

SEISMOLOGICAL BULLETIN.

JANUARY 1916.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

Mean Greenwich 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 1916.		Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epi- centrum.	Amplitude (half)		Remarks.	
										A _E .	A _N .		
1	1	Jan.	I,	iP	h	m	s	5.5	180	μ	μ	Malabar: P - S = 11 sec. Δ = 105.	
				iS	11	12	9			16.1	11.5		
				M	11	12	29						
				F	11	13							
2	1	"	II,	P	15	29	0	50		2115.—	3058.—	Very strong long waves. New Britain.	
				eL	15	40							
				M	15	48							
				F	16	44							
3	5	"	I,	iP	14	27	58	5	175	15.7	19.4		
				iS	14	27	58						
				M	14	29							
				F	14	33							
4	4	"	I	i	5	16	55	5.5		9.4	15.4		
				M	5	21							
				F	5	34							
5	5	"	I,	eP	6	15	11	6		14.0	25.5		
				S?	6	16	15						
				M	6	19	17						
				F	6	32							
6	7	"	III,	iP	15	17	2	5	560	352.5	196.2	Felt at several places in Madioen and at some places in Pasoeroean, Djokjakarta, Kedoe and Banjoemas.	
				iS	15	18	2						
				M	15	19	28						
				F	15	48							
7	11	"	I	e	2	28							
				F	2	37							
8	15	"	II,	P	6	24	53	6	3600	162.4	82.2	New Guinea.	
				S	6	29	53						
				M	6	30	15						
				F	7	58							
9	15	"	II,	P	8	26	45	6	3500	520.7	295.6	New Guinea.	
				S	8	31	57						
				M	8	35							
				eL	8	36							
				M _{L1}	8	45				28	1571.—		2750.—
				M _{L2}	9	12				14	74.7		58.5
				F	10	51							

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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) which 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 every minute through a drop of mercury.

For each month are applied the mean constants for that month. T_0 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 by giving the pendulum a displacement by means of the horizontal adjusting screws, of which the value can be determined easily from the pitch (a) and 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 last year are given below.

1915.	E.-W. component.			N.-S. component.		
	V.	T_0 .	ϵ .	V.	T_0 .	ϵ .
January	217	7.2	5.3	186	7.1	5.9
February	"	"	5.4	"	7.2	"
March	"	"	5.5	"	7.0	"
April	"	"	5.3	"	7.2	5.3
May	"	"	"	"	"	4.7
June	"	"	5.2	"	"	4.6
July	"	"	5.4	"	"	4.7
August	"	"	"	"	"	4.8
September	"	"	5.8	"	"	"
October	"	7.0	5.5	"	7.0	4.9
November	"	7.2	5.0	"	"	4.8
December	"	7.1	5.6	"	"	5.1

No.	Date 1916.	Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.		
				h	m	s			A _E .	A _N .			
10	15	I.	P	10	57	12	p	160	27.5	27.6			
			S?	10	57	56							
			M	11	5								
			F	11	26								
11	15	I.	iP	16	12	0	5.5	160	57.2	68.5			
			iS	16	12	19							
			M	16	13	55							
			F	16	50								
12	15	I	e	21	52								
			F	22	18								
15	19	I	e	19	4								
			F	19	49								
14	24	I.	e	7	7		6	14.0	10.8	Felt in Lho Nga, Atjeh.			
			M	7	19								
			M _{L1}	7	34	42						114.5	190.5
			M _{L2}	7	44	22						90.0	45.0
			M _{L3}	7	57	16						19.9	20.7
			F	8	29								
15	24	I.	P	17	36	29	185			Very small. Malabar:	P - S = 14 sec. Δ = 150		
			S	17	56	50							
			M	17	58								
			F	17	44								
16	25	I	e	11	52		6	6.4	9.0				
			M	11	55								
			F	12	1								
17	26	I	e	8	2								
			F	8	9								
18	26	I	e	12	37		6	19.2	15.8				
			M	12	49								
			F	15	54								
19	26	I	e	15	16								
			F	15	51								
20	50	I	e	20	47		6	12.0	7.7				
			M	21	0								
			F	21	29								
21	31	I	e	18	19		20						
			L	19	4								
			F	19	24								

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.

	T.	V.		T.	V.	
January	7.1	180	5.8	7.2	217	
February	7.2	"	6.4	"	"	
March	7.0	"	8.5	"	"	
April	7.2	"	6.9	"	"	
May	7.4	"	6.2	"	"	
June	7.4	"	6.4	"	"	
July	7.4	"	6.4	"	"	
August	7.4	"	6.4	"	"	
September	7.4	"	6.8	"	"	
October	7.0	"	6.5	7.0	"	
November	7.4	"	6.0	7.2	"	
December	7.1	"	6.9	7.1	"	

SEISMOLOGICAL BULLETIN.

