

# SEISMOLOGICAL BULLETIN.

## JANUARY 1921.

### BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

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

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

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

No.	Date 1921.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
				h	m	s		$A_E$	$A_N$		
1	Jan. 2	I	e	7	17	0		$\mu$	$\mu$		
			i	7	25	37					
			F	7	37						
2	" 4	I	e	7	42						
			F	7	45						
5	" 6	I $\Delta$	e <sub>E</sub>	12	8	11					
			M	12	12	14					
			L	12	27	42					
			F	12	30						
4	" 6	I $\Delta$	e	25	30	40					
			M	23	33	47					
			F	23	42						
5	" 7	I <sub>u</sub>	iP	1	12	16			8530		ESE — WNW.
			i <sub>N</sub>	1	13	0					
			i	1	15	14					
			iS	1	21	43					
			i	1	22	31					
			M	1	23	53					
			eL	1	35	19					
6	" 7	I	M	1	45						
			F	1	57						
			iP	5	0	50					
			i	5	5	57					
			i	5	11	21	6.5	34.1	15.6		
7	" 7	I	M	5	12	5					
			F	5	37						
			e	10	5	43					
			M	10	9	45					
8	" 7	I <sub>v</sub>	F	10	17						
			iP	17	48	32			270		EW, Lampongs (Sumatra).
			iS	17	49	3					
			M	17	50	9					
9	" 9	I	F	18	6						
			P	14	7	5					
			S	14	16	52					
9	" 9	I	F	14	25						

N <sup>o</sup> .	Date 1921.	Character.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epicentrum	Remarks.
				h	m	s		A <sub>E</sub>	A <sub>N</sub>		
10	Jan. 11	I	e F	20	7	32					
11	" 12	I,	eP M F	2	5	3				1410	Malabar P — S = 17 sec. Δ = 150.
12	" 16	I	e F	10	53	55					Central Celebes.
13	" 16	I	e M <sub>E</sub> F	13	23	2					Central Celebes.
14	" 21	I,	e eS M F	21	22	53				1410	Malabar very faint. Eastern Java.
15	" 24	II,	P iS i <sub>1</sub> i <sub>2</sub> M <sub>1</sub> M <sub>2</sub> F	11	19	42				1590	No minute marks. Malabar P — S <sup>?</sup> = 3 <sup>m</sup> 7 <sup>s</sup> Δ = 1820. Tapanoeli, Sumatra (damage at Taroetoeng).
16	" 26	II,	iP iS=M eL F	17	58	25				780	WNW — ESE. Malabar P — iS = 22 sec. Δ = 200; Azimuth NW — SE.
17	" 27	I	e M F	0	41	29					
18	" 30	I	e M F	7	48	54					
19	" 30	I	e i F	10	49	9					
20	" 31	III,	P? M=S? eL F	0	25	59					P during changing of papers. Malabar P 0 <sup>h</sup> 23 <sup>m</sup> 58 <sup>s</sup> .
21	" 31	I	eP iP iS F	9	23	58				200	Malabar P — iS = 16 sec. Δ = 140. Western Java.

# SEISMOLOGICAL BULLETIN 1921.

## BATAVIA OBSERVATORY, JAVA.

### PREFACE.

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

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

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

For each month the mean constants for that month are applied. T<sub>0</sub> and ε, the oscillation period and the coefficient of damping, are determined every week. V, the magnification for very short waves, is determined occasionally only. It is found by direct measurement, giving the pendulum a displacement by means of the horizontal adjusting screws, the value of which can be determined easily from the pitch (a), the angle of displacement of the screws and the height of the screws (b) and of the centre of gravity (c) above the Cardanic suspension apparatus.

It was found

(a) = 1.407 millimeters.

(b) = 1225 "

(c) = 895 "

The constants used in 1920 are given below.

1920.	E-W component.			N-S component.		
	V.	T <sub>0</sub> .	ε.	V.	T <sub>0</sub> .	ε.
January . . . . .	216	7.7	4.9	193	7.8	4.5
February . . . . .	"	7.6	"	"	"	4.6
March . . . . .	"	"	"	"	"	4.5
April . . . . .	"	"	"	"	"	4.4
May . . . . .	"	7.7	4.8	"	"	4.6
June . . . . .	218	7.8	4.6	209	"	4.4
July . . . . .	"	"	4.8	"	"	4.4
August . . . . .	"	"	4.9	"	"	4.3
September . . . . .	"	7.7	4.3	"	"	4.2
October . . . . .	"	7.9	4.6	"	8.0	4.2
November . . . . .	"	"	4.7	"	"	4.3
December . . . . .	"	7.8	4.4	"	7.9	4.0

... 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) = 1<sup>st</sup> preliminary tremors.

S ( " secundae) = 2<sup>nd</sup> " "

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

M ( " maximae) = maximum amplitude.

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

F (finis) = end of perceptible movement.

PR<sub>1</sub>, PR<sub>2</sub>, ..... SR<sub>1</sub>, SR<sub>2</sub>, ..... = 1<sup>st</sup>, 2<sup>nd</sup> ..... 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<sub>E</sub> = E.-W. component of A.

A<sub>N</sub> = N.-S. " " "

i (impetus) = abrupt commencement, clearly defined.

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

MALABAR.

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

Particulars about the registrations have been put under the remarks.

Year	Month	Day	Time	Intensity	Duration	Remarks
1911	July	11	10.00	III	1.0	First registration with astatic pendulum.
1911	July	12	10.00	III	1.0	Second registration with astatic pendulum.
1911	July	13	10.00	III	1.0	Third registration with astatic pendulum.
1911	July	14	10.00	III	1.0	Fourth registration with astatic pendulum.
1911	July	15	10.00	III	1.0	Fifth registration with astatic pendulum.
1911	July	16	10.00	III	1.0	Sixth registration with astatic pendulum.
1911	July	17	10.00	III	1.0	Seventh registration with astatic pendulum.
1911	July	18	10.00	III	1.0	Eighth registration with astatic pendulum.
1911	July	19	10.00	III	1.0	Ninth registration with astatic pendulum.
1911	July	20	10.00	III	1.0	Tenth registration with astatic pendulum.
1911	July	21	10.00	III	1.0	Eleventh registration with astatic pendulum.
1911	July	22	10.00	III	1.0	Twelfth registration with astatic pendulum.
1911	July	23	10.00	III	1.0	Thirteenth registration with astatic pendulum.
1911	July	24	10.00	III	1.0	Fourteenth registration with astatic pendulum.
1911	July	25	10.00	III	1.0	Fifteenth registration with astatic pendulum.
1911	July	26	10.00	III	1.0	Sixteenth registration with astatic pendulum.
1911	July	27	10.00	III	1.0	Seventeenth registration with astatic pendulum.
1911	July	28	10.00	III	1.0	Eighteenth registration with astatic pendulum.
1911	July	29	10.00	III	1.0	Nineteenth registration with astatic pendulum.
1911	July	30	10.00	III	1.0	Twentieth registration with astatic pendulum.
1911	July	31	10.00	III	1.0	Registration with astatic pendulum.

