



1938.

No. 45.

Geodætisk Institut

Proviantgaarden, Copenhagen, Denmark.

Bulletin

of the seismological station

KØBENHAVN

$\varphi = 55^{\circ}41' N.$ $\lambda = 12^{\circ}27' E.$ $h = 13 m.$

Lithologic foundation: chalk.

No. 45. Jan.—March 1938.

Instruments:

Galitzin-Wilip seismographs.

Constants:

Component	l	A_1	T_1	μ^2	T	k
	cm	cm	sec		sec	
N	12.5	100	12.61	-0.05	12.6	103
E	12.5	100	12.65	0.1	12.5	104
Z	14.5	100	11.55	0.1	9	95

On february 24th recording on E was suspended.

Wiechert 1000 kg. horizontal seismograph.

Wiechert 1300 kg. vertical seismograph.

Constants:

Component		T	ν	ρ	V
		sec		mm	
N	$1/1-3/2$	9.5	4.3	0.3	215
E	$1/1-3/2$	9.3	4.0	0.4	190
Z		5.4	4.0	0.2	160

After february 3rd readjustments of the horizontal seismograph took place and the constants varied.

Milne-Shaw seismograph, E component, with the approximate constants $T = 12^s$ $\nu = 20$ $V = 300$.

Benioff vertical seismograph, $T_1 = 1/4^s$ $T = 1^s$.

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No.	Date	Hour	Forerunners				L	Un-defined	△	Remarks
			P	S						
			m s	m s	h m s	m s	h m	h m	°	
1	1938 Jan. 1	11			41 33	48 57	1.1			Readings not certain. Masked by [irregular microseismic movement. Pacific Ocean. Crete. Mexico.
2*	1* 23		i40 49	51 30	44 18	57.3	1.2			
3	2 11				3 58			6		
4*	2* 22			50 59	43 34	50 40				
5	3 21				37.0		.7			
6	4 5						.4			
7	7 15						1.3			Small preceding movement.
8	7 18									Read on Benioff Z. Seismic?
9	8 7									
10	9 19									
11	10 18						.33			
12	10 21		i6 35	16 38			.6			Pacific Ocean.
13	11 14							2		
14*	11* 15		i23 58	33 54	27 2					Japan.
15	12 1							30		
16	13 9						.0			
17	16 15						.1			
18	18 4				44.3		1.2			Masked by strong microseisms. Afghanistan.
19*	18* 9		36 46	43 1*	39.5	44.3				
20	19 10									Read on Benioff Z. Seismic?
21	22 3						.0			
22	23 8							74		Preceding movement disturbed.
23*	24* 10				50.8					
24	25 17				11 45	13.5	1.1			
25	26 4						.0			
26	29 4						.8			Masked by strong microseisms.
27	30 17									
28*	Febr. 1* 19		19 5		23 42	29 51				Banda Sea. Read on Benioff Z. Seismic?
29	2 14									
30	4 0						.49			
31	4 11						.15			
32*	5* 2		36 0		36 40	37 0				Colombia.
33	7 14		i54 48	64 30			1.4			Japan. Ecuador.
34	8 7				40 6	40.6	1.1			
35	8 14						.0			
36	8 14				45		1.2			
37	10 7						.2			
38	10 10						.5			
39	10 20		42 58				.8			P not quite certain, masked by microseisms.
40	11 15						.4			
41	13 8				23 50		1.2			Disturbed.
42*	14* 3		i0 33	5 36	i0 46	5 46				Golf of Karabugas.
43	15 3		i36 15	43 5						eP ca. 36 ^m 13 ^s . Atlantic Ocean.

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No.	Date	Hour	Forerunners				L	Un-defined	△	Remarks
			P	S						
			m s	m s	h m s	m s	h m	h m	°	
44	1938 Febr. 15	7	i5 42	12 36						
45	15 10									
46	21 14									
47	22 5						.9			
48	22 6						1.1			e 42 ^m .3.
49	26 12				25.3	32 26	.7			
50	27 1		i40 52	50 20			1.1			P+. East of Japan. Faint.
51	27 12						.3			
52	March 2 0						.4			
53	4 14									
54*	8* 5				55.6	61 16	1.5			Read on Benioff Z. Seismic? Pacific Ocean.
55	9 2						1.3			Small preceding movement.
56	10 16				2.9		.4			
57	10 16				45.3		1.2			
58	11 14		55.0	58 26						60
59	11 16		i10 14							12
60	11 17						.3			Small preceding movement.
61	12 13						.5			
62	12 20						.5			
63	13 6									56
64	13 15									51
65	13 17		49.8	53 0*	53 12	53 17	1.1			54
66	13 21		14 14				.5			18
67	14 0		i58 16		i58 20		1.3			Greece. Baluchistan. P+. Bengal. P+. China.
68	14 5		i24 57				.8			Read on Benioff Z. Seismic?
69	14 14									16
70	15 15									27
71	21 1						1.4			
72	22 15				i24 5					
73*	22* 15		33 16	42 31	35.8	46.8	1.1			71
74	22 22		38 49				.0			West of Queen Charlotte Islands. P+. South of Queen Charlotte [Islands].
75	25 17									
76	27 3									2
77	27 3									32
78	27 11		i18 50							21
79	31 22		43 43	54 2*			1.2			83
										Small beginning on Benioff Z 18 ^m 48 ^s . [Yugoslavia. P-. Southeast of Formosa.]