FEBRUARY 1916.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

Mean Greenwich 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 1916.		Char-acter.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epi-centrum.	Amplitude (half)		Remarks.	
										A _E .	A _N .		
22	2	Febr.	II _r	iP	h	m	s	6	4700	μ	μ		
					7	44	28						
					S	7	50						53
					M	7	54						
					eL	7	57						
					M _{L1}	8	1						24
M _{L2}	8	14	15										
F	8	54											
23	2	»	I	e	9	21							
					F	9	54						
24	2	»	I	e	21	52							
					F	21	54						
25	3	»	I _v	iP	14	29	46	6	250	88.2	60.3	Malabar: iP — iS = 7 sec. Δ = 70 Felt at Goenoeng Walet, Preanger.	
					iS	14	30						12
					M	14	52						
					F	14	44						
26	4	»	I	e	19	7							
					F	19	22						
27	5	»	I _v	iP	21	41	52	5.5	160	30.6	26.5		
					iS	21	41						50
					M	21	45						
					F	21	51						
28	6	»	I	e	11	5		6		58.1	16.5		
					i	11	11						24
					M	11	11						56
					F	11	55						
29	6	»	I _v	P	14	57	55	6	160	12.4	16.0	Malabar: iP — iS = 17 sec. Δ = 150	
					S	14	58						12
					M	14	40						
					F	14	46						
30	6	»	I _u	e	22	4		6	11500?	9.6	7.5		
					S?	22	12						36
					M	22	16						
					M _L	22	59						
					F	25	14						

N ^o .	Date 1916.		Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.
										A _E .	A _N .	
51	9	Febr.	I _v	iP iS=M F	7 30 10 7 30 28 7 39		1.5	160	59.5	42.2	Malabar: iP-iS = 15 sec. Δ = 140 Felt at Lebak Parai, Bantam.	
52	10	"	I	e M F	2 10 2 22 2 42		6		33.7	27.0		
53	11	"	I	P M F	8 49 7 8 35 9 0		5		7.7	6.6		
54	14	"	I	e M F	10 8 10 14 10 44		6		52.1	29.7		
55	14	"	I _v	P S M F	16 50 17 16 50 48 16 52 16 37		3	160	13.5	9.5	Malabar: iP-iS = 11 sec. Δ = 100 Felt at Tjikorai, Preanger.	
56	14	"	I _v	e M _{L1} M _{L2} F	17 50 17 55 17 57 18 22		14 9		142.7 35.5	75.5 45.9	Felt at Sabang and Lho Nga, Atjeh.	
57	16	"	I _v	iP iS=M F	21 26 14 21 26 38 21 32			200				
58	17	"	I _v	iP iS M F	19 10 46 19 11 7 19 12 15 19 18		4	190	50.9	15.9	Malabar: iP-iS = 8 sec. Δ = 75 Felt at Goenoeng Walet, Preanger.	
59	19	"	I _v	iP iS M F	12 10 10 12 10 31 12 12 12 25		5	190	41.9	32.6	Malabar: iP-iS = 21 sec. Δ = 190	
40	19	"	I _v	iP iS M F	12 46 19 12 46 40 12 48 12 52		5	190	9.8	8.4	Malabar: iP-iS = 21 sec. Δ = 190 Felt at Goenoeng Walet, Preanger.	
41	20	"	I	e M M _L F	18 2 18 12 18 47 19 24							
42	21	"	I _v	P S M F	15 56 11 15 58 45 14 1 14 54		6	1450	95.8	112.9	Earthquake at Taroetoeng, Sumatra.	
43	22	"	I	e M F	5 7 5 12 5 25							

N ^o .	Date 1916.		Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.
										A _E .	A _N .	
44	26	Febr.	I _v	iP S M	25 9 19 25 9 59 25 11			190	μ	μ		
45	26	"	II _v	P S M F	25 15 4 25 15 26 25 17 25 54		4.5 6	190	92.1	107.5	End overtaken by following earthquake.	
46	27	"	I _a	e e _L M _{L1} M _{L2} F	20 42 21 6 21 51 22 9 22 42		20 20		51.9 60.5	58.0 82.8		
47	28	"	I	e F	16 47 16 52							



SEISMOLOGICAL BULLETIN.

MARCH 1916

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Mean Greenwich 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 1916.		Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.
										A _E	A _N	
48	3	March	L _v	P	h	m	s		250	μ	μ	Malabar: iS — iP = 10° Δ = 100
				S	8	53	28					
				M	8	54						
				F	8	59						
49	4	"	I	e	7	18	7		7.0	6.8		
				M	7	27						
				F	7	54						
50	7	"	I	e	18	57						
				M	19	3						
				F	19	4						
51	8	"	L _v	iP	3	6	20	5	740	46.1	39.2	Direction E-W. Malabar: iS — iP = 1 ^m 9 ^s Δ = 630 Felt in Patjitan, Madioen.
				iS	3	7	42					
				M	3	10						
				F	3	27						
52	11	"	I	e	11	13						
				M	11	19						
				F	11	28						
53	12	"	L _v	P	2	5	3	6	150	2.8	4.9	Very small. Malabar: iS — iP = 8° Δ = 80 Felt in Tjibadak, Preanger. P uncertain.
				S	2	5	19					
				M	2	6						
				F	2	9						
54	14	"	L _v	P	3	41	15	6	550?	13.9	12.3	Malabar: S — P = 55° Δ = 470
				S	3	42	15					
				M	3	44						
				F	3	49						
55	14	"	I	e	16	51					Felt in Moeara Laboeh, Fort van der Cappellen and Loeboek Kilangan, Sumatra's Westkust.	
				F	16	42						
56	18	"	I	e	1	6						
				M	1	15						
				F	1	28						
57	19	"	L _v	eP	9	29	52	5	200?	7.4	6.1	P uncertain.
				S	9	30	16					
				M	9	52						
				F	9	45						

