

# زلزله‌های سال ۱۹۶۸ کشور ایران





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# IRAN EARTHQUAKES 1968

By: N. N. Ambraseys, Imperial College, London  
A. A. Moinfar, Plan and Budget Organization, Tehran,

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نشریه های شماره ۵۳ و ۶۳ این دفتر که به ترتیب در شهریورماه ۱۳۵۴ و مردادماه ۲۵۳۵ در اختیار قرار گرفت حاوی زلزله هائی بود که در سالهای ۱۹۷۰ و ۱۹۶۹ میلادی در کشور ایران روی داده است و در این نشریه که سومین نشریه ای است که باین صورت از طرف این دفتر انتشار می یابد ، زلزله هائی که در سال ۱۹۶۸ در ایران روی داده است جمع آوری شده است و چون در سطح بین المللی مورد استفاده قرار میگیرد بر حسب تقویم میلادی و به زبان انگلیسی تهیه شده است .

در سال ۱۹۶۸ زلزله بزرگ دشت بیاض رخ داد که این زلزله از طرف عده ای از کارشناسان ایرانی و خارجی مورد مطالعه قرار گرفت و در این نشریه به مدارکی که میتوان برای مطالعه این زلزله مراجعه نمود اشاره شده است . گرچه همانطوریکه در مقدمه نشریه شماره ۵۳ ذکر شد هدف از تهیه این مجموعه ها ورود در مبحث لرزه شناسی ( Seismology ) نیست و بیشتر استفاده های مهندسی مورد نظر میباشد ، لکن از آنجا که تلفیق اطلاعات حاصله از دستگاههای لرزه شناسی و اطلاعات ماکروسیسمیک در محاسبه مراکز زلزله کاربرد دارد تهیه کاتالوگی از زلزله های ایران که اطلاعات کسب شده از دستگاههای لرزه شناسی در سطح جهانی و در سطح منطقه را با اطلاعات محلی تواما " مورد توجه قرار دهد میتواند برای بررسی زلزله های گذشته ایران مفید واقع شود .

در این نشریه در مواردیکه عددی برای بزرگی ( Magnitude ) زلزله ای ذکر شده آن عدد متوسط ارقامی است که توسط پایگاههای مختلف گزارش شده است که با مقیاس ریختر است ، در حالاتی که از پایگاههای کشور شوروی استفاده وبا حروف ( NEP ) و یا ( TSK ) نمایش داده شده مقدار بزرگی بر حسب مقیاس کشور شوروی ذکر گردیده و عدد بزرگی در پرانتز نمایش داده شده است .

توضیحات دیگر مربوط به این کاتالوگ در مقدمه نشریه شماره ۵۳ ذکر شده است . انتظار دارد با کمک متخصصین فن و علاقمندان ، این قبیل مجموعه ها تکمیل گردد و احیانا " چنانچه خطاهائی در ارقام و توضیحات مندرج در آن ها وجود دارد تذکر فرمایند که رفع و مجموعه های دقیق تری در اختیار قرار گیرد .

دفتر تحقیقات و استانداردهای فنی





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## INTRODUCTION

The documentation of the seismicity of Iran has now reached the stage which allows the publication of some preliminary results on the distribution of earthquakes in Iran for this century.

This is the third issue of a bulletin to be published by the Plan & Budget Organization at irregular intervals which hopefully and in a short period of time, will cover the documentation of all seismic events found to have occurred during the present century. The principle emphasis of this presentation is on the engineering effects of earthquakes in Iran rather than on the purely seismological aspects of the events.

The much needed assessment of earthquake risk in Iran cannot be achieved by relying solely on the local or world-wide seismograph data available. The five first class seismic stations at present in existence in Iran are inadequate to locate with accuracy small to moderate local earthquakes which can be equally as damaging as larger shocks. The identification and assessment of macroseismic effects, therefore both contribute to the information available and is invaluable in combination with the instrumental data in reducing bias in the determination of focal parameters particularly of focal depth for earlier events. A relocation programme based on a joint epicenter determination technique and using macroseismic data is already well advanced. The purpose of this catalogue is thus to present in an orderly fashion both instrumental data and the related macroseismic information which material in combination with field evidence permits a re examination of focal estimates delineation of seismic

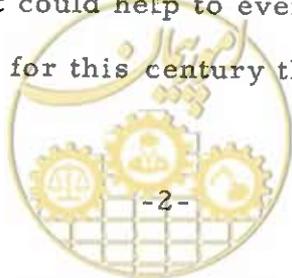
zones establishment of recurrence relations and the assessment of seismic risk for engineering purposes.

Entries in this catalogue have been arranged to read as follows:

The date and origin time of the event is given in hours minutes and seconds(GMT). When no seconds or minutes are shown the time refers to macroseismic information and the time at which the shock was felt locally(GMT). The focal location of the event estimated from instrumental results. i. e. the geographical coordinates of the epicenter and focal depth in kilometres. is shown and the agency reporting this location is given first in the reference column. Other agencies reporting different focal estimates are also shown. In all cases magnitude values are the average of those reported by different stations. In the case of K TKSE magnitudes determined by the Soviet networks (TSK and NEP) these are given in brackets.

The radius of perceptibility  $r_3$  in kilometers and the maximum intensity  $I_0$  (MM). when known are also given. Asterisked entries indicate minimum values.

