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SIMBAD: a database with Selected Input Motions for displacement-Based Assessment and Design – 3rd release

by

Chiara Smerzini & Roberto Paolucci

Department of Structural Engineering

Politecnico di Milano, ITALY

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1 Scope

In response to the objectives of the RELUIS Project Line 2 "*Development of displacement-based approaches for vulnerability assessment*", funded by the Department of Civil Protection from 2010 to 2013, the construction of a strong ground motion database suitable for displacement-based design and assessment was achieved by the Research Unit at the Department of Structural Engineering of Politecnico di Milano.

One of the key issues related to the definition of the seismic demand in terms of displacement spectra within displacement-based procedures for both design and assessment purposes is the availability of reliable response spectral ordinates up to long periods, say about 10 s, of potential interest for engineering applications. The need of reliable displacement spectral ordinates over a broad range of periods (< 10 s) leads to the selection of worldwide good quality accelerograms, provided in most cases by digital instruments.

The SIMBAD database (***S****elected* ***I****nput* ***M****otions for displacement-****B****ased* ***A****ssessment and* ***D****esign*) was created by assembling records from different worldwide strong ground motion databases, with the main objective of providing records of engineering relevance for the most frequent design conditions in Italy.

2 Data selection

The 3rd release of the *SIMBAD* database consists of 467 three-component accelerograms, selected according to the following criteria:

a) shallow crustal earthquakes worldwide with moment magnitude M_W ranging from 5 to 7.3 and epicentral distance R_{epi} approximately less than 30 km. This ensures to provide strong ground motion records of engineering relevance for most of the design conditions of interest in Italy, that can be used without introducing scaling factors.

b) Good quality at long periods, so that we considered, expect for a few exceptions, only records for which the high-pass cut-off frequency used by the data provider is below 0.15 Hz. Therefore, most records are from digital instruments, while from analog instruments only those records with a good signal to noise ratios at long periods, typically from large magnitude earthquakes, were retained.

c) Availability of V_{S30} measurements (*preferable*) or definition of the Eurocode 8 (CEN, 2004) site class based on quantitative criteria.

3 Data source and processing

The sources of strong ground motion records are summarized in Table 1.

In general, raw acceleration time histories were processed according to the procedure devised by Paolucci et al. (2010) and applied to the Italian ACcelerometric Archive (ITACA, http://itaca.mi.ingv.it), with special care to ensure compatibility of corrected records. The latter requirement means that single and double integration of the corrected accelerograms produce velocity and displacement time series with zero initial conditions and without unphysical baseline trends, so that no further correction is needed. For each record, the same filter band was selected and applied to the three spatial components. Except for a few exceptions, records were included in SIMBAD only if the high-pass filter frequency was not larger than 0.15 Hz.

It is worth recalling herein that only for the ground motions derived from ITACA or from USA providers (PEER, CESMD and NSMP databases, see Table 1), corrected records were included in SIMBAD as disseminated by the data provider, without re-processing raw records.

From an operational viewpoint, the database is handled through the relational database management system Microsoft Access (see example in Figure 1). The compiled database is organized into three main sections:

1. Earthquakes: event name and date, area, M_W, focal mechanism, event latitude and longitude, focal depth, fault solutions (strike, dip, rake, fault length, fault width, fault depth, reference for source inversion);
2. Stations: station code and name, station latitude and longitude, elevation above the sea level, site class according to EC8, V_{S30} measurements, type of instrument, analog/digital recorder, data source;
3. Records: station code, epicentral distance, hypocentral distance, Joyner-Boore distance, fault distance, record file name, sampling time interval, data units, type of record processing, high-pass and low-pass filtering,

Table 1 Sources of strong ground motion records of the SIMBAD database.

Country/area	No. of records	Source	Website
Japan[§]	**220**	***K-NET***	*http://www.k-net.bosai.go.jp/*
		KiK-net	*http://www.kik.bosai.go.jp/*
Italy	**83**	**ITalian ACcelerometric Archive: *ITACA***	*http://itaca.mi.ingv.it/*
		Department of Civil Protection	*http://www.protezionecivile.gov.it/*
USA	**44**	**Center for Engineering Strong Ground Motion Data: *CESMD***	*http://strongmotioncenter.org/*
		***PEER* Strong Motion Database**	*http://peer.berkeley.edu/peer_ground_motion_database*
		U.S. Geological Survey National Strong Motion Project: *NSMP*	*http://nsmp.wr.usgs.gov/*
Europe	**18**	**European Strong-Motion Data Base: *ESMD***	*http://www.isesd.hi.is/*
New Zealand	**77**	**Institute of Geological and Nuclear Sciences: *GNS***	*http://www.geonet.org.nz*
Turkey	**15**	**Turkish National Strong Motion Project: *T-NSMP***	*http://daphne.deprem.gov.tr*
Greece	**7**	**Institute of Engineering Seismology and Earthquake Engineering**	*http://www.itsak.gr/en/head*
Iran	**3**	**Iran Strong Motion Network *ISMN***	*http://www.bhrc.ac.ir/*
Tot	**467**		

[§]*Records from the 1995 Hyogo-ken Nanbu earthquake come from the ESG98 data distribution CD-ROM for the Kobe Simultaneous Simulation*

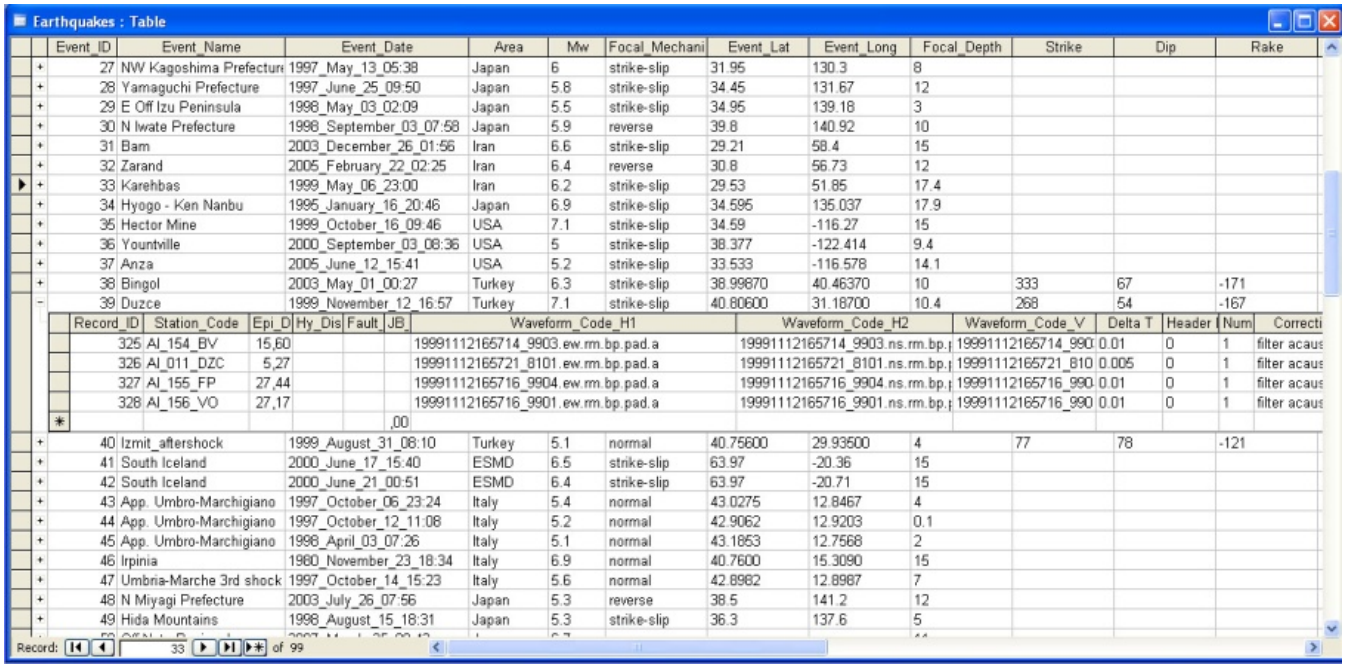

Figure 1 Development of the strong ground motion database in Microsoft Access: structure of the archive of accelerograms.

4 Data format

SIMBAD includes only processed records (raw data are not provided), using a homogeneous format, with sampling time interval Δt = 0.005 s and units = cm/s^2.

Filename

Similarly to the data format adopted for the ITACA database, the record filename is uniquely determined by the earthquake date and time, the station code and the measured component, according to the following format:

yyyymmdd_hhmm_StationCode_Component

As an example, *20120529_0700_MRN_EW* is the filename associated to the record obtained at Mirandola (MRN), EW component, during the earthquake occurred on May 29, 2012 at 0700 (UTC).

File extension

The adopted file extensions are listed below:

*.acc: acceleration time history;

*.vel: velocity time history;

*.dis: displacement time history;

*.sa: pseudo-acceleration response spectrum;

*.sd: displacement response spectrum.

Header lines

Each ASCII record file includes 43 header lines summarizing the most significant metadata (when available) related to the waveform (see Table 2).

Table 2 Header lines of the ASCII waveform files in the database.

No.	Description	No.	Description
1	Event_Name	*23*	Length_km
2	Event_Date_yyyymmdd	*24*	Width_km
3	Event_Time_hhmm	*25*	Depth_top_km
4	Event_Latitude_deg	*26*	Reference_fault
5	Event_Longitude_deg	*27*	Sampling_Time_s
6	Event_Depth_km	*28*	N_Data
7	Magnitude_W	*29*	Duration_s
8	Focal_Mechanism	*30*	Component
9	Station_Code	*31*	Units
10	Station_Name	*32*	Instrument
11	Station_Latitude_deg	*33*	Instrument_Analog_Digital
12	Station_Longitude_deg	*34*	Data_Source
13	Station_Elevation_m	*35*	PGA_cm_s_s (or PGV_cm_s or PGD_cm)
14	Site_Classification_EC8	*36*	Time_PGA_s (or Time_PGV_s or Time_PGD_s)
15	VS30_m_s	*37*	Filter_Type
16	Epicentral_Distance_km	*38*	Low_Cut_Frequency_Hz
17	Hypocentral_Distance_km	*39*	High_Cut_Frequency_Hz
18	Fault_Distance_km	*40*	Late_Normal_Triggered
19	JB_Distance_km	*41*	Waveform_ID
20	Strike_deg	*42*	Event_ID
21	Dip_deg	*43*	Data_Version
22	Rake_deg		

5 Main features of the strong ground motion database

Figure 2 shows the distribution of magnitude and distance for the acceleration records compiled in the database. As mentioned previously, at present the database consists of 467 three-component acceleration time histories, from 130 earthquakes worldwide (see Annex A). Most of records (about 90%) included in the database are from digital instruments, while a limited number of analog records was retained, typically from large magnitude earthquakes, for which a good signal to noise ratio at long periods could be achieved. Most records come from Japan (47%), Italy (18%), New Zealand (17%), and USA (9%), with minor contributions from Greece, Turkey, Iran and other European countries (9%), as shown in Figure 3.

