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STRONG-MOTION RECORDINGS IN ICELAND

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SUMMARY

The objective of this paper is to describe strong-motion monitoring and accelerometric recordings in Iceland. Furthermore, to point out some basic properties of the tectonic environments governing earthquakes within Iceland and the Icelandic Region. Finally, outline the data available and provide information regarding its accessibility.

Strong-motion monitoring and recordings have been carried out in Iceland since the early seventies. The Icelandic Strong-Motion Network was established in the mid eighties providing a nation wide coverage of the most important seismic zones. The importance of these data is partly related to the fact that Iceland is an active earthquake area, the most active one in north-western Europe. Over the centuries, earthquakes have caused quite significant damage to buildings and structures, concomitant injuries and casualties. In the last millennium, destructive earthquakes have struck, on average, twice every century. The objective of the Network is to collect data required for rational structural design and risk management.

The Network has recorded over 300 earthquakes, in which the acceleration of the ground response channels has exceeded 0.4% of the acceleration of gravity (g). In these earthquakes over 2300 time series have been recorded, including both ground and response channels. In addition to these series, recordings of more than 1000 time series have been made as a result of acceleration triggered by structural response. At present, the database contains about 3300 time series recorded in earthquakes with magnitudes in the range of about 2 to 6.6 and epicentral distances ranging from close to zero up to roughly 350 km.

The recordings obtained in earthquakes with magnitude greater than 4 are accessible through the ISESD Website, http://www.ISESD.hi.is. The information provided is: raw data, i.e. uncorrected time series, corrected acceleration series, derived velocity series, linear elastic response spectra, associated parameters, including earthquake magnitude, source distances, site characterisation, peak ground acceleration and velocity.

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INTRODUCTION

Iceland is an active seismic area, in fact the most earthquake prone region in the Northwest Europe. Over the centuries, earthquakes have caused quite significant damage to buildings and structures, concomitant injuries as well as loss of life. In the last millennium, destructive earthquakes have struck, on average, twice every century.

During the last two decades, activities in seismological research in Iceland have been steadily increasing. These activities include earthquake monitoring programmes and a variety of research projects in geophysics, engineering seismology and earthquake engineering. The objective of this paper is to describe strong-motion monitoring and accelerometric recordings in Iceland. Furthermore, to point out some basic properties of the tectonic environments governing earthquakes within Iceland and the Icelandic Region. Finally, outline the data available and provide information regarding its accessibility. Special attention will be given to the Icelandic Strong-Motion Network run by the University of Iceland.

GEOPHYSICAL BACKGROUND

Iceland is by far the biggest island on the Mid-Atlantic Ridge, the borderline between the Eurasian Plate and the North American Plate. Crossing the island, the ridge is shifted eastward through two major fracture zones, one in the South, the South Iceland Seismic Zone (SISZ), and another in the North, the so-called Tjörnes Fracture Zone (TFZ), which extends far offshore. A mantel plume rising under the island increases Iceland's geophysical complexity.

The earthquakes in Iceland may be divided into three main categories, reflecting the main triggering mechanisms:

- *Tectonic earthquakes* are due to relative movements of the North American and Eurasian Plates. These are the biggest earthquakes and may reach magnitude seven or even more.
- *Volcanic earthquakes* are attributable to volcanic activities as the main source of triggering. These earthquakes are generally located in the vicinity of well-known volcanoes, and their magnitude will hardly ever exceed magnitude six. This type of earthquake does not normally have any significant effect on structures.
- *Geothermal earthquakes*, usually not exceeding magnitude three, are small tremors occurring quite frequently in high-temperature geothermal areas. They do not have any significant effect on engineered structures, but can be annoying and disturbing to exposed people.

In addition to these naturally triggered earthquakes, the so-called man-made quakes should be mentioned to complete the picture. They are assigned primarily to the activities of man, e.g., the filling of reservoirs and rock blasting, and have been encountered a few times. In all cases to date, they have been small.

