

No. 22.

1932.

## 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. 22. April—June 1932.

**Instruments:**

Galitzin pendulums with galvanometric registration.

**Constants:**

Component	$l$	$T_1$	$A_1$	$\mu^2$	$T$	$k$
	cm	sec	cm		sec	
<i>N</i>	12.5	12.62	100	-0.03	12.4	105
<i>E</i>	12.5	12.62	100	0.0	12.0	101
<i>Z</i>	14.4	11.56	100	-0.1	10	95

*Z* was dismantled on June 24th.

Wiechert 1000 kg. horizontal seismograph.

Wiechert 1300 kg. vertical seismograph.

**Constants:**

Component		$T$	$\nu$	$\rho$	$V$
		sec		mm	
<i>N</i>		9.6	4.5	0.5	220
<i>E</i>	$\frac{1}{4} - \frac{17}{6}$	9.4	4.2	0.7	195
	$\frac{17}{6} - \frac{30}{6}$	9.9	4.6	0.9	200
<i>Z</i>		5.5	4.5	0.2	170

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

Wood-Anderson seismograph, *E* component,  $T = 2^s.7$ .

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No.	Date	Hour	Forerunners				L	Un-defined	△	Remarks		
			P		S							
			m	s	m	s	h	m	h	m	°	
	1932 April											
1	3	20					i 58	50	62.7	1.9		Pacific Ocean.
2	4	15					24.0		29.5	1.0		33 <sup>m</sup> .8.
3	4	19	i 28	17	i 37	57	29	57	40.7			Japan. Deep focus.
4	6	0							.5			
5	6	9							49			Small preceding movement.
6	8	12					.9		1.3			[Wiechert records only.]
7	12	7							14			
8	13	0					.2	18.4	.8			New Guinea.
9	14	1	i 43	38	48	1					25	
10	18	11	32	2*	39.0						48	Persia.
11	20	20							28			
12	22	5	10	24			22	15	22.6	.8		
13	23	10							8			Small preceding movement.
14	24	6					34.4		.9			
15	26	8					20.0	22.8	.8			Disturbed.
16	27	1					57.0		61			
17	28	5							.3			
18	29	17					.9		1.3			Faint.
19	29	18	29	55	39	18			.9		72	Aleutian Islands.
20	30	1	16	55	25	33			.6		64	
21	30	11	0	22	6	35	3	9	10.0		41	Afghanistan.
22	30	14							27			
	May											
23	1	2							50			
24	1	4					.6		1.5			
25	1	19							.9			
26	3	0							9			
27	3	10							48			
28	4	1							.7			
29	5	4					31	35				
30	5	10										Disturbed.
31	6	0								51		
32	6	5							.1			
33	7	15							.2			Small preceding movement.
34	11	7					16.0		.6			
35	12	6					40.6		1.0			Small preceding movement.
36	14	3								.1		
37	14	3	50	13	53	59			56		21	Asia Minor. P quite small.
38*	14*	13	24	58			35.6	38.2				Celebes.
39	17	13								51		
40	18	19					.3		.9			
41	20	4								27		Small.
42	20	8							.3			Faint.
43	20	19	22	59	28	26			37		34	Persia.
44*	21*	10	i 22	38			25	59	32	55		Central America.
45	21	15					54	62.5	.8			
46	21	22					3.1					
47	22	1							.9			
48*	22*	11					48	56				

