

No. 52.

1942.

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. 52. Jan.—Dec. 1942.

Instruments:

Galitzin-Wilip seismographs.

Constants:

Component	l	A_1	T_1		T	k
	cm	cm	sec		sec	
N	12.5	100	12.59		$12\frac{1}{2}$	105
E	12.5	100	12.60		$12\frac{1}{2}$	102
Z	14.5	100	11.52	$\frac{1}{1}-\frac{30}{11}$	8	88
				$\frac{30}{11}-\frac{31}{12}$	10	90

Damping was approximately aperiodic.

Wiechert 1000 kg. horizontal seismograph.

Wiechert 1300 kg. vertical seismograph.

Constants:

Component		T	ν	ρ	V
		sec		mm	
N	$\frac{1}{1}-\frac{17}{7}$	9.0	4.1	0.5	175
	$\frac{7}{8}-\frac{31}{12}$	9.0	4.5	0.3	175
E	$\frac{1}{1}-\frac{17}{7}$	8.9	4.6	0.4	210
	$\frac{7}{8}-\frac{31}{12}$	10.2	7	0.5	175
Z	$\frac{1}{1}-\frac{17}{7}$	5		0.3	165
	$\frac{8}{9}-\frac{31}{12}$	6	$6\frac{1}{2}$	0.1	155

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

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

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No.	Date	Hour	Forerunners				L	△	Remarks					
			P or P'		S									
			m	s	m	s	m	s	m	s	h	m	°	
	1942													
	March													
46	12	14	i	36 13										
47	19	12			19	45					.6			
48	20	1	i	24 26 +	33	53							73	Aleutian Islands.
49	21	23	i	32 58 +	43	1*	i	33 16	36.1				80	Japan.
50	22	2	e	16 18 +	i	22 34	i	17 2	i	17 21			45	$P(x, -5.3, +4.0; x, +7.5, -7.1)$. PP 18 ^m 1 ^s . pPP 18 ^m 39 ^s . 18 ^m 57 ^s . 19 ^m 23 ^s ; 20 ^m 3 ^s . isS 23 ^m 44 ^s . eN 25 ^m 23 ^s . SS 25 ^m 51 ^s . Depth about 210 km. Hindu Kush.
51	27	18	i	44 23										
52	30	9	i	16 11										
	April													
53	3	16	e	40 40										
54	4	23	i	13 41										
55	8	15	i	53 21	i	64 6		56 45		i	63 50		88	$P(-1.0, -2.8, +1.9; +1.7, +4.0,$ [-4.5]. 64 ^m 34 ^s . PS 65 ^m 5 ^s . 65 ^m 50 ^s . [67 ^m 49 ^s . SS 70 ^m 10 ^s . Felt in the [Philippines.
56	8	19	e	42 45							74			
57	9	4	e	55 20							76			
58	10	13	e	46 50										
59	11	1	i	37 40				48 5		48 45				
60	13	3	e	10 28				15.1						
61	13	7	i	e 56 37 +	64	53		59 0*		i	60 30		61	i 65 ^m 3 ^s . Atlantic Ocean.
62	13	18	i	14 35										
63	14	20	i	32 58										
64	14	20	i	50 42										
65	16	19	i	19 1										
66	16	21	i	2 16				e 5 26						
67	20	1	i	40 5	43	42		i 40 24		40 32	45		20	
68	20	8	i	51 59	i	61 27		53 15		53 51			80	63 ^m 45 ^s . 66 ^m 36 ^s . Depth about 325 km. [Japan.
69	20	23	i	8 32										
70	23	11	i	8 55										
	27	9												Recording interrupted.
71	27	11	i	2 24										
72	29	12	i	0 12—				3 46						
73	29	12	e	3 31										
74	30	23	i	31 31										
	May													
75	5	3						46 4			60			
76	9	4	i	e 41 55				46 34						Deep focus.
77	10	8	i	53 6										
78	11	23	i	e 43 28	52	56							73	
79	14	2	i	26 35	38	4		30 12		i	32 18		99	e P 26 ^m 30 ^s . e 36 ^m .3. i SKS 37 ^m 4 ^s . [SKKS 37 ^m 24 ^s . PS 38 ^m 56 ^s . SS 43 ^m .1. [Destructive in Ecuador.
80	14	8						62 34		63 4				
81	15	2	e	e 56 52	61	3							24	
82	15	11						14 23		14 48				
83	15	12	e	4.5				15 5		15 31				
84	15	14	i	19 3										
85	15	16	i	29 2										
86	15	17	i	3 11				4 19		6 0*				12 ^m 51 ^s .