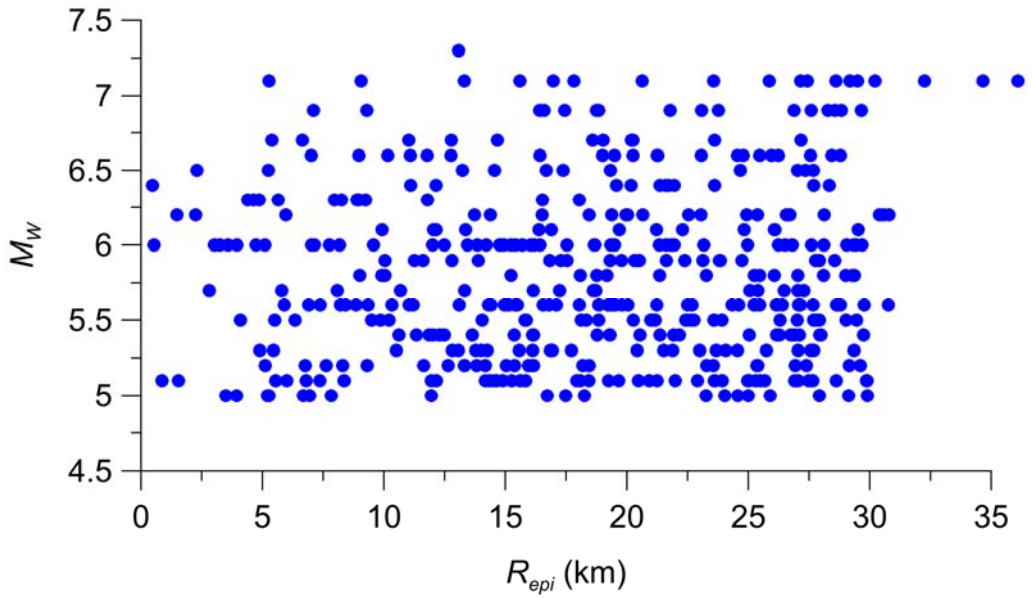

Figure 2 Distribution of magnitude and epicentral distance (R_{epi}) for the SIMBAD records.

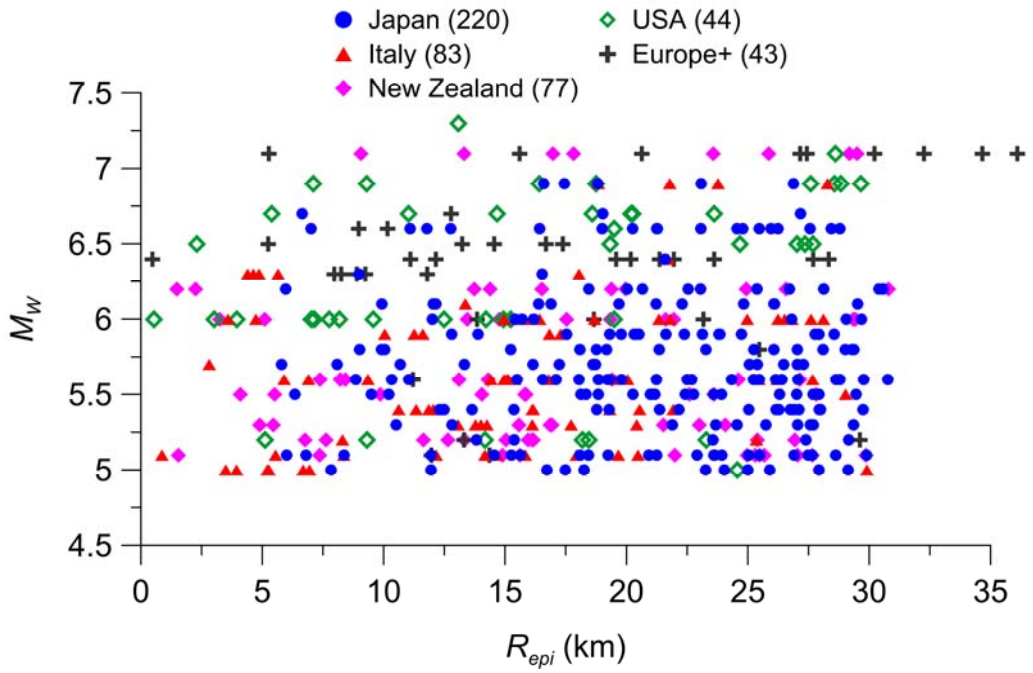

Figure 3 Geographic origin of the SIMBAD records.

Based on the European (CEN, 2004) and Italian (CS.LL.PP, 2008) seismic norms, we adopted the site classification into 5 ground categories: A (rock, $V_{S30} \geq 800$ m/s), B ($360 \leq V_{S30} < 800$ m/s), C ($180 \leq V_{S30} < 360$ m/s), D ($V_{S30} < 180$ m/s) and E (site C or D with thickness smaller than 20 m over rigid rock)*. Most records are representative of soil B (44%) and C (43%), while only a few of them are registered on rock (8%), or soft soils D (4%) and E (1%), as depicted in Figure 4.

* Following the ITACA notation, a star after the letter denotes that the value of V_{S30} is not available and, thus, soil classification is mainly based on geological criteria.

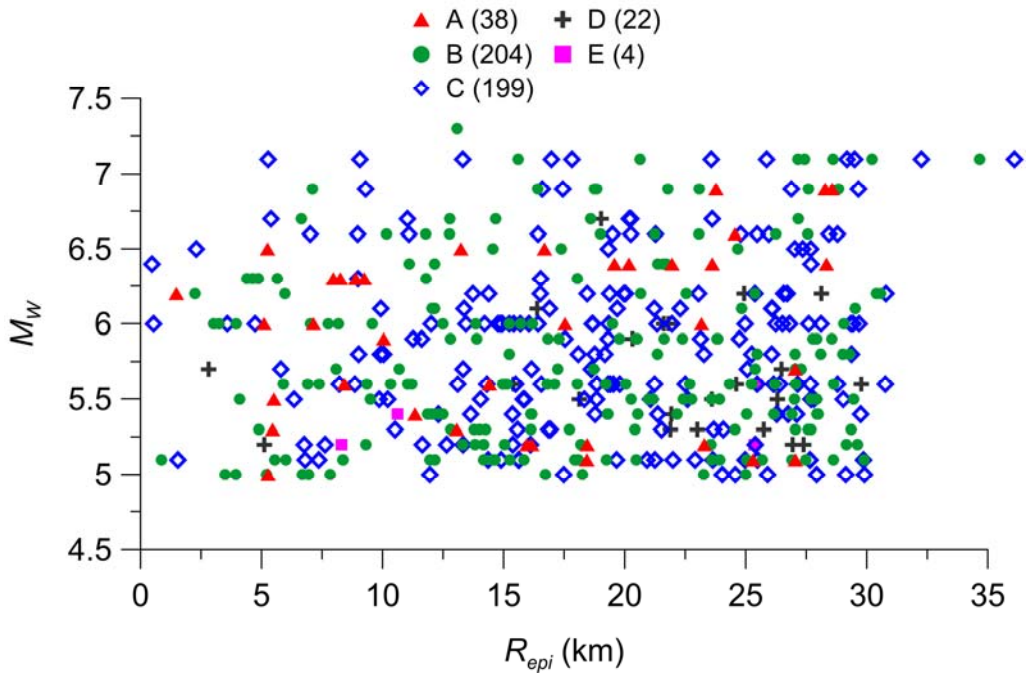

Figure 4 Distribution of magnitude, distance and ground categories of records.

6 3rd release of SIMBAD

The 3rd version of the SIMBAD database will be released with the January 31, 2013 new release of REXEL-DISP (v 1.2) software for selection of displacement-spectrum compatible real strong ground motion records, freely available at http://www.reluis.it.

A CD-ROM of the final version of SIMBAD will be released at the end of the RELUIS project.

References

CEN (2004) prEN 1998-1 Eurocode 8: Design of structures for earthquake resistance - Part 1: General rules, seismic actions and rules for buildings.

CS.LL.PP; DM 14 Gennaio 2008: Norme tecniche per le costruzioni. Gazzetta Ufficiale della Repubblica Italiana, 29

Paolucci R, Pacor F, Puglia R, Ameri G, Cauzzi C, Massa M, 2011. Record Processing in ITACA, the New Italian Strong-Motion Database. In Akkar S, Gülkan P, van Eck T (Eds.) Earthquake Data in Engineering Seismology. Geotechnical, Geological, and Earthquake Engineering 14, 99-113.

ANNEX A

Event_Name	Event_Date	Area	Lat	Lon	D_km	M_W	Station	Slat	Slon	Soil	VS30_m_s	Repi_km	A/D	Data_source
Near Miyakejima Island	2000_June_29	Japan	34.13	139.35	20	5.6	TKY011	34.119	139.535	B	408	17.11	D	KNET
Near Miyakejima Island	2000_June_29	Japan	34.13	139.35	20	5.6	TKY010	34.3779	139.2573	C	235	28.79	D	KNET
Near Niijima Island	2000_July_01	Japan	34.2	139.22	15	6.2	TKY010	34.3779	139.2573	C	235	20.03	D	KNET
Near Niijima Island	2000_July_01	Japan	34.2	139.22	15	6.2	TKY011	34.119	139.535	B	408	30.4	D	KNET
Near Miyakejima Island	2000_July_02	Japan	34.15	139.33	18	5.6	TKY011	34.119	139.535	B	408	19.22	D	KNET
Near Miyakejima Island	2000_July_02	Japan	34.15	139.33	18	5.6	TKY010	34.3779	139.2573	C	235	26.15	D	KNET
Near Miyakejima Island	2000_July_08	Japan	34.22	139.25	14	5.9	TKY010	34.3779	139.2573	C	235	17.53	D	KNET
Near Miyakejima Island	2000_July_08	Japan	34.22	139.25	14	5.9	TKY011	34.119	139.535	B	408	28.56	D	KNET
Near Niijima Island	2000_July_23	Japan	34.2	139.24	9	5.6	TKY010	34.3779	139.2573	C	235	19.8	D	KNET
Near Niijima Island	2000_July_23	Japan	34.2	139.24	9	5.6	TKY011	34.119	139.535	B	408	28.64	D	KNET
Near Miyakejima Island	2000_July_27	Japan	34.19	139.29	12	5.5	TKY010	34.3779	139.2573	C	235	21.06	D	KNET
Near Miyakejima Island	2000_July_27	Japan	34.19	139.29	12	5.5	TKY011	34.119	139.535	B	408	23.92	D	KNET
Near Miyakejima Island	2000_July_30	Japan	34.01	139.38	14	5.7	TKY011	34.119	139.535	B	408	18.73	D	KNET
Near Miyakejima Island	2000_July_30	Japan	33.96	139.4	18	6.4	TKY011	34.119	139.535	B	408	21.59	D	KNET
Near Miyakejima Island	2000_July_30	Japan	34.01	139.39	18	5.6	TKY011	34.119	139.535	B	408	18.04	D	KNET
Near Niijima Island	2000_August_03	Japan	34.24	139.24	12	5.2	TKY010	34.3779	139.2573	C	235	15.38	D	KNET
Near Niijima Island	2000_August_18	Japan	34.21	139.26	11	5.7	TKY010	34.3779	139.2573	C	235	18.62	D	KNET
Near Niijima Island	2000_August_18	Japan	34.21	139.26	11	5.7	TKY011	34.119	139.535	B	408	27.29	D	KNET
W Tottori Prefecture	2000_October_06	Japan	35.27	133.35	11	6.6	OKYH07	35.05	133.32	A	929	24.56	D	KIKNET
W Tottori Prefecture	2000_October_06	Japan	35.27	133.35	11	6.6	TTR009	35.168	133.314	B	486	11.78	D	KNET
W Tottori Prefecture	2000_October_06	Japan	35.27	133.35	11	6.6	TTR007	35.279	133.49	B	429	12.77	D	KNET
W Tottori Prefecture	2000_October_06	Japan	35.27	133.35	11	6.6	SMN015	35.361	133.173	B	549	19	D	KNET
W Tottori Prefecture	2000_October_06	Japan	35.27	133.35	11	6.6	SMN003	35.1795	133.0929	C	339	25.47	D	KNET
Shimane Hiroshima Border	2000_October_08	Japan	35.14	133.15	8	5.1	OKYH07	35.05	133.32	A	929	18.44	D	KIKNET