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NOTES

- No. 2. Jan. 1. 23^h. Pacific Ocean; $\Delta = \text{ca. } 90^\circ$. $iP_Z 40^m 49^s$, dilatation. $PP 44^m 18^s, 31^s$. $SKS 51^m 18^s$. $S 51^m 30^s$. $PS 52^m 31^s$. $e_N 56^m 5$. $SS 57^m 3$.
- No. 4. Jan. 2. 22^h. Mexico; $\Delta = \text{ca. } 88^\circ$. $e_Z 40^m 12^s$, possibly preceded by quite small movement, masked by microseisms, beginning about 40^m.0. $PP 43^m 34^s$. $SKS 50^m 40^s$; $S 50^m 59^s$; $PS 51^m 56^s$. $e_E 53^m 1$. $SS 56^m 3$. $e 63^m 5$. The beginning of L not certain.
- No. 14. Jan. 11. 15^h. Japan. Possibly deeper than normal. $iP_Z 23^m 58^s$, dilatation. $i(pP) 24^m 13^s$. $PP 27^m 2^s$; $e 27^m 4$. $e_E 33^m 44^s$. $S 33^m 54^s$, followed by several oscillations; phases not clearly separated. L not large, the beginning uncertain.
- No. 19. Jan. 18. 9^h. Afghanistan. Deep Focus. Masked by strong microseisms. $iP 36^m 46^s$. $e 39^m 2, 39^m 5$. $S 43^m 1^s$. $e_E 44^m 3$. $e 46^m 2, 46^m 5$.
- No. 23. Jan. 24. 10^h. Masked by strong microseisms, readings uncertain. $e_Z 50^m 8$. $e_{N,Z} 52^m 26^s$. $e_E 53^m 3$; $e_N 53^m 8$. $e 55^m 9$. $e_E 57^m 50^s$. $e_E 58^m 20^s$. $e_N 58^m 6$. $e_{E,Z} 59^m 19^s$. $e 62^m 4, 63^m 4$.
- No. 28. Febr. 1. 19^h. Banda Sea; $\Delta = \text{ca. } 110^\circ$. Large earthquake. Galitzin records not readable. $eP 19^m 5^s$, condensation. $P' 22^m 55^s$. $PP 23^m 42^s$ very large. $PPP 25^m 54^s$. $e_N 27^m 4$; $28^m 0$. $e_E 29^m 1$. $e 29^m 23^s$. $SKS 29^m 51^s$ very large. $e_N 30^m 9$. $e_{N,E} 31^m 3$, oscillations of long period. $e 32^m 7$. $PS 33^m 2$ and $PPS 34^m 0$ very large on N and E . $e_E 37^m 4$. $SS 38^m 55^s$ very large on N . $e 40^m 1^s$ very large on E . $L_Q 49^m$, very large oscillations of period of more than 1 minute.
- No. 32. Febr. 5. 2^h. Colombia; $\Delta = \text{ca. } 85^\circ$. $h = \text{ca. } 160 \text{ km}$. Records masked by strong microseisms. $P_Z 36^m 0^s$. $pP 36^m 40^s$, $sP 37^m 0^s$. $PP 39^m 8$. $e 42^m 4$. $(S) 46^m 2$. $e 47^m 0, 47^m 5$.
- No. 42. Febr. 14. 3^h. Golf of Karabugas, Caspian Sea. Deeper than normal. $iP 0^m 32^s 5$, condensation. $ipP 0^m 46^s$. $S 5^m 36^s$. $e_Z 5^m 46^s$. Movement of short period prevailing; strong Benioff Z record.
- No. 54. March 8. 5^h. Pacific Ocean; $\Delta = \text{ca. } 125^\circ$. PP about 55^m.6, not clearly marked. $SKS 61^m 16^s$. $SKKS 62^m 52^s$. $PS 65^m 5$. $SS 72^m 3$.
- No. 73. March 22. 15^h. West of Queen Charlotte Islands. $P 33^m 16^s$, not clearly marked, possibly two seconds later. $e_E 34^m 4$. $PP 35^m 8$. $e_E 41^m 4$. $e_N 41^m 40^s$. $S_E 42^m 31^s$. $e_N 42^m 9, 43^m 4$. $e_N 46^m 5$. $SS 46^m 8$. $SSS 50^m 0$.

Seismometric readings: Notation

- P — normal first preliminary tremors, longitudinal waves.
 $P+$ — first wave condensation (away from the epicentre).
 $P-$ — first wave dilatation (towards the epicentre).
 $P(\pm a, \pm b, \pm c)$ — a, b and c are trace amplitudes in mm. of first swing on NS, EW and vertical component Galitzin records respectively. $+$ indicates ground motion directed to N, to E or up, $-$ indicates ground motion to S, to W or down. When a second set of amplitudes is given it refers to the second swing. If an amplitude is not measurable the number is replaced by x .
- $PP...$ — longitudinal waves reflected at the earth's surface.
 S — normal second preliminary tremors, transverse waves.
 $SS...$ — transverse waves reflected at the earth's surface.
 $PS; PPS; ...$ — waves reflected at the earth's surface which travel partly as longitudinal, partly as transverse waves.
 SKS — waves which traverse the mantle as transverse waves but are refracted through the core with longitudinal oscillation.
 PKS — waves which pass the mantle on one side of the core as longitudinal waves, on the other side as transverse waves and are refracted through the core with longitudinal oscillation.
 $SKKS$ — waves which traverse the mantle as transverse waves, are refracted through the core with longitudinal vibration and are reflected on its inner boundary.
- L — long, or surface, waves; main phase.
 M — waves of greatest amplitude in the surface waves.
 i — sharply defined beginning of a phase.
 e — gradual beginning of a phase.
 Δ — arcual distance from the station to the epicentre.
^{*}) affixed to time of phase indicates that the beginning is in a time-mark.
^{*}) affixed to number and date refers to Notes.

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 of the seismological station

KØBENHAVN

$\varphi = 55^\circ 41' N$. $\lambda = 12^\circ 27' E$. $h = 13 \text{ m}$.

Lithologic foundation: chalk.

No. 46. April—June 1938.

Instruments:

Galitzin-Wilip seismographs.

Constants:

Component	l	A_1	T_1		μ^2	T	k
	cm	cm	sec			sec	
N	12.5	100	12.61		-0.03	12.6	102
Z	14.5	100	11.55	$\frac{1}{4} - \frac{12}{5}$	0.1	9	96
				$\frac{12}{5} - \frac{30}{6}$	0.1	10	92

Wiechert 1000 kg. horizontal seismograph.

Wiechert 1300 kg. vertical seismograph.

Constants:

Component		T	ν	ρ	V
		sec		mm	
N	$\frac{1}{4} - \frac{28}{4}$	9.4	3.3	0.4	205
	$\frac{28}{4} - \frac{30}{6}$	10.3	3.9	0.4	205
E		8.8	3.3	0.3	210
Z		5.2	4.1	0.2	165

Milne-Shaw seismographs, N and E components, with the approximate constants $T = 12^s$ $\nu = 20$ $V = 300$.

Benioff vertical seismograph, $T_1 = \frac{1}{4}^s$ $T = 1^s$.

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No.	Date	Hour	Forerunners				L	Un-defined	△	Remarks
			P	S						
	1938 April		<i>m s</i>	<i>m s</i>	<i>h m s</i>	<i>m s</i>	<i>h m</i>	<i>h m</i>	°	
1	1	1				.5				
2	1	21		54.1		1.2				Pacific Ocean.
3	2	6			31	1.0				
4	2	7	41 35			1.1				
5	3	12				.0				Faint.
6	9	12					44			Seismic?
7	10	5					37			Small preceding movement.
8*	13*	2	<i>i</i> 49 24	<i>i</i> 52 20	<i>i</i> 52 24					Mediterranean Sea.
9*	14*	1	<i>i</i> 27 15	35 56	<i>i</i> 27 44	28 0*			68	Burma.
10	14	8							32	Seismic?
11	14	13					18			Seismic?
12	14	16				.8				
13	16	21				.1				
14	17	15			4	.4				
15*	19*	11	4 6	7 59*	<i>i</i> 4 11				22	Anatolia, Turkey.
16	19	22			4 19	4 49	.9			
17	19	23	<i>i</i> 16 3	20 7					23	Turkey.
18	20	6			<i>i</i> 46 39	49 50	1.6			e 63 ^m .8.
19	21	1			43.6	49 26	1.1			
20	22	4			35 19		.7			
21	22	15						32		Seismic?
22	23	0	40 11	50 24	43.3	55.7	1.1	82		East of Riukiu Islands.
23	23	6	<i>i</i> 11 47	17 56*	13 18	21.4	.4	40		Iran.
24	23	9	<i>i</i> 33 45	39 55	35 24	43.2	.8	40		"
25	23	23			<i>i</i> 16 37					
26	24	3						.7		
27	25	9	9 25	13 40				24		Asia Minor.
28	25	10					.7			
29	25	11					.8			
30	25	14	<i>i</i> 57 3	67 8			1.4	80		Japan.
31	25	17			30 59*		.7			
32	26	13					.8			Disturbed.
33	27	10					.9			"
34	29	2					.8			
35	29	5						5		Small preceding movement.
36	M j	1					.0			
37	2	15					.6			Some preceding movement.
38	3	0						.3		
39	3	2	28 6	39 9	38 42		.9	92		P—, Mexico.
40	3	10						2		Seismic?
41	3	19	27 14	36 33	32 15	37 10	.9		72	
42	4	6			16.5		.7			
43	6	4						21		
44	6	5						6		
45	6	14			36 21					