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No.	Date	Hour	Forerunners				L	△	Remarks
			P or P'		S				
			m s	m s	m s	m s	h m	°	
87	1942 May 17	15			37 28	37 58			
88	18	0					42		
89	18	16	i 35 19		i 35 22				
90	21	3	i i 46 58	50 39				20	
91	21	5	i 48 59						
92	22	10	i 43 17	53 40				84	
93	23	14	i 30 31						
94	23	20	e 9 58	16 51				47	
95	24	3	i e 38 53	49 7				82	
96	27	6	- e 52.1		55.7	62 21			
97	28	1	e i 15 37 +		19 50	27 0*			29 ^m 3 ^s . 34 ^m .7.
98	28	3	e 26 3						
99	28	15	i 27 55		29 34	34 15			37 ^m 36 ^s .
100	29	2	i 58 27						
101	29	5	i 38 2						No time-marks except on B. Z.
102	31	2	e e 48 6	52 26				25	
	June								
103	1	9	e i 21 49	25 17	25 41			19	Greece.
104	1	12	e e 17 35				42		
105	1	22	e 14 30						
106	2	0	e 49 53		57 47	65.4			69 ^m .3.
107	3	0	i 51 11						
108	7	10	e 55 46		62 8				
109	10	1	i 18 52 +	27 47				67	
110	10	10			39 14	45 19			47 ^m 41 ^s .
111	13	19	i 34 12 —						
112	14	3	e e 23 39		28 5	i 34 15			34 ^m 48 ^s . 35 ^m 12 ^s . 36 ^m 40 ^s . 41 ^m 50 ^s .
113	14	14			46 35	54 3			
114	15	1	e 1 32						
115	15	14	e 6 8						i e 6 ^m 16 ^s ; i 31 ^s ; i 33 ^s .
116	16	4	e e 52 43	56 52			60	23	Anatolia. Deeper than normal.
117	16	5	e e 46 42	50 2*				18	Balkan.
118	16	6	i 18 52						
119	16	9	i i 18 39	i 22 29				21	
120	16	15	i 37 41						Seismic?
121	16	21			18 23				
122	18	9			45 32	48 12			49 ^m 16 ^s . 50 ^m 9 ^s . 55 ^m 31 ^s . 56 ^m 30 ^s . 58 ^m 18 ^s .
123	19	19	i i 48 42	58 13				74	
124	20	10	-		i 25 6				
125	21	4	i i 43 28	47 24				22	
126	21	21	e 59 45						Seismic?
127	24	11	e e 36 27		37 18	41 0			SKKS 47 ^m 39 ^s . 48 ^m 25 ^s . SKSP 51 ^m 12 ^s .
128	27	2	e 55 34		i 65 11				[SS 61 ^m .0. SSS 68 ^m .7. New Zealand.
129	29	6	-		45 53	i 51 47			i SKKS 52 ^m 53 ^s . PS 55 ^m 22 ^s . Chile.
130	29	19	i 9 3						
	July								
131	2	6	i 47 4						Seismic?
132	3	2	e e 59 5	66 9	61 2*	70 3	74	49	