Nº.	Date 1916.		Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epi- centrum.	Amplitude (half)		Remarks.
										A _E	A _N	
58	21	March	I,	i P	h	m	s	6	440	μ	μ	Direction E-W.
				i S	2	52	17			64.2	51.1	
				M	2	53	5					
				F	3	14						
59	21	"	I,	P	3	29	51	6	580			
				S	3	30	36					
				M	3	32				21.8	17.6	
				F	3	45						
60	22	"	I,	e P	6	46	45	6	740?			
				S	6	48	5					
				M	6	50				20.6	22.5	
				F	7	2						
61	25 26	"	I	e	23	59		6.5				
				M	0	6				16.4	16.5	
				F	0	28						

SEISMOLOGICAL BULLETIN.

APRIL 1916.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartaire.

Mean Greenwich time. S. Latude $6^{\circ} 11' 0''$. 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 1916.		Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epi- centrum.	Amplitude (half)		Remarks	
										A _E	A _N		
62	3	April	I	P	h	m	s	6		μ	μ		
					10	37	15			26.1	22.2		
					M	10	46			7			
63	3	"	I _v	iP	18	7	38	5	140	47.4	55.7	S uncertain. Malabar: $iS - iP = 9^{\circ}$ $\Delta = 80$ N-S component ran down 18" after beginning. Direction S W-N E. Malabar: $iS - iP = \pm 7^{\text{m}} 10^{\circ}$ $\Delta = 5510$	
					S	18	7						53
					M	18	9						12
					F	18	19						
64	7	"	II _u	iP	9	55	44	5.5	6200	110.5	106.6		
					iS	9	45						28
					M	9	45						
					eL	9	50						
					M _L	9	54						18
					F	10	50						
65	7	"	I	e	14	45							
					F	14						54	
66	14	"	I	e	2	58					Felt in Kaimana N- Guinea.		
					F	2						50	
67	14	"	I	e	17	24							
					F	17						48	
68	15	"	II _v	iP	9	20	50	6	450	125.9	115.7	Direction E S E-W N W. Felt all along the coast of Benkoelen and in Pager- alam, Palembang.	
					S	9	21						25
					M	9	25						
					F	9	57						
69	15	"	III _v	iP	12	52	51	6	450	>360.8	>391.9	N-S component ran down at $iP + 1^{\text{m}}$; E-W comp. at $iP + 5^{\text{m}}$. Direction E S E-W N W. Malabar: $iS - iP = 57^{\circ}$ $\Delta = 520$ Felt all along the coast of Benkoelen, at several places in Palembang, in Kota Agoeng, Lampongs and in Lebak Parai, Ban- tam.	
					S	12	53						41
					M		?						

No.	Date 1916.		Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.
										A _E	A _N	
					h	m	s			μ	μ	
70	18	April	I	e M F	4 4 5	15 28 9		6		71.8	78.8	
71	21	"	I	e M F	11 11 12	40 48 55		6		41.7	50.5	
72	24	"	I	e M F	4 4 5	47 58 25		6		7.6	12.6	
73	24	"	I _u	e M eL M _{L1} M _{L2} F	8 8 9 9 9 10	22 37 28 42 53 18		6 25 18		12.8 55.5 28.1	8.3 32.3 29.0	
74	26	"	I	e M eL M _L F	2 2 3 4 4	42 58 44 8 29		5.5 18		5.5	4.3	

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SEISMOLOGICAL BULLETIN.

MAY 1916.

BATAVIA OBSERVATORY, JAVA

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 DEC 23 1916
 to the other B...

Foundation: River Quartair.

Mean Greenwich time. S. Latitude 6° 11' 0". Height above sealevel 8 m.

E. Longitude 7^h 7^m 19^s.

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

No.	Date 1916.		Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.
										A _E	A _N	
75	3	May	I	e	h	m	s	5	320?	μ	μ	
				M	5	40				6.1	4.7	
				F	6	5						
76	5	"	I _v	P	13	11	59	6	320?	22.1	50.1	S uncertain. Malabar: S - P = ± 27" Δ = ± 240
				S	13	12	54					
				M	13	17						
				F	13	50						
77	5	"	I _v	e	18	6						Felt all along the coast of the residence of Benkoe-len, Sumatra.
				M	18	8						
				F	18	16						
78	4	"	II _v	iP	19	26	27	5	190	74.8	90.3	Malabar: S - P = ± 9" Δ = ± 80
				iS	19	26	48					
				M	19	28						
				F	19	41						
79	5	"	I	e	2	28						Malabar: S - P = ± 47" Δ = ± 430? Felt at several places in Madioen, Java.
				F	2	56						
80	5	"	I _v	e	7	56	45	6		29.0	18.5	Felt at Fort van der Capellen, Fort de Kock, Moeara Laboeh, and near Padang, Sumatra's Westkust.
				M	7	59						
				F	8	10						
81	9	"	II _v	P	14	58	7	5	2150	75.6	91.2	Malabar: S - P = ± 4" Δ = ± 2440
				S	14	41	43					
				M	14	43						
				P	15	15						
82	11	"	I	e	18	54		5		9.5	10.8	Malabar: iS - iP = ± 1 ^m 18" Δ = ± 710
				S	18	55	32					
				M	18	57						
				F	18	46						
83	18	"	I	e	1	1						
				F	1	8						
84	19	"	II _v	iP	8	26	41	6	200	79.7	74.0	
				S	8	27	5					
				M	8	50						
				F	8	45						