Shimane Hiroshima Border	2000_October_08	Japan	35.14	133.15	8	5.1	SMN003	35.1795	133.0929	C	339	6.8	D	KNET
Shimane Hiroshima Border	2000_October_08	Japan	35.14	133.15	8	5.1	TTR009	35.168	133.314	B	486	15.26	D	KNET
Shimane Hiroshima Border	2000_October_08	Japan	35.14	133.15	8	5.1	HRS021	34.95	133.12	C	358	21.25	D	KNET
Shimane Hiroshima Border	2000_October_08	Japan	35.14	133.15	8	5.1	HRS001	35.031	132.904	C	353	25.49	D	KNET
Shimane Hiroshima Border	2000_October_08	Japan	35.14	133.15	8	5.1	SMN004	35.285	132.903	C	306	27.65	D	KNET
Shimane Hiroshima Border	2000_October_08	Japan	35.14	133.15	8	5.1	HRS002	34.892	133.278	B	397	29.89	D	KNET
N Miyagi Prefecture	2003_July_25	Japan	38.434	141.164	12	5.5	MYG010	38.4282	141.2809	C	279	10.22	D	KNET
N Miyagi Prefecture	2003_July_25	Japan	38.434	141.164	12	5.5	MYG012	38.3145	141.0227	D	114	18.12	D	KNET
N Miyagi Prefecture	2003_July_25	Japan	38.434	141.164	12	5.5	MYG013	38.2633	140.9327	C	274	27.7	D	KNET
N Miyagi Prefecture	2003_July_25	Japan	38.405	141.171	12	6.1	MYG010	38.4282	141.2809	C	279	9.93	D	KNET
N Miyagi Prefecture	2003_July_25	Japan	38.405	141.171	12	6.1	MYG012	38.3145	141.0227	D	114	16.39	D	KNET
N Miyagi Prefecture	2003_July_25	Japan	38.405	141.171	12	6.1	MYG007	38.5847	141.2541	C	206	21.22	D	KNET
N Miyagi Prefecture	2003_July_25	Japan	38.405	141.171	12	6.1	MYG009	38.4436	140.8908	B	529	24.83	D	KNET
N Miyagi Prefecture	2003_July_25	Japan	38.405	141.171	12	6.1	MYG013	38.2633	140.9327	C	274	26.1	D	KNET
Mid Niigata Prefecture	2004_October_23	Japan	37.292	138.867	13	6.6	NIG019	37.3057	138.7898	C	313	7.01	D	KNET
Mid Niigata Prefecture	2004_October_23	Japan	37.292	138.867	13	6.6	NIG020	37.23	138.965	C	354	11.09	D	KNET
Mid Niigata Prefecture	2004_October_23	Japan	37.292	138.867	13	6.6	NIG017	37.439	138.846	C	281	16.42	D	KNET
Mid Niigata Prefecture	2004_October_23	Japan	37.292	138.867	13	6.6	NIG021	37.125	138.75	B	412	21.25	D	KNET
Mid Niigata Prefecture	2004_October_23	Japan	37.292	138.867	13	6.6	NIG022	37.033	138.849	C	203	28.79	D	KNET
Mid Niigata Prefecture	2004_October_23	Japan	37.292	138.867	13	6.6	NIG018	37.369	138.561	C	199	28.44	D	KNET
Mid Niigata Prefecture	2004_October_23	Japan	37.306	138.93	14	6.3	NIG020	37.23	138.965	C	354	8.99	D	KNET
Mid Niigata Prefecture	2004_October_23	Japan	37.306	138.93	14	6.3	NIG017	37.439	138.846	C	281	16.53	D	KNET
Rumoi	2004_December_14	Japan	44.077	141.7	9	5.7	HKD020	44.146	141.668	B	579	8.08	D	KNET
Rumoi	2004_December_14	Japan	44.077	141.7	9	5.7	HKD024	44.047	141.861	C	336	13.32	D	KNET
Rumoi	2004_December_14	Japan	44.077	141.7	9	5.7	HKD021	43.938	141.641	C	291	16.15	D	KNET
NW Off Kyushu	2005_March_20	Japan	33.739	130.176	9	6.6	FKO007	33.558	130.205	C	283	20.25	D	KNET
NW Off Kyushu	2005_March_20	Japan	33.739	130.176	9	6.6	FKO006	33.5969	130.3985	C	195	25.96	D	KNET
NE Fukuoka Prefecture	2005_April_19	Japan	33.678	130.288	14	5.4	FKO006	33.5969	130.3985	C	195	13.64	D	KNET

NE Fukuoka Prefecture	2005_April_19	Japan	33.678	130.288	14	5.4	FKO007	33.558	130.205	C	283	15.37	D	KNET
NE Fukuoka Prefecture	2005_April_19	Japan	33.678	130.288	14	5.4	FKO001	33.844	130.515	B	561	27.95	D	KNET
NE Fukuoka Prefecture	2005_April_19	Japan	33.678	130.288	14	5.4	FKO009	33.492	130.519	C	323	29.75	D	KNET
Honshu	1996_August_10	Japan	38.92	140.63	7	5.9	MYG005	38.7963	140.6541	B	361	13.89	D	KNET
Honshu	1996_August_10	Japan	38.92	140.63	7	5.9	AKT019	39.0384	140.451	D	180	20.32	D	KNET
Honshu	1996_August_10	Japan	38.9	140.7	10	5.7	AKT019	39.0384	140.451	D	180	26.48	D	KNET
Honshu	1996_August_10	Japan	38.9	140.7	10	5.7	AKT023	39.1433	140.7205	B	483	27.06	D	KNET
Kyushu	1996_September_09	Japan	30.5	130.9	20	5.7	KGS026	30.517	130.957	C	312	5.79	D	KNET
Kyushu	1996_September_09	Japan	30.5	130.9	20	5.7	KGS027	30.345	130.885	B	364	17.24	D	KNET
Kyushu	1996_September_09	Japan	30.5	130.9	20	5.7	KGS025	30.728	131	A	889	27.04	D	KNET
Central Izu Peninsula	1997_March_04	Japan	34.95	139.17	2	5.5	SZO002	34.9652	139.1031	C	325	6.34	D	KNET
Central Izu Peninsula	1997_March_04	Japan	34.95	139.17	2	5.5	SZO003	34.813	139.058	C	222	18.33	D	KNET
Central Izu Peninsula	1997_March_04	Japan	34.95	139.17	2	5.5	SZO007	34.974	138.95	B	459	20.27	D	KNET
Central Izu Peninsula	1997_March_04	Japan	34.95	139.17	2	5.5	SZO001	35.139	139.083	B	414	22.42	D	KNET
Central Izu Peninsula	1997_March_04	Japan	34.95	139.17	2	5.5	TKY008	34.782	139.394	B	433	27.69	D	KNET
NW Kagoshima Prefecture	1997_March_26	Japan	31.98	130.37	8	6.1	KGS002	32.088	130.356	B	493	12.05	D	KNET
NW Kagoshima Prefecture	1997_March_26	Japan	31.98	130.37	8	6.1	KGS005	31.897	130.454	B	390	12.15	D	KNET
NW Kagoshima Prefecture	1997_March_26	Japan	31.98	130.37	8	6.1	KGS004	32.011	130.195	C	201	16.89	D	KNET
NW Kagoshima Prefecture	1997_March_26	Japan	31.98	130.37	8	6.1	KGS007	31.811	130.306	C	210	19.69	D	KNET
NW Kagoshima Prefecture	1997_March_26	Japan	31.98	130.37	8	6.1	KGS003	32.053	130.59	C	277	22.3	D	KNET
NW Kagoshima Prefecture	1997_March_26	Japan	31.98	130.37	8	6.1	KMM015	32.213	130.407	C	351	26.07	D	KNET
NW Kagoshima Prefecture	1997_March_26	Japan	31.98	130.37	8	6.1	KGS001	32.191	130.179	B	403	29.53	D	KNET
NW Kagoshima Prefecture	1997_April_02	Japan	31.98	130.32	9	5.4	KGS004	32.011	130.195	C	201	12.3	D	KNET
NW Kagoshima Prefecture	1997_April_02	Japan	31.98	130.32	9	5.4	KGS007	31.811	130.306	C	210	18.78	D	KNET
NW Kagoshima Prefecture	1997_April_02	Japan	31.98	130.32	9	5.4	KMM015	32.213	130.407	C	351	27.11	D	KNET
NW Kagoshima Prefecture	1997_April_02	Japan	31.98	130.32	9	5.4	KGS001	32.191	130.179	B	403	26.91	D	KNET
NW Kagoshima Prefecture	1997_April_02	Japan	31.98	130.32	9	5.4	KGS003	32.053	130.59	C	277	26.76	D	KNET
NW Kagoshima Prefecture	1997_May_13	Japan	31.95	130.3	8	6	KGS004	32.011	130.195	C	201	12.01	D	KNET

NW Kagoshima Prefecture	1997_May_13	Japan	31.95	130.3	8	6	KGS007	31.811	130.306	C	210	15.42	D	KNET
NW Kagoshima Prefecture	1997_May_13	Japan	31.95	130.3	8	6	KGS002	32.088	130.356	B	493	16.19	D	KNET
NW Kagoshima Prefecture	1997_May_13	Japan	31.95	130.3	8	6	KGS005	31.897	130.454	B	390	15.7	D	KNET
NW Kagoshima Prefecture	1997_May_13	Japan	31.95	130.3	8	6	KGS010	31.709	130.276	C	275	26.81	D	KNET
NW Kagoshima Prefecture	1997_May_13	Japan	31.95	130.3	8	6	KGS001	32.191	130.179	B	403	29.06	D	KNET
NW Kagoshima Prefecture	1997_May_13	Japan	31.95	130.3	8	6	KGS003	32.053	130.59	C	277	29.68	D	KNET
Yamaguchi Prefecture	1997_June_25	Japan	34.45	131.67	12	5.8	SMN014	34.464	131.778	C	342	10.05	D	KNET
Yamaguchi Prefecture	1997_June_25	Japan	34.45	131.67	12	5.8	YMG003	34.38	131.603	C	295	9.91	D	KNET
Yamaguchi Prefecture	1997_June_25	Japan	34.45	131.67	12	5.8	YMG001	34.614	131.604	C	184	19.18	D	KNET
Yamaguchi Prefecture	1997_June_25	Japan	34.45	131.67	12	5.8	YMG002	34.404	131.401	C	181	25.25	D	KNET
Yamaguchi Prefecture	1997_June_25	Japan	34.45	131.67	12	5.8	SMN012	34.35	131.938	B	456	27.04	D	KNET
Yamaguchi Prefecture	1997_June_25	Japan	34.45	131.67	12	5.8	YMG009	34.229	131.819	B	368	28.1	D	KNET
Yamaguchi Prefecture	1997_June_25	Japan	34.45	131.67	12	5.8	SMN013	34.666	131.848	B	668	29.01	D	KNET
E Off Izu Peninsula	1998_May_03	Japan	34.95	139.18	3	5.5	SZO003	34.813	139.058	C	222	18.85	D	KNET
E Off Izu Peninsula	1998_May_03	Japan	34.95	139.18	3	5.5	SZO007	34.974	138.95	B	459	21.17	D	KNET
E Off Izu Peninsula	1998_May_03	Japan	34.95	139.18	3	5.5	SZO001	35.139	139.083	B	414	22.76	D	KNET
E Off Izu Peninsula	1998_May_03	Japan	34.95	139.18	3	5.5	TKY008	34.782	139.394	B	433	27.02	D	KNET
N Iwate Prefecture	1998_September_03	Japan	39.8	140.92	10	5.9	IWT021	39.918	141.086	C	286	19.32	D	KNET
N Iwate Prefecture	1998_September_03	Japan	39.8	140.92	10	5.9	AKT012	39.696	140.722	B	384	20.52	D	KNET
N Iwate Prefecture	1998_September_03	Japan	39.8	140.92	10	5.9	AKT022	39.7711	140.6702	B	487	21.63	D	KNET
N Iwate Prefecture	1998_September_03	Japan	39.8	140.92	10	5.9	IWT018	39.6925	141.1513	C	358	23.13	D	KNET
Bam	2003_December_26	Iran	29	58.33	10	6.6	3168-2	29.09	58.35	B		10.16	D	ISMN
Zarand	2005_February_22	Iran	30.8	56.73	12	6.4	3660-1	30.605	56.911	C		27.7	D	ISMN
Yountville	2000_September_03	USA	38.377	-122.414	9.4	5	732	38.267	-122.658	C	338.5	24.57	D	PEER
Anza	2005_June_12	USA	33.533	-116.578	14.1	5.2	2044	33.578	-116.59	D		5.11	D	NSMP
Anza	2005_June_12	USA	33.533	-116.578	14.1	5.2	605	33.5558	-116.6745	B		9.31	D	NSMP
Anza	2005_June_12	USA	33.533	-116.578	14.1	5.2	515	33.6076	-116.4541	B	724.9	14.17	D	NSMP
Anza	2005_June_12	USA	33.533	-116.578	14.1	5.2	2139	33.6022	-116.7557	B		18.19	D	NSMP

