

Year 1919, No.1

January 1st to 3rd, 1919.

MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.

$\phi=14^{\circ} 34' 41''$ N. $\lambda=120^{\circ} 58' 33''$ E. $h=2.40$ ms. Alluvium.

Instrument: Wiechert's Astatic Pendulum (1,000 Kgs.)

	T_0	ϵ	$\frac{-I}{T_0^2}$
A_N :	6.62	2.726	0.021
A_E :	6.03	2.378	0.037

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		Δ	Remarks.
				h.	m.	s.		A_N μ	A_E μ		
1	1	IIIv	eP L	1	36	24 49				E Mindanao. End over- taken by following earthquake.	
2	1	Iv	eP	1	44	36				This quake merged into the preceding quake and F barely visible.	
3	1	IIIr	e L?	3	10	50 55				End overtaken by fol- lowing earthquake.	
4	1	IIv	eP	3	19	42				End overtaken by fol- lowing earthquake.	
5	1	Iv	eP L ME	3	39	22 47 40	11		140	F not certainly iden- tified among the waves of the prece- dent quake.	
6	1	Ir	e L ME F	6	02	31 20 46 07	8		55	E Mindanao.	
7	1	Iv	e F	9	16	16 31					
8	1	I	e F	16	00	36 02					
9	2	Iv	eP F	13	22	20 26					
10	2	Iv	eP F	22	26	56 58				Butuan (N Mindanao).	
11	3	Iv	e F	0	04	02 13					

Year 1919, No.2.

January 3rd to 18th, 1919.

MANILA, P. I.
SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.--Continued.

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		Remarks.
				h.	m.	s.		μ	μ	
12	3	Iv	eP F	4	05	11				
13	3	Iv	eP F	23	20	55				
14	4	Iv	eP F	2	35	24			NE Mindanao.	
15	4	Iv	eP L MN ME F	14	20	18			NE Mindanao.	
					21	38	6	93		
					22	22	6		42	
					23	10				
					52					
16	5	Iv	e F	20	23	36				
					38					
17	6	Ir	e S L MN ME F	22	33	12				
					39	26				
					43	12	11	53		
					45	00	9		55	
					45	13				
					23	38				
18	9	Ir	e F	19	17	28				
					20	06				
19	10	Ir	e F	5	02	27				
					19					
20	11	Ir	e L F	9	40	44				
					46	02				
					10	29				
21	12	Iv	eP F	15	36	24				
					55					
22	13	Iv	eP F	12	00	52			Davao (SE Mindanao).	
					13					
23	17	Iv	eP F	22	27	25				
					49					
24	18	Ir	e S L ME MN F	5	58	54				
					6	03	16		26	
					08	28	15	29		
					09	34				
					12	06				
					7	02				
25	18	Iv	eP F	21	08	34				
					13					

Year 1919, No.3.

January 19th to 31st, 1919.

MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.--Continued.

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		△	Remarks.	
				h.	m.	s.		μ	μ			
26	19	Iv	eP	12	53	43						
			F	13	04							
27	19	Iv	eP	17	20	38						
			F		24							
28	20	Iv	eP	13	49	44						
			L		51	22						
			ME		51	25					5	49
			LN		51	36					6	
			F	14	01						51	
29	21	Iv	eP	2	26	14						
			F		29							
30	21	Iv	eP	7	23	58						
			F		50							
31	22	Iv	eP	23	32	19						
			L		32	38						
			ME		32	43					3	99
			LN		32	44					3	
			F		41						79	
32	26	Iv	eP	11	17	04						
			F		21							
33	27	Iv	eP	4	21	38						
			F		35							
34	27	Iv	eP	5	40	07						
			F		43							
35	27	Iv	eP	21	48	53				F overtaken by following earthquake.		
36	27	Iv	e	21	56	32						
			F	22	09							
37	30	Iv	eP	15	57	54						
			F	16	04							

Year 1919, No.4.

February 1st to 12th, 1919.



MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.

$\phi=14^{\circ} 34' 41''$ N. $\lambda=120^{\circ} 58' 33''$ E. $h=2.40$ ms. Alluvium.

Instrument: Wiechert's astatic Pendulum (1,000 Kgs.)

	T_0	ξ	$\frac{-\xi}{T_0^2}$
AM:	6.62	2.726	0.021
AE:	6.03	2.378	0.037

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		Δ	Remarks.
				h.	m.	s.		AM μ	AE μ		
38	2	Iv	eP F	2	47	52 01					
39	2	Iv	eP F	7	15	04 18					
40	2	Iv	eP F	17	51	56 55					
41	2	Iv	e F	20	49						
42	2	Iv	eP F	22	21	08 25					
43	3	Ir	e MN ME F	2	33	40 00 03 04	6 6	21	16		
44	3	Iv	eP F	12	56	38 06					
45	5	Iv	eP F	15	23	55 32					
46	5	Ir	(PS) L ME MN F	20	08	34 10 18 21 04	7 7	49	38		
47	9	Iv	eP F	5	54	18 05					
48	9	Ir	(PS) L MN ME F	12	50	47 27 44 00 18	6 8	31	14		
49	9	Ir	eP S L MN ME F	15	30	31 38 04 16 37 19	9 8	30	21		
50	12	Iv	eP F	5	10	45 24					
51	12	Iu	e L ME MN F	12	49	43 06 03 08 02	19 19	10	6		

Year 1919, No. 5.

February 12th to 28th, 1919.

MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.--Continued.

