

SEISMOLOGICAL BULLETIN 1931.

BATAVIA OBSERVATORY, JAVA.

Foundation: River Quaternary.

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

E. Longitude $7^{\text{h}} 7^{\text{m}} 20.3^{\text{s}}$. (1)

WIECHERT Horizontal Pendulum, 1000 kilograms.

WIECHERT Vertical Pendulum, 1300 kilograms.

PREFACE.

The astatic seismograph of WIECHERT of 1000 kg is registering regularly since December 6th 1908; the vertical seismograph since July 9th, 1926.

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

The writing styles 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 impulse dial of the Synchronome Company Ltd., London.

For each month the mean constants for that month are applied. 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 for the horizontal pendulum by direct measurement, giving the pendulum a displacement by means of the horizontal adjusting screw, 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

$$(a) = 1.407 \text{ mm}; (b) = 1225 \text{ mm}; (c) = 895 \text{ mm}.$$

The *notation used* 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 km).

r (" " remotus) = distant (1000 to 5000 km).

u (" " ultimus) = very distant (over 5000 km).

(1) For the E. Longitude of the Observatory, see: J. BOEREMA, Determination of the Eastern Longitude of Batavia; K. Magn. Met. Observ. Batavia, Verhandelingen No. 12, 1924.

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 commencement, not clearly defined.

MALABAR.

Foundation: Volcanic.

S. Latitude 7° 13'; E. Longitude 107° 37'; Height above sea-level 1550 m.

WIECHERT Horizontal Pendulum 100 kg, NS and EW component. Since July 1911.

Time Signals by Malabar Radio.

Possession of Mr. R. A. KERKHOVEN.

AMBOINA.

Foundation: Quaternary.

S. Latitude 3° 42'; E. Longitude 128° 10'; Height above sea-level 4 m.

WIECHERT Horizontal Pendulum 1000 kg, NS and EW component. Since October 1924.

Time Signals by Malabar Radio.

MEDAN.

Foundation: Quaternary.

N. Latitude 3° 35'; E. Longitude 98° 41'; Height above sea-level 25 m.

WIECHERT Horizontal Pendulum 1000 kg, NS and EW component. Since July 24th, 1929.

Time Signals by Malabar Radio.

The distances given in the Bulletin Batavia are calculated with the time tables of Dr. S. W. Visser. See Verhandelingen Batavia No. 22, 1930. The following table is an extract of these tables.

Distance.	S-P	P-O	S-O	Distance.	S-P	P-O	S-O
	m s	m s	m s		m s	m s	m s
1°	0 13	0 16	0 29	56°	7 44	9 54	17 38
2	25	31	56	57	51	10 1	52
3	38	46	1 24	58	57	8	18 5
4	50	1 1	51	59	8 3	15	18
5	1 1	17	2 18	60	9	22	31
6	12	32	44	61	15	29	44
7	24	47	3 11	62	21	36	57
8	35	2 2	37	63	26	43	19 9
9	47	16	4 3	64	32	49	21
10	57	31	28	65	38	55	33
11	2 8	45	53	66	43	11 2	45
12	19	59	5 18	67	49	8	57
13	30	3 12	42	68	55	14	20 9
14	40	26	6 6	69	9 1	20	21
15	50	39	29	70	6	26	32
16	3 0	52	52	71	11	33	44
17	10	4 4	7 14	72	16	39	55
18	19	17	36	73	21	45	21 6
19	28	29	57	74	27	51	17
20	37	41	8 18	75	32	57	29
21	46	53	39	76	37	12 3	40
22	55	5 4	59	77	43	8	51
23	4 3	16	9 19	78	48	14	22 2
24	11	27	38	79	54	19	13
25	19	38	57	80	59	25	24
26	27	48	10 15	81	10 5	30	35
27	35	58	33	82	11	35	46
28	41	6 9	50	83	16	40	56
29	48	19	11 7	84	21	45	23 6
30	55	28	23	85	26	50	16
31	5 2	37	39	86	31	55	26
32	9	46	55	87	35	13 1	36
33	16	55	12 11	88	40	6	46
34	23	7 4	27	89	45	11	56
35	29	13	42	90	50	16	24 6
36	34	22	56	91	54	21	15
37	40	30	13 10	92	59	26	25
38	47	38	25	93	11 3	31	34
39	53	46	39	94	7	36	43
40	6 1	53	54	95	12	40	52
41	7	8 1	14 8	96	16	45	25 1
42	14	9	23	97	20	50	10
43	20	17	37	98	23	55	18
44	27	24	51	99	28	59	27
45	35	31	15 6	100	31	14 4	35
46	42	39	21	101	33	9	42
47	48	47	35	102	36	14	50
48	56	54	50	103	39	18	57
49	7 2	9 2	16 4	104	41	23	26 4
50	9	9	18	105	44	27	11
51	15	17	32	106	48	31	19
52	21	24	45	107	50	36	26
53	26	32	58	108	52	41	33
54	33	39	17 12	109	55	45	40
55	38	47	25	110	57	50	47

1931.	E-W component.			N-S component.			V component.		
	V.	T ₀ .	ε.	V.	T ₀ .	ε.	V.	T ₀ .	ε.
	January	220	6.7	3.1	200	6.8	3.7	318	4.6
February	220	6.6	3.3	200	6.8	3.6	318	4.6	2.2
March	220	6.5	3.3	200	6.8	3.7	318	4.8	2.2

	With lifted pen						With writing pen					
	e ₀			r			e ₀			r		
	EW.	NS.	V.	EW.	NS.	V.	EW.	NS.	V.	EW.	NS.	V.
January	1.12	1.12	1.13	0.0	0.0	0.0	1.12	1.13	1.16	0.88	0.51	0.47
February	"	"	"	"	"	"	1.11	1.12	1.15	0.87	0.39	0.53
March	"	"	"	"	"	"	1.11	1.14	1.16	0.91	0.44	0.71

MEDAN: no time marks, January 1-22; no reliable time marks, March 8-31.

JANUARY.

No.	Date 1931.	Station.	Char-acter.	Phase.	Time (G. C. T.).	Period.	Amplitude (half).		Distance of epi-centre.	Remarks.
							A _E	A _N		
	Jan. 1	Amb.	I _v	P _N S F	h m s 16 14 29 16 15 0 16 22	sec.	μ	μ	km. 270	
	" 1	Amb.	I _v	P S F	19 26 31 19 26 31 19 29				170	
	" 2	Bat.	I	eP i i F	25 38 36 0 5 3 0 3 39 0 7					
2	" 2	Bat.	I	iP _v i i i i F	10 8 10 10 8 14 10 29 25 10 17 38 10 23					Dilatation.
		Med.	I	P i L L L L F	10 10,1 10 11,6 11 0 11 21 11 26,8 11 32,9 11 35	50 24 22 20				
	" 4	Med.	I	e? i iS i F	4 34,8 4 37,9 4 39,4 5 1,1 5 9					

No.	Date 1931.	Station.	Char-acter.	Phase.	Time (G. C. T.).	Period.	Amplitude (half).		Distance of epi-centre.	Remarks.
							A _E	A _N		
—	Jan. 4	Amb.	I _v	P S F	h m s 16 31 25 16 32 27 16 33	sec.	μ	μ	km. 390	
—	" 4	Amb.	II _v	P iS _N F	18 0,9 18 1 58 18 12				400	In minute mark.
—	" 4	Med.	I	i i F	25 34,2 25 34,4 25 39					
—	" 7	Med.	I _r	eP S i F	1 2,4 1 9,0 1 9,2 1 32				(3000)	
—	" 7	Amb.	I _r	P _N S _w F	12 42 33 12 46 12 12 32				2000	
—	" 10	Amb.	I _v	eP S F	10 4 48 10 3 22 10 9				500	
—	" 10	Amb.	I _v	P iS F	11 33 22 11 36 18 11 41				310	
5	" 12	Bat.	I	i _w F	20 33 4 20 39					
		Med.	I	i i L L F	20 42,2 20 42,3 21 12,4 21 18,3 21 35	19 20				
4	" 15	Bat.	I	i F	21 30 32 21 36					
3	" 14	Bat.	I _r	eP i i F	1 29 48 1 33 46 1 35 32 1 40					Manado and Soela Isl.
		Amb.	I _v	P iS F	1 28 8 1 29 7 1 35				340	
—	" 14	Med.	I	e i i F	17 12,5 17 14,6 17 18,2 17 25					
6	" 15	Bat.	II _u	i _v i _E i _S i _E eL	2 9 36 2 10 0 2 11 2 2 14 4 2 47					
				L L L L F	2 39 50 2 39 14 2 36 0 2 35 18 2 4 4	37 37 22 36 30				Dilatation. Mexico.
		Mal.	I _u	i	2 10 49					

No.	Date 1951.	Station.	Character.	Phase.	Time (G. C. T.).			Period.	Amplitude (half).		Distance of epicentre.	Remarks.
					h	m	s		sec.	μ		
		Med.	II _u	eL	5	6						
				L	5	8	22					
				F	5	46						
				eP	2	11,2						
				iP	2	12,9						
				L	2	42	59					
				L	2	55,6	45					
				L	5	6,1	28					
				M	5	13,8	20					
				M	5	15	21					
		Amb.	II _u	F	4	21						
				P	2	10	2					
				i	2	12	34					
				i	2	15	27					
				L	2	50	27,5					
				M	5	2	55					
				M	5	5	26					
				F	4	9						
7	Jan. 13	Bat.	I _v	eP	18	17	55					
				F	18	20						
		Mal.	I _v	P	18	18	2			90		
				iS	18	18	15					
				F	18	19						
8	" 15	Bat.	I	P	21	8	55					
				i	21	15	54					
				i	21	16	58					
				F	21	26						
9	" 13	Bat.	II	iP	22	49	54					
				i	22	50	58					
				iE	22	51	4					
				i	22	58	6					
				F	25	59						
		Amb.	I _r	iP	22	46	57			1900		
				iS	22	49	48					
				F	25	52						
	" 13	Mal.	I _v	P	22	54	50			100		Tjitjoeroeg (W. Priangan).
				iS	22	55	2					
				F	22	56						
10	" 17	Bat.	I	e	5	9,8						
				F	5	25						
11	" 18	Bat.	III _d	iP _v	15	12	6			200		WSW, dilatation.
				iP	15	12	7					West-Java and Lampongs
				i _v	15	12	10					(S. Sumatra).
				iS	15	12	30					Pens off 15 ^h 12 ^m 31 ^s
				F	15	36						on 15 ^h 18 ^m
		Mal.	III _v	iP	15	12	53			270		
				iS	15	15	26					
				F	15	20						
		Med.	II _r	P	15	14,5				(1900)		
				S _E	15	17,5						
				i _s	15	17,9						
				i	15	18,1						
				F	15	48						
12	" 19	Bat.	I	eP _v	12	27	52					
				iP	12	27	56					
				i	12	28	49					
				iE	12	55	11					

