

SEISMOLOGICAL BULLETIN.

JANUARY 1920.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

Greenwich Mean Time. S. Latitude $6^{\circ} 11' 0''$. Height above sealevel 8 m.

E. Longitude $7^{\text{h}} 7^{\text{m}} 19''$.

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

N ^o .	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.		Amplitude (half)		Distance of epi- centrum.	Remarks.
				h	m	s			A _E	A _N		
1	Jan. 1	I _u	e	12	16	30					9200?	E — W.
			M	12	18	15						
			e S?	12	26	44						
			M	12	28	9						
			L ₁	12	49.2							
			L ₂	12	55.2							
			L ₃	12	59.2							
			F	13	4							
2	• 2	I	e	16	47	50						Felt on the Isle of Kisar (Timor).
			F	16	50							
3	• 6	I _v	e	5	45	25						Felt on the West Coast of Su- matra.
			M	5	46	25						
			F	5	50							
4	• 8	I _v	e	9	4	18					190	
			S	9	4	59						
			F	9	7							
5	• 10	I	e	1	30	14						Felt in Benkoelen, Sumatra.
			eM	1	32	1						
			F	1	34							
6	• 10	I _v	i	18	30	16						Felt in the resid. of Kedoe and Banjoemas, Java.
			M	18	31	52						
			F	18	56							
7	• 12	I _r	eP	2	59	57					5950	
			M	3	2	44						
			eS	3	5	20						
			M	3	6	21						
			F	3	14							
8	• 12	I _r	eP	12	32	20						SE-Borneo.
			eM	12	33	57						
			F	12	42							
9	• 12	I _r	P	13	48	29	6.0	11.3	—		4990	E — W.
			iS	13	55	11	6.0	27.0	24.3			
			M ₁	13	55	36						
			M ₂	13	58	59						
			F	14	13							
10	• 12	I	e	14	44	28						Felt at Padang, Sumatra.
			M	14	45	54						
			F	14	53							

No.	Date 1920.	Char- acter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum	Remarks.
								A _E	A _N		
11	Jan. 12	I,	iP M F	h 16 16	m 5 6	s 28 54 16		μ	μ		SSW.
12	" 13	I,	e F	6 6	13 17	44					Malabar e — S = 14 sec. Δ = 120.
13	" 13	I	e M ₁ M ₂ M ₃ F	14 14 14 14	31 34 36 37	57 28 20 21	6.0	31.1	23.4		Malabar: NS Component very faint.
14	" 13	I _u	e iS M ₁ M ₂ M ₃ F	23 23 23 23 23	9 16 16 19 20	54 40 57 19 38				5430	Malabar e ₁ — e ₂ = 6 ^m 42 sec. Δ = 4990.
15	" 15	I	e F	11 12	55 6	57					
16	" 18	I,	i S F	20 20 20	1 2 6	47 9 51				190	N — S. Malabar iP — iS = 12 sec. Δ = 100; SW. Felt at Sindangbarang, (Preanger) Java.
17	" 20	I,	e eS M ₁ M ₂ F	1 1 1 1 2	46 50 50 51 6	42 25 49 40	5.9 6.0	18.0 63.8	57.0 69.9	2230	E — W. Malabar e — eS = 3 ^m 16 sec. Δ = 1920.
18	" 21	I _u	P iS F	6 6 6	15 24 35	53 14				7320	
19	" 22	I	e F	21 22	31,4 8						
20	" 23	I	i F	3 4	57 6	50					
21	" 26	I	e F	20 20	16 20	33					
22	" 28	I,	e S F	2 2 2	31 35 39	56 40				960	Malabar faint.
23	" 29	I	e F	22 22	3 7	17					

SEISMOLOGICAL BULLETIN 1920.

BATAVIA OBSERVATORY, JAVA.

PREFACE.

The astatic Seismograph of WIECHERT of 1000 K.G. has been registering regularly since December 6th 1908. The results are published from the beginning of 1909 (the Messina earthquake included) in a monthly bulletin.

The instrument is mounted on a heavy brick pillar in a room with thick walls (about 70 centimeters), that is protected against the sun's heat by open galleries around it. The components are placed in E-W and N-S direction respectively.

The pins are lifted electrically every hour for a period of 10 seconds by the Javanese observer on duty. A lifting of two seconds every minute is given by an electrical clock of PEYER FAVARGER by means of the second-dial passing through a drop of mercury.

For each month the mean constants for that month are applied. T₀ and ε, the oscillation period and the coefficient of damping, are determined every week. V, the magnification for very short waves, is determined occasionally only. It is found by direct measurement, giving the pendulum a displacement by means of the horizontal adjusting screws, the value of which can be determined easily from the pitch (a), the angle of displacement of the screws and the height of the screws (b) and of the centre of gravity (c) above the Cardanic suspension apparatus.

It was found

(a) = 1.407 millimeters.

(b) = 1225 "

(c) = 895 "

The constants used in 1919 are given below.

1919.	E-W component.			N-S component.		
	V.	T ₀ .	ε.	V.	T ₀ .	ε.
January 1 — 12.	218	6.6	4.4	195	6.6	5.0
" 13 — 31.	228	8.0	4.5	192	8.0	4.5
February.	"	7.8	3.8	"	"	"
March.	"	"	4.7	"	"	4.9
April.	"	"	5.0	"	"	4.7
May.	"	7.9	4.2	"	7.8	4.2
June.	"	7.6	4.9	"	7.6	5.4
July.	"	"	4.8	"	"	5.4
August.	"	"	5.2	"	"	5.1
September.	216	"	5.1	193	"	4.9
October.	"	7.5	4.7	"	"	5.2
November.	"	7.6	4.8	"	8.2	6.0
December.	"	"	4.9	"	7.9	4.5

The notation employed is that of the Göttingen Geophysical Institute.

The following abbreviations are employed:

CHARACTER OF THE EARTHQUAKE.

I = perceptible; II = moderately strong; III = strong.

d (terrae motus domesticus) = local.

v (" " vicinus) = near (less than 1000 K.M.).

r (" " remotus) = distant (1000 to 5000 K.M.).

u (" " ultimus) = very distant (over 5000 K.M.).

PHASES.

P (undae primae) = 1st preliminary tremors.

S (" secundae) = 2nd " "

L (" longae) = principal phase, long waves.

M (" maximae) = maximum amplitude.

C (coda) = prominent waves among the after tremors.

F (finis) = end of perceptible movement.

PR₁, PR₂, SR₁, SR₂, = 1st, 2nd reflected waves of P and S.

PS = waves changed by reflection from longitudinal to transversal oscillation.

WAVE-ELEMENTS, UNITS.

T = complete period in seconds.

A = amplitude, measured from median position in microns.

A_E = E.-W. component of A.

A_N = N.-S. " " "

i (impetus) = abrupt commencement, clearly defined.

e (emersio) = gradual " , not clearly defined.

MALABAR.