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		△	Remarks.
				h.	m.	s.		AN μ	AP μ		
52	12	Iv	eP F	17	35	07 42					
53	12	Iu	e L? F	20 21	55	56 04 51					
54	13	Iv	eP L ME MN F	23	05	18 42 58 00 31	8 9	50	27		Felt eastern Visayas and Mindanao.
55	14	I	e F	15	07	00 33					
56	15	I	eP F	0	39	04 03					
57	15	Iv	eP F	10	40	34 51					
58	17	Iv	eP L ME MN F	3	41	42 56 15 55 04	5 6	21	23		Felt at Butuan (N Mindanao).
59	17	Ir	eP S L MN ME F	18	01	17 42 07 34 12 09	6 6	23	22		
60	20	Iv	eP F	15	28	54 32					
61	22	Ir	eP S L MN ME F	4	24	29 24 20 06 04 42	9 9	9	9		
62	22	Iv	eP F	4	52	45 56					This record merged in to the precedentquake
63	22	Iv	eP F	11	38	47 54					
64	22	Ir	eP F	17	12	00 34					Felt at Butuan (N Mindanao).
65	23	Iv	eP F	5	34	02 46					
66	24	Iv	eP F	21	38	00 59					Felt at Butuan (N Mindanao).
67	26	Ir	e F	9	32	28 06					
68	28	Iv	eP F	8	34	32 39					

Year 1919, No.6.

March 1st to 10th, 1919.

MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.

$\phi=14^{\circ} 34' 41''$ N. $\lambda=120^{\circ} 58' 33''$ E. $h=2.40$ ms. Alluvium.

Instrument: Wiechert's astatic Pendulum (1,000 Kgs.)

	T_0	ϵ	$\frac{-\kappa}{T_0^2}$
A_N :	6.62	2.726	0.021
A_E :	6.03	2.378	0.037

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		Δ	Remarks.
				h.	m.	s.		A_N μ	A_E μ		
69	1	I _r	eP	13	40	21	8	107	58		
			S		44	33					
			L		46	30					
			M _E		46	51					
			M _N		47	18					
F	15	07									
70	2	I _u	e	3	46	33					
			F	6	27						
71	2	I _u	e	12	05	00					
			F	14	32						
72	2	I _v	e	17	11						
			F		23						
73	3	I _r	eP	2	36	41					Felt in some stations of eastern and northern Mindanao.
			L		39	10					
			F	3	11						
74	6	I _r	(PS)	3	18	12	6	59	55		
			L		21	22					
			M _N		21	39					
			M _E		21	54					
			F	4	07						
75	6	I _r	(PS)	7	22	56	8	38	29		Felt at Butuan (N Mindanao) and Marbajao (Caniguin Island).
			L		24	44					
			M _E		26	00					
			M _N		26	26					
			F	8	03						
76	7	I _r	eP	1	12	12					Felt at Cotabato (SW Mindanao).
			L		14	04					
			F		33						
77	8	I _r	eP	18	15	05					
			F		31						
78	9	I _u	e	3	36	44					
			F	6	18						
79	10	I _r	eP	19	23	32					
			F		53						

Year 1919, No. 7

March 10th to 21st, 1919.



MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.--Continued.

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		Δ	Remarks.
				h.	m.	s.		A_H μ	A_E μ		
80	10	I _r	eP	21	23	03					
			S		25	40					
			L		26	28					
			M _E		26	57	6			56	
			M _N		27	09	6	156			
		F	22	56							
81	11	I _v	eP	8	33	31					
			F		46						Felt at Mambajao (Caminiguin Island).
82	13	I _r	eP	14	22	14					
			L?		26	40					
			M _E		26	51	6			26	
			M _N		27	04	7	29			
			F		51						
83	14	I _v	eP	7	51	10					
			F		54						
84	15	I _v	eP	14	08	08					
			F		16						Northern Luzon.
85	16	II _r	eP	7	35	14					
			S		37	10					
			L		37	48					
			M _E		39	23	9			479	
			M _N		39	30	10	950			
			F	9	51						Felt in the central and eastern Mindanao, and the island of Samar and Leyte.
86	16	I _r	eP	15	04	55					
			S		07	32					
			L		08	19					
			M _E		09	06	8			230	
			M _N		09	17	9	264			
			F	16	33						
87	17	I _v	eP	3	18	52					
			F		25						Felt at Butuan (N Mindanao).
88	17	I _r	eP	3	32	51					
			F		48						Felt at Butuan (N Mindanao).
89	18	I _v	eP	14	53	25					
			F		58						
90	21	III _d	iP	1	03	02					
			F	3	09						Felt through the southern and southeastern part of Luzon and in the islands of Mindoro, Marinduque, Romblon, Panay and Masbate. L and maxima lost by the force of the shock.



No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		Remarks.
				h.	m.	s.		A_H μ	A_V μ	
91	21	Iv	eP	6	03	38				F overtaken by following earthquake.
92	21	Iv	eP	6	07	17				
93	21	Iv	F eP F	7	42	47 52				
94	21	Iv	eP F	13	02	42 11				
95	21	Ir	e F	16	09	12 17 02				
96	21	Iv	eP L ME MN	17	22	58 24 25 25 40 26 08	6 7	221	144	Felt eastern Mindanao, Samar and Leyte Islands. Had overtaken by following earthquake.
97	21	IIr	e? F	17	34	45 18 58				
98	21	IIv	eP L MN ME F	19	04	05 04 24 04 50 05 04 20	5 5	232	319	
99	22	Iv	e F	13	04	49 17				
100	22	I	e F	16	25	52				
101	22	Iv	eP F	16	28	20 31				This record merged into the precedent quake.
102	23	Iv	eP F	2	12	17 18				
103	23	Iv	eP S L ME MN F	22	53	02 54 08 55 00 55 23 55 24 23 55	6 6	86	77	Felt in Samar, Leyte, Cebu, Bohol Islands and NE Mindanao.
104	25	Iv	e F	14	23	04 52				Felt at Cotabato (SW Mindanao).
105	26	I	e F	13	35	14 06				

Year 1919, No. 9.