No.	Date 1951.	Station.	Character.	Phase.	Time (G. C. T.).			Period.	Amplitude (half)		Distance of epicentre.	Remarks.
					h	m	s		sec.	μ		
		Med.	I	P	12	56						
				e	12	50,1						
				i	12	55,0						
				i	12	55,5						
				i	12	59,2						
				F	15	15						
		Amb.	II _v	P	12	25	46				600	
				iS	12	24	51					
				F	13	9						
	Jan. 20	Amb.	I _v	iP	5	10	8				550	
				iS	5	10	48					
				F	5	37						
15	" 20	Bat.	I	i	9	45	56					
				i	9	45	17					
				i	9	46	25					
				F	9	49						
		Med.	I	eP	9	55,1						
				iS	9	57,6						
				F	10	1						
14	" 20	Bat.	I _r	P	15	28	52				1110	N. Sumatra and.
				S	15	50	29					Salangor and Negeri sem-
				F	15	48						bilan (Malacca).
		Med.	III _v	P	15	21,9					(160)	ESE.
				iP	15	21,1						WNW.
				iS	15	21,4						
				off	15	21,4						
15	" 20	Bat.	III _v	iP	25	44	1				290	Destructive at Boemiajoe
				iS	25	44	54					(C. Java).
				F	24	51						
		Mal.	III _v	iP	25	44,5					(120)	In minute mark.
				S	25	44	45					
				F	24	0						
	" 24	Med.	I _v	P	15	22	42				210	
				S	15	25	6					
				F	15	26						
16	" 24	Bat.	I _r	iP	15	46	42				1680	
				S	15	49	53					
				F	14	8						
		Mal.	I	i	15	48	45					
				i	15	50	12					
				F	15	52						
		Med.	II _r	P	15	46	56				4500	
				i	15	48	25					
				iS	15	55	0					
				F	14	52						
		Amb.	I	i	15	45	45					
				i	15	48	40					
				L	15	52	45			17		
				F	14	15						
	" 27	Amb.	I _v	P	6	46	22				500	
				iS	6	46	56					
				F	6	59						
17	" 27	Bat.	III _r	eP _v	15	15	54					WNW, faint dilatation fol-
				iP _v	15	15	55					lowed by strong com-
				iP	15	15	57					pression.
				L _v	20	25,5				53		Kamaing, India.

No.	Date 1931.	Sta-tion.	Char-acter.	Phase.	Time (G. C. T.)			Period.	Amplitude (half).		Distance of epi-centre.	Remarks.				
					h	m	s		sec.	μ			μ			
18	Jan. 28	Med.	III _r	i	20	17	58	17			2610	Dilatation.				
				i _{NS}	20	28	5									
				F	21	19										
				P	20	14	15									
				iP	20	14	18									
				S	20	18	22									
		Amb.	I _u	F	21	58										
				P	20	18	12									
				iS	20	24	55									
				L	20	27.6										
				F	21	4										
—	Jan. 28	Bat.	II	iP _v	21	51	52	24			5250					
				iP	21	51	55									
				i	21	55	28									
				i _{EW}	21	42	0									
				eL _v	21	44.5										
				F	22	17										
		Med.	II _u	eP	21	52	50									
				iS	21	59	20									
				F	25	10										
				Amb.	II	iP	21						29	5		
						F	22						45			
				—	Jan. 29	Med.	I						i _N	17	21	27
i _E	17	22	58													
F	in next.															
—	Jan. 29	Med.	I					i _N	17	42	46					
								F	18	0						
								—	Jan. 30	Med.	I _u	i	5	57	35	
				S?	5	44	59									
				F	4	4										
				—	Jan. 31	Med.	I					e _{NS}	20	54	12	
i	20	55	51													
F	21	9														

FEBRUARY.

—	Feb. 1	Mal.	I _v	P	6	50	50	70				
				Si	6	50	58					
				F	6	52						
—	Feb. 2	Med.	I	e	5	47						
				i _w	5	48	44					
				F	4	5						
19	Feb. 2	Bat.	III _u	iP _v	22	57	59	42.5			7890	SE, dilatation. New Zealand.
				iP	22	58	4					
				iP _v	22	58	5					
				i	22	59	41					
				iS	25	7	15					
				i	25	8	0					
				L	25	16	35					
				L	25	25.5						
				M	25	27	5					
				M	25	29						
				F	25	7						

No.	Date 1931.	Sta-tion.	Char-acter.	Phase.	Time (G. C. T.)			Period.	Amplitude (half).		Distance of epi-centre.	Remarks.							
					h	m	s		μ	μ									
—	—	Mal.	II _u	iP	22	57	58	20.0			7670								
				i	25	6	0												
				iS	25	6	58												
				L	25	15													
				M	25	22	5												
				L	25	48													
		Med.	III _u	F	24	10													
				P	22	59	5												
				S	25	9	51												
				i	25	15	5												
				L	25	28													
				L	25	29	52												
—	—	Amb.	II _u	M	25	51	52	26.5			7550								
				M	25	55	18												
				F	26	18													
				iP	22	55	26												
				i	22	55	50												
				S	25	4	10												
		Med.	I	L	25	10	55												
				M	25	21	10												
				F	24	37													
				e	6	42	52												
				F	6	55													
				—	—	Med.	I						e	1	16	44			
F	1	29																	
Bat.	I	i _v	1					55	4										
		i	1					55	6										
		i _N	2					5	50										
		F	2					12											
		e	1			56	10												
		F	2			6	44												
—	—	Bat.	I _r			F	2	15					450	S. Sumatra.					
						e	1	50.6											
						i	1	40	9										
						i	1	41	44										
				F	2	5													
				P	1	27	40												
		Med.	III _r	S?	1	51	57												
				i	1	55	45												
				F	1	46													
				P	5	59	42												
				S	6	0	29												
				F	6	17													
—	—	Mal.	I _v	eP	6	0	0	21.0			450	WNW, compression. S. Sumatra and W. Java.							
				S	6	0	50												
				F	6	8													
				e	6	1	9												
				F	6	24													
				Bat.	III _d	iP	6						55	57					
		iS	6			56	26												
		off	6			57	57												
		on	6			58													
		F	8			59													
		iP	6			55	52												
		—	—	Mal.	III _v	i	6						55	59	21.0			450	
F	6					50													

No.	Date 1951.	Station	Character.	Phase.	Time (G. C. T.).			Period.	Amplitude (half).		Distance of epicentre.	Remarks.							
					h	m	s		sec.	μ			μ	km.					
54	Feb. 19	Mal.	II _v	iP ₁	17	41	38	30			540								
				iP ₂	17	42	14												
				iS ₁	17	42	37												
				iS ₂	17	45	14												
		Med.	III _r	eP _{NS}	17	42	33						1370						
				i	17	45	53												
		Amb.	I	iS	17	48	56						(5780)						
				F	in next.														
				eP	17	46	11												
				i	17	51	54												
Med.	III _v	L	17	56	(950)														
		F	in next.																
55	Feb. 19	Bat.	III _v	iP _v	18	25	21	30			550?	Compression. Cocos Islands.							
				iP	18	25	25												
				S?	18	26	55												
		Mal.	I _v	F	19	12	450												
				P	18	24							47						
		Med.	III _v	S	18	25	(950)												
				F	18	54							55						
		Amb.	I	i	18	27	(950)												
				F	18	29							29						
		Med.	III _v	i	18	29	(950)												
F	19			2	2														
Amb.	I	i	18	50	21														
		F	18	51															
56	Feb. 19	Amb.	I	i	21	57	13	30											
				i	21	40	38												
				F	21	45													
54	Feb. 20	Bat.	II _u	iP _v	5	42	29	30			5840	ENE, compression.							
				iP	5	42	30												
				iS	5	49	34												
				F	6	29	34												
		Mal.	I _u	P	5	42	6320												
				eS	5	50							50						
		Med.	III _u	F	5	54	5350												
				iP	5	42							8						
		Amb.	I	iS	5	49	5												
				F	5	50							6						
Med.	III _u	i	5	50	6														
		F	6	56															
Amb.	I	iP	5	41	55														
		F	6	12															
55	Feb. 22	Bat.	I _v	eP	10	55	45	30			970?	Moeara Mentalla, S. E. Borneo?							
				S?	10	53	26												
				F	10	47													
56	Feb. 22	Bat.	I	eP	21	50	19	30			2140	Flores?							
				i	21	51	34												
				i	21	58	53												
				F	21	55													
		Med.	II _r	eP	21	52	48												
				i	21	53							23						
		Med.	II _r	iS	21	56	19												
				F	22	7													
		57	Feb. 25	Bat.	I _r	P	5						28	18	30			15	Flores??
						i	5						29	35					
i	5					32	53												
L _v	5					55.6													
F	5					41													

No.	Date 1951.	Station	Character.	Phase.	Time (G. C. T.).			Period.	Amplitude (half).		Distance of epicentre.	Remarks.		
					h	m	s		sec.	μ			μ	km.
38	Feb. 24	Med.	I _r	P	5	50	50	30			5890			
				i	5	51	39							
				iS	5	55	59							
				i	5	55	40							
				F	6	5								
		Bat.	I _r	P _v	17	51	0						1600	
				eP	17	51	29							
				iP _v	17	51	51							
				S _{NS}	17	54	15							
				F	17	55								
Med.	I _r	P	17	54	1	5190								
		S	17	58	47									
		i	17	45	10									
		F	18	4										
39	Feb. 26	Bat.	I _v	eP	8	56	45	30			260			
				S	8	57	12							
				F	8	41								
—	Feb. 26	Amb.	I _v	P	10	5	11	30			260			
				iS	10	5	40							
				F	10	5	49							
—	Feb. 26	Mal.	I _v	P	21	50	20	30			150			
				iS	21	50	35							
				F	21	52								
40	Feb. 27	Bat.	II _r	P _v	9	42	14	30			2580	NE, compression. Menado (N. Celebes).		
				P	9	42	24							
				S	9	46	14							
				L _v	9	50	15							
				F	10	11								
		Med.	II _r	P	9	45.7	24						(5410)	No minute marks.
				iS	9	48.7								
		Amb.	II _v	F	10	23	690							
				iP	9	59							10	
		Med.	II _r	iS	9	40	24							
F	10			11										
41	Feb. 27	Bat.	I _r	i	11	16	51	30			Menado.			
				F	11	22								
MARCH.														
42	March 2	Bat.	I _u	iP _v	2	29	56	30			7070	Compression.		
				eP	2	29	58							
				iP _v	2	29	42							
				iP	2	29	44							
				iS	2	58	6							
		Med.	I	L	2	48.5	40						25	
				F	5	15								
		Med.	I	P	2	51	46							
				i	2	41							11	
		Amb.	I	L	2	59.4	25							
F	5			41										
Med.	I	P	2	26	59									
		i	2	64		45								
Med.	I	i _N	2	28	58									
		F	5	5										