ca 102^a

< 100^a

ca 105^a

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No.	Date	Hour	Forerunners				L	△	Remarks			
			P or P'		S							
			m	s	m	s	m	s	h	m	°	
133	1942 July 4	2	-e	6 30	17	17	16	47	18	25	89	Ecuador.
134	4	6	-e	22 9	32	52	32	20			88	»
135	5	10					52	46	54	3		
136	7	3	i i	12 41			i	14 26	14	46		16 ^m 7 ^s . 35 ^m .6. 37 ^m .0. Deep focus.
137	7	12	e	51 10	61	53					88	Ecuador.
138	7	18	i	52 19								
139	8	7	ee	9 54			13	21	i	14 14		17 ^m 2 ^s . 20 ^m 34 ^s . 21 ^m 56 ^s . 23 ^m 34 ^s . 29 ^m .5. Chile. <i>h a ca 150 km</i>
140	8	21					41	53	49	25		Chile. <i>6:55 (50)</i>
141	8	22	e	44 20	55	4	54	40	56	16	88	Ecuador.
142	12	5	ee	18 26 +	i	29 29	22	1	28	59*	92	PS 30 ^m 30 ^s .
143	25	6	e	35 41 -			39	28	46	7		46 ^m 37 ^s . 47 ^m 18 ^s . 47 ^m 49 ^s . 48 ^m 22 ^s .
144	27	11					26	11				
145	29	20	i i	29 51			36	6				
146	29	23	e	3 27			7	56	10	8		14 ^m 15 ^s . 17 ^m 25 ^s . Banda Sea.
147	Aug. 1	12	i i	54 1			54	45	58	25		61 ^m 38 ^s . 66 ^m 30 ^s . 69 ^m .9. New Zealand.
148	3	20	ee	28 33								No G. or W. Z records.
149	6	23	i	49 36			53	7	60	5		i i 49 ^m 38 ^s , 51 ^s . i _E 60 ^m 10 ^s . i _N 60 ^m 17 ^s .
150	8	0	i -	31 49	41	11					72	[65 ^m .9. 69 ^m .6. Guatemala and [Salvador.
151	8	14									14	
152	8	22	ee	49 11			52	43	59	15		59 ^m 44 ^s . Central America.
153	12	20	ee	43 8	46	55					49	21
154	12	22									3	
155	13	16	e	5 42			15	42				Solomon Islands.
156	14	8	e	32 21			42	17				
157	14	17	i	28 44			30	29	31	25		34 ^m 57 ^s . 36 ^m 10 ^s . 38 ^m 23 ^s .
158	15	15					22	36	32	58	56	33 ^m 18 ^s . 38 ^m .8.
159	16	11	e	39 37			48	6	49	6		49 ^m 34 ^s . 51 ^m 9 ^s .
160	16	20					31	25			48	
161	19	19					50	31				
162	20	9	i	40 20								
163	20	16	e	28 29								
164	22	8	i	42 51								
165	22	9									39	Disturbed.
166	22	15	-i	48 7								Local. Seismic?
167	23	6	-i	46 23 -	i	55 27	48	54	57	36	67	69
168	23	15									49	P (+1.5, +0.8, -2.8; -2.7, -1.1, [+4.3).
169	23	21	e	19 55								
170	24	23	ee	4 17			8	17	9	0*		14 ^m 30 ^s . 15 ^m 14 ^s . 15 ^m 58 ^s . 16 ^m 31 ^s . 18 ^m .1. 18 ^m 51 ^s . 20 ^m .1. 23 ^m .0. 27 ^m .2. Destructive in Peru.
171	25	20					40	30	41	22		
172	26	12	e	22 22			26	30	33	2*		33 ^m 22 ^s . 36 ^m 23 ^s . Peru.
173	27	6	e i	17 46	20	37					22	16
174	28	16	i	41 15								P (-2.0, +0.5, -1.2; +5.5, -2.5, [+4.5). L _R 23 ^m . Albania.
175	29	1	i i	8 28			18	11				