March 29th to April 14th, 1919.



MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.

$\phi=14^{\circ} 34' 41''$ N. $\lambda=120^{\circ} 58' 33''$ E. $h=2.40$ ms. Alluvium.

Instrument: Wiechert's astatic Pendulum (1,000 Kgs.)

	T_0	ξ	$\frac{-\xi}{T_0^2}$
A_N :	6.62	2.726	0.021
A_E :	6.03	2.378	0.037

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		Δ	Remarks.
				n.	m.	s.		A_N μ	A_E μ		
106	29	II _r	eP L	1	34	42 00					F overtaken by following earthquake.
107	29	I _v	eP F	2	23	29 32					Atimonan (E Luzon).
108	30	II _r	eP S L MN ME F	10	44	37 48 54 18 35 06	6 7	50	34		
109	31	I _v	e F	13	33	20 49					
110	31	I _v	eP F	19	18	04 21					

A P R I L, 1919.

111	2	II _v	eP L MN ME	0	40	30 16 34 34	4 6	96	71		and overtaken by following earthquake.
112	2	I	e F	0	44	10 04					
113	3	I _v	eP F	17	16	48 20					
114	5	I	e F	20	02	19					
115	8	I _v	eP F	15	59	00 11					Felt at Butuan (N Mis- danao).
116	12	I _v	eP F	0	21	23 45					
117	12	I _v	eP F	12	14	12 18					Felt at Paracale (SE Luzon).
118	14	I _v	eP F	15	56	44 12					

Year 1919, No.10.

April 15th to 26th, 1919

MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY. --Continued.

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		Remarks.
				h.	m.	s.		AN μ	AE μ	
119	15	Iv	eP F	19	55	10				
				20	02					
120	15	Iv	eP F	21	29	34				
					39					
121	16	IIv	eP L ME MN F	16	42	24				
					44	10				
					44	22	6			
					44	38	6	150	171	
				18	02					
122	17	Iv	eP F	9	30	36				
				10	19					
123	17	Iu	eP S L ME MN F	11	33	42				
					43	30				
					54	25	16			
					55	20	15	21	17	
				14	28					
124	17	Iu	e ME MN F	21	12	26				
					59	16	23		7	
				22	03	41	21	6		
				23	16					
125	21	Iv	eP F	9	49	25				
					58					
126	21	Iv	eP F	11	47	00				
				13	37					
127	21	Iv	eP F	13	48	34				
					59					
128	22	IIr	eP S L ME MN F	2	50	03				
					54	20				
					56	35	11			
					57	30	11	84	33	
					57	34				
				4	37					
129	22	Iv	eP F	4	41	44				
				5	04					
130	23	Ir	e F	8	24	00				
				9	11					
131	24	I	e F	17	16	22				
					47					

Felt through the eastern half of Mindanao Island.

Felt at Mags and Tigayon (SE Luzon).

Year 1919, No.11.

April 27th to 29th, 1919.

MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.--Continued.

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		△	Remarks.
				h.	m.	s.		A_N μ	A_E μ		
132	27	III _d	1P F	0	22	44				Tablas Island. L and maxima lost by the force of the shock.	
133	27	I _v	eP F	1	18	24				This record merged into the precedent quake.	
134	27	II	e F	2	42	30					
135	27	I _v	eP F	12	17	00					
136	28	II _v	eP L M _E M _N	5	10	22	5			147	Tablas Island. End overtaken by following earthquake.
				11	11		6	121			
137	28	II _v	eP L M _E M _N F	5	28	01	7			192	Tablas Island.
				28	32		5	193			
				29	16						
				29	22						
				6	02						
138	28	I _v	eP F	15	06	49					
					19						
139	28	I _v	eP F	15	25	31					
					35						
140	28	I _v	eP F	17	15	36					
					24						
141	28	I _v	eP F	19	48	05					Tablas Island.
					54						
142	28	I _v	eP	22	12	00					
					17						
143	29	I _v	eP F	2	11	54					
					17						
144	29	I _v	eP F	4	21	55					
					28						
145	29	I _v	eP F	6	04	16					
					14						
146	29	I _v	eP	8	47	45					F overtaken by following earthquake.

Year 1919, No.12.

April 29th to 30th, 1919.

MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY,--Continued.

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		△	Remarks.	
				h.	m.	s.		μ	μ			
147	29	I _v	eP F	8	52	31						
148	29	I _v	eP F	10	16	00						
149	29	I _v	eP F	11	57	30						
150	29	II _v	eP	13	09	02				Wind overtaken by following earthquake.		
151	29	I _v	eP F	13	22	53						
152	29	I _v	eP F	15	37	51						
153	30	III _u	eP 1E 1E 1N 1N 1E 1E S 1E 1E 1N 1E 1E 1N 1N 1N L M _{E1} M _{N1} M _{E2} M _{N2} M _{N3} M _{E3} M _{N4} M _{E4} C F	7	28	42						Felt at Mambajao and Butuan (Mindanao).
					30	18	5					
					31	25	6					
					31	26	6					
					31	48	6					
					33	19	6					
					35	05	6					
					38	17						
					39	13	10					
					40	04	10					
					40	06	9					
					41	45	10					
					43	43	11					
					44	14	10					
					45	07	10					
					47	24	10					
					53	24						
					57	06	11		377			
					59	17	14	343				
				8	01	16	15		403			
					01	54	16	271				
					06	58	14	266				
					09	37	16		418			
					13	38	15	257				
					21	32	15		404			
					11	06	28					
					58							
154	30	I _v	eP F	12	03	57						
					16							

Year 1919, No. 13.