No.	Date 1912.		Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.	
										A _E	A _N		
85	21	May	I,	iP iS M F	h 11 11 12	m 52 54 56	s 54 14	6	730	66.6	57.6	Direction S E-N W Malabar: iS - iP = ± 1 ^m 12' Δ = ± 660 Felt at Patjitan, Madioen, Java Malabar: I,	
86	26	"	I	e F	1 1	21 26							
87	29	"	I,	P S M F	15 13 15 15	2 3 4 15	51 27	5	320	17.8	15.1	Malabar: S - P = ± 31' Δ = ± 280	



SEISMOLOGICAL BULLETIN.

JUNE 1916.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartaire.

Mean Greenwich time. S. Latude 6° 11' 0". Height above sealevel 8 m.

E. Longitude 7^h 7^m 19^s.

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

No.	Date 1916.		Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.
										A _E	A _N	
88	1	June	I,	eP M F	h 4 4 4	m 55 57 41	s 20	6		μ 5.7	μ 4.0	Malabar: iS — iP = ± 8° Δ = ± 70
89	1	"	I,	eP S M F	7 7 7 7	4 5 6 14	54 4	5	270?	25.1	17.0	
90	4	"	I,	iP iS M F	6 6 6 6	21 21 25 40	56 54	5	170	106.9	124.6	Direction E-W
91	6	"	I,	P iS M F	16 16 16 16	20 20 22 52	18 43	5	226	14.4	19.2	Malabar: iS — iP = ± 33° Δ = ± 500
92	8	"	I	e M F	6 6 6	27 33 44		5		15.6	11.3	Felt at Gorontalo, Menado, Celebes.
93	9	"	I,	eP iS M F	21 21 21 22	28 33 36 1	22 48	6	3620?	52.5	59.7	
94	10	"	I	e M F	21 21 21	24 26 58	15	5		2.5	1.7	
95	11	"	I	e M F	0 0 0	29 54 42	16	6		2.7	3.1	
96	14	"	I	e M F	4 4 4	41 44 47		5		3.8	3.1	
97	14	"	I	e M F	12 12 15	46 50 5		6		7.3	8.8	

N ^o .	Date 1916.		Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.
										A _E	A _N	
98	15	June	I _v	iP	h	m	s	5	840	17.0	22.7	
				iS	11	21	49					
				M	11	25	20					
				F	11	24						
99	19	"	I	e	4	0	7		5.5	9.2		
				M	4	8						
				F	4	15						
100	21	"	I	e	14	59					Malabar: iS - eP = ± 57° Δ = ± 330 Felt at several places in Madioen, and at Gondang Lipoero, Djokjakarta.	
				F	15	2						
101	21	"	I _v	iP	21	51	20	5	60	14.0	10.9	Malabar: iS - iP = 4° Δ = 40
				iS	21	51	26					
				M	21	58						
				F	22	41						
102	26	"	I	e	6	49	6		15.4	11.5	Malabar: iS - P = 4° Δ = 40	
				M	6	55						
				F	7	8						
103	29	"	I _r	iP?	±10	53	6	2480?	50.6	28.7	S-P = 4 ^m 4 ^s Hour-marks missing. Malabar commencement at ± 10 ^h 53 ^m	
				S?	±10	57						
				M	±10	59						
				F	±11	18						
104	29	"	I _r	eP	±13	21	6	2500?	11.1	13.2	S-P = 4 ^m 5 ^s Hour-marks missing. Malabar commencement at ± 13 ^h 19 ^m	
				iS?	±13	25						
				M	±13	26						
				F	±13	51						
105	30	"	I _u	eP?	± 3	21	6	10290?	15.3	13.2	S-P = 11 ^m 11 ^s Hour-marks missing.	
				eS?	± 3	32						
				M	± 3	55						
				eL	± 4	24						
				M _L	± 4	41						
				F	± 5	9						
							19					

SEISMOLOGICAL BULLETIN.

JULY 1916.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

Mean Greenwich time. S. Latude 6° 11' 0". Height above sealevel 8 m.