# SEISMOLOGICAL BULLETIN

## FEBRUARY 1921.

### BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

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

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

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

No.	Date 1921.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								$A_E$	$A_N$		
22	Febr. 3	I	e	19	27	53		$\mu$	$\mu$		
			M	19	28	45					
			F	19	36						
23	" 4	I <sub>u</sub>	e	8	42	39					
			i <sub>1</sub>	8	43	46					
			i <sub>2</sub>	8	49	56					
			i <sub>3</sub>	8	56	50	5.7	17.8	17.3		
			i <sub>4</sub>	9	0	23					
			eL <sub>1</sub>	9	6						
			eL <sub>2</sub>	9	44						
			eL <sub>3</sub>	10	9		24.0				
24	" 4	I	e	13	1	29					
			M <sub>1</sub>	13	5	13					
			M <sub>2</sub>	13	9	27					
			F	13	12						
25	" 5	I	e	8	57	44					
			i <sub>1</sub>	8	59	28					
			i <sub>2</sub>	9	1	40					
			eL	9	6	14					
			F	9	12						
26	" 10	I	e	19	56	4					
			F	20	7						
27	" 11	I	e	0	1	52					
			i <sub>1</sub>	0	2	32					
			i <sub>2</sub>	0	4	45					
			F	0	22						
28	" 13	I <sub>r</sub>	e	12	38	40					Menado and Taroena (Sangir Isles).
			F	12	47						
29	" 14	I <sub>r</sub>	P	1	5	40				2400	Menado and Sangir Isles (pro- bably at Ternate).
			S	1	9	57					
			M	1	10	28	5.9	65.1	96.7		
			eL	1	16						
			F	1	37						
30	" 19	II <sub>r</sub>	P	14	39	36				3020	
			i	14	41	15					
			iS	14	44	20					
			M	14	45	7	7.2				
			eL	14	52	20					
			F	15	8						

No.	Date 1921.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.	
				h	m	s		A <sub>E</sub>	A <sub>N</sub>			
31	Febr. 19	I	e	18	21	22						
			i <sub>1</sub>	18	23	31						
			i <sub>2</sub>	18	24	32						
			i <sub>3</sub>	18	25	8						
			i <sub>4</sub> <sub>N</sub>	18	27	1						
			i <sub>5</sub>	18	29	22						
			eL	18	33	22						
			F	19	12							
32	• 26	I,	e	5	59	14					Malabar iP — iS = 10 sec;	
			i	5	59	35					Δ = 90.	
			F	6	5						Preanger (Java).	
33	• 26	I	P	13	48	19			290		Malabar P — S? = 53 sec;	
			S	13	48	52					Δ = 470?	
			F	13	56							
34	• 27	III,	P	18	35	42				8730	ESE — WNW.	
			iP	18	35	44						Malabar P — S = 9 <sup>m</sup> 52 sec.
			iS	18	45	35						Δ = 8710.
			M	18	45	45	6.6	386	358			
			eL	18	55	35						
			M	19	8	35	22.0	323	387			
			F	20	7							

# SEISMOLOGICAL BULLETIN.

## MARCH 1921.

### BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

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

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

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

No.	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								$A_E$	$A_N$		
35	March 1	I	e	h	m	s		$\mu$	$\mu$		
			$i_1$	6	42	54					
			$i_2$	6	43	4					
			F	7	51	2					
36	" 1	I,	iP	19	51	49					SSE. Malabar iS — iP = 12 sec. $\Delta = 100$ KM; az. $\pm$ NS Preanger.
			eS?	19	52	13					
			K	19	53	27					
			F	19	53	21					
37	" 2	II	P	12	4	53	5.7	96	107		
			i	12	4	55					
			K	12	6	26					
			F	12	16						
38	" 3	I	P	3	11,0					(8700)	Confused by street traffic.
			$i_1$	3	11	49					
			$i_2$	3	12	57					
			$i_3$	3	14	47					
			$i_4$	3	18	29					
			$i_5$	3	19	23					
			iS	3	20	46					
			L	3	37						
F	3	48									
39	" 3	III <sub>a</sub>	iP	8	21	25				220 (')	SW; pens thrown off. Malabar iS? — iP = 7 sec. $\Delta = 60$ (?) Felt from Benkoelen (Sumatra) to Kedoe (Central Java).
			M	8	22	0					
			F	9	37						
40	" 4	I	P <sub>E</sub>	12	58	49					
			S <sub>N</sub>	13	4	57					
			F	13	8						
41	" 5	II	e	6	28	35	14.8	257	193		
			M	6	35	24					
			F	7	28						
42	" 9	I	e	22	14	46					
			$i_1$	22	15	6					
			$i_3$	22	22	44					
			F	22	26						
43	" 10	I	$i_E$	20	14	12					
			$i_1$	20	17	26					
			$i_2$	20	21	19					
			F	20	38						

(1) read from Bosch seismograph.