May 1st to 7th, 1919.

MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.

$\phi=14^{\circ} 34' 41''$ N. $\lambda=120^{\circ} 53' 33''$ E. $h=2.40$ ms. Alluvium.

Instrument: Wiechert's astatic Pendulum (1,000 Kgs.)



	T_0	ϵ	$\frac{-k}{T_0^2}$
Am:	6.62	2.726	0.021
Am:	6.03	2.378	0.037

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		Δ	Remarks.
				h.	m.	s.		μ	μ		
155	1	Ir	e	1	26	07					
			L		30	08					
			F	2	38						
156	1	I	e	5	19	30					
			F	6	52						
157	1	Iv	eP	13	13	01					
			F		20						
158	1	Ir	e	15	32	36					
			F	16	38						
159	1	Ir	e	21	29						
			F	22	26						
160	2	Iu	e	2	18	53					
			F	4	11						
161	3	IIIr	eP	0	58	40					
			S	1	04	00					
			L		07	24					
			M ₁		07	39	8			308	
			M ₂		07	44	9	159			
			F	4	04						
163	4	Iv	eP	22	01	49					
			L		03	06					
			M ₁		03	23	4			60	
			M ₂		03	34	5	64			
			F		28						
163	4	Ir	e	22	53	28					
			F	23	02						
164	6	I	e	4	21	10					
			F	5	10						
165	6	IIIr	e	19	48	27					
			S?		54	48					
			L?		58	18					
			M ₁		58	25	8			627	
			M ₂		58	49	11	586			
			M ₂	20	01	08	13	1,036			
			M ₂		01	28	11			760	
			C	23	03	47					
			F		45						
166	7	Ir	e	5	21	00					

Felt at Aparri (NE Luzon) and Santo Domingo (Batanes Islands).

Felt very feeble at Butuan (Mindanao).

End overtaken by following earthquake.



International
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No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		Remarks
				h.	m.	s.		A _{II} u	A _{III} u	
167	7	I _r	e F	6	57	57				
				7	38					
168	7	I	e F	9	25	27				
				10	04					
169	7	I _v	eP F	12	16	33				
					20					
170	8	I	e F	5	52	09				
				6	22					
171	8	I	e F	10	19	57				
					55					
172	8	I	e F	19	07	53				
					39					
173	9	I _v	e F	1	44	32				
				2	03					
174	10	I _v	e F	13	05	47				
					21					
175	11	I _v	eP F	9	36	26				
					30					
176	11	I _v	eP F	13	50	31				
				14	07					
177	13	I	e F	14	36					
				15	20					
178	15	I _v	e F	6	42					
				7	12					
179	16	II _v	eP S I II F	1	02	13				
					03	51				
					04	20				
					06	00	9	80		
				2	08					
180	16	I	eP F	21	06					
					37					
181	18	I _v	eP F	7	13	42				
					18					
182	19	I	e F	4	01	06				
				5	04					
183	21	I _v	eP F	4	49	37				
					52					
184	21	I	e F	23	46	19				
	22			0	04					

Felt very feeble at
Davao and Butuan (Mindanao Island).

Year 1919, No. 15.

May 22nd to 31st, 1919.

MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.--Continued.

No.	Date	Char- acter	Phase	Greenwich mean time			Period	Amplitude		Δ	Remarks.
				h.	m.	s.		Am μ	Ag μ		
185	22	I	e	12	03						
			F		55						
186	23	I	e	6	20	28					
			F	7	28						
187	23	Iv	eP	12	54	56					
			F		57						
188	23	Iv	eP	19	19	44					
			F		27						
189	24	Iv	(PS)	5	45	28					Felt at Mambajao (N Mindanae).
			L		47	27					
			LN		49	24	10	23			
			M ₂		49	30	7		18		
			F	6	16						
190	25	Iv	eP	11	39	21					Felt at Catbalogan and Guiuan (Samar I.)
			F		46						Tacleban (NE Leyte) and Irosin (SE Luzon)
191	25	Iv	eP	14	05	30					
			F		09						
192	25	Iv	eP	22	49	20					
			F		52						
193	26	Iv	eP	14	40	13					
			F		46						
194	26	Iv	eP	16	08	04					
			F		10						
195	27	Iv	eP	17	36	38					
			F	18	15						
196	28	Iv	eP	14	35	17					
			F		38						
197	29	Iv	eP	3	33	01					
			F		37						
198	29	I _r	eP	11	05	25					
			S		10	42					
			L		12	37					
			M ₂		14	28	10	26			
			M ₂		14	44	13		28		
			F	12	18						
199	30	Iv	eP	4	25	53					
			F		29						
200	31	IIv	eP	0	19	55					Felt at Baguio (W Luzon).
			L		20	27					
			F		38						
201	31	Iv	eP	16	08	08					
			F		31						

Year 1919, No. 16.

June 1st to 12th, 1919.

MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.

$\phi=14^{\circ} 34' 41''$ N. $\lambda=120^{\circ} 58' 33''$ E. $h=2.40$ ms. Alluvium.

Instrument: Wiechert's astatic Pendulum (1,000 Kgs.)