The tectonic earthquakes in Iceland are of two types, i.e., interplate earthquakes, related directly to plate boundaries, and intraplate earthquakes originating inside the plates. The interplate earthquakes in Iceland can be divided into two groups, depending on the place of origin. In the first group, earthquakes originate in the spreading zone between the plates, i.e., on the Mid-Atlantic Ridge. These earthquakes are rather small, with magnitudes that seldom exceed five. The source mechanism can be complex. In the second group, earthquakes originate in the above-mentioned fracture zones. They are the biggest earthquakes in Iceland, and their source mechanism, obtained by fault plane solutions, is, in all cases, of a strike slip type. The seismic motion projected for the South Iceland Seismic Zone on the basis of plate tectonics, which is left-lateral on the east-west striking fault, is, nevertheless, not visible on the surface as a major surface fracture. It appears, on the contrary, that the motion can be visualised as a series of north-south striking, right-lateral faults. This is supported by the geological evidence of fault traces on the surface as well as by the north-south, elongated shape of the mapped destruction zones of large, historical earthquakes [1, 2, 3]. In the northern seismic area, this is not as obvious since the epicentral areas are mostly beyond the coast.

The intraplate earthquakes in Iceland are not as frequent as the interplate earthquakes. In this century, they have been recorded in the western part of the country [6]. Their mechanism seems to be complex.

Written documentation exists of earthquakes in Iceland in the last millennium. This information has been summarised in a pioneering work by Professor Thoroddsen [7, 8, 9]. In this century, some important work has been carried out regarding this historic seismicity. Here it is especially worth mentioning the contributions by Tryggvason, Thoroddsen and Thorarinsson [10] and Bjornsson and Einarsson in a series of papers [1-6] as well as Solnes [11, 12]. However, an earthquake catalogue for Iceland has never been published. Therefore, different researchers have used different earthquake catalogues for different purposes [13]. Ambraseys and Sigbjornsson [14] have compiled available public domain data on earthquakes in Iceland and given a comprehensive uniform account of the seismicity of the region, which includes a parametric earthquake catalogue for Iceland covering the period from 1896 to 1996 containing recalculated surface-wave magnitude using teleseismic data. The geographical distribution of the epicentres of these events is indicated on Figure 1 along with the main tectonic structures.

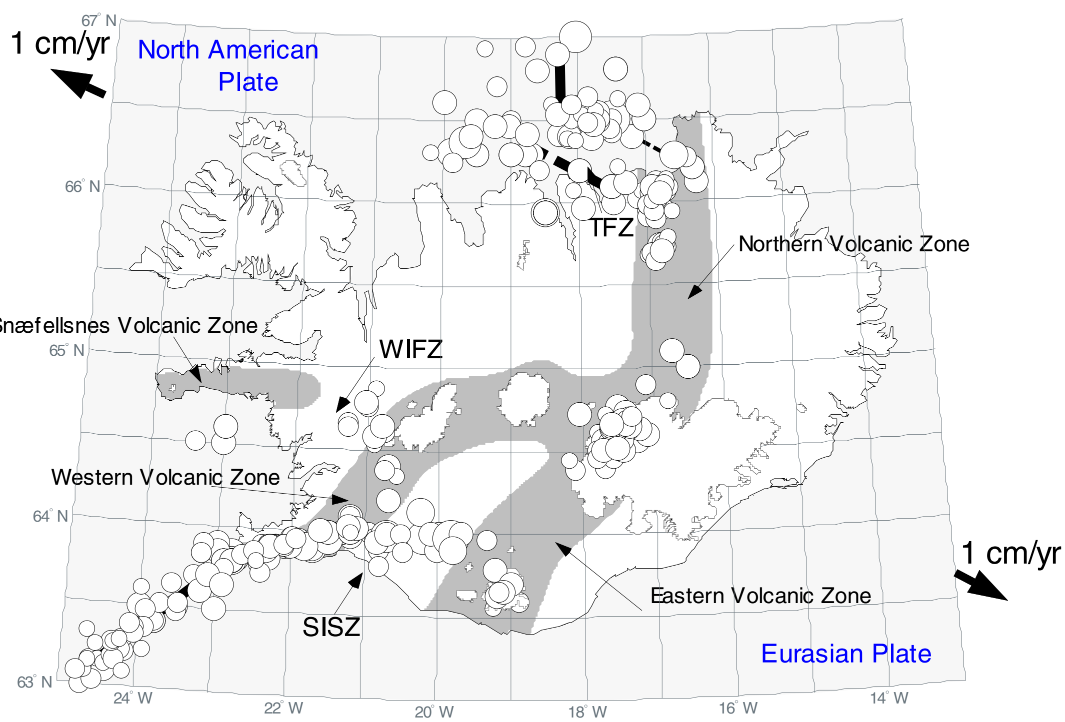

Figure 1: Main tectonic structures and earthquake epicentres. The grey areas denote volcanic zones as well as rift zones on land, solid lines are rift zones offshore representing parts of the Mid-Atlantic Ridge, dashed lines indicate fracture zones and seismic lineation, the white circles indicate earthquake epicentres [14]. The following notation is used: SISZ is the South Iceland Seismic Zone, TFZ is the Tjörnes Fracture Zone and WIFZ is the West Iceland Fracture Zone.