July 1911 an astatic WIECHERT pendulum of 100 K.G. which is the possession of Mr. K. A. R. BOSSCHA, chief administrator of the tea estate Malabar (Preanger, Java; E. Long. 107° 37'; S. Lat. 7° 13') has been erected.

Particulars about the registrations have been put under the remarks.

Year	Month	Day	Time	Remarks
1911	July	1	10.15	Small tremor, I, d.
1911	July	2	11.30	" " " " " "
1911	July	3	12.45	" " " " " "
1911	July	4	1.00	" " " " " "
1911	July	5	2.15	" " " " " "
1911	July	6	3.30	" " " " " "
1911	July	7	4.45	" " " " " "
1911	July	8	5.00	" " " " " "
1911	July	9	6.15	" " " " " "
1911	July	10	7.30	" " " " " "
1911	July	11	8.45	" " " " " "
1911	July	12	9.00	" " " " " "
1911	July	13	10.15	" " " " " "
1911	July	14	11.30	" " " " " "
1911	July	15	12.45	" " " " " "
1911	July	16	1.00	" " " " " "
1911	July	17	2.15	" " " " " "
1911	July	18	3.30	" " " " " "
1911	July	19	4.45	" " " " " "
1911	July	20	5.00	" " " " " "
1911	July	21	6.15	" " " " " "
1911	July	22	7.30	" " " " " "
1911	July	23	8.45	" " " " " "
1911	July	24	9.00	" " " " " "
1911	July	25	10.15	" " " " " "
1911	July	26	11.30	" " " " " "
1911	July	27	12.45	" " " " " "
1911	July	28	1.00	" " " " " "
1911	July	29	2.15	" " " " " "
1911	July	30	3.30	" " " " " "
1911	July	31	4.45	" " " " " "

SEISMOLOGICAL BULLETIN

FEBRUARY 1920.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

Greenwich Mean Time. S. Latitude $6^{\circ} 11' 0''$. Height above sealevel 8 m.

E. Longitude $7^{\text{h}} 7^{\text{m}} 19^{\text{s}}$.

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

N ^o .	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _N		
24	Febr. 1	I _r	iP	h	m	s	5.7 5.5	51.4 45.8	65.5 19.9	5950	Malabar P — S = 5 ^m 56 sec. $\Delta = 5800$.
			M ₁	13	35	11					
			M ₂	13	34	40					
			S	13	36	54					
			M ₃	13	38	54					
			M ₄	13	40	33					
			F	13	42	7					
25	" 1	I _r	iP	13	51						
			S=M	17	55	40					
			F	18	0	59					
26	" 2	III _u	P	18	4		6.0 53.2 31.0 31.0	138.8 3310 6070 7140	107.2 5860 4650 3350	5320?	E — W. Malabar e — S = 6 ^m 59 sec. $\Delta = 4950$.
			i	11	30	58					
			M ₁	11	31	30					
			S?	11	52	24					
			eL	11	57	59					
			M ₁	11	42	12					
			M ₂	11	45	45					
			M ₃	11	51	50					
			F	11	58	16					
27	" 2	I _v	e	13	58						Malabar iP — S = 11 sec. $\Delta = 94$ Felt in Preanger and Banjoemas, Java.
			M ₁	15	48	18					
			M ₂	15	48	50					
			F	15	49	51					
28	" 2	I	e ₁	15	55						
			e ₂	16	53						
			F	16	59						
29	" 2	I	e	17	12						
			F	18	56						
30	" 3	I _v	e	19	0					240	E — W.
			iS=M	11	19	27					
			eL	11	19	54					
			F	11	20	29					
31	" 3	I	e	11	24						
			M	15	1	28					
			F	15	9	36					
32	" 3	II _r	P	15	18					2490	
			iS=M	18	57	25					
			P	19	1	29					

N ^o .	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).	Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
						A _E	A _N		
33	Febr. 4	I	e M F	h m s 12 52 12 57 13 4		μ	μ		
34	" 6	I	e F	5 12 6 5 16					Malabar e — iS = 20 sec. Δ = 180 KM. Felt in Banjoemas and Preanger, Java.
35	" 7	I	e ₁ e ₂ e ₃ e ₄ F	15 16 8 15 25 3 15 32 42 15 39 48 16 7					
36	" 8	I _r	P M ₁ M ₂ eL F	5 30 53 5 32 26 5 36 56 5 42 24 6 33					
37	" 8	I _r	e S M F	7 2 24 7 2 46 7 4 1 7 9				180	Malabar i — S = 9 sec. Δ = 78; WSW. Felt in the Preanger, Java.
38	" 9	I _r	e S F	2 39 50 2 45 28 2 57				3840	
39	" 9	I _r	e S F	19 17 8 19 23 18 19 34				4400	
40	" 10	I	e M F	9 22 9 32 9 40					
41	" 10	I	e M F	10 11 10 23 10 27					
42	" 10	I _r	e M ₁ M ₂ M ₃ eL ₁ M eL ₂ F	22 27 22 36 5 22 44 1 22 52 23 39 23 44 43 23 59 0 7					
43	" 12	H _r	i S M F	10 34 33 10 35 49 10 37 17 10 47	6.7	146.0	165.0	720	E — W.
44	" 14	I _r	e S F	12 14 48 12 15 7 12 18				170	Malabar iP — S = 15 sec. Δ = 130. Felt in the Preanger, Java.
45	" 14	I	e F	13 48 19 13 52					
46	" 16	I	e F	9 57 9 10 1					

N ^o .	Date 1920.	Cha- racter	Phase.	Time (Greenwich).	Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
						A _E	A _N		
47	Febr. 18	I _r	e M F	h m s 25 17 22 23 18 26 23 23		μ	μ		Malabar P — S = 29 sec. Δ = 260.
48	" 19	I	e F	12 40 57 12 43					
49	" 20	I _u	e S M F	11 56 31 12 6 4 12 7 47 12 12				8460	
50	" 22	I _u	iP iS=M ₁ M ₂ F	17 45 45 17 53 49 17 57 7 18 2				6570	SW — NE.
51	" 25	II _r	iP M S eL F	22 45 6 22 46 23 22 49 21 22 53 22 12				2650	ENE.
52	" 26	III _r	iP ₁ P ₂ S ₁ eS ₂ M F	1 28 56 1 29 26 1 30 40 1 31 32 1 32 7 2 27	5.3	420	> 550	1160 1180	No minute marks. ENE Malabar record very uncertain. Felt in SE Borneo. Computed epicentrum 2,1° S; 116,5 E.
53	" 26	I	eP S M F	18 15 32 18 15 32 18 16 32 18 24				1120	Felt in SE Borneo.
54	" 29	I	eP S M F	6 4 10 6 6 14 6 7 16 6 13				1160	Felt in SE Borneo.
55	" 29	I	e M F	22 5 15 22 6 37 22 13					Felt in SE Borneo.

MARCH 1920.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quarlair.

Greenwich Mean Time. S. Latitude $6^{\circ} 11' 0''$. Height above sealevel 8 m.E. Longitude $7^{\text{h}} 7^{\text{m}} 19''$.