Date 1951.	Stations.	Char-acter.	Phase.	Time (G. C. T.).			Period.	Amplitude (half).		Distance of epi-centre.	Remarks.		
				h	m	s		μ	μ				
5 March	2	Bat.	I _r	i _w	7	30	14				Manado.		
				F	7	30							
	Med.	I _r	eP	7	32	30				5350			
			S	7	37	23							
			i	7	38	38							
			F	7	36								
	Amb.	I _v	iP	7	26	13				520			
			iS	7	27	10							
	F				7	49							
5	Amb.	I _v	P		6	7	(50)				(40)	In minute mark.	
				iS	6	7	35						
				F	6	11							
4	4	Bat.	I _v	eP _v	4	37	31				520	Compression, S. Sumatra.	
				eP	4	37	36						
				iP _v	4	38	6						
				S	4	38	27						
				F	3	6							
	5	Bat.	I _r	I _r	i _N	18	2	41	20			380	Teupah, Atjeh (N. Su- matra).
					L _v	18	4	20					
					i _E	18	3	0					
					L _v	18	11	10					
					F	18	15						
Med.	II _v	II _v	II _v	iP	18	1	4	15			380	Azimuth WSW.	
				iS	18	1	47						
				F	18	13							
7	Amb.	II _v	P		4	24.0				(80)	In minute mark.		
				iS	4	24						10	
				F	4	42							
6	7	Bat.	I	e	10	10	33						
				e	10	13	33						
				i	10	18	8						
				F	10	27							
	8	Med.	I	I	eP	0	35	39	25			81	
					i	0	36	13					
					L	1	16	46					
					L	1	31	36					
					F	2	3						
7	8	Bat.	I _u	eP	2	4	0	23			(9900)	Azimuth NNW. Balkan.	
				iS	2	14	46						
				i _w	2	16	28						
				L	2	44	48						
				F	2	30							
	9	Bat.	II _u	II _u	P _v	3	39	13	51			6420	
					iP	3	39	14					
					iS	4	7	9					
					i	4	9	6					
					L	4	19	28					
Med.	II _u	II _u	II _u	L _v	4	19	28	30			6250		
				L	4	24.5	19						
				M	4	26	43						
				F	3	12							
				iP	3	37	38						
iS					4	5	44						
					4	6	30						
					4	15.9	58						

No.	Date 1951.	Sta-tion.	Char-acter.	Phase.	Time (G. C. T.).			Period.	Amplitude half.		Distance of epi-centre.	Remarks.		
					h	m	s		μ	μ				
—	March 11	Amb.	I _u	I _u	M	4	20.6	22			5220			
					F	3	19							
					iP	3	37						17	
					i	3	37						34	
					iS	4	4						3	
		Med.	I _r	I _r	I _r	L	4	15				5340		
						F	4	34						
						eP	4	4						37
						iS	4	10						3
						i	4	10						20
49	11	Bat.	I _r	I _r	iP _v	6	4	24				2640	Dilatation.	
					P _{EW}	6	4	25						
					S	6	8	33						
					F	6	29							
		Amb.	II _v	II _v	II _v	P	3	59	33				530	
						iS	6	0	15					
						F	6	16						
—	11	Med.	I	I	P	10	19	31	22					
					i	10	20	33						
					i	10	23	25						
					i	10	23	37						
					L	10	36							
		Bat.	I	I	I	F	11	21					380	
						iP _v	12	33	44					
						P _E	12	33	47					
						i	12	36	43					
						i	12	37	50					
50	11	Bat.	I	I	i	12	42	27						
					i	12	45	17						
					L	13	33	27						
					L _v	13	33	43						
					L _v	13	37	40						
		Amb.	I	I	I	F	13	14		18				
						e	12	35	2					
						L	12	42						
						F	13	12						
—	11	Amb.	I	I	i	16	3	22						
					F	16	15							
		Med.	I	I	I	eP	18	48	29	18				
						i	18	50	6					
						F	19	12						
—	12	Amb.	I _v	I _v	P	4	48	16				510		
					S	4	48	31						
					F	4	53							
		Bat.	I	I	I	i _v	10	49	45					
						i	10	49	45					
						i	10	56	27					
						F	11	3						
—	12	Med.	I	I	eP	11	0	28						
					i	11	8	32						
					F	11	33							
		Med.	I _v	I _v	I _v	P	18	46	0				380	
						S	18	46	43					
						F	19	8						

No.	Date 1951.	Station.	Char-acter.	Phase.	Time (G. C. T.).	Period.	Amplitude (half)		Distance of epi-centre.	Remarks.
							A _E	A _N		
	March 15	Amb.	I	eP i F	h m s 21 48 19 21 51 15 21 56		μ μ	km.		
2	" 18	Bat.	I	i L M F	8 25 14 8 54 9 20 9 52	25 15				
		Med.	II	e i L M F	8 22 5 8 44 48 9 5 9 12 10 50	20 18.5				
3	" 18	Bat.	I	i _{NS} F	10 57 8 10 42			550		
		Mal.	I _v	P iS F	10 57 1 10 57 59 10 40					
4	" 18	Bat.	II _r	iP _v iP S? F	20 18 41 20 18 45 20 21 20 20 52			1850?	Az. ENE; compression. Sangir Isl. (N. Celebes).	
		Mal.	I	P F	20 18 44 20 32					
		Amb.	II _r	iP S F	20 16 0 20 17 55 21 10			1070	Azimuth WNW.	
		Med.	II _r	iP i S? F	20 16 29 20 16 51 20 21 36 21 56			5520		
5	" 18	Bat.	I _v	P _w S _s F	21 55 46 21 56 54 22 10			450	Benkoelen (S. Sumatra).	
		Med.	I _r	eP eS i F	21 57 21 21 59 52 22 0 2 22 10			1250		
	" 18	Med.	I	i F	22 19 9 22 51					
6	" 19	Bat.	II _r	iP _v P _N S i F	6 30 51 6 30 54 6 35 50 6 36 21 7 12			5390	Faint dilatation, strong compression. Hong Kong.	
		Amb.	I _r	P S i F	6 50 6 6 54 29 6 41 14 7 5			2850	Azimuth NNW.	
		Med.	II _r	iP iS i F	6 25 53 6 29 21 6 30 53 7 57			2560		
7	" 22	Bat.	I _v	e _{NS} S F	0 41 45 0 42 22 0 45					
		Mal.	I _v	eP iS F	0 41 5 0 41 26 0 45			200		

No.	Date 1951.	Sta-tion.	Char-acter.	Phase.	Time (G. C. T.).	Period.	Amplitude (half)		Distance of epi-centre.	Remarks.
							A _E	A _N		
	March 24	Amb.	I _v	P S F	h m s 11 50 5 11 50 19 11 53		μ μ	km.		
58	" 27	Bat.	I _v	P _v P i _v iS _v S i _v F	25 47 4 25 47 5 25 47 42 25 48 1 25 48 4 25 48 27 24 7			540	Compression. S. Sumatra.	
59	" 28	Bat.	I _v	P S F	8 27 7 8 27 46 8 55			340	S. Sumatra.	
	" 28	Amb.	I _v	eP S? F	9 56 54 9 57 47 10 6			480?		
60	" 28	Bat.	III _r	iP _v iP ₁ iP ₂ S ₁ S ₂ iP iS F	12 45 55 12 45 54 12 44 57 12 47 56 12 48 56 12 59 48 12 40 4 14 52			I 2540 II 2500	Az. WNW; dilatation. Probably two shocks. S. Moluccas.	
		Amb.	III _v	iP iS F	12 59 48 12 40 4 14 52			140	Azimuth NW.	
		Med.	III _u	iP S F	12 58 6 12 46 28 14 8			6900	Azimuth NW.	

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CONSTANTS.

1931.	E-W component.			N-S component.			V component.		
	V.	T ₀ .	ε.	V.	T ₀ .	ε.	V.	T ₀ .	ε.
	April	220	6.3	2.9	200	6.7	3.6	330	4.6
May	"	6.5	3.1	"	6.7	3.6	"	4.6	2.2
June	"	6.6	3.3	"	6.7	3.6	"	4.6	2.5

	With lifted pen						With writing pen					
	e ₀			r			e ₀			r		
	EW.	NS.	V.	EW.	NS.	V.	EW.	NS.	V.	EW.	NS.	V.
April	1.12	1.12	1.13	0.0	0.0	0.0	1.10	1.12	1.14	0.98	0.47	0.64
May	"	"	"	"	"	"	10.9	1.16	1.14	0.89	0.45	0.69
June	"	"	"	"	"	"	1.14	1.14	1.14	0.85	0.42	0.52

APRIL.

No.	Date 1951.	Station.	Character.	Phase.	Time (G. C. T.).			Period.	Amplitude (half).		Distance of epicentre.	Remarks.
									A _E	A _N		
—	April 1	Med.	I	eP	h	m	s	sec.	μ	μ	km.	
				i	1	36	11					
				F	1	37	16					
					2	4						
—	" 2	Med.	I	e	0	57						
				i	0	59	44					
				F	0	41	23					
					0	37						
—	" 2	Amb.	I _v	iP	12	25	58				380	
				iS	12	24	21					
				F	12	39						
—	" 5	Amb.	I _v	iP	19	14	54				420	
				S	19	13	41					
				F	19	23						
16	" 3	Bat.	I _u	iP _v	23	29	59				6890	WNW; dilatation.
				iP	23	29	40					
				iS	25	58	1					
				F	23	55						
		Med.	I	P	25	24.4						No minute marks.
				i	25	25.4						
				i	25	25.8						
				i	23	34.1						
				F	25	56						
		Amb.	I _r	iP	25	28	28				4980	NNW.
				iS	25	53	2					
				F	24	52						

No.	Date 1931.	Sta- tion.	Char- acter.	Phase.	Time (G. C. T.)			Amplitude (half).		Distance of epi- centre. km. (80)	Remarks.
					h	m	s	A _E	A _N		
—	April 4	Amb.	III _d	iP off	14	5	38 48	μ	μ		
62	• 5	Bat.	I	eP e F	21	59	26 45,1 55				
65	• 6	Bat.	I _r	iP _v P S L L F	6	58	19 22 55 7 4 55 7 15 7 22 7 38			4970	SE, compression.
		Med.	I _v	P S i F	6	59	29 17 55				
		Amb.	I _r	iP S F	6	54	17 6			4260	S.
—	• 6	Med.	II _v	P iS F	7	24	4 40			520	Teupah, Atjeh.
—	• 7	Mal.	I _v	eP iS F	19	4	26 36 5			80	
—	• 8	Mal.	I _v	iP iS F	8	52	28 43 55			150	
64	• 8	Bat.	I	eP e i F	19	9	44 24 55				
		Amb.	I _r	P iS L M F	19	5	42 56 28 15 29			1080	
					27			15			
65	• 9	Bat.	I _v	iP iS F	1	0	47 4			150	NE, dilatation. West Priangan (W. Java).
		Mal.	II _v	iP iS F	1	0	43 56			110	
66	• 9	Bat.	I _v	iP iS F	19	55	0 17			150	Dilatation. Djampang Koelon (W. Priangan).
		Mal	I _v	iP iS F	19	52	56 7			90	
67	• 9	Bat.	I	e i F	25	11	25 56				
68	• 10	Bat.	I	e F	12	9	41 21				