EARTHQUAKE MONITORING

The first seismic events in Iceland, for which there are available teleseismic data, is the destructive 1896 South Iceland earthquake sequence [7, 15]. The first seismographic station in Iceland started operating in 1910 for a few years. From 1928 the observations are almost continuous.

Currently three earthquake-monitoring systems are permanently installed and operated in Iceland. They are the following:

- The seismic network of the Science Institute of the University of Iceland is distributed over the most geologically active parts of the country, emphasising the seismic zones and volcanic areas. The objective of this network was originally defined as scientific, primarily to facilitate tectonic and seismological research in Iceland [4].
- The SIL-system consists of 43 stations, each equipped with a tri-axial short period seismometer, connected to a central computer in Reykjavik [14]. The SIL-system is operated by the Icelandic Meteorological Office. The primary purpose of the SIL-system has been defined in terms of earthquake prediction research.
- The Icelandic Strong-Motion Network is operated by the University of Iceland, the Earthquake Engineering Research Centre (see the following section). The objective of this network is primarily earthquake engineering research, emphasising the dynamic behaviour of structural systems.

In addition to these permanently installed networks, from time to time networks are operated for short term observations or seismological studies of a specific geophysical phenomenon or geological structure.

THE ICELANDIC STRONG MOTION NETWORK

The Icelandic Strong-motion Network [16-19], established in 1984, is based on a small-scale network proposed and installed by Professor J Solnes in the early seventies [16]. The objective of the network is to collect earthquake-engineering data required for rational structural design and risk management. The locations of the stations in the network were selected on the basis of the geophysical information outlined in the preceding section, the geographic distribution of the population, locations of industrial and power plants as well as the main life-line systems.

The geographical distribution of the ground response stations and the arrays in structures are shown in Figure 2, using appropriate signatures to indicate the type of station. Further details of the network are given in Table 1. In most cases the sensors in ground response stations are located inside buildings. This is considered necessary due to severe climatic conditions. A disadvantage is that the buildings may affect the recordings.

The Icelandic Strong Motion Network consists of 34 ground response stations and arrays measuring ground motion and structural response. At present, the network comprises 185 channels, which can be divided as follows: (a) 22 standalone, tri-axial ground response stations in farmhouses and public buildings (66 channels); (b) 3 arrays in earth-fill dams (30 channels); (c) 5 arrays in hydro-power stations (58 channels); (d) 2 arrays in office buildings (14 channels); (e) 2 arrays in seismically isolated bridges (17 channels). The network runs with a high degree of automation, using digital instruments, with the exception of three analogue instruments recording on a film. The individual stations and arrays are connected to a central computer that records detected events, when the acceleration exceeds a prescribed threshold. Afterwards the recordings go through a routine processing and are then finally transferred to a database. The data can then be visualised using a password protected Internet site.