No.	Date 1920.	Character.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epicentrum.	Remarks.
				h	m	s		A <sub>E</sub>	A <sub>N</sub>		
44	March 15	I	e <sub>1</sub> e <sub>2</sub> F	2	50	25					
45	" 15	I <sub>r</sub>	P M F	14	42	50	6.0			Lebak Parai (Bantam), Java.	
46	" 16	I	e i F	11	44	7					
47	" 19	I	e eL M F	8	29	45					
48	" 23	I	eP S F	2	49	10					
49	" 23	II <sub>r</sub>	eP eS M <sub>1</sub> M <sub>2</sub> eL F	22	49	19	5.9 6.0	105 175	185 198	2750	Malabar eS — eP = 4 <sup>m</sup> 5 <sup>s</sup> ; Δ = 2510.
50	" 24	II <sub>r</sub>	eP iS M eL F	1	30	44	5.5	116	218	2700	EW. Malabar S — eP = 4 <sup>m</sup> 5 <sup>s</sup> ; Δ = 2510.
51	" 24	I	e M eL M F	9	29	11	20 18.0				
52	" 24	I	e <sub>1</sub> e <sub>2</sub> i eL F	14	55	14					
53	" 28	II <sub>u</sub>	e i <sub>1</sub> M i <sub>2</sub> L <sub>1</sub> L <sub>2</sub> M <sub>1</sub> M <sub>2</sub> M <sub>3</sub> F	8	9	41	6.0	359	80.0		Malabar S — P = 11 <sup>m</sup> 25 <sup>s</sup> ; Δ = 10570?
54	" 29	I	e F	17	19	56					
55	" 29	I	e <sub>1</sub> e <sub>2</sub> e <sub>3</sub> F	22	21	36	25.3 20.0				

No.	Date 1919.	Character.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epicentrum.	Remarks.
				h	m	s		A <sub>E</sub>	A <sub>N</sub>		
56	March 30	I	e M F	10	53	1					
57	" 30	III <sub>r</sub>	P eS M F	15	6	45	6.5	339	373	2230	WNW. Malabar iS — P = 5 <sup>m</sup> 53 <sup>s</sup> ; Δ = 2120

## SEISMOLOGICAL BULLETIN.

APRIL 1921.

## BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

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

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

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

N <sup>o</sup> .	Date 1920.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A <sub>E</sub>	A <sub>N</sub>		
58	April 1	III <sub>r</sub>	iP	h	m	s	8.0	μ	μ	1410	Destructive earthquake at Ta- roetoeng (Tapanoeli), Sumatra.
			eS	4	9	29					
			i	4	11	55					
			M <sub>1</sub>	4	13	4					
			M <sub>2</sub>	4	13	55					
			eL	4	18	45					
F	4	21	25								
			F	5	28						
59	" 1	I <sub>r</sub>	eP	12	10	29				3800	E—W.
			F	12	59						
60	" 2	II	P	9	45	40				3800	E—W.
			i	9	45	17					
			S	9	49	5					
			eL	10	5						
			F	10	28						
61	" 10	I	e	3	46					1180?	± E—W. Eastern Java and Bali.
			F	3	58						
62	" 12	I <sub>v</sub>	eP	5	56	31					Benkoelèn.
			F	5	41						
63	" 12	I	e	9	44	25					
			i	9	51	1					
			i	10	1	44					
			F	10	13						
64	" 13	I	e	21	52	10					
			F	21	55						
65	" 14	II	P	0	27	39				1180?	
			i	0	28	4					
			eS?	0	29	45					
			eL	0	32	31					
			F	0	45						
66	" 15	I	i	21	18	46					
			i	21	29	5					
			F	21	56	1					
67	" 18	I <sub>v</sub>	e	3	52	20					
			i	3	55	8					
			M	3	55	36					
			F	3	59						
			F	3	59						



No.	Date 1920	Char- acter.	Phase	Time (Greenwich)	Period in seconds	Amplitude (half)		Distance of epi- centrum.	Remarks.
						A <sub>E</sub>	A <sub>N</sub>		
68	April 1	III		11 29	8.0	1.0	0.7	1410	Destructive earthquake at Ta- ratorog (Yapanoh), Sumatra.
69	" 1	I		13 39					Yapanoh.
70	" 2	II		9 40				2800	E-W.
71	" 10	I		2 46					Troubled by street traffic.
72	" 12	I		3 56					Bobjong Aech (Prenanger) Java.
73	" 12	I		9 44					
74	" 12	I		10 1					
75	" 12	I		10 13					
76	" 12	I		21 55				11803	E-W. Eastern Java and Bali.
77	" 14	II		0 27					
78	" 18	I		18 46					
79	" 18	I		21 29					
80	" 18	I		21 38					Benkoelan.

# SEISMOLOGICAL BULLETIN

## MAY 1921.

### BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

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

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

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WICHERT.

N <sup>o</sup> .	Date 1921.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.		Amplitude (half)		Distance of epi- centrum	Remarks.
							A <sub>E</sub>	A <sub>N</sub>	A <sub>E</sub>	A <sub>N</sub>		
71	May. 1	I	e F	14 14	39 46	56						
72	" 1	I	e M F	19 19	12 16	49 49						
73	" 1	I <sub>v</sub>	P iS M F	19 19 19 19	27 27 28 35	20 42 43			190		Malabar e — e S = 29 sec. Δ = 260.	
74	" 1	I <sub>r</sub>	iP iS F	19 19 19	45 46 55	3 29			800		EW. Malabar P — S = 78 sec. Δ = 720.	
75	" 4	I	e F	5 5	19 27	6						
76	" 4	I	i M F	21 21 21	33 34 41	52 18						
77	" 5	I	e iN iN M F	5 5 5 6 6	35 58 59 0 13	17 41 18 36						
78	" 7	I <sub>v</sub>	e iS F	4 4 4	53 53 59	14 44			270			
79	" 12	I	e i <sub>1</sub> i <sub>2</sub> eL F	3 3 3 4 4	48 55 57 3 18	27 16 40						
80	" 13	II <sub>r</sub>	eP e M F	12 12 12 13	44 49 51 13	57 23 15						