	T_0	S	$\frac{-I}{T_0^2}$
A_N :	6.62	2.726	0.021
A_E :	6.03	2.378	0.037

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		Δ	Remarks.
				h.	m.	s.		A_N μ	A_E μ		
202	1	II _r	(PS)	6	54	02					
			L		56	22					
			M _{N1}		56	32	5	657			
			M _{E1}		56	37	6		425		
			M _{E2}		57	07	6		397		
			M _{N2}		59	04	7	331			
203	1	Iv	eP	14	56	56					
			F	15	19						
204	4	Iv	eP	11	10	56					Felt at Caba Bejador (NW Luzon).
			F		13						
205	4	Iv	eP	19	32	45					
			F		37						
206	5	Iv	eP	2	04	29					
			F		22						
207	5	Iv	eP	17	51	40					Felt at Zamboanga and Cotabato (Mindanao I)
			L		53	22					
			M _E		54	01	15		14		
			M _N		54	19	17	14			
			F	18	23						
208	7	Iv	eP	6	47	00					
			L		47	15					
			M _E		47	17	3		222		
			M _N		47	26	3	110			
			F		52						
209	7	Iv	eP	8	28	55					
			F		32						
210	10	Iv	eP	2	13	10					
			F		15						
211	10	Iv	eP	14	37	15					
			L		37	31					
			M _E		37	33	3		151		
			M _N		37	44	3	93			
			F		42						
212	10	I	e	20	19	17					
			F		44						
213	11	I	e	6	17	28					
			F		38						
214	11	Iv	eP	14	27	29					
			F		30						
215	12	I	e	19	58	43					
			F	20	24						



No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		△	Remarks.
				n.	m.	s.		AN μ	AH μ		
216	13	Iv	(PS) L MN ME F	8	55	29	6 7	66	45		Felt in southeastern Luzon and the Islands of Samar and Leyte.
217	13	Iv	eP F	17	39	06 42					
218	15	Ir	(PS) L ME MN F	14	37	32 39 45 44 06	13 12	21	30		Felt at Zamboanga and Cotabato (Mindanao Island).
219	15	Iv	e F	20	05	42 18					
220	15	Iv	eP F	20	32	14 35					
221	16	Iv	eP F	5	13	41 17					
222	18	I	e F	3	16	45 35					
223	20	Iv	eP F	4	46	44 52					Felt at Vigan and Aparri (N Luzon).
224	20	Iv	eP F	13	25	12 35					Felt at Aparri (NE Luzon).
225	20	Iv	eP F	21	33	37 40					
226	20	IIv	eP F	22	50	01 23					Felt at Vigan (NW Luzon).
227	21	Iv	eP F	4	07	36 12					
228	21	Iv	eP F	6	20	25 23					
229	21	Iv	eP F	8	03	52 07					
230	21	Iv	eP F	11	06	35 14					Felt at Tacloban (NE Leyte) and at Tuburan (NW Cebu).
231	22	Iv	eP F	16	08	04 13					Felt at Cabo Bojeador (NW Luzon) and at Dagupan (W Luzon).

Year 1919, No.18.

June 24th to 30th, 1919.

MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.--Continued.

	T_0	Σ	$\frac{-F-}{T_0^2}$
A_N :	6.25	2.566	0.053
A_E :	6.18	1.909	0.042

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		Δ	Remarks.
				h.	m.	s.		A_N μ	A_E μ		
232	24	III _v	eP	18	35	21				N Luzon.	
			L		35	56					
			M _{N1}		37	39	4	1,231			
			M _{E1}		37	41	5		1,067		
			M _{E2}		40	18	7		1,143		
			M _{N2}		41	36	6	1,282			
233	24	I _v	eP	19	37	19				N Luzon.	
			F		49						
234	24	I _v	eP	19	53	27				N Luzon.	
			F		06						
235	24	I _v	eP	21	08	32				N Luzon.	
			F		21						
236	24	II _v	eP	23	18	38				N Luzon.	
			F		56						
237	25	I _v	eP	16	58	14				N Luzon.	
			L		58	26					
			M _N		58	28	4	135			
			M _E		58	29	4		185		
			F		17	05					
238	27	I _v	eP	9	44	29				N Luzon.	
			F		48						
239	28	I _r	e	4	45	44				N Luzon.	
			F		37						
240	28	I _r	e	10	33	52				N Luzon.	
			F		09						
241	28	I _v	eP	16	06	02				N Luzon.	
			F		08						
242	29	I	e	23	34	29				N Luzon.	
			F		22						
243	30	I _v	eP	4	21	58				N Luzon.	
			F		24						
244	30	I	e	7	39	07				N Luzon.	
			F		47						
245	30	I _v	eP	13	03	26				N Luzon.	
			F		24						
246	30	I _v	eP	21	23	41				Felt at Iloilo (E Pa- nay) and in Negros Occidental.	
			F		35						

Year 1919, No. 19.

July 1st to 5th, 1919.



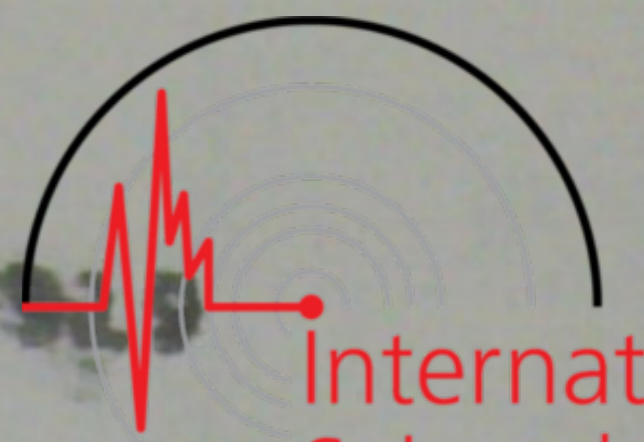
MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.

$\phi=14^{\circ} 34' 41''$ N. $\lambda=120^{\circ} 58' 33''$ E. $h=2.40$ ms. Alluvium.
Instrument: Wiechert's astatic Pendulum (1,000 Kgs.)