In a catalogue like this, composed from press reports and from microseismic data estimated using different methods and instruments, many errors will doubtless be found. Also, with the great number of place names although we have followed the official Village Gazetteer of Iran mistakes are unavoidable. We would be most grateful, therefore, for any corrections or notices of omissions that could help to eventually produce an earthquake catalogue of Iran for this century that is as accurate and reliable as possible.



Date	Time (GMT)	Epicenter	M <sub>6</sub>	M <sub>5</sub>	h	I <sub>0</sub>	r <sub>3</sub>	Macro seismic data, references
Jan. 1								
	2	115933	29.52 - 52.56	4.8			34	relatively strong earthquake at Minudasht(et/13 Dey) Strongly felt in <u>Maharlu</u> and <u>Shiraz</u> where it cause minor damage; followed by three strong aftershocks up 1630 causing panic; (pr,ke/13-4 Deh, ICS, IC, US) (NEP) (NEP)
	4	125814	38.1 - 55.7	.			(10)	
	8	085253	36.3 - 57.7	.			(10)	
	9							
	10	104348	27.3 - 56.0	4.6			61	relatively strong earthquake at Gorgan (et/19 Dey) (IC, US)
	14	115410	39.7 - 44.6	.			(9)	(TSK)
	14	181226	38.0 - 54.8	.			3.6	
	19	135348	37.5 - 56.7	.			3.7	Very strong at <u>Aliabad</u> and <u>Gorgan</u> (ke,pr/25 Deh, NE) Felt in the <u>Atrek</u> valley and <u>Bejnurd</u> , without damage (pr,ke/30 Deh, NEP, ICS) (TSK)
	21	224655	39.1 - 46.1	.			(10)	
	22	10	-	.				
	22	203413	33.80 - 46.83	4.9			51	Felt in <u>Maku</u> (ke/3 Bah) (IC, US, BC)
	22	212044	33.80 - 46.80	4.9			51	(IC, US, BC) (NEP)
	22	215330	37.3 - 56.0	.			(9)	(NEP)
	31	201902	37.9 - 57.2	.			(8)	(NEP)
Feb. 2	111537	37.4 - 57.0	.				(9)	(NEP)
	8	0930	-	.				(NEP)
	9	213242	39.7 - 49.7	.			(10)	Strong in <u>Lar</u> and vicinity, followed by one aftershock (ke/22 Bah) (TSK)
	12						10	
	12							at Shahsavari a shock caused panic(et/24 Bah) at Alan-Baraghus(Tabriz)a shock caused some damages (et/24 Bah) (TSK)
	16	201333	39.1 - 44.7	.			(9)	
	19	003748	39.5 - 44.7	.			(10)	Caused panic in <u>Maku</u> (ke/3 Isf, TSK)



Feb.	20	064338	36.2	- 55.7	.	(10)		(NEP)
	21	095512	39.6	- 44.8	.	(10)		Strong in <u>Maku</u> ; it caused no damage (ke/3 Isf, TSI)
	22	171827	37.2	- 57.7	.	4.0		(NEP)
Mar.	5	013111	35.6	- 58.7	.	(9)		(NEP)
	5	1303	-		.			Felt in <u>Shahsavar</u> region, particularly at <u>Rudsar</u> & <u>Ramsar</u> , followed by an aftershock at 1330 (pr, ke/16 Is)
	7	194537	38.2	- 47.2	.	3.2		(TSK)
	14	070950	38.1	- 57.5	.	(10)		(NEP)
	22	114919	38.1	- 57.5	.	4.0		(NEP)
	22	132958	36.8	- 58.5	.	3.6		(NEP)
	23	164728	37.4	- 59.4	.	(10)		(NEP)
	24	225639	37.0	- 59.0	.	(9)		Felt in <u>Quchan</u> (ke/8 Farv, NEP)
	25	113848	36.9	- 58.4	.	(9)		Felt in <u>Quchan</u> (ke/8 Farv, NEP)
	26	044225	29.91	- 51.84	4.9	62		(IC, US)
	27	24	-		.			Strongly felt in <u>Torbat-i Haydarieh</u> (ke/8 Farv)
	30	112217	39.6	- 54.0	.	(10)		(NEP)
Apr.	3	133849	32.57	- 48.72	4.5	34		(IC, US)
	4	002917	38.5	- 44.9	.	(10)		(TSK)
	5	081451	39.3	- 44.3	.	(9)		(TSK)
	9	141301	37.4	- 56.3	.	(9)		(NEP)
	15	090003	39.2	- 55.8	.	(10)		(NEP)
	23	123859	27.65	- 56.67	4.9	36		(IC)
	23	123949	27.68	- 56.76	5.1	74	170	Strong in <u>Hajjiabad</u> and <u>Bandar Abbas</u> ; felt widely at <u>Bastak</u> , <u>Lingeh</u> and <u>Minab</u> , followed by many slight shocks (pr, ke/4 Ord, ICS, IC, US)
	26	025824	35.09	- 50.16	5.2	32	VI+ 140	Damaging shock at <u>Tigabad</u> and <u>Abadeh Nivasht</u> ; str felt at <u>Gharqabad</u> where walls cracked; felt at <u>Arak</u> , and in the <u>Kharagan</u> area (pr, ke/6-8 Ord, ICS, IC, US,



Apr. 29 170156 39.24 - 44.23 5.3 5.7 17 VII+ 190

Destructive in the Dehestans of Avajiq and Chaldera of western Azarbaijan. About 90 villages were affected which 10 were completely destroyed with the loss of 42 lives; many hundreds on animals were killed and 6,000 people were made homeless.