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

No.	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _N		
				h	m	s		μ	α		
55	Febr. 29	I	e	22	5	15					Felt in SE-Borneo.
			M	22	6	57					
			F	22	15						
56	March 2	I _v	e	16	31	15				980	Felt in SE-Borneo.
			eS	16	55	1					
			M ₁	16	53	32					
			M ₂	16	39	58					
			F	16	49						
57	" 3	I _v	P	10	47	55				2420	Azimuth about E — W.
			S = M ₁	10	51	45					
			M ₂	10	52	35					
			M ₃	10	53	27	5.5	27.9	18.2		
			M ₄	10	54	27					
			F	10	55						
58	" 5	I _v	eP	1	58	58				270	Malabar i P — i S = 13 sec. $\Delta = 110$.
			iS	1	59	27					
			M	1	40	22					
			F	1	45						
59	" 10	I	P	17	46	57					
			M	17	49	46					
			F	17	54						
60	" 10	II _v	iP	18	12	56				530	SSE. Felt in Central Java.
			S?	18	15	54					
			M	18	14	54					
			F	18	20						
61	" 11	I	e	12	5						
			F	12	15						
62	" 13	I	e	11	46	55					SE-Borneo.
			M	11	48	33					
			F	11	57						
63	" 15	I	e	12	16	22					
			M	12	28	19					
			F	12	49						
64	" 17	I	e	20	29	14					SE-Borneo.
			eS	20	31	22					
			F	20	57						

No.	Date 1920.	Cha- racter.	Phase	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum	Remarks.
								A _E	A _N		
65	March 17	II _r	eP	h	m	s	6.0	84.0	44.0	2320?	Malabar very faint. Felt in Northern Sumatra.
			S?	18	40	17					
			M ₁	18	44	8					
			M ₂	18	45	30					
			eL	18	48	38					
66	" 17	I _r	F	18	56						
				19	27						
			P	22	54	8	2710			2710	Malabar P — iS = 265 sec. △ = 2770.
			iS	22	58	36					
			F	23	5						
67	" 18	II _r	eP	1	25	5				220	Malabar iP — iS = 18 sec △ = 160. Felt in Central Java.
			iS	1	25	30					
			M ₁	1	25	41					
			M ₂	1	26	44					
			F	1	37						
68	" 18	I	e	7	59	20				250?	Malabar iP — S = 20 sec. △ = 180.
			S?	7	59	46					
			M	7	40	52					
			F	7	44						
69	" 20	III _r	iP	1	5	21	5.8	382.7	444.0	200	E — W. Malabar faint.
			iS	1	3	44					
			M	1	5	56					
			F	1	13						
70	" 20	I	e	14	5	47					Malabar faint. Felt in Bantam and the Pre- anger, Java.
			F	14	7						
71	" 20	II _r	iP	14	14	44				150	E — W. Malabar iP — S = 26 sec. △ = 250. Felt at Lebak Parai (Bantam), Java
			iS=M	14	15	1					
			F	14	25						
72	" 20	I _r	e _r	18	52	16	6.2	55.8	33.2		
			M	18	55	28					
			i	18	59	24					
			M ₁	19	0	28					
			M ₂	19	2	46					
			M ₃	19	18	44					
			L ₁	19	31	16					
			ML ₁	19	43	24					
			L ₂	19	48	52					
			L ₃	20	1	24					
			F	20	37						
73	" 22	I _r	e	3	22	24				1090	
			S	3	24	21					
			F	3	28						
74	" 22	I	iP	4	45	6					Malabar faint.
			F	4	45	56					
75	" 22	I _r	e	7	25	7				1110	SE-Borneo.
			eS	7	27	6					
			M	7	28	38					
			F	8	4						

No.	Date 1919.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _N		
76	March 22	I	P	h	m	s		μ	μ		
			M _N	20	15	0					
			M	20	18	45					
			M	20	22	26					
			M	20	25	18					
			eL	20	45	14					
77	" 25	I _r	F	20	50					950	Malabar eP — eS = 67 sec. △ = 610. Felt in Eastern Java.
			eP	21	52	5					
			eS	21	55	45					
			M	21	54	50					
			F	21	7						
78	" 28	I _r	eP	0	57	57				1060 1100?	two shocks?
			i	0	58	28					
			eS	0	59	31					
			i	1	0	26					
			M	1	1	55					
			F	1	18						

SEISMOLOGICAL BULLETIN.

APRIL 1920.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

Greenwich Mean Time. S. Latitude $6^{\circ} 11' 0''$. Height above sealevel

E. Longitude $7^{\text{h}} 7^{\text{m}} 19^{\text{s}}$.

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

No.	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _N		
				h	m	s		μ	μ		
79	April 2	I _r	P	1	12	25				1050	E — W.
			S	1	14	18					
			M ₁	1	14	20	6.1	22.5	10.7		
			M ₂	1	17	7	5.9	21.2	11.6		
			F	1	37						
80	" 4	I	eP	17	4	23					SE-Borneo.
			M	17	6	2					
			F								
81	" 5	I _r	e	15	58	45				1000	E — W.
			eS	16	0	51					
			F	16	12						
82	" 5	I	e	16	40	45					
			F	16	42						
83	" 6	I _u	P	19	10	50				5050	E — W.
			M	19	11	59					
			S	19	17	55					
			eL _E	19	25						
			F	19	37						
84	" 7	I _v	eP	17	51	9				190	Malabar P — iS = 11 sec. Δ = 100. Felt in the Preanger, Java.
			S	17	51	50					
			F	17	54						
85	" 9	I _v	e	19	11	50				920	E — W.
			S	19	15	29					SE-Borneo
			F	19	17						
86	" 11	I _u	eP	23	14	41				6700	
			eS	23	22	52					
			M	23	23	54	7.0	49.9	6.1		
			eL	23	28						
			F	23	48						
87	" 17	I	e	5	24	59					Probably felt in Benkoelen, Su- matra.
			F	5	30						
88	" 18	I _v	P	8	45	6				190	Felt in Benkoelen, Sumatra.
			S	8	45	28					
			M	8	47	15					
			F	8	55						

No.	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _N		
89	April 19	I _v	P iS=M F	h 3 5 in	m 24.3 24 next	s 37		μ	μ	± 190	P begins in minute mark. Azimuth S 34, 3 W. Malabar iP — iS = ± 22 sec. (iS in minute mark) Δ = ± 190. Felt in the Preanger and Ban- tam, Java.
90	" 19	I _v	P iS F	5 5 3	54.3 55.2 39					± 570	disturbed by 89. Malabar P — S = 23 sec. Δ = 200.
91	" 19	II _v	P iS F	3 3 4	56.3 56 12	37				± 190	P begins in minute mark. Azimuth S 34.3 W. Malabar P — S = 20 sec. Δ = 180. Felt in the Preanger and Ban- tam, Java.
92	" 19	I	i F	14 15	58 1	54					
93	" 19	II _v	P S? M F	17 17 17 18	47 48 48 1	5 22 54				710?	E — W. Malabar faint.
94	" 19	I	e M F	21 21 21	25 28 37	36 36					
95	" 21	I _v	eP iS F	21 21 21	5 5 11	51 48				1090	Malabar eP — cS = 107 sec. Δ = 990.
96	" 25	I	i F	15 15	52 55	0					
97	" 25	I _v	P i M ₁ M ₂ M ₃ F	16 16 16 16 16 17	50 51 55 56 59 7	56 20 57 49 6	6.0 5.9	17.8 50.5	42.5 24.5		Malabar eP — S = 5 ^m 54 sec. Δ = 2360. Felt in the Isle of Jamdena, Tanimbar Isles, Moluccas.
98	" 29	I	i F	6 6	56 39	3					
99	" 29	I	P F	16 16	18 52	39					
100	" 30	I _v	e M F	5 5 6	55 57 1	12 30					Malabar P — iS = 17 sec. Δ = 150. Felt at Tjikadjang (Preanger), Java.