E. Longitude 7^h 7^m 19^s.

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

N ^o .	Date 1916.		Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epi- centrum.	Amplitude (half)		Remarks.
										A _E	A _N	
					h	m	s			μ	μ	
106	5	July	I	e F	22 23	55 7						
107	8	"	II _a	iP iS M F	9 9 9 10	45 55 54 19	5 45	6	7250	85.0	126.1	Malabar: iS — iP = ± 9 ^m 11 ^s Δ = ± 7820
108	15	"	I _r	eP eS? M F	15 15 15 15	4 8 9 29	22 55	6	2570?	23.4	50.3	
109	14	"	I	e M F	14 14 15	51 55 6		6		16.4	19.7	
110	15	"	I	i M F	18 18 19	53 51 4	40	6		6.2	5.1	Felt in Kolonedale, Celebes
111	16	"	I	e M F	18 18 18	25 52 40		6		5.5	4.7	
No record July 17, 1916, 0 ^h 21 ^m — 9 ^h 11 ^m (clockwork in repairs).												
112	21	July	I _v	i F	19 19	58 39	25			μ	μ	
113	22	"	I _v	i M F	7 7 7	19 19 22	52 55	3		25.8	20.4	
114	24	"	I _v	e F	22 23	58 1						Malabar: iS — iP = 9 ^s Δ = 80
115	25	"	I _v	e F	15 15	59 42						Malabar: iS — iP = 9 ^s Δ = 80

No.	Date 1916.		Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.
										A _E	A _N	
116	27	July	II _r	eP M F	h 11 12	m 55 0	s 27	6		μ 113.0	μ 106.4	Milne: S - P = 2.3 ^m Δ = ± 1500 Malabar: iS - iP = 2 ^m 23 ^s Δ = 1550 Felt in Tjalang, Roendeng, Singkel, Atjeh, Loeboe Raja, Tapanoeli and in Moeara Laboeh, Sumatra's Westkust.
117	30	"	I _v	i F	6 6	8 11						Malabar: iS - iP = ± 15 ^s Δ = ± 150
118	30	"	I _v	e F	20 20	31 35	53					Malabar: iS - eP = ± 10 ^s Δ = 90

SEISMOLOGICAL BULLETIN.

AUGUSTUS 1916.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

Mean Greenwich 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 1916.		Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.
										A _E	A _N	
119	5	Aug.	I _r	i P S? M F	1 37 33 1 43 5 1 48 3 9		7	3700?	122.6	118.8	Malabar: i S — i P = $\pm 5^{\text{m}} 32^{\text{s}}$ $\Delta = \pm 3740$	
120	5	"	I _r	i P i S M F	5 56 54 4 0 51 4 2 4 13		6	2400	15.5	15.0	Direction ENE-WSW.	
121	5	"	I	e M F	12 38 12 47 12 57		6		9.2	5.5		
122	5	"	I	e M F	15 23 15 25 15 29		5		5.6	4.7		
123	7	"	I	e M F	11 28 11 34 11 43		6		6.6	5.5		
124	8	"	I	e F	4 34 4 38							
125	8	"	I	e M F	4 41 4 42 4 51		6		9.2	6.5	Felt in Laboeha, Ternate?	
126	8	"	I _r	i M F	9 53 48 9 55 9 57		4		4.0	5.3	Malabar: i S — i P = 15^{s} $\Delta = 130$	
127	8	"	I	e M F	18 59 19 6 19 19		6		6.1	4.7		
128	10	"	I _r	e F	11 45 11 50							
129	14	"	I	e M F	21 0 ? 21 9 21 11		6		4.8	2.4		

No.	Date 1916.		Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.
										A _E	A _N	
130	14	Aug.	I.	i	h	m	s	6		μ	μ	Malabar: iS — iP = 10° Δ = 90
	15	"		M	23	43	51			7.0	7.1	
131	16	"	I.	F	0	19		6		6.1	5.1	
				i	4	38	27					
132	21	"	I	M	4	40		6		4.4	3.6	
				F	4	45						
133	24	"	I	e	14	48.5		6		5.7	2.8	
				M	15	22						
134	25	"	I	F	15	28		6		5.7	2.8	
				e	10	4	17					
135	26	"	II.	M	10	6		5		9.9	7.5	
				F	11	32						
136	27	"	I	iP	7	40	33	5	500?	90.2	106.0	
				S?	7	41	28					
137	27	"	I	M	7	45		6		19.7	15.0	
				F	7	59						
138	27	"	I.	e	22	52		4	250	64.4	45.5	
				F	22	57						
139	28	"	I	iP	25	17	43	4		64.4	45.5	
				iS?	25	18	9					
140	28	"	I	M	25	20		7		71.4	67.6	S uncertain. Direction S E-N W. End overtaken by following earthquake.
				M _L	25	33						
141	28	"	I.	F	6	47	48	12		97.8	63.5	
				iP	6	54	11					
142	30	"	I.	M	6	59		6		17.5	15.8	S uncertain. Same origin as former one?
				M _L	7	14						
143	28	"	I.	F	7	?		12		63.4	36.7	
				eP	7	35	27					
144	28	"	I.	iS?	7	39	16	6		17.5	15.8	
				M	7	42						
145	28	"	I.	M _L	7	51		12		63.4	36.7	
				F	8	28						
146	28	"	I.	i	10	19		4		64.4	45.5	Malabar: iS — iP = 16° Δ = 140
				F	10	25						
147	30	"	I.	iP	23	19	26	5	140	10.0	10.6	
				iS	23	19	42					
148	30	"	I.	M	25	21		3		10.0	10.6	
				F	25	25						

SEISMOLOGICAL BULLETIN.

SEPTEMBER 1916.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartaire.