In the village of Gol 18 out of 200 people were killed and the 35 houses of the village were destroyed; in Qezel Suri, 8 of the 240 inhabitants were killed and 47 houses destroyed; 7 were killed in Shah Bandalu, 3 in Saz Aghel out of 45, 2 in Arkhashan, 2 in Shadlu-ye Sof and 1 in Pareh Khodik where the shock caused large-scale landslides. The villages of Aghbolagh, Majnun-e Olia, Qermezi Dizaj, and Saghu were ruined.

The earthquake triggered many landslides and rockfalls at Ghar Dizaj, on the road between Bedowli and Bashkand and as far as Maku.

The only reinforced concrete structure in the region the Customs Building in Bazargan where the intensity was V+, suffered no damage.

The shock was felt in Khoi, Tasuj, Marand, Goris (IV Nakhichevan, Julfa).

Followed by many aftershocks. (pr,et,ke/10-18 Ord, ICS, Ayatollahi et al 1968, Nabavi Ruttner et al 1968, IC, US, UR, BC, TAB, B&T, RLS, FS)

Felt in Saz Aghel (pr, TAB)

Felt in Maku (pr, TAB, TSK)

(TAB)

Widely felt in epicentral area (pr,FS, TAB, TSK)

(TSK)

Felt in Maku (pr, TAB)

Felt in Maku (pr, TAB)

earthquake at Bujnurd with no damage(et/11 Ord)

shock at Shahabad-e-Gharb(et/11 Ord)

Felt in Takht-i Ravan and Gol (pr/12 Ord)

Felt in Gol (pr/12 Ord, TAB)

29	1722	-	.	3.2	IV	
29	183857	39.3 - 44.3	.	4.1	V+	
29	1847	-	.	2.7		
29	195706	39.2 - 44.3	4.4	(10)	VI	40
29	221627	39.7 - 46.1	.	(9)		
29	2305	-	.	3.1		
30	1155	-	.	3.0		
30						
30						
May 1	0906	-	.			
1	1017		.			



May	1	2340	-	.	3.4		
	2	100228	39.3 - 44.4	.	3.8	VI	45
	2	1352	-	.	3.4	IV	
	4	0604	-	.	3.3		
	7	074528	38.2 - 58.3	.	(7)		
	7	1153	-	.	3.0		
	8	121816	38.7 - 48.3	.	(10)		
	9	080755	38.2 - 57.3	.	(10)		
	9	2105	-	.			
	11	0630	-	.	3.1		
	11	214242	39.2 - 44.3	.	3.8	V+	60
	11	2345	-	.			
	12	051442	39.2 - 44.2	.	3.8	V+	50
	12	051618	39.1 - 44.3	.	4.0		
	12	052054	39.5 - 44.3	.	(10)		
	14	051842	39.2 - 44.3	.	3.8		
	14	064011	39.2 - 44.3	.	(9)		
	16	022059	39.0 - 44.3	.	3.8		

Caused the collapse of houses at Siyah Cheshmeh and additional damage to the ruined Gol (pr/12 Ord, TAB) The shocks of the 30th Apr. and 1st May at 1017 killed more people at Siyah Cheshmeh (FS)

Damaging shock about 20 kilometres south-southeast of the epicentral area demolished the village of Siyah Cheshmeh and caused serious damage to Zavieh and Takht-e Ravan Sofla, (pr,ke,et/12-13 Ord, FS, TAB) The shock felt at Bazargan.

Felt in Takht-i Ravan (pr/13 Ord, TAB, KER) At 20 hours another shock caused damage at Siyah Cheshmeh (ke/14 Ord)

Felt in Siyah Cheshmeh (ke/15 Ord, TAB) (NEP)

Felt in Takht-e Ravan (pr/18 Ord, TAB) (TSK)

(NEP)

In Shakhkhteh ten houses were damaged (ke/21 Ord)

Aftershock at Siyah Cheshmeh (pr/21 Ord, TAB)

Widely felt at Siyah Cheshmeh, Bazargan and Shahab Maku and throughout the epicentral area of the earthquake of the 29th April. (pr,ke,et/22 Ord, TSK, TAB)

Aftershock at Bazargan and Shahabad (ke/22 Ord)

Strongly felt at Maku, Shahabad, Siyah Cheshmeh and Bazargan (ke/22 Ord, TSK, TAB, SHZ)

(TSK, TAB)

(TSK)

Associated with landslides on the Ghazal-kuh which cut the road between Maku and Abaju (ke/24 Ord, TAB, TSK)

(TSK)

(TSK, TAB)

May	16	031200	39.2 - 44.4	.	3.4		
	16	055033	39.2 - 44.2	.	3.5		
	18	100435	39.2 - 44.2	.	3.5		
	18	1608	-	.	3.1		
	19	164950	36.61 - 53.35	4.6	4.0	22	
	20	1919	-	.	4.5		VI
	21	2031	-	.	4.0		V
	22	0510	-	.	3.3		
	22	183608	33.16 - 49.25	4.6		51	
	23	180305	38.8 - 54.4	.	(9)		
	24	204249	37.4 - 56.3	.	3.2		
	25	112021	36.7 - 54.3	.	3.7		
	26	234823	38.5 - 45.0	.	4.1		V-
	26	235114	38.5 - 44.9	.	4.2		V+
	30	001119	32.73 - 48.26	4.6		54	
	30	011031	27.83 - 53.94	5.2		40	VII+ 160.
	30	195306	29.70 - 51.24	5.2		22	VI+
	31	-	-	.			