No.	Date 1931.	Sta- tion.	Char- acter.	Phase.	Time (G. C. T.)			Period.	Amplitude (half)		Distance of epi- centre. km.	Remarks.
					h	m	s		A _E	A _N		
—	April 11	Med.	I _r	P S F	2	13	21 14			1070		
69	• 12	Bat.	I	e i L _N _s M F	2	11,1	44					
		Med.	I	eP i L F	2	54	20					
					2	35		21				
					2	50		20				
					2	15						
					2	22	57					
					2	40,7		18				
					5	5						
70	• 15	Bat.	I _v	P _{EW} S F	6	9	15 36			200		
					6	9						
					6	16						
71	• 16	Bat.	I _r	eP eS F	11	58	33 28			1720		
		Med.	I _r	P iS i F	12	0	54 50 54			2460		
		Amb.	I	i i F	12	8	54 55 0			(3520)		
					11	58						
					12	4						
					12	18						
—	• 17	Amb.	I _v	iP S F	9	7	57 45			410		
					9	8						
					9	17						
—	• 18	Amb.	I	P F	18	41	12 47					
					18	47						
72	• 21	Bat.	I	e _{EW} e _{EW} i F	25	52,0						
	• 22				0	0,8	59					
					0	14						
					0	54						
					0	5	52					
					0	52						
75	• 24	Bat.	I	e F	5	48	54					
		Mal.	I _v	P iS F	5	48	35 57 55			570		
—	• 24	Amb.	I _v	P S? F	15	26	26 55			830?		
					15	27						
					15	31						
74	• 24	Bat.	II _v	iP _v iP iS F	16	5	52 53 19			250	WSW, compression. Lampongs, S. Sumatra.	
					16	5						
					16	4						
					16	16						
		Mal.	I _v	P S F	16	4	13 56			580		
					16	4						
					16	7						
		Med	I _r	P S F	16	5	58 48			2510		
					16	9						
					16	19						

No.	Date 1931.	Station.	Character.	Phase.	Time (G. C. T.).			Period.	Amplitude (half).		Distance of epicentre.	Remarks.
					h	m	s		A _E	A _N		
75	April 24	Bat.	II _u	iP	17	50	55	30	μ	μ	5000	ESE;
				S	17	57	56					
				i _{NS}	17	58	51					
		Mal.	I _u	L _v	17	46,2						
				F	18	2						
				iP	17	51	1					
		Med.	II _u	S	17	57	39					
				F	17	45						
				iP	17	52	2					
		Amb.	II _r	iS	17	59	55					
				F	18	35						
				iP	17	27	55					
iS	17			52	26							
i	17			53	11							
L	17			40,8								
Med.	I _v	F	18	4								
		eP	9	22	19							
		iS	9	22	42							
76	April 25	Bat.	I _v	F	9	27						
				iP _v	20	39	56					
				iP	20	39	37					
		Mal.	I _v	iS	20	39	54					
				F	20	45						
				P	20	39	41					
		Med.	I	iS	20	39	57					
				F	20	45						
				eP	17	2	39					
				i	17	11	25					
				i	17	12	52					
				F	17	28						
Med.	I	eP	17	0	57							
		i	17	10	13							
		F	17	50								
Med.	I _v	P	10	25	55							
		iS	10	26	15							
		F	10	31								
MAY.												
78	May 2	Bat.	I _v	eP	5	26	54	30	μ	μ	550	Benkoelen, S. Sumatra
				S	5	27	54					
				F	5	55						
		Med.	I _v	eP	5	28	19					
				eS	5	29	12					
				i	5	29	49					
		Med.	I	F	5	41						
				e	19	22,4						
				i	19	24	55					
		Med.	I _r	F	19	56						
				P	2	51	55					
				S	2	55	15					
Med.	I _r	F	5	15								
		P	2	51	55							
		S	2	55	15							

No.	Date 1931.	Station.	Character.	Phase.	Time (G. C. T.).			Period.	Amplitude half.		Distance of epicentre.	Remarks.
					h	m	s		A _E	A _N		
—	May 7	Mal.	I _v	eP	4	21	1	20	μ	μ	100	
				iS	4	21	15					
				F	4	23						
—	» 7	Amb.	I _v	P	19	54	9	20	μ	μ	380?	
				S?	19	54	52					
				F	19	57						
—	» 9	Amb.	I _v	iP	20	52	0	20	μ	μ	50	
				iS	20	52	7					
				F	20	55						
—	» 10	Med.	I _v	P	5	4	8	20	μ	μ	240	
				S	5	4	55					
				i	5	4	48					
				F	5	14						
				iP _v	1	48	28					
				iP	1	48	50					
79	» 12	Bat.	I _u	i	1	57	51	20	μ	μ	7520	Compression. ESE.
				F	2	2						
				P	1	48	6					
—	» 12	Med.	I _u	iS	1	56	59	20	μ	μ	180	Dilatation.
				i	1	59	29					
				F	2	5						
—	» 12	Amb.	I _v	iP	17	11	15	20	μ	μ	870	
				S	17	11	56					
				F	17	17						
—	» 15	Amb.	I _v	eP	7	51	45	20	μ	μ	3650	
				S	7	55	16					
				F	7	42						
				P _w	7	53	25					
				i	8	0	9					
				i	8	1	21					
80	» 15	Bat.	I	F	8	9		20	μ	μ	7120	Dilatation. WNW?
				P _{NS}	7	53	50					
				iS	7	59	5					
—	» 14	Amb.	I	F	8	21		20	μ	μ	3650	
				i	2	55	57					
				i	5	5	5					
81	» 15	Bat.	I _u	F	5	4		20	μ	μ	7120	Dilatation. WNW?
				iP _v	7	52	58					
				P	7	52	59					
		Med.	I	iS	8	1	14					
				F	8	8						
				P	7	53	42					
82	» 20	Bat.	I	i	8	5	14	20	μ	μ	7120	Dilatation. WNW?
				F	8	10						
				eP	2	55	45					
—	» 20	Amb.	I	eL	3	25		20	μ	μ	2010	
				L	3	50						
				M	5	55						
				L	5	51						
				F	4	4						
				i	2	42	57					
				L	5	11						
				L	5	52,4						
F	4	2										

No.	Date 1951.	Station.	Character.	Phase.	Time (G. C. T.)			Period.	Amplitude (half).		Distance of epicentre.	Remarks.
					h	m	s		μ	μ		
85	May 20	Bat.	II	e	2	40	57	40				
				i	2	49	52					
				i _E	2	52	29					
				L _{NS}	5	9,2						
				M	5	27						
			F	4	27							
85	May 20	Bat.	I	i	5	26	55					
				iP	5	36						
				F	5	14	56					
85	May 20	Med.	I _u	S	5	21	59				5460	
				F	5	37						
					5	37						
85	May 20	Amb.	I _v	P	16	51	52				60	
				iS	16	51	59					
				F	16	58						
85	May 20	Amb.	I _v	iP	18	58	55				160	
				iS	18	58	54					
				F	19	10						
84	May 24	Bat.	I _r	P	0	18	27				2950	
				iS	0	22	57					
				F	0	36						
				e	0	16	27					
				F	0	25						
84	May 24	Amb.	I	F	0	16	27				2650	
				F	0	25						
				P	0	18	55					
				iS	0	23	5					
				i	0	25	26					
85	May 24	Bat.	I	i	0	32	17	14				
				F	0	42						
				P	21	25	48					
				F	21	40						
				i	21	23	46					
85	May 24	Amb.	I	i	21	37	15					
				F	21	40						
					21	40						
85	May 27	Med.	I	P	0	54	24					
				i	0	55	51					
				i	0	56	47					
				F	1	7						
85	May 27	Mal.	I _v	P	18	27	55				160	
				iS	18	28	11					
				F	18	50						
86	May 29	Bat.	I _v	P	2	8	58				200	
				S	2	9	21					
				F	2	12						
				P	2	8	56					
				S	2	9	18					
86	May 29	Mal.	I _v	S	2	9	18				190	
				F	2	11						
					2	11						
JUNE.												
87	June 1	Bat.	I	i	12	9	22					
				F	12	17						
88	June 2	Bat.	I _u	P	2	46	52				5220	
				iS	2	53	20					
				F	2	59						
					2	59						

No.	Date 1951.	Stations.	Character.	Phase.	Time (G. C. T.)			Period.	Amplitude (half).		Distance of epicentre.	Remarks.
					h	m	s		μ	μ		
89	June 2	Bat.	I	i	3	40	53					
				F	3	47						
				eP	3	53	57					
				F	3	45						
90	June 2	Bat.	I _v	P	11	12	48				460?	Boemiajoe, Central Java.
				S?	11	15	59					
				F	11	20						
90	June 2	Med.	I	eP	16	54						
				F	16	41						
91	June 5	Bat.	I _r	eP	14	5	12				2550	
				S _{NS}	14	8	58					
				F	14	16						
92	June 4	Bat.	II _r	iP _v	9	55	18					
				iP _w	9	55	19					
				F	10	16						
				iP	9	51	6					
				iS	9	51	49					
92	June 4	Amb.	III _v	F	10	18					380	Dilatation. Ceramond Banda, Moluccas. Azimuth SE.
				iP	9	51	6					
				iS	9	51	49					
				F	10	18						
				eP	9	57	45					
92	June 4	Med.	I	i	10	0	17					
				i	10	5	58					
				i	10	7	49					
				F	10	29						
					10	29						
92	June 8	Amb.	I _v	iP	14	28	11				260	
				S	14	28	41					
				F	14	40						
92	June 9	Med.	I	e	12	52	34					
				F	13	5						
92	June 9	Med.	I	i	16	21	59	20				
				L	16	52.0						
				F	17	14						
92	June 10	Med.	I _v	eP	12	24	17				750	
				S	12	25	58					
				F	12	33						
95	June 16	Bat.	I _v	P	22	1	58				180	Dilatation. Tjibitoe, C. Priangan (W. Java).
				iP _v	22	2	2					
				iS	22	2	19					
				F	22	6						
				iP	22	2	8					
95	June 16	Mal.	I _v	iS	22	2	26				160	
				F	22	2	26					
				iS	22	2	26					
				F	22	4						
					22	4						
94	June 17	Bat.	I _v	P	11	1	55				240	
				iS	11	2	20					
				F	11	10						
94	June 17	Amb.	I _r	iP _N	17	6	10				2160	
				iS	17	9	42					
				F	17	22						
				iP	17	8	42					
				iS	17	15	45					
94	June 17	Med.	I _u	i	17	16	10				5460	
				F	17	34						
					17	34						

No.	Date 1931.	Station.	Char- acter.	Phase.	Time (G. C. T.).			Period.	Amplitude (half)		Distance of epi- centre.	Remarks.
					h	m	s		sec.	μ		
—	June 21	Mal.	I _v	eP	22	59	57				60	
				iS	22	59	44					
				F	23	0						
—	" 25	Med.	I _v	iP	5	11	1				290	Atjeh.
				iS	5	11	54					
				F	5	17						
95	" 25	Bat.	I _u	iP _v	6	24	16				5920	Compression.
				iP	6	24	20					Azimuth SSW.
				iS	6	51	44					
				F	6	40						
		Amb.	I _r	P	6	22,7					(4740)	
				iS	6	28	59					
				F	6	56						
		Med.	I	i	6	24	25					
				L	6	47						
				F	7	4						
—	" 25	Mal.	I _v	P	18	58	57				160	
				iS	18	58	55					
				F	19	0						
—	" 24	Mal.	I _v	P	15	6	22				150	
				iS	15	6	59					
				F	13	8						
—	" 25	Med.	I	eP	0	51	16					
				i	0	55	56					
				F	1	4						
96	" 26	Bat.	I _v	P	6	0	54				260	E. Pringan (W. Java).
				iP _v	6	0	58					Dilatation.
				iS	6	1	4					
				i	6	2	5					
				F	6	9						
		Mal.	II _v	P	6	0	24				150	
				iS	6	0	59					
				F	6	4						
97	" 27	Bat.	I	e	18	0,8						Padang (W. Sumatra).
				F	18	8						

Batavia Observatory.