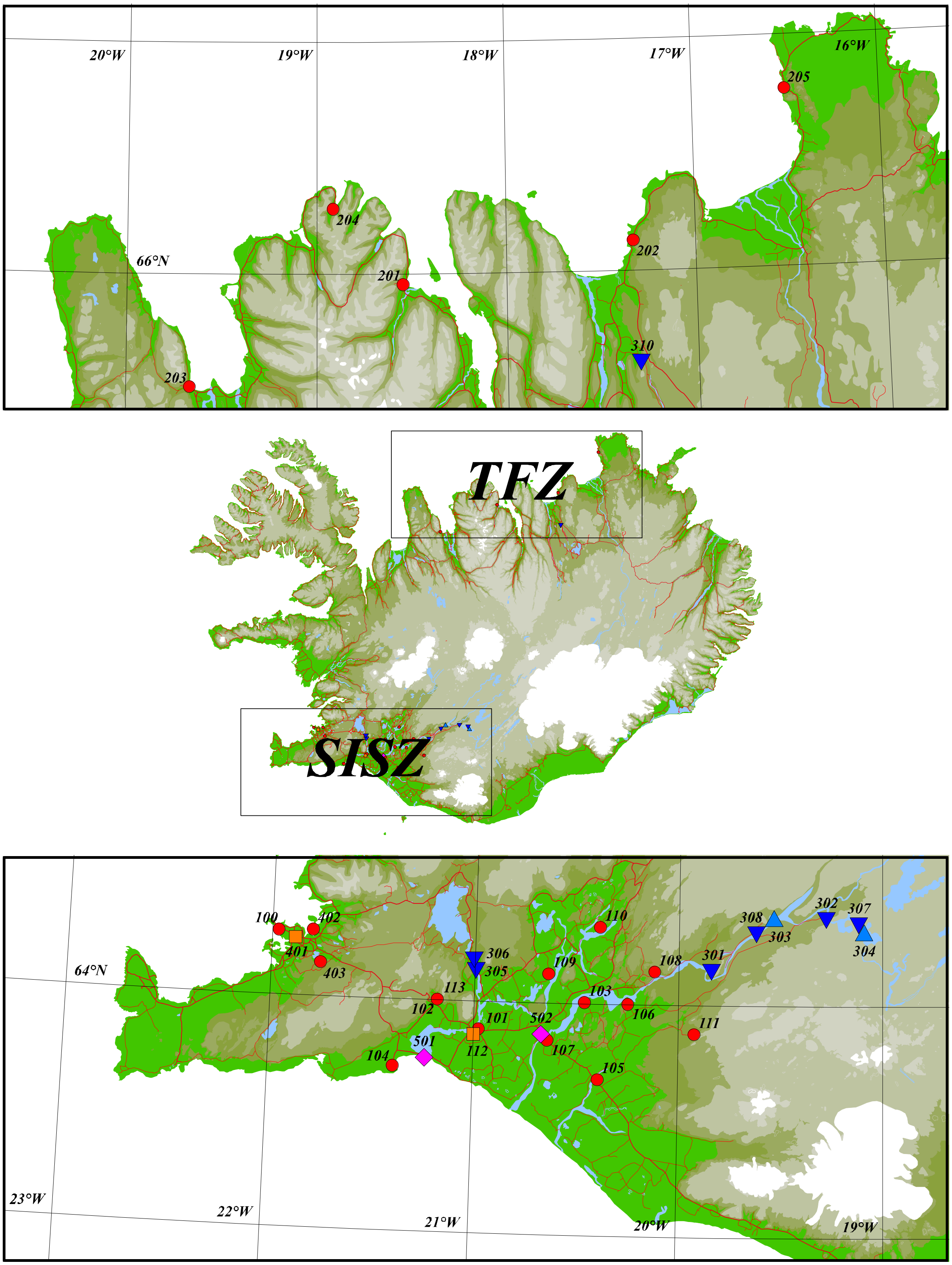

Figure 2: The Icelandic Strong-motion Network. The following notation is used: ● ground response stations, ▼ hydropower stations, ▲ earth-fill dams, ◆ bridges and ■ office buildings.

Table 1: An overview of the Icelandic Strong-Motion Network. Listed are ground response stations and arrays in buildings and structures. Each ground response station contains one tri-axial sensor. The sensors are located in buildings or structures on firm ground. Sensors from Kinemetrics are applied in arrays. The trigger thresholds are in the range 0.002 to 0.009 g, but are in most cases around 0.004 g. Type of the Station is described as: FF – free field, SR – structure related free field, DR – dam related free field.

