ASIAN JOURNAL OF CIVIL ENGINEERING (BUILDING AND HOUSING) VOL. 11, NO. 5 (2010)
PAGES 663-674

Technical Note

IRAN STRONG MOTION CATALOG (JUNE TO DECEMBER 2007)

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ABSTRACT

Iran Strong Motion Network (ISMN) started its activities in 1973. Iran Strong Motion Network had 1087 digital (1082 SSA-2 and 5CMG-5TD) and 13 analog (SMA-1) accelerographs in operation in 2007. The accelerograms of different earthquake, are downloaded, controlled, processed, and then added to the comprehensive data bank, which is very useful for scientists and engineers in the field of engineering seismology and earthquake engineering. In the second half of the year 2007, 124 accelerograms (with PGA greater than the trigger level of 0.01g) were recorded by 91 accelerographs, which were triggered by 69 different earthquakes. The maximum PGA of about 0.148g was occurred in Tabriz station (Eastern Azerbaijan Province).

Keyword: Acclerogram; accelerograph; earthquake; strong motion; peak ground acceleration, Iran

1. INTRODUCTION

The Iranian plateau is one of the most seismically active areas of the world and frequently suffers destructive and catastrophic earthquakes that cause heavy life loss and widespread damages.

The Alpine-Himalayan earthquake belt, where Iran is located, extends from west Portugal eastward along southern Europe, including Iran and southern East Asia, and then encircling the Pacific Ocean. Major geological structures of Iran are the Alborz Mountains in the North, the Zagros belt in the west and south, the Kopet-dagh range in the northeast, the depression of the Great Kavir in the center, Dasht-e Lut in the east and the Caspian Sea in the north.

For better understanding of earthquake occurrence in the country we need to complete our knowledge about these natural phenomena. One of the most advanced methods in this process is direct recording and measurement of the strong ground motions during earthquakes. Knowledge of the ground motion is essential in the understanding of

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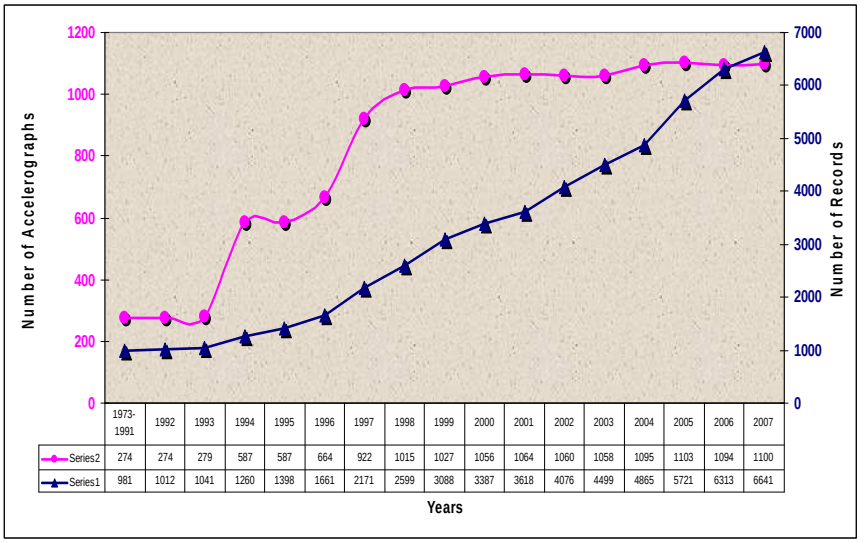
earthquake and the behavior of Structures. For this purpose, a network of strong motion accelerographs is maintained by the Building and Housing Research Center (BHRC).

2. IRAN STRONG MOTION NETWORK

The accelerographic Network of Iran started its activities in 1973 at the date of this study; the network was consisted of more than 1100 accelerographic stations (Figures 1&2) that are equipped with digital accelerographs. The trigger level of all the instruments were set at 0.01g and more than 6641 accelerograms have been recorded from January 1973 to December 2007.



	1973-1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Series2	274	274	279	587	587	664	922	1015	1027	1056	1064	1060	1058	1095	1103	1094	1100
Series1	981	1012	1041	1260	1398	1661	2171	2599	3088	3387	3618	4076	4499	4865	5721	6313	6641

Figure 1. Number of accelerographs in operation

3. THE CATALOG OF ACCELEROGRAMS, RECORDED BY ISMN

In the second half of the year 2007, 124 accelerograms (with PGA greater than the trigger level of 0.01g) were recorded by 91 accelerographs, which were triggered by 69 different earthquakes (Figure 2). The maximum PGA of about 0.14g was occurred in Tabriz station (Eastern Azerbaijan Province) due to the Tabriz Earthquake of December 1st, 2007, even if it was not the greatest earthquake of this year. The strong motion and the seismological data of the major earthquakes are presented in Table 1 and the most important events are briefly described at the following.