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No.	Date	Hour	Forerunners				L	Un-defined	△	Remarks
			P	S						
	1938 May		<i>m s</i>	<i>m s</i>	<i>h m s</i>	<i>m s</i>	<i>h m</i>	<i>h m</i>	°	
46	6	18	29 53				.9			P not certain, possibly 30 ^m 2 ^s . [Off West Nicaragua.
47	7	3						15		Faint.
48	7	3						50		"
49	7	6						40		"
50	8	14			.2		.7			
51	9	14						48		Seismic?
52	11	3					.9			
53*	11*	14			58 32	69 35	1.4			Off Mexico.
54	11	15						36		Seismic?
55*	12*	15	54 16		57.9	<i>i</i> 59 15	1.5			New Guinea.
56	12	21	39 32	45 50	49 0*	49 16			42	
57	12	22	<i>i</i> 14 41	18 48				21	23	
58	13	1						32		
59	13	1			58 19		61			
60	13	2	<i>i</i> 58 55	63 28	59 39		66		26	
61	13	3					.7			
62	13	4					15			
63	13	5					.9			
64	13	8						8		
65	13	9					.6			
66	13	13						4		
67	13	15			39 55		.9			
68	14	1					54			Small preceding movement.
69	14	4			0 20					
70	14	4	<i>i</i> 50 40	54 49			58		23	
71	14	6			<i>i</i> 12 26					
72	14	7			4.2		7			
73	14	7					54			
74	14	12			23 32	28.0	48			e 31 ^m .2.
75	14	14					.9			Faint.
76	15	0					.9			
77	15	3	39 5	43 39			47		26	P small, uncertain.
78	15	14					.2			
79	15	19					.7			
80	16	1					.2			
81	16	1			<i>i</i> 25 58	<i>i</i> 26 2				
82	16	7					.9			Small preceding movement.
83	16	14			<i>i</i> 6 36	<i>i</i> 6 52	.5			
84	16	16					.4			Small preceding movement.
85	16	18			46		50			
86	18	11					32			
87	19	15					29			
88*	19*	17	<i>i</i> 22 32		26 6	26 40				Celebes.
89	20	18					21			
90	22	8			8					Disturbed. No G. Z record.
91	22	8			43					Disturbed. No G. Z record.

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No.	Date	Hour	Forerunners				L	Un-defined	△	Remarks
			P	S						
92*	1938 May 23*	7	m s	m s	h m s	m s	h m	h m	°	Japan. Disturbed. No Galitzin records.
93	23	8	i30 30	i40 22	33 22	35 16			78	
94	23	16	i34 23		44.7		0			
95	24	10					1			
96	26	11					52			
97	27	21	27 16	30.2	i27 20					
98	28	0	i 9 45				17			
99	28	10	25 51	35.5			.8		75	
100	28	11					.8			
101	28	16	i53 34	63 2*	58.0	63 40	76		73	
102*	30*	14			49 8	52 9	1.5			
103	30	21					.0			
104	30	23	i39 31	48.8	54		1.0		71	
105	31	3					3			
106	31	9			4 31					
107	31	14			8 0					
108	31	17	i59 56	63 49	63 58*		66		22	P-. P+. Repetition.
109	31	19	i39 21	43 14	43 23		46		22	
110	June 2	15						.3		Small preceding movement.
111	2	17					1.1	9		Small preceding movement. Asia Minor.
112	3	0					51		23	
113	3	16	42 59	47 3*			.2			
114	5	17					.0			
115	5	23					4			
116	9	18								
117*	9*	19	29 20		32.8	i33 48			81	Small. Banda Sea. Pacific Ocean. Followed by groups of small long [waves; shocks not clearly [separated. Mexico.
118*	10*	10	5 55	16 5	8 57	10 51	32			
119	10	16					3			
120	10	18	18 52		29 39	35 24	.8			
121	10	20					.2			Superposed on preceding shock.
122	11	1			i45 38		.0			
123	11	10								
124	11	10	i59 17				.2			Belgium.
125	11	18					.8			
126	11	18								
127	12	2			55 50		77			
128	13	3					1.2			
129*	16*	2	i27 31	37.7	30.7	34.2	56		81	Some preceding movement. Riu-Kiu Islands.
130	16	13					.0			
131	16	23					.5			
132	17	13					21			
133	17	14						0		Read on Benioff Z. Seismic?
134	17	14						17		" " " " " "
135	18	0	i55 10	65 0*	i55 22	i65 27	83		77	P+. Japan.

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No.	Date	Hour	Forerunners				L	Un-defined	△	Remarks
			P	S						
136*	1938 June 20*	23	m s	m s	h m s	m s	h m	h m	°	Kirghiz ASSR.
137	21	7	i58 27	64 57	60 5	67 51			44	
138	23	0					.4			
139	23	1					.1			
140*	23*	13			14 45	17 45	.9			
141	24	13					.1			East of Loyalty Islands.
142	24	19			57.6		62			
143	25	9						11		
144	25	23	i49 57	53 58	50 25		56		23	
145	28	19	i30 30		41 7		60			
146	29	3						55		Seismic?
147	29	10					.6			P+. Greenland Sea. Deeper than [normal. Mexico.
148	29	11						19		
149	29	14					.7			
150	29	19			i 3 47		1.0			
151	30	17			4 0	7.1	.8			PKP+. Northeast of Loyalty [Islands.
152	30	21			36.3					