No.	Date 1920.	Character.	Phase.	Time (Greenwich).			Amplitude (half)		Distance of epicentrum.	Remarks.
				h	m	s	A <sub>E</sub>	A <sub>N</sub>		
81	May 13	II <sub>r</sub>	eP	20	2	52			3560?	
			i	20	6	55				
			iS?	20	8	2				
			M <sub>1</sub>	20	8	24	6.2	114 213		
			M <sub>2</sub>	20	9	30				
82	" 13	I <sub>r</sub>	e	20	40	5				
			i	20	43	26				
			i	20	44	5				
			F	21		5				
83	" 13	II <sub>r</sub>	eP	21	12	20			2590	Malabar e - i <sub>2</sub> = 257 sec. Δ = 2480.
			i	21	15	22				
			S	21	16	10				
			M <sub>1</sub>	21	16	45	7.0	172 555		
			M <sub>2</sub>	21	19	14	6.0	269 191		
84	" 14	III <sub>r</sub>	P	11	20	34			2520	Malabar e - i <sub>2</sub> = 217 sec. Δ = 2250
			i <sub>1</sub>	11	20	54				
			i <sub>2</sub>	11	24	2				
			S	11	24	19				
			M <sub>1</sub>	11	24	39	5.9	287 580		
85	" 15	I	M <sub>2</sub>	11	26	5	5.9	519 545		
			F	12		8				
			i	14	55	5				
			F	15		6				
			e	5	3	14				
86	" 18	I <sub>v</sub>	F	5		6			Preanger (Java).	
			e	5		6				
87	" 18	I <sub>v</sub>	iP	18	15	25			210	Malabar P - eS = ± 18 sec. Δ = ± 160.
			iS	18	15	47				
			F	18		21				
88	" 18	I	P	23	57,6				± 5200	Troubled by street traffic.
			i <sub>N</sub>	23	59	12				
			F	0		8				
89	" 20	I <sub>u</sub>	P	0	52,9				± 5200	Troubled by street traffic.
			S <sub>E</sub>	0	59	41				
			F	1		22				
90	" 20	I <sub>r</sub>	P	13	27	4			2490	EW - NS.
			S	13	31	2				
			M	13	32	21	6.0	28.6 52.8		
			F	13		40				
91	" 21	I	eP	8	47	42				
			M	8	54	36				
			eL	8	59	5				
			F	9	15	50				
92	" 21	II <sub>u</sub>	e	22	37	9			7900	
			eS	22	46	20				
			F	22		55				
93	" 21	I	e	25	43	14				
			i <sub>E</sub>	25	46	20				
			F	25		57				

No.	Date 1921.	Character.	Phase.	Time (Greenwich).			Amplitude (half).		Distance of epicentrum.	Remark.
				h	m	s	A <sub>E</sub>	A <sub>N</sub>		
94	May 25	I	e	4	19	10				
			F	4		41				
95	" 28	I	P	19	24	36				EW > NS.
			M	19	26	18				
			eL	19		37				
			F	19		41				

# SEISMOLOGICAL BULLETIN

## JUNE 1921.

### BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

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

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

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

N <sup>o</sup> .	Date 1921.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
				h	m	s		A <sub>E</sub>	A <sub>N</sub>		
96	June 1	I	e	19	56	51		μ	μ		
			M	19	56	49					
			F	20	2						
97	" 2	II <sub>r</sub>	eP	7	9	18				1250?	Padang and Tapanoeli (Sumatra).
			eS?	7	11	27					
			M <sub>1</sub>	7	15	27	6.1	123	129		
			M <sub>2</sub>	7	14	25	5.6	134	169		
			M <sub>3</sub>	7	15	11					
			M <sub>4</sub>	7	16	15	6.0	121	69.0		
98	" 3	I	e	4	17	12					Ternate (?).
			i	4	20	55					
			F	4	31						
99	" 4	I	e <sub>1</sub>	16	12	50					
			e <sub>2</sub>	16	16	49					
			F	16	49						
100	" 7	I	e	4	49	37					Central Celebes (?).
			i	4	53	18					
			M	4	54	20					
			F	5	5						
101	" 8	II <sub>v</sub>	iP	15	10	18					N 65 W. Benkoelen (Sumatra).
			i <sub>1</sub>	15	10	58					
			i <sub>2</sub>	15	11	9					
			F	15	21	27					
102	" 9	II <sub>r</sub>	P	10	40	5				2570	EW > NS.
			iS	10	44	9					
			eL	10	47	2					
			F	10	56						
103	" 12	I <sub>v</sub>	P	23	42	1					EW > NS. Benkoelen.
			i <sub>N</sub>	23	42	49					
			M <sub>1</sub>	23	43	54					
			M <sub>2</sub>	23	43	28					
			F	23	55						
104	" 14	I <sub>v</sub>	P	0	55	48				240	EW > NS. Malabar P — S = 34 sec. Δ = 300 KM. Lampongs (Sumatra).
			iS	0	54	15					
			F	0	41						

No.	Date 1921.	Char- acter.	Phase.	Time (Greenwich)			Period in seconds.		Amplitude (half)		Distance of epi- centrum.	Remarks.
							A <sub>E</sub>	A <sub>N</sub>	A <sub>E</sub>	A <sub>N</sub>		
105	June 14	I	P M <sub>N</sub> F	h 6 6	m 45 58	s 57 41					EW. Soela Islands (?).	
106	" 14	I	e F	7 7	1 5	56 22					Benkoelen (Sumatra).	
107	" 18	I <sub>v</sub>	e iS M F	15 15 15	22 22 23	14 57 49				200		
108	" 19	I	eP S F	4 4 4	17 18 21	32 6				500	Troubled by street traffic. Malabar iP — iS = 11 sec; Δ = 100. Preanger (Java).	
109	" 19	I <sub>r</sub>	e S F	9 9 9	31 35 44	8 12				2570	Menado (Celebes).	
110	" 25	I	i i <sub>E</sub> i <sub>E</sub> F	15 15 15 15	45 46 46 57	19 51 48						
111	" 28	I <sub>u</sub>	P i iS i eL M <sub>N</sub> F	14 14 14 14 14 14	9 11 18 19 33 36 39	55 8 57 42 10 4				19.0 7700		

# SEISMOLOGICAL BULLETIN.

## JULY 1921.

### BATAVIA OBSERVATORY, JAVA.

Foundation: River Quairair.

