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Seismograms of Strong Earthquakes in Japan, 1923-1956



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日本における大地震の記録

昭和 32 年 9 月

気 象 庁

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## ま え が き

本書は、1923年（大正12）9月1日関東地震以後1956年（昭和31）2月14日の江戸川下流域の地震までの33年間に、気象官署で震度IV以上を感じた地震50個について、気象官署の地震計記象紙を集録したものである。

わが国は、世界でも地震の多い国であり、しばしば大地震に見舞われている。建物を破損するような地震になると、防災的な見地から利用者は、日時や震源地のみにとどまらず、地震動の振幅、周期、加速度などの科学的な資料を必要としてきた。

幸い気象官署においては、長年月にわたって不断の観測を続け、貴重な資料を得ているので、これらの要望に答えられるのは気象官署のみであり、われわれの誇でもある。しかしこれらの資料は、個々には発表されているが、総括したものはなく、しかも、たびたびの利用によって破損するおそれもあるので、ここに科学技術庁資源調査会保全防災部会地震小委員会の要望があって本書を発刊し、さらに本書に集録した記象紙は、全部をマイクロフィルムに収めて保存することにした。これらの資料は、気象官署における地震観測、津波予報、防災などに役立つ資料として、今後大いに利用されるものと信ずる。

本書の発刊にあたり、多年にわたり観測を続け、さらに記象紙の保存、整理などにおほねおり願った気象官署の諸氏ならびに本書の編集にあたった広野卓蔵氏の労に対し、深甚の謝意を表する次第である。なお、本書の印刷については、科学技術庁のご承認を得たことを付記し、あわせて深謝の意を表する。

昭和32年9月

気象庁長官 和 達 清 夫

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## EXPLANATORY NOTES

1. The contents of this volume covers all the earthquakes of more than seismic intensity IV in JMA Scale recorded at the seismological stations under Japan Meteorological Agency during the period from 1923 (Kanto Earthquake) to 1955.
2. Seismograms are arranged chronologically totalling 45 earthquakes. The order is shown in Table 1, and epicentres are mapped in Figure 1.
3. Stations at which earthquake movements of more than IV of seismic intensity were observed are tabulated in Table 2, and relation between seismic intensity and acceleration are shown in Table 3.
4. A brief explanation of earthquake, intensity distribution map and notes of records precede every seismogram.
5. Five earthquakes seismograms of which were missing though accompanied by some disasters are also explained and shown of intensity distribution.
6. All the seismograms, 584 in total, collected for this purpose are microfilmed, of which the well-recorded 469 seismograms are selected and reproduced in this volume. The explanation of the latter and missing seismograms are given in notes of records mentioned in 4.
7. The microfilms are in the custody of Japan Meteorological Agency, Resouce Bureau and other institutes concerned.\*
8. The scale showing original dimension of record is appended to these reproduction as well as microfilm. The time-scale in the record shall be obtained from the running speed of recording paper. (cf. Note 4).
9. Constants of seismograph employed shall be referred to the notes of records mentioned in 4 and its approximate values to Table 4.
10. At the end of the volume a microfilm index is provided. Name of seismological stations are arranged alphabetically, and earthquakes chronologically. Seismograms which were not compiled in this volume are marked with asterisk (\*). The location of seismological stations are shown in geographical coordinates.

\* The copy of film from the original may be available by applying to the offices above mentioned.

Researchers are recommended to employ this copy for the minute investigation of the records as the microfilm can be easily read enough by a simple cimro-reader, while the most plates in the present volume are retouched more or less.

As a sample, a piece of the microfilm is illustrated here.