SEISMOLOGICAL BULLETIN.

MAY 1920.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

Greenwich Mean Time. S. Latitude $6^{\circ} 11' 0''$. Height above sealevel 8 m.

E. Longitude $7^{\circ} 7' 19''$.

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

No.	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.		Amplitude (half)		Distance of epi- centrum.	Remarks.
				h	m	s			A_r	A_n		
101	May 2	I	e	8	45	30			μ	μ		
			e	8	49	56						
			M	8	51	32						
			eL	8	52	56						
			F	9	2							
102	" 2	I	e	15	6	2						
			e	15	9	56						
			eL	15	12	2						
			F	15	18							
103	" 2	I,	e	18	45	56						Malabar P — i S = 8 sec.
			F	18	47							$\Delta = 70.$
104	" 5	I,	e	3	18	18					110	Azimuth about N — S.
			S	3	18	34						Malabar i P — i S = 10 sec.
			M	3	19	40						$\Delta = 90.$
			F	3	22							Azimuth SW.
												Felt at Sindang Barang 'Pre- anger', Java.
105	" 5	I	e	8	43	49						
			e	8	48	38						
			M ₁	8	53	49	5.8	24.4	8.2			
			M ₂	8	55	17						
			F	8	59							
106	" 6	I	e	9	49	1					5180	
			S	9	55	54						
			M ₁	9	56	6	5.7	14.8	16.0			
			M ₂	9	57	46	4.9	10.5	16.0			
			F	10	13	18						
107	" 7	III,	iP	5	46	2					1600	N 69.7 E.
			S	5	50	14						Malabar confused record.
			M ₁	5	50	27	5.9	422	402			Butuan, Mindanao.
			M ₂	5	53	11	5.8	428	446			Felt at Taroena, Sangi Isles, Menado.
			eL	6	1	17						
			F	6	41	17						
108	" 7	II	P	21	40	2						E — W.
			i	21	42	23						Malabar faint.
			i	21	44	32						
			i _N	21	47	14						
			i _E	21	48	54						
			eL	21	52	35						
			F	23	7							

No.	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum	Remarks.
								A _g	A _s		
				h	m	s		μ	μ		
109	May 9	I	P	17	15	3					
			M	17	20	54					
			F	17	25	38					
110	" 10	III,	P	18	54	22				2770?	E — W; two shocks?
			iP	18	55	11					Malabar P — eS = 224 sec.
			iS	18	59	36					Δ = 2240.
			M	19	0	7					Felt in the Moluccas and Wes-
			eL	19	11						tern N. Guinea.
			F	19	32						
111	" 12	I	i	22	9	1					
			F	22	11	43					
112	" 13	II	P	1	55	54					
			M ₁	1	57	56	6.3	43.0	10.2		
			M ₂	1	58	35	6.2	93.3	26.6		
			M ₃	1	59	19	6.2	104	53.2		
			M ₄	2	0	8	6.3	75.6	32.8		
			eL	2	10						
			F	3	9						
113	" 13	I,	P	8	36	11				910?	E — W.
			eS?	8	37	49					Felt in Benkoelen, Sumatra.
			M	8	39	9					
			F	8	42	17					
114	" 16	I,	P	21	15	56				2440	
			iS	21	19	56					
			M	21	24	18					
			F	21	28	29					
115	" 19	II,	iP	5	14	24				1830?	NE.
			S?	5	17	31					Malabar faint.
			M ₁	5	19	2	5.8	157	122		Felt in Menado, Banggai Isles
			M ₂	5	20	58	6.0	191	164		and Halmaheira.
			F	5	42						
116	" 19	I	e	4	4	15					
			M ₁	4	5	54					
			M ₂	4	9	2					
			F	4	17						
117	" 19	II,	P	12	45	56				2410?	Felt on the whole isle of Celebes.
			i	12	46	49					
			i	12	49	0					
			iS?	12	49	54					
			M ₁	12	50	48	6.8	96.4	151		
			M ₂	12	51	49					
			M ₃	12	55	15	5.9	72.6	143		
			M ₄	12	54	56	6.3	108	151		
			M ₅	12	56	52	5.3	172	105		
			F	13	15						
118	" 20	I	P	0	45	52				180	
			S	0	46	15					
			F	0	50						
119	" 20	II,	iP	7	56	0				6530	ENE.
			i	7	59	42					
			S	7	44	2					
			eL	7	54	42					
			F	8	12	42					

No.	Date 1919.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _S		
120	May 22	I.	P S F	h m s 18 19 56 18 20 19 18 24				μ	μ	200	Malabar P — eS = 29 sec. Δ = 260.
121	" 23	I	e F	20 21 20 35							No minute marks.
122	" 23	II	P i M F	13 27 57 13 28 16 13 30 15 13 59	5.2	137	89.1				E — W. Malabar faint.
123	" 26	I.	iP iS F	12 35 8 12 44 7 12 52						7700	E — W.
124	" 26	I	e M F	22 30 11 22 31 36 22 35							Malabar P — iS = 12 sec. Δ = 100. Felt in the Preanger, Java.
125	" 27	III.	iP iS = M ₁ M ₂ F	5 50 1 5 51 25 5 55 10 6 14	5.8 5.6	461 507	457 434			750	ESE. Malabar P — iS = 80 sec. Δ = 750. Felt as weak or moderate shocks from Preanger to Pasoeroean, Java

SEISMOLOGICAL BULLETIN.

JUNE 1920.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quairair.