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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	°	
	1932																
	May																
49	22	17	5	55	9	22							11			19	Sicily.
50	22	22					63.0						1.3				Faint preceding movement.
51	23	6											13				" " "
52	24	23	37	56	42	55							.8			30	Persia.
53	26	5					31.9						.8				
54*	26*	16					28 15				30 39						New Hebrides region.
55	26	22					40 30				42 40						
56	27	1					48.4				50 55						
57	27	10										50					Some preceding movement; the beginning not certain, possibly 43 <sup>m</sup> 3 <sup>s</sup> .
58	28	2	i 33	34	43	45	36.8				43 55	1.0				81	Pacific Ocean.
59	28	5										.8					
60	29	1										.9					
61	31	8										.1					Preceding movement disturbed.
62	31	11											.1				
63	31	14										.5					
64	31	15										.7					
	June																
65	2	20					10						14				
66	3	0	30.8		40.8							1.0					Japan. P quite small, uncertain.
67*	3*	10	49	47			60.4				61.9	1.2					Mexico.
68	3	17										.3					Faint.
69	3	17											57				
70	3	18					.4					.5					
71	3	21										.1					
72	4	2										.7					
73	4	19										.9					Faint.
74	4	22					2.9					.5					
75	5	9					28 8*					.9					The beginning disturbed.
76	5	13					28.1					.9					
77	6	8	56	18	66.1		56 31				66 28		82			77	
78	6	12	1	29	11	2						.4				74	P and S small.
79	8	2					53 28					2.2					Faint.
80	8	5										.5					"
81	8	6										.9					
82	8	8	3	1													Disturbed.
83	8	10										1.5					Faint preceding movement.
84	8	15					18.5					.8					" " "
85	9	4					59.1				60.5	1.4					" " "
86	9	7										.5					
87	10	6											50				Small.
88	10	20	34	55			38.9				45 31	1.2					46 <sup>m</sup> 22 <sup>s</sup> ; 47 <sup>m</sup> .45 <sup>s</sup> .
89	10	22										.3					
90	10	23					6.4					.5					
91	11	8	42	6	49	28										52	
92	11	11										.3					
93	11	17					24 16					.8					Faint preceding movement.
94	12	23			33.2								37				

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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	°	
	1932 June																
95	13	21	10	9	20	34						.7				84	Luzon region.
96	14	6	12	5*	22	24						.7				83	" "
97	14	11					43.2					1.1					
98	16	1	i31	15	41	36	i 31	34				1.0					Sumatra. Deep focus.
99	16	12												20			
100	18	0					38					1.1					
101	18	2										.2					
102	18	6										.5					Faint.
103*	18*	10	24	59	36	19	35.4	37	20			51					Pacific Ocean off Mexico.
104	18	18										.3					
105	18	21					46.1					1.2					
106	20	4					7	26				1.1					
107	20	6										.7					
108	20	9					25										Disturbed.
109	20	15										.0					
110	20	15					44					50					
111	20	19					28	19	37.8			1.1					
112	21	4					57					1.3					
113	21	7											.9				
114	21	9										.9					
115	21	23										.7					Small preceding movement.
116	22	0	48	3	57	55						1.3				78	Japan.
117*	22*	13	12	23	23	59	23	0	24	35		.7					Pacific Ocean off Mexico.
118	22	17										.7					Faint.
119	23	2					32.7					1.3					
120	23	7										.9					Faint.
121	23	23										0					
122	25	1												17			
123	25	9											.2				Disturbed.
124	26	19	30	40	40	6						55				73	Kurile Islands.
125	27	3										26					
126	27	5										35					
127	29	2	35	1	39	4						42				23	Mediterranean Sea.
128	29	10										.0					
129	29	10											.3				Seismic?
130	29	15											.4				
131	29	16										.6					
132	29	18					36	58*	42.5			.9					} Two shocks; uncertain whether forerunners are connected with first or second L.
133	29	18										45					
134	30	6										.8					