Mean Greenwich 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 1916.	Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.
				h	m	s			A _E	A _N	
143	1	Sept.	I,	i	2	36	7		μ	μ	
				F	2	40					
144	3	"	I	eP	7	22	25	±5500?	22.7	18.7	
				iS?	7	29	24				
				M	7	34					
				F	7	38	5				
145	5	"	I	e	22	24	24	6	6.6	8.5	
				M	22	51					
				F	23	5					
146	6	"	I	e	8	20		6	6.2	6.1	
				M	8	26					
				F	8	57					
147	9	"	III,	iP	12	26	45	510	>388.8	>331.3	<p>Maos-earthquake. Direction N 120° E. About 1 minute after iP possibly a 2nd quake; end lost in following earthquake. Malabar: S uncertain; mi- nute-marks missing. Destructive earthquake in Maos and environs, Ban- joemas; also felt at sever- al places in Preanger and Cheribon and severe- ly in Pekalongan and Kedoe.</p>
				iS	12	27	17				
				M	12	29					
				F		?	5				
148	9	"	III,	iP	12	41	26	300	>393.5	>323.1	<p>Same origin as former one. Malabar: iP — iS = 20° Δ = 180 also severely felt at sever- al places in Pekalongan and Kedoe.</p>
				iS	12	41	59				
				M	12	44	6				
				F	15	10					
149	9	"	I,	e	15	23	33	6	8.8	6.1	<p>Malabar: S — P = ± 18° Δ = ± 165 Felt at Tjilatjap, Banjoemas.</p>
				M	15	26					
				F	15	29					
150	9	"	I	e	14	5					
				F	14	6					

No.	Date 1916.	Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.
									A _E	A _N	
151	9 Sept.	II,	iP iS M F	h m s 14 34 7 14 34 41 14 36 14 32		5	310	±59.0	±46.8	Same origin as No. 147. Malabar: S — iP = 20° △ = 180 Felt at several places in Banjoemas and Kedoe.	
152	9 "	I	e F	15 36 15 39							
153	9 "	II,	iP iS M F	22 12 28 22 15 2 22 15 22 32		6	310	137.1	99.4	Same origin as No. 147. Malabar: iS — iP = 20° △ = 180 Severely felt at Banjoemas and Tjilatjap, Banjoemas and Bantarsari, Pekalongan; also felt at several places in Kedoe.	
154	11 "	III,	iP S M	6 32 7 ? 6 32 16		5	±900?	>384.2	>287.2	S uncertain. N-S component ran down at iP + 1 ^m 37'; E-W comp. at iP + 1 ^m 42'. Direction: N ± 118° E. Milne pendulum: S — P = 1 ^m 50" to 1 ^m 36" △ = 830 to 880 Origin in Indian ocean, south from E-Java. Malabar: S uncertain; minute- marks missing. Severely felt in Southern Madioen, Southern Kediri and Southern Pasoeroean; also felt at several places in Banjoemas, Kedoe, Semarang, Djokjakarta, Soerabaja, Besoeki, all in Java, in Madoera and at Djembrana, Bali.	

No record Sept. 11, 1916, 6^h 39^m to Sept. 12, 1916, 0^h 39^m. Malabar: small earthquakes registered Sept. 11, 1916, at ± 6^h 45^m, ± 12^h 18^m and ± 20^h 58^m.

No.	Date 1916.	Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.
									A _E	A _N	
159	22 Sept.	I,	i F	h m s 13 4 15 6				μ	μ		
160	22 "	I	e M F	19 9 46 19 12 19 16		5		10.5	7.1		
161	25 "	I	e M F	6 3 6 4 6 9		6		6.2	4.2		
162	24 "	I,	e M F	11 27 11 28 11 30		5		4.8	5.2	Malabar: iS — iP = 10° △ = 90	
163	24 "	I,	iP S? M F	18 25 29 18 24 22 18 27 18 43		5	480?	87.4	88.0	Felt at several places in Palembang, Sumatra and severely at Benkoelen, Sumatra.	
164	26 "	I	e M F	18 13 50 18 18 18 26		5		4.4	3.7	Rather severely felt at Pagaralam, Palembang, Sumatra.	
165	27 "	I,	e F	4 20 4 23						Malabar: iS — P = 10° △ = 90	
166	28 "	I	e F	11 17 11 20							
167	29 "	I	e M F	7 20 7 22 7 26		6		4.4	3.0		
168	29 "	I	e M F	7 32 7 35 7 37		8		4.6	4.2		
169	30 "	I	e M F	16 59 1 16 44 16 54		6		7.5	8.7		

SEISMOLOGICAL BULLETIN.

OCTOBER 1916.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quairair.