We acknowledge with thanks the receipt of the following bulletins.

Adelaide	1929, No. 1-4	Ottawa	1931, 13-26
,, prel.	1931, May-August	Oxford	1927, July-Sept.
Apia	1931, Feb.-June	Paris	1931, Avril-Juin
Barcelona	1930, 141-1931, 146	Pasadena	1931, 22-24
Beograd	Ann. micr. 1930	Perth	1931, 8-9
Ferkeley	1930, Vol. 2, No. 20	,, prel.	1931, Aug. 7
Buffalo	1931, March, April	Phu Lien	1930, Aout-Sept.; Nov.-Déc.
Cartuja	1931, No. 1-2		1931, Janvier.
Crimée	1929, 1-4		1931, Aout-Sept. 9
Denver	1931, No. 2-3	,, spéc.	1928, 7-12
España	1930, 74-75	Riverview	1931, 6-8
Florissant	1931, 12-25	,, prov.	1931, 703-720.
Göttingen	1929-1931, März	Roma Boll. sett.	1931, 7-19
Graz	1930, No. 10-1931, No. 5	Saint Louis	1931, 23-43
		,, prel.	1931, 2-3
Hamburg	1931, 4-6	San Fernando	1928, 4-16
Helwan	1931, May-July	Stonyhurst	1931, Avril-Juin
Hong Kong	1931, March-June	Strasbourg	,, bull. d'éch. 1931, 9-10
,, princ. e'qu.	1931, May-Aug.	,, bull. bibl.	1931, 3
Innsbruck	1930, No. 3-4	Stuttgart	1931, 1. Halbjahr
Kew	1931, April-July	Sydney	1931, April-July
Kobe	1930, Vol. 6, No. 4-1931, Vol. 7, No. 1	Tananarive	1930, Nov.-1931, Févr.
Köbenhavn	1928, 5-8	Tanus (Frankfurt)	1931, S. 3-9
Koti	1931, 1-5	Uccle	1931, 1-2
,, prel.	1931, April-June	U.R.S.S.	1929, 10-12; 1930, 4-9
La Paz	1930, 26-38	Washington,	
La Plata	1931, 3-5	Georgetown	1931, 173-177
Lemberg	1930, No. 3-1931, No. 2	Washington,	
		USCGS. Rep.	1930, July-Oct.
Little Rock	1931, 1-11	Washington,	
Manilla	1930, July-December	prel. det.	1931, Apr. 15-Aug. 16
,,	1931, 23-44	Wien	1930, No. 8-1931, No. 4
,, spec.	1931, May-Aug.	Wellington	1931, 30, 33-35
,, USCGS	1931, May 20-Sept. 9	Zagreb	1930, 25-37
Melbourne	1931, 14	Zi-ka-wei	1931, 6-9
Nagasaki	1931, 3-5	,, prel.	1931, May-June
New York Forcham	1931, Feb.-April	Zürich	1931, 26-27
Numazu	1931, Apr.-May		
Osaka	1930, July-Dec.		
,,	1931, 53-62		

Batavia, June 1 - Sept. 29, 1931.

GEOLOGICAL BULLETIN 1931.

BATAVIA OBSERVATORY, JAVA.

CONSTANTS.

1931.	E-W component.			N-S component.			V component.		
	V.	T ₀ .	ε.	V.	T ₀ .	ε.	V.	T ₀ .	ε.
July	220	6.4	3.2	200	6.6	3.4	330	4.6	2.8
Augustus	220	6.2	3.1	200	6.6	3.3	330	4.7	3.1
September	220	6.2	3.1	200	6.8	3.5	330	4.8	3.2

	With lifted pen						With writing pen					
	e			r			e			r		
	EW.	NS.	V.	EW.	NS.	V.	EW.	NS.	V.	EW.	NS.	V.
July	1.12	1.12	1.13	0.0	0.0	0.0	1.12	1.12	1.15	0.84	0.40	0.55
Augustus	"	"	"	"	"	"	1.10	1.10	1.16	0.83	0.39	0.58
September	"	"	"	"	"	"	1.08	1.12	1.14	0.60	0.33	0.62

JULY.

No.	Date 1951.	Sta-tion.	Char-acter.	Phase.	Time (G. C. T.).			Period.	Amplitude (half).		Distance of epi-centre	Remarks.
					h	m	s		A _E	A _N		
—	July 1	Med.	I	eP F	6	0						
98	" 4	Bat.	I	P i i F	11	12	58					
		Med.	I	e _{EW} i _{NS} F	11	15	55					
99	" 4	Bat.	I	e F	15	2	59					
100	" 7	Bat.	I _v	iP _v iP iS F	9	55	26			220	E; dilatation.	
		Mal.	I _v	P iS F	9	5,1				270	No time marks.	
101	" 8	Bat.	I _v	iP _v P i F	15	55	15				SW; compression. Bantam (West Java).	
		Mal.	I _v	P iS F	15	55,0				190	No time marks.	

No.	Date 1951.	Station.	Character.	Phase.	Time (G. C. T.).			Period.	Amplitude (half).		Distance of epicentre.	Remarks.
					h	m	s		μ	μ		
—	July 27	Med	I _v	P S F	6	10	11			150	Angkola (Tapanoeli).	
112	" 27	Bat.	I _v	iP _v eP iS _v iS F	9	28	42			120	Compression.	
115	" 28	Bat.	I	eP F	5	41	21					
		Med.	I _r	P S? F	5	42	55			5800?	In hour eclipse.	
114	" 29	Bat.	I _v	iP iP _v iS F	5	17	8			210	Compression.	
113	" 29	Bat.	I _v	iP _v iP iS F	21	12	28			190	Compression.	
116	" 50	Bat.	I _v	iP _v P iS _v iS F	17	18	16			220		
117	" 51	Bat.	I _v	eP _{EW} iS F	13	45	46			100		

AUGUST.

—	Aug. 1	Amb.	I _v	P iS F	19	20	50			580	
—	" 2	Amb.	I _v	iP eS F	14	50	28			190	
—	" 4	Med.	I	P i F	15	52	9				
118	" 5	Bat.	I _v	P iS F	20	26	12			120	WNW; dilatation. Bantam and Lampongs (S. Sumatra).
		Mal.	I _v	P iS F	20	26	15			150	
—	" 6	Amb.	I	i i F	15	26	15				

No.	Date 1951.	Station.	Character.	Phase.	Time (G. C. T.)			Period.	Amplitude (half).		Distance of epicentre.	Remarks.
					h	m	s		μ	μ		
119	Aug. 7	Bat.	II	eP i iS L _v F	2	19	27				Tanah Merah and Genjern (New Guinea).	
		Amb.	II	i _N iP i L F	2	14	47	27		1790	SE.	
		Med.	II _r	iP iS	2	17	48	24		4780	Clock stops at 2 ^h 42 ^m	
—	" 7	Amb.	I _v	iP S F	12	40	55			550	Laboeba (Batjan, N. Mo- luccas).	
120	" 8	Bat.	I _r	eP S F	1	0	59			1640		
		Med.	II _v	P iS F	8	58	44			870		
—	" 10	Amb.	I _v	P iS F	1	42	58			90		
—	" 10	Med.	I	i F	10	50	16					
121	" 10	Bat.	III _u	iP _v P S? _{EW} L M F	21	29	18	32		7820	SE; compression.	
		Amb.	II _r	iP _s S L L L F	21	26	17	30		2540		
		Med.	III _u	iP iS i L L L F	21	50	4	40		5240	NNW.	
—	" 15	Amb.	I _v	iP S F	22	26	56	26		190		
—	" 14	Mal.	I _v	eP iS F	15	14	59			110	E. Priangan (W. Java).	
—	" 14	Mal	II _v	iP iS F	15	14	52			90	E. Priangan (W. Java).	
122	" 18	Bat.	II	e _{NS} L	14	52	54	29				

No.	Date 1951.	Stations.	Character.	Phase.	Time (G. C. T.).			Period.	Amplitude (half).		Distance of epicentre.	Remarks.
					h	m	s		sec.	μ		
		Amb.	I	L	14	52	6	15				
				M	14	56	14	12				
				F	15	17						
		Amb.	I	i	14	51	25					
				L	14	59	26					
				F	14	52		24.5				
		Med.	III	P	14	55	0					No time marks.
				i	14	59.5						
				i	14	49.8						
				F	14	52.4						
				F	15	39						
	Aug. 19	Mal.	I _v	P	2	51	11				110	
				S	2	51	24					
				F	2	55						
125	" 25	Bat.	I _v	eP	14	23	17				310	E. Priangan and Banjoemas.
				S	14	25	52					
				F	14	29						
		Mal.	III _v	iP	14	21	56				180	
				iS	14	22	17					
				F	14	24.5						
124	" 24	Bat.	I	i	21	44	41					
				L	21	52	15					
				F	22	7		25				
		Med.	II	eP	22	54						No time marks.
				i	21	51.2						
				F	22	57						
	" 25	Amb.	I _v	P	18	57	0				90	
				S	18	57	11					
				F	18	42						
125	" 27	Bat.	II _u	iP	15	56	54				5720	NNW.
				i	15	57	40					
				S	15	45	52					
				L	16	1		16.5				
				F	17	19						
		Amb.	I _u	P	15	58	17				7200	
				iS	15	46	54					
				i	15	48	4					
				L	15	54.9		16.5				
				F	16	56						
		Med.	III _u	iP	15	54.5						No time marks.
				i	15	41.9						
				i	15	44.8						
				F	18	7						
126	" 27	Bat.	I	e	25	5	25					
				F	25	16						
127	" 29	Bat.	I _v	eP	1	24	28				510	Central Java.
				iS	1	25	24					
				F	1	29						
128	" 29	Bat.	I _v	eP	8	24	11				950	
				S?	8	25	51					
				F	8	55						
129	" 31	Bat.	I	i	6	42	14					Talud Islands (N. Celebes)?
				i	6	44	5					
				F	6	50						

SEPTEMBER.

