

## Geodætisk Institut

Proviantgården, Copenhagen, Denmark

## Bulletin

of the seismological station

## KØBENHAVN

 $\varphi = 55^{\circ}41'N.$   $\lambda = 12^{\circ}26'E.$   $h = 13$  m.

Lithologic foundation: chalk

No. 61. Jan.—Dec. 1951.

## Instruments:

Galitzin-Wilip seismographs.

## Constants:

Component	$l$	$A_1$	$T_1$	$\mu^2$	$T$	$k$
	cm	cm	sec		sec	
$N$	12.5	100	12.64	0.0	12.7	103
$E$	12.5	100	12.69	0.0	12.3	97
$Z$	14.5	100	11.56	0.0	8.9	88

Wiechert 1000 kg. horizontal seismograph.

Wiechert 1300 kg. vertical seismograph.

## Constants:

Component	$T$	$\nu$	$\rho$	$V$
	sec		mm	
$N$	7.9	4.2	0.4	213
$E$	8.0	4.3	0.5	210
$Z$	5.1	3.2	0.2	166

Milne-Shaw seismograph,  $E$  component, with the approximate constants  $T = 12^s$ ,  $\nu = 20$ ,  $V = 300$ .Benioff vertical seismograph,  $T_1 = \frac{1}{4}^s$ ,  $T = 1^s$ ,  $V_{\max} = \text{abt. } 30\,000$ .



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No.	Date	Hour	Forerunners				L	△	Remarks
			P or P'	S					
			m s	m s	m s	m s	h m	°	
1	1951 Jan.	3					38		
2	1	21					23		
3	3	13					09		
4	3	18					31		
5	5	1	e 05 20	i 16 00	e 15 50			86	
6	6	5	i i 25 03	i 31 19	i 25 51	26 13		Panama. PP 26 <sup>m</sup> 55 <sup>s</sup> , pPP 27 <sup>m</sup> 31 <sup>s</sup> , PPP 27 <sup>m</sup> 54 <sup>s</sup> , sS 32 <sup>m</sup> 36 <sup>s</sup> , 34 <sup>m</sup> 41 <sup>s</sup> , 34 <sup>m</sup> 51 <sup>s</sup> . Depth abt. 250 km. Hindu Kush.	
7	6	8	e 04 08	i 14 44				Interrupted. Depth abt. 100 km. Panama.	
8	8	18	i 44 25-	e 54 17			74	77	
9	9	0	e 32.2	i 35 41			38		
10	9	9					.7	Japan. No Gal. Z record. Greece.	
11	9	16	i 07 47+				19		
12	14	10	e e 39 05						
13	15	4	i i 31 50			34 14	i i 34 45	1.2	
14	16	1							
15	18	21	i 27 15	36.8			19		
16	22	12	i 27 56+	i 37 43			51.6		
17	24	5				19 22	25 39	53	
18	24	7						56	
19	25	17						.2	
20	28	14						05	
21	29	6					15		
22	30	23	i 13 18	e 17 42			20.5	25	
23	Febr.	3	i 04 25						
24	7	3	i 51 01						
25	7	7	e 08 27						
26	8	10	e i 57 46						
27	8	12						.1	
28	9	1	i 38 44						
29	10	4						.9	
30	10	22					48		
31	12	17	i e 31 13	38 37	i 31 18	33 16	48	52	
32	13	0	e 59 08		e 69 49		96		
33	13	12	i e 14 46		i 14 50	15 58			
34	13	22	i i 23 59	i 33 06	24 12	26 33		69	
35	16	5	i 19 50						
36	17	21	i 25 38		27 04	29 35			
37	19	22			51 15				
38	20	0					1.4		
							19.1		



