Iranian Strong Motion Database: 2004-2014; A Processing and Preliminary Analysis

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Abstract

The Iranian strong motions are recorded in the last 42 years in the national strong motion network of Iran. There are actually more than 11,800 of 3 component accelerograms recorded in this network. In this study, we employ the strong motion records, which are recorded by Iran Strong Motion Network (ISMN), established by the Building and Housing Research Center (BHRC) of Iran. In the last years (2004-2014) there are important earthquakes recorded in this network (among which the greatest Iranian earthquake in the last 50 years, which was the 16 April 2013 M_w7.8 Saravan, Makran SE Iran earthquake; occurred in the subduction zone of Makran). More than 6200 three component accelerograms have been recorded in this 11 years period of time, of which 100 records having greater peak acceleration have been processed with a more focus in this study. In this respect, the data selected are processed in order to achieve the most important strong motion parameters in aspect of engineering seismology and carrying out a preliminary analysis of the available data.

Keywords: Strong Motion; Processing; Iran; Acceleration time history.

1. Introduction

The Iranian plateau formed by the active tectonics of the Alpine-Himalayan belt, is situated between the Eurasian and Arabian plates. Most deformation in Iran is concentrated in the Zagros, Alborz and Kopet Dagh mountains and eastern Iran [1]. The plataue is considered as one of the most seismically active regions in the world and is faced with different warthquakes each year. Iran strong motion network (ISMN) is responsible for recording strong motion data throughout the country. The ISMN started its activities since 1973 and is maintained by the Road, Housing and Development Research Center of Iran (BHRC). Most of the accelerograph stations have been installed in seismically active or in densely populated and industrialized areas. Meanwhile, according to higher seismicity of Zagros belt, and higher population density in this region (southwest and western Iran) comparing to eastern and southeastern Iran, more stations are located in Zagros. Therefore, most of the records are actually corresponding to the Zagros belt.

The ISMN network has gradually extended. During the years 1973 to 1992, about 276 Kinemetrics SMA-1 analog accelerographs were installed throughout the country. After the catastrophic 1990 Manjil earthquake, this network was developed using digital SSA-2 and CMG-5TD instruments. To May 2016, it consists of 1160 digital strong motion accelerographs (Fig.1) and has recorded about 10,800 three component accelerograms. Among these, there are some of the most important and distinct accelerograms of the world (e.g. September 16, 1978, Tabas, (Ms=7.4) with PGA=0.9g, 3 km distance from fault and 50 seconds strong motion duration; June 20, 1990, Manjil, (Mw 7.3); June 20, 1994, Zanjiran, (mb=6.1) with an uncorrected PGA> 1g; December 26, 2003, Bam, (Mw=6.5) with vertical PGA= 1g including near fault and near field effect; August 11, 2012, Vazeghan, (Mw=6.5) which was recorded by 40 instruments, having a PGA=0.54g.).

Different dataset of strong motions of Iran have been previously processed and studied by several researchers. For example, Zare [2] processed 468 accelerograms of ISMN obtained from earthquakes in the time span of 1974-1997. Zare [3] prepared a catalogue of 100 selected records obtained from 15 earthquakes with higher qualities in the low frequencies during 1994-2002. Sinaeiyan [4] processed also 3268 accelerograms of ISMN obtained from earthquakes in the time span of 1994-2004.

In this paper, the procedure of data selection and processing of the most important accelerograms recorded during 2004-2014 is presented and some important strong motion parameters are estimated based on selected records to obtain a preliminary analysis of the data.

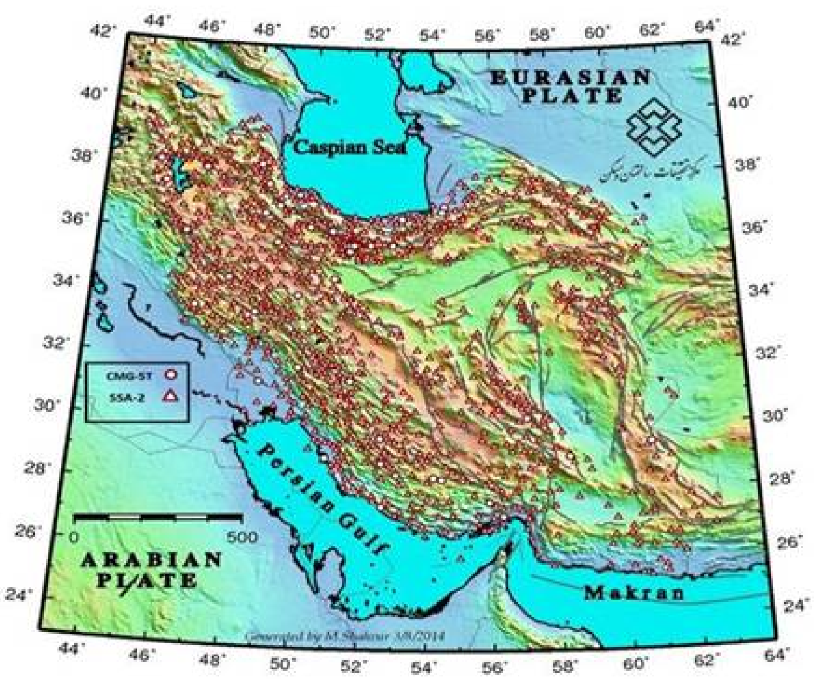

Fig. 1. Distribution of accelerograph stations of the ISMN (source: www.ismn.bhrc.ac.ir)