No.	Date 1951.	Station.	Character.	Phase.	Time (G. C. T.)			Period.	Amplitude (half).		Distance of epicentre.	Remarks.
					h	m	s		sec.	μ		
	Sept. 4	Med.	I _v	P	13	57.2					360	No time marks.
				S	15	57.9						
				F	15	45						
130	" 6	Bat.	I	e	5	50						
				i	5	52	42					
				F	6	1						
		Med.	II _r	eP	5	46.8					5420	No time marks.
				S	5	51.8						
				F	6	15						
	" 8	Amb.	I _v	P	12	41	24				160	
				iS	12	41	45					
				F	12	46						
	" 8	Mal.	I _v	P	25	25	41				110	
				iS	25	25	54					
				F	25	26						
	" 9	Med.	I _v	P	12	51	54				190	
				iS	12	51	56					
				F	12	55.2						
131	" 9	Bat.	II _r	iP _v	20	46	54				4890	NE; compression.
				iP	20	46	55					
				i	20	47	9					
				iS	20	55	2					
				F	21	12						
		Amb.	I	iP	20	44	5					
				i	20	45	4					
				i	20	45	57					
				i	20	54	25					
				F	21	7						
		Med.	II _r	P	20	48	58				4980	
				i	20	49	51					
				iS	20	55	54					
				F	21	57						
	" 10	Amb.	I _v	P	5	41	58				180	
				S	5	41	59					
				F	5	45						
	" 11	Med.	I _v	eP	11	52	0				310	
				iS	11	52	55					
				F	11	56.8						
	" 11	Amb.	I _v	iP	21	28	59				50	
				iS	21	29	5					
				F	21	50						
	" 15	Amb.	I _v	P	4	50	18				160	
				S	4	50	56					
				F	4	55						
132	" 16	Bat.	I	i	12	59	28					
				F	15	4						
		Med.	I	e	15	0.1					15	
				L	15	12.1						
				F	15	24						

No.	Date 1951.	Sta- tion.	Char- acter.	Phase.	Time (G. C. T.).			Period.	Amplitude (half)		Distance of epi- centre.	Remarks.									
					h	m	s		A _E	A _N											
153	Sept. 19	Bat.	I _v	iP _v	7	47	15	50	μ	μ	990										
				iP _w	7	47	19														
				S _N	7	49	5														
		Med.	I	P	7	47	59														
				i	7	55	57														
				L	8	11															
				F	8	15															
154	» 21	Bat.	I _r	eP	2	29	28	15			4780										
				iS	2	55	48														
				i	2	56	56														
				L _v	2	56	41														
				F	5	11															
													F	2	27	45					
		Amb.			L	2	39	22	24			5220	No time marks.								
					F	2	52	15.5													
					P	2	29,6														
		Med.	II _u		S	2	56,4														
					L	2	45														
					M	2	45														
F	4				5																
—	» 21				Med.	I _v	eP	5	55,6	520			520	No time marks.							
							S	5	56,5												
		F	5	45																	
		155	» 21	Bat.			II	P	10						55	10	5150			5150	No time marks.
								i	10						55	48					
								F	11						9						
Amb.	I			P	10	55	10														
				i	10	57	40														
				F	11	0															
Med.	III _r	iP	10	52,5																	
		iS	10	37,2																	
		F	11	55																	
156	» 21	Bat.	I	i	15	45	47				440	SE. NW.									
				iP	15	45	50														
				i _w	15	56	4														
				F	14	2															
157	» 22	Bat.	I	P	9	40	55				440										
				i	9	45	54														
				i	9	44	25														
				F	9	50															
158	» 25	Bat.	III _v	iP _v	6	1	5	20,5			440	Pens off 6 ^h 2 ^m 5 ^s , on 6 ^h 17 ^m . S. Sumatra (felt from Padang to Bantam, W. Java).									
				iP	6	1	6														
				iS	6	1	52														
				F	7	56															
		Mal.	III _v	iP	6	1	35				550			550							
				S	6	2	15														
				F	6	46															
		Amb.	II _r	i _x	6	5	15				2880?			2880?							
				iP	6	5	56														
				i	6	6	18														
				S?	6	10	2														
				L	6	17,4															
Med.	III _v	F	7	14		690			690	SE; no time marks.											
		iP	6	2,5																	
		iS	6	5,5																	
		F	6	46																	

No.	Date 1931.	Sta- tions.	Char- acter.	Phase.	Time (G. C. T.).			Period.	Amplitude (half).		Distance of epi- centre.	Remarks.		
					h	m	s		A _E	A _N				
159	Sept. 25	Bat.	II _v	P _v ?	6	52	55		μ	μ	350	Overlapped by No. 158. Felt in Lampongs and Palembang. Overlapped by No. 158.		
				iS _v ?	6	55	10							
—	» 25	Mal.	I _v	P	6	53	11	50			570			
				eS	6	54	15							
		Mal.	I _v	i	6	54	25							
				P	9	51	49							
				iS	9	52	54							
				F	9	54								
140	» 25	Bat.	I _v	P	10	28	59				600	Benkoelen.		
				F	10	54								
—	» 25	Med.	I _v	eP	10	52,0	620			620	No time marks.			
				iS	10	55,1								
				F	10	49								
141	» 25	Bat.	I _v	iP	10	47	21	420			420			
				S	10	48	8							
				F	10	58								
142	» 25	Bat.	I _v	eP _{ew}	11	47	46	440			440	Tandjong Keling (Palem- bang, S. Sumatra).		
				S	11	48	55							
				F	11	54								
145	» 25	Bat.	I _v	P	17	37	26				(580)			
				F	17	45								
144	» 25	Bat.	I _v	eP	19	21,0	460			460	Benkoelen and Palembang.			
				S	19	21						45		
				F	19	27								
145	» 25	Bat.	II _v	iP _v	21	52	54	530			530	No time marks.		
				iP	21	52	56							
				iS	21	55	48							
				F	21	55								
				P	21	55,0								
				iS	21	56,0								
				i	21	56,4								
i	21	58,4												
F	22	59												
146	» 26	Bat.	I _v	i	18	56	49				440			
				F	19	0								
147	» 27	Bat.	I _v	iP	0	24	52	440			440			
				S	0	25	41							
				F	0	41								
				Med.	I	eP	0						27,2	No time marks.
						i	0						29,5	
i	0	29,8												
				i	0	51,0								
				F	1	2								
148	» 27	Bat.	I	eP	10	14	47				650	No time marks.		
				F	10	18								
—	» 27	Med.	I _v	P	11	44	6	650			650	No time marks.		
				S	11	48,7								
				F	11	50								
—	» 28	Med.	I _v	P	21	7,8	520			520	No time marks.			
				iS	21	8,4								
				i	21	9,0								
				i	21	92								
				i	21	92								
				F	21	17								

No.	Date 1951.	Sta- tion.	Char- acter.	Phase.	Time (G. C. T.).			Period. sec.	Amplitude (half)		Distance of epi- centre. km.	Remarks.
					h	m	s		A _E	A _N		
149	Sept. 28	Bat.	III _v	iP _v	17	19	50		μ	μ	440	W; compression.
				iP	17	19	51					
				iS	17	20	40					
		Mal.	I	i	17	21	47					
				F	17	49						
				P	17	20	7					
				S?	17	20	56					
		Med.	II _r	F	17	24						
				P	17	20	6					
				i	17	21	0					
S	17			22	6							
i	17			22	9							
150	" 29	Bat.	I _r	P	5	19	21				2490	
				iS	5	25	19					
				F	5	53						
		Amb.	I _v	P	5	16	4					
				iS	5	17	4					
				F	5	30						
		Med.	I	iP	5	21.2						
				i	5	25.7						
				i	5	24.7						
				F	5	49						
—	" 30	Amb.	I	iP	9	41	27				590	
				iS	9	42	11					
				F	9	48						

SEISMOLOGICAL BULLETIN 1931.

BATAVIA OBSERVATORY, JAVA

CONSTANTS.

1931.	E-W component.			N-S component.			V component.		
	V.	To.	ϵ .	V.	To.	ϵ .	V.	To.	ϵ .
	October	220	6.6	3.4	200	6.8	3.8	330	4.7
November	"	6.7	3.4	"	6.8	4.0	"	4.8	3.6
December	"	6.8	3.6	"	6.8	3.7	"	4.7	3.4

	With lifted pen						With writing pen					
	e			r			e			r		
	EW.	NS.	V.	EW.	NS.	V.	EW.	NS.	V.	EW.	NS.	V.
October	1.12	1.12	1.13	0.0	0.0	0.0	1.12	1.12	1.16	0.79	0.40	0.56
November	"	"	"	"	"	"	1.12	1.12	1.16	0.98	0.38	0.67
December	"	"	"	"	"	"	1.12	1.12	1.16	1.08	0.46	0.39

Soengei Langka, established September 1931; $5^{\circ} 24'$ S.L. $105^{\circ} 15'$ E.L. 240 m above s.l. Bosch-Omori EW. component.

Absolute time indications are not reliable.

Medan: no time signals during October.

OCTOBER.

No.	Date 1931.	Station.	Character.	Phase.	Time (G. C. T.).			Period.	Amplitude (half).		Distance of epicentre.	Remarks.
					h	m	s		A_E	A_N		
151	Oct. 1	Bat.	I	i F	9 9	26 29	40	sec.	μ	μ	km.	
—	" 2	Med.	I	eP i F	14 14 14	57.7 40.0 45						
—	" 2	Med.	I _v	eP S F	15 15 15	50.1 50.9 56					430	Poelau Tello (Tapanoeli, N. Sumatra) and Padang (S.W.K.)
—	" 3	Amb.	II _d	iP iS F	18 18 18	46 46 48	28 50					Felt at Amboina.
152	" 3	Bat.	II _r	eP P _v iP S? L _v L _v	19 19 19 19 19	22 22 25 27.6 45 46	54 58 5	30 0 18			4140?	Compression. WNW.

Batavia Observatory

Principal Earthquakes.

October 1931.

152	Oct.	3	Bat.	eP	19	22	54	S?	19	27.6	Lv	19	43	(2660Km)	about W; dilat.	
			Amb.	iP	19	20	7	S?	19	25.28				(2800)		
			Med.	i	19	30,9		iS	19	39,9				7670		
153	Oct.	3	Bat.	i	21	28	7				eL	21	53,4	-		
			Amb.	i _N	21	25	11				L	21	35	-		
154	Oct.	3	Bat.	iP	22	5	40	iS?	22	12	6			4870		
			Amb.	i _N	22	2	5	i	22	7.57				4310		
			Med.	P	22	13.4		S	22	22.4				7670		
155	Oct.	3	Bat.	iP	22	57	26	iS _S	23	4	53	Lv	23	15	39	5900
			Amb.	i	22	54	29	i	22	59.46				-		
			Med.	P	23	5,1		S	23	13.9				-	7430	
163	Oct.	10	Bat.	P _E	0	29	22	S?	0	34.40	L	0	46	50	(3700)	
			Mal.	i	0	29	16	i	0	36.7	L	0	44		-	
			Amb.	P _S	0	26	31	S	0	30.52	L	0	37		2920	
			Med.	iP	0	35	39	i _N	0	36.7	L	0	54		-	
168	Oct.	18	Bat.	iP	4	41	0	iS	4	49	40				7270 NW; dilat.	
			Amb.	iP	4	38.6		iS	4	45,2	L	4	52		(5000)	
			Med.	i	4	45.9		i	4	55.5				-	-	
171	Oct.	23	Bat.	i	11	55	50	i	12	3	49				-	
			Med.	i	11	59,4		i	12	8.5				-	-	
175	Oct.	28	Bat.	eP	5	40	44	i	5	46	59	L	5	53.9	-	
			Amb.	P	5	40	40	S	5	44	48				3620	
			Med.	P	5	47.7		i	5	52.3				-	-	

Medan: no time signals.

Batavia, 12.11.'31.

S.W.V.