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No.	Date	Hour	Forerunners				L	△	Remarks
			P or P'	S					
			m s	m s	m s	m s	h m	°	
39	1951 Febr.	13	i 03 12				34		
40	25	15	i 54 23					Japan.	
41	March	2					48		
42	5	14	e 57 24						
43	5	20	i i 23 40	e 33.5	24 22	26.8	50		
44	6	19	i 08 42		08 48		29		
45	7	19					15		
46	9	16	i i 28 25						
47	9	20			e 02 55	11.2	38		
48	10	10	e 43 25	e 47 18			50	22	
49	10	22	i i 16 38		17 15	19 52	1.0		
50	12	9	i 00 56				.1		
51	12	15	i i 02 48-	i 11 20	12 43			63	
52	13	18	i 03 31-		i 06 15				
53	14	9	i e 48 29		49 00	49.4			
54	16	14	i e 07 17	e 15 50			28	64	
55	17	4	e e 38 00	e 46 28			.9	63	
56	19	20	i e 39 42	i 48 31			63	66	
57	23	21	i e 58 14		62.2	73 45			
58	25	20	i 28 23-						
59	29	6					.7		
60	31	1	i 58 51		e 59 18				
61	April	1	e 34 39						
62	2	0	e 26 26		36 54	37.9	57		
63	2	22			29.9	46.5	65		
64	5	3	i i 19 48+	i 23 20			25.4	19	
65	6	2					06		
66	6	23	i 04 48+						
67	7	0	e e 03 28				28		
68	8	21	i i 43 31	i 47 56			51	25	
69	9	17					40		
70	9	23					59		
71	10	11	e 15 32		e 18.7		62		
72	11	5					04		
73	14	1			09 30	10 42	39		
74	14	4			19 37		31		
75	14	13	e 42 37	e 50 21	i 42 40	54.1	56		
76	14	23	e 51 20	e 59 45	61.2		72	62	
77	20	3					.9		



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No.	Date	Hour	Forerunners				L	△	Remarks
			P or P'	S					
			m s	m s	m s	m s	h m	°	
78	1951 April 22	3	e 48 06+				72		Tibet.
79	22	12	i 43 19				53		Baffin Bay.
80	23	7	i 10 11		i 10 47				New Zealand.
81	25	18	i 41 46						Southwest of Spitsbergen.
82	25	23	e 10 26						Kamchatka.
83	26	18	i e 08 30						
84	26	19					54		
85	28	8	e 23 19		i 23 26				
86	29	7	i 43 11	e 49 08			56	39	Arctic Ocean.
87	29	10	i 32 43						Depth abt. 600 km. Fiji Islands.
88	29	19			e 59 10	e 60 48			Celebes?
89	29	22		e 13 06	17 25		22		Arctic Ocean.
90	30	15			e 48 25	e i 48 50	1.6		55 <sup>m</sup> .8, 58 <sup>m</sup> .4, 60 <sup>m</sup> .2, 65 <sup>m</sup> .6. Solomon Islands region.
91	May 1	5	e i 22 35		i i 22 42	26.5			SS 45 <sup>m</sup> 56 <sup>s</sup> . SSS 51 <sup>m</sup> .0. South of Tasmania.
92	2	16			52.0		1.1		Indian Ocean.
93	4	12	i i 04 09	i 13 08	e i 05 05	07 35			iScS 13 <sup>m</sup> 42 <sup>s</sup> . Depth abt. 200 km. Japan.
94	4	19					.9		
95	6	22					.5		
96	6	23	e 16 04				43		32 <sup>m</sup> 30 <sup>s</sup> . Depth abt. 150 km. El Salvador.
97	6	23		e 30 43					
98	8	19					19		
99	10	9	e i 30 29	e 40 21	45.2		58.8		Seems deper than normal. Mozambique.
100	10	15					32		
101	10	20					28		
102	10	22					33		
103	12	22	i 15 47	e 21 57			29	41	Turkestan.
104	14	4	e 16 12	i 23 07	26 37		33	48	Baluchistan.
105	15	5			37 07	43 14	65		43 <sup>m</sup> 42 <sup>s</sup> . Depth abt. 100 km. Chile.
106	15	10	i 01 23						Mariana Islands.
107	15	22	e 57 18						Northern Italy.
108	16	2					31		
109	16	14			38.6	41 45	56		Molucca Islands region.
110	16	14	i 35 31						Seismic?
111	17	12	e 42 32						
112	19	15	e e 59 13	e 63.0	i e 59 19		65.2		Spain.
113	21	8	i 46 04		47 33	55.6			57 <sup>m</sup> .6. SS 64 <sup>m</sup> 34 <sup>s</sup> . Depth abt. 150 km.
114	25	20					48.5		[Solomon Islands.
115	26	11		i 15 07			18		Greece.
116	28	16					28		
117	29	6					56		
118	30	20			e 15 22	15 54	51		SKS 22 <sup>m</sup> .0. PS 24 <sup>m</sup> 46 <sup>s</sup> . 26 <sup>m</sup> 35 <sup>s</sup> . SS 30 <sup>m</sup> .8. All phases weak. Molucca Islands.
119	31	21	i 08 27-	i 18 43	11.8	19 35	.6		Depth abt. 100 km. Philippine Islands.