(TSK, TAB)

(TSK, TAB)

(TSK, TAB)

Felt at Siyah Cheshmeh and Maku (pr/29/Ord, TAB)

Felt in the Zamrud valley causing some damage at Shabkola and Ahudasht (ICS, IC, US, NEP)

Damaging in the Maku-area (TAB)

A few ruins collapsed in the Shahbadalu area; strongly felt in Maku, Shahabad and Bazargan, followed by minor shocks (pr,ke/1 Khor, TAB)

Felt in Maku, Shahabad and Bazargan (pr,ke/1 Khor, 1 (IC, US)

(NEP)

(NEP)

(NEP)

Very strong at Khoi (ke/6 Khor, TAB, TSK) —

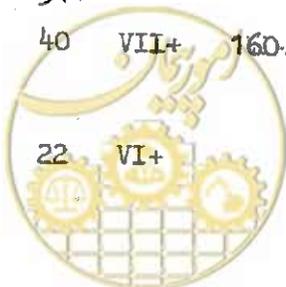
Strongly felt at Khoi and Tasuj and the villages of the surrounding region. Prolonged landslides in Kuh-i-Musaq on the shores of Lake Rezaiyyeh. (pr,ke/6 and 22 Khor, TAB, TSK)

(IC, US)

Destructive at Evaz-i-Lar (Uz or Avuz) where part of the bazaar and seven houses collapsed injuring 15 people Felt in Jahrum and Lingeh (pr,ke/9 Khor, ICS, IC, US)

Slight damage at Mishan; strongly felt in Kazerun, and Borazjan (pr/10-11 khor, ICS, IC, US, BC)

Continuing shocks in Lar and Evaz have damaged 95% of the houses there; also at Gerash and Deh-kuyeh houses were ruined (pr,ke/10-11 Khor, ICS)



Jun.	4	014426	37.50 - 49.19	4.6		49		
	4	065008	32.86 - 42.28	5.1		45		
	5	132941	38.8 - 54.5			(9)		
	9	005632	39.09 - 46.10	5.0	5.0	31	VII+	190
	9	045830	39.3 - 46.1	.		(9)		
	9	071455	39.3 - 46.1	.		(9)		
	9	103532	39.3 - 46.1	.		(9)		
	9	113822	39.24 - 46.23	4.8	4.2	28		160
	9	-	-	.		(8)		
	10	045730	39.3 - 46.1	.		(9)		
	10	055020	39.3 - 46.1	.		(10)		
	10	075256	38.1 - 57.9	.		(9)		
	10	110840	39.3 - 46.1	.		(9)		
	10	133842	39.3 - 46.1	.		(9)		
	10	143320	39.3 - 46.1	.		(10)		
	10	225740	37.2 - 54.5	.		(10)		
	11	011942	39.4 - 45.9	.		(10)		

(IC, US)

Felt at Pul-i-Dokhtar, Malavi, Dizful, Khorramabad (pr/ke/14-5 Khor., IC, US, BC)

(NEP)

Destructive in Zangezur in the USSR. The villages Gekhi, Gird, Zabukh, Kadjaran, Keypashin, Niurgiod, Kl and Chaikend were ruined; these villages are confined within an area of 75 square kilometres at 39.2°N - 46. with I<sub>0</sub> = VII+.

Ground deformations associated with slumping and sliding was noticed near Girdand Gekhi.

The shock was strongly felt at Ahar and Shabistar in the region of Qarachehdag and Arasbaran in Iran.

Numerous aftershocks.

(Bagramin A. 1972, Rustanovich D. 1972, Shirokova E. pr,et,ke/19-20 Khor, IC, US, UR, TSK, TAB)

(TSK)

(TSK)

(TSK)

Damaging in the Zangezur region; felt at Ahar and vicinity; (ke/19-20 Khor, IC, US, TSK)

Felt and recorded at Ashkhabad and Venovska at 09 (NEP)

(TSK)

(TSK)

(NEP)

(TSK)

(TSK)

(TSK)

(NEP)

(TSK)



Jun. 11	2300	-	.						
11	233522	39.4 - 45.9	.	(9)					
13	114926	39.1 - 44.3	.	(9)					
13	135728	39.5 - 45.9	.	(9)					
13	150917	38.4 - 56.5	.	(9)					
13	160734	38.3 - 56.5	.	(9)					
13	230400	29.84 - 51.30	4.8		49				
14	032418	39.3 - 46.0	.	(10)					
15	000824	29.8 - 51.93	4.5		88				
15	032108	39.2 - 45.9	.	4.1					
16	054514	39.2 - 46.1	.	4.0	13	V+	120		
16	062533	39.2 - 46.1	.	2.9					
19	201230	39.1 - 44.2	.	3.8					
22	195650	29.64 - 51.26	4.7		52	V			
23	044000	39.2 - 45.3	.	4.1					
23	053115	39.3 - 46.6	.	3.5					
23	091619	29.76 - 51.24	5.3		32	VI			
24	033007	38.2 - 56.3	.	(10)					
24	043352	39.3 - 46.1	.	3.5					