2. Data

During the past decade, Iran has experienced many earthquakes among which some are considerable events with magnitude over 5.5 (Table 1). It has been tried to record the strong motions of these earthquakes as much as possible using the ISMN. Since 2004 till the end of 2014, about 6,135 accelerograms have been recorded in ISMN (Fig.2). Some of these records belong to the important earthquakes with M>5.5. In this study, 100 records with high quality are processed and analyzed. These records were selected by considering the criteria of PGA over 0.1g and epicentral distance less than 140 km. The waveform of the data were prepared by the Road, Housing and Development Research Center.

Table1. The most important earthquakes in 2004-2014

Date	Mw	Macroseismic epicenter
05/28/2004	6.4	Firouzabad- Kojour
02/22/2005	6.5	Dahuiyeh Zarand
03/31/2006	5.9	Darb Astane Silakhor
06/18/2007	5.7	Kahak Qom
08/11/2012	6.2	Ahar- Varzeghan
04/09/2013	6.0	Shonbe Bushehr
04/16/2013	7.8	Saravan, Sistan
05/11/2013	6.2	Goharan-Bashagerd
08/18/2014	6.0	Mormori

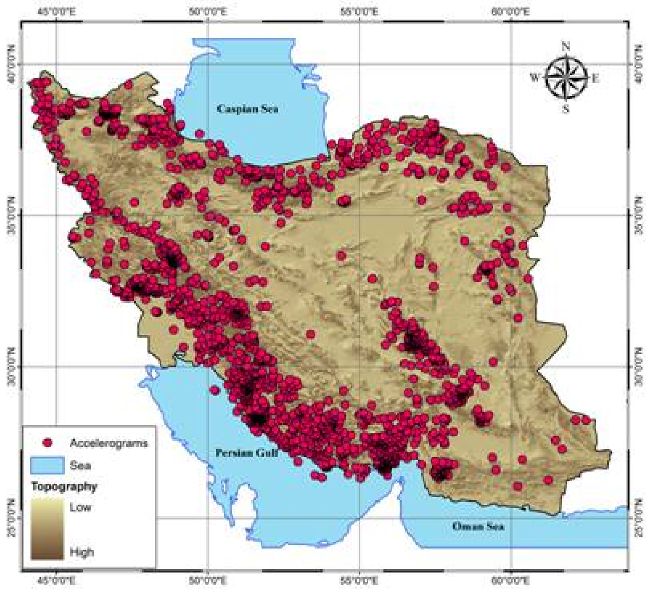

Fig. 2. Distribution of recorded accelerograms (2004-2014)

3. Processing

Standard steps in strong motion processing consists of: 1- baseline correction, 2- instrument correction (if needed), 3- calculation of fast Fourier transform, 4- evaluation of high (or band Pass) frequency filtering, 5- initial integration and long period filtering, 6- computation of maximum-bandwidth response spectra and 7- calculation of parameters of interest.

Several softwares have been developed for strong motion processing such as BAP [5], Kinemetrics SWS (Seismic Work Station) [6], Kinemetrics Strong Motion Analyst (SMA) [7], Proschema [8], Seismosignal [9] and so on.

Baseline correction is the first step of the processing. There may be numerous sources of the offsets (e.g., hysteresis in the sensor, static buildup in the A/D converter, or tilting of the ground), and for this reason, there is no universal correction scheme that can be applied blindly to the records [10]. In addition, the baseline shift of an accelerogram can be composed of a pre-event baseline shift and an event-induced baseline shift [11]. Several researchers have proposed empirical methods to adjust the baseline of a record [e.g. 12, 13, 14 , 15]

The most important step in processing strong-motion accelerograms is the choice of the long-period cut-off, or rather the longest response period for which the data are judged to be reliable in terms of signal-to-noise ratio [16].

There are two main criteria to infer the band pass cut-off:

(1): frequency squared (ω^2) trapezoidal model: in this model, the Fourier amplitude spectra (FAS) of acceleration is used to determine the high pass (HP) and low pass (LP) cut-offs. According to the ω^2 model, the amplitude of the Fourier spectra between the corner frequency (f_c) and maximum frequency (f_{max}) is more or less constant and in the frequencies less than f_c as well as frequencies over f_{max}, the amplitude decreases and where the trend deviates from the tendency to decay, HP and LP for filtering are selected.