No	Site name	Long °W	Lat °N	Instrument type	Structures	Type
100	Reykjavik	21.96	64.14	Kinemetrics SMA-1	University building, 3 story	FF
101	Selfoss	21.00	63.94	Terra DCA-333	Hospital, 3 story	FF
102	Hveragerdi	21.19	64.00	Geotech A-700	Church	FF
103	Kaldarholt [1)]	20.47	64.00	Terra DCA-333	Farm house, 2 story	FF
104	Thorlakshofn	21.38	63.85	Kinemetrics SMA-1	School building, 1 story	FF
105	Hella [1)]	20.39	63.84	Kinemetrics ETNA	School building, 2 story	FF
106	Flagbjarnarholt	20.26	63.99	Kinemetrics SSA-1	Farm house, 2 story	FF
107	Thjorsartun	20.65	63.93	Geotech A-700	Farm house, 2 story	FF
108	Minni-Nupur	20.16	64.05	Kinemetrics ETNA	Farm house, 2 story	FF
109	Solheimar [1)]	20.64	64.07	Kinemetrics ETNA	School building, 2 story	SR
110	Hvitarbakki	20.39	64.16	Terra DCA-333	Farm house, 1 story	FF
111	Selsund [1)]	19.95	63.94	Kinemetrics SMA-1	Farm house, 1 story	SR
112	Selfoss, Radhus	21.00	63.94	KMI K2 (array) [4)]	Office building, 3 story	SR
113	Hveragerdi, Grund	21.19	64.00	Kinemetrics K2	Retirement home, 2 story	FF
201	Dalvik	18.53	65.97	Kinemetrics SSA-1	Office building, 3 story	SR
202	Husavik	17.36	66.05	Kinemetrics K2	Fire Station, 3 story	SR
203	Saudarkrokur	19.64	65.74	Kinemetrics SSA-1	School building, 2 story	FF
204	Siglufjorður	18.91	66.16	Kinemetrics SSA-1	Retirement home, 3 story	FF
205	Kopasker	16.44	66.30	Kinemetrics SSA-1	House, 1 story	FF
301	Burfellsvirkjun	19.84	64.10	HP/KMI (array) [6)]	Hydroelectric power station	SR
302	Hrauneyjarfoss	19.24	64.20	KMI K2 (array) [4)]	Hydroelectric power station	FF
303	Sultartangastifla	19.57	64.19	HP/KMI (array) [6)]	Earth-fill dam	FF
304	Sigoldustifla	19.10	64.16	HP/KMI (array) [4)]	Earth-fill dam	SR
305	Irafossvirkjun	21.01	64.09	KMI SSA-1 (array) [4)]	Hydroelectric power station	SR
306	Ljosafossvirkjun	21.01	64.10	KMI K2 (array) [5)]	Hydroelectric power station	FF
307	Sigolduvirkjun	19.13	64.17	Kinemetrics K2	Hydroelectric power station	FF
308	Sultartangavirkjun	19.60	64.15	KMI K2 (array) [6)]	Hydroelectric power station	SR
310	Laxarvirkjun	17.31	65.82	Kinemetrics SSA-1	Hydroelectric power station	SR
311	Blondustifla	19.67	65.23	KMI SSA-1 (array) [4)]	Earth-fill dam	DR
401	Rvk., Hus Versl.	21.90	64.13	KMI SSA-1 (array) [4)]	Office building, 14 story [2)]	SR
402	Rvk., Foldaskoli	21.79	64.13	Kinemetrics SSA-1	School building, 2 story	FF
403	Rvk., Heidmork	21.76	64.07	Kinemetrics SSA-1	Well-house/pump station	FF
501	Oseyrarbru	21.21	63.88	KMI SSA-1 (array) [4)]	Concrete bridge [3)]	SR
502	Thjorsarbru	20.65	63.93	KMI K2 (array) [5)]	Steel arch bridge [3)]	SR

[1)] Site-dependent magnification observed
[2)] Concrete shear walls
[3)] Bridge with seismic base isolation
[4)] Including one ground response station
[5)] Including two ground response stations
[6)] Including three ground response stations

OVERVIEW OF RECORDED AND PUBLISHED ACCELEROMETRIC DATA

Currently 300 earthquakes have been recorded by the network, in which the acceleration of the ground response channels has exceeded 0.4 percent of the acceleration of gravity (g). In these earthquakes over 2300 time series have been recorded, including both recordings from ground and response channels. In addition to these series, recordings of more than 1000 time series have been made as a result of acceleration triggered by structural response. At present, the database contains well over 3300 time series recorded in earthquakes with magnitudes in the range of 2 to 6 and epicentral distances ranging from close to zero up to roughly 350 km. This is indicated in Figure 3 where the coloured dots (red and blue) indicate earthquake epicentres. Table 2 shows parameters for earthquakes for which good quality records exist. The triggering is in all cases presented by ground response channels.

In June 2000 the South Iceland Lowland was hit by a devastating earthquake sequence. The biggest events in this sequence were recorded on 17 June and 21 June (see Table 2). In the June 2000 earthquake sequence, about 80 events where recorded on the Icelandic Strong-Motion Network, resulting in about 750 ground response time series. Further information on these earthquakes can be found in [21, 22, 23].