Mean Greenwich 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 1916.	Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.
				h	m	s			A _E	A _N	
170	1 Oct.	I	e	2	27		6		μ	μ	
			M	2	57	4.5			5.5		
			F	2	44						
171	5 "	I	eP	1	46	51	6	$\pm 5750?$	6.4	8.9	S uncertain.
			S?	1	54	14					
			M	1	54.5						
			eL?	2	10						
			M _L	2	52	19					
F	5	55									
172	4 "	I	e	11	54		6		5.0	2.6	
			M	11	59						
			F	12	3						
173	4 "	I	e	12	44						Felt at several places in Madioen and Pasoeroean, Java.
			F	12	47						
174	10 "	I _v	e	17	40		6		4.5	5.5	
			M	17	41						
			F	17	45						
175	11 "	I _v	i	12	45						Malabar: iS - P = 15° $\Delta = 130$
			F	12	47						
176	11 "	I _v	iP	17	7	12	3	450?	5.7	7.8	Malabar: S? - P = $\pm 48^{\circ}$ $\Delta = \pm 455?$
			iS?	17	7	59					
			M	17	8.5						
			F	17	14						
177	11 "	I _u	iP	18	17	29	6	8450	22.6	12.9	
			iS	18	27	12					
			M	18	29						
			F	18	55						
178	15 "	I	e	7	55		5		5.4	5.7	
			M	7	54						
			F	7	56						
179	15 "	I _v	e	16	52						Malabar: iS - iP = 15° $\Delta = 120$
			F	16	54						
180	15 "	I _v	iP	17	24	4	2	140	8.5	5.6	Malabar: iS - P = 11° $\Delta = 100$
			iS	17	24	20					
			M	17	24.5						
			F	17	27						

No.	Date 1916.		Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.
										A_E	A_N	
181	16	Oct.	I	e	± 17	16			μ	μ	Hour-marks missing.	
				M	± 17	19	4		5.6	2.8		
				F	± 17	21						
182	19	"	I	eP	6	9 51		500?			Malabar: $iS - iP = \pm 56^s$	
				iS?	6	10 46					$\Delta = \pm 510$	
				M	6	13	6		10.2	9.2		
				F	6	25						
183	20	"	L _v	i	0	6 44					Malabar: $iS - P = \pm 52^s$	
				M	0	8	5		4.7	3.0	$\Delta = \pm 470$	
				F	0	10						
184	20	"	II _u ?	iP	17	17 1		$\pm 6000?$			By Milne Pendulum L-P also	
				M	17	28.5	6		14.9	10.0	$= \pm 19.5^m$.	
				eL	17	36.5					Milne: F at 18 ^h 51 ^m .	
				M ^u	17	53	17		19.8	20.1		
				F	18	8						
185	20	"	I	e	19	43 0					Same origin as former one?	
				M	19	54	6		5.1	6.7		
				F	20	1						
186	21	"	L _v	eP	19	26 8		$\pm 2400?$				
				iS?	19	30 6						
				M _E	19	35	5		40.9			
				M _N	19	41.5	6			58.4		
				F	20	8						
187	21	"	I	e	21	50						
				M	22	0	6		3.4	4.1		
				eL	22	15						
				M _L	22	18	18		19.1	15.0		
				F	22	50						
188	23	"	I	e	10	5 18						
				M	10	16	6		12.4	7.8		
				F	10	34						
189	24	"	L _v	iP	10	52 6		470?				
				iS	10	52 58						
				M	10	54	5		61.8	62.4		
				F	10	51						
190	25	"	L _v	e	1	21					Felt at Wangon, Djamboe	
				M	1	22	5		5.0	5.7	and Rawalo, Banjoemas,	
				F	1	25					Java.	
191	25	"	I	i	2	54						
				F	2	59						

No.	Date 1916.		Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.
										A_E	A_N	
192	26	Oct.	III _v	iP	3	18 22			μ	μ	S uncertain; direction ESE.	
				S	?						N-S comp. ran down at iP	
				M _E	3	21 26	6		>214.0		$\pm 5^m 15^s$, by which	
				M _N	3	21 57	6		>187.0		E-W comp. got unmovable	
											at iP + 3 ^m 17 ^s .	
											Milne Pendulum: S at \pm	
											3 ^h 19.7 ^m ?	
											$\Delta = \pm 710?$	
											or at $\pm 5^h 20.9^m?$ Δ	
											$= \pm 1400?$	
											Malabar: $S? - iP = \pm$	
											1 ^m 23 ^s	
											$\Delta = \pm 760?$	
											Felt at several places in	
											Pasoeroean, Java;	
											at Negara, Bali; at Ma-	
											taram and Selong, Lom-	
											bok; at Roeteng, Flores;	
											and rather severely at	
											Waikaboebak and Wain-	
											gapoe, Soemba.	
195	26	"	I	e	5	54?						
				iS?	6	5 2						
				M	6	4	6		11.2	6.9		
				F	6	12						
194	30	"	L _v	iP	1	54 50		$\pm 2200?$			Milne Pendulum: S at 1 ^h	
				iS?	1	58 9					58.0 ^m .	
				M	2	0	5		57.0	36.4	Malabar: $iS - P = \pm 3^m 26^s$	
				F	2	19					$\Delta = \pm 2050$	
195	31	"	L _v	P	0	52 26		1680?			Direction: S W-NE?	
				S?	0	55 20					Rather severely felt at Pa-	
				M	0	59	6		96.5	92.3	rigi and Donggala, Me-	
				F	1	21					nado, Celebes.	
196	31	"	I	e	9	32						
				M	9	55	6		5.0	4.8		
				F	9	40						
197	31	"	I	e	9	44						
				F	9	49						
198	31	"	L _u	iP	15	42 16		± 8000			Direction: S W-NE?	
				iS	15	51 53					Milne Pendulum: S-P =	
				M	15	52 5	6		15.4	12.6	9.5 ^m ?	
				eL	16	0						
				M _{L1N}	16	14	19			40.7		
				M _{L1E}	16	16	18		82.5			
				M _{L2N} ?	16	21	15			24.1		
				M _{L2E} ?	16	27	15		40.2			
				F	17	15						

SEISMOLOGICAL BULLETIN.