(2): signal to noise (S/N) ratio: in this method, two windows consisting of one noise window (usually in the pre-event memory of the record during the time t_n) and one signal window (triggered event during the time t_s) are initially selected in the acceleration time history. Then, the FAS of the signal window, S(f) and the FAS of the noise window, N(f) are calculated and smoothed by Konno & Ohmachi function. The signal to noise ratio, R_{sn}, is then calculated according to the below formula:

$$R_{sn}(f) = \frac{S(f)/\sqrt{t_s}}{N(f)/\sqrt{t_n}} \quad (1)$$

Considering the $R_{sn}(f)=3$ as the desirable threshold, the band pass filter [HP-LP] is determined for the frequency ranges having values equal and over this ratio.

As mentioned above, we selected events with high quality and having uncorrected PGA over 0.1g and epicentral distances less than 140 km. In order to process the data, we first applied the baseline correction to our data of interest in order to remove the long period noises. Then, range of band-pass filter for each record was determined based on the both frequency squared (ω^2) trapezoidal model and S/N ratio methods. The PGA (cm/s^2) and significant duration (which is calculated based on 5-95% of the Arias intensity method [17]) were calculated for all the data.

Among the selected accelerograms recorded since 2004 to 2014, the maximum PGA belongs to the record No.3333 which corresponds to the 5/25/2004 M_w6.4 Firouzabad- Kojour earthquake. The record was obtained in Hasan Keyf strong motion station in the coordinates of 36.51N and 51.16E. Based on BHRC information, the Vs_{30} has been measured 339 m/s in this site. This record has an uncorrected PGA of 922.17 cm/s^2 in the L (north-south) component (Fig. 3-a). Based on the two ω^2 model and S/N methods for determination of HP and LP, the band-pass range was estimated between 0.2-50 Hz for this accelerogram (Fig. 3-c and e). In order to apply the S/N ratio method to determine the proper the band-pass filter, the noise window was selected between 0-14 second in the pre-event memory and the signal window was selected between 14-34 seconds. In addition, it was tried to evaluate the site classification [2] of the Hasan Keyf strong motion station on the basis of the receiver function method (estimating the H/V ratio) (Fig. 3-f). According to this procedure, maximum H/V ratio was determined in the frequency of 2 which indicates the site type II equaled to the soft alluvium or sand (Table 2). This result is consistent with the Vs30=339 m/s showing the site type II for the Hasan Keyf strong motion station. All of the results of the 100 accelerograms are shown in Table 3.

Table 2. Proposed classification of site effects for Iran [2].

Site Class	Vs30 (m/s)	Fundamental Frequency
I (Rock)	700<	F≥15 Hz
II (Hard Alluvium)	500-700	5≤F<15 Hz
III (Soft Alluvium, Sand)	300-500	2≤F<5 Hz
IV (Soft Soil, Clay)	<300	F<2Hz