Greenwich Mean Time. S. Latitude $6^{\circ} 11' 0''$. Height above sealevel

E. Longitude $7^{\circ} 7' 19''$.

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

No.	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _N		
				h	m	s		μ	μ		
126	June 4	I	i F	18	4	55				NE.	
				18	6						
127	" 4	I	eL	25	57						
	" 5		F	0	17						
128	" 8	III _n	iP M ₁ M ₂ S? M ₁ ✓ eL F	4	28	13				6800?	NE. Malabar, confused record.
				4	30	13	6.7	201	242		
				4	34	20					
				4	36	29	6.7	255	269		
				4	36	44					
				4	43	9					
				6	27						
129	" 8	II _r	iP M F	6	42	53				NE. overlapped by 128. Malabar P — eS? = 189 sec. $\Delta = 1850?$	
				6	47	53					
				7	3						
130	" 8	I	e i F	16	47	2				Felt in Menado, Celebes.	
				16	51	57					
				16	59						
131	" 7	I _v	eP S F	10	46	43				550?	S in hour eclipse. Malabar eP — eS = ± 42 sec. $\Delta = \pm 370$. Felt at Tandjoeng Sakti, Ben- koelen, Sumatra.
				10	47	43					
				10	56						
132	" 9	III _r	P ₁ P ₂ ? M ₁ eS ₁ S ₂ ? M eL F	11	55	40				2490 2350?	E — W. Malabar iP ₂ — S ₂ = 240 sec. $\Delta = 2440$. Felt on the Isles of Amboina and Ceram, Moluccas.
				11	56	50	4.9	112	82.6		
				11	57	58	6.1	145	245		
				11	59	46					
				11	40	45	8.5	592	575		
				11	43	14	6.3	272	413		
				11	55						
				12	50						
133	" 10	I	L F	2	24	19					
				2	26	11					
134	" 10	II _r	iP S M F	2	36	2	6.2	87.0	77.4	1970	N 56.8 E. Malabar faint.
				2	39	24					
				2	42	14					
				3	10						

No.	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _N		
				h	m	s		μ	μ		
135	June 11	I	e	10	46	7					Felt probably at Taloe, Sumatra's Westcoast.
			M _E	10	47	57					
			F	10	52						
136	" 12	I	P	15	56	56					Felt on the Isles of Amboina and Ceram, Moluccas.
			M	15	46	55					
			F	15	55						
137	" 15	I _r	e	5	18	14	5.8				
			M ₁	5	22	57					
			M ₂	5	25	41					
			M ₃	5	25	45					
			F	5	57						
138	" 19	I _v	eP	10	58	59				840?	Felt in Benkoelen, Sumatra.
			S?	11	0	10					
			F	11	6						
139	" 20	I	e	0	18	12					Malabar faint. Felt in Eastern Java, Madoera and Bali.
			M	0	22	19					
			F	0	55						
140	" 24	I	e	9	6	59					Felt in Eastern Java and Madoera.
			M	9	9	20					
			F	9	17						
141	" 26	II _r	P	15	2	9	6.1			1560	
			iS	15	4	52					
			M	15	6	7					
			F	15	27	52					
142	" 26	I _r	e	14	18	47					Felt in Tandjong, SE-Borneo.
			F	14	27	55					
143	" 27	I _r	P	16	21	25					
			S	16	22	46					
			F	16	24	54					

SEISMOLOGICAL BULLETIN.

JULY 1920.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

Greenwich Mean Time. S. Latitude $6^{\circ} 11' 0''$. Height above sealevel 8 m.

E. Longitude $7^{\text{h}} 7^{\text{m}} 19^{\text{s}}$.

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

No.	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _N		
				h	m	s		μ	μ		
144	July 1	I _v	P	21	46	18				120	Malabar i P — S? = 8 sec.
			iS	21	46	32					Δ = 80?
			M	21	47	49					Felt in the Preanger, Java.
			F	21	51						
145	" 2	I	eP	8	54	46					
			i	9	5	28					
			M	9	4	48					
			F	9	6						
146	" 2	II _r	iP	10	11	6				5100?	ca E-W.
			i	10	12	40					Malabar very faint.
			i	10	15	27					
			S?	10	15	55					
			F	10	28						
147	" 2	I _u	e	18	48	48				5140	ca E-W.
			M	18	50	17					Malabar i P — i S = 405 sec.
			iS	18	55	39					Δ = 5010.
			M ₁	18	56	32					
			M ₂	18	57	29					
			eL	19	5						
			F	19	17						
148	" 2	II _r	P ₁	21	41	51	6.6	159	81.1	2230	Felt on the Isle of Amboina, Moluccas.
			iP ₂	21	42	17				2200	
			iS ₁	21	45	34					
			S ₂	21	45	57					
			M ₁	21	46	46	6.5	270	159		
			M ₂	21	47	52	6.2	233	255		
			M ₃	21	49	5	6.5	210	270		
			M ₄	21	58	45	6.4	63.9	42.7		
			L	22	0	52					
			F	22	27						
149	" 3	I	e ₁	15	55	42					Very faint traces of EW-com- ponent.
			e ₂	16	4	34					
			F	16	12						
150	" 4	I	e	17	14,0						
			F	17	20						
151	" 5	I	e	3	6,1						
			F	3	13						

No.	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum	Remarks.
								A _E	A _N		
				h	m	s		μ	μ		
152	July 5	I	e F	11 11	38 41	1					
153	" 6	I	e M F	3 3 5	11,3 20,3 28						
154	" 7	I	e M F	9 9 9	38 43 57	39					
155	" 7	I	e M F	20 20 20	4 11 14	21 31					
156	" 8	III	iP ₁ i ₁ i ₂ M ₁ M ₂ F	4 4 4 4 4 5	41 41 43 44 47 47	11 52 7 3 7	5.9 6.3	>499 110	480 484	N 69° W.	
157	" 8	I _v	P iS M ₁ M ₂ F	19 19 19 19 19	41 44 44 45 54	41 23 53 57				1560	E — W. Felt on Eastern Java and Bali.
158	" 8	I	e F	20 20	11 13	13 48					Bali.
159	" 8	I	e F	22 22	14 20	49					
160	" 9	I _v	P i S=M ₁ M ₂ F	0 0 0 0 0	39 39 41 41 52	16 44 17 49				1140	SE-Borneo.
161	" 9	I _v	eP iS F	13 13 13	47 48 50	33 4 1				270	Malabar faint.
162	" 9	I	e M F	23 23 23	19 23 38	8 15					
163	" 10	I	e M F	9 9 9	42 49 52	40 46					
164	" 11	I	e M F	8 8 8	18 21 25	45 10					
165	" 18	I	e F	11 11	47 52	36					Malabar P—S = 35 sec. Δ = 310.
166	" 18	I _v	eP S M ₁ M ₂ F	12 12 12 12 12	25 26 26 27 33	40 20 25 29				350	Malabar P—S = 17 sec. Δ = 150. Felt in Central Java.

No.	Date 1919.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _N		
				h	m	s		μ	μ		
167	July 20	I	e F	23 23	10 12	20					Malabar faint. Felt at Tjikentjreng (Preanger), Java.
168	" 26	I _v	eP iS M F	10 10 10 10	12 13 14 19	47 11 9				210	ca E-W.
169	" 26	I _v	e F	20 20	5 11	39					Probably felt at Tandjong Sakti (Benkoelen), Sumatra.
170	" 26	I	e eL F	21 21 21	16 25 29	33 56					
171	" 28	I	P F	25 25	14 24	8					ca E-W.