Anza	2005_June_12	USA	33.533	-116.578	14.1	5.2		2050	33.6758	-116.68	A		18.45	D	NSMP
Anza	2005_June_12	USA	33.533	-116.578	14.1	5.2		604	33.7077	-116.7174	A	845.4	23.29	D	NSMP
Izmit_aftershock	1999_August_31	Turkey	40.756	29.935	4	5.1	YPT		40.756	29.765	C	297	14.36	D	ESMD
South Iceland	2000_June_17	Iceland	63.97	-20.36	15	6.5		105	63.84	-20.39	B		14.56	D	ESMD
South Iceland	2000_June_17	Iceland	63.97	-20.36	15	6.5		106	63.991	-20.264	A		5.25	D	ESMD
South Iceland	2000_June_17	Iceland	63.97	-20.36	15	6.5		108	64.05	-20.16	A		13.23	D	ESMD
South Iceland	2000_June_17	Iceland	63.97	-20.36	15	6.5		109	64.065	-20.642	B		17.38	D	ESMD
South Iceland	2000_June_21	Iceland	63.97	-20.71	15	6.4		102	64.002	-21.187	A		23.61	D	ESMD
South Iceland	2000_June_21	Iceland	63.97	-20.71	15	6.4		103	64.004	-20.474	B		12.15	D	ESMD
South Iceland	2000_June_21	Iceland	63.97	-20.71	15	6.4		105	63.84	-20.39	B		21.37	D	ESMD
South Iceland	2000_June_21	Iceland	63.97	-20.71	15	6.4		106	63.991	-20.264	A		21.96	D	ESMD
South Iceland	2000_June_21	Iceland	63.97	-20.71	15	6.4		108	64.05	-20.16	A		28.33	D	ESMD
South Iceland	2000_June_21	Iceland	63.97	-20.71	15	6.4		109	64.065	-20.642	B		11.1	D	ESMD
South Iceland	2000_June_21	Iceland	63.97	-20.71	15	6.4		113	64.002	-21.187	A		23.61	D	ESMD
South Iceland	2000_June_21	Iceland	63.97	-20.71	15	6.4		305	64.088	-21.007	A		19.58	D	ESMD
South Iceland	2000_June_21	Iceland	63.97	-20.71	15	6.4		306	64.094	-21.011	A		20.18	D	ESMD
App. Umbro-Marchigiano	1998_April_03	Italy	43.1853	12.7568	2	5.1	GBP		43.313	12.589	C	224	19.67	D	ITACA
N Miyagi Prefecture	2003_July_26	Japan	38.5	141.2	12	5.3	MYG007		38.5847	141.2541	C	206	10.51	D	KNET
N Miyagi Prefecture	2003_July_26	Japan	38.5	141.2	12	5.3	MYG006		38.5772	140.9688	D	165	21.89	D	KNET
N Miyagi Prefecture	2003_July_26	Japan	38.5	141.2	12	5.3	MYG012		38.3145	141.0227	D	114	25.75	D	KNET
N Miyagi Prefecture	2003_July_26	Japan	38.5	141.2	12	5.3	MYG008		38.574	141.4549	C	254	23.68	D	KNET
N Miyagi Prefecture	2003_July_26	Japan	38.5	141.2	12	5.3	MYG009		38.4436	140.8908	B	529	27.69	D	KNET
N Miyagi Prefecture	2003_July_26	Japan	38.5	141.2	12	5.3	MYG003		38.7319	141.3141	B	471	27.58	D	KNET
N Miyagi Prefecture	2003_July_26	Japan	38.5	141.2	12	5.3	MYG004		38.7263	141.0252	B	446	29.36	D	KNET
Hida Mountains	1998_August_15	Japan	36.32	137.63	5	5.3	GIF004		36.2492	137.5174	B	450	12.81	D	KNET
Hida Mountains	1998_August_15	Japan	36.3	137.6	5	5.3	NGN009		36.3378	137.8694	B	403	24.56	D	KNET
Hida Mountains	1998_August_15	Japan	36.3	137.6	5	5.3	GIF003		36.3322	137.3014	B	541	27.06	D	KNET
Off Noto Peninsula	2007_March_25	Japan	37.22	136.69	11	6.7	ISK006		37.1602	136.6897	B	391	6.64	D	KNET

Off Noto Peninsula	2007_March_25	Japan	37.22	136.69	11	6.7	ISK005	37.2307	136.9039	D	123	19.02	D	KNET
Off Noto Peninsula	2007_March_25	Japan	37.22	136.69	11	6.7	ISK003	37.3919	136.9083	B	558	27.17	D	KNET
Southern Iwate Prefecture	2008_June_13	Japan	39.028	140.88	8	6.9	IWT010	38.9334	141.1173	B	744	23.08	D	KNET
Southern Iwate Prefecture	2008_June_13	Japan	39.028	140.88	8	6.9	AKT023	39.1433	140.7205	B	483	18.82	D	KNET
Southern Iwate Prefecture	2008_June_13	Japan	39.028	140.88	8	6.9	IWT011	39.1454	141.152	C	275	26.89	D	KNET
S Suruga Bay	2009_August_10	Japan	34.785	138.498	23	6.2	SZO005	34.752	138.787	C	225	26.71	D	KNET
S Suruga Bay	2009_August_10	Japan	34.785	138.498	23	6.2	SZO013	35.038	138.479	D	137	28.13	D	KNET
S Suruga Bay	2009_August_10	Japan	34.785	138.498	23	6.2	SZO014	34.962	138.377	B	398	22.54	D	KNET
S Suruga Bay	2009_August_10	Japan	34.785	138.498	23	6.2	SZO016	34.853	138.314	C	232	18.45	D	KNET
S Suruga Bay	2009_August_10	Japan	34.785	138.498	23	6.2	SZO018	34.737	138.227	B	363	25.38	D	KNET
Mid Niigata Prefecture	2004_November_09	Japan	37.37	139	5	5.1	NIG017	37.439	138.846	C	281	15.64	D	KNET
Noto Peninsula	2007_March_25	Japan	37.303	136.838	13	5.2	ISK004	37.308	137.147	D	160	27.4	D	KNET
N Mie Prefecture	2007_April_15	Japan	34.79	136.407	16	5	MIE002	35.0279	136.5073	C	293	27.93	D	KNET
N Mie Prefecture	2007_April_15	Japan	34.79	136.407	16	5	MIE006	34.7178	136.5039	C	233	11.95	D	KNET
N Mie Prefecture	2007_April_15	Japan	34.79	136.407	16	5	MIE007	34.6435	136.3365	C	315	17.48	D	KNET
N Mie Prefecture	2007_April_15	Japan	34.79	136.407	16	5	MIE009	34.5788	136.5276	C	279	25.9	D	KNET
Southern Iwate Prefecture	2008_June_14	Japan	38.88	140.677	6	5.5	MYG005	38.7963	140.6541	B	361	9.5	D	KNET
Off S Niigata Prefecture	2007_July_16	Japan	37.557	138.608	17	6.6	NIG017	37.439	138.846	C	281	24.79	D	KNET
Off S Niigata Prefecture	2007_July_16	Japan	37.557	138.608	17	6.6	NIG018	37.369	138.561	C	199	21.28	D	KNET
Mid Niigata Prefecture	2004_October_27	Japan	37.291	139.032	12	5.8	FKS028	37.346	139.318	C	318	26.07	D	KNET
Mid Niigata Prefecture	2004_October_27	Japan	37.291	139.032	12	5.8	NIG017	37.439	138.846	C	281	23.27	D	KNET
Mid Niigata Prefecture	2004_October_27	Japan	37.291	139.032	12	5.8	NIG020	37.23	138.965	C	354	9.01	D	KNET
App. Umbro-Marchigiano	1997_October_06	Italy	43.0275	12.8467	4	5.4	NCR2	43.1116	12.7847	E	534	10.62	D	ITACA
App. Umbro-Marchigiano	1997_October_12	Italy	42.9062	12.9203	0.1	5.2	NCR2	43.1116	12.7847	E	534	25.35	D	ITACA
Umbria-Marche 3rd shock	1997_October_14	Italy	42.8982	12.8987	7	5.6	NCR2	43.1116	12.7847	E	534	25.46	D	ITACA
App.Umbro-Marchigiano	1997_October_03	Italy	43.0427	12.8245	12	5.2	NCR2	43.1116	12.7847	E	534	8.31	D	ITACA
App.Umbro-Marchigiano	1998_March_21	Italy	42.9485	12.9143	1	5	SELE	42.8892	12.928	B	520	6.68	D	ITACA
App.Umbro-Marchigiano	1998_March_21	Italy	42.9485	12.9143	1	5	SELW	42.8862	12.9218	B	518	6.95	D	ITACA