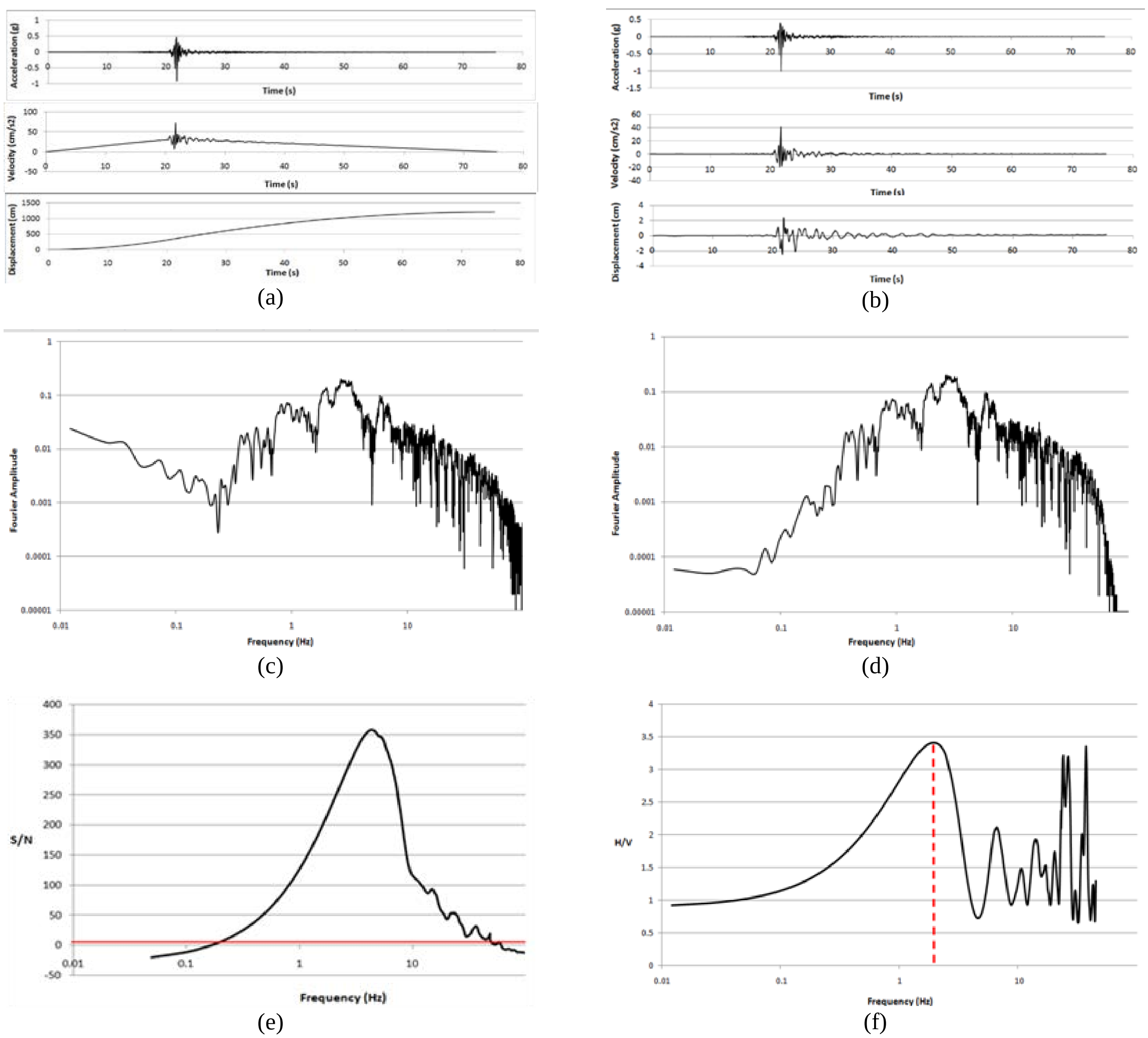

Fig . 3. Processing of NS component of the record No. 3333 corresponding to the 5/25/2004 Firouzabad- Kojour earthquake. (a): uncorrected acceleration, velocity and displacement time series, (b): corrected acceleration, velocity and displacement time series, (c) uncorrected Fourier amplitude spectra, (d) corrected Fourier amplitude spectra with the band-pass filter of 0.2-50 Hz. (e): signal to noise (S/N) ratio and. The red line indicates S/N>3 ranged in the frequency band of 0.2-50 Hz and (f): H/V spectral ratio for site type consideration.

Table 3. Results of the processing and analysis of the 100 important accelerograms of Iran recorded during 2004-2014.