- ca 105°

← 120°

80-90

→ 100°

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No.	Date	Hour	Forerunners				L	△	Remarks			
			P or P'		S							
			<i>m</i>	<i>s</i>	<i>m</i>	<i>s</i>	<i>m</i>	<i>s</i>	<i>h</i>	<i>m</i>	°	
176	1942 Aug. 29	1	<i>ee</i> 58	2			<i>i</i> 58	5	<i>i</i> 60	9		
177	29	12	<i>i</i>	23	17							
178	29	15	<i>i</i>	6	41							
179	Sept. 1	9	<i>e</i> 47	13	51	18	<i>e</i> 47	17	51	48	53	23
180	1	18	<i>i</i>	28	10							
181	1	19	<i>-e</i>	10	10						34	
182	3	8					3	14				
183	4	17	<i>i</i>	36	47							
184	4	17	<i>i</i>	57	40							
185	8	16	<i>ii</i>	19	26	29	13					77
186	9	1	<i>i</i>	36	39	45	54	46	41		58	71
187	14	11	<i>ie</i>	50	20			53	40			
188	17	11						59	55			
189	20	23						65	11			
190	21	6						14	31		35	
191	22	1						17	55	25.5	49	
192	24	3	<i>ei</i>	51	15—	61	21	54	18	62	16	80
193	26	4						23	10	24	35	
194	30	22						40	4			29 ^m .0.
195	Oct. 1	0	<i>e</i>	17	56							
196	5	7	<i>i</i>	33	44							
197	9	15	<i>ii</i>	57	18—	66	26					70
198	20	13						<i>i</i> 11	25			
199	20	23	<i>-e</i>	35	7			39	0*	45	46	
200	21	16				44	56					46 ^m 19 ^s . 47 ^m 49 ^s . 53. ^m 0. Philippines.
201	22	2				13	15					
202	25	8						58	5	58	30	
203	26	15	<i>i</i>	27	27							
204	26	21	<i>ii</i>	20	40+	30	1*	30	35			72
205	28	2	<i>e</i>	27	13*							
206	28	2	<i>e</i>	46	15							
207	28	11						8	21			
208	Nov. 3	0	<i>e</i>	19	4*			21	52	23	31	75
209	5	11						50	0			
210	6	13	<i>-i</i>	44	20—			55	48	56	25	Peru.
211	10	11	<i>e</i>	55	40			59	2*	60	5	62 ^m 25 ^s . SKS 66 ^m 21 ^s . 67 ^m 45 ^s . PS 69 ^m 20 ^s . PPS 70 ^m 30 ^s . SS 75 ^m .0. Mexico. Period of <i>M</i> waves about [1/2 min.
212	12	5	<i>ii</i>	8	4	18	38	18	22	19	11	30
213	12	15						50	36	51	22	
214	13	23	<i>i</i>	13	23			<i>i</i> 13	27			
215	15	17	<i>ie</i>	5	49			9	28			
216	15	17	<i>ie</i>	24	0	33	51	24	15			78
217	16	21	<i>e</i>	33	57							Strong microseisms. » »
218	19	9						15	9			

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No.	Date	Hour	Forerunners				L	△	Remarks
			P or P'		S				
	1942		<i>m s</i>	<i>m s</i>	<i>m s</i>	<i>m s</i>	<i>h m</i>	°	
219	Nov. 20	4	<i>i</i> 24 31						
220	21	14	<i>e</i> 6 28	10.5			14	22	Strong microseisms.
221	25	12	<i>i</i> 19 14						
222	26	14	<i>i i</i> 38 50	48 8	43 46	48 49		72	
223	28	10	<i>e e</i> 49 1	57 18	63 52		66	61	
	Dec.								
224	2	19	<i>e e</i> 9 6—	12 58				22	Turkey.
225	4	15			55.4	62.3	82		66 ^m .7.
226	5	14	<i>i i</i> 39 7—	47 42	48 56			64	
227	11	2	<i>i e</i> 43 57	47 52	<i>i</i> 43 59	48 10		22	Anatolia.
228	19	23	<i>e</i> 23 5	33.1	<i>i</i> 23 19	33 17		79	
229	20	14	<i>i</i> 7 57	<i>i</i> 12 2	9 30	11.8		23	<i>P</i> (—9.9, + 11.2, —6.0). Anatolia.
230	24	15	<i>i</i> 30 53						Seismic?
231	24	16	<i>i</i> 29 53						Seismic?
232	24	23	<i>e</i> 53 3						
233	26	12	<i>i e</i> 44 18	54 15	<i>e</i> 44 7			79	Colombia.
234	27	16		62 45	<i>e</i> 52 34		83		Japan.
235	29	3	<i>e i</i> 45 19	47.8				14	
236	31	11	<i>i</i> 41 0						Seismic?
237	31	11	<i>i</i> 56 11						
238	31	12	<i>i</i> 13 40—	21 45				59	

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Seismometric readings: Notation

P — normal first preliminary tremors, longitudinal waves.

P+ — first wave, as recorded on Galitzin or Wiechert instruments, condensational (away from the epicentre).

P- — first wave, as recorded on Galitzin or Wiechert instruments, dilatational (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.

i, *i* — sharply defined beginning of a phase as recorded on Benioff seismograph and other seismographs respectively.

e, *e* — gradual beginning of a phase as recorded on Benioff seismograph and other seismographs respectively.

Δ — arcual distance from the station to the epicentre.

*) affixed to time of phase indicates that the beginning is in a time-mark.