## List of Earthquake

No.	Name	Date	Hour	Location		M
				E	N	
1	Kantō	1923 Sep. 1	11:58	139°20'	35°20'	7.9
2	Central Sagami	1924 Jan. 15	5:50	139 12	35 30	7.2
3	North Tajima	1925 May 23	11:09	134 42	35 42	7.1
4	North Tango	1927 Mar. 7	18:28	135 06	35 42	7.6
5	Down Stream of the Arita River	1929 Nov. 20	14:54	135 06	34 06	6.2
6	North Izu	1930 Nov. 26	04:03	139 00	35 06	7.3
7	Off the Mouth of the Mabuchi Riv.	1931 Mar. 9	12:49	141 54	40 36	7.5
8	West Saitama	1931 Sep. 21	11:20	139 18	36 00	6.7
9	Mouth of the Niikappu River	1932 Nov. 26	13:24	142 18	42 24	7.0
10	Sanriku	1933 Mar. 3	02:31	144 42	39 06	8.5
11	Noto	1933 Sep. 21	12:14	137 00	37 06	6.3
12	Shizuoka	1935 Jul 11	17:24	138 24	34 59	6.7
13	Kawachi-Yamato	1936 Feb. 21	10:08	135 42	34 30	6.7
14	East Off the Cape of Shiriya	1936 Jun. 3	11:55	142 18	41 18	6.3
15	SSE Off the Cape of Nojima	1936 Oct. 26	00:30	140 06	34 24	6.9
16	Off Kinkazan	1936 Nov. 3	05:46	142 00	38 24	7.8
17	Nii and Shikine IIs.	1936 Dec. 27	09:14	139 12	24 24	6.4
18	Yake Volcano, Niigata	1937 Jul. 4	00:23	138 03	36 51	5.2
19	Off Tanabe, Wakayama	1938 Jan. 12	00:12	135 12	33 42	7.2
20	ESE Off the Cape of Shiyoa	1938 May 23	16:13	141 30	36 42	7.6
21	Kutcharo Lake, Hokkaido	1938 May 29	01:42	144 18	43 36	5.9
22	East Off Fukushima Pref.	1938 Nov. 5	17:43	141 42	37 06	7.3
23	"	Nov. 5	19:50	141 42	37 12	7.7
24	"	Nov. 6	17:54	141 48	37 36	7.7
25	Hyūga Sea	1939 Mar. 20	12:22	131 48	32 24	6.8
26	Oga, Akita	1939 May 1	14:58	139 48	40 00	6.6
27	Off the Cape of Kamui, Hokkaido	1940 Aug. 2	00:08	139 06	44 18	5.9
28	Chikuma River, Nagano	1941 Jul. 15	23:45	138 16	36 42	6.6
29	Hyūga Sea	1941 Nov. 19	01:46	132 24	32 18	7.4
30	Off Hamamura, Tottori	1943 Mar. 5	04:50	134 06	35 42	6.8
31	Nosaka River, Tottori	1943 Sep. 10	17:37	134 12	35 30	7.4
32	Nojiri Lake, Nagano	1943 Oct. 13	14:42	138 12	36 48	6.3
33	Tōnankai	1944 Dec. 7	13:35	136 12	33 42	8.3
34	Mikawa	1945 Jan. 13	03:38	137 00	34 42	7.0
35	Nankaidō	1946 Dec. 21	04:19	135 36	33 00	8.1
36	Hidaka River, Wakayama	1948 Jun. 15	20:44	135 30	33 48	7.2
37	Fukui	1948 Jun. 28	16:13	136 12	36 06	7.2
38	West Tajima	1949 Jan. 20	22:25	134 36	35 36	6.5
39	Imaichi, Tochigi	1949 Dec. 26	08:25	139 42	36 42	6.7
40	Near Chōshi, Chiba	1950 Apr. 17	01:19	140 54	35 48	6.0
41	Kumano River, Mie	1950 Apr. 26	16:05	135 48	33 48	6.6
42	Kujukuri Beach	1950 Sep. 10	12:21	140 30	35 18	6.6
43	Off Tokachi, Hokkaido	1952 Mar. 4	10:23	143 52	42 09	8.2
44	Daishōji, Fukui	1952 Mar. 7	16:32	136 12	36 28	6.8
45	Yoshino	1952 Jul. 18	01:10	135 49	34 27	7.0
46	NE Off Chōshi, Chiba	1952 Oct. 15	09:10	141 24	35 54	5.7
47	Off Bōsō, Chiba	1953 Nov. 26	02:48	141 48	34 18	8.0
48	Off Chōshi Chiba	1954 Jul. 18	18:07	141 07	35 30	6.4
49	SE Off Chōshi, Chiba	1955 Jul. 24	20:02	140 42	35 42	6.1
50	Mouth of the Edo River	1956 Feb. 14	09:52	139 54	35 42	6.0

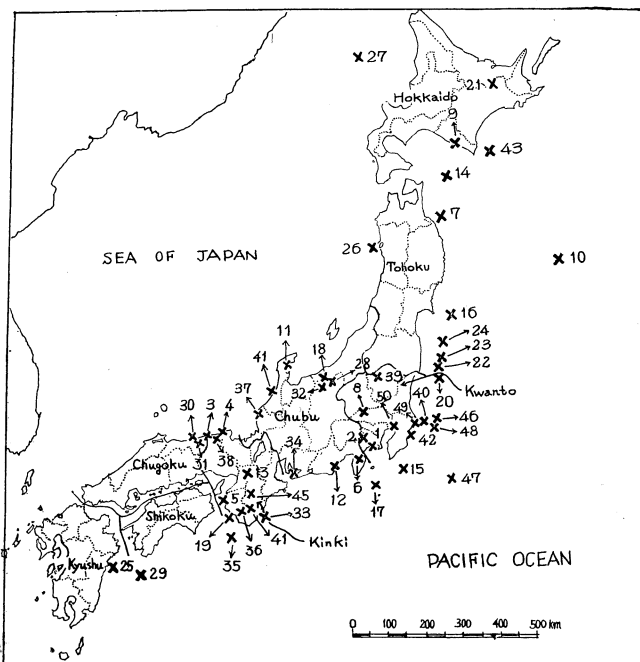
## List of Station

(where seismic intensity is IV or larger in JMA scale)