Earthquake						Station					L (N-S)				Vertical				T (E-W)			
No	Year	Month	Day	Time	Mw	Code	X	Y	Record No.	Epi. Dist.	HP	LP	PGA	duration	HP	LP	PGA	duration	HP	LP	PGA	duration
1	2004	3	2	7:51	5.4	ALH	51.32	29.01	3244/02	29	0.2	50	129.6	8.59	0.2	50	55.83	11.765	0.1	50	95.66	7.85
2	2004	3	2	7:51	5.4	AHM	51.32	29.01	3241	14	0.3	50	177.7	4.875	0.1	50	124.3	5.97	0.3	50	112.4	5.93
3	2004	3	2	7:51	5.4	AAA	51.32	29.01	3239/01	6	0.1	50	393.1	5.705	0.1	50	271.3	6.65	0.2	50	410.5	5.465
4	2004	3	2	7:51	5.4	BSH5	51.32	29.01	3235	50	0.1	50	72.44	4.955	0.1	50	38.25	11.23	0.1	50	127.1	0.13687
5	2004	5	28	12:38	6.4	NSH	51.61	36.28	3368/01	43	0.1	50	69.76	28.935	0.1	40	38.9	29	0.1	40	107.2	23.205
6	2004	5	28	12:38	6.4	TAL1	51.61	36.28	3318	77	0.1	50	100.7	20.045	0.1	50	61.91	28.535	0.1	50	117.9	19.545
7	2004	5	28	12:38:00	6.4	POO	51.59	36.4	3330/01	14	0.1	45	283	13.995	0.3	45	246.9	13.075	0.1	40	163.6	13.65
8	2004	5	28	12:38	6.4	MLK	51.61	36.28	3367	104	0.1	50	287	7.66	0.1	50	81.24	17.475	0.1	50	265.6	10.62
9	2004	5	28	12:38	6.4	ZYZ	51.61	36.28	3442	140	0.1	40	138.3	9.295	0.2	35	85.65	18.055	0.1	50	127.3	9.175
10	2004	5	28	12:38	6.4	HKF	51.61	36.28	3333	48	0.2	50	960.8	2.075	0.1	50	421.2	4.755	0.1	50	471.6	2.26
11	2004	5	28	12:38	6.4	CBS	51.61	36.28	3355	121	0.1	50	92.42	13.04	0.1	40	39.25	18.385	0.1	50	155	1.91943
12	2004	5	29	9:23	5.3	BLD	51.29	36.37	3432/01	50	0.2	50	43.22	3.18	0.1	50	20.75	4.96	0.2	50	111.4	1.865
13	2004	10	6	11:14	5.1	MAM	57.98	28.81	3555/01	14	0.1	50	120.5	3.365	0.1	50	76.26	7.555	0.2	45	116	6.42
14	2004	10	7	21:46	6.2	GOG1	54.38	37.17	3545	37	0.1	50	105.2	10.225	0.1	50	47.35	15.48	0.1	50	63.07	13.41
15	2005	1	10	18:47	6.1	AGG1	54.54	37.12	3608	14	0.1	50	36.99	23.21	0.1	50	55.41	17.725	0.1	50	125.2	13.11
16	2005	1	10	18:47	6.1	ICB	54.54	37.12	3618	40	0.1	50	169.9	5.14	0.1	45	31.19	14.01	0.1	50	79.89	10.775
17	2005	2	22	2:25	6.5	RVR	56.77	30.8	3661	52	0.1	50	120.7	20.28	0	50	35.14	22.015	0.1	50	73.29	20.68
18	2005	2	22	2:25:00	6.5	ZRN	56.58	30.81	3671/01	18	0.1	35	312.2	17.865	0.1	35	310.9	17.305	0.1	35	243.8	19.88
19	2005	3	13	3:31	6.2	SBS	61.69	27.27	3722	30	0.1	50	72.87	9.095	0.1	45	62.16	9.14	0.1	40	110.4	3.905
20	2005	11	27	10:22	5.7	SUZ	55.9	26.78	3915/01	17	0	50	352.6	7.605	0.1	50	130.4	9.88	0.1	50	215.8	11.17
21	2006	2	28	7:31	5.7	AHD	56.91	28.26	3996/02	43	0.1	50	116.9	8.28	0.1	50	56.39	15.715	0.1	50	137.9	11.15
22	2006	3	25	7:28	5.5	RZV	55.69	27.57	4012/01	38	0.1	50	120.6	19.305	0.1	50	34.96	38.02	0.1	50	104	21.06
23	2006	3	25	7:28	5.5	FYN1	55.69	27.57	4013/01	21	0.1	50	170.9	18.54	0.1	50	152	15.07	0.1	50	194.8	16.19
24	2006	3	30	16:17	5.3	CHL	48.97	33.61	4027/02	8	0.1	50	165.6	5.515	0.1	50	113.4	5.2	0.1	50	97.8	9.63
25	2006	3	30	19:36	5.2	CHL	48.95	33.69	4027/05	5	0.1	50	336.5	5.29	0.1	50	212.7	8.2	0.1	50	320	6.755
26	2006	3	31	1:17	5.9	CLV	49	33.69	4018/03	41	0.1	50	171.5	19.395	0.1	50	78.39	19.995	0.1	50	147.4	19.81
27	2006	3	31	1:17	5.9	DSF	49	33.69	4052/03	27	0.1	50	109.7	13.125	0	50	74.11	14.865	0.1	50	124.9	13.445
28	2006	3	31	1:17:00	5.9	CHL	48.91	33.66	4027/08	9	0.1	35	432	13.88	0.1	35	562.5	7.035	0.1	35	342.6	10.985
29	2006	3	31	1:17	5.9	ALR	49	33.69	4025	71	0.1	50	156	6.67	0.1	50	72.59	11.265	0	50	149.5	8.545
30	2006	3	31	1:17	5.9	TOA	49	33.69	4035/03	41	0.1	50	336.3	5.425	0.1	50	235.6	5.745	0.1	50	397.2	5.35
31	2006	6	3	7:15	5.4	TOM	55.92	26.97	4147/05	23	0.1	50	127.3	9.015	0.1	50	77.62	9.225	0.1	50	71.37	10.235
32	2006	6	3	7:15	5.4	SUZ	55.92	26.97	4096/01	26	0.1	50	178.3	4.005	0.1	50	64.63	8.065	0.1	50	158.2	4.32
33	2006	6	28	21:02	5.7	TOM	55.83	27.02	4147/13	28	0.1	50	561.8	4.81	0.1	50	475.6	7.52	0.1	50	307.9	7.985