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NOTES

- No. 8. April 13. 2^h. 39°8' N 15°11' E; $\Delta = 16^\circ.6$; $h = \text{ca. } 300 \text{ km}$. eP 49^m22^s, quite small. iP 49^m24^s. e 49^m44^s; i_Z 49^m59^s; e 50^m5^s. iS_E 52^m20^s, iS_N 52^m24^s.
- No. 9. April 14. 1^h. Burma. Depth 120 km. eP_Z 27^m12^s, iP 27^m15^s, condensation. iPP 27^m44^s, sP 28^m0^s (in time-break). PP 29^m44^s. S 35^m56^s. e 36^m.7. e_E 37^m.0. e 38^m2^s (in time-break). SS 40^m.2; SSS 43^m.7. L small.
- No. 15. April 19. 11^h. Anatolia, Turkey. eP_Z 4^m6^s, read on Wiechert Z , quite small, not certain; iP_Z 4^m7^s, small, and i 4^m11^s, large, read on Benioff Z . i 4^m12^s large on Wiechert N, E, Z . e_Z 4^m26^s. e 5^m22^s. eS 7^m59^s. e_N 8^m11^s, i_E 8^m16^s. L not very large, probably some depth of focus.
- No. 53. May 11. 14^h. Off Mexico; $\Delta = \text{ca. } 90^\circ$. e_Z 58^m32^s. e_E 61^m9^s; $(PP)_Z$ 61^m39^s. e_E 67^m45^s. e_Z 68^m0^s. e_N 68^m.5. $(S)_E$ 68^m50^s. (PS) 69^m35^s. (PPS) 70^m.6. SS 75^m.0.
- No. 55. May 12. 15^h. New Guinea; $\Delta = \text{ca. } 120^\circ$. P 54^m16^s and P' 57^m.9, both small. iPP 59^m15^s. PPP 61^m.8. SKS 65^m.0. e 66^m.1, 66^m30^s, 67^m16^s, not large and not very clearly marked. e 68^m.0; e_Z 68^m.6. iPS 68^m54^s, very large. PPS 70^m31^s, large. e 71^m.4, 73^m.9. SS 75^m49^s, 76^m15^s, very large. SSS 80^m.3 very large.
- No. 88. May 19. 17^h. Celebes; $\Delta = \text{ca. } 100^\circ$. iP 22^m32^s, preceded by small movement. e_Z 25^m36^s. P' 26^m6^s. PP 26^m40^s large. PPP 28^m56^s, e_N 29^m.2. $e_{E,Z}$ 30^m37^s, e_N 31^m.6. SKS 33^m10^s, and $(SKKS)_N$ 34^m12^s, large. $(S)_E$ 34^m.9. PS 35^m32^s and PPS 36^m.4, large. e 37^m20^s. (SS) 40^m.
- No. 92. May 23. 7^h. Japan. iP 30^m30^s ($-5.2, x, 6.8; 6.2, x, -15.0$) (No Galitzin E record, therefore no E amplitudes). PP 33^m22^s, PPP 35^m16^s. e 39^m.8. iS 40^m22^s, very large. e 40^m44^s. e_E 41^m13^s, 42^m.2. SS 45^m.0. e 46^m.0 followed by movement of long period; the beginning of L uncertain.
- No. 102. May 30. 14^h. New Hebrides Islands; $\Delta = \text{ca. } 140^\circ$. P' 49^m8^s, large on Z . PP 52^m9^s. $PKS_{N,E}$ 52^m52^s. PPP 55^m.3. SKS 57^m2^s. $(SKKS)$ 58^m.8. e 60^m43^s, 62^m17^s. PS or PPS 64^m23^s. e 66^m4^s. SS 70^m.9. SSS 75^m.6.
- No. 117. June 9. 19^h. Banda Sea; $\Delta = \text{ca. } 105^\circ$. P 29^m20^s and P' 32^m.8 small. iPP 33^m48^s. PPP 36^m0^s. SKS 39^m33^s. $iSKKS$ 40^m15^s. e 41^m.0, 41^m21^s, 42^m41^s. PS 43^m3^s and PPS 43^m.9 large. SS 48^m.5, 49^m.0. SSS_N 53^m3^s.
- No. 118. June 10. 10^h. Pacific Ocean. P 5^m55^s, quite small, dilatation. i 6^m8^s large. PP 8^m57^s. i_Z 9^m14^s. PPP 10^m51^s; $PPPP$ 12^m.5. S 16^m5^s large. PPS 17^m.1 large, followed by large oscillations. e_N 19^m.8. SS 21^m.1, 21^m.4. SSS 24^m.9, 25^m.7 very large. L large.
- No. 129. June 16. 2^h. Riu-Kiu Islands. iP 27^m31^s, condensation; first movement quite small, followed 27^m32^s by large oscillations. i 27^m41^s. PP 30^m.7. $PPPP$ 34^m.2. S 37^m.7 large, but beginning not well defined. e 38^m15^s, 38^m.7. SS 42^m.7, 43^m.4. SSS 47^m.2.
- No. 136. June 20. 23^h. Kirghiz ASSR. iP 58^m27^s condensation; i 58^m29^s large. PP 60^m5^s large. S_N 64^m57^s; S_E 65^m0^s (in time-break). e 65^m35^s. e_N 67^m.2. $i(SS)_Z$ 67^m51^s, e_E 67^m.9, e_N 68^m0^s; followed by large oscillations; the beginning of L uncertain.
- No. 140. June 23. 13^h. East of Loyalty Islands; $\Delta = \text{ca. } 140^\circ$. P' 14^m45^s, condensation. PP 17^m45^s. PKS 18^m28^s. PPS 30^m.5. SS 36^m.6; SSS 41^m.5.

Geodætisk Institut

Proviantgaarden, Copenhagen, Denmark.

 Bulletin
of the seismological station

KØBENHAVN

 $\varphi = 55^\circ 41' \text{ N}$. $\lambda = 12^\circ 27' \text{ E}$. $h = 13 \text{ m}$.

Lithologic foundation: chalk.

No. 47. July—Sept. 1938.

Instruments:

Galitzin-Wilip seismographs.

Constants:

Component	l	A_1	T_1		μ^2	T	k
	cm	cm	sec			sec	
N	12.5	100	12.59		-0.02	12.7	103
E	12.5	100	12.60	$5/8-31/12$	0.0	12.5	102
Z	14.5	100	11.52		0.2	9	92

 E recorded from July 22.

Wiechert 1000 kg. horizontal seismograph.

Wiechert 1300 kg. vertical seismograph.

Constants:

Component		T	ν	ρ	V
		sec		mm	
N	$1/7-8/8$	10.4	4.0	0.5	205
	$8/8-30/9$	9.9	3.6	0.6	205
E	$1/7-8/8$	8.7	3.2	0.3	210
	$8/8-30/9$	9.2	4.3	1.3	240
Z		5.6	4.4	0.1	140

Milne-Shaw seismograph, E component, (until $12/3$), with the approximate constants $T = 12^s$ $\nu = 20$ $V = 300$.Benioff vertical seismograph, $T_1 = 1/4^s$ $T = 1^s$.