	To	E	$\frac{-E^2}{T_0^2}$
A_H :	6.25	2,906	0.053
A_B :	6.18	2,393	0.042

No.	Date	Char-acter	Phase	Greenwich mean time			Period.	Amplitude		Δ	Remarks.
				h.	m.	s.		A_H μ	A_B μ		
247	1	Iv	eP F	2	22	25 27					
248	2	Ir	(PS) L ME ME F	22	38	50 41 12 41 21 41 59 56	8 8	60	46	Felt at Butuan (N Mindanao).	
249	3	Iv	e F	2	15	23					
250	3	Iv	e F	7	00	15					
251	3	Iv	eP F	23	14	08 19					
252	4	Iv	eP F	0	54	45 1 04					
253	4	Iv	eP L ME ME F	1	38	35 39 25 39 48 39 56 2 01	7 7	115	86	Felt in Panay and Negros Islands.	
254	4	Iv	eP v	9	55	14 10 02					
255	4	Iv	(PS) F	18	55	28 19 09				Felt at Maasin (S Leyte).	
256	7	Ir	e F	13	59	55 14 39					
257	8	Iv	eP F	12	01	33 12				Felt in Panay and Negros Islands.	
258	8	Iv	eP F	12	26	00 36					
259	8	Iv	eP F	13	11	40 24					



No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		Δ	Remarks.
				h.	m.	s.		μ_N	μ_E		
260	8	Iv	eP F	14	59	42 15 13					
261	8	I	e F	21	19	23 23 08					
262	11	Iv	eP F	17	12	43 32					
263	12	Iv	eP F	9	39	55 10 02					
264	13	IIv	eP iL MK F	5	21	11 21 29 21 33 32	3	464			
265	13	Iv	eP F	14	36	12 46					
266	14	I	e F	11	22	32 44					
267	14	Iv	eP F	11	59	11 12 02					
268	14	I	e F	13	55	14 57					
269	15	Iv	e F	5	33	46					
270	16	Iv	(PS) L F	0	47	44 48 36 1 05					
271	16	Iv	(PS) F	4	22	12 35					
272	16	Iv	(PS) F	10	08	00 29					
273	16	Iv	eP F	18	18	48 36					
274	17	Iv	eP L eP MK F	7	29	07 29 22 29 29 29 41 35	3 3	78	65		

Year 1919, No. 21.

July 17th to 31st, 1919.



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MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.--Continued.

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		△	Remarks.
				h.	m.	s.		μ_N	μ_E		
275	17	I _r	e	9	51	40					
			L		54	10					
			ME		56	22	11			54	
			MN		56	30	11	53			
			F	11	04						
276	17	I _v	eP	15	58	28					
			F	16	02						
277	18	I _v	eP	10	55	13					
			F	11	07						
278	18	I _r	e	15	12	16					
			F		36						
279	20	I _r	(PS)	8	03	14					
			L		07	26					
			F		21						
280	21	I _r	(PS)	13	53	23					
			L		59	18					
			F	14	46						
281	21	I _r	e	19	09	28					
			F		42						
282	22	I _v	eP	8	37	28					
			F		54						
283	22	I _v	eP	17	10	45					
			F		16						
284	23	I	e	18	20						
			F		39						
285	24	I _u	e	2	12	08					
			S		20	18					
			L		31	06					
			M ₁₁		34	13	10			27	
			M ₁₁		34	18	11	42			
			M ₁₂		35	19	13			32	
			M ₁₂		35	50	14	66			
			F	3	38						
286	24	I _r	(PS)	4	03	35					
			F		29						
287	24	I _v	eP	11	54	36					
			F		58						
288	29	I	e	13	28	20					
			F		43						

Year 1919, No. 22.

August 1st to 18th, 1919.

MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.

$\phi=14^{\circ} 34' 41''$ N. $\lambda=120^{\circ} 53' 33''$ E. $h=2.40$ ms. Alluvium.

Instrument: Wiechert's astatic Pendulum (1,000 Kgs.)



	T_0	ξ	$\frac{-\xi}{T_0^2}$
Am:	6.25	2.906	0.053
Ag:	6.18	2.393	0.042

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		Δ	Remarks.
				h.	m.	s.		μ	μ		
289	1	Iv	eP F	1	25	35					
					27						
290	3	Iv	eP F	14	32	12					
					34						
291	3	Ir	e F	18	16	14					
					04						
292	5	Iv	e F	10	44						
					52						
293	6	Iv	e F	5	37	36					Felt at Butuan (N Min- danao).
					52						
294	6	Iv	e F	18	00	00					Felt at Butuan (N Mindanao).
					13						
295	8	Iv	eP F	13	35	22					
					38						
296	13	IIv	e L Mg Mg F	22	14	23					Felt in Remblon Is- land.
					56		5		145		
					23		5	222			
					42		5				
					29						
297	14	Iv	eP F	6	10	14					
					12						
298	14	Iv	eP L Mg Mg F	7	59	55					Felt in Remblon Is- land.
					31		5		89		
					50		5	128			
					14		5				
					11						
299	15	Iv	eP F	15	53	17					
					55						
300	16	Iv	eP F	15	44	30					
					46						
301	18	IIr	e S L Mg Mg F	17	06	06					
					09						
					45		8	282			
					22		6		212		
					22						
					58						



No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		△	Remarks.
				h.	m.	s.		μ	γ		
302	19	II _v	eP L ME MN F	14	21	48 42 04 10 32	5 5	266	186		Felt in northern Luzon.
303	21	I _v	eP F	9	37	44 39					
304	21	I _v	eP L MN F	9	32	32 49 52 42	3	91			
305	25	I _r	e L ME MN F	20	01	06 23 10 35	10 10	62	36		
306	27	I _r	eP L F	5	26	54 48 22					
307	27	I _v	eP F	7	22	08 25					
308	29	II _r	(PS) L MN1 MN2 MN2 F	5	48	12 00 09 58 12 28 09	6 6 6 6	327 427	251 271		
309	29	I _v	eP F	13	56	26 07					
310	30	I _v	eP F	17	33	46 36					
311	31	II _r	eP S L ME MN F	17	30	04 39 34 07 14 46	6 6	345	334		

SEPTEMBER, 1919.