No.	Earthquake	In- tensity	Station
1	Kantō	VI V	Mera, Yokosuka, Kōfu, Tōkyō (Kumagaya) Utsunomiya, Hamamatsu, Numazu, (Nagano), Chō- shi, Miyazu
2	Central Sagami	IV	(Maebashi), Tsukubasan, Mito, Matsumoto, (Toku- shima), (Hikone), (Osaka)
3	North Tajima	VI V IV	Kōfu Kumagaya, Yokohama, Utsunomiya, Tōkyō Numazu, Nagano
		VI IV	Toyooka Tokushima, Kyōto, Tadotsu, Yagi, Sumoto
4	North Tango	VI V IV	Wakayama, Osaka, Kōbe Miyazu, Toyooka Kyōto, Wakayama, Kōchi, Tokushima, Yagi, Fukui, Kōbe Osaka, Sumoto, Hikone, Gifu, Okayama, Fushiki, Tadotsu Iida, Matsuyama, Kōfu, Sakai, Nagoya
5	Down Stream of the Arita River	IV	Wakayama, Sumoto
6	North Izu	VI V	Mishima Yokohama, Numazu, Yokosuka
7	Off the Mouth of the Mabuchi	IV	Kōfu, Iida, Kumagaya, Maebashi, Nagoya, Tōkyō
8	West Saitama	V IV IV	Morioka, Miyako, Aomori, Hakodate, Nemuro Kumagaya, Maebashi, Tsukubasan, Kakioka, Mito Oiwake, Numazu, Kōfu, Tōkyō Yokosuka, Utsuno- miya, Yokohama, Matsumoto, Itō, Chōshi, Ona- hama
9	Mouth of the Niikappu River		Urakawa Muroran, Obihiro, Hakodate
10	Sanriku	V	Miyako, Ishinomaki, Sendai, Fukushima, Aizu, Kakioka Morioka, Mizusawa, Urakawa, Aomori, Kushiro, Onahama, Hakodate Mito, Tsukubasan, Kuma- gaya, Maebashi, Yokohama, Kōfu
12	Shizuoka	VI IV V	Shizuoka Numazu, Mishima, Funatsu, Kōfu, Yokohama
13	Kawachi-Yamato	IV IV	Yagi, Kyōto, Osaka Wakayama, Tsu, Hikone, Tsuruga
14	East Off Shiryazaki	IV	Hakodate
15	SSE Off Nojimizaki	V	Itō, Numazu, Katsuura
16	Off Kinkazan	IV	Sendai, Ishinomaki, Onahama Fukushima, Mizusawa, Morioka, Utsunomiya, Kaki- oka, Tsukubasan, Aizu, Maebashi, Kumagaya, Kōfu, Itō
18	Yake Volcano, Niigata	IV	Nagano
19	Off Tanabe, Wakayama	V IV	Tokushima Shionomisaki, Wakayama, Sumoto, Yagi, Muroto, Kōbe, Tsu, Kyōto, Kōchi, Hikone, Toyooka
20	ESE Off Shioyazaki	V IV	Onahama, Mito, Kakioka, Aizu, Fukushima Tsukubasan, Utsunomiya, Kumagaya, Yokohama, Maebashi, Kōfu, Yokosuka, Mizusawa
22	East Off Fukushima Pref. (I)	V	Onahama, Fukushima, Sendai, Tsukubasan, Mito, Aizu, Ishinomaki