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No.	Date	Hour	Forerunners				L	Un-defined	△	Remarks
			P	S						
	1938 July		m s	m s	h m s	m s	h m	h m	°	
1	1	12					54			
2	2	1						51		
3	2	7	i 45 24	49 20	49 25		52		22	Spitsbergen.
4	2	12					37			
5	4	17					.8			
6	4	21			32 0*	35.1	1.3			Loyalty Islands region.
7*	5*	2			23.1	26 24	1.1			
8	5	3			17.1		1.0			Loyalty Islands region.
9*	5*	22			26 39	30 1*		69		Fiji Islands region.
10*	6*	1			43 55	46.5	1.4			
11	6	7					.3			
12	6	8						39		Seismic?
13	6	9			59 4	65.4	1.9			
14	6	13			i 13 4		.7			
15	7	7						53		
16	7	17					1.3			Small preceding movement.
17	8	6						40		
18	8	14	i 11 15				.7			
19	11	16						39		
20	12	12			56 17		1.7			
21	13	20						8		
22	13	20	i 18 19	21 5	22 45		.5			Rumania. Deep focus.
23	14	3					1.7			No G. Z record.
24	14	23			54.4	73.0	.3			
25	16	10					.7			
26	16	16					.6			
27	17	11			28.1			69		
28	17	13							4	Disturbed. The French Alps. Small preceding movement. No [Galitzin records.
29	18	1								
30	19	20					.2			
31	19	21			47		1.4			No Galitzin records.
32	20	0	27 59	31 35	i 28 1	i 28 14		33		Greece. Deeper than normal.
33*	20*	12			6 51					
34	21	9	21.1	29 39			.7		64	Off East Africa.
35	21	22	0 54	4 52	5 13			9	22	Asia Minor. Beginning disturbed. Off Mexico.
36	22	8			12 0	18.0	.4			
37	23	20			18 39		1.0			
38	23	23			20 45		1.0			
39	24	13	i 23 34	32 50	33.6			44		Aleutian Islands.
40	25	10					.5			
41	25	22					.7			
42	26	15						.8		No Galitzin records.
43	27	1	33 34	37.1				39		
44	27	13	28 4*	32.1	28 10	32 14		34		S uncertain.
45	27	16						14		
46	27	17			18.1			36		

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No.	Date	Hour	Forerunners				L	Un-defined	△	Remarks
			P	S						
	1938 July		m s	m s	h m s	m s	h m	h m	°	
47	27	19	56 9	60 9			63		22	Greenland Sea.
48	27	23					27			
49	28	6					.4			
50	28	8					.9			
51	29	13	i 19 28	30 10	29.9	35.9			88	No Galitzin records. Off Sumatra.
52	30	19							38	
53	31	22	i 4 52	13 32	6 10	14 19			65	Manchuria.
	Aug.									
54	1	4					.4			
55	1	11							10	
56	2	0					.8			
57	3	9					.1			
58	3	13						64		
59*	4*	9	8 35		18 54	i 19 39				Argentina. No Galitzin records.
60	5	14	i 25 40	32.1	27.4	35.4			43	
61	5	17							8	
62	8	13	11 25							Greenland Sea.
63	8	13	13 31							» »
64	8	13	19 10						24	» »
65	8	15	39 38	43.3					44	» »
66	8	16	19 52						24	» »
67	8	16	54 8						58	» »
68	8	19					.1			
69	9	4						21		
70	9	14			56 58					Read on Benioff Z. Seismic?
71	9	18						39		Small preceding movement.
72	10	2					.6			
73	10	10	45 43							Read on Benioff Z.
74	10	12						52		
75	12	2						36		
76	12	4			29			1.1		
77	13	9							39	
78	14	2						.0		
79	14	8						.9		Disturbed.
80	14	20			57.5			1.1		
81	15	11			9.1			11		Disturbed.
82*	16*	4	i 38 43	i 47 33	41 10	48.1	1.0		67	Burma. Seismic?
83	16	9							10	Small preceding movement.
84	17	2						.4		Sumatra.
85*	18*	9	43 12	54 12	53 33					P 18 ^m .9 small, uncertain. Riu-Kiu [Islands.
86	18	19		28 41	28 55			.8		
87	18	23						.0		
88	20	6						.1		
89	20	9			7.2			.5		
90	22	15							33	Seismic?
91	22	21			55.4			1.1		

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No.	Date	Hour	Forerunners				L	Un-defined	△	Remarks
			P	S						
92	1938 Aug. 23	8					.7			Small preceding movement.
93	24	16					.7			
94*	25*	1	41 21	52 35	45 5	53 36	1.3		51	Off Sumatra. Seismic?
95	27	8								
96	28	21	7 39	11 17					13	Greenland Sea. P and S quite [small.
97	29	2					.6			
98*	29*	15	35 32	46 35	46 9	47.4	1.1			Philippine Islands. Phases not clearly marked. North [of New Guinea.
99	30	12			9.3	18.9	.7			
100	30	17			27.5	33.6	1.1			
101	30	19			38.6				41	
102*	31*	18			4.7					New Ireland Island.
	Sept. 1	3	6 28	16.6			.6		81	Riu Kiu Islands. Off Guatemala.
104*	1*	23	1 6		4 26	11 31	.5		26	
105	3	4	51 18	55 46					58	
106	3	6	41 26						48	
107	4	0					.7			
108	4	4					.4			
109	4	19	34 42		45 18		1.1			P quite small, uncertain. Philippine [Islands. P+.
110	4	20	i34 39				1.0			
111	4	21	i23 21				.9			
112	4	22					.8			
113	5	15			2 36	3 49	1.1			e 7 ^m 40 ^s . Caspian Sea. P+. S small, uncertain. South of [Kurile Islands. P+. E of Mindanao. Formosa.
114	6	13	i34 14	39.1					46	
115	6	20	i57 23	66.9			1.4		74	
116	7	2	8 15		12 21	18 50	.7			
117*	7*	4	i15 31	25 36	18.4	26.4	.41		80	
118	7	12					.1			
119	7	13			18.4	19.4	.9			e 23 ^m 45 ^s , 28 ^m .4, 29 ^m .3.
120	9	6					.7			
121	9	17					1.8			Some preceding movement.
122	9	19					.5			
123	10	22			i35 1		1.1			
124	11	18							2	
125	11	20					.4			
126	12	6					.8			
127	14	9					.5			
128	15	13							38	Seismic?
129	18	1							.1	
130	18	1			50		1.1			
131	18	3	i54 53	58 21					19	P (-1.4, +1.0, -1.3; +5.9, -2.0, [+4.2). Greece.
132	18	14					.4			
133	19	0			i49 21					
134	19	12					.8			
135	19	20					.3			