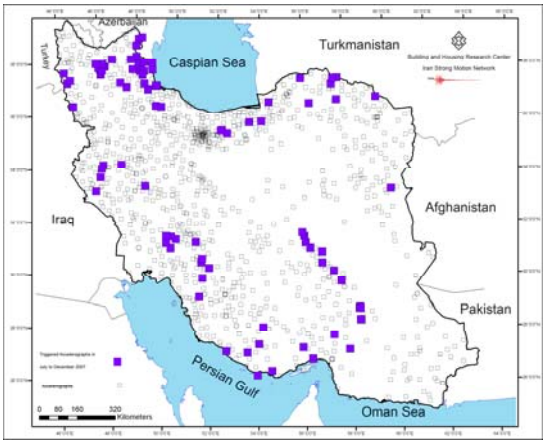


Figure 2. Iran Strong Motion Network and triggered stations in July to December 2007

3.1 Azerbaijan Country Earthquake of July 11th, 2007

On July 11th, 2007 at 06:51:12 (UTC), an earthquake with Mw5.3 (BHRC), Mn5.1 (IGUT), Ml5.1 (IIEES), and Mw5.0 (NEIC) occurred in Azerbaijan Country in north-west of Iran. This event was recorded by 15 sets of digital accelerographs of Iran Strong Motion Network (Figure 3). The maximum peak acceleration was recorded in Hir station (34 cm/s^2). The epicenter of this event has been located at 38.71N, 48.66E (BHRC), 38.58N, 48.51E (IGUT), 38.94N, 48.75E (IIEES) and 38.75N, 48.60E (NEIC).

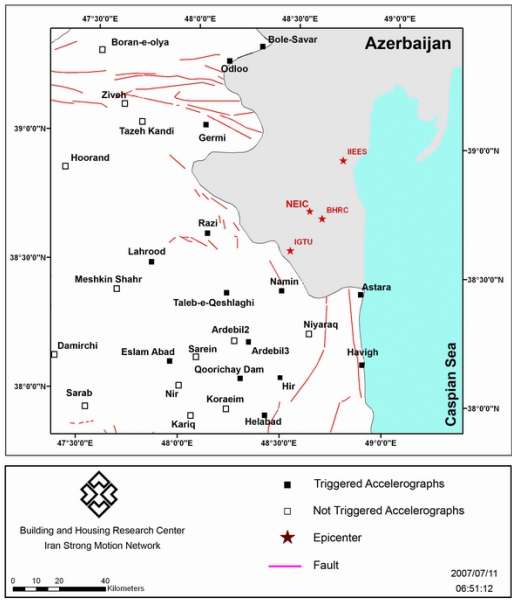


Figure 3. The location map of Azerbaijan Country Earthquake of July 11th, 2007 and triggered accelerographs

3.2 Naveh Earthquake of August 20th, 2007

On August 20th, 2007 at 04:53:30 (UTC), an earthquake with Mn4.0 (IGTU), Ml4.0 (IIEES), Ml5.3 and Mw4.7 (BHRC) occurred in Naveh area (Northern Khorasan province) in north-east of Iran. This event was recorded by 3 sets of digital accelerographs (Naveh, Gifan, Robat) of Iran Strong Ground Motion Network (Figure 4). The maximum peak acceleration of about 128 cm/s^2 was recorded in Naveh station. The epicenter of this event has been located at 37.74N, 57.28E (BHRC), 37.83N, 57.45E (IGTU) and 37.71N, 57.46E (IIEES).

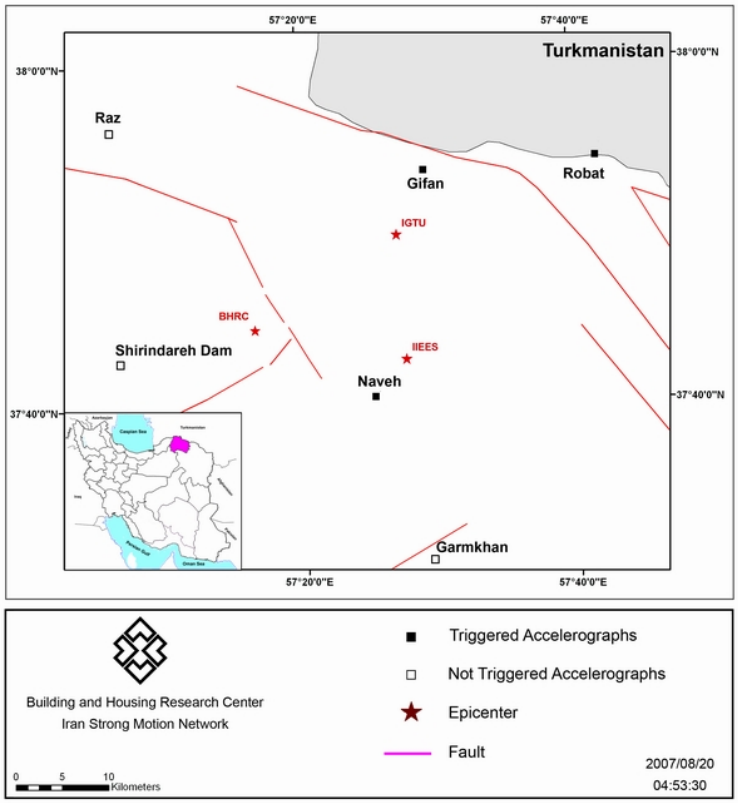


Figure 4. The location map of Naveh Earthquake of August 20th, 2007 and triggered accelerographs