Felt at Bandar-Gaz and vicinity (ke/22 Khor)

(TSK)

(TSK, TAB)

(TSK)

(NEP)

(NEP)

(IC, US)

(TSK)

(IC, US)

(TSK)

Strongly felt in the Zangezur region; at Goris V, felt in Varzaqan, Kaleybar and Ahar in Iran. (ke/26 Khor, TSK)

(TSK)

(TSK)

Felt in Kazerun and near-by villages, causing slight damage and great panic; followed by aftershocks; (p, ke/2-3 Tir, IC, US, BC)

(TSK, TAB)

(TSK, TAB)

At Borj Seyyd and Khisht most houses were cracked and a few collapsed without casualties; at Kunar Takhteh also a number of houses were damaged and at Chit and Hajji J the shock caused panic; (pr/3-5 Tir, ICS, IC, US, BC)

(NEP)

(TSK, TAB)



Jun.	25	101350	39.7 - 49.6	.	4.0	
	26	015415	29.74 - 51.12	5.0		17
	26	020848	39.3 - 46.1	.	(9)	
	27	102336	36.5 - 59.3	.	(10)	
	30	211332	39.2 - 55.9	.	(10)	
Jul.	1	200119	39.2 - 44.3	.	(9)	
	1	234223	29.56 - 51.20	4.6		33
	2	214542	37.2 - 58.0	.	(10)	
	8	112731	27.98 - 56.97	4.7		108
	8	171527	29.71 - 51.08	4.8	5.1	35
	12	103406	29.82 - 50.73	4.7		45
	12	0222	-	.		
	13	011109	39.3 - 57.2	.	(10)	
	14	223438	39.10 - 55.71	4.3	3.7	46
	15	083340	32.63 - 48.75	4.5		57
	19	021217	38.8 - 55.9	.	(10)	
	20	222131	36.5 - 58.1	.	(9)	
	21	060552	38.8 - 44.0	.	(10)	
	21	130023	36.9 - 55.1	.	(10)	
	21	170035	30.18 - 51.00	4.4		73
	23	165212	39.2 - 46.1	.	(10)	
	24					
	24	090047	38.3 - 58.7	.	3.6	
	26	232240	39.2 - 46.1	.	4.0	
	27	034622	39.2 - 46.1	.	(10)	
	27	054758	38.3 - 58.1	.	(8)	
	29	145450	39.8 - 54.0	.	(10)	

(TSK)

Additional damage caused in the Khisht - Kunar Takh area (pr/5 Tir, ICS, IC, US)

(TSK)

(NEP)

(NEP)

(NEP)

(IC, US, UR)

(NEP)

(IC, US, UR)

(IC, US, UR, BC)

(IC, US, UR)

Felt at Bandar Pahlavi (ke/22 Tir)

(NEP)

(IC, US, NEP)

(IC, US, UR)

(NEP)

(NEP)

(TSK)

(NEP)

(IC, US)

(TSK)

R. atively strong shock at Sarab(et/3 Ord)

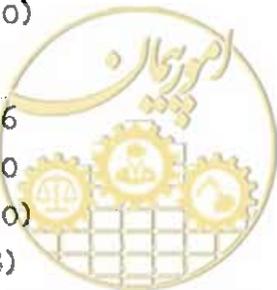
(NEP)

(TSK)

(TSK)

(NEP)

(NEP)



Jul. 29	160343	36.72 - 53.85	4.8	3.8	14	
31	200500	33.60 - 60.22	4.3		33	
Aug. 2	035927	36.85 - 49.33	4.7		36	
2	133023	27.54 - 60.92	5.7		65	
3	140140	25.19 - 62.85	4.7		29	
5	082831	37.0 - 49.2	.	3.8		
5	101141	39.3 - 46.0	.	(9)		
6	124333	37.8 - 47.8	.	(10)		
10	042801	37.00 - 43.13	4.9		42	
12			.			
13	103845	38.3 - 57.3	.	(8)		
26	055915	26.70 - 55.28	4.6		92	
28	033120	39.2 - 44.1	.	(9)		
28	055255	40.0 - 52.1	.	3.4		
29	0930	-	.			
30	211119	34.91 - 58.40	4.3		33	
31	104737	34.08 - 58.87	6.0	7.5	15	X 550+

(IC, US, UR, NEP)

(IC, UR)

(IC, US, UR)

(IC, US, UR)

(IC, US, UR)

(TSK)

(TSK)

(TSK)

(IC, US, UR, BC)

Twenty shocks in the last 24 hours caused 70% of the houses in Evaz-i Lar to crack (ke/22 Mord)

(NEP)

(IC, US)

(TSK)

(NEP)

At Hashtgerd-i Karaj a shock caused panic (et/9 She  
(IC, US)

A most destructive earthquake in Khorasan in the Ni Valley. The shock affected 157 villages with a total population of 112,100 out of which 5,590 were killed; unofficial figures suggest 12,000 killed. Out of 23,200 houses in the area 9,356 were destroyed and 70,000 people were made homeless.