No.	Date 1931.	Stations.	Character.	Phase.	Time (G. C. T.).			Period.	Amplitude (half).		Distance of epicentre.	Remarks.							
					h	m	s		sec	μ			μ						
153	Oct. 3	Amb.	III _r	L _v	19	54		15			3750?	NNW.							
				F	21	10													
				i	19	19	57												
				iP	19	20	7												
				S?	19	25	28												
		Med.	III	i	19	55													
				F	20	56													
				i	19	50.9													
				i _w	19	51.2													
				iS	19	59.9													
				in next.															
Bat.	I	i	21	28.7		17													
		eL	21	53.4															
		F	22	1															
Amb.	I	i _N	21	25	11	31													
		L	21	55															
		F in next.																	
154	" 3	Bat.	I _r	iP	22	5	40				4870?								
				iS?	22	12	6												
				i	22	15	16												
		Amb.	I	F	22	42													
				i _N	22	2	5												
				i _s	22	2	40												
				i	22	7	57												
		Med.	I _u	F	22	58						(8270)							
				P	22	15.4													
				S	22	22.4													
				in next.															
155	" 3	Bat.	II _u	iP	22	57	26	52			5900								
				iS _s	25	4	55												
				i _N	25	5	11												
				L _v	25	15	59												
				L _v	25	24	15												
		Amb.	II	F	25	59		12.5											
				i	22	54	29												
				i	22	55	46												
				i	22	59	46												
				F	24	11													
Med.	I _u	P	25	5.1						(7180)									
		S	25	15.9															
		F	25	59															
		Bat.	I	e _{EW}	0							58	22						
i _{NS}	1			5	24														
F	1			20															
" 4	Amb.	I _v	P	7	22	1													
			iS	7	22	2													
			F	7	25	54													
" 4	Amb.	II	P	7	55.5					(50)	In minu te eclipse. new shock.								
			iS	7	55	25													
			iS	7	54	9													
" 4	Amb.	I _v	F	7	54	55													
			P	7	59	25													
			iS	7	59	27													
" 4	Amb.	I _v	F	8	0	7													
			P	7	59	25													
			iS	7	59	27													
157	" 5	Bat.	II _v	iP _v	4	50	6				500	Compression. S. Sumatra.							
				iP _w	4	50	8												

No.	Date 1931.	Station.	Character.	Phase.	Time (G. C. T.).			Period.	Amplitude (half)		Distance of epicentre.	Remarks.
					h	m	s		sec.	μ		
		Mal.	I _v	iS	4	51	5				540	
				F	5	10						
				P	4	50	20					
				S	4	51	19					
				F	4	58						
		Med.	II _v	eP	4	55.4					(820)	
				S	5	0.6						
				F	5	54						
				eP	4	54	9					
				S?	4	55	57					
Amb.	I _v	F	5	2					820?			
—	Oct. 5	Amb.	I _v	i	12	12	56					
				F	12	13.5						
—	" 5	Amb.	I _v	P	15	55	55					
				iS	15	55	54					
				F	15	56.7						
158	" 5	Bat.	I _v	P	19	6	40				150	S. Sumatra.
				iS	19	6	55					
				F	19	8						
159	" 5	Bat.	I _v	eP _{EW}	19	16	44				510	
				iS	19	17	58					
				F	19	22						
160	" 5	Bat.	I	eP	19	40	55					
				i _E	19	42	59					
				i	19	45	26					
				F	20	5						
—	" 5	Med.	I _r	P	22	45	26				1940	
				iS	22	48	40					
				F	25	59						
161	" 6	Bat.	I _v	iP _v	21	8	32				480	Compression. Soengei Langka S—eP= 41 sec. 560 km.
				iP _w	21	8	32					
				S	21	9	25					
				F	21	20						
				eP	21	15.6						
Med.	I	S	21	19.7					(2650)			
		F	21	51								
—	" 8	Amb.	I _v	P	5	16	56				90	
				iS	5	16	47					
				F	5	25						
—	" 9	Med.	I _r	eP	5	2	55				1680	
				i	5	4	9					
				S	5	5	44					
				i	5	6	56					
165	" 10	Bat.	II _r	P _E	0	29	22				4740?	
				S?	0	55	40					
				L	0	46	50					
				F	2	49						
				i	0	29	16					
		Mal.	I	i	0	36.7					40	
				L	0	44						
				L	0	46						
				L	0	56.2						
				F	1	0						

Royal Magnetical and Meteorological Observatory.

Batavia.

Principal Earthquakes.

November 1931.

		P	S	L	Δ	
176 Nov.	1 Bat.	19 1 28	19 8 28		3730	NS.
	Med.	19 5,4		19 13		
178 ,,	2 Bat.	10 11 18	10 18 17	10 26	5420	dilatation;NE.
	Amb.	10 1 34	10 10 4	10 15,5	7070	
	Med.	10 7 14	10 13 27	10 18	4660	
180 ,,	2 Bat.	17 10 29	17 19 36	17 26	7800	
	Med.	17 7 23	17 14 16	17 31	5290	
	Amb.	17 7 8	17 10 31	17 13	2050	NNW.
188 ,,	20 Bat.	14 25 28	14 33 33	14 45 52	6590	
	Amb.	14 23 17	14 29 43	14 36 33	4870	
	Med.	14 27,8	14 35 59		(6650)	
190 ,,	23 Bat.	13 36 14	13 36 30		140	dilat.N56,5°E; West Java and Sutra.
	Mal.	13 36 24	13 36 53		160	
	Med.	13 38 27	13 39 50		770	dilat. NNW.

Batavia, 16 XII 1931.

S.W.V.

No.	Date 1951.	Stations.	Character.	Phase.	Time (G. C. T.).			Period.	Amplitude (half).		Distance of epicentre.	Remarks.	
					h	m	s		A _E	A _N			
		Amb.	II _r	P _S	0	26	31	29	μ	μ	2810		
				S	0	50	52						
				L	0	57							
		Med.	III	F	2	21		45			NW.		
				iP	0	35	39						
				i _N	0	36	7						
				i _E	0	36	14						
				L	0	54							
				F	4	20							
	Oct. 11	Med.	I	L	17	17		20					
				M	17	20							
				F	17	35							
164	" 11	Bat.	I _v	P	17	26	9	50			220		
				iS	17	26	54						
				F	17	50							
		Mal.	I _v	P	17	26	14					190	
				S	17	26	56						
				F	17	28							
165	" 12	Bat.	I	P	15	55	15	19					
				i	15	54	2						
				F	15	39							
		Amb.	I	i	15	30	50						
				eL	15	44							
				L	15	45.9							
				F	15	51							
	" 12	Amb.	I _v	P	16	49	23	19			160		
				iS	16	49	42						
				F	16	56							
	" 15	Mal.	I _v	eP	9	16	55	60					
				iS	9	17	0						
				F	9	18							
166	" 17	Bat.	I	iP _S	15	42	47	18					
				F	15	51							
	" 18	S.L.	I	P	0	12	28	18				S. Sumatra.	
				iS	0	12	50						
				F	0	15							
167	" 18	Bat.	I	i	0	48	4	25					
				i _w	0	51	42						
				F	1	4							
		Med.	I	eP	0	54.5							
				L	1	19							
				L	1	50							
				F	1	48							
168	" 18	Bat.	I _u	iP _v	4	40	59	12			7270	Dilatation. Azimuth NNW.	
				iP	4	41	0						
				iS	4	49	40						
				i	4	51	4						
				F	5	5							
		Amb.	I _u	iP	4	58.6					(5030)	No time eclipses.	
				iS	4	45.2							
				L	4	52							
				F	5	0							
		Med.	I	i	4	45.9							
				i	4	55.5							

No.	Date 1951.	Station.	Character.	Phase.	Time (G. C. T.)			Period.	Amplitude (half).		Distance of epicentre.	Remarks.	
					h	m	s		A _E	A _N			
				i	4	56.0			μ	μ	km.		
				F	5	22							
	Oct. 18	Med.	I	eP	7	15	16	29					
				i	7	22	12						
				F	7	24	28						
				F	7	41							
169	" 19	Bat.	I _v	eP	11	21	45	20			180		
				iS	11	22	6						
				F	11	25							
170	" 19	Bat.	I _v	P	11	58	47	20			140		
				iS	11	59	5						
				F	11	45							
	" 25	Med.	I _v	eP	6	59.0		20			(160)	Koeta Radja (Ajeh, N. Sumatra).	
				iS	7	0.5							
				F	7	9							
171	" 25	Bat.	I	i	11	55	50	20					
				i	12	5	49						
				F	12	8							
		Med.	I	i	11	59.4							
				F	12	8.5							
				F	12	11							
	" 24	Amb.	I _v	P	1	24	35	20					
				iS	1	24	35						
				F	1	25.1							
	" 24	Amb.	I _v	P	22	28	36	20			70		
				S	22	28	44						
				F	22	50							
172	" 26	Bat.	I _v	iP	2	41	52	20			160	Dilatation; West-Java.	
				iS	2	42	10						
				F	2	47							
		Mal.	II _v	iP	2	42	5					100	
				iS	2	42	17						
				F	2	47							
	" 26	Med.	I _v	iP	10	51.0		20			(240)	Sibolga (Tapanoeli).	
				iS	10	51.5							
				F	10	56							
175	" 26	Bat.	I	P	12	2	44	20				Awisang (N. Celebes)?	
				i _N	12	7	51						
				F	12	17							
		Med.	I	i	12	1.9							
				F	12	25							
174	" 26	Bat.	I	e	14	47	41	20					
				i	14	52	8						
				F	14	57							
	" 26	Amb.	I _v	P	16	17	50	20			320		
				S	16	18	7						
				F	16	26							
175	" 28	Bat.	I	eP	5	40	44	20					
				i	5	46	59						
				L	5	53.9							
				F	6	4							

No.	Date 1931.	Station.	Char-acter.	Phase.	Time (G. C. T.)	Period.	Amplitude (half).		Distance of epi-centre.	Remarks.
							A _E	A _N		
		Amb.	I _r	P	h m s		μ μ	km.		
				S	5 40 40			2650		
				F	5 44 48					
		Med.	I	P	5 51					
				i	5 47.7					
				i	5 52.5					
				F	5 54.9					
				F	6 17					
	Oct. 28	Amb.	I _d	iP	10 34 33			80	Felt at Amboina.	
				iS	10 34 43					
				F	10 43					
	" 30	Amb.	I	P	11 16 55			80	Amahei and Wahai (Ce-ram).	
				iS	11 17 4					
				F	11 18					
NOVEMBER.										
	Nov. 1	Amb.	I _v	P	6 49 48					
				iS	6 49 50					
				F	6 51					
176	" 1	Bat.	I _r	P _{NS}	19 1 28			3750		
				i	19 8 10					
				iS	19 8 28					
				F	19 14					
		Med.	I	e	19 5.4					
				eL	19 15	24				
				M	19 18 47	14				
				M	19 21 6	12				
				F	19 41					
177	" 2	Bat.	I _v	P _N	4 55 25			350	Soengei Langka S—eP = 25 ^{sec} 220 km.	
				S	4 56 21					
				F	4 59					
		Med.	I	P	4 54 9					
				i	4 54 25					
				i	4 55 28					
				F	4 50					
178	" 2	Bat.	II _u	P _v	10 11 16			5420	Dilatation NE.	
				P	10 11 18					
				iS	10 18 17					
				L	10 25 59	30.0				
				L	10 31 49	20				
				L _v	10 37 29	15				
				F	in next.					
		Amb.	II _u	eP	10 1 54			7070		
				iS	10 10 4					
				iL	10 15 35	24				
				iL	10 18 9	20				
				F	11 8					
		Med.	III	iP	10 7 14					
				i _w	10 15 27					
				iS	10 15 46					
				L	10 18	35				
				M	10 19	30				
				M _E	10 24 2	11				
				M _S	10 26 45	20				
				M _E	10 27 13	20				
				F	11 37					
179	" 2	Bat.	I _r	P	11 9 0			4950		
				S	11 15 53					
				F	11 49					