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No.	Date	Hour	Forerunners				L	△	Remarks
			P or P'	S					
			m s	m s	m s	m s	h m	°	
120	1951 June 1	17					.3		
121	2	7	i 01 06	i 12 13	11 44	18.5		91	SSS 22 <sup>m</sup> .6. No Gal. Z record. Borneo.
122	3	18		e 52.8			69		Formosa.
123	5	2					21		
124	5	3	i 41 14				49		
125	5	17	i 09 51-	i 19 42	i 10 06		.6		No Gal. records. Depth abt. 100 km. Japan.
126	6	16	i i 15 04				19.0		Jan Mayen.
127	7	22	i 45 45				52		Repetition?
128	7	23	e 18 50		e 18 57	22 40	72		SS 42 <sup>m</sup> .1. Kermadec Islands region.
129	9	4	i i 10 32						Depth abt. 600 km. Fiji Islands.
130	9	11	i i 28 57+	i 34 28			40	35	Western Iran.
131	10	0					.8		
132	10	9			e 12 18	i 12 30	26		
133	12	22	i i 48 23+		49 37	i 51 17			iScS 58 <sup>m</sup> 08 <sup>s</sup> . Depth abt. 200 km.
134	15	21	e 00 50						[Hindu Kush.
135	17	3	i 59 31						Kamchatka.
136	18	17	e 56 56		e 67.1				Depth abt. 100 km. Costa Rica-Nicaragua border.
137	19	17	e 06 30						Depth abt. 600 km. Fiji Islands region.
138	19	20					19		
139	20	22					29		
140	20	23					29		
141	21	0					.5		
142	24	11			19 48		.7		Mariana Islands region.
143	24	17					41		
144	25	4					19		
145	25	16	i 23 10-				.7		Depth abt. 100 km. Alaska.
146	26	4					.5		
147	27	16					24		
148	29	22					47		
149	July 2	5					.9		
150	2	22	e e 06 10				54		Tonga Islands region.
151	3	5	32 48	40 05			48	51	No vertical records. Gulf of Aden.
152	3	18		32 23	36.1		40		Repetition.
153	5	9		20 21	24.1		28		Turkestan.
154	8	5	e 57 32	i 68 39	61 23	i 68 05	1.5	92	i 69 <sup>m</sup> 44 <sup>s</sup> . Philippines Islands.
155	9	0	e i 16 46		20 01	27.0	43		Mexico.
156	9	1	i 42 50+						Japan.
157	11	18	e i 33 39		i i 33 41	i 35 28			PP 37 <sup>m</sup> 19 <sup>s</sup> . PPP 39 <sup>m</sup> 29 <sup>s</sup> . iSKS 43 <sup>m</sup> 22 <sup>s</sup> . iSP 44 <sup>m</sup> 35 <sup>s</sup> . iS 46 <sup>m</sup> 35 <sup>s</sup> . iSS 49 <sup>m</sup> 13 <sup>s</sup> . sSS 51 <sup>m</sup> 59 <sup>s</sup> . 56 <sup>m</sup> 11 <sup>s</sup> . Depth abt. 500 [km. Bonin Islands region.
158	13	7					08		30 <sup>m</sup> .4. The readings uncertain.
159	13	20			14.2	23.7	49		Solomon Islands.