NOVEMBER 1916.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quairair.

Mean Greenwich 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 1916.	Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.
				h	m	s			A _E	A _N	
199	2 Nov.	I _v	e M F	1 2 2	58 0 4		5		μ μ		
200	2 "	I _v	P S? M	10 10 10	7 8 8.1	36 0	5	210?	9.4 5.0	Malabar i S-P = 14 sec. $\Delta = 130$	
201	5 "	I _v	e S? M F	6 6 6	45.9 47 48.8 54	8	5		4.7 5.7		
202	4 "	I _v	e? S? M F?	1 1 1 1	9.1 10 12.5 18	2	5.4		6.4 6.5		
205	4 "	I	eP S? M F	2 2 2 2	28 28 32.5 48	5 18	5.4		25.6 24.7		
204	9 "	I	e	18	7						
205	10 "	II _v	iP S M F	18 18 18 18	41 41 45.0 58	8 28	5	185	157.7 152.4		
206	14 "	I	iP M L F	22 22 22 23	58 59.9 57 28	16	4 12		4.9 14.0		
207	18 "	I _r	e? S M L F	11 11 11 12 12	48.2 57 58.8 17 35	36	5.5 24.0	8400	14.5 35.0 8.8 16.4	Begins during eclipse of hourly mark.	
208	21 "	I _v	e M	6 6	46 49		6.0		2.6 2.1		

No.	Date 1916.		Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.
										A _E	A _N	
209	22	Nov.	I _v	iP S? M F	h 7 7 7 8	m 57 57 58.2 2	s 13 54 	3.2	570?	μ	μ	
210	22	"	III _v	iP S?	19 19	46 46	23 58		153?			Registering-pens thrown off at 19 ^h 46 ^m 58 ^s . Destructive earthquake in mountain chan of South-Preanger (Malang to Patoea) $\Delta = \pm 100$. At Kalibaroe strong subterraneous noise.
211	25	"	II _v	iP S? M F	5 5 5 4	50 51 52.1 10	27 15 	4.8	420?	70.7	95.8	Malabar register ends after 8 sec. $\Delta = 65$. Rather strongly felt in Pageralam (Palembang, Sumatra) $\Delta = 460$
212	25	"	I _v	eP M F	9 9 9	3 4.4 9	16 					Malabar S-P = 17 sec. $\Delta = 135$
213	25	"	I _v	iP S M F	22 22 22 22	40 40 41.4 50	53 51 	5.4	160	50.6	77.8	Malabar S-P = 9 sec. $\Delta = 90$
214	27	"	I	e M F	6 6 7	45.5 51.8 8		6.0		10.6	6.5	
215	29	"	II _v	iP S M L F	5 5 5 5 5	1 2 5.0 10 21	56 2 	2.0 6.5	210	20.2	16.4	Direction W 16° S. Rather strongly felt at Menees (Bantam, Java). Malabar S-P = 29 sec. $\Delta = 260$

SEISMOLOGICAL BULLETIN.

DECEMBER 1916.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

Mean Greenwich 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 1916.		Character.	Phase.	Time (Greenwich).			Period in seconds.	Distance of epicentrum.	Amplitude (half)		Remarks.
										A _E	A _N	
					h	m	s			μ	μ	
216	2	Dec.	I	e	12	18						
				M	12	39		6.5		4.8	5.9	
217	5	"	I	iP	19	26	24					
				M	19	28.2		4.4		18.6	10.6	
				F	19	46						
218	5	"	I	e	21	11						
				M	21	22		5.0		5.5	5.5	
				F	21	38						
219	6	"	I _v	P	9	15	4					
				M	9	15.8						
				F	9	19						
220	6	"	II _r	iP	18	37	47		2000			
				S	18	41	15					
				M	18	43.6		5.7		41.8	72.1	
				F	18	58						
221	12	"	I _v	e	15	27						
				M	15	31.4		6.0		8.5	10.8	
222	13	"	II _v	iP	19	13	50		160			Direction ESE
				S	19	14	8					
				M	19	15.6		6.0		58.2	88.7	
				F	19	28						
223	14	"	II _v	iP	21	54	14		200			Direction W 59° S
				S	21	54	37					Malabar S-P = 27 sec.
				M	21	55.5		2.5		62.2	77.5	△ = 290
				F	22	6						
224	25	"	I	e	9	45						
				M	9	47		5.4		11.7	10.9	
				F	10	15						
225	26	"	I	e	5	36						
				M	5	45		5.5		15.5	12.8	
				F	4	25						
226	26	"	I	e	20	16						
				M	20	26		5.8		9.7	9.1	
				F	20	48						
227	27	"	I	e	21	48						
				M	21	54		5.5		10.5	6.6	
				F	22	28						