L'Aquila mainshock	2009_April_06	Italy	42.334	13.334	9	6.3	AQA	42.3755	13.3393	B	552	4.63	D	ITACA
L'Aquila mainshock	2009_April_06	Italy	42.334	13.334	9	6.3	AQG	42.3735	13.337	B	685	4.39	D	ITACA
L'Aquila mainshock	2009_April_06	Italy	42.334	13.334	9	6.3	AQK	42.345	13.4009	B	717	5.65	D	ITACA
L'Aquila mainshock	2009_April_06	Italy	42.334	13.334	9	6.3	AQV	42.3772	13.3439	B	474	4.87	D	ITACA
L'Aquila mainshock	2009_April_06	Italy	42.334	13.334	9	6.3	GSA	42.4207	13.5194	B	488	18.05	D	ITACA
L'Aquila aftershock	2009_April_06	Italy	42.366	13.34	10	5.1	AQG	42.3735	13.337	B	685	0.87	D	ITACA
L'Aquila aftershock	2009_April_06	Italy	42.366	13.34	10	5.1	AQK	42.345	13.4009	B	717	5.54	D	ITACA
Gran Sasso	2009_April_06	Italy	42.451	13.364	8.6	5.1	AQK	42.345	13.4009	B	717	12.16	D	ITACA
Gran Sasso	2009_April_06	Italy	42.451	13.364	8.6	5.1	AQV	42.3772	13.3439	B	474	8.36	D	ITACA
L'Aquila aftershock	2009_April_07	Italy	42.342	13.338	10.2	5	AQG	42.3735	13.337	B	685	3.5	D	ITACA
L'Aquila aftershock	2009_April_07	Italy	42.342	13.338	10.2	5	AQK	42.345	13.4009	B	717	5.2	D	ITACA
L'Aquila aftershock	2009_April_07	Italy	42.342	13.338	10.2	5	AQP	42.3837	13.3686	A	830	5.27	D	ITACA
L'Aquila aftershock	2009_April_07	Italy	42.342	13.338	10.2	5	AQV	42.3772	13.3439	B	474	3.94	D	ITACA
L'Aquila aftershock	2009_April_07	Italy	42.275	13.464	15	5.6	AQG	42.3735	13.337	B	685	15.14	D	ITACA
L'Aquila aftershock	2009_April_07	Italy	42.275	13.464	15	5.6	AQK	42.345	13.4009	B	717	9.35	D	ITACA
L'Aquila aftershock	2009_April_07	Italy	42.275	13.464	15	5.6	AQP	42.3837	13.3686	A	830	14.41	D	ITACA
L'Aquila aftershock	2009_April_07	Italy	42.275	13.464	15	5.6	AQV	42.3772	13.3439	B	474	15.06	D	ITACA
L'Aquila aftershock	2009_April_07	Italy	42.275	13.464	15	5.6	AVZ	42.0275	13.4259	C	199	27.67	D	ITACA
L'Aquila aftershock	2009_April_07	Italy	42.275	13.464	15	5.6	BZZ	42.337	13.4686	B	679	6.9	D	ITACA
L'Aquila aftershock	2009_April_07	Italy	42.275	13.464	15	5.6	GSA	42.4207	13.5194	B	488	16.81	D	ITACA
L'Aquila aftershock	2009_April_07	Italy	42.275	13.464	15	5.6	MI03	42.3274	13.4757	B	378	5.9	D	ITACA
L'Aquila aftershock	2009_April_09	Italy	42.484	13.343	15	5.4	AQA	42.3755	13.3393	B	552	12.05	D	ITACA
L'Aquila aftershock	2009_April_09	Italy	42.484	13.343	15	5.4	AQG	42.3735	13.337	B	685	12.29	D	ITACA
L'Aquila aftershock	2009_April_09	Italy	42.484	13.343	15	5.4	AQK	42.345	13.4009	B	717	16.16	D	ITACA
L'Aquila aftershock	2009_April_09	Italy	42.484	13.343	15	5.4	AQP	42.3837	13.3686	A	830	11.34	D	ITACA
L'Aquila aftershock	2009_April_09	Italy	42.484	13.343	15	5.4	AQV	42.3772	13.3439	B	474	11.86	D	ITACA
L'Aquila aftershock	2009_April_09	Italy	42.484	13.343	15	5.4	BZZ	42.337	13.4686	B	679	19.32	D	ITACA
L'Aquila aftershock	2009_April_09	Italy	42.484	13.343	15	5.4	GSA	42.4207	13.5194	B	488	16.12	D	ITACA

L'Aquila aftershock	2009_April_09	Italy	42.484	13.343	15	5.4	MI03	42.3274	13.4757	B	378	20.54	D	ITACA
L'Aquila aftershock	2009_April_09	Italy	42.501	13.356	17	5.3	AQA	42.3755	13.3393	B	552	14	D	ITACA
L'Aquila aftershock	2009_April_09	Italy	42.501	13.356	17	5.3	AQG	42.3735	13.337	B	685	14.25	D	ITACA
L'Aquila aftershock	2009_April_09	Italy	42.501	13.356	17	5.3	AQK	42.345	13.4009	B	717	17.72	D	ITACA
L'Aquila aftershock	2009_April_09	Italy	42.501	13.356	17	5.3	AQP	42.3837	13.3686	A	830	13.07	D	ITACA
L'Aquila aftershock	2009_April_09	Italy	42.501	13.356	17	5.3	AQV	42.3772	13.3439	B	474	13.78	D	ITACA
L'Aquila aftershock	2009_April_09	Italy	42.501	13.356	17	5.3	BZZ	42.337	13.4686	B	679	20.43	D	ITACA
L'Aquila aftershock	2009_April_09	Italy	42.501	13.356	17	5.3	GSA	42.4207	13.5194	B	488	16.13	D	ITACA
L'Aquila aftershock	2009_April_13	Italy	42.504	13.363	8	5.1	AQG	42.3735	13.337	B	685	14.65	D	ITACA
L'Aquila aftershock	2009_April_13	Italy	42.504	13.363	8	5.1	AQK	42.345	13.4009	B	717	17.94	D	ITACA
L'Aquila aftershock	2009_April_13	Italy	42.504	13.363	8	5.1	AQV	42.3772	13.3439	B	474	14.17	D	ITACA
L'Aquila aftershock	2009_April_13	Italy	42.504	13.363	8	5.1	BZZ	42.337	13.4686	B	679	20.48	D	ITACA
L'Aquila aftershock	2009_April_13	Italy	42.504	13.363	8	5.1	GSA	42.4207	13.5194	B	488	15.84	D	ITACA
Duzce	1999_November_12	Turkey	40.806	31.187	10.4	7.1	AI_154_BV	40.7552	31.0147	B	719.3	15.6	D	Turkish SMDB
Duzce	1999_November_12	Turkey	40.806	31.187	10.4	7.1	AI_155_FP	40.7447	30.8721	B	439.5	27.44	D	Turkish SMDB
Duzce	1999_November_12	Turkey	40.806	31.187	10.4	7.1	AI_156_VO	40.743	30.8761	B	481.3	27.16	D	Turkish SMDB
Bingol	2003_May_01	Turkey	38.9987	40.4637	10	6.3	AI_049_BNG	38.8971	40.5032	B	528.7	11.79	D	Turkish SMDB
Izmit_aftershock	1999_September_13	Turkey	40.75	30.079	10.4	5.8	AI_005_SKR	40.7371	30.3801	B	412	25.47	D	Turkish SMDB
Izmit_aftershock	1999_November_11	Turkey	40.747	30.248	7.5	5.6	AI_005_SKR	40.7371	30.3801	B	412	11.21	D	Turkish SMDB
Duzce 2	2000_June_06	Turkey	40.7	32.982	10	6	AI_013_CER	40.8149	32.8834	C	347.9	15.23	D	Turkish SMDB
Parkfield	2004_September_28	USA	35.815	-120.374	7.9	6	36227	35.6911	-120.334	C	290	14.22	D	CESMD
Parkfield	2004_September_28	USA	35.815	-120.374	7.9	6	36519	35.886	-120.35	B	590	8.17	D	CESMD
Parkfield	2004_September_28	USA	35.815	-120.374	7.9	6	36520	35.882	-120.35	B	540	7.75	D	CESMD
Parkfield	2004_September_28	USA	35.815	-120.374	7.9	6	36529	35.878	-120.358	A	1340	7.14	D	CESMD
Olfus	2008_May_29	Iceland	64.011	-21.0063	2	6.3	113	64.002	-21.187	A		8.89	D	ESMD
Olfus	2008_May_29	Iceland	64.011	-21.0063	2	6.3	112	63.937	-21.002	A		8.25	D	ESMD
Olfus	2008_May_29	Iceland	64.011	-21.0063	2	6.3	101	63.94	-20.987	A		7.97	D	ESMD
E Off Izu Peninsula	2006_April_20	Japan	34.94	139.195	7	5.6	SZO001	35.139	139.083	B	414	24.33	D	KNET

E Off Izu Peninsula	2006_April_20	Japan	34.94	139.195	7	5.6	SZO002	34.9652	139.1031	C	325	8.85	D	KNET
E Off Izu Peninsula	2006_April_20	Japan	34.94	139.195	7	5.6	SZO003	34.813	139.058	C	222	18.85	D	KNET
E Off Izu Peninsula	2006_April_20	Japan	34.94	139.195	7	5.6	SZO007	34.974	138.95	B	459	22.69	D	KNET
E Off Izu Peninsula	2006_April_20	Japan	34.94	139.195	7	5.6	TKY008	34.782	139.394	B	433	25.26	D	KNET
KUJUKURI COAST BOSO PEN	2007_August_18	Japan	35.342	140.345	20	5.1	CHB016	35.2999	140.3867	B	364	6.01	D	KNET
KUJUKURI COAST BOSO PEN	2007_August_18	Japan	35.342	140.345	20	5.1	CHB018	35.154	140.326	C	359	20.92	D	KNET
MID NIIGATA PREF	2007_July_16	Japan	37.503	138.643	23	5.6	NIG016	37.639	138.771	C	328	18.86	D	KNET
MID NIIGATA PREF	2007_July_16	Japan	37.503	138.643	23	5.6	NIG017	37.439	138.846	C	281	19.31	D	KNET
MID NIIGATA PREF	2007_July_16	Japan	37.503	138.643	23	5.6	NIG018	37.369	138.561	C	199	16.55	D	KNET
MID NIIGATA PREF	2007_July_16	Japan	37.503	138.643	23	5.6	NIG019	37.3057	138.7898	C	313	25.47	D	KNET
Southern Iwate Prefecture	2008_June_14	Japan	38.88	140.677	6	5.5	AKT019	39.0384	140.451	D	180	26.31	D	KNET
Southern Iwate Prefecture	2008_June_14	Japan	38.88	140.677	6	5.5	AKT023	39.1433	140.7205	B	483	29.46	D	KNET
SOUTHERN IWATE PREF	2008_June_16	Japan	38.997	140.84	11	5.1	AKT023	39.1433	140.7205	B	483	19.25	D	KNET
SOUTHERN IWATE PREF	2008_June_16	Japan	38.997	140.84	11	5.1	IWT010	38.9334	141.1173	B	744	25.04	D	KNET
SOUTHERN IWATE PREF	2008_June_16	Japan	38.997	140.84	11	5.1	MYG005	38.7963	140.6541	B	361	27.49	D	KNET
S Suruga Bay	2009_August_10	Japan	34.785	138.498	23	6.2	SZO006	34.908	138.797	B	460	30.57	D	KNET
WESTERN FUKUSHIMA PREF	2010_September_29	Japan	37.285	140.025	8	5.6	FKS017	37.281	140.372	C	241	30.77	D	KNET
WESTERN FUKUSHIMA PREF	2010_September_29	Japan	37.285	140.025	8	5.6	FKS020	37.5444	140.1111	D	145	29.77	D	KNET
WESTERN FUKUSHIMA PREF	2010_September_29	Japan	37.285	140.025	8	5.6	FKS023	37.474	139.933	C	201	22.5	D	KNET
WESTERN FUKUSHIMA PREF	2010_September_29	Japan	37.285	140.025	8	5.6	FKS024	37.393	140.136	C	238	15.5	D	KNET
WESTERN FUKUSHIMA PREF	2010_September_29	Japan	37.285	140.025	8	5.6	FKS025	37.305	139.903	B	572	11.04	D	KNET
EASTERN FUKUSHIMA PREF	2011_April_11	Japan	36.945	140.672	6	6.6	FKS011	37.088	140.907	B	367	26.24	D	KNET
EASTERN FUKUSHIMA PREF	2011_April_11	Japan	36.945	140.672	6	6.6	FKS014	36.865	140.433	B	528	23.07	D	KNET
EASTERN FUKUSHIMA PREF	2011_April_11	Japan	36.945	140.672	6	6.6	FKS015	37.0217	140.3775	B	601	27.56	D	KNET
EASTERN FUKUSHIMA PREF	2011_April_11	Japan	36.965	140.633	11	5.5	FKS011	37.088	140.907	B	367	27.93	D	KNET
EASTERN FUKUSHIMA PREF	2011_April_11	Japan	36.965	140.633	11	5.5	FKS014	36.865	140.433	B	528	20.99	D	KNET
EASTERN FUKUSHIMA PREF	2011_April_11	Japan	36.965	140.633	11	5.5	FKS015	37.0217	140.3775	B	601	23.59	D	KNET
NORTHERN NAGANO PREF	2011_April_11	Japan	36.8187	138.6057	8	5.4	NGN001	36.848	138.369	C	324	21.37	D	KNET