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No.	Date	Hour	Forerunners				L	Un-defined	△	Remarks
			P	S						
	1938 Sept. 20	13								
136	20	13								
137	20	14					.45			
138	20	16					.9			
139	20	22					.4			
140	21	2			26		.30			
141	21	19	i 3 59	13 51	7.1	14.2			78	P+. SS 19 ^m .1. Japan.
142	22	5	29 44						35	
143	22	5	36 37	40 35					42	P—.
144	22	6	28 11						34	
145	24	13							29	Seismic?
146	25	16			44 55		1.3			
147	25	20			36 38		1.3			
148	26	13							2	Seismic?
149	27	0							.3	
150	27	2	40 45	48 5	42.8				57	P+. Abyssinia.
151*	27*	10			36 1*	46.0	1.2			Solomon Islands region. Solomon Islands.
152	28	18			35.1	36.3	1.2			
153	30	9					.5			

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NOTES

- No. 7. July 5. 2^h. Loyalty Islands region; $\Delta = \text{ca. } 145^\circ$. P_Z' 23^m.1 small; 23^m36^s larger. PP 26^m24^s. Later phases not clearly marked, e_N 27^m3^s, e_Z 27^m53^s. e_N 30^m46^s, 31^m51^s. PS_Z 38^m.5. L not large.
- No. 9. July 5. 22^h. Loyalty Islands region; $\Delta = \text{ca. } 150^\circ$. P_Z' 26^m39^s quite small; e 26^m44^s larger. e_Z 29^m.0. PP 30^m1^s. SS 49^m.2; SSS 54^m.0. L not large.
- No. 10. July 6. 1^h. Fiji Islands region; $\Delta = \text{ca. } 145^\circ$. P_Z' 43^m55^s, i (Benioff Z) 44^m4^s. e_Z 46^m.5, e_N 47^m51^s. Much oscillatory movement, phases not clearly marked. SS 66^m.7, SSS 71^m.2. L not large.
- No. 33. July 20. 12^h. Two or three shocks. e_Z 6^m51^s, 11^m57^s. $e_{N,E}$ 12^m23^s, e_Z 13^m48^s, e 20^m24^s, 21^m57^s.
- No. 59. Aug. 4. 9^h. Argentina; $\Delta = \text{ca. } 105^\circ$; depth about 200 km. No Galitzin records. P_Z 8^m35^s quite small. e 18^m54^s, i 19^m39^s, e 20^m4^s, e 21^m39^s clearly marked phases.
- No. 82. Aug. 16. 4^h. Burma. iP 38^m43^s (x , -3.2, +3.0; x , +6.0, -7.7). PP 41^m10^s; PPP 42^m46^s. e 43^m.3, 43^m48^s, e 47^m.4. iS_N 47^m33^s large. PS 48^m.1. (ScS) $_N$ 48^m41^s. e 50^m.9, SS_E 51^m.9. SSS 54^m.8.
- No. 85. Aug. 18. 9^h. Sumatra; $\Delta = \text{ca. } 95^\circ$; depth about 100 km. P small 43^m12^s, condensation. pP 43^m35^s. SKS_E 53^m33^s. S 54^m12^s. e 54^m.8. e_E 55^m17^s, 55^m.9. e_N 59^m.6. e_E 60^m.4. L small.
- No. 94. Aug. 25. 1^h. Off Sumatra; $\Delta = \text{ca. } 95^\circ$. Deeper than normal. eP 41^m21^s, dilatation. pP 41^m55^s. PP 45^m5^s. e 47^m.1, 48^m.9. SKS_E 51^m.9, $S_{N,E}$ 52^m35^s. PS 53^m36^s.
- No. 98. Aug. 29. 15^h. Destructive in the Philippines; $\Delta = \text{ca. } 90^\circ$. P quite small, 35^m32^s. e_E 40^m.9. SKS_E 46^m9^s. S 46^m35^s. PS 47^m.4. e_E 49^m.3.
- No. 102. Aug. 31. 18^h. New Ireland Island; $\Delta = \text{ca. } 120^\circ$; depth about 350 km. Quite small beginning on Z 3^m.4. PP 4^m.7. e_Z 6^m.0. e 6^m42^s; 9^m.1. e_E 12^m25^s, e 13^m44^s. e_E 14^m.5. e 16^m.3. e_Z 17^m33^s. L small.
- No. 104. Sept. 1. 23^h. Off Guatemala; $\Delta = \text{ca. } 85^\circ$. P 1^m6^s, condensation. PP 4^m26^s. (SKS) 11^m31^s. PS 12^m49^s. SS 17^m.3.
- No. 117. Sept. 7. 4^h. Formosa. iP 15^m31^s (-0.9, -1.5, +2.5; +1.2, +2.5, -4.6). PP 18^m.4; PPP 20^m.5 quite small; $PPPP$ 22^m4^s. S 25^m36^s. PS 26^m.4. SS 31^m.1; SSS 35^m.0.
- No. 151. Sept. 27. 10^h. Solomon Islands region; $\Delta = \text{ca. } 125^\circ$. PP 36^m1^s, in time-break. e 43^m.3. PS 46^m.0, PPS 47^m.5.

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Bulletin
of the seismological station

KØBENHAVN

$\varphi = 55^\circ 41' N$. $\lambda = 12^\circ 27' E$. $h = 13$ m.

Lithologic foundation: chalk.

No. 48. Oct.—Dec. 1938.

Instruments:

Galitzin-Wilip seismographs.

Constants:

Component	l	A_1	T_1		μ^2	T	k
N	cm 12.5	cm 100	sec 12.59		-0.04	sec 12.7	104
E	12.5	100	12.60		0.04	12.1	102
Z	14.5	100	11.52	$^{1/10-15/12}$	0.2	9	90
				$^{15/12-21/12}$	0.0	11 $^{1/2}$	92

Wiechert 1000 kg. horizontal seismograph.

Wiechert 1300 kg. vertical seismograph.

Constants:

Component		T	ν	ρ	V
N		sec 11	3.3	mm 0.6	200
	$^{21/10-31/12}$	9.4	3.2	0.4	195
E	$^{1/10-21/10}$	9.3	4.0	1.6	240
	$^{21/10-31/12}$	9.3	3.5	0.6	210
Z		5.5	4	0.1	150

Milne-Shaw seismograph, E component (from $^{18/10}$), with the approximate constants $T = 12^s$ $\nu = 20$ $V = 300$.

Benioff vertical seismograph, $T_1 = 1/4^s$ $T = 1^s$.