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

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

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

No.	Date 1921.	Cha- racter.	Phase	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum	Remarks.
				h	m	s		A <sub>E</sub>	A <sub>N</sub>		
112	July 2	I <sub>v</sub>	eP iS F	1	11	14 32 57		$\mu$ $\mu$	160	Malabar P — iS = 12 sec. $\Delta$ = 100. Preanger and Bantam (Java).	
113	" 3	II <sub>v</sub>	iP iS M F	14	3	59 17 37 3	4.7	264 174	160	$\pm$ NS. Malabar iP — iS = 10 sec. $\Delta$ = 90 KM; EW. Western Java.	
114	" 4	I <sub>v</sub>	i <sub>1</sub> i <sub>2</sub> iS F	14	25	59 47 27 47	6.0 5.9	22.3 30.0	13.1 57.5	4830	
115	" 7	I	e <sub>1</sub> e <sub>2</sub> F	10	55	44 28 11					
116	" 8	III <sub>v</sub>	P S <sub>E</sub> M <sub>1</sub> M <sub>2</sub> F	13	17	12 46 40 36 46	6.1 6.1	502 416	629 445	500	NS. Malabar iP — iS? = $\pm$ 100. Preanger and Central Java.
117	" 9	II	P i F	20	57.9	51 52					In minute mark.
118	" 9	I	e F	21	14	24 20					
119	" 9	I	i <sub>E</sub> i M F	21	27	34 44 42 36					
120	" 13	I	e F	13	24	2					
121	" 15	I	eP F	6	3	15 13					
122	" 15	I	e i <sub>E</sub> F	10	8	23 4 15					

No.	1921.	racter.	Phase.	(Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A <sub>E</sub>	A <sub>N</sub>		
123	July 15	II <sub>v</sub>	P	h	m	s	5.7 6.0	175 170	292 252	2450	EW > NS. Malabar e - iS = 3 <sup>m</sup> 47 sec. △ = 2550. Taroena (Sangi Isles), Kopanda- kan (N. Celebes) and Ternate.
			iS	18	11	5					
			M <sub>1</sub>	18	12	17					
			M <sub>2</sub>	18	14	56					
			F	18	15	6					
124	" 17	III <sub>v</sub>	P	20	48	5	5.6	444	601	250	S 9,5° E. Malabar iP - iS = 58 sec. △ = 330. Preanger.
			iS	20	48	31					
			M	20	49	21					
			F	21	5						
125	" 17	I <sub>v</sub>	eP	21	58	6				100	S in minute marks. Malabar P - iS = 11 sec. △ = 530 Tjikentjreng (Preanger).
			S	21	58,5						
			F	22	2						
126	" 18	I	e	0	28	41					
			M	0	30	21					
			F	0	32						
127	" 18	I	eP	1	45	8					
			i <sub>E</sub>	1	45	16					
			i	1	46	29					
			M	1	46	57					
			F	1	52						
128	" 18	I	e	11	17						
			M	11	21						
			F	11	27						
129	" 19	I	e	2	2	8					
			i	2	3	58					
			M	2	4	26					
			F	2	7						
130	" 25	I <sub>v</sub>	iP	16	32	48				160	Malabar e - S = 16 sec. △ = 140. Lebak Parai (Bantam).
			iS	16	33	6					
			F	16	38	4					
131	" 25	I	e	19	35	45					
			M	19	35	44					
			F	19	37						
132	" 25	I	e	20	3	19					
			i	20	7	27					
			i <sub>E</sub>	20	8	19					
			F	20	12						
133	" 25	II <sub>v</sub>	P	23	26	11				480	S in minute marks. Azimuth N 76,5 W. Malabar iP - S = 1 <sup>m</sup> 0 sec. △ = 540; EW. Benkoelen and Padang (Sumatra).
			i	23	26	51					
			S <sub>N</sub>	23	27,1						
			M	23	28	15					
			F	23	44						
134	" 29	I <sub>v</sub>	P	2	41	31				870?	EW > NS. Padang and Mentawai Isles (Su- matra)
			eS?	2	43	4					
			M	2	45	31					
			F	3	2						
135	" 31	I	P?	10	0	56					
			i <sub>E</sub>	10	4	15					
			i <sub>1</sub>	10	4	45					
			i <sub>2</sub>	10	9	5					
			eL	10	25	57					
			F	10	36						

# SEISMOLOGICAL BULLETIN.

## AUGUST 1921.

### BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

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

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

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

No.	Date 1921.	Cha- racter.	Phase.	Time (Greenwich).	Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.			
						$A_E$	$A_N$					
136	Aug 1	I	$i_E$	h			$\mu$	$\mu$				
				m	17	48	24					
				s	17	49	7					
					$i_E$	17	49	52				
					M	17	49	46				
		F	17	53								
137	" 2	$I_v$	$i_P$	6	15	50			150	Malabar $i_P - i_S = 13$ sec $\Delta = 100$ . Western Java.		
				S	6	16	7					
				M	6	16	46					
				F	6	20						
138	" 4	$I_r$	$e_P$	25	18	26			2500	Menado.		
				S	25	22	24					
				F	25	26						
139	" 13	$II_r$	$i_P$	12	58	28			1750?	Azimuth S 74 E. Malabar P — S = $3^{\text{m}} 1$ sec. $\Delta = 1790$ . Timor and Flores.		
				$S_N?$	13	1	25					
				M	13	2	59					
				F	13	27	16					
140	" 14	I	$i$	13	36	6						
				M	13	37	2					
				F	13	40						
141	" 16	II	P	6	53	59			$\pm$ NS. (P troubled by street traffic).			
				$i$	6	54	45					
				$M_1$	6	56	25	5.5		241	152	
				$M_2$	6	57	37	5.5		150	162	
				$i$	6	0	51					
				M	6	3	0	6.5		216	199	
				F	in next.							
142	" 16	I	$e$	7	27	52			e troubled by No. 141.			
				$i$	7	29	22					
				F	7	42						
143	" 20	I	$e_P$	5	26	57			660	Malabar $e_P - S = 76$ sec. $\Delta = 710$ .		
				$i_S$	5	28	8					
				$i$	5	28	52					
				F	5	38						
144	" 22	I	$e$	13	36	59						
				$i_E$	13	38	19					
				$i$	13	41	0					
				F	13	45						



No.	1921.	recter.	Phase.	(Greenwich).			Periode in seconds.		Amplitude (half).		Distance of epi-centrum	Remark.
							A <sub>E</sub>	A <sub>N</sub>	A <sub>E</sub>	A <sub>N</sub>		
143	Aug. 25	I <sub>r</sub>	e	h	m	s	5.9	58.9	20.3	2150	Malabar P — S = 3 <sup>m</sup> 30 sec. Δ = 2140.	
				10	1	8						
				i	10	1						15
				i S <sub>E</sub>	10	4						39
				i	10	5						48
146	" 26	I	P	17	54	58	5.9	58.9	20.3	2150	Kisar and Maety Miarang (Southern Moluccas).	
				M	10	6						24
				F	10	17						17