The earthquake was associated with 80 kilometres of left-lateral faulting, in places showing evidence of this with an average displacement of 2.0 metres. Vertical displacements were mainly down to the south by about one metre.

The shock was felt with an intensity IV as far as Herat and Bust in Afghanistan and cause water to slosh out of pools in Herat and Bust.



Aug. 31	113433	33.98 - 59.12	5.4		24		
31	132257	34.11 - 59.49	4.7		13		
31	140616	34.08 - 59.44	4.9		17		
31	1804	-	.	.			
Sep. 1	053945	39.14 - 46.20	5.0	4.9	24	VIII	140
1	072731	34.09 - 58.24	5.9	6.3	14	VIII	210

Maximum damage occurred at Dasht-e Bayaz where 1,379 out of 1,670 were killed; at Kakhk 1,379 out of 4,380; at Kareshk 570 out of 670; at Miam 120 out of 302; at Boshkabad 400 out of 1,116 and at Beynabach 380 out of 1,800.

This earthquake has been studied in great detail, Ambraseys et al (1969a,b), Bayer et al (1969), Behzadi (1972), Brown (1969), Bubnov (1968), Crampin et al (1969), Eftekhari-Nejad (1968), Javaheri (1970), Moinfar (1969), Niazi (1968, 1969), Pakhtaman (1969), Tchalenko et al (1970, 1975), Tchalenko (1970), Wyss et al (1972), H. Kroth et al (1970)

Seismic moment  $M_0 = 1.8 \times 10^{27}$ ,  $M_0P = 4.8 \times 10^{26}$ ,  $M_0S = 8.6 \times 10^{26}$ , Strike  $71^\circ E$ , Dip  $80^\circ$ , North (1973), Wyss

(IC, US, UR)

(IC, US, UR)

(IC, US, UR, BC)

Felt in Kerman (et/10 Shar)

Destructive aftershock in the Zangezur area, widely felt as far as Ahar in Iran where it caused concern (see: Bagramin et al (1972), Rustanovic (1972), Shirokov (1972) (pr, ke/10-11 Shahr, IC, US, UR, BC, TSK)

Destructive aftershock of the Dasht-e Bayaz earthquake ruined Ferdows where 730 out of 10,900 people in the area were killed. The shock destroyed or damaged beyond repair 2,100 houses out of the 2,350 and caused great damage to the extreme west part of the Dasht-e Bayaz epicentral area (same references as for Dasht-e Bayaz earthquake)

Seismic moment  $M_0 = 8.5 \times 10^{25}$ , thrust, Strike  $148^\circ$ , dip  $65^\circ$ , North (1973).



Sep.	1	0730	-	.		
	1	082318	34.2 - 58.2	5.6	6.3	13
	1	110358	34.20 - 59.91	4.9		2
	1	164314	39.3 - 46.0	.	(9)	
	1	191637	34.16 - 58.24	4.8		20
	1	200821	37.4 - 55.8	.	(9)	
	1	204416	39.3 - 46.1	.	(9)	
	1	211641	34.17 - 58.18	4.8		37
	2	061829	39.3 - 46.1	.	(10)	
	2	070320	39.3 - 46.1	.	(10)	
	2	185141	37.0 - 54.5	.	(10)	
	3	013814	39.3 - 46.1	.	(9)	
	3	095350	34.02 - 59.26	5.0		30
	3	2130	-	.		
	4	055408	34.21 - 58.50	4.7		33
	4	055428	37.2 - 56.2	.	(10)	
	4	080845	34.20 - 59.47	5.0		24
	4	111935	34.00 - 59.31	5.1		25
	4	191313	39.3 - 46.1	.	(9)	
	4	232445	34.06 - 58.32	5.4	5.2	1
	6	022736	34.06 - 59.52	4.9	4.8	16
	6	045459	39.3 - 46.1	.	(9)	
	7	170413	37.7 - 56.6	.	(10)	

Felt in Yazd. If this shock was due to the earthquake that ruined Ferdows it should have been felt 440 km from the epicentre; (ke/11 Shahr).

(IC, US, UR)

(IC, US, UR)

(TSK)

(IC, US)

(NEP)

(TSK)

(IC, US, UR)

(TSK)

(TSK)

(NEP)

(TSK)

(IC, US, UR)

Causing panic in Behbahan (ke/13 Shahr)

(IC, US)

NEP, UR)

(IC, US, UR)

Damaging in Dasht-e Bayaz area and Ferdows, followed by many shocks (ke/14 Shahr, IC, US, UR, BC)

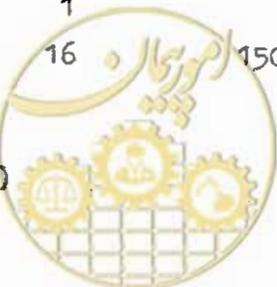
(TSK)

Damaging in Ferdows area (ke/14 Shahr, IC, US, UR, BC)

Strongly felt over a large area including Qain (pr, ke, et/16 Shahr, IC, US, UR, BC)

(TSK)

(NEP)