Earthquake						Station					L (N-S)				Vertical				T (E-W)			
No	Year	Month	Day	Time	Mw	Code	X	Y	Record No.	Epi. Dist.	HP	LP	PGA	duration	HP	LP	PGA	duration	HP	LP	PGA	duration
34	2006	9	14	2:25	5.2	DLK	51.51	29.3	4190/02	26	0.1	50	76.9	3.895	0.1	50	51.14	5.515	0.1	50	153.8	2.705
35	2006	11	5	20:06	5	KLR	48.83	37.48	4207/01	14	0.1	50	148.1	6.915	0.1	50	82.77	5.94	0.2	50	203.3	3.805
36	2007	3	26	6:36	4.6	BAR	58.4	29.2	4298/01	14	0.1	50	109.9	5.28	0.1	50	133.4	0.10962	0.2	50	182.3	2.315
37	2007	6	18	14:29:00	5.7	KAK	50.87	34.4	4348	16	0.3	40	102.6	12.185	0.1	40	52.01	15.285	0.2	40	66.81	14.905
38	2007	12	1	18:45	4.8	TAB6	46.43	38.13	4509/02	13	0.1	50	86.96	4.525	0.1	50	48.93	6.145	0.1	50	150	2.875
39	2008	8	27	21:52	5.8	MOS	47.42	32.3	4646	25	0.1	50	466.8	4.55	0.1	50	130.2	7.125	0.1	50	590.1	3.225
40	2008	9	10	11:00	6	SUZ	55.81	26.83	4678/01	26	0.1	50	168.2	11.23	0.1	50	114.9	15.535	0.1	50	169.6	12.35
41	2008	9	10	11:00:00	6	TOM	55.86	26.77	4686/03	9	0.1	45	598	5.74	0.2	45	302.1	6.615	0.1	45	564	6.8
42	2010	7	20	19:38:00	5.9	ESK	53.61	27.22	4994/01	32	0.1	35	280	6.58	0.1	35	103.1	6.58	0.1	35	362.4	6.58
43	2010	7	30	13:50:00	5.9	TBH	59.22	35.27	5006	4	0.1	35	441.8	4.5	0.3	35	130.1	8	0.1	35	176.2	8.68
44	2010	7	30	13:50:00	5.9	JNG	59.22	34.7	5002	64	0.2	35	104.2	6.58	0.1	35	80.15	14.845	0.1	35	152.6	10.955
45	2010	7	31	6:52	5.7	LZR	56.79	29.6	5014	9	0.1	50	79.89	5.405	0.1	50	64.94	7.3	0.4	50	108	4.465
46	2010	8	27	19:23:00	5.6	KUZ	54.59	35.45	5030/01	17	0.1	45	499.6	3.89	0.1	45	455.1	5.69	0.1	45	590.4	3.155
47	2010	9	27	11:22:00	5.8	QAM	51.59	29.85	5062	18	0.1	35	343	4.02	0.1	35	102.4	11.16	0.1	35	331.4	6.505
48	2010	9	27	11:22:00	5.8	KZR1	51.64	29.63	5065	21	0.1	35	116.4	11.025	0.1	35	80.46	12.355	0.1	35	80.68	11.35
49	2010	12	20	18:41:00	6.5	RGN	59.01	28.65	5130	41	0.1	35	62.25	20.515	0.1	35	45.26	29.06	0.1	45	126.1	19.505
50	2011	1	5	5:55	5.4	SEP	51.7	30.16	5151/01	29	0.1	50	137.8	7.63	0.1	50	35.01	11.43	0.1	50	121.8	4.7
51	2011	1	27	8:38	6.1	SRH	59	28.15	5179/04	21	0	50	197.3	5.825	0	50	85.28	9.085	0.1	50	159.6	6
52	2012	5	3	10:09	5.5	MUR	47.72	32.88	5449	17	0.1	50	167	4.77	0.1	50	124.3	7.94	0.1	50	146.4	5.745
53	2012	8	11	12:34	6.2	HUR	46.75	38.45	5544/03	70	0.1	50	117.6	11.815	0.1	50	43.73	18.62	0	50	65.77	20.09
54	2012	8	11	12:34:00	6.2	HAS	47.12	38.25	5540/03	39	0.1	45	110.9	22.195	0.1	45	71.87	24.595	0.1	45	280.3	17.49
55	2012	8	11	12:34:00	6.2	MES	47.67	38.39	5602/03	80	0.1	45	83.72	12.055	0.1	35	55.49	21.465	0.1	45	100.4	15.895
56	2012	8	11	12:23	6.1	DUZ	46.86	38.52	5533/01	67	0	50	112.3	10.23	0.1	50	40.1	17.87	0.1	50	80.87	15.845
57	2012	8	11	12:23	6.1	NHN	46.86	38.52	5558/01	46	0	50	185.1	7.05	0.1	50	90.41	14.1	0.1	50	220.6	14.425
58	2012	8	11	12:23	6.1	KAL	46.86	38.52	5545/01	42	0.1	50	104.1	9.19	0.1	50	69.21	13.05	0.1	50	60.87	13.075
59	2012	8	11	12:34:00	6.2	DMC	47.37	38.12	5532/03	65	0.1	45	169.9	13.21	0.1	45	92.75	17.67	0.1	45	192.7	12.63
60	2012	8	11	12:34:00	6.2	NHN	46.47	38.25	5558/03	33	0.1	45	123.8	12.4	0.1	45	69.47	13.86	0.1	45	123.8	12.025
61	2012	8	11	12:34	6.2	NHN	46.75	38.45	5558/03	33	0.1	50	133	12.42	0.1	50	71.25	13.855	0.1	50	159.9	11.795
62	2012	8	11	12:34	6.2	KAL	46.75	38.45	5545/03	53	0.1	50	111.7	8.92	0.1	50	91.52	13.19	0.1	50	110	11.635
63	2012	8	11	12:23	6.1	AHR	46.86	38.52	5520/01	18	0	50	196.7	11.085	0.1	50	97.66	13.275	0.1	50	267.7	10.485
64	2012	8	11	12:34:00	6.2	KJH	46.59	38.15	5547/03	36	0.1	45	172.3	10.955	0.1	45	81	15.07	0.1	45	244.6	9.665
65	2012	8	11	12:23	6.1	VAZ	46.86	38.52	5579/01	19	0.1	50	464.2	5.58	0.1	50	261	8.435	0.1	50	393.7	8.205
66	2012	8	11	12:23	6.1	KJH	46.86	38.52	5547/01	47	0.1	50	231.1	9.54	0.1	50	99.84	16.595	0.1	50	288.5	7.3

