	139	3MSM
WFB	FAIRBOURNE	52.6831	-4.0383	262.23	311.48	316	1R
WIM	ISLE OF MAN(South)	54.1475	-4.6738	225.39	475.73	386	1R
WLF	LLYNFAES	53.2894	-4.3966	240.27	379.65	58	1
WME	MYNDD EILIAN	53.3969	-4.3032	246.88	391.40	129	1R
WPM	PENMAENMAWR	53.2581	-3.9048	272.95	375.18	353	1R
XAL	ALLENDALE	54.8617	-2.2147	386.22	551.91	458	1R
XDE	DENT	54.5056	-3.4902	303.52	513.29	301	1R
XSO	SOURHOPE	55.4924	-2.2510	384.14	622.10	516	1R
YEL	YELL	60.5509	-1.0830	450.29	1185.55	203	1
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	52.9811	-4.4254	237.19	345.43	193	1R
YRH	RHIW	52.8336	-4.6288	222.94	329.51	286	1R

Component Codes:

1	Single vertical seismometer
3	Orthogonal set of 3 seismometers
M	Low-frequency microphone
R	Station coordinates registered with the International Seismological Centre (ISC), England and the National Earthquake Information Centre (NEIC), USA
LG	Single low-gain vertical seismometer
SM	Strong motion seismometers
BB	Broadband Instrument



Seismograms of the Aberfoyle earthquake of 20 June 2003 06:44 UTC 3.2 ML recorded on the Paisley and LOWNET seismic networks.