312	5	I _v	eP F	3	08	12 12					
313	5	I _v	eP F	3	40	13 44					



No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		Remarks.
				h.	m.	s.		A _N μ	A _E μ	
314	5	II _r	eP	16	55	08	7	418	172	
			S		57	24				
			L		58	04				
			ME		58	32				
			F	18	08	33				
315	6	I	e	14	53	40				
			F	15	36					
316	7	I	e	18	25	13				
			F		48					
317	8	IV	eP	1	47	24				
			F		50					
318	8	I _r	e	4	13	36	12	272	7	
			L		20	40				
			ME		22	32				
			ML		23	00				
			F		52	11				
319	8	I	e	14	06	40				
			F		34					
320	10	IV	eP	4	39	51				Felt at Paracale (SE Luzon).
			F		46					
321	11	I	e	13	58					
			F	14	22					
322	12	I	e	6	17	40				
			F	7	04					
323	12	I	e	14	00					
			F		35					
324	13	I	e	12	51					
			F	13	14					
325	13	I	eP	13	19	12				
			F		29					
326	16	IV	eP	21	17	08				
			F		20					
327	17	IV	eP	9	51	10				
			F		54					
328	19	III _d	eP	9	46	26				Felt in western Luzon Maxima and end lost by the force of the shock.



No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		Remarks.
				h.	m.	s.		μ	μ	
329	20	I _v	eP L M _N M _E F	15	36	05 19 21 21 47	2 2	131	56	
330	21	I _v	(PS) L M _E M _N F	4	05	34 31 33 40 43	4 4	75	33	Felt at Davao (SE Mindanao).
331	21	I _v	eP L M _E M _N F	22	46	44 04 15 28 00	2 2	218	217	
332	22	I _v	eP F	1	35	40 42				
333	22	I _v	eP F	5	43	36 55				
334	22	I _v	e F	6	03	22 21				
335	22	I _v	eP F	12	17	20 21				
336	22	I _v	eP F	22	19	18 31				
337	22	I _v	eP F	23	15	30 18				
338	23	I _v	eP F	8	35	34 45				
339	23	II _v	eP L M _N M _E F	10	46	24 42 48 52 55	3 3	200	165	
340	23	II _v	eP L M _E M _N F	10	58	35 53 04 08 09	3 3	242	153	
341	23	III _v	eP L M _E M _N F	13	46	39 57 06 08 54	2 2	704	623	Western Luzon.



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No.	Date	Char-acter	Phase	Greenwich mean time			Amplitude		Remarks.
				h.	m.	s.	A_{II} μ	A_{III} μ	
342	23	II _v	eP F	14	19	16 24			Western Luzon.
343	23	II _v	eP F	20	03	37 08			
344	23	I _v	eP F	20	27	51 30			
345	24	I _v	eP F	19	25	37 29			
346	26	I	e F	6	29	38 56			
347	26	III _d	eP	9	07	34			west Northern Luzon. Maxi- ma and end lost by the force of the shock.
348	26	I _v	eP F	10	15	24 19			
349	26	I _v	eP F	11	51	09 54			
350	26	I _r	eP F	19	42	00 20			Felt in the central and western Mindanao.
351	26	I _r	eP F	21	41	36 22			Felt in the central and western Mindanao.
352	26 27	I _r	eP F	22	51	12 0			Felt in the central and western Mindanao.
353	27	I _r	eP F	0	54	44 1			Felt in the central and western Mindanao.
354	27	I _r	eP F	6	44	52 7			
355	27	I	e F	11	02	20 24			
356	28	I _v	eP F	11	51	34 57			
357	29	I	e F	13	26	39			
358	29	I	e F	13	45	53 14			
359	30	I	e F	1	06	33 28			

Year 1919, No.27.

October 1st to 16th, 1919.

MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.

$\phi=14^{\circ} 34' 41''$ N. $\lambda=120^{\circ} 58' 33''$ E. $h=2.40$ ms. Alluvium.

Instrument: Wiechert's astatic Pendulum (1,000 Kgs.)

	T_0	ϵ	$\frac{-T}{T_0^2}$
A_N :	6.25	2.906	0.053
A_E :	6.18	2.393	0.042

No.	Date	Char-acter	Phase	Greenwich mean time			Period.	Amplitude		Δ	Remarks.
				h.	m.	s.		A_N μ	A_E μ		
360	3	Ir	e F	9	49	22					
361	4	Ir	e F	17	57	18 22					
362	8	Ir	eP S L M _N M _E	4	46	36 51 22 53 53 54 30 56 11	12 11	47	36		F on next earthquake
363	8	II _v	eP L M _N M _E F	5	11	16 12 05 12 10 12 14 33	2 2	245	135		Felt in Masbate, Samar and SE Luzon.
364	9	I	e F	7	02	26					
365	12	Ir	eP S L M _N M _E F	21	54	14 58 06 59 40 22 01 00 01 07 23 04	8 7	71	58		
366	13	Iv	eP F	5	38	12 6 11					Central Mindanao.
367	15	I	e F	15	48	12 16 21					
368	16	Iv	eP F	21	39	34 43					



MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.--Continued.