NORTHERN NAGANO PREF	2011_April_11	Japan	36.8187	138.6057	8	5.4	NGN003	36.7403	138.4129	B	490	19.29	D	KNET
NORTHERN NAGANO PREF	2011_April_11	Japan	36.8187	138.6057	8	5.4	NGN023	37.0147	138.6529	B	474	22.16	D	KNET
EASTERN FUKUSHIMA PREF	2011_April_12	Japan	37.052	140.643	15	5.9	FKS009	37.275	140.638	C	350	24.74	D	KNET
EASTERN FUKUSHIMA PREF	2011_April_12	Japan	37.052	140.643	15	5.9	FKS011	37.088	140.907	B	367	23.81	D	KNET
EASTERN FUKUSHIMA PREF	2011_April_12	Japan	37.052	140.643	15	5.9	FKS014	36.865	140.433	B	528	27.93	D	KNET
EASTERN FUKUSHIMA PREF	2011_April_12	Japan	37.052	140.643	15	5.9	FKS015	37.0217	140.3775	B	601	23.85	D	KNET
EASTERN FUKUSHIMA PREF	2011_April_13	Japan	36.915	140.707	5	5.4	FKS011	37.088	140.907	B	367	26.17	D	KNET
EASTERN FUKUSHIMA PREF	2011_April_13	Japan	36.915	140.707	5	5.4	FKS014	36.865	140.433	B	528	25.04	D	KNET
EASTERN FUKUSHIMA PREF	2011_April_14	Japan	36.983	140.772	11	5	FKS011	37.088	140.907	B	367	16.73	D	KNET
E OFF FUKUSHIMA PREF	2011_April_22	Japan	37.168	141.193	21	5.1	FKS010	37.2311	141.005	B	409	18.09	D	KNET
E OFF FUKUSHIMA PREF	2011_April_22	Japan	37.168	141.193	21	5.1	FKS011	37.088	140.907	B	367	26.91	D	KNET
SOUTHERN SURUGA BAY REG	2011_August_01	Japan	34.7	138.6	20	5.8	SZO004	34.644	138.823	B	485	21.36	D	KNET
SOUTHERN SURUGA BAY REG	2011_August_01	Japan	34.7	138.6	20	5.8	SZO005	34.752	138.787	C	225	18.08	D	KNET
SOUTHERN SURUGA BAY REG	2011_August_01	Japan	34.7	138.6	20	5.8	SZO006	34.908	138.797	B	460	29.29	D	KNET
NORTHERN GIFU PREF	2011_February_26	Japan	36.155	137.453	4	5.1	GIF003	36.3322	137.3014	B	541	23.93	D	KNET
NORTHERN GIFU PREF	2011_February_26	Japan	36.155	137.453	4	5.1	GIF004	36.2492	137.5174	B	450	11.95	D	KNET
NORTHERN GIFU PREF	2011_February_26	Japan	36.155	137.453	4	5.1	GIF008	35.9483	137.263	B	530	28.62	D	KNET
NW WAKAYAMA PREF	2011_July_05	Japan	34	135.2	10	5	WKY004	34.0841	135.4309	B	618	23.26	D	KNET
NW WAKAYAMA PREF	2011_July_05	Japan	34	135.2	10	5	WKY005	33.8938	135.4883	C	319	29.13	D	KNET
CENTRAL NAGANO PREF	2011_June_29	Japan	36.1885	137.9547	5	5	NGN009	36.3378	137.8694	B	403	18.26	D	KNET
CENTRAL NAGANO PREF	2011_June_29	Japan	36.1885	137.9547	5	5	NGN011	36.2564	138.2669	B	563	25	D	KNET
CENTRAL NAGANO PREF	2011_June_29	Japan	36.1885	137.9547	5	5	NGN012	36.2564	137.9785	B	529	7.84	D	KNET
MID NIIGATA PREF	2011_March_11	Japan	36.985	138.597	8	6.2	NGN001	36.848	138.369	C	324	25.38	D	KNET
MID NIIGATA PREF	2011_March_11	Japan	36.985	138.597	8	6.2	NIG021	37.125	138.75	B	412	20.66	D	KNET
MID NIIGATA PREF	2011_March_11	Japan	36.985	138.597	8	6.2	NIG022	37.033	138.849	C	203	23.05	D	KNET
MID NIIGATA PREF	2011_March_11	Japan	36.985	138.597	8	6.2	NIG023	37.0147	138.6529	B	626	5.97	D	KNET
MID NIIGATA PREF	2011_March_11	Japan	36.948	138.572	1	5.6	NGN001	36.848	138.369	C	324	21.23	D	KNET
MID NIIGATA PREF	2011_March_11	Japan	36.948	138.572	1	5.6	NGN003	36.7403	138.4129	B	490	27.07	D	KNET

MID NIIGATA PREF	2011_March_11	Japan	36.948	138.572	1	5.6	NIG021	37.125	138.75	B	412	25.24	D	KNET
MID NIIGATA PREF	2011_March_11	Japan	36.948	138.572	1	5.6	NIG022	37.033	138.849	C	203	26.4	D	KNET
MID NIIGATA PREF	2011_March_11	Japan	36.948	138.572	1	5.6	NIG023	37.0147	138.6529	B	626	10.33	D	KNET
MID NIIGATA PREF	2011_March_11	Japan	36.972	138.59	4	5	NGN001	36.848	138.369	C	324	24.03	D	KNET
MID NIIGATA PREF	2011_March_11	Japan	36.972	138.59	4	5	NIG022	37.033	138.849	C	203	24.03	D	KNET
MT FUJI REGION	2011_March_15	Japan	35.308	138.713	14	5.9	SZO008	35.093	138.869	B	363	27.77	D	KNET
MT FUJI REGION	2011_March_15	Japan	35.308	138.713	14	5.9	SZO009	35.194	138.916	B	494	22.39	D	KNET
MT FUJI REGION	2011_March_15	Japan	35.308	138.713	14	5.9	SZO010	35.306	138.938	B	420	20.47	D	KNET
MT FUJI REGION	2011_March_15	Japan	35.308	138.713	14	5.9	SZO011	35.218	138.625	B	477	12.8	D	KNET
MT FUJI REGION	2011_March_15	Japan	35.308	138.713	14	5.9	YMN006	35.465	138.61	B	381	19.78	D	KNET
NORTHERN IBARAKI PREF	2011_March_19	Japan	36.783	140.57	5	5.8	FKS014	36.865	140.433	B	528	15.23	D	KNET
NORTHERN IBARAKI PREF	2011_March_19	Japan	36.783	140.57	5	5.8	IBR001	36.773	140.36	C	208	18.77	D	KNET
NORTHERN IBARAKI PREF	2011_March_19	Japan	36.783	140.57	5	5.8	IBR004	36.5516	140.4102	C	356	29.37	D	KNET
EASTERN FUKUSHIMA PREF	2011_March_22	Japan	37.083	140.787	8	5.7	FKS009	37.275	140.638	C	350	25.07	D	KNET
EASTERN FUKUSHIMA PREF	2011_March_22	Japan	37.083	140.787	8	5.7	FKS010	37.2311	141.005	B	409	25.39	D	KNET
EASTERN FUKUSHIMA PREF	2011_March_22	Japan	37.083	140.787	8	5.7	FKS011	37.088	140.907	B	367	10.68	D	KNET
EASTERN FUKUSHIMA PREF	2011_March_22	Japan	37.063	140.77	7	5.4	FKS009	37.275	140.638	C	350	26.28	D	KNET
EASTERN FUKUSHIMA PREF	2011_March_22	Japan	37.063	140.77	7	5.4	FKS010	37.2311	141.005	B	409	27.99	D	KNET
EASTERN FUKUSHIMA PREF	2011_March_22	Japan	37.063	140.77	7	5.4	FKS011	37.088	140.907	B	367	12.49	D	KNET
HIDA MOUNTAINS REGION	2011_October_05	Japan	36.5	137.7	10	5.2	NGN006	36.506	137.854	B	412	13.82	D	KNET
HIDA MOUNTAINS REGION	2011_October_05	Japan	36.5	137.7	10	5.2	NGN009	36.3378	137.8694	B	403	23.56	D	KNET
HIDA MOUNTAINS REGION	2011_October_05	Japan	36.5	137.7	10	5.2	TYM011	36.575	137.388	B	421	29.16	D	KNET
NORTHERN IBARAKI PREF	2011_September_21	Japan	36.7	140.6	10	5.1	FKS014	36.865	140.433	B	528	23.6	D	KNET
NORTHERN IBARAKI PREF	2011_September_21	Japan	36.7	140.6	10	5.1	IBR001	36.773	140.36	C	208	22.91	D	KNET
NORTHERN IBARAKI PREF	2011_September_21	Japan	36.7	140.6	10	5.1	IBR004	36.5516	140.4102	C	356	23.64	D	KNET
E OFF FUKUSHIMA PREF	2011_September_29	Japan	37.1	141	5	5.1	FKS010	37.2311	141.005	B	409	14.55	D	KNET
E OFF FUKUSHIMA PREF	2011_September_29	Japan	37.1	141	5	5.1	FKS011	37.088	140.907	B	367	8.37	D	KNET
Loma Prieta	1989_October_18	USA	37.037	-121.883	18	6.9	LGPC	37.172	-122.01	B	477.7	18.75	D	PEER