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NOTES

- No. 38. May 14. 13<sup>h</sup>. Celebes;  $\Delta = \text{ca. } 105^\circ$ . Very strong record. The beginning of  $P$  small; followed by large movement  $25^{\text{m}}4^{\text{s}}$ .  $e_z 28^{\text{m}}.4$ ;  $e_z 28^{\text{m}}.9$ .  $PP 29^{\text{m}}.4$  followed by increasing oscillations.  $PPP_E 32^{\text{m}}.1$ .  $e_E 33^{\text{m}}.9$ ;  $e_N 34^{\text{m}}.9$ ;  $e_N 35^{\text{m}}.5$ .  $S_c P_c S 35^{\text{m}}.6$ , very large;  $(S_c P_c P_c S) 36^{\text{m}}.7$ , large;  $PS 38^{\text{m}}.2$ , very large, followed by a group of large oscillations;  $SS 43^{\text{m}}$ , very large;  $SSS 47^{\text{m}}.9$ , large. Surface waves large, but smaller than largest waves in forerunners.
- No. 44. May 21. 10<sup>h</sup>. Central America;  $\Delta = \text{ca. } 85^\circ$ .  $PP 25^{\text{m}}59^{\text{s}}$ , larger than  $P$ , clearly marked on  $Z$  and  $E$ .  $S$  (or  $S_c P_c S$ )  $32^{\text{m}}55^{\text{s}}$ , clearly marked.  $(PS) 34^{\text{m}}22^{\text{s}}$ ;  $e 35^{\text{m}}.0$ .  $SS 38^{\text{m}}.7$ .  $M$  regular.
- No. 48. May 22. 11<sup>h</sup>. New Caledonia region;  $\Delta = \text{ca. } 140^\circ$ .  $P' 48^{\text{m}}56^{\text{s}}$ , clearly marked, especially on  $Z$ . Later forerunners distinct, but phases not clearly marked. The beginning of  $L$  not certain, about 12<sup>h</sup>.7.
- No. 54. May 26. 16<sup>h</sup>. New Hebrides region;  $\Delta = \text{ca. } 140^\circ$ . Deep focus. The beginning quite small,  $e_z 28^{\text{m}}15^{\text{s}}$ ;  $e 28^{\text{m}}20^{\text{s}}$  larger;  $i 28^{\text{m}}29^{\text{s}}$ , followed by increasing oscillations, very large on  $Z$ .  $i 30^{\text{m}}40^{\text{s}}$ , very large on  $Z$ . Continued strong oscillatory movement.  $e 35^{\text{m}}.2$ ;  $e 45^{\text{m}}.1$ .  $L$  small.
- No. 67. June 3. 10<sup>h</sup>. Mexico. Very strong record; continued strong oscillatory movement, beginning of phases not clearly marked. Beginning of  $P$  small,  $iP 50^{\text{m}}2^{\text{s}}$ .  $PP 53^{\text{m}}28^{\text{s}}$ ;  $e 54^{\text{m}}6^{\text{s}}$ .  $e_N 58^{\text{m}}.6$ . After  $60^{\text{m}}.4$  increasing oscillations;  $PS 61^{\text{m}}.9$ , very large, followed by large oscillations.  $SS$  about  $67^{\text{m}}$ , not clearly marked.  $M$  very large.
- No. 103. June 18. 10<sup>h</sup>. Pacific Ocean off Mexico. Strong record. Beginning of  $P$  quite small;  $iP 25^{\text{m}}23^{\text{s}}$  followed by large oscillations. Later phases clearly marked.  $PP 28^{\text{m}}52^{\text{s}}$ ;  $S_c P_c S 35^{\text{m}}.4$ , on  $E$  only;  $S_n 36^{\text{m}}19^{\text{s}}$ , very clearly marked on  $N$ ;  $PS 37^{\text{m}}20^{\text{s}}$ .  $SS 42^{\text{m}}$ . In first part of  $L$  large oscillations of long period on  $N$ . Later  $M$  large, regular.
- No. 117. June 22. 13<sup>h</sup>. Pacific Ocean off Mexico. Beginning of  $P$  small, uncertain, increase about  $12^{\text{m}}.6$ .  $PP 16^{\text{m}}9^{\text{s}}$ .  $S_c P_c S$  clearly marked on  $N$  and  $E$ ;  $S$  small, on  $N$  only.