No.	Date 1931.	Station.	Char-acter.	Phase.	Time (G. C. T.)	Period.	Amplitude (half)		Distance of epi-centre.	Remarks.
							A _E	A _N		
					h m s	sec.	μ μ	km.		
180	Nov. 2	Bat.	I _u	P _v	17 10 25					
				eP	17 10 29					
				i	17 11 51					
				i _{EW}	17 19 36					
				i _{NS}	17 19 49					
				eL _v	17 26	27				
				F	17 56					
		Med.	I _u	P	17 7 25			5290		
				iS	17 14 16					
				L	17 51	17				
				F	17 56					
		Amb.	I _r	iP	17 7 8			2050	Azimuth NNW.	
				S	17 10 31					
				L	17 15	25				
				F	17 49					
181	" 3	Bat.	I	e	12 51.7					
				L _{EW}	12 49	29				
				F	15 0					
		Med.	I	eP	12 (54.7)				No time marks.	
				i	12 (51.1)					
				F	15 (51)					
	" 7	Amb.	I _v	P	2 18 5			420?		
				S?	2 18 50					
				F	2 26					
182	" 7	Bat.	I	e _{EW}	4 27 41				Sumatra's Westkust.	
				i	4 50 28					
				F	4 58					
		Med.	I _v	eP	4 (56.1)			(710)		
				S?	4 (37.4)					
				F	4 (46)					
	" 8	Mal.	I _v	P	5 12 7			70		
				iS	5 12 15					
				F	5 12.8					
185	" 8	Bat.	I _v	eP _{NS}	9 19 58			650		
				S	9 21 8					
				F	9 29					
		Mal.	I	e	9 20 50					
				F	9 24					
	" 8	Mal.	I _v	P	18 51 34			80		
				iS	18 51 43					
				F	18 55					
	" 9	Mal.	I	e	5 55 42					
				F	5 58					
184	" 9	Bat.	I _v	iP _v	7 5 50			400		
				P	7 5 51					
				iS	7 6 56					
				F	7 15					
		Mal.	I _v	P	7 6 2			260		
				S	7 6 31					
				F	7 9					
	" 10	Amb.	I _v	P	3 18 51			150		
				S	3 19 8					
				F	3 22					

No.	Date 1951.	Sta- tion.	Char- acter.	Phase.	Time (G. C. T.)			Period.	Amplitude (half)		Distance of epi- centre.	Remarks.
					h	m	s		sec.	μ		
—	Nov. 11	Amb.	I _v	P S F	19 19 19	6 7 10	58 14		μ	μ	140	
—	" 12	Med.	I _v	P iS F	6 6 6	4 5 14	54 59				600	
185	" 15	Bat.	I	P i F	3 3 3	0 1 9	51 42				100	
		S.L.	I	e S F	3 3 3	0 0 1	30 42 26					
—	" 14	Amb.	I _v	P S F	23 23 23	11 11 16	0 27				240	Wahai, Ceram.
—	" 17	Amb.	I _v	eP S F	1 1 1	22 25 25	56 2				250	Obi I. (N. Moluccas).
186	" 17	Bat.	I _r	eP _{NS} iS F	9 9 9	40 44 50	1 25				2850	
		Amb.	I _v	P _{EW} S? F	9 9 9	37 58 45	0 11				660	
187	" 18	Bat.	I	i i F	5 5 4	44 55 5	6 55					
—	" 20	Amb.	I _v	iP S F	9 9 9	24 25 29	0 4				590	
188	" 20	Bat.	I _u	eP iS L F	14 14 14 15	25 33 45 7	28 33 52			29	6590	
		Amb.	I _r	P i iS L F	14 14 14 14 15	25 25 29 36 15	17 35 43 33			24	4870	
		Med.	I _u	P iS F	14 14 15	27.8 35 35					(6650)	In hour eclipse.
189	" 21	Bat.	I	eP S? F	1 1 1	21 21 26	32 58				250?	Banjoemas (C. Java).
		Mal.	I	P iS F	1 1 1	20 21 24	54 13				160	
190	" 23	Bat.	III _d	iP _v i iP iS off	13 13 13 13 13	36 36 36 36 36	12 13 14 30 32				140	Dilatation. N 56.5°E. West-Java and S. Suma- tra. On: 15 ^h 54 ^m .
		Mal.	III _d	iP i	13 13	36 28	24 28				160	

No.	Date 1951.	Sta- tion.	Char- acter.	Phase.	Time (G. C. T.)			Period.	Amplitude (half).		Distance of epi- centre.	Remarks.
					h	m	s		sec.	μ		
—	Nov. 25	Mal.	I _v	iP iS F	18 18 18	8 8 9.1	0 9				80	
—	" 25	Mal.	I _v	P S F	12 12 12	39 59 40.1	28 38				80	
191	" 28	Bat.	I _v	P _{EW} S? F	25 25 25	1 2 16	47 45				550?	Soengei Langka —SeP= 4 sec. (40 km.)
		Med.	I _r	eP S? F	25 25 25	4 6 14	29 21				1060?	
—	" 29	Mal.	I	eP S F	14 14 14	10 11 11.8	51 3				100	
—	" 29	Med.	I _v	P S i F	20 20 20 20	9 10 11 19	29 12 58				580	
—	" 50	Med.	I _v	P S? F	8 8 8	8 9 16	58 24				250?	Simaloer I. (N. Sumatra).
—	" 50	Med.	I	P F	17 17	7 24	5					
192	" 50	Bat.	I _r	P iS F	25 25 25	29 51 55	37 55				1520	
—	" 50	Mal.	I	i F	25 25	42 45	41					
DECEMBER.												
195	Dec 1	Bat.	I	i i F	3 3 3	52 41 55	36 31					
—	" 2	Amb.	I _v	iP S? F	12 12 12	5 6 17	25 14				440?	NW-SE.
—	" 5	Med.	I _v	P _{EW} S? F	7 6 6	49 50 59	50 35				400?	
—	" 6	Mal.	I _v	P iS F	4 4 4	12 12 16	51 52					

No.	Date 1951.	Station.	Character.	Phase.	Time (G. C. T.).			Period.	Amplitude half.		Distance of epicentre.	Remarks.
					h	m	s		sec.	μ		
—	Dec. 6	Amb.	I _v	P	15	2	16			70	Amabei, South Ceram.	
				iS	15	2	24					
				F	15	3						
—	» 6	Amb.	III _d	iP	16	34	21			60	NE-SW; South Ceram.	
				iS	16	34	28					
				off	16	34	35					
—	» 9	Amb.	I _v	iP	1	12	50			100	South Ceram.	
				S	1	12	42					
				F	1	19						
—	» 9	Amb.	I _v	P	14	35	15			80	South Ceram.	
				S	14	33	22					
				F	14	36						
194	» 15	Bat.	I _r	P _v	6	25	50			2160	Compression.	
				P _N	6	25	52					
				iS	6	29	24					
				F	6	39						
		Amb.	II _v	iP	6	22	17			350		
				iS	6	22	55					
				F	6	52						
195	» 15	Bat.	I _v	e _{NS}	25	4	55				E. Priangan (W. Java).	
				e _S	25	4	46					
				F	25	8						
		Mal.	II _v	iP	25	4	2			80		
				iS	25	4	11					
				F	25	6						
—	» 14	S.L.	I _d	P	15	42	0					
				iS	15	42	2					
				F	15	42	50					
196	» 15	Bat.	I _v	P	10	28	8			160	C. Priangan (W. Java).	
				S	10	28	25					
				F	10	31						
		Mal.	I _v	P	10	28	0			90		
				iS	10	28	10					
				F	10	30						
197	» 18	Bat.	III _v	iP	9	50	52			250	Compression; WSW. Buitenzorg (W. Java).	
				iS	9	51	0					
				i	9	51	28					
				F	11	8						
		Med.	III _v	P	9	52	9			920		
				S	9	55	48					
				i	9	55	4					
				F	11	39						
		Amb.	I	i	9	55	51					
				i	9	55	41					
				i	9	56	15					
				F	10	23						
		S.L.	III _v	P	9	47	41			540		
				S	9	48	20					
				F	9	51						
—	» 19	Med.	I _v	P	2	20	20			350	Atjeh, (N. Sumatra).	
				iS	2	20	58					
				F	3	1						
—	» 19	Amb.	II _v	iP	7	56	58			80		
				iS	7	56	47					
				F	7	44						

No.	Date 1951.	Station.	Character.	Phase.	Time (G. C. T.).			Period.	Amplitude (half).		Distance of epicentre.	Remarks.
					h	m	s		sec.	μ		
—	Dec. 22	Amb.	I _v	eP	1	2	26			200		
				S	1	2	49					
				F	1	4						
198	» 22	Bat.	III _d	iP _v	10	14	57			180	Dilatation; NE. W. Java.	
				P	10	14	58					
				iP	10	14	59					
				iS	10	15	0					
				off	10	15	8					
				on	10	20	31					
				F	10	32						
		Mal.	II _v	iP	10	14	59			240		
				iS	10	15	6					
				F	10	21						
		S.L.	I _v	P	10	10	17			70		
				S	10	10	25					
				F	10	14						
199	» 22	Bat.	I	P _w	19	55	59					
				i	19	54	18					
				i	19	57	10					
				i _s	19	57	26					
				F	20	5						
		Amb.	II _v	iP	19	50	22			710		
				iS	19	51	59					
				F	19	58						
200	» 25	Bat.	I _u	eP _{NS}	3	13	55			6000		
				S _{EW}	3	21	28					
				F	3	58						
—	» 25	Amb.	I _v	P	6	24	47					
				iS	6	24	51					
				F	6	26						
201	» 25	Bat.	I _v	eP _{EW}	8	55	25			420		
				iS	8	54	10					
				F	8	45						
		S.L.	I _v	eP	8	50	0			250		
				S	8	50	26					
				F	8	52						
202	» 28	Bat.	I	e	9	19	14					
				i	9	25	55					
				F	9	31						
		Amb.	II _v	iP	9	14	58			90		
				iS	9	14	48					
				F	9	37						
—	» 29	S.L.	I _v	P	4	37	0			160		
				S	4	37	18					
				F	4	44						
203	» 29	Bat.	II _r	P _{NS}	16	39	51			1220		
				S	16	41	59					
				F	in next.							
204	» 29	Bat.	I _v	eP	17	9	16			400		
				S	17	10	1					
				F	17	18						

No.	Date 1931.	Sta- tion.	Char- acter.	Phase.	Time (G. C. T.).			Period.	Amplitude (half).		Distance of epi- centre.	Remarks.
					h	m	s		sec.	A _E		
205	Dec. 31	Bat.	I	e	0	51,7					km.	
					i	0	38	32				
					F	1	5					
206	• 31	Bat.	I	e	11	42	10					
					i	11	46	25				
					F	11	57					
—	• 31	Amb.	I _v	eP	18	21	53				180	
					S	18	21	54				
					F	18	25					