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No.	Date	Hour	Forerunners				L	△	Remarks
			P or P'	S					
160	1951 July 14	7	<i>m s</i> i 15 18	<i>m s</i>	<i>m s</i> i 15 31	<i>m s</i>	<i>h m</i> 39	°	Slightly deeper than normal, Kurile Islands.
161	14	7	29 40*		i 29 52				Repetition.
162	16	11			00.3	16.3	36		Depth abt. 200 km. New Guinea.
163	18	9	i i 16 47	i 25 25	17 17	19 05	34	64	20 <sup>m</sup> 53 <sup>s</sup> . Mid Atlantic Ocean.
164	19	20	i i 52 52	e 62.3	62 44	67.3	75		Aleutian Islands.
165	21	1	i i 42 58+	i 51 31	51 45	52 55	64	64	Assam.
166	21	3			13.5	18 52	32		22 <sup>m</sup> 10 <sup>s</sup> .
167	21	3		39 55			8		Arabian Sea.
168	21	20					54		
169	23	4	i 41 17						Depth abt. 100 km. Kurile Islands.
170	23	16		57 06					Arabian Sea.
171	25	17	i e 24 43-				53		Japan.
172	25	18					38		
173	25	20	i 46 09	e 56 13			76	79	Japan.
174	26	10	i i 11 37	e 21 15	i i 14 26	i 21 38	37.5	75	iScS 21 <sup>m</sup> 46 <sup>s</sup> . SS 26 <sup>m</sup> 11 <sup>s</sup> . Japan.
175	27	1	i 11 54				44		Japan.
176	27	16					.6		
177	28	21	i i 10 25				38		Japan.
178	28	23	e i 16 36	i 26 32	i 16 46	19 33	44	78	Japan.
179	30	0			06.6		44		Banda Sea.
180	31	10	i 07 06		i 07 17		26		Japan.
181	31	13			i 52 47				East of Java.
182	31	23					.2		
183	Aug. 1	14					06		
184	2	3	i 58 28		61 45	64 43			66 <sup>m</sup> 13 <sup>s</sup> . 69 <sup>m</sup> 04 <sup>s</sup> . iSS 75 <sup>m</sup> 49 <sup>s</sup> . Depth abt. 500 km. New Britain region. South of Easter Island.
185	2	10	e i 35 48		e 43 08	58.5	83		
186	2	16	i 25 27		i 25 38				
187	2	20		53.5			69		Nicaragua.
188	3	0	i 36 37		46 49		61		
189	3	6					.1		
190	3	23	e 43 27				58		
191	4	6					07		
192	4	12					.1		
193	5	15					27		
194	5	16					.6		
195	6	7	i 39 27						
196	6	15			e 29 40		1.1		Depth abt. 300 km. Japan Sea. New Britain.
197	8	20	e 59 42		62.5		63.5		Italy.
198	10	5		e 51 19	58.0		61		No Gal. Z record. Mid Atlantic Ocean.
199	13	18	e i 38 01*	e 41 35	i 38 06				Destructive. Turkey.
200	14	18	e e 50 53	e 54 24			55.6	20	No Gal. Z record. Repetition.

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No.	Date	Hour	Forerunners				L	△	Remarks
			P or P'	S					
201	1951 Aug. 16	7	<i>m s</i> e 27 59	<i>m s</i>	<i>m s</i>	<i>m s</i>	<i>h m</i> 16	°	
202	17	0	i 00 05	e 06 26	10 03		30	43	No Gal. Z record. Iran.
203	18	4			i 02 49				Depth abt. 200 km. Molucca Islands.
204	19	3	i 25 56				64.2	23	Mediterranean Sea.
205	20	22	i i 56 43	e 60 47			47		ePS 24 <sup>m</sup> 21 <sup>s</sup> . Hawaii.
206	21	11		i 22 56	e 15 19	21 51	24		
207	22	14					37.7		Depth abt. 100 km. No Gal. Z record. Ionian Sea.
208	24	10	i 31 56	e 35 37	32 18				Depth abt. 150 km. Kurile Islands. Japan.
209	24	14	i 32 40+	i 41 44	33 26	i 42 32			
210	24	23	i 12 59						
211	25	0	i 34 04						
212	28	3					34		
213	28	16	i 49 45		i 49 51	i i 49 58			ipP <sub>1</sub> ' 52 <sup>m</sup> 13 <sup>s</sup> . ipP <sub>2</sub> ' 52 <sup>m</sup> 31 <sup>s</sup> . Depth abt. 600 km. Kermadec Islands region. Depth abt. 600 km. Fiji Islands region. Greece.
214	31	10	i 27 44		i 27 57		40.3	21	
215	31	12	i e 34 24	i 38 14			30.5	23	
216	31	20	i 23 23	e 27 31					
217	Sept. 1	7		e 01.7			03.7		Italy.
218	1	9			34.4		52		Easter Island region.
219	1	23	e 57.7				42		Southwest of Crete.
220	5	8							
221	8	16	i 34 15						Depth abt. 500 km. Kermadec Islands region. Samoa Island region. Kurile Islands region.
222	9	5			e 07 21		51		
223	12	15	i 21 50	e 31 10			44	72	
224	13	0	e 39 12						
225	13	3	e 04 05				61.9		Turkey. Sumatra.
226	15	22	e 56 34						Kermadec Islands region. Molucca Islands. Seismic?
227	17	21			12 15				
228	21	3	i 40 09+				59		
229	21	9			e 28 32				
230	21	11	i 56 00						
231	21	19	e 04 57				61		Kermadec Islands.
232	22	23	i 50 40	i 58 56	65.3		46	61	North Atlantic Ocean.
233	24	13	i e 22 14	e 31 26	26 50	36 07	.9		Depth abt. 100 km. Kurile Islands. British Columbia. South of Fiji Islands.
234	27	19	e e 35 29	e 44.6					
235	28	1	e 45.1						
236	28	4					33		
237	28	12					47		
238	28	14	i 57 41						Kermadec Islands region.
239	28	15			23.8		37		Nicaragua.
240	28	23	e i 48 31		i 48 54	52 08	100		SS 72 <sup>m</sup> .0. Kermadec Islands.
241	Oct. 1	1	e e 31 40	e 35 54			38.9		Southeast of Crete.
242	2	0	e 10 39	e 19 23			32	66	Burma.