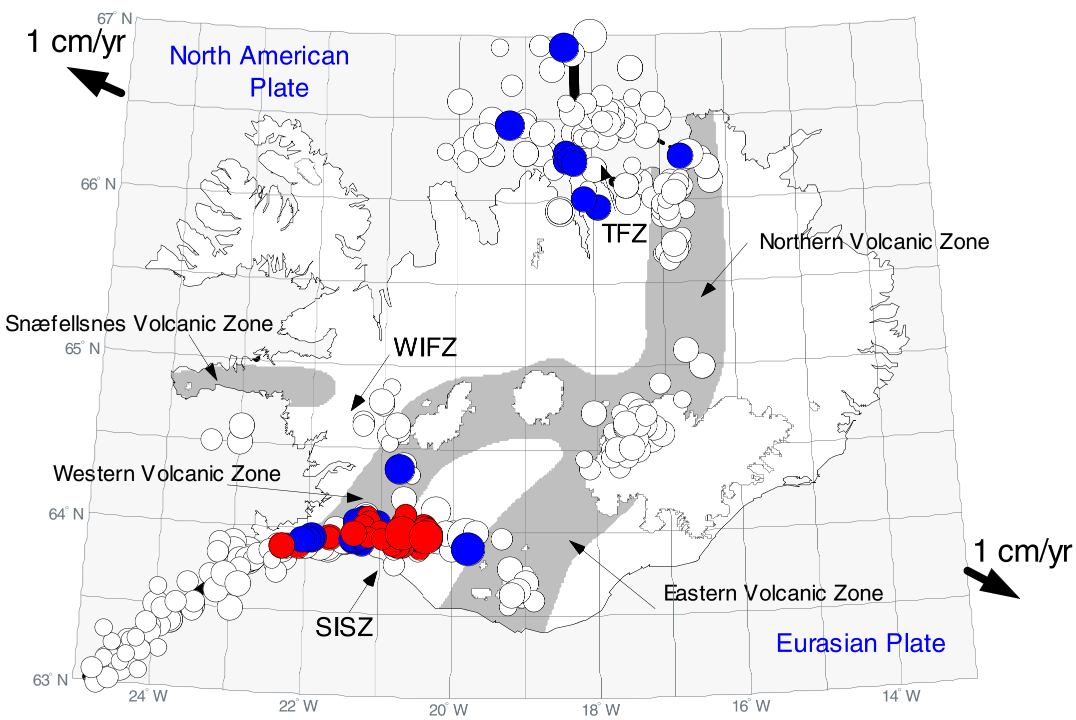

Figure 3: Earthquakes recorded by the Icelandic strong-motion. The blue and red dots are earthquake epicentres for which good quality records exist. The triggering is in all cases presented by ground response channels. The red dots indicate South Iceland earthquakes in June 2000. The blue dots represent other earthquakes (see Table 2).

Table 2: Earthquakes recorded by the Icelandic Strong-Motion Network, for which good quality records exist. All records included where triggered by ground response channels.