3.3 Tabriz Earthquake of September 16th, 2007

On September 16th, 2007 at 05:20:01 (UTC), an earthquake with Mw4.1 (BHRC), Mn4.4 (IGUT) and Ml3.9 (IIEES) occurred near Tabriz city, north-west of Iran. This event was recorded by 7 sets of digital accelerographs of Iran Strong Ground Motion Network (Figure 5). The maximum peak acceleration was recorded in Tabriz station (39.27 cm/s^2).The epicenter of this event has been located at 38.10N, 46.36E (BHRC), 38.12N, 46.37E (IGUT) and 38.19N, 48.37E (IIEES).

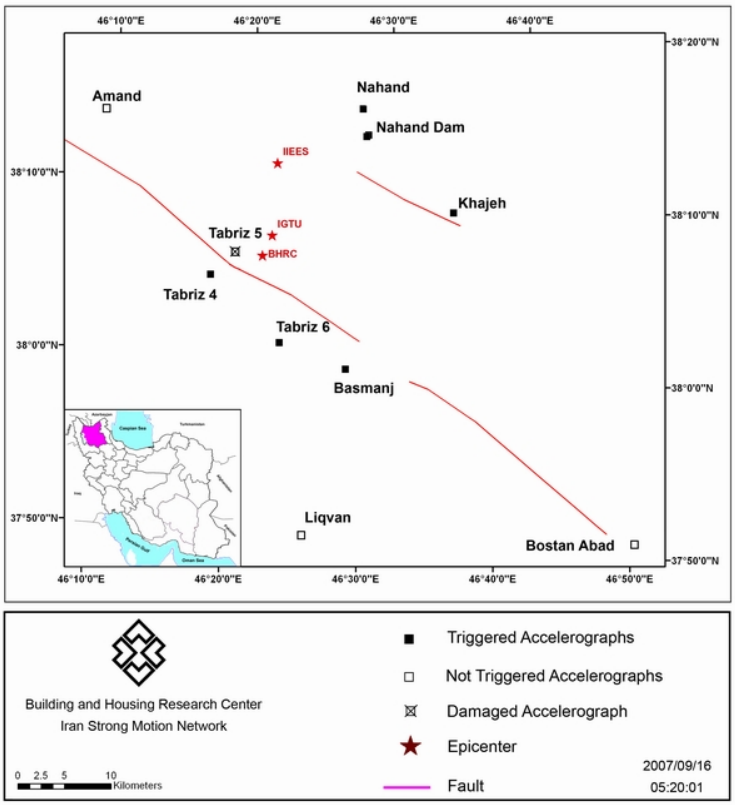


Figure 5. The location map of Tabriz Earthquake of September 16th, 2007and triggered accelerographs

3.4 Karoon3 Dam Earthquake of November 20th, 2007

On November 20th, 2007 at 05:20:02 (UTC), an earthquake with Ml5.5, Mw4.9 (BHRC), Mn5.1 (IGUT) and Ml4.9 (IIEES) occurred near Izeh city (Khuzestan Province) in south-west of Iran. This event was recorded by 5 sets of digital accelerographs of Iran Strong Ground Motion Network (Figure 6). The maximum peak acceleration was recorded in Karoon3 Dam station (71 cm/s^2). The epicenter of this event has been located at 31.83N, 50.02E (BHRC), 31.69N, 49.93E (IGUT), 31.66N, 50.09E (IIEES) and 31.60N, 50.03E (NEIC).

3.5 Mahidasht Earthquake of November 29th

On November 29th, 2007 at 01:10:49 (UTC), an earthquake with Mw4.2 (BHRC), Mn3.9 (IGTU), Ml3.8 (IIEES), occurred near Mahidasht region (Kermanshah Province) in west of Iran. This event was recorded by 3 sets of digital accelerographs (Figure 7) of Iran Strong Ground Motion Network. The maximum peak acceleration of about 21 cm/s^2 was recorded in Mahidasht station. The epicenter of this event has been located at 34.08N, 46.81E (BHRC), 34.10N, 46.78E (IGTU), 34.20N, 47.09E (NEIC) and 34.12N, 46.93E (IIEES).