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No.	Date	Hour	Forerunners				L	Un-defined	△	Remarks
			P	S						
	1938		<i>m s</i>	<i>m s</i>	<i>h m s</i>	<i>m s</i>	<i>h m</i>	<i>h m</i>	°	
1	Oct. 2	16			56.5		1.1			
2	4	9					.4			
3	5	11						12		Disturbed.
4	7	1					.7			Seismic?
5	7	7					.0			Small preceding movement, masked by microseisms.
6	7	16			45.6		1.2			Faint.
7	9	16			56.8	61 26	2.1			Small preceding movement.
8	10	3					.9			
9*	10*	21	2 3	13 35	12 37	15 0	.5			Celebes region.
10	11	0					1.0			Small preceding movement.
11	11	12						.6		Seismic?
12*	12*	0	46 15	55 54	i49 6	56 25	72		75	East of Japan.
13	13	15					1.1			Small forerunners, phases not clearly marked.
14	14	18						6		Seismic?
15	16	2					30			Small preceding movement.
16	17	15	i37 51	46 49						Sea of Okhotsk. Deep focus.
17	17	23					.8			
18	19	1					.0			
19*	19*	4	21 47	28 23	23 32	32 1*			45	Altai Mountains.
20*	20*	2	33 52	45 50	38 19	38 45				Lesser Sunda Islands.
21	20	12					.1			
22	20	13					.7			
23	21	6	i56 33	64 51						
24	21	20	35 17	44 23	45 20		1.1		69	Deep focus.
25	21	23			55 34	56 11	2.0			Indian Ocean.
26	23	2			44.9		.9			
27	23	5					.6			
28	23	15	1 3 12	22 58			.7		77	Madagascar.
29	26	17					.6			
30	28	5					.7			
31	28	15						25		
32	29	13	i20 29	30 28	30 45	32 20	.8		79	Read of Benioff Z. Seismic?
33	29	23			17 28		.8			Japan.
34	29	23			i30 18		1.5			
35	Nov. 4	3	i54 39					62		
36*	5*	8	55 17	65 13	58 11	70.0			79	East of Japan.
37*	5*	11	i 2 10	12 2*	5.5	17.1			78	" " "
38	5	22					.1			
39	5	23					.0			
40	6	0					.2			
41*	6*	9	i 5 50	15 41	8 52	20.4		31		
42	6	14					.4		78	East of Japan.
43	6	17	i31 11	41.1			1.0		78	East of Japan.

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No.	Date	Hour	Forerunners				L	Un-defined	△	Remarks
			P	S						
	1938		<i>m s</i>	<i>m s</i>	<i>h m s</i>	<i>m s</i>	<i>h m</i>	<i>h m</i>	°	
44	Nov. 6	19					.1			
45	6	20					.1			
46	6	21	15 55				.7		78	Japan.
47*	6*	21	50 44	60 38	53 37		77		78	"
48	7	0	i59 56	69.8	60 5		1.5		78	"
49	7	1	50 21	60 14	50 24	50 30	1.3		78	"
50	7	1			57 21	i57 31				
51	7	2	6 21							e 6 ^m 25 ^s , 6 ^m 33 ^s .
52	7	4					.4			Small.
53	7	4	i27 29		i27 39					Japan.
54	7	4			28 1	37 48	57			i (B. Z) 28 ^m 4 ^s , Japan.
55	7	13						2		
56	7	19	i24 36	34 25	39.3		.9		77	Japan.
57	7	19	45 34							Japan. Superposed on preceding shock.
58	8	3	13 42				16			South of Wien.
59	8	11					.8			
60	8	12					.4			
61	8	13					.9			
62	8	21					.0			
63	9	4			41		.8			
64*	9*	9	27 55	37 55	37.0				51	East of Japan.
65	9	14								i51 ^m 34 ^s read on Benioff Z.
66	9	16	20 50				50			
67	10	3					.1			
68	10	7					26			
69	10	11		9.1			.5			Disturbed.
70*	10*	20	29 47	39.0					71	South of Alaska.
71	10	22	2 9							
72	10	22	6 58							
73	10	22	34 19							
74	11	0			i20 30					20 ^m 16 ^s uncertain.
75	11	1	i 8 51	17 59	19 10		.5		70	
76	11	3		19 47			.6			
77	11	5					.4			
78	11	8	41 56				1.2			Disturbed.
79	11	15					.2			
80	11	22	i44 48							
81	12	8					.8			
82	12	15	1 28	10.8			.4		72	South of Kurile Islands.
83	12	15			i35 29					
84	12	20	i35 15				1.1			
85	13	3					.7			
86	13	5					.7			
87	13	13	i25 9	34 31	29 55	35 48	48		72	Some preceding movement.
88*	13*	22	43 31	53 30	46.9	58.6	67		79	Kurile Islands.
89	14	2		58 19			1.3			Pacific Ocean.
90	14	6					.5			Japan.

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No.	Date	Hour	Forerunners				L	Un-defined	△	Remarks
			P	S	h m s	m s				
	1938 Nov.		<i>m s</i>	<i>m s</i>	<i>h m s</i>	<i>m s</i>	<i>h m</i>	<i>h m</i>	°	
91	14	12					8			
92	14	12					21			
93	14	12			26.5	36.2	1.0			
94	15	10	3 5	12.2	3 24	13.4	25		70	S small, uncertain. South of Alaska.
95	15	15			44 32		1.1			
96	15	20					.0			
97*	15*	21	13 26	24 24	17.1	24.0	.8		91	Indian Ocean.
98	16	5	i47 20	56.7			74		72	Pacific Ocean.
99	16	11	20 2	29 55			46		78	Japan. Read on Benioff Z.
100	16	15			i33 43					
101*	17*	4	5 43	14 47	8 22	15 55			69	South of Alaska. Seismic? No Galitzin records.
102	17	13						4		
103	18	14			34 41					
104	18	19					4			
105	18	21					.4			
106	19	0					.1			
107	19	5	i51 8	60 47			75		75	Pacific Ocean.
108	21	1			30.3		.8			
109	21	7					.7			
110*	22*	1	i26 3	36 0*			.9			Japan.
111	22	8			35.5		.9			
112	23	0					59			
113	23	14					.8			
114	25	0					20			
115	25	8	i32 21	42.2					78	East of Japan.
116	25	23					.0			
117	26	4					.3			
118	26	10					.8			
119	29	13	i51 32	61 28			81		78	East of Japan. Strong microseisms.
120*	30*	2	41 47	51 39	44.7	46.7	1.1		79	Japan.
121	30	16					.0			
	Dec.									
122	1	2			44.1		1.0			Masked by microseisms.
123	2	22			32 6		44			
124	3	1					.4			
125	3	12	i23 40	33 33			.9		78	East of Japan. P—.
126	4	6	i24 2		i24 15		.9			Japan.
127	4	16			44.9		1.4			Pacific Ocean.
128	5	1					.1			
129	5	19					.6			
130	6	9						.3		Disturbed.
131	6	23	i13 8		23.4	23 46	.6			Formosa. SS 29 ^m .4.
132	7	10					.9			
133	7	13	i16 9	26 19			.7		81	East of Japan.
134	7	14					.3			
135	7	15					.7			
136	9	4	6 17	15.1			.4		66	