SEISMOLOGICAL BULLETIN

AUGUST 1920.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

Greenwich Mean Time. S. Latitude $6^{\circ} 11' 0''$. Height above sealevel

E. Longitude $7^{\text{h}} 7^{\text{m}} 19^{\text{s}}$.

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

No.	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _N		
172	Aug. 3	H _r	iP	h	m	s	6.1	288	294	2270	ENE. Malabar faint.
			M	5	7	20					
			S	5	8	12					
			M	5	11	7					
			eL	5	13	3					
173	" 3	I _n	F	5	15	3	6.0	27.9	38.6		traces on EW. traces on EW.
			i	5	19						
			M	5	37						
			e _E	20	17	6					
			eL _N	20	18	23					
174	" 8	I _r	M	20	39	46	20.4				Menado.
			eL _E	21	9	33					
			F	21	22	4					
			eL _E	21	42	41					
			F	21	57						
175	" 9	I _v	eP	10	34	10	26.2				Malabar P — iS = 12 sec. △ = 100. Garoet (Preanger), Java.
			S	10	37	13					
			F	10	43						
176	" 11	I	e	1	24	30					ESE — WNW.
			M	1	25	33					
			F	1	28						
177	" 13	I	e	13	13	33					
			F	13	17						
			P	2	22	47					
178	" 15	I	F	2	31						
			e?	7	6	14					
			M	7	13	14					
179	" 15	I	F	7	27						
			iP	8	25	59					
			M	8	36	45					
180	" 15	I	eL	8	43	14					
			F	8	53						
			e	8	55,8						
181	" 16	I	F	9	1						
			i	22	39,8						
			F	22	41						

No.	Date 1920.	Cha- racter.	Phase.	Time (Greenwich)			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _N		
				h	m	s		μ	μ		
181	Aug. 20	I _u	e	16	36	21					
			M	16	37	53					
			eL ₁	17	26	53	21.0				
			eL ₂	17	33	53	19.8				
			eL ₃	17	40	53					
			F	17	47						
183	" 23	I _v	P	2	30	22					Malabar i P — i S = 12 sec.
			i S = M	2	30	37					Δ = 100.
			F	2	33	15					Tjirenang (Preanger), Java.
184	" 23	II _v	P	6	18	0				270?	E-W.
			S?	6	18	31					Benkoelen and Lompongs, Su-
			M	6	19	27	6.0	184	173		matra.
			F	6	31						
185	" 25	I _v	P	3	54	28				200	
			i S = M	3	54	51					
			F	4	6						
186	" 25	I	e	17	30						
			F	17	33						
187	" 25	I	e	22	1	48					
			i ₁	22	2	55					
			M ₁	22	4	52					
			i ₂	22	7	24					
			M ₂	22	7	31					
			M ₃	22	10	24					
			eL	22	17	36					
			F	22	28						
188	" 26	I	e ₁	23	16	33					
			e ₂	23	24	35					
			F	23	32						
189	" 27	I	e	3	31						
			eL _E	3	40	51					
			F	3	43						

SEISMOLOGICAL BULLETIN.

SEPTEMBER 1920.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

Greenwich Mean Time. S. Latitude $6^{\circ} 11' 0''$. Height above sealevel 8 m.

E. Longitude $7^{\circ} 7' 19''$.

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

No.	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _N		
190	Sept. 3	II _v	iP iS=M F	h m s 19 36 7 19 36 24 19 48				μ	u	150	Malabar iP — iS = 16 sec. Δ = 140. Bantam and Preanger, (Java).
191	" 4	I _u	i ₁ i ₂ M eL F	14 23 39 14 33 34 14 36 0 14 48 2 15 8							
192	" 7	I _v	eP iS M F	4 58 50 4 59 15 5 0 14 5 8						220	Malabar iP — iS = 15 sec. Δ = 110. Preanger, (Java).
193	" 7	III _v	iP iS=M ₁ M ₂ F	6 47 49 6 48 15 6 50 54 7						210	Azimuth NS. Malabar iP — iS? = 10 sec. Δ = 90? Azimuth S 65 W. Preanger, Batavia, (Java).
194	" 7	I _v	e S M ₁ M ₂ F	12 55 45 12 56 4 12 56 37 12 57 5 12 58		6.0				170	Malabar P — S = 15 sec. Δ = 110.
195	" 9	II _u	i ₁ M ₁ M ₂ i ₂ M _E i ₃ M ₃ M ₄ eL ML i F	1 57 21 1 58 26 1 59 16 2 0 57 2 3 2 2 6 53 2 6 38 2 7 58 2 19 2 25 32 2 48 19 3 7		6.0 6.4 5.8 6.3 6.4 19.0		46.0 32.0 65.2 59.5 70.8 108 122		8000?	
196	" 9	I _u	i eL M F	19 6 22 19 22 22 19 25 22 19 52							

N ^o .	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum	Remarks.
								A _E	A _N		
				h	m	s		μ	μ		
197	Sept. 10	I _v	e i M F	15 15 15 15	30 30 30 32	21 27 47 5					Malabar P — i S = 14 sec Δ = 120.
198	" 11	I	? F	17 17	46.7 52						In hour mark.
199	" 12	I	e eS? M F	8 8 8 8	0 5 5 17	41 58 59			1610?		Felt at Mamasa and Tapalang, Central Celebes.
200	" 12	I	e F	15 16	58 2	17					
201	" 15	I _v	e S F	12 12 12	32 32 35	7 29			190		Malabar P — i S = 13 sec. Δ = 110. Preanger (Java).
202	" 15	I _v	P iS=M F	15 15 15	26 26 35	8 28			180		Malabar i P — i S = 14 sec. Δ = 120. Preanger (Java).
203	" 15	I _v	i F	15 15	50 55	22					
204	" 14	I _v	e ₁ e ₂ M S ₂ F	23 23 23 23 23	30 41 42 45 55	18 30 22 8					Malabar e ₁ — e ₂ about 11 mi- nutes. Amboina records two shocks at 23 ^h 28 ^m and 23 ^h 38 ^m .
205	" 15	I	e eL F	7 8 8	59 1 6	9 10			2170?		
206	" 20	III _a	i ₁ M ₁ i ₂ i ₃ M ₂ i ₄ L M _E M _N M C M F	14 14 14 14 15 15 15 15 15 17 17 17	49 50 51 57 0 1 5 15 15 18 5 21 35	18 56 53 33 28 27 53 17 41 32 55 39	5.6 6.0 25.4 20.0 21.0	141 178 2580 648	69.4 146 682 1870		
207	" 20	I	e F	17 17	58 54	22 2					
208	" 21	I	e i _N F	2 2 3	44 52 2	25 57					
209	" 21	I	i ₁ i ₂ F	17 18 18	52 1 8	58 46					

N ^o .	Date 1919.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _N		
				h	m	s		μ	μ		
210	Sept. 23	I	e M F	1 1 1	42 44 48	17 39					
211	" 23	I	P S F	5 5 5	43 52 58	52 59				7900	
212	" 23	I	e i F	17 17 17	56 56 12	30 57 44					
213	" 23	I	e eL F	19 20 20	44 9 17	50 42					
214	" 24	I	eP M F	4 4 4	22 27 58	31 0					
215	" 27	I _v	e M F	15 13 13	21 27 57	7 35					Paloe (Menado), Celebes.
216	" 30	I	P S M F	17 17 17 17	27 28 29 34	57 18 2				190	Azimuth WSW. Malabar P — S? = 22 sec. Δ = 200.