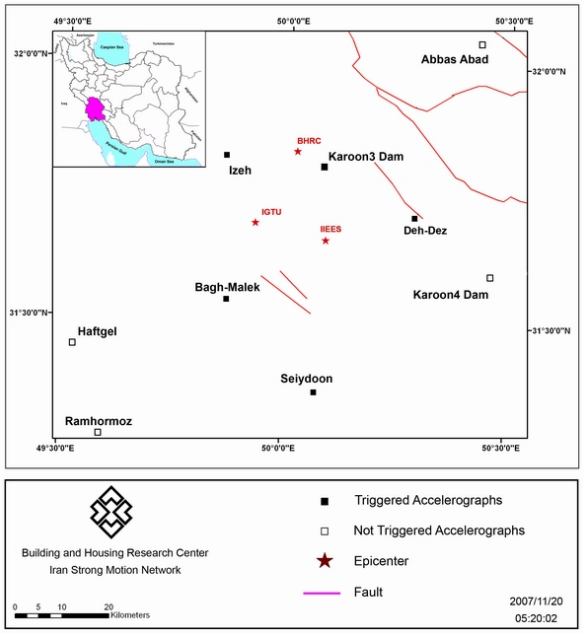


Figure 6. The location map of Karoon3 Dam Earthquake of November 20th, 2007 and triggered accelerographs

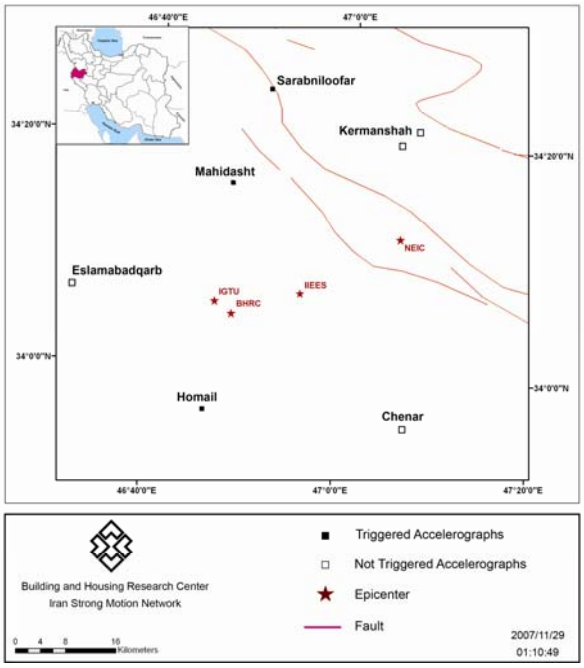


Figure 7. The location map of Mahidasht Earthquake of November 29th, 2007 and triggered accelerographs

3.6 Tabriz Earthquake of December 1st

On December 1st, 2007 at 18:45:11 (UTC), an earthquake with Mw4.8, Ml5.5 (BHRC), Ml4.5 (EMSC), and Mn4.6 (IGUT) occurred near Tabriz city in the north-west of Iran. This event was recorded by 9 sets of digital accelerographs (Figure 8) of Iran Strong Ground Motion Network.The maximum peak acceleration was recorded in Tabriz 6 station (148 cm/s^2). The epicenter of this event has been located at 38.13N, 46.43E (BHRC), 38.02N, 46.41E (IGUT), and 38.05N, 46.53E (EMSC). This earthquake had a foreshock at 18:22:17 (UTC) with Mw4.4 (BHRC), Mn3.3 (IGTU) and Ml3.9 (EMSC), and also recorded by 7 accelerographs (Tabriz 4, Tabriz 6, Nahand Dam3, Nahand Dam1, Basmanj, Nahand and Khajeh). Several more weak aftershocks were recorded in this region, which are not presented here.

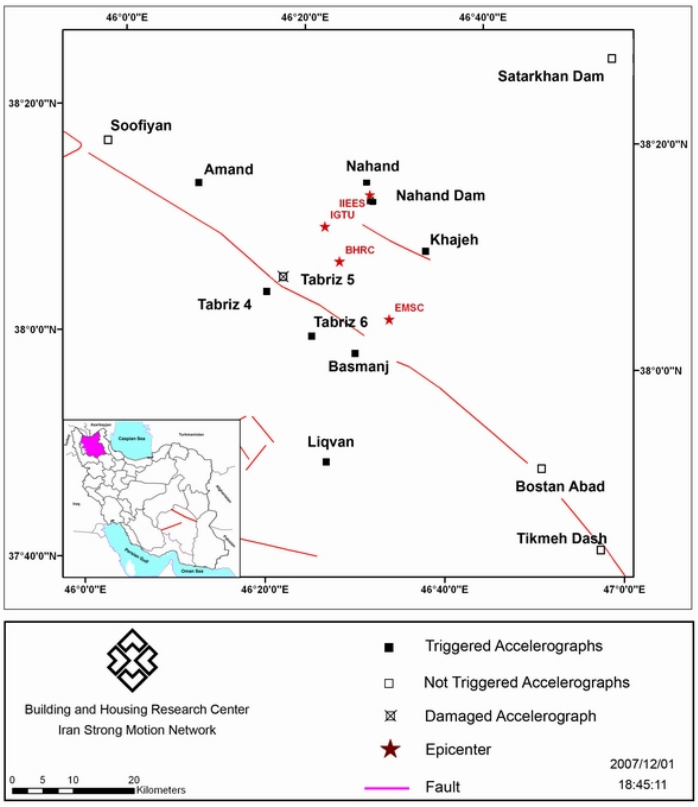


Figure 8. The location of Tabriz Earthquake of December 1st, 2007 and triggered accelerographs

4. CONCLUSION

In the second half of the year 2007, 124 accelerograms (with PGA greater than the trigger level of 0.01g) were recorded by 91 accelerographs, which were triggered by 69 different earthquakes. The maximum PGA of about 0.14g was occurred in Tabriz 6 station (Eastern

Azerbaijan Province).