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No.	Date	Hour	Forerunners				L	Un-defined	△	Remarks
			P	S	h m s	m s				
	1938 Dec.		<i>m s</i>	<i>m s</i>	<i>h m s</i>	<i>m s</i>	<i>h m</i>	<i>h m</i>	°	
137	9	5					46			
138	9	9			47.6		1.3			
139	12	19					57			
140	13	0					.3			
141	13	3					.3			
142	13	17	i37 25	47.2			1.1		77	Faint. E of Japan.
143	16	5					.3			
144	16	11	7 55				15			
145*	16*	17			41 30	42 13	1.4			New Zealand. SS 59 ^m .4. New Zealand. Mongolia.
146	16	23			46	50.1	1.4			
147	17	16	i44 4	51.0	i45 55	54.6	57		48	
148	18	7			48		1.1			
149	18	22			i 2 36	19	26			
150	19	18	i35 18	44 45			1.0		73	Japan.
151	20	15					33			
152	21	12			41.8	51.7	1.3			e 54 ^m .6. Lesser Sunda Islands.
153	22	4					.1			
154	22	14							9	
155	22	17					.6			Small forerunners, masked by microseisms. Faint.
156	23	1							47	
157	23	2					.5			
158	23	18	25 51	34 58			.9		70	South of Alaska.
159	24	21					.0			
160	26	7					.4			
161	26	12					.1			
162	26	22	i 6 40	10 11	10 47		13		19	
163	29	0					15			
164	29	21					.7			
165	30	3					.8			
166	31	1					.2			

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NOTES

- No. 9. Oct. 10. 21^h. Celebes region; $\Delta = \text{ca. } 100^\circ$. P 2^m3^s, dilatation. PP 6^m.0, PPP 8^m.5. $e_{E,Z}$ 11^m.2. SKS 12^m37^s large. S 13^m35^s. PS 15^m0^s, in time-break. PPS 16^m.1. e 17^m.6, 18^m27^s, 19^m.4. SS 20^m.2, 21^m.0. SSS 24^m.3.
- No. 12. Oct. 12. 0^h. East of Japan. P 46^m15^s, condensation. iPP 49^m6^s. S 55^m54^s; PS 56^m25^s. e_N 57^m0^s, e_E 57^m30^s. SS 60^m.9.
- No. 19. Oct. 19. 4^h. Altai Mountains. P 21^m47^s, dilatation. PP 23^m32^s large; PPP 24^m21^s. S_N 28^m23^s, S_E 28^m28^s. e 29^m40^s, 30^m21^s. SS 31^m41^s; 32^m1^s, in time-break.
- No. 20. Oct. 20. 2^h. Lesser Sunda Islands; $\Delta = \text{ca. } 110^\circ$. Deeper than normal. P_Z small, 33^m52^s. $PP_{E,Z}$ 38^m19^s large, $pPP_{E,Z}$ 38^m45^s larger. PPP 40^m42^s. e 41^m.4, 42^m.7. $iSKS$ 44^m19^s large. $SKKS_E$ 44^m58^s. e 45^m17^s. S 45^m50^s. e_N 46^m28^s. iPS 47^m28^s, large on E and Z . PPS 48^m18^s, i_E 48^m31^s. e_N 52^m44^s. SS 53^m.7; SSS 57^m.9; e_E 59^m.0.
- No. 36. Nov. 5. 8^h. East of Japan. Large shock. Onsets masked by groups of large, increasing oscillations. P 55^m17^s, condensation. PP 58^m11^s, PPP 60^m15^s. e_N 64^m49^s. S_N 65^m13^s, S_E 65^m17^s. e_E 66^m.2. SS 70^m.0.
- No. 37. Nov. 5. 11^h. East of Japan. Large shock, superposed on the preceding one. iP (Benioff Z) 2^m10^s, condensation; e 2^m33^s larger. e_Z 4^m.8; PP 5^m.5. e_E 6^m.8; e_Z 7^m5^s; $e_{N,E}$ 7^m20^s. eS 12^m2^s (in time-break); e 12^m24^s very large. SS 17^m.1. SSS 20^m.9.
- No. 41. Nov. 6. 9^h. East of Japan. Galitzin records interrupted until 9^h10^m; the recorded movement very large; phases read on Benioff and Wiechert records. iP 5^m49^s.5, condensation; i_Z (B.) 5^m51^s; i_Z (W.) 5^m59^s. i_Z (B.) 8^m41^s. PP 8^m52^s. PPP 10^m36^s. S 15^m41^s very large. e_E 16^m13^s, 17^m28^s. $e_{N,E}$ 18^m4^s. SS 20^m.4; SSS 24^m.3, 24^m.6. L_E 31^m, L_N 32^m.
- No. 47. Nov. 6. 21^h. Japan. eP_Z (B.) 50^m44^s, (W. and G.) 45^s. i_Z (B.) 50^m51^s, 51^m4^s. e_Z 52^m56^s. PP 53^m37^s. e 54^m.4. S 60^m38^s. $e_{N,Z}$ 61^m.0.
- No. 64. Nov. 9. 9^h. East of Japan. Deeper than normal. Beginning of Galitzin records disturbed. P 27^m55^{1/2}^s; i (Benioff Z) 28^m10^s. e 30^m55^s. e 37^m.0. eS 37^m55^s. SS 42^m.9. L not large, but of long duration.
- No. 70. Nov. 10. 20^h. South of Alaska. Very large earthquake. P_Z 29^m47^s small, condensation. i_Z 29^m55^s; i 29^m58^s; very large increasing oscillations. Later onsets not distinct owing to continued large oscillatory movement. e $S_{N,E}$ 39^m.0. L very large.
- No. 88. Nov. 13. 22^h. Pacific Ocean. P 43^m31^s, the beginning small, not very clearly marked. PP 46^m.9; PPP 48^m.8. S 53^m30^s; e 53^m.9. SS 58^m.6.
- No. 97. Nov. 15. 21^h. Indian Ocean. P 13^m26^s, condensation. PP 17^m.1, PPP 19^m17^s. SKS 24^m.0, S 24^m24^s. PS_Z 25^m36^s. e 26^m.0, 26^m.2, 27^m.4. SS 30^m.5.
- No. 101. Nov. 17. 4^h. South of Alaska. iP 5^m42^s.5 (—8.0, x , +9.5; +11.2, x , —17.0). PP 8^m22^s; PPP 10^m15^s. S 14^m47^s. e_N 15^m0^s (in time-break). $(S_eS)_N$ 15^m55^s. e 18^m.0. SS 19^m.5. SSS 22^m.3, immediately followed by L .
- No. 110. Nov. 22. 1^h. Japan. Deeper than normal. iP 26^m3^s. e 29^m.1, 29^m.3. S 36^m0^s (in time-break). e_N 37^m.2, e_E 38^m22^s.
- No. 120. Nov. 30. 2^h. Japan. P 41^m47^s, condensation. e_Z 43^m16^s. PP 44^m.7, PPP 46^m.7. S 51^m39^s. SS 56^m.5.
- No. 145. Dec. 16. 17^h. New Zealand. Masked by microseisms, phases not clearly marked. P_1' 41^m30^s, P_2' 42^m13^s. PP 45^m55^s. e_E 50^m.5. e_N 52^m.2, 53^m.7. $SKSP_E$ 56^m.9. PPS 59^m.7. SS 66^m.4.