No.	Earthquake	Intensity	Station
		IV	Kakioka, Kumagaya, Tōkyō, Mizusawa, Maebashi, Yokohama, Yokosuka, Funatsu, Kōfu, Utsunomiya, Yamagata, Oiwake
23	East Off Fukushima Pref. (II)	V	Fukushima, Onahama, Sendai, Ishinomaki, Aizu
		IV	Kōfu, Kakioka, Mizusawa, Kumagaya, Miyako, Tsukubasan, Yamagata, Mito
24	East Off Fukushima Pref. (III)	V	Fukushima, Onahama, Aizu
		IV	Sendai, Kakioka, Mizusawa, Akita, Ishinomaki, Yamagata, Mito, Tsukubasan
25	Hyūga Sea	IV	Kumamoto, Shimizu, Miyazaki, Kagoshima, Oita
28	Chikuma River, Nagano	VI	Nagano
		IV	Karuzawa
29	Hyūga Sea	V	Miyazaki
		IV	Uwajima, Shimizu, Oita, Kumamoto, Fukuoka
30	Off Hamamura, Tottori	V	Tottori
		IV	Miyazu, Tadotsu
31	Nosaka River, Tottori	VI	Tottori
		V	Okayama
		IV	Toyooka, Yonago, Sakai, Saigō, Miyazu, Matsue, Takamatsu, Fukui, Sumoto, Kyōto, Kōbe, Osaka, Hikone, Kōchi, Tokushima
32	Nojiri Lake, Nagano	IV	Nagano
33	Tōnankai	VI	Tsu, Omaezaki
		V	Owashi, Wakayama, Sumoto, Kyōto, Tokushima, Kōbe Muroto, Ibukisan, Takamatsu, Iida, Shizuoka, Kōchi, Mishima, Matsumoto, Funatsu, Yokohama, Tōkyō, Chichibu, Toyama, Takayama, Osaka, Maebashi, Takada
34	Mikawa	V	Tsu
		IV	Gifu, Iida, Nagoya, Kameyama, Ibukisan Tsuruga
35	Nankaidō	V	Shionomisaki, Owashi, Kashiwara, Tokushima, Sumoto, Hikone, Gifu, Kōchi, Tsu
		IV	Osaka, Kōbe, Kyōto, Kameyama, Tottori, Nagoya, Tsuruga, Kanazawa, Miyazaki, Kumamoto, Unzendake, Kumagaya
36	Hidaka River, Wakayama	IV	Kōbe, Wakayama, Shionomisaki, Owashi, Osaka, Sumoto, Irako
37	Fukui	IV	Miyazu, Kanazawa, Tsuruga, Toyama, Hikone, Takayama, Nagoya, Kameyama, Wajima, Iida, Kashiwara, Kyōto
38	West Tajima	IV	Toyooka, Fukui
39	Imaichi, Tochigi	IV	Utsunomiya, Kakioka, Kumagaya, Mito, Chōshi
40	Near Chōshi	IV	Chōshi
41	Kumano River, Wakayama	IV	Shionomisaki, Owashi, Kyōto
42	Kujūkuri Beach	IV	Chōshi, Yokohama
43	Off Tokachi, Hokkaidō	V	Urakawa, Obihiro, Kushiro
		IV	Sapporo, Nemuro, Mori, Hakodate, Aomori, Miyako
44	Daishōji, Fukui	IV	Fukui, Toyama, Wajima
45	Yoshino	IV	Kashiwara, Kyōto, Osaka, Tsu, Owashi, Kōbe, Kameyama, Sumoto, Hikone, Wakayama, Gifu, Nagoya Toyooka, Fukui, Okayama, Tottori
46	NE Off Chōshi	IV	Chōshi
47	Off Bōsō, Chiba	V	Tomisaki
		IV	Hachijōjima, Chōshi, Oshima, Yokohama, Ajiro, Tōkyō, Mito, Funatsu, Kōfu, Tsukubasan, Onahama, Shirakawa, Fukushima, Inawashiro, Sendai
48	Tone River Down Stream	IV	Chōshi
49	SE Off Chōshi, Chiba	IV	Chōshi
50	Mouth of the Edo River	IV	Kashiwa, Tōkyō, Yokohama

## Location of Epicenters



The numbers are referred to "the List of Earthquake".

## JMA Seismic Intensity Scale

Name	No Feeling	Slight	Weak	Rather Strong	Strong	Very Strong	Disastrous	Very Disastrous
Scale	0	1	2	3	4	5	6	7
Accel. (gal)	<0.8	0.8~2.5	2.5~8.0	8.0~25.0	25.0~80.0	80~250	250~400	400<

Remark: The 7th degree in the scale has been set since 1949.

## List of Seismographs

Group	Type	Symbol	Period(T)	Magnification(V)	Damping Ratio(v)	Paper Speed (ps)
Strong (S)	Omori's	S(O)	3~6 sec	2~3	no	30 mm
	Imamura's	S(I)	3~8	2	no	30 min
	C M O	S	5	1	8	30
	Milne's Seismometer	M	2~3	5~10	no	150
Portable (P)	Omori's	P(O)	4~6	50	no	30
	Nakamura's	P(C)	4~5	40~50	2~3	30
Special	Wiechert	W	4~6	80~100	5	30
	Omori's	O	6~20	20	no	30
	Omori's Trometer	T	8~25	80~120	no	30
	Mainka	Ma	10	100	8<	30

Remark: Symbols of seismographs and characters in this list are used through-out the present volume. The symbol r appearing later means the coefficient of friction. In the plates, N, E, V and H stand for the sense or the components of north, east, vertical and horizontal.