The seismological parameters including magnitude and epicentral coordinates of the causal earthquakes were estimated using the recorded accelerograms. The outcomes are compared with those reported by national and international organizations and presented for the comparison. Since the accelerograms are occurred in the maximum distances of few tenths of kilometers, which in many cases are less than the accuracy of earthquake reported location. Therefore the computed parameters can be used in more assurance.

The comparison of seismological and strong motion data also helps to find the gaps in the ISMN and enables for more documented development and instruments setups.

REFERENCE

1. Berberian, M., 1976c. Contribution to the Seismotectonics of Iran (part II). Geological Survey of Iran, Report No. 39, 518 p., 5 Maps, 259 Figures.

ABBREVIATIONS

BHRC: Building and Housing Research Center
ISMN: Iran Strong Motion Network.
IGTU: Institute of Geophysics of Tehran University.
IIEES: International Institute of Earthquake Engineering and Seismology.
NEIC: National Earthquake Information Center.

Strong Motion Data (BHRC)								Seismological Data						
No.	Station	Record No.	Coordinate N	Coordinate E	U.P.G.A (cm/s^2)	S-P	Shear Wave Vel.	Origin Time Y-M-D	Origin Time h:m:s	Epicenter N	Epicenter E	FD (km)	Magnitude	Ref.
1	Molea Esmaeel	4412	32.015	55.934	11	2.69		2007/07/04	09:51:34	32.08 32.73	55.88 56.20	11 10	Mn4.7 Mw4.5	IGTU KHSN
2	Evaz	4537/01	27.759	54.005	25	1.79	757	2007/07/06	19:35:43	28.07	53.88	18	Mn3.2	IGTU
3	Esfarayen Dam2	4524	37.081	57.639	20	1.27		2007/07/07	11:39:33	37.16	57.64	2	Mn3.0	IGTU
4	Koopar	4461	36.531	45.251	15	4.18		2007/07/08	13:44:38	36.49 36.42	45.02 44.86	14 32	Ml4.1 mb4.4	IIEES NEIC
5	Hir	4418	38.083	48.491	34	9.92	612	2007/07/11	06:51:12	38.58	48.51		Mn5.1	IGTU
	Bile-Savar	4417	39.365	48.319	31	9.78	533							
	Helabad	4419	37.936	48.425	25	12.02	387			38.71	48.66	34	Mw5.3	BHRC
	Odloo	4422	39.302	48.158	25	10.34	445							
	Havigh	4420	38.149	48.891	24	9.20								
	Taleb-e-Qeshlaqi	4424	38.403	48.206	23	7.37	978							
	Astara	4416	38.422	48.869	22	7.48								
	Razi	4423	38.630	48.095	22	6.93	720							
	Eslam-Abad	4426	38.126	47.944	18	10.89	833							
	Qoorichay Dam2	4489	38.074	48.296	17	-								
	Ardebil 3	4483	38.217	48.328	15	8.74	659							
	Germi	4427	39.050	48.057	15	8.18	712							
	Lahrood	4425	38.507	47.826	15	9.60	981			38.94	48.75		Ml5.0	IIEES
	Namin	4421	38.423	48.477	15	5.67	1236							
	Qoorichay Dam1	4488	38.074	48.296	11	-								
6	Posht Rood	4540/02	29.123	58.381	17	1.49	329	2007/07/11	18:32:48	29.17 29.18	58.63 58.17	1 14	Mn3.4 Ml3.3	IGTU IIEES
7	Faryab	4447	28.099	57.229	19	3.62	641	2007/07/16	17:25:51	28.23 28.18	57.00 57.16	2 28	Mn3.9 Ml4.0	IGTU IIEES
8	Dorahan	4444	31.623	51.188	24	0.95		2007/07/17	04:42:52	31.35	51.28	10	Mn2.8	IGTU
9	Satarkhan Dam 3	4543	38.457	46.915	12	3.93		2007/07/18	21:00:14	38.22 38.31	46.90 46.85	13 14	Mn3.5 Ml3.3	IGTU IIEES
10	Fin1	4442/01	27.630	55.895	66	3.20	681	2007/07/23	17:54:10	27.57 27.55 27.55	55.69 55.79 55.79	18 11 11	Mn4.2 Ml4.2 mb4.7	IGTU IIEES NEIC
11	Fin1	4442/02	27.630	55.895	57	2.91	681	2007/07/24	10:08:08	27.65 27.64	56.05 56.14	22 14	Mn4.4 Ml4.4	IGTU IIEES
12	Bandar-e-Asaluyeh1	4454	27.479	52.609	29	1.24		2007/07/27	02:29:50	27.68 27.40	52.40 52.55	18 26	Mn3.0 Ml3.4	IGTU IIEES
13	Hineman	4579/02	30.529	57.289	26	1.66	617	2007/07/28	21:43:10	30.49 30.46	57.19 57.23	19 17	Mn3.7 Ml3.4	IGTU IIEES
14	Bahabad	4441	31.872	56.015	16	4.26	458	2007/07/29	15:08:48	32.16	56.06	5	Mn4.6	IGTU
	Molea Esmaeel	4513/01	32.015	55.934	21	3.35				32.13 32.37	56.25 55.57	14	Ml4.7 Mw4.6	IIEES KHSN
15	Nahand	4466/01	38.248	46.470	16	2.31		2007/08/10	17:47:05					
16	Laieen no	4610	37.127	59.499	19	1.57		2007/08/12	16:40:01	37.10	59.39	11	Mn3.2	IGTU
17	Jajarm	4440	36.961	56.341	22	3.64		2007/08/13	04:37:23	37.09 37.22	56.55 56.73	10 14	Mn4.3 Ml4.2	IGTU IIEES
18	Haji Abad	4452	33.605	59.994	33	2.75		2007/08/15	21:58:11	33.44	60.10	2	Mn3.6	IGTU
19	Khalkhal1	4486	37.608	48.537	25	0.96	485	2007/08/16	02:18:46					
20	Joshan	4472/02	30.124	57.610	17	1.50	776	2007/08/16	12:41:25	29.78 30.31	58.67 57.54	7 16	Mn3.7 Ml3.5	IGTU IIEES