Olfus	2008_May_29	Iceland	64.011	-21.0063	2	6.3	306	64.094	-21.011	A		9.25	D	ESMD
Hyogo - Ken Nanbu	1995_January_16	Japan	34.595	135.037	17.9	6.9	JMA	34.688	135.179	C	312	16.6	D	ESG99
Duzce	1999_November_12	Turkey	40.806	31.187	10.4	7.1	AI_010_BOL	40.7457	31.6073	C	293.6	36.1	D	Turkish SMDB
Duzce	1999_November_12	Turkey	40.806	31.187	10.4	7.1	AI_159_FI	40.724	30.8204	C	316	32.26	D	Turkish SMDB
Duzce	1999_November_12	Turkey	40.806	31.187	10.4	7.1	AI_158_LS	40.7199	30.7924	B	455.7	34.66	D	Turkish SMDB
Duzce	1999_November_12	Turkey	40.806	31.187	10.4	7.1	AI_157_WF	40.7028	30.8559	B	448.2	30.22	D	Turkish SMDB
EMILIA_Pianura_Padana	2012_May_20	Italy	44.89	11.23	6.3	6.1	MRN	44.8782	11.0617	C	208	13.36	D	DPC
EMILIA_Pianura_Padana	2012_May_29	Italy	44.851	11.086	10.2	6	MRN	44.8782	11.0617	C	208	3.58	D	DPC
EMILIA_Pianura_Padana	2012_May_29	Italy	44.851	11.086	10.2	6	SAN0	44.838	11.143	C		4.73	D	DPC
EMILIA_Pianura_Padana	2012_May_29	Italy	44.851	11.086	10.2	6	RAV0	44.7157	11.1428	C		15.69	D	DPC
EMILIA_Pianura_Padana	2012_May_29	Italy	44.851	11.086	10.2	6	SMS0	44.934	11.235	C		14.95	D	DPC
EMILIA_Pianura_Padana	2012_May_29	Italy	44.851	11.086	10.2	6	FIN0	44.8297	11.2867	C		16.04	D	DPC
EMILIA_Pianura_Padana	2012_May_29	Italy	44.851	11.086	10.2	6	MOG0	44.932	10.912	C		16.43	D	DPC
EMILIA_Pianura_Padana	2012_May_29	Italy	44.851	11.086	10.2	6	CRP	44.7823	10.8703	C		18.69	D	DPC
EMILIA_Pianura_Padana	2012_May_29	Italy	44.851	11.086	10.2	6	CNT	44.723	11.287	C		21.34	D	DPC
EMILIA_Pianura_Padana	2012_May_29	Italy	44.851	11.086	10.2	6	SAG0	44.791	11.3904	C		24.98	D	DPC
EMILIA_Pianura_Padana	2012_May_29	Italy	44.851	11.086	10.2	6	BON0	44.886	11.418	C		26.52	D	DPC
EMILIA_Pianura_Padana	2012_May_29	Italy	44.851	11.086	10.2	6	CAS0	45.025	11.311	C		26.25	D	DPC
EMILIA_Pianura_Padana	2012_May_29	Italy	44.851	11.086	10.2	6	MDN	44.646	10.889	C		27.61	D	DPC
EMILIA_Pianura_Padana	2012_May_29	Italy	44.851	11.086	10.2	6	NVL	44.8419	10.7306	C	190	28.12	D	DPC
EMILIA_Pianura_Padana	2012_May_29	Italy	44.851	11.086	10.2	6	MODE	44.63	10.95	C		26.82	D	RAIS-INGV
EMILIA_Pianura_Padana	2012_May_29	Italy	44.888	11.008	6.8	5.5	MODE	44.63	10.95	C		29.03	D	RAIS-INGV
EMILIA_Pianura_Padana	2012_June_03	Italy	44.899	10.943	9.2	5	MODE	44.63	10.95	C		29.9	D	RAIS-INGV
Darfield	2010_September_03	NewZealand	-43.55	172.18	10	7.1	CACS	-43.4848	172.5299	C*		29.19	D	GNS
Darfield	2010_September_03	NewZealand	-43.55	172.18	10	7.1	DFHS	-43.4913	172.102	C*		9.06	D	GNS
Darfield	2010_September_03	NewZealand	-43.55	172.18	10	7.1	DSLC	-43.6692	172.1978	C*		13.31	D	GNS
Darfield	2010_September_03	NewZealand	-43.55	172.18	10	7.1	HORC	-43.5413	171.9598	C*		17.82	D	GNS
Darfield	2010_September_03	NewZealand	-43.55	172.18	10	7.1	RKAC	-43.7531	172.023	C*		25.87	D	GNS

Darfield	2010_September_03	NewZealand	-43.55	172.18	10	7.1	ROLC	-43.5945	172.381	C*	16.97	D	GNS
Darfield	2010_September_03	NewZealand	-43.55	172.18	10	7.1	SBRC	-43.8104	172.2523	C*	29.5	D	GNS
Darfield	2010_September_03	NewZealand	-43.55	172.18	10	7.1	TPLC	-43.5517	172.4718	C*	23.58	D	GNS
Christchurch	2011_February_21	NewZealand	-43.6	172.71	5	6.2	CACS	-43.4848	172.5299	C*	19.38	D	GNS
Christchurch	2011_February_21	NewZealand	-43.6	172.71	5	6.2	HVSC	-43.5798	172.7094	B*	2.25	D	GNS
Christchurch	2011_February_21	NewZealand	-43.6	172.71	5	6.2	KPOC	-43.3781	172.6636	D*	24.93	D	GNS
Christchurch	2011_February_21	NewZealand	-43.6	172.71	5	6.2	LPCC	-43.6078	172.7248	A*	1.48	D	GNS
Christchurch	2011_February_21	NewZealand	-43.6	172.71	5	6.2	PPHS	-43.4945	172.6068	C*	14.38	D	GNS
Christchurch	2011_February_21	NewZealand	-43.6	172.71	5	6.2	RHSC	-43.5362	172.5644	C*	13.73	D	GNS
Christchurch	2011_February_21	NewZealand	-43.6	172.71	5	6.2	ROLC	-43.5945	172.381	C*	26.57	D	GNS
Christchurch	2011_February_21	NewZealand	-43.6	172.71	5	6.2	SMTC	-43.4688	172.6139	C*	16.52	D	GNS
Christchurch	2011_February_21	NewZealand	-43.6	172.71	5	6.2	SWNC	-43.3711	172.4952	C*	30.79	D	GNS
Christchurch	2011_February_21	NewZealand	-43.6	172.71	5	6.2	TPLC	-43.5517	172.4718	C*	19.97	D	GNS
Christchurch	2011_February_22	NewZealand	-43.5906	172.6608	6	5.5	CACS	-43.4848	172.5299	C*	15.81	D	GNS
Christchurch	2011_February_22	NewZealand	-43.5906	172.6608	6	5.5	HVSC	-43.5798	172.7094	B*	4.1	D	GNS
Christchurch	2011_February_22	NewZealand	-43.5906	172.6608	6	5.5	KPOC	-43.3781	172.6636	D*	23.6	D	GNS
Christchurch	2011_February_22	NewZealand	-43.5906	172.6608	6	5.5	LPCC	-43.6078	172.7248	A*	5.51	D	GNS
Christchurch	2011_February_22	NewZealand	-43.5906	172.6608	6	5.5	RHSC	-43.5362	172.5644	C*	9.86	D	GNS
Christchurch	2011_February_22	NewZealand	-43.5906	172.6608	6	5.5	ROLC	-43.5945	172.381	C*	22.6	D	GNS
Christchurch	2011_February_22	NewZealand	-43.5906	172.6608	6	5.5	SMTC	-43.4688	172.6139	C*	14.05	D	GNS
Christchurch	2011_February_22	NewZealand	-43.5906	172.6608	6	5.5	SWNC	-43.3711	172.4952	C*	27.81	D	GNS
Christchurch	2011_February_22	NewZealand	-43.5906	172.6608	6	5.5	TPLC	-43.5517	172.4718	C*	15.86	D	GNS
Christchurch	2011_February_22	NewZealand	-43.5975	172.6214	7	5.6	HVSC	-43.5798	172.7094	B*	7.38	D	GNS
Christchurch	2011_February_22	NewZealand	-43.5975	172.6214	7	5.6	KPOC	-43.3781	172.6636	D*	24.61	D	GNS
Christchurch	2011_February_22	NewZealand	-43.5975	172.6214	7	5.6	LPCC	-43.6078	172.7248	A*	8.42	D	GNS
Christchurch	2011_February_22	NewZealand	-43.5975	172.6214	7	5.6	RHSC	-43.5362	172.5644	C*	8.22	D	GNS
Christchurch	2011_February_22	NewZealand	-43.5975	172.6214	7	5.6	ROLC	-43.5945	172.381	C*	19.41	D	GNS
Christchurch	2011_February_22	NewZealand	-43.5975	172.6214	7	5.6	SMTC	-43.4688	172.6139	C*	14.31	D	GNS

Christchurch	2011_February_22	NewZealand	-43.5975	172.6214	7	5.6	SWNC	-43.3711	172.4952	C*	27.14	D	GNS
Christchurch	2011_February_22	NewZealand	-43.5975	172.6214	7	5.6	TPLC	-43.5517	172.4718	C*	13.11	D	GNS
Christchurch	2011_June_05	NewZealand	-43.5828	172.3914	8	5.1	CACS	-43.4848	172.5299	C*	15.61	D	GNS
Christchurch	2011_June_05	NewZealand	-43.5828	172.3914	8	5.1	CSTC	-43.314	172.3812	C*	29.87	D	GNS
Christchurch	2011_June_05	NewZealand	-43.5828	172.3914	8	5.1	DFHS	-43.4913	172.102	C*	25.49	D	GNS
Christchurch	2011_June_05	NewZealand	-43.5828	172.3914	8	5.1	HVSC	-43.5798	172.7094	B*	25.68	D	GNS
Christchurch	2011_June_05	NewZealand	-43.5828	172.3914	8	5.1	LPCC	-43.6078	172.7248	A*	27.06	D	GNS
Christchurch	2011_June_05	NewZealand	-43.5828	172.3914	8	5.1	MQZ	-43.7077	172.6536	A*	25.3	D	GNS
Christchurch	2011_June_05	NewZealand	-43.5828	172.3914	8	5.1	RHSC	-43.5362	172.5644	C*	14.9	D	GNS
Christchurch	2011_June_05	NewZealand	-43.5828	172.3914	8	5.1	ROLC	-43.5945	172.381	C*	1.55	D	GNS
Christchurch	2011_June_05	NewZealand	-43.5828	172.3914	8	5.1	SBRC	-43.8104	172.2523	C*	27.65	D	GNS
Christchurch	2011_June_05	NewZealand	-43.5828	172.3914	8	5.1	SMTC	-43.4688	172.6139	C*	21.99	D	GNS
Christchurch	2011_June_05	NewZealand	-43.5828	172.3914	8	5.1	SWNC	-43.3711	172.4952	C*	24.97	D	GNS
Christchurch	2011_June_05	NewZealand	-43.5828	172.3914	8	5.1	TPLC	-43.5517	172.4718	C*	7.36	D	GNS
Christchurch	2011_June_13	NewZealand	-43.5706	172.7686	10	5.3	CACS	-43.4848	172.5299	C*	21.52	D	GNS
Christchurch	2011_June_13	NewZealand	-43.5706	172.7686	10	5.3	HVSC	-43.5798	172.7094	B*	4.89	D	GNS
Christchurch	2011_June_13	NewZealand	-43.5706	172.7686	10	5.3	KPOC	-43.3781	172.6636	D*	23	D	GNS
Christchurch	2011_June_13	NewZealand	-43.5706	172.7686	10	5.3	LPCC	-43.6078	172.7248	A*	5.45	D	GNS
Christchurch	2011_June_13	NewZealand	-43.5706	172.7686	10	5.3	PPHS	-43.4945	172.6068	C*	15.57	D	GNS
Christchurch	2011_June_13	NewZealand	-43.5706	172.7686	10	5.3	RHSC	-43.5362	172.5644	C*	16.93	D	GNS
Christchurch	2011_June_13	NewZealand	-43.5706	172.7686	10	5.3	SMTC	-43.4688	172.6139	C*	16.86	D	GNS
Christchurch	2011_June_13	NewZealand	-43.5706	172.7686	10	5.3	TPLC	-43.5517	172.4718	C*	24.07	D	GNS
Christchurch	2011_June_13	NewZealand	-43.5639	172.7431	6	6	CACS	-43.4848	172.5299	C*	19.34	D	GNS
Christchurch	2011_June_13	NewZealand	-43.5639	172.7431	6	6	HVSC	-43.5798	172.7094	B*	3.24	D	GNS
Christchurch	2011_June_13	NewZealand	-43.5639	172.7431	6	6	KPOC	-43.3781	172.6636	D*	21.61	D	GNS
Christchurch	2011_June_13	NewZealand	-43.5639	172.7431	6	6	LPCC	-43.6078	172.7248	A*	5.1	D	GNS
Christchurch	2011_June_13	NewZealand	-43.5639	172.7431	6	6	MQZ	-43.7077	172.6536	A*	17.53	D	GNS
Christchurch	2011_June_13	NewZealand	-43.5639	172.7431	6	6	PPHS	-43.4945	172.6068	C*	13.44	D	GNS