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		△	Remarks.
				h.	m.	s.		μ	μ		
369	18	Iv	eP F	6	46	24 49					
370	19	Iv	eP F	12	56	47 59					
371	21	I	e F	21	28	42 58					
372	22	Iv	eP F	12	19	34 22					
373	23	Ir	eP F	16	06	30 17 07					
374	26	Ir	eP F	18	07	58 49					
375	26	Ir	eP S L M _E M _N F	18	54	12 57 00 57 48 58 07 59 38 20 05	7 8	22	18		
376	27	I	e F	4	01	43					
377	29	I	e F	12	23	47					
378	31	I	e F	15	50	48 17 06					
379	31	IIr	eP S L M _E M _N F	19	04	39 06 52 07 22 08 10 08 46 20 30	9 10	195	304		



MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.

$\phi=14^{\circ} 34' 41''$ N. $\lambda=120^{\circ} 58' 33''$ E. $h=2.40$ ms. Alluvium.

Instrument: Wiechert's astatic Pendulum (1,000 Kgs.)

	T_0	ϵ	$\frac{-\epsilon}{T_0^2}$
A_H :	6.25	2.906	0.053
A_E :	6.18	2.393	0.042

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		Δ	Remarks.
				h.	m.	s.		A_H μ	A_E μ		
380	2	I _v	eP F	11	16	24 20					
381	3	I _v	eP F	14	44	00 15 02					Felt in northeastern Mindanao and eastern Samar.
382	4	I _r	(PS) L M _N M _E F	13	32	16 34 13 34 16 34 17 14 28	8 7	102	64		Felt in southern and eastern Mindanao.
383	4	I _v	eP F	15	35	10 38					
384	4	I _v	eP F	15	39	12 43					
385	5	I	e F	20	19	43					
386	6	I	e F	13	51	28 14 11					
387	6	III _v	eP L M _N M _E F	16	44	28 45 16 45 34 45 43 17 22	6 5	95	612		Felt in northern Luzon.
388	8	I _r	e F	7	01	50 23					
389	9	I _v	e F	7	16	33					



No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		△	Remarks.
				h.	m.	s.		μ	μ		
390	10	I _v	eP F	11	54	13 57					
391	14	I	e F	17	26	54 53					
392	16	I _v	eP F	3	08	24 43				Felt in the eastern part of Mindanao.	
393	17	I _v	eP F	22	36	51 42					
394	18	II _r	eP S L M _{NE} M _{SE} F	4	03	41 07 00 08 00 08 16 08 35 5 20	7 7	836		690	Felt very lightly at Butuan (N Mindanao).
395	18	I	eL? F	22	45	20 23 38					
396	20	I _r	eP S L M _{NE} M _{SE} F	14	20	41 25 23 27 47 28 23 28 25 15 22	7 7	129		208	
397	20	I _v	eP F	21	13	18 16					
398	20	I _v	eP F	22	42	44 45					
399	21	II _v	eP L M _{NE} M _{SE} F	15	52	30 46 52 52 52 52 57	4 4	273		181	
400	23	I	e F	6	05	38 57					
401	26	I _v	eP F	14	23	53 27					
402	30	I _v	eP F	5	13	19 24					
403	30	I _v	eP F	21	22	20 25					

Year 1919, No. 31.

December 1st to 20th, 1919.

MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.

$\phi=14^{\circ} 34' 41''$ N. $\lambda=120^{\circ} 58' 33''$ E. $h=2.40$ ms. Alluvium.

Instrument: Wiechert's astatic Pendulum (1,000 Kgs.)

	T_0	ϵ	$\frac{\epsilon}{T_0^2}$
A_N :	6.25	2.906	0.053
A_E :	6.18	2.393	0.042

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		Δ	Remarks.
				h.	m.	s.		A_N μ	A_E μ		
404	1	I _v	eP F	0	49	26 51					
405	1	I _v	eP L M _N M _E F	18	58	32 47 49 49 01	2 2	73	92		
406	3	I _v	eP F	14	24	20 27					Felt at Naga (SE Luzon).
407	9	I	e F	20	30	50 56					
408	12	I	e F	3	50	08 11					
409	15	I _v	eP F	16	49	30 59					Felt at Davao (SE Mindanao).
410	16	I _v	eP F	0	49	32 55					Felt at Candon (NW Luzon).
411	16	I	e F	11	45	44 12 12					
412	17	I	e F	23	39						
	18			0	06						
413	20	II _v	eP S L M _N M _E	19	36	41 38 26 38 53 38 58 39 07	8 6	482	258		End overtaken by following earthquake.



MANILA, P. I.

SEISMOLOGICAL BULLETIN OF THE OBSERVATORY.--Continued.

No.	Date	Char-acter	Phase	Greenwich mean time			Period	Amplitude		△	Remarks.
				h.	m.	s.		A _H μ	A _E μ		
414	20	III _v	eP	20	39	39					
			S		41	24					
			L		41	46					
			M _E		42	16	10			890	
			M _N		42	22	12	1,364			
		F	22	22							
415	23	I _r	eP	15	29	27					
			S		32	27					
			L		33	07					
			M _N		33	29	6	95			
			M _E		33	30	5		45		
		F	16	13							
416	27	I _r	eP	19	33	27					
			L		37	19					
			M _E		37	25	6		59		
			F		46						
417	28	I _v	eP	7	52	39					
			L		52	57					
			M _E		52	59	2		145		
			M _N		53	09	2	155			
			F		56						
418	29	I _v	eP	13	23	05					
			F		26						
419	29	I _v	eP	18	10	40					
			F		13						
420	30	II _v	eP	1	55	05					
			L		56	07					
			M _E		56	14	4		131		
			M _N		56	27	4	236			
			F		2	08					

Felt very lightly at Butuan (N Mindanae).

Felt lightly at Cavite (SW Luzen).

Northern Luzen.