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No.	Date	Hour	Forerunners				L	△	Remarks
			P or P'	S					
			m s	m s	m s	m s	h m	°	
243	1951 Oct. 3	20	i i 54 09-						Kermadec Islands. Hindu Kush. Kermadec Islands region.
244	4	5	i e 50 48+						
245	5	11	e 57 30		80.9		1.9		
246	5	20	i 19 41						
247	8	4					42		
248	11	1	e 56 27		67 49	74.5	1.5		New Britain. Japan.
249	11	5	e 04 36				31		
250	13	23					.5		
251	15	21					42		
252	16	6	e e 59 18		e 63 25		65.4		iSE without known time. Arctic Sea.
253	16	19					37		
254	18	8	i 37 56+						Deeper than normal. Strong microseisms. Japan. Spitzbergen region.
255	19	0	e 59 27						
256	19	15			i 03 02-				Depth abt. 100 km. Japan. Foreshock to next quake.
257	21	21	i i 46 30	i 56 38	i 46 36		72	80	
258	22	3	e e 41 45	i 51 57			68		Destructive, Formosa. Repetition. » »
259	22	4	e 40 20						
260	22	5	i 55 20						
261	22	11					09.5		
262	22	11					51		Strong microseisms. Formosa. » Formosa.
263	22	13		11 08			29		
264	22	15					28		
265	22	15	i 42 03*	52 19	53 10		69		
266	22	19	e 54 46				24		
267	22	21					07		
268	22	21					31		
269	23	1	e 31 52	41 55			59		
270	23	9	e 07 27	i 17 40			35		
271	23	13		e 49 43	i 49 50		68		
272	23	19					01		
273	24	4		e 01 23			18		
274	24	14					28		
275	24	19	i 34 52+						
276	25	12	e 31 56	i 42 04			60		
277	28	2	i 01 19-						
278	28	2					37		
279	28	7	e 07 46		12 13				
280	29	0					18		
281	29	16					44.5		Yugoslavia. 32 <sup>m</sup> .4. Sumatra.
282	29	21					44		
283	30	16					08		
284	30	16					38		
285	31	7	e i 09 12	i 19 55	19 41	20 10	37	87	
286	31	19	e 22 47						
287	31	19					37		