Sep. 8	142822	39.2 - 44.1	.	(10)					(TSK)
10	0215	-	.						Very strong at <u>Bujnurd</u> (ke/19 Shahr)
10	145240	39.3 - 46.1	.	(9)					(TSK)
10	203158	34.08 - 59.49	4.7		10				Very strong at <u>Qain</u> and <u>Damghan</u> (sic), bringing down four houses and affects mosque at <u>Gonabad</u> ; aftershock (ke/20 Shahr, IC, US, UR, BC)
11	191713	34.03 - 59.54	5.2	5.4	33		160		Caused additional damage to the epicentral area; very strong at <u>Bajestan</u> , <u>Qain</u> and <u>Gonabad</u> ; felt in <u>Birjand</u> , <u>Torbati Haydarieh</u> and <u>Kashmar</u> ; aftershocks; (pr,ke/21-22 Shahr, IC, US, UR, BC)
12	0212	-	.						Causing panic in <u>Damghan</u> , no damage (et/21 Shahr). preceded by a shock at 0150.
14	0415	-	.						Felt in <u>Khurramabad</u> (et/23 Shahr)
14	134832	28.42 - 53.15	5.8	6.0	34	VII	150+		Caused heavy damage in the <u>Afzar</u> district; preceded a shock at 01h 50m, the main shock ruined almost all 1 in <u>Barikhun</u> , <u>Tang-e Ruin</u> and caused damage to <u>Mobarak</u> where a number of people were injured; in villages north west of that place, a number of houses collapsed; the caused minor damage in <u>Jahrum</u> and it was strongly felt in <u>Firuzabad</u> ; it was also felt as a slight shock in <u>Fasa</u> , <u>Jonj</u> and <u>Lar</u> . Followed by violent aftershocks. (pr,et,ke/24-29 Shahr, ICS, DEM, IC, US, UR, BC, SHZ)
14	192024	28.40 - 53.19	5.1	5.9	34	VII+			Destructive in <u>Mobarakabad</u> where almost all house destroyed 1 person killed and 3 injured; damage extended to <u>Karzin</u> , <u>Barikhun</u> and in the <u>Afzar</u> area; slight damage in <u>Firuzabad</u> and <u>Jahrum</u> ; continuing aftershocks, (pr,ke,et/24-29 Shahr, ICS, DEM, IC, US, UR, BC, SHZ)
15	061501	28.41 - 53.24	4.6						For the shock at 13h 48m 32s, Seismic moment $M_0 = 2.9$ Thrust, strike $108^{\circ}E$ , dip $30^{\circ}$ (NRTH) Felt in <u>Firuzabad</u> (ke/25 Shahr, DEM, IC, US)

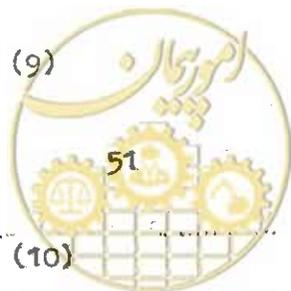
-14-



Sep.	15	094214	34.03 - 59.59	4.8		14		Strongly felt in <u>Qain</u> (ke/25 Shahr, IC, US, UR)
	15	1504	-	.	5.0		VI	Damaging in <u>Jahrum</u> and vicinity (pr/26 Shahr, TEH)
	15	1922	-	.				Strongly felt in <u>Jahrum</u> (pr/26 Shahr)
	16	071007	39.3 - 46.3	.	4.2	44		(IC, TSK)
	16	1755	-	.				Strong at <u>Khurramabad</u> (et/26 Shahr)
	17	191509	34.10 - 58.37	4.4		38		Felt in <u>Qain</u> , and <u>Gonabad</u> (pr,et/27 Shahr, IC, US, U
	17	1930	-	.				Caused panic in <u>Torbat-i Haydarieh</u> and it was strong felt at <u>Torbat-i Jam</u> (pr,et/27-8 Shahr)
	17	2330	-	.				Felt in <u>Shahr-i Kurd</u> and vicinity (pr/27-8 Shahr)
	19	051514	34.21 - 58.05	4.6		42		(IC, US)
	19	221239	28.45 - 53.17	5.1		24		Felt in <u>Jahrum</u> (ke/30 Shahr, DEW, IC, US, UR)
	19	233558	28.37 - 53.26	4.7		40		(DEW, IC, US, UR)
	27	041958	39.4 - 45.9	.	(9)			(TSK)
	27	093457	38.3 - 57.9	.	(8)			(NEP)
	27	1630	-	.				Felt in <u>Bushire</u> and surroundings (pr,ke/6-7 Mehr)
	28		-	.				Continuing shocks in <u>Jahrum</u> ; strong shock (pr/7 Mehr)
	29	0130	-	.				Preceded by numerous shocks, strong earthquake in <u>Khurramabad</u> causing panic (ke/7 Mehr)
	29	2330	-	.				Strongly felt in <u>Gach Saran</u> ; preceded by many minor shocks during the last six months (ke/8 Mehr)
Oct.	1	181603	39.19 - 46.21	3.5	3.6	10	V	Causing panic in <u>Kaleybar</u> (pr/10 Mehr, IC, US, UR, TSK)
	2		-	.				Felt, the 37th shock in <u>Jahrum</u> during the last fortnight (ke/11 Mehr)
	2	1100	-	.				Violent shock felt in <u>Langerud</u> , <u>Rudsar</u> and <u>Lahijan</u> as well as near-by villages (ke/11 Mehr)
	3	201605	39.3 - 46.1	.	(9)			(TSK)
	4	090438	37.5 - 59.4	.	(10)			Caused small damage in <u>Guchan</u> and <u>Jafarabad</u> ; (pr,ke/14-15 Mehr, NEP)