SEISMOLOGICAL BULLETIN

OCTOBER 1920.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartaïr.

Greenwich Mean Time. S. Latitude $6^{\circ} 11' 0''$. Height above sealevelE. Longitude $7^{\circ} 7' 19''$.

WIECHERT Horizontal Pendulum, 1000 kilograms

The symbols are according to WIECHERT.

No.	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _N		
217	Oct. 2	I _v	iP	h	m	s	5.5 6.3	μ	μ	250	Azimuth ESE. Malang (Paseroean), Eastern Java.
			i	13	45	13					
			M ₁	13	45	31		438	494		
			M ₂	13	47	44		388	371		
			F	13	48	34					
218	" 4	I _v	F	14	1	26					
			eP	22	1	29	6.3			250	E — W. Kota Agoeng (Lampongs), Su- matra.
			iS	22	1	57					
			eL	22	2	42					
			F	22	6						
219	" 7	I	e	0	15	25				1400	SE-Borneo.
			M	0	16	47					
			F	0	21						
220	" 7	I	e	21	15,9		6.3			1400	SE-Borneo.
			F	21	24						
221	" 7	I _v	eP	23	12	11	6.3			1400	SE-Borneo.
			eS	23	14	38					
			M	23	17	23					
			F	23	27						
222	" 8	I	e	7	59,9		6.3			1400	SE-Borneo.
			F	7	47						
223	" 8	I	e	8	6	54	6.3			1400	SE-Borneo.
			F	8	11						
224	" 8	I	e	19	21		6.3			1400	SE-Borneo.
			i	19	23	15					
			F	19	27						
225	" 9	I	e	11	31	57	6.3			1400	SE-Borneo.
			iM	11	32	57					
			F	11	36						
226	" 10	I	e	9	24	4	6.3			1400	SE-Borneo.
			F	9	30						
227	" 12	I	i	8	8	24	6.3			1400	SE-Borneo.
			M	8	12	41					
			F	8	14						
228	" 13	I _v	e	11	25	41	6.3			1400	SE-Borneo.
			F	11	26						

No.	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _N		
				h	m	s		μ	μ		
229	Oct. 18	H _u	iP	8	22	15				7010	Azimuth N 33 W.
			i _E	8	23	15					
			i _W	8	25	49					
			iS	8	30	41					
			M	8	30	49	6.3	117	96.7		
			eL	8	49						
			e	8	52						new shock?
			M	8	52	51	5.5				
			F	9	9						
230	" 18	I	e	15	28	13					
			F	15	30						
231	" 19	I	e	21	56	14					
			M	21	57	38					
			F	22	1						
232	" 20	I	e	10	8	30					
			M	10	12	22					
			eL	10	22						
			F	10	37						
233	" 22	I	e	10	58	28					
			e	11	0	21					
			M ₁	11	1	24	5.7				
			M ₂	11	4	48					
			M ₃	11	8	26					
			F	11	16						
234	" 22	I	P	12	29	45	6.0	31.9	35.8		
			M	12	30	59					
			F	12	55						
235	" 24	I	e	1	48	25					
			S	1	56	26					
			F	2	12						
236	" 25	I	e	8	20.2						
			M	8	26	47					
			F	8	29						
237	" 26	I	eP	3	30	54				820	
			iS	3	32	3					
			F	3	41						
238	" 27	I	eP	4	5	8					Probably felt in Tapanoeeli, Su-
			M	4	7	6					matra.
			F	4	6						
239	" 28	I _u	i	15	9	50	6.0	40.2	27.6		
			M	15	12	21					
			eL	14	2	29					
			F	14	11						
240	" 28	I	e	16	19						
			F	16	24						

SEISMOLOGICAL BULLETIN.

NOVEMBER 1920.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

Greenwich Mean Time. S. Latitude $6^{\circ} 11' 0''$. Height above sea level 8 m.

E. Longitude $7^{\text{h}} 7^{\text{m}} 19^{\text{s}}$.

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

No.	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _N		
241	Nov. 1	I _r	i	h	m	s		μ	μ		Taroena (Sangi isles).
			M ₁	8	58	12					
			M ₂	9	0	52					
			F	9	4	10					
242	" 3	II	P	15	40	35	6.8	88.1	67.8	140	Malabar P — eS = 150 sec. $\Delta = 1430$.
			i ₁	15	43	0					
			i ₂	15	44	40					
			i ₃	15	46	56					
			M	15	47	18					
			L	15	52	49					
			F	16	14						
243	" 4	I _v	eP	18	38	31					
			iS	18	38	47					
			L	18	39	1					
			F	18	41						
244	" 5	I	eP	6	14	50					
			S	6	16	16					
			F	6	20						
245	" 9	II _v	eP	5	49,1					130	No hour marks. Malabar P — iS = 24 sec. $\Delta = 210$. Preanger, Java.
			iS	5	49,3						
			M	5	50,2						
			F	5	59						
246	" 14		eP	23	17	21					
			i	23	18	4					
			eL	23	20						
			F	23	23						
247	" 16	I	e ₁	8	48,9						No hour marks.
			e ₂	9	7,5						
			F	9	9						
248	" 19	I	e	9	54	41	5.5			110	Malabar P — iS = 15 sec. $\Delta = 130$.
			S	9	55	54					
			F	10	2						
249	" 23	II _v	iP	6	49	1	6.2	340	156	650	Azimuth S 37 E. Malabar iP — S = ± 44 sec. $\Delta = 700$.
			iS	6	50	12					
			M	6	51	7					
			F	7	14						

No.	Date 1919.	Cha- racter.	Phase.	Time (Greenwich).	Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
						A _v	A _u		
250	Nov. 50	I	e i M eL F	h m s 11 12 51 11 14 8 11 18 51 11 21 11 31					

The symbols are according to Wüchener.
Wüchener Horizontal Bandwidth 1000 Kilograms.