No.	Date 1921.	Class. Factor.	Phase.	Time (Greenwich).		Amplitude (half).		Distance of epi-centrum.	Remarks.
				A <sub>E</sub>	A <sub>N</sub>	A <sub>E</sub>	A <sub>N</sub>		
136	Aug 1	I	e	17	17	17	17		
137	" 2	I	P	17	17	17	17	180	Malabar P — S = 12 sec Δ = 100. Western Java.
				17	17	17	17		
				17	17	17	17		
				17	17	17	17		
				17	17	17	17		
138	" 4	I	P	17	17	17	17	2800	Mendo.
				17	17	17	17		
				17	17	17	17		
				17	17	17	17		
				17	17	17	17		
139	" 13	H	P	12	12	12	12	1780	Azimuth S 74 E. Malabar P — S = 3 <sup>m</sup> 1 sec. Δ = 1700. Timor and Flores.
				12	12	12	12		
				12	12	12	12		
				12	12	12	12		
				12	12	12	12		
140	" 14	I	P	12	12	12	12		
				12	12	12	12		
				12	12	12	12		
				12	12	12	12		
				12	12	12	12		
141	" 18	H	P	12	12	12	12		± NS. P troubled by street traffic.
				12	12	12	12		
				12	12	12	12		
				12	12	12	12		
				12	12	12	12		
142	" 18	I	P	12	12	12	12		e troubled by No. 141.
				12	12	12	12		
				12	12	12	12		
				12	12	12	12		
				12	12	12	12		
143	" 20	I	P	12	12	12	12	880	Malabar P — S = 36 sec. Δ = 710.
				12	12	12	12		
				12	12	12	12		
				12	12	12	12		
				12	12	12	12		
144	" 22	I	P	12	12	12	12		
				12	12	12	12		
				12	12	12	12		
				12	12	12	12		
				12	12	12	12		

# SEISMOLOGICAL BULLETIN

## SEPTEMBER 1921.

### BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

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

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

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

N <sup>o</sup> .	Date 1921.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.		Amplitude (half)		Distance of epi- centrum.	Remarks.
				h	m	s			A <sub>E</sub>	A <sub>N</sub>		
147	Sept. 5	I	eP <sub>N</sub>	20	7	44			μ	μ	420	Central and Eastern Java.
			i	20	16	56						
			i <sub>E</sub>	20	17	29						
			eL <sub>E</sub>	20	34							
			F	21	2							
148	" 6	I <sub>v</sub>	eP	12	46	20					420	
			S	12	47	7						
			M	12	47	47						
			F	12	55							
149	" 11	III <sub>d</sub>	iP	4	5	16					760?	S 59.6 E. Pens thrown off 4 <sup>h</sup> 4 <sup>m</sup> 57 sec; removed 4 <sup>h</sup> 27 <sup>m</sup> . Malabar iP — i <sub>2</sub> = 59 sec. Δ = 540; S 24 E. Epicenter ± 11° S, 111° E. Felt all over the Isles of Java, Madoera, Bali and Lombok and at Kroe (Benkoelen Sumatra).
			i	4	4	1						
			S?	4	4	38						
			F	6	52							
150	" 11	I <sub>v</sub>	eP	8	25	6					Malabar e — iS = 51 sec. Δ = 460. Kali Baroe (Besoeeki) Java.	
			i	8	26	9						
			F	8	56							
151	" 11	I <sub>v</sub>	P	11	47,3					P in hour mark. Malabar e — S = 50 sec. Δ = 450.		
			F	11	58							
152	" 11	I <sub>v</sub>	e	12	19	54					Malabar e — S = 53 sec. Δ = 480.	
			F	12	22							
153	" 11	I	P	15	29	11						
			F	15	34							
154	" 11	I	e	16	31	19						
			F	16	38							
155	" 11	I <sub>v</sub>	P	21	57	52					Malabar e — S = 52 sec. Δ = 470.	
			i	21	39	1						
			F	22	6							
156	" 12	I <sub>v</sub>	eP	15	59	0					Malabar e — iS = 57 sec. Δ = 510. Central Java.	
			F	15	41							

# GICAL BULLETIN.

## OCTOBER 1921.

### BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

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

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

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

No.	Date 1921.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
								A <sub>E</sub>	A <sub>N</sub>		
188	Oct. 1	I	e F	1	0,0					No minute marks.	
189	" 1	II <sub>v</sub>	P i <sub>N</sub> S M F	4	19 57				500	E — W	
				4	20 9	6.0	160	121			
				4	20 52						
				4	21 44						
				4	35						
190	" 1	I <sub>v</sub>	eP iS F	10	39 23				640	Malabar P — iS = 75 sec. Δ = 700. Eastern Java.	
				10	40 52						
				10	50						
191	" 1	I <sub>v</sub>	e F	18	50 33					Malabar P — eS = 38 sec. Δ = 330. Eastern Java.	
				18	39						
192	" 2	I	i F	18	30 33						
				18	33						
193	" 3	I <sub>v</sub>	P i iS F	23	52 39				240		
				23	52 44						
				23	53 6						
				23	57						
194	" 4	I	e i <sub>E</sub> i <sub>E</sub> i <sub>N</sub> F	8	59 14						
				10	1 25						
				10	2 56						
				10	5 55						
				10	6						
195	" 5	I	e F	0	28 35						
				0	40						
196	" 5	II	iP <sub>E</sub> i <sub>N</sub> i <sub>E</sub> i <sub>E</sub> M <sub>N</sub> F	1	55 21						
				1	56 17						
				1	56 52						
				1	57 52						
				2	0 0						
				2	57						
197	" 5	III <sub>v</sub>	iP iS M F	17	53 57				180	ESE — WNW.	
				17	54 17						
				17	55 45	6.2	384	525			
				18	10						