Oct.	4	2330	-	.	.				Felt in <u>Gonabad</u> (ke/14 Mehr)
	5	212721	36.5 - 54.7	.	(10)				(NEP)
	5		-	.	.				Felt in <u>Ferdows</u> together with other shocks during last 24 hours (ke/15 Mehr)
	5	220022	39.4 - 45.3	.	(9)	10			(TSK)
	9	180605	29.5 - 53.8	.	.	46			(IC, US)
	10	183326	38.3 - 47.5	.	(10)				Strongly felt at <u>Meshginshahr</u> and <u>Ahar</u> ; no damage in either (ke/21 Mehr, TSK)
	13	013453	34.10 - 58.87	.	.	29			(IC, US, UR)
	13	131132	39.4 - 45.5	.	(9)				(TSK)
	13		-	.	.				Felt in <u>Jahrum</u> (ke/22 Mehr)
	16	1400	-	.	.				Felt in <u>Kazerun</u> (ke/25 Mehr)
	16	152733	32.60 - 48.93	4.1	.	68			Felt in <u>Bala Rud</u> , 14 km north of <u>Andimeshgh</u> and <u>Vakhman-i Ghir</u> (?) = <u>Vakhmanshir</u> and <u>Andimeshgh</u> . (ke/25 Mehr, IC, US, BC)
	16	1745	-	.	.				Felt in <u>Kazerun</u> and <u>Guyom</u> (?) (ke/25 Mehr)
	16	2350	-	.	.				Widely felt, from <u>Andimeshgh</u> to <u>Dorud</u> (ke/25 Mehr)
	17	075127	39.3 - 46.1	.	(9)				(TSK)
	22			.	.				earthquake occurred at <u>Tange-Haft</u> and <u>Tange-Panj</u> (railway stations of southern part) between <u>Sefid dasht</u> and <u>Andimeshk</u> (et/30 Mehr)
	23	220153	38.8 - 53.3	.	3.2				(NEP)
	25	063840	38.1 - 55.8	.	(9)				(NEP)
	25	2100	-	.	.				Felt in <u>Jahrum</u> (et/4-5 Aban)
	27	212555	38.2 - 58.2	.	(9)				(NEP)
	29	0214	-	.	.				Felt in <u>Lar</u> (ke/9 Aban)
Nov.	6	170607	31.84 - 50.76	4.6	.				(IC, US, UR)
	12	2130	-	.	.				This was the 50th aftershock felt in <u>Jahrum</u> (ke/
	13	013603	38.6 - 56.6	.	(10)				(NEP)



Nov.	13	072828	39.6 - 53.7	.	3.6				(NEP)
	15	062539	37.6 - 58.5	5.1	5.5	22	VII	175	Damaging in the Ashkhabad region. At <u>Nasosnay</u> almost all houses were damaged and five collapsed. Within a radius of 20 kilometres the villages of <u>Annay</u> , <u>Kipchak</u> , <u>Kaledjar</u> and <u>Shorkala</u> were damaged and <u>Ashkhabad</u> itself was shaken with an intensity VI+. The earthquake was studied by Galinski et al (1972). (IC, UR, BC, NEP)
	16	2330	-	.					Felt at <u>Oshnuiyeh</u> (ke/26 Aban)
	17	0200	-	.					Felt at <u>Oshnuiyeh</u> (ke/26 Aban)
	18	142303	27.40 - 53.22	,		89			(IC, UR)
	28	180246	34.23 - 59.65	4.8		33			(IC, UR)
Dec.	3	091717	37.4 - 56.8	.	(8)				(NEP)
	7	2200	-	.					Strongly felt in <u>Qasr-i Shirin</u> and its villages causing some damage to houses. (ke/17 Azor)
	11	182541	39.4 - 46.6	.	(9)				(TSK)
	12	185447	35.80 - 53.49	4.9		27	VI+		Strongly felt in <u>Semnan</u> causing some damage at <u>Sangsa</u> and <u>Shahmirzad</u> ; rockfalls on the road to Kiasar. (pr, ke/22-23 Azor, ICS, IC, US, UR)
	15	062529	38.0 - 58.32	.		20			(IC, UR)
	15	111640	39.1 - 55.6	.	(10)				(NEP)
	18	030806	37.9 - 57.2	.	3.6				(NEP)
	18	032525	37.6 - 57.2	.	(9)				(NEP)
	25	0400	-	.					Felt in the <u>Sanandaj</u> region, particularly at <u>Paveh</u> and vicinity where it caused some damage. (ke/4-6 Deh)
	26	122113	38.3 - 47.9	.	(9)				(I)
	28	0730	-	.					Felt at <u>Ramsar</u> (pr,ke/8 Deh)
	29	0830	-	.					Felt in <u>Shirvan</u> and <u>Ilam</u> , causing panic; no damage. (pr,ke/8-9 Deh)



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ETL-  
KEY-

ISC: IGS:  
MOŠ:  
USG:  
BCS:  
BUL:

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ETL-  
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By: N. N. Ambraseys, Imperial College, London  
A. A. Moïnfar, Plan and Budget Organization, Tehran,

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