Christchurch	2011_June_13	NewZealand	-43.5639	172.7431	6	6	RHSC	-43.5362	172.5644	C*		14.76	D	GNS
Christchurch	2011_June_13	NewZealand	-43.5639	172.7431	6	6	ROLC	-43.5945	172.381	C*		29.44	D	GNS
Christchurch	2011_June_13	NewZealand	-43.5639	172.7431	6	6	SMTC	-43.4688	172.6139	C*		14.86	D	GNS
Christchurch	2011_June_13	NewZealand	-43.5639	172.7431	6	6	SWNC	-43.3711	172.4952	C*		29.34	D	GNS
Christchurch	2011_June_13	NewZealand	-43.5639	172.7431	6	6	TPLC	-43.5517	172.4718	C*		21.95	D	GNS
Christchurch	2011_June_21	NewZealand	-43.5986	172.525	8	5.2	CACS	-43.4848	172.5299	C*		12.64	D	GNS
Christchurch	2011_June_21	NewZealand	-43.5986	172.525	8	5.2	HVSC	-43.5798	172.7094	B*		15.04	D	GNS
Christchurch	2011_June_21	NewZealand	-43.5986	172.525	8	5.2	KPOC	-43.3781	172.6636	D*		26.94	D	GNS
Christchurch	2011_June_21	NewZealand	-43.5986	172.525	8	5.2	LPCC	-43.6078	172.7248	A*		16.16	D	GNS
Christchurch	2011_June_21	NewZealand	-43.5986	172.525	8	5.2	MQZ	-43.7077	172.6536	A*		15.96	D	GNS
Christchurch	2011_June_21	NewZealand	-43.5986	172.525	8	5.2	PPHS	-43.4945	172.6068	C*		13.32	D	GNS
Christchurch	2011_June_21	NewZealand	-43.5986	172.525	8	5.2	RHSC	-43.5362	172.5644	C*		7.63	D	GNS
Christchurch	2011_June_21	NewZealand	-43.5986	172.525	8	5.2	ROLC	-43.5945	172.381	C*		11.64	D	GNS
Christchurch	2011_June_21	NewZealand	-43.5986	172.525	8	5.2	SMTC	-43.4688	172.6139	C*		16.11	D	GNS
Christchurch	2011_June_21	NewZealand	-43.5986	172.525	8	5.2	SWNC	-43.3711	172.4952	C*		25.39	D	GNS
Christchurch	2011_June_21	NewZealand	-43.5986	172.525	8	5.2	TPLC	-43.5517	172.4718	C*		6.76	D	GNS
Kozani_aftershock	1995_May_15	Greece	40.083	21.591	8.7	5.2	CHR1	40.133	21.733	B	596.76	13.31	D	ITSAK
Kozani_aftershock	1995_May_15	Greece	40.083	21.591	8.7	5.2	KOZ2	40.3052	21.7837	B*		29.62	D	ITSAK
Kozani_aftershock	1995_May_19	Greece	40.054	21.58	6.8	5.1	KRR1	39.95	21.617	B*		11.97	D	ITSAK
Athens_mainshock	1999_September_07	Greece	38.059	23.571	14.5	6	ATHA	38	23.77	C*		18.66	D	ITSAK
Athens_mainshock	1999_September_07	Greece	38.059	23.571	14.5	6	DMKA	37.99	23.82	A*		23.17	D	ITSAK
Athens_mainshock	1999_September_07	Greece	38.059	23.571	14.5	6	SPLB	38	23.71	B*		13.85	D	ITSAK
Hyogo - Ken Nanbu	1995_January_16	Japan	34.595	135.037	17.9	6.9	TKS			C		17.45	D	ESG103
Hector Mine	1999_October_16	USA	34.574	-116.291	5	7.1	HEC	34.8294	-116.335	B	684.9	28.61	?	PEER
Irpinia	1980_November_23	Italy	40.76	15.309	15	6.9	ALT	40.5561	15.395	A	1149	23.77	A	ITACA
Irpinia	1980_November_23	Italy	40.76	15.309	15	6.9	BGI	40.8308	15.0681	B	498	21.79	A	ITACA
Irpinia	1980_November_23	Italy	40.76	15.309	15	6.9	BSC	41.0097	15.3761	A	997	28.29	A	ITACA
App. Umbro-Marchigiano	1997_October_06	Italy	43.0275	12.8467	4	5.4	BVG	42.9324	12.6111	D	162	21.93	A	ITACA

Umbria-Marche 3rd shock	1997_October_14	Italy	42.8982	12.8987	7	5.6	CLF	43.0359	12.9205	D	140	15.4	A	ITACA
Umbria-Marche 3rd shock	1997_October_14	Italy	42.8982	12.8987	7	5.6	NRC	42.7914	13.0964	B	687	20.05	A	ITACA
Umbria-Marche 1st shock	1997_September_26	Italy	43.0228	12.891	4	5.7	CLF	43.0359	12.9205	D	140	2.81	A	ITACA
Umbria-Marche 2nd shock	1997_September_26	Italy	43.0147	12.8538	10	6	BVG	42.9324	12.6111	D	162	21.81	A	ITACA
Irpinia	1980_November_23	Italy	40.76	15.309	15	6.9	CLT	40.8983	15.4386	B	495	18.85	A	ITACA
Friuli 1st shock	1976_May_06	Italy	46.35	13.26	12	6.4	TLM1	46.3825	12.9817	B	522	21.72	A	ITACA
Friuli 2nd shock	1976_September_11	Italy	46.3	13.317	9	5.6	BUI	46.2217	13.0903	C	258	19.53	A	ITACA
Friuli 2nd shock	1976_September_11	Italy	46.3	13.317	9	5.6	FRC	46.2211	12.9967	B	454	26.2	A	ITACA
Friuli 2nd shock	1976_September_11	Italy	46.3	13.317	9	5.6	GMN	46.292	13.1231	B	445	14.96	A	ITACA
Friuli 3rd shock	1976_September_15	Italy	46.3	13.19	2	5.9	BUI	46.2217	13.0903	C	258	11.61	A	ITACA
Friuli 3rd shock	1976_September_15	Italy	46.3	13.19	2	5.9	FRC	46.2211	12.9967	B	454	17.29	A	ITACA
Friuli 4th shock	1976_September_15	Italy	46.3	13.183	21	5.9	BUI	46.2217	13.0903	C	258	11.26	A	ITACA
Friuli 4th shock	1976_September_15	Italy	46.3	13.183	21	5.9	FRC	46.2211	12.9967	B	454	16.83	A	ITACA
Friuli 4th shock	1976_September_15	Italy	46.3	13.183	21	5.9	TRC	46.2145	13.2249	A	901	10.04	A	ITACA
Dinar	1995_October_01	Turkey	38.0561	30.1515	5	6.4	AI_137_DIN	38.0599	30.1537	C	198.1	0.47	A	Turkish SMDB
Parkfield	2004_September_28	USA	35.815	-120.374	7.9	6	36177	35.9732	-120.468	B	713	19.5	A	CESMD
Parkfield	2004_September_28	USA	35.815	-120.374	7.9	6	36408	35.803	-120.344	B	371	3.02	A	CESMD
Parkfield	2004_September_28	USA	35.815	-120.374	7.9	6	36411	35.718	-120.304	B	438	12.49	A	CESMD
Parkfield	2004_September_28	USA	35.815	-120.374	7.9	6	36415	35.8177	-120.379	C	339	0.54	A	CESMD
Parkfield	2004_September_28	USA	35.815	-120.374	7.9	6	36420	35.796	-120.411	B	438	3.95	A	CESMD
Parkfield	2004_September_28	USA	35.815	-120.374	7.9	6	36443	35.879	-120.445	B	438	9.57	A	CESMD
Parkfield	2004_September_28	USA	35.815	-120.374	7.9	6	36445	35.921	-120.481	B	376	15.23	A	CESMD
Parkfield	2004_September_28	USA	35.815	-120.374	7.9	6	36449	35.878	-120.382	B	376	7.03	A	CESMD
Gazli	1976_May_17	exUSSR	40.465	63.462	18.2	6.7	KAR	40.35	63.47	B	659.6	12.78	A	PEER
Tabas	1978_September_16	Iran	33.215	57.323	5.8	7.1	DAY	33.3	57.52	B	659.6	20.63	A	PEER
Imperial Valley	1979_October_15	USA	32.6435	-115.309	10	6.5	AEP	32.651	-115.332	C	274.5	2.31	A	PEER
Imperial Valley	1979_October_15	USA	32.6435	-115.309	10	6.5	CPE	32.421	-115.301	B	659.6	24.68	A	PEER
Imperial Valley	1979_October_15	USA	32.6435	-115.309	10	6.5	EMO	32.773	-115.447	C	186.2	19.33	A	PEER

Imperial Valley	1979_October_15	USA	32.6435	-115.309	10	6.5	EC04	32.864	-115.432	C	208.9	27.03	A	PEER
Imperial Valley	1979_October_15	USA	32.6435	-115.309	10	6.5	EC05	32.855	-115.466	C	205.6	27.68	A	PEER
Imperial Valley	1979_October_15	USA	32.6435	-115.309	10	6.5	EC06	32.839	-115.487	C	203.2	27.35	A	PEER
Whittier Narrows	1987_October_01	USA	34.0493	-118.081	14.6	6	NOR	33.915	-118.07	C	270.2	14.93	A	PEER
Superstition Hills	1987_November_24	USA	33.0222	-115.831	9	6.6	WSM	33.037	-115.623	C	194	19.5	A	PEER
Loma Prieta	1989_October_18	USA	37.037	-121.883	18	6.9	47125	36.974	-121.952	C	288.6	9.3	A	PEER
Loma Prieta	1989_October_18	USA	37.037	-121.883	18	6.9	57007	37.0465	-121.804	B	462	7.1	A	PEER
Loma Prieta	1989_October_18	USA	37.037	-121.883	18	6.9	47379	36.973	-121.572	A	1428	28.57	A	PEER
Loma Prieta	1989_October_18	USA	37.037	-121.883	18	6.9	47380	36.9813	-121.557	C	271	29.66	A	PEER
Loma Prieta	1989_October_18	USA	37.037	-121.883	18	6.9	47006	36.9729	-121.569	B	730	28.83	A	PEER
Loma Prieta	1989_October_18	USA	37.037	-121.883	18	6.9	58135	37.0012	-122.062	B	714	16.41	A	PEER
Loma Prieta	1989_October_18	USA	37.037	-121.883	18	6.9	58065	37.2552	-122.032	B	371	27.59	A	PEER
Landers	1992_June_28	USA	34.2	-116.43	7	7.3	22170	34.1309	-116.315	B	379	13.08	A	PEER
Northridge	1994_January_17	USA	34.2057	-118.554	17.5	6.7	24087	34.2358	-118.44	C	298	11.02	A	PEER
Northridge	1994_January_17	USA	34.2057	-118.554	17.5	6.7	24389	34.063	-118.418	C	278	20.19	A	PEER
Northridge	1994_January_17	USA	34.2057	-118.554	17.5	6.7	24303	34.09	-118.339	C	316	23.62	A	PEER
Northridge	1994_January_17	USA	34.2057	-118.554	17.5	6.7	24279	34.3875	-118.534	C	269	20.25	A	PEER
Northridge	1994_January_17	USA	34.2057	-118.554	17.5	6.7	24436	34.16	-118.534	C	257	5.39	A	PEER
Northridge	1994_January_17	USA	34.2057	-118.554	17.5	6.7	24688	34.068	-118.439	B	398	18.59	A	PEER
Northridge	1994_January_17	USA	34.2057	-118.554	17.5	6.7	5108	34.232	-118.71	B	715.1	14.67	A	PEER
Erzincan	1992_March_13	Turkey	39.705	39.587	9	6.6	ERZ	39.75	39.5	C	274.5	8.97	A	PEER
Duzce	1999_November_12	Turkey	40.806	31.187	10.4	7.1	AI_011_DZC	40.8436	31.1489	C	282.2	5.27	A	Turkish SMDB
Kozani_mainshock	1995_May_13	Greece	40.162	21.724	3.1	6.5	KOZ1	40.3052	21.7837	A		16.69	A	ITSAK