No.	Date 1921.	Character.	Phase.	Time (Greenwich).			Period in seconds.		Amplitude (half)		Distance of epicentrum.	Remarks.
				h	m	s			A <sub>E</sub>	A <sub>N</sub>		
198	Oct. 5	I <sub>v</sub>	iP iS <sub>N</sub> F	18	58	15			μ	μ	180	
199	" 6	I	i F	16	20	25						
200	" 8	I	e <sub>E</sub> F	11	7	22						
201	" 9	II <sub>r</sub>	P i e S eL F	0	16	6	5.5	372	216	1780	P troubled by street traffic. Malabar P — iS = 2 <sup>m</sup> 50 sec. Δ = 1670.	
202	" 9	I <sub>v</sub>	P <sub>E</sub> M <sub>N</sub> F	1	17	28					Benkoelen (Sumatra).	
203	" 9	II <sub>v</sub>	e P iS M F	4	54	53	5.9	230	252	350	Lais (Benkoelen).	
204	" 9	I	e F	14	51	14					Kedoe (Java).	
205	" 10	II <sub>r</sub>	e i <sub>1</sub> i <sub>2</sub> i <sub>3</sub> F	2	12	54					Dobo Isles and New Guinea.	
206	" 11	I	e i i <sub>N</sub> F	7	53	43						
207	" 12	I	e i F	8	2	43						
208	" 14	I	e i L F	16	52	51						
209	" 14	I <sub>r</sub>	P iS F	17	14	57				2390	Malabar eP — S = 3 <sup>m</sup> 44 sec. Δ = 2310. Menado and Ternate.	
210	" 15	II	P i i i <sub>E</sub> eL M F	5	8	18					EW. Malabar P? — S = 8 <sup>m</sup> 26 sec. Δ = 7000?	

No.	Date 1919.	Character.	Phase.	Time (Greenwich).			Period in seconds.		Amplitude (half)		Distance of epicentrum.	Remarks.
				h	m	s			A <sub>E</sub>	A <sub>N</sub>		
211	Oct. 16	I <sub>v</sub>	iP S? M F	22	6	35			μ	μ	390?	ESE. Malabar iP — eS? = 43 sec. Δ = 580?; SE. Central and Eastern Java.
212	" 17	I	P F	1	24	20						
213	" 17	I <sub>v</sub>	P eS? F	20	39	38					220?	Malabar iP — iS = 10 sec. Δ = 90. Preanger (Java).
214	" 17	I <sub>v</sub>	e F	20	49	3						
215	" 17	I <sub>v</sub>	i F	21	53	23						Malabar P — S = 15 sec. Δ = 130. Sodonghilir (Preanger).
216	" 18	I	e i F	0	39	5						
217	" 20	I	e i i i F	6	23	10						
218	" 20	I	e F	10	43	59						
219	" 24	I <sub>v</sub>	iP iS M F	23	19	51					350	SE. Malabar P — S = 50 sec. Δ = 270. Preanger and Central Java.
220	" 30	I <sub>r</sub>	P i iS F	7	53	36					2520	
221	" 31	I <sub>v</sub>	e i F	10	18	57						Malabar P — S = 29 sec. Δ = 260. Preanger and Central Java.

# SEISMOLOGICAL BULLETIN.

## NOVEMBER 1921.

### BATAVIA OBSERVATORY, JAVA.

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

WIECHERT Horizontal Pendulum, 1000 kilograms.  
 The symbols are according to WIECHERT.

No.	Date 1921.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum.	Remarks.
				h	m	s		A <sub>E</sub>	A <sub>N</sub>		
222	Nov. 7	II <sub>r</sub>	eP	16	5	2	6.0	91.5	210	2740	Malabar P — eS = 4 <sup>m</sup> 34 sec. $\Delta = 3000$ . P — L = 8 <sup>m</sup> 34 sec.
			iP	16	5	4					
			i <sub>1</sub>	16	5	21					
			iS	16	9	18					
			M	16	10	26					
			i <sub>2</sub>	16	12	0					
			eL	16	15	30					
			F	16	16	11					
225	" 8	I	e	15	26	40					
			F	15	33						
224	" 10	I <sub>v</sub>	i	16	57	35					Malabar P — iS = 20 sec. $\Delta = 180$ . Preanger.
			F	16	59						
225	" 11	III <sub>r</sub>	eP	18	41	46	6.2	475	251	2410?	Malabar iP — eS = 4 <sup>m</sup> 7 sec. $\Delta = 2620$ . iP — eL = 7,2 <sup>m</sup> . Menado, Taroenā; tide waves at Great Sangir Island.
			iP	18	41	49					
			i	18	42	44					
			eS?	18	45	38					
			i	18	46	10					
			M	18	46	26					
			eL	18	49	10					
F	20	7									
226	" 12	I <sub>v</sub>	e	23	55	23					Tjikentjreng (Preanger).
			i <sub>1</sub>	23	54	31					
			i <sub>2</sub>	23	54	55					
			i <sub>N</sub>	23	55	15					
			i <sub>E</sub>	23	57	17					
" 15			F	0	8						
227	" 13	I	e	9	13	9					
			F	9	20						
228	" 13	I	e	12	53	11					Preanger.
			i	12	53	35					
			F	12	57						
229	" 13	I <sub>v</sub>	P	13	59	33					
			iP	13	59	34					
			S	14	6	7					
			i	14	7	2					
			F	14	15						

No.	Date 1921.	Character.	Phase.	Time (Greenwich).			Amplitude (half)		Distance of epicentrum.	Remarks.
							A <sub>E</sub>	A <sub>N</sub>		
				h	m	s	μ	μ		
230	Nov. 13	I	e F	18 18	5 22	40				
231	" 14	I <sub>n</sub>	e i S? F	7 7 7	2 3 10	50 52 30			6490?	
232	" 14	I	e F	7 8	53 5	56				
233	" 15	I	e F	2 2	21 37	45				
234	" 15	II <sub>n</sub>	iP i <sub>1</sub> i <sub>2</sub> i <sub>3</sub> eL F	20 20 20 20 20 21	45 52 53 54 56 27	44 51 51 15			ESE — WNW. Malabar eP — iS = 7 <sup>m</sup> 24 sec. Δ = 5790. eP — eL = 10,8 <sup>m</sup> .	
235	" 16	I	e F	4 4	42 54	45			Menado.	
236	" 16	I	e F	9 9	45 51	6				
237	" 16	I	e F	14 14	45 57	20			Singkel (Atjeh)?	
238	" 17	I <sub>r</sub>	P i <sub>1</sub> i <sub>2</sub> F	7 7 8 8	55 57 0 10	37 39 4			Malabar P — e = 4 <sup>m</sup> 53 sec. Δ = 2980.	
239	" 18	I <sub>v</sub>	iP S F	20 20 20	45 45,9 51	46			SW; S in hour mark. Malabar P — iS = 16 sec. Δ = 140. Western Java.	
240	" 19	I <sub>v</sub>	e i F	19 19 19	34 35 40	29 35			Eastern Java.	
241	" 19	I <sub>v</sub>	P F	22 22	26 30	6			Central and Eastern Java.	
242	" 20	I <sub>r</sub>	P S <sub>E</sub> ? i F	11 12 12 12	58 1 5 9	8 43 15			2200? NE. Menado and Taroena.	
243	" 21	I <sub>v</sub>	e i F	17 17 17	40 41 43	51 10				
244	" 22	I	e <sub>E</sub> F	9 9	46 51	56				
245	" 22	I	e <sub>1</sub> e <sub>2</sub> e <sub>3</sub> F	20 20 20 20	14 17 19 22	19 55 40				