Strong Motion Data (BHRC)								Seismological Data						
No.	Station	Record No.	Coordinate N	Coordinate E	U.P.G.A (cm/s^2)	S-P	Shear Wave Vel.	Origin Time Y-M-D	Origin Time h:m:s	Epicenter N	Epicenter E	FD (km)	Magnitude	Ref.
21	Naveh	4451/01	37.674	57.421	128	1.83		2007/08/20	04:53:30	37.74	57.28	5	Mw4.7 Ml5.3	BHRC
	Gifan	4453	37.893	57.487	38	3.15				37.83	57.45	8	Mn4.1	IGTU
	Robat	4450	37.903	57.698	12	5.12				37.71	57.46	6	Ml4.0	IIEES
22	Naveh	4451/02	37.674	57.421	33	1.92		2007/08/20	09:23:33	37.81	57.44	5	Mn3.3	IGTU
23	Rezvanshahr	4445	37.549	49.137	15	3.30		2007/08/20	16:08:57	37.48	49.05	3	Mn4.1	IGTU
	Shafa Rood Dam	4476/02	37.551	49.088	27	3.81				37.54	49.11	14	Ml4.0	IIEES
24	Beyram	4516	27.436	53.513	12	2.79	377	2007/08/22	07:23:36	28.08	53.76	5	Mn3.4	IGTU
25	Sefidrood Dam 1	4477/02	36.758	49.387	13	1.77		2007/08/28	00:52:12	36.90	49.41	8	Mn3.2	IGTU
										36.87	49.45	14	Ml3.2	IIEES
26	Agh Ghala	4443	37.010	54.452	17	5.18	341	2007/08/30	16:49:28	37.12	54.41	12	Mn4.0	IGTU
										37.21	54.43	46	Ml3.9	IIEES
27	Posht Rood	4540/03	29.123	58.381	22	0.60	329	2007/09/03	20:45:49					
28	Naveh	4523/01	37.674	57.421	21	1.88		2007/09/06	21:24:58	37.78	57.46	1	Mn2.7	IGTU
29	Sahne	4449	34.479	47.679	19	1.55		2007/09/09	06:38:56	34.53	47.59	5	Mn3.1	IGTU
										34.71	47.66	14	Ml3.3	IIEES
30	Maraveh Tappeh	4473	37.904	55.955	65	1.28	538	2007/09/14	07:54:46	37.80	56.14	1	Mn3.6	IGTU
31	Tabriz 6	4464	38.017	46.388	39	3.03		2007/09/16	05:20:01					
	Basmanj	4467	37.996	46.471	39	3.49	564			38.10	46.36	24	Mw4.1	BHRC
	Tabriz 4	4463	38.078	46.298	34	2.90								
	Nahand Dam 3	4469	38.223	46.479	30	3.51				38.12	46.37		Mn4.4	IGTU
	Nahand Dam 1	4468	38.223	46.479	21	3.54								
	Khajeh	4465	38.154	46.589	16		450							
	Nahand	4466/02	38.248	46.470	13	3.53				38.19	46.37	18	Ml3.9	IIEES
32	Astaneh	4475	36.269	54.099	25	3.68		2007/09/19	03:39:00	37.37	50.05	3	Mn3.8	IGTU
										37.20	49.96	18	Ml3.8	IIEES
33	Koloor	4487	37.388	48.723	125	1.55	860	2007/09/29	21:52:18	37.61	48.89	4	Mn4.2	IGTU
										37.37	48.56	15	Ml4.2	IIEES
34	Naveh	4523/02	37.674	57.421	16	1.90		2007/09/30	02:44:38	37.87	57.27	10	Mn2.5	IGTU
35	Sisakht	4496	30.852	51.458	25	0.62		2007/10/02	16:30:44					
36	Gilvan	4491	36.781	49.132	51	2.25		2007/10/02	17:01:57	36.52	48.97	14	Mn2.6	IGTU
										36.79	49.19		Ml2.4	IIEES
37	Bandar-e-Abas 1	4515	27.193	56.293	19	2.81	337	2007/10/10	03:53:36	27.23	56.16	9	Mn3.4	IGTU
										27.38	56.09	6	Ml3.3	IIEES
38	Boshkan	4470	31.625	56.075	22	1.35	1109	2007/10/12	14:40:36	31.67	56.09	3	Mn3.5	IGTU
										31.62	55.99	14	Ml3.5	IIEES
39	Hotkan	4576/02	30.848	56.788	10	1.44	837	2007/10/14	12:53:49	31.06	56.67	9	Mn3.0	IGTU
40	Gangejin	4479	37.759	44.666	19	2.52		2007/10/16	22:20:42	37.80	44.62	5	Mn3.9	IGTU
										37.65	44.59	18	Ml3.7	IIEES
										37.80	44.62		mb4.2	NEIC
41	Molea Esmaeel	4513/02	32.015	55.934	24	1.89		2007/10/17	10:45:03	32.02	55.82	15	Ml3.8	IIEES
42	Arjomand	4490	35.807	52.512	124	0.68		2007/10/18	20:48:39	35.77	52.52	3	Mn3.2	IGTU
										35.80	52.47	6	Ml3.2	IIEES
43	Khafr	4529	30.995	51.481	29	1.57		2007/10/29	11:38:25	31.03	51.49	10	Mn3.3	IGTU
										31.33	51.83	15	Ml3.2	IIEES