Earthquake						Station					L (N-S)				Vertical				T (E-W)			
No	**Year**	**Month**	**Day**	**Time**	**Mw**	**Code**	**X**	**Y**	**Record No.**	**Epi. Dist.**	**HP**	**LP**	**PGA**	**duration**	**HP**	**LP**	**PGA**	**duration**	**HP**	**LP**	**PGA**	**duration**
67	2012	8	11	12:34:00	6.2	AHR	47.06	38.47	5520/04	27	0.1	40	238.9	8.605	0.1	40	202.4	10.89	0.1	40	414.1	6.62
68	2012	8	11	12:34:00	6.2	VAZ	46.64	38.51	5579/04	11	0.1	45	535	6.965	0.1	45	215.9	8.685	0.1	45	542.8	5.945
69	2012	8	14	14:02	5.5	KMO	46.76	38.38	5609/11	13	0.1	50	314.5	4.535	0.1	50	127.7	5.975	0.1	50	149.2	6.71
70	2012	8	14	14:02	5.5	VAZ	46.76	38.38	5589/07	18	0.2	50	382	3.775	0.1	50	91.99	7.515	0.2	50	148.7	3.975
71	2012	8	14	14:02	5.5	MTL1	46.76	38.38	5611/02	11	0.1	50	350.8	3.17	0.1	50	80.56	7.98	0.1	50	271.8	3.415
72	2012	8	14	14:02	5.5	CHY1	46.76	38.38	5597/43	5	0.1	50	266.3	5.62	0.1	50	104	7.07	0.2	50	358.2	3.07
73	2013	4	10	1:58	5.5	SNB	51.74	28.35	5801/69	6	0.1	50	561.6	2.13	0.1	50	283.1	3.255	0.1	50	446.9	2.83
74	2013	4	16	10:44	7.8	SBG	62.14	28.24	5842/01	68	0.1	50	162	36.69	0.1	50	135.2	31.14	0.1	50	214.8	40.165
75	2013	4	16	10:44:00	7.8	SRV	62.32	27.37	5820	98	0.1	45	118.3	30.99	0.1	45	133.5	24.01	0.1	45	134.2	35.77
76	2013	4	16	10:44:00	7.8	KAS	61.21	28.22	5844	91	0.1	45	105.2	21.88	0.1	45	43.78	30.32	0.1	45	66.23	31.96
77	2013	4	16	10:44	7.8	JLQ	62.14	28.24	5827	90	0.1	45	129	28.815	0.1	50	73.64	29.675	0.1	50	108.4	30.78
78	2013	4	16	10:44:00	7.8	GOS	61.96	27.79	5829	53	0.1	45	150.4	35.77	0.1	45	183.6	30.115	0.1	45	165.1	30.115
79	2013	4	16	10:44	7.8	SBS	62.14	28.24	5846	107	0.1	50	104.3	27.93	0.1	50	120	25.22	0.1	40	136.1	23.46
80	2013	4	18	10:39:00	4.9	ZJI	45.37	38.46	5859/01	7	0.1	45	143.9	3.52	0.1	45	51.17	7.93	0.1	45	84.53	4.105
81	2013	5	12	10:54	5.5	GOH	57.68	26.66	5908/05	23	0.1	50	213.5	4.04	0.1	50	153.6	4.935	0.1	50	396.5	3.425
82	2013	5	18	10:03	5.7	GOH	57.84	26.74	5928/01	18	0.1	50	164.3	3.37	0.1	50	131.4	5.63	0	50	116.1	6.165
83	2013	5	18	10:57	5.5	GOH	57.83	26.73	5928/04	18	0.1	50	137.5	5.03	0.1	50	104.8	5.46	0.1	50	117.2	4.685
84	2013	11	22	18:30	5.7	GRS	45.53	34.29	6031/02	30	0.1	50	109	14.46	0.1	50	49.68	13.295	0.1	50	108.1	14.295
85	2013	11	22	6:51	5.6	GRS	45.45	34.5	6031/01	48	0.1	50	110.4	13.035	0.1	50	51.42	10.82	0.1	50	105.1	12.075
86	2013	11	24	18:05	5.5	QSR	45.57	34.24	6043	30	0.1	50	57.08	10.68	0.1	50	23.08	0.4479	0.1	50	106.7	8
87	2013	11	28	13:51	5.7	SBK	51.36	29.35	6068	38	0.1	50	120.4	18.365	0.1	50	37.62	24.71	0.1	45	60.81	20.465
88	2013	11	28	13:51	5.7	KNT	51.36	29.35	6067/01	20	0.1	50	77.5	17.93	0.1	50	52.59	13.49	0.1	50	100.4	14.405