Date	OT (GMT)	Lat °N	Long °W	Magnitude[4] M_s	M_w	m_b	M	No[5] of records	PGA[6] (m/s^2) X	Y	Z	D[7] (km)
26-Aug-1986	04:00	63.96	20.32		4.6		4.6	2	0.19	-0.70	-0.16	14
25-May-1987	11:32	63.91	19.79	6.0	6.0	5.7	5.9	7	0.60	-0.51	0.53	(24)
29-Jun-1987	10:40	64.00	20.45	3.0				2	0.21	-0.11	0.03	12
09-Sep-1988	14:41	66.64	17.84	4.2	5.3	4.4	4.5	1	-0.06	0.06	0.04	81
19-Mar-1990	10:47	63.95	21.93	4.7	4.7	4.7	4.7	3	-0.10	-0.13	-0.07	(16)
30-Jan-1991	07:44	64.38	20.75	4.8	5.2	5.1	4.7	4	-0.05	-0.06	-0.03	(51)
23-Apr-1991	10:27	63.99	20.39		4.7		4.6	3	1.05	1.21	-1.07	4
27-Dec-1992	12:23	64.00	21.20	3.7	4.8	4.3	4.8	8	-0.20	-0.19	-0.11	(12)
28-Aug-1993	19:59	65.97	17.94	4.1	4.6	4.1	4.6	3	0.22	0.38	0.14	27
08-Feb-1994	03:28	66.47	19.25	5.5	5.5	5.2	5.3	5	-0.20	0.24	0.12	38
16-Aug-1994	16:42	64.06	21.20		3.7		3.7	1	0.01	-0.01	0.01	35
19-Aug-1994	19:19	64.03	21.25		3.9		3.7	2	-0.04	-0.03	-0.01	26
20-Aug-1994	16:40	64.03	21.24	4.2	3.5	4.2	3.4	1	-0.01	-0.01	-0.01	35
17-Jan-1996	18:02	66.01	18.13		5.1		4.3	2	-0.20	0.18	-0.06	19
14-Oct-1996	21:00	64.05	21.05	3.3	4.3	4.1	4.2	3	-0.08	-0.13	-0.07	9
23-Feb-1997	08:45	63.94	22.08			4.0		1	0.04	0.13	-0.03	23
22-Jul-1997	16:22	66.29	18.39	4.6	5.0	4.7	5.0	2	-0.13	-0.26	-0.08	36
22-Jul-1997	16:41	66.28	18.40			3.7		1	-0.04	-0.07	0.03	35
24-Aug-1997	03:04	64.04	21.27	4.2	4.9	4.7	5.0	4	-1.69	0.71	0.40	6
20-Sep-1997	15:38	66.26	18.33	3.9	4.8	4.5		4	-0.45	0.42	-0.19	29
20-Sep-1997	15:52	66.23	18.30	4.2		4.6		5	-0.56	0.48	0.30	31
03-Jun-1998	06:48	64.06	21.26	3.1		3.9		2	0.11	0.13	-0.06	7
04-Jun-1998	19:05	64.04	21.28	4.0		4.2		6	-0.39	0.35	0.16	7
04-Jun-1998	21:37	64.04	21.29	5.2	5.4	5.1	5.4	13	-1.70	1.33	-0.61	6
04-Jun-1998	23:00	63.99	21.30	4.1		4.2		10	-0.57	0.53	0.30	6
13-Nov-1998	10:39	63.95	21.35	4.4	5.1	4.9	5.1	12	1.44	-0.95	0.54	11
14-Nov-1998	14:24	63.96	21.24	4.2		4.7		9	-1.43	-2.31	-0.96	5
25-May-1999	13:20	64.06	21.15	3.5		4.1		9	0.32	0.66	0.27	6
27-Sep-1999	16:01	63.98	20.79	3.6		4.3	4.6	14	0.47	0.49	-0.28	10
28-Sep-1999	21:50	63.98	20.79				(3.8)	9	0.35	-0.34	0.18	10
17-Jun-2000	15:41	63.97	20.36	6.6	6.5	5.7	6.6	26	-6.14	5.02	-6.54	7
17-Jun-2000	15:41	63.95	21.69				(4.8)	8	-0.36	0.34	0.43	14
17-Jun-2000	15:41	63.94	21.94				(4.6)	7	-0.46	0.25	-0.46	(17)
17-Jun-2000	15:43	63.95	20.46			5.7	5.9	21	2.15	-2.19	1.21	6
17-Jun-2000	15:45	63.90	22.13			4.9	(4.6)	3	0.10	-0.04	-0.05	27
17-Jun-2000	15:46	63.96	20.38				(4.4)	9	0.57	0.55	-0.58	14
17-Jun-2000	15:46	63.97	20.58				(4.4)	13	-0.84	-0.40	0.31	6
17-Jun-2000	15:54	64.03	20.41				(3.7)	9	0.70	-0.46	-0.48	4
17-Jun-2000	16:24	64.06	21.31				(3.6)	5	0.14	0.19	0.07	9
17-Jun-2000	17:09	64.04	21.35			3.9	4.7	10	0.16	-0.18	0.12	9
17-Jun-2000	17:40	63.98	20.72	4.4		4.5	4.9	15	-1.67	-2.85	1.20	6
21-Jun-2000	00:52	63.97	20.71	6.6	6.4	6.1	6.5	26	-7.30	8.22	-4.14	5
21-Jun-2000	13:11	63.93	20.75				(3.4)	8	0.32	-0.36	-0.20	5
25-Jun-2000	05:52	63.93	20.75				(3.5)	8	0.35	0.39	0.25	5
01-Jul-2000	13:36	63.99	21.36				(3.6)	5	-0.10	0.12	-0.05	9
18-Sep-2001	23:17	66.27	16.70			4.3	(4.1)	1	0.08	-0.06	0.03	12
16-Sep-2002	18:48	66.93	18.41	5.7	5.8	5.5	5.7	6[8]	-0.10	0.08	-0.05	(89)
23-Aug-2003	02:00	63.91	22.08	4.5	5.1	4.8	5.0	6[8]	-0.07	0.06	-0.03	11

4 M_s refers to surface-wave magnitude, M_w is moment magnitude and m_b is body wave magnitude [ref]. M is a 'moment magnitude' assessed by the authors (see, for instance, [24]), numbers in parenthesis represent M_L published by [13].