Strong Motion Data (BHRC)								Seismological Data						
No.	Station	Record No.	Coordinate N	Coordinate E	U.P.G.A (cm/s^2)	S-P	Shear Wave Vel.	Origin Time Y-M-D	Origin Time h:m:s	Epicenter N	Epicenter E	FD (km)	Magnitude	Ref.
44	Ghale Ganj	4526	27.523	57.881	15	2.71	683	2007/10/31	22:15:25	27.44 27.64	57.82 57.66	30 37	Mn3.3 Ml3.3	IGTU IIEES
45	Gazanak Vana	4492 4514	35.903 35.923	52.218 52.268	26 74	2.29 1.63		2007/11/01	15:21:49	35.94 35.93	52.37 52.31	4 14	Mn3.3 Ml3.4	IGTU IIEES
46	Arkvaz-e-Malek Shahi	4533	33.388	46.606	12	1.94		2007/11/07	03:32:08	33.40 33.48	46.66 46.97	13 14	Mn3.3 Ml3.1	IGTU IIEES
47	Darbastaneh	4485	33.701	48.817	14	2.79	1103	2007/11/08	09:40:38	33.54 33.67	48.91 48.94	2 14	Mn4.2 Ml4.1	IGTU IIEES
48	Band Silvana	4478 4480	37.498 37.395	44.999 44.877	21 56	3.78 1.86		2007/11/09	09:08:52	37.37 37.70	44.87 44.82	 14	Mn4.7 Ml4.2	IGTU IIEES
49	Evaz	4537/02	27.759	54.005	21	3.66	757	2007/11/11	23:23:48	27.74 28.50 27.74	53.66 53.94 53.66	36 14 35	Mn4.1 Ml3.9 mb4.5	IGTU IIEES NEIC
50	Ravar	4482	31.263	56.791	27	2.09	853	2007/11/14	02:00:28	31.10 31.22	56.72 56.75	17 6	Mn3.8 Ml3.6	IGTU IIEES
51	Kish	4481	26.572	53.951	17	1.30		2007/11/14	23:57:34					
52	Doobaran1	4532	28.411	54.182	37	1.71	1363	2007/11/18	07:33:31	28.13 28.22	54.15 53.95	13 45	Mn3.3 Ml3.3	IGTU IIEES
53	Eslam-Abad	4517	38.126	47.944	15	1.63	833	2007/11/18	21:42:50	38.11 38.37	47.96 48.05	5 36	Mn3.5 Ml3.3	IGTU IIEES
54	Kakan Masiri	4494 4495	30.638 30.246	51.805 51.519	59 14	2.73 7.06		2007/11/19	18:25:18	30.46	51.77		Mn4.7	IGTU
55	Karoon3 Dam Izeh1 Bagh-Malek Dah-dez Seiydoon	4568/01 4499 4497 4498 4500	31.803 31.818 31.540 31.708 31.366	50.081 49.860 49.871 50.289 50.075	71 40 40 32 27	2.81 3.51 5.16 4.57 6.82		2007/11/20	05:20:02	31.69 31.83 31.66	49.93 50.02 50.09	7 26 17	Mn5.1 Mw4.9 Ml5.5 Ml4.9	IGTU BHRC IIEES
56	Karoon3 Dam	4568/02	31.803	50.081	16	2.49		2007/11/21	08:04:25	31.58 31.67	49.86 49.96	7 18	Mn3.9 Ml3.8	IGTU IIEES
57	Mahidasht Sarabniloofar Homail	4521 4582 4518	34.267 34.406 33.939	46.799 46.856 46.771	21 20 14	3.72 5.37 3.46		2007/11/29	01:10:49	34.08 34.12 34.20 34.10	46.81 46.93 47.09 46.78	24 15 15 6	Mw4.2 Ml3.7 mb4.2 Mn3.9	BHRC IIEES NEIC IGTU
58	Nahand Dam 1	4538/03	38.223	46.479	13	3.23		2007/12/01	10:59:33	37.78	45.98	11	Mn2.0	IGTU
59	Tabriz 4 Nahand Dam 3 Khajeh Tabriz 6 Basmanj Nahand Dam 1 Nahand	4504/01 4539/01 4503/01 4509/01 4502/01 4538/01 4530/01	38.078 38.223 38.154 38.017 37.996 38.223 38.248	46.298 46.479 46.589 46.388 46.471 46.479 46.470	44 40 39 37 28 28 27	3.03 3.39 3.29 2.90 3.21 3.33 3.59	 450 564	2007/12/01	18:22:17	38.15 38.06 37.66 38.21	46.41 46.40 46.57 46.51	22 5 14	Mw4.2 Ml5.2 Ml3.9 Mn3.9 Ml3.6	BHRC EMSC IGTU IIEES