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No.	Date	Hour	Forerunners				L	△	Remarks
			P or P'	S					
			m s	m s	m s	m s	h m	°	
288	1951 Nov. 1	11	e 21.1						Tanganyika region. Caucasus. Strong microseisms. Kamchatka region.
289	2	22	e i 01 13	i 05 39	i 01 35		.7		
290	3	13	i 56 27				08.5	26	
291	4	11							Foreshock to next quake. Kurile Islands. Masked by preceding shock. Repetition.
292	6	5					56		
293	6	15	e e 08 44				18		
294	6	16	e e 51 35	i 61 03	i 51 39	i 61 40	32	73	
295	6	19	e i 01 57	e 11 31	12 16		74		
296	7	18					25		
297	8	13	i i 56 35	e 65 44	66 44		19.5		
298	9	6					78	70	
299	9	8	e 08 45	e 18.4	18 38		32		
300	9	22		33 22	32 24	34 22	33		
301	10	6					41		Kurile Islands. Masked by preceding shock. Repetition. Depth abt. 400 km. Masked by preceding shocks. Fiji Islands. Deeper than normal. Kamchatka. Repetition. » » » » » » » » »
302	11	12					49		
303	12	8	i 21 02-	e 30 26	35.2		44	72	
304	12	9	e 01 39						
305	12	9	i i 32 49						
306	12	19					56		
307	13	15					06		
308	15	8	i 36 55	e 46 19			62		
309	15	8	i 50 16						
310	15	10	i 13 45	e 23 10			39		
311	15	10	e e 42 35	e 51 42			68		» » » Main shock. » » Kurile Islands. Kamchatka. » » East of Kamchatka. Kermadec Islands. Kamchatka.
312	15	15	i 14 02	e 23 17			43		
313	15	19	e e 53 14-	i 62 36	i 53 24		76		
314	15	22	e 10 21	e 19 39			36		
315	16	1	i 50 38						
316	16	15	i 14 27	23.8			40		
317	16	15	i e 31 45						
318	16	15	i 40 07						
319	16	17	i 53 14				108		
320	16	19	e 17 57				45		
321	17	4	e e 56 02	e 64.1	67.8		73		Tibet. Kamchatka. East of Kamchatka. » » Tibet. » » » » Kurile Islands.
322	17	20	e 35 52				66		
323	18	4	i e 49 35				74		
324	18	8	e 31 27						
325	18	9	i i 36 38	i 44 43				59	
326	18	9	i i 45 50	i 53 52					
327	18	11	e 33 05						
328	18	12	e 17 03						
329	18	19					.2		
330	21	19	i 14 29						
331	22	3					02		Kurile Islands.
332	24	2					26		
333	24	18	i e 59 30	e 69 40			88	80	



København

No.	Date	Hour	Forerunners				L	△	Remarks					
			P or P'		S									
			m	s	m	s	m	s	m	s	h	m		
334	1951 Nov. 24	19	e	i 02 34	i	12 44							80	09 <sup>m</sup> 21 <sup>s</sup> . Formosa.
335	26	6	i	i 50 49	e	61 04					78			Repetition.
336	Dec. 5	7									41			Strong microseisms.
337	8	4	i	e 27 44	i	38 37	i	27 56	i	28 16	.9			31 <sup>m</sup> 49 <sup>s</sup> . 32 <sup>m</sup> 15 <sup>s</sup> . 38 <sup>m</sup> 10 <sup>s</sup> . <i>iPS</i> 40 <sup>m</sup> 40 <sup>s</sup> . SS 46 <sup>m</sup> .4. Depth abt. 100 km. South- east of Madagascar.
338	12	1	e	50 10			i	50 29	e	60 26	73			<i>e</i> 60 <sup>m</sup> 35 <sup>s</sup> . <i>i</i> 61 <sup>m</sup> 19 <sup>s</sup> . 61 <sup>m</sup> 45 <sup>s</sup> . No Benioff
339	13	20									55.6			[record. Depth abt. 100 km. Mexico.
340	20	19									22			
341	21	8	e	e 48.4	i	57 32					69			China.
342	25	16									33			
343	26	10	e	16 53				31.3			35			Eastern Tibet.
344	26	16	i	e 40 23—	e	48.2	i	40 26			58			Gobi Desert.
345	26	17	e	04 40							.5			Later forerunners masked by pre- ceding shock. Kurile Islands.
346	27	2	e	33 07										Strong microseisms. Kurile Islands.
347	28	9	i	33 12	i	44 08		36 42		38.7	62	89		40 <sup>m</sup> 20 <sup>s</sup> . <i>SKS</i> 43 <sup>m</sup> .9. <i>SS</i> 49 <sup>m</sup> .5. Mexico.
348	29	22	e	e 16 31							47			South of Formosa.
349	30	18	i	29 02							42			Kerman.

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