89	2013	11	28	13:51	5.7	TEA	51.36	29.35	6065/03	27	0.1	50	130.2	6.54	0.1	50	76.61	7.995	0.1	50	135.9	7.545
90	2013	11	28	13:51	5.7	DLK	51.36	29.35	6063/01	11	0.1	50	214.9	5.42	0.1	50	113	5.67	0.1	50	234.8	4.25
91	2014	8	18	18:08	5.9	DLR	47.79	32.53	6303/06	53	0.1	50	104.6	40.745	0.1	50	75.59	42.275	0.1	50	117.8	40.255
92	2014	8	18	18:08	5.9	MUR	47.79	32.53	6306/11	25	0.1	50	133.4	11.425	0.1	50	82.37	10.68	0.1	50	201.7	10.065
93	2014	8	18	5:25	5.8	MUR	47.7	32.72	6283/21	3	0	50	184.1	6	0	50	92.7	7.635	0.1	50	120.9	7.69
94	2014	8	18	2:32:00	6	DLR	47.27	32.69	6279/02	39	0.1	45	70.57	14.245	0.1	45	50.61	13.64	0.1	45	106.3	7.36
95	2014	8	18	11:51	5.8	MUR	47.62	32.74	6306/04	5	0.1	50	142.1	6.255	0.1	50	59.07	8.35	0.1	50	86.53	6.73
96	2014	8	18	2:32:00	6	ABN	47.42	33	6275	48	0.1	45	220.4	5.555	0.1	45	97.03	9.78	0.1	45	194.6	5.895
97	2014	8	20	10:14	5.8	DAS	47.82	32.7	6317/01	32	0.1	50	135.1	8.27	0.1	50	78.58	7.89	0.1	50	266.5	6.65
98	2014	8	20	10:14	5.8	MUR	47.82	32.7	6302/01	14	0.1	50	241.5	3.825	0.1	50	146.1	6.8	0.1	50	325.2	4.4
99	2014	8	23	20:05	5.5	DAS	47.9	32.74	6317/04	37	0.1	50	88.37	13.385	0.1	50	34.79	14.09	0.1	50	108.1	7.87
100	2014	10	15	13:35	5.6	DAS	47.93	32.55	6350/01	18	0.1	40	139.3	12.875	0.1	45	91.39	13.115	0.1	50	211.1	10.885

4. Conclusion

In this study, 100 records corresponding to earthquakes since 2004 till the end of 2014 were processed and analyzed in order to calculate the most important ground motion parameters and prepare a catalog to be used as a preliminary database for further studies. In order to achieve the proper range of band-pass filter for each record, frequency squared (ω^2) trapezoidal model and S/N ratio methods were used. Among the selected accelerograms recorded since 2004 to 2014, the maximum PGA belongs to the record No.3333 which corresponds to the 5/25/2004 M_w6.4 Firouzabad- Kojour earthquake. Based on the H/V procedure for site classifications, maximum H/V ratio was determined in the frequency of 2 for the station of the record No.3333. This predominant frequency indicates the site type II equaled to the soft alluvium or sand which was consistent with the measured Vs_{30}=339 m/s showing the site type II for this station. The final catalog of the 100 selected data contains some information of earthquake and strong motion record as well as the calculated ground motion parameters such as HP-LP band, PGA and duration. This catalog provides a basis for the good quality/recent strong motion records in Iran and can be used for further studies (for instance, strong motion-intensity relationships and empirical attenuation laws).

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