Strong Motion Data (BHRC)								Seismological Data						
No.	Station	Record No.	Coordinate N	Coordinate E	U.P.G.A (cm/s^2)	S-P	Shear Wave Vel.	Origin Time Y-M-D	Origin Time h:m:s	Epicenter N	Epicenter E	FD (km)	Magnitude	Ref.
60	Tabriz 6	4509/02	38.017	46.388	148	2.92		2007/12/01	18:45:11	38.13	46.43	22	Mw4.8 Ml5.5	BHRC
	Basmanj	4502/02	37.996	46.471	82	3.16	564							
	Tabriz 4	4504/02	38.078	46.298	66	3.02				38.05	46.53	10	Ml4.5	EMSC
	Nahand Dam 3	4539/02	38.223	46.479	59	3.36								
	Nahand Dam 1	4538/02	38.223	46.479	54	3.53				38.18	46.40	1	Mn4.6	IGTU
	Khajeh	4503/02	38.154	46.589	50	3.46	450							
	Liqvan	4508/01	37.833	46.432	35	4.43								
	Nahand	4530/02	38.248	46.470	29	3.76				38.23	46.48	15	Ml4.4	IIEES
	Amand	4501	38.231	46.156	16	4.01	743							
61	Tabriz 6	4509/03	38.017	46.388	71	2.85		2007/12/02	10:00:02	38.09	46.43	22	Mw4.1 Ml5.1	BHRC
	Basmanj	4507	37.996	46.471	58	3.19	564							
	Tabriz 4	4506	38.078	46.298	37	2.98				38.10	46.39	5	Mn3.8	IGTU
	Khajeh	4505	38.154	46.589	26	3.42	450							
	Nahand Dam 3	4539/03	38.223	46.479	22	3.42				38.25	46.49	14	Ml3.6	IIEES
	Liqvan	4508/02	37.833	46.432	12	4.48								
62	Koohbanan	4578	31.421	56.276	15	2.81	469	2007/12/06	21:02:50	31.42	56.44	5	Mn3.9	IGTU
										31.38	56.29	14	Ml3.6	IIEES
63	Posht Rood	4540/04	29.123	58.381	21	1.61	329	2007/12/10	16:44:49	29.59	58.91	3	Mn3.0	IGTU
64	Konar Takhteh	4520	29.531	51.395	21	2.79	450	2007/12/11	00:29:43	29.60	51.31	10	Mn3.7	IGTU
										29.60	51.37	14	Ml3.8	IIEES
65	Kia-sar	4531	36.237	53.539	52	1.51		2007/12/12	02:52:45	36.30	53.49	3	Mn3.5	IGTU
										36.19	53.68	14	Ml3.6	IIEES
66	Miyaneh	4522	37.431	47.705	33	3.76		2007/12/14	21:56:04	37.30	47.63	14	Mn4.5	IGTU
	Torkmanchay	4525	37.579	47.391	15	6.23	542			37.27	47.70	33	Ml4.4	IIEES
67	Nesa Dam 1	4580	28.634	58.411	26	2.48		2007/12/22	10:04:41	28.85	58.31	17	Mn3.7	IGTU
	Nesa Dam 2	4581	28.650	58.389	63	2.21				28.74	58.07	14	Ml3.6	IIEES
68	Chah Moslem	4528	26.742	54.557	16	4.15	650	2007/12/25	13:15:50	27.28	54.81	12	Mn3.7	IGTU
										26.71	54.63	14	Ml3.9	IIEES
										26.71	54.63	14	mb4.5	NEIC
69	Barvat	4527	29.071	58.402	18	1.46	491	2007/12/25	15:34:53	29.21	54.48	12	Mn4.2	IGTU
	Bam1	4560/01	29.079	58.353	30	1.07				29.16	58.08	15	Ml4.0	IIEES