No.	Date 1921.	Character.	Phase.	Time (Greenwich).			Amplitude (half)		Distance of epicentrum.	Remark.
							A <sub>E</sub>	A <sub>N</sub>		
				h	m	s	μ	μ		
246	Nov. 24	I <sub>v</sub>	P iS F	2 2 2	7 8 11	51 7 14			140	NS. Malabar P — eS = 13 sec. Δ = 110. Preanger.
247	" 25	I	eP i F	18 18 18	45 46 50	26 42				
248	" 25	I	P M F	19 19 19	3 6 10	55 2				
249	" 25	I	e <sub>1</sub> e <sub>2</sub> e <sub>3</sub> F	18 18 18 19	49 52 58 3	42 55 10				
250	" 26	I	P iS? M F	22 25 25 25	58 8 9 14	20 25 32				

N.B. Earthquake 149, Sept 11<sup>th</sup>.  
Computed epicentre 12,4 S; 110,8 E.  
Time at epicentre 4<sup>h</sup> 1<sup>m</sup> 24<sup>s</sup>.

# SEISMOLOGICAL BULLETIN.

## DECEMBER 1921.

### BATAVIA OBSERVATORY, JAVA.

Foundation: River Quartair.

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

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

WIECHERT Horizontal Pendulum, 1000 kilograms.

The symbols are according to WIECHERT.

N <sup>o</sup> .	Date 1921.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.	Amplitude (half)		Distance of epi- centrum	Remarks.			
				h	m	s		A <sub>E</sub>	A <sub>N</sub>					
251	Dec. 1	I <sub>u</sub>	e <sub>E</sub>	10	57	58		μ	μ					
			i <sub>1</sub>	11	4	6								
			i <sub>2</sub>	11	4	47								
			eL	11	16	27								
		F	11	32										
252	" 2	I	e <sub>E</sub>	20	53	28								
			i <sub>1</sub>	20	56	48								
			i <sub>2</sub>	21	1	48								
			F	21	7									
253	" 4	I <sub>v</sub>	e	12	6	4				190	Malabar iP <sub>N</sub> — S = 42 sec. Δ = 370.			
			i <sub>N</sub>	12	7	4								
			i <sub>E</sub>	12	7	11								
			i	12	8	28								
			F	12	22									
254	" 4	I <sub>v</sub>	e	17	55	59				190	Malabar P — S = 48 sec. Δ = 420.			
			i	17	58	16								
			i	18	3	2								
			i <sub>N</sub>	18	5	45								
			F	18	10									
255	" 6	I <sub>v</sub>	P <sub>N</sub>	12	39	34				190	Malabar eP — S = ± 50 sec. Δ = ± 290.			
			i <sub>1</sub>	12	40	12								
			i <sub>E</sub>	12	41	8								
			F	12	49									
256	" 7	I <sub>v</sub>	e	12	24	24				190	Lebak Parai (Bantam) Java.			
			iS	12	24	49								
			F	12	27									
257	" 7	II <sub>r</sub>	i <sub>E</sub>	17	32	16	6.1	107	112			Malabar i <sub>1</sub> — i <sub>2</sub> = 8 <sup>m</sup> 10 sec.		
			i <sub>N</sub>	17	36	21								
			M	17	38	48								
			eL	17	45									
			F	18	7									
258	" 7	I <sub>r</sub>	i <sub>1</sub>	18	45	55				190	Taroena, Gr Sangir Isles.			
			i <sub>2</sub>	18	48	28								
			i <sub>3</sub>	18	51	41								
			F	18	55									
259	" 8	I <sub>v</sub> Δ	e	0	58					190	Troubled by street traffic. Bodjong Asih (Preanger), Java.			
			F	0	41									

No.	Date 1921.	Cha- racter.	Phase.	Time (Greenwich).			Period in seconds.		Amplitude (half)		Distance of epi- centrum.	Remarks.
							$A_E$	$A_N$	$\mu$	$\mu$		
				h	m	s						
260	Dec. 8	I	e <sub>1</sub> e <sub>2</sub> iS <sub>N</sub> ? F	12	40	40						
261	" 9	I <sub>r</sub>	e i F	5	11	56						Praja, Lombok (?).
262	" 11	I	i <sub>E</sub> i F	0	24	25						
263	" 13	I	i M F	2	50	15						
264	" 14	I <sub>v</sub>	eP <sub>E</sub> iS F	14	20	22				250		
265	" 15	I	eP i i <sub>N</sub> i F	6	1	19						
266	" 16	I	P <sub>E</sub> i <sub>E</sub> i F	2	45	39						
267	" 18	I <sub>u</sub>	P <sub>E</sub> i <sub>N</sub> ? S <sub>N</sub> ? i eL F	15	48	29				7680?		
268	" 20	I <sub>u</sub>	iP iS? F	2	35	18				7550?		SE — NW.
269	" 22	I	e <sub>E</sub> M F	2	0	5						
270	" 23	I	e i i <sub>E</sub> F	14	0	2						
271	" 26	I <sub>r</sub>	e S F	11	6	58				1370		Malabar eP — eS = 1 <sup>m</sup> 6 sec. $\Delta$ = 610. Eastern Java.
272	" 27	I	e <sub>E</sub> i F	22	21	58						
273	" 29	I <sub>v</sub>	eP <sub>E</sub> i <sub>N</sub> F	0	1	25						Bodjong Asih (Preanger), Java.
274	" 29	I <sub>v</sub>	P i F	19	46,2							P in hour mark. Malabar iP <sub>E</sub> — iS = 17 sec $\Delta$ = 130. Western Java.