5 Number of recording accelerometric stations in the Network producing high quality tri-axial records.

6 The highest recorded peak ground acceleration. The comparison is based on the square root of the sum of the squares of the recorded x-, y- and z-components.

7 Numbers in parentheses indicate that the epicentral distance, D, does not correspond to the given peak ground acceleration.

8 The recorded peak ground acceleration can be lower than 0.04 cm/s^2 for some of the counted recording stations.

The data recorded by the Icelandic Strong-motion Network is now freely available through the ISESD Website, http://www.ISESD.hi.is [25, 26]. The information provided is: raw data, i.e. uncorrected time series, corrected acceleration series, derived velocity series, linear elastic response spectra, associated parameters, including earthquake magnitude, source distances, site characterisation, peak ground acceleration and velocity. The most noteworthy part of the data is also available on a CD ROM [27] including additional information like non-linear earthquake response spectra.

DISCUSSION

Some basic knowledge of the geology of the South Iceland Lowland is needed for the interpretation of the strong-motion data. The surface geology is mostly formed during and after the last ice age as a pile of basaltic lavas, as well as tuff layers, often with intermediate layers of sediments or alluvium. The youngest lavas are from the Holocene (not more than a couple of hundred years old), while the oldest formations are up to 3.3 million years old. In the glacial period Iceland was covered with a plateau glacier. During warmer interglacial periods the ice melted and the glaciers retreated, which resulted in sea level changes up to couple of hundred meters. The South Iceland Lowland was then partly a seabed, accumulating marine sediments. During warm periods, and towards the end of the Pleistocene, when the glacier was retreating and the land rising, glacial streams formed thick sediment layers, composed chiefly of sand and fine-grain gravel. In the postglacial period, some of these sediments were covered by lava, which adds to the complexity of the geological structure of the surface. The lava layers may be as thick as 10 m while the sediment layers can be up to 20 m thick or even more [29]. The shear wave velocity in basaltic rock is typically in the range 2 to 2.8 km/s, depending on how dense the rock are, while the shear wave velocity in tuff and sedimentary rock is, respectively, 850 m/s and 1000 m/s on the average.

The complexity of the surface geology characterised by the lava piles, tuff and sedimentary formations, is augmented further by fractures, fissures and faults of tectonic origin. These intricacies tend to increase earthquake-induced effects as already noticed in the 1896 destructive earthquakes [8]. The magnification of earthquake induced ground motion as recorded by the Icelandic Strong-Motion Network has been dealt with by Olafsson [24] and Bessason [28]. The ground response stations are classified according to Boore et al. [30] classification scheme. The majority of the stations fall into the rock class ($v_{s,30} > 750$ m/s) leaving only two stations (109 and 111) in the stiff soil class (360 m/s $< v_{s,30} <$ 750 m/s). This classification should, however, be treated with some caution due to the inherent complex geological structure outlined above. Further studies into the classification of the stations are therefore in progress.

CONCLUSIONS

Iceland, located on the Mid-Atlantic Ridge, is a seismically active area. There are two transform zones where most of the significant earthquakes occur. The South-Iceland Seismic Zone (SISZ) located in a populated area and the Tjörnes Fracture Zone (TFZ) in North-Iceland. The SISZ is currently relatively well instrumented, with networks comprised of sensors for various geophysical and strong motion measurements. Earthquakes in the two zones are typically rather shallow and have, in most cases, a strike-slip mechanism.

The Icelandic Strong-Motion Network has been in operation in both SISZ and TFZ since the mid eighties. Strong motion acceleration from several moderate sized earthquakes has been recorded during that period. The most notable events are: the magnitude 6 Vatnafjöll earthquake, May 25 1987, and the South-Iceland earthquakes on June 17th and 21st in 2000 (magnitude 6½ events). In the June 2000 events several high-quality ground acceleration records, as well as structural response records, were obtained, including several near-field records with very high pga-values. The records provide important information for further earthquake risk mitigation, providing a basis for improved codes of practice and realistic design action. Records obtained in the Icelandic Strong-Motion Network, above magnitude 4, are now freely available through the ISESD Website, http://www.ISESD.hi.is.

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