No.	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).	Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
						A _v	A _u		
241	Nov. 1	I		h m s 8 58 12 9 0 32 9 4 10 9 10					Tarawa (Gardie isles).
242	" 2	II		18 40 25 18 45 0 18 44 40 18 46 50 18 47 18 18 52 49 18 14					Malabar P - 62 = 180 sec $\Delta = 1450$
243	" 4	I		18 38 31 18 38 47 18 39 1 18 41				140	
244	" 8	I		6 14 50 6 16 18 6 20					
245	" 9	II		8 49.1 8 49.3 8 50.2 8 52				130	No hour marks Malabar P - 12 = 24 sec $\Delta = 210$ Pescadore, Java.
246	" 14			23 17 21 23 18 4 23 20 23 22					
247	" 16	I		8 48.0 8 48.2 8 48.4					No hour marks
248	" 18	I		9 84 41 9 88 84 10 2				110	Malabar P - 12 = 18 sec $\Delta = 130$
249	" 23	II		6 49 1 6 50 12 6 51 7 7 14				680	Azimuth 2 27 E. Malabar P - 2 = ± 44 sec $\Delta = 260$ Central and Eastern Java.

Intern.

SEISMOLOGICAL BULLETIN

DECEMBER 1920.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

Greenwich Mean Time. S. Latitude $6^{\circ} 11' 0''$. Height above sealevelE. Longitude $7^{\text{h}} 7^{\text{m}} 19^{\text{s}}$.

WIECHERT Horizontal Pendulum, 1000 kilograms

The symbols are according to WIECHERT.

No.	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _N		
251	Dec. 1	I	e M F	h	m	s		μ	μ		
				4	31	4					
				4	31	42					
				4	35	4					
252	" 1	I	e i M F	13	18	57					
				13	19	48					
				13	20	24					
				13	25						
253	" 1	I _v	P iS L F	19	25	32				190	Malabar P — iS = 18 sec. Δ = 160 KM.
				19	25	55					
				19	26	51					
				19	29						
254	" 2	I	e M F	12	54	56					
				12	55	42					
				12	58						
255	" 2	I	e _E M F	18	54	52					
				18	55	25					
				18	58						
256	" 3	I _v	e i L M F	19	50	9					Malabar e — S = 56 sec. Δ = 310 KM. Eastern Java.
				9	50	51					
				9	51	17					
				9	52	27					
257	" 4	I	e F	2	16	31					
				2	21						
258	" 4	I	e i ₁ i ₂ F	6	4	13					
				6	5	6					
				6	13	57					
				6	18						
259	" 4	I	e M ₁ M ₂ F	18	54	53					
				18	56	47					
				18	58	45					
				19	5						
260	" 5	I	e M _N F	22	4	37					
				22	15	37					
				22	25						

No.	Date 1920.	Cha- racter.	Phase	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum	Remarks.
								A _E	A _N		
				h	m	s		μ	μ		
61	Dec. 6	I	e	10	42	55					
			i	10	25	12					
			M ₁	10	44	56	6.0	41.0	45.6		
			M ₂	10	45	48	6.4	50.0	45.0		
			eL	10	51						
			F	11	0						
62	" 7	I	e	6	5	47					
			i	6	7	9					
			F	6	10						
63	" 7	I	e	15	24	20					
			i	15	52	35					
			F	15	58						
64	" 8	I	e	5	39	56					SE-Borneo.
			i	5	41	21					
			M	5	41	51					
			F	5	47						
65	" 8	I _v	e	16	40	20					N-S.
			i	16	40	44					Malabar P — i S = 18 sec.
			M	16	41	25					Δ = 160 KM.
			F	16	47						
66	" 8	I	e	16	55	15					Malabar P — i S = 16 sec.
			M	16	56	19					Δ = 140 KM.
			F	16	59						
67	" 8	I	e	20	39	15					Malabar c — e = 61 sec.
			i	20	40	16					
			F	20	45						
68	" 9	I	e	14	8	40					Malabar P — S = 45 sec.
			M	14	10	15					Δ = 400 KM.
			F	14	15						
69	" 10	I _u	i ₁	4	48	46					
			i ₂	4	50	52					
			i ₃	4	52	29					
			L _E	5	22	22					
			M _E	5	22	28					
			L	5	56	45					
			M	5	58	25	21.0	120	62		
			eL	5	58	41					
			eL _E	6	8	41					
			eL _E	6	14						
			eL _E	6	21						
			F	6	28						
70	" 10	I	e _E	20	55	7					
			i	20	56	10					
			M	20	57	47					
			F	20	45						
71	" 13	I	e	3	51	58	6.0	20.5	24.4		
			M ₁	3	39	7					
			M ₂	4	1	56					
			L	4	6	54					
			F	4	10						

No.	Date 1920.	Cha- racter.	Phase	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _N		
				h	m	s		μ	μ		
272	Dec. 16	III _r	iP	12	13	49				4800	Azimuth S 72 E.
			i ₁	12	15	25					± 18° S; ± 150° E.
			M	12	15	58					
			i ₂	12	18	46					
			S	12	20	21					
			M ₁	12	20	42	6.7	425	478		
			M ₂	12	28	5	5.0	250	383		
			L	?							
			F	15	52						
272	—	—	iP	12	15	58				4800	Malabar records.
			i	12	14	26					
			i _N	12	15	18					
			i _E	12	16	13					
			i _N	12	16	38					
			i _N	12	17	38					
			eS	12	20	50					
			M	12	20	58					
			L	12	22,7						
			LM _E	12	24	27					
			iL _E	12	27	41					
			iL	12	31	4					
			M	12	15	41					
			F	15	40						
275	" 16	I	P	21	20	6					
			M	21	22	31					
			i	21	28	11					
			F	21	58						
274	" 17	III _v	P	9	25	15				170	Azimuth S 78,6 E.
			iS	9	25	52					Malabar e — i = 46 sec.
			M	9	27	19	5.8	422	485		Δ = 410.
			F	9	45						
275	" 17	I	e	19	22	46					
			i	19	25	5					
			F	19	28						
276	" 18	I	P	10	8	20					Menado, Celebes.
			i ₁	10	9	7					
			i ₂	10	12	58					
			L	10	18	24					
			M	10	18	48					
			F	10	52						
277	" 19	I _u	eP	20	20	17				5950	
			iS	20	27	49					
			M	20	28	16					
			F	20	55						
278	" 21	I _v	eP	5	48	56				520	E-W.
			S?	5	49	15					Tandjong Sakti, (Benkoelen)
			F	5	53						Sumatra.
279	" 22	I	e	6	57	7					
			F	6	41						
280	" 22	I _v	e	22	16	11					Pekalongan, Central Java.
			M	22	17	55					
			F	22	20						

No.	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A _E	A _N		
281	Dec. 24	III _v	iP	h	m	s		μ	μ	320	Azimuth S 69 W. Malabar P—iS = 44 sec. Δ = 390. KM.
			S	17	29	51					
			M	17	30	28					
			F	17	30	35					
282	" 25	II _r	iP	18	0		6.0	124	117	4690	NNW—SSE. Malabar faint.
			i	11	41	21					
			iS	11	44	8					
			i	11	47	47					
			i	11	49	16					
			i	11	57	20					
			M	11	58	11					
283	" 28	I	F	12	37						
			iP	3	24	34					
			S?	3	40	32					
			eL	3	44						
284	" 30	I	F	3	50						
			e	16	25	58					
			M	16	28	18					
			F	16	30						