

# Manila Observatory. - Philippine Island.

## Seismological Bulletin, No. 1, a.

Ref-2613

January, 1911.

No.	Date	Char-acter.	Instru-ment and Component	Beginning			Maximum range of motion			F	Remarks.			
				P.	S	L	Hour	A	T					
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.				
1	1	I <sub>u</sub>	V.	18 27 26	18 38 26	18 51 44	18 58 09	0.01	14.4	19 30				
			H. NNW	18 27 26	18 37 29	18 50 59	18 58 14	.02	16.5	19 22				
			H. WSW	18 27 26	18 37 41	18 50 54	18 58 13	.06	13.8	19 25				
2	4	III <sub>u</sub>	V.	7 34 24	7 41 50	7 50 16	7 58 28	.31	14.4	9 30	Vertical Component 0.05 mm. Earth-quake in Turkestan.			
			H. NNW	7 34 24	7 41 20	7 51 25	8 00 17	3.13	13.2	9 35				
			H. WSW	7 34 24	7 41 34	7 51 25	7 58 21	2.60	13.8	9 46				
3	4	I	H. NNW	17 41 48						18 25				
			H. WSW	17 41 48							18 26			
4	5	II <sub>d</sub>	V.	7 51 30		7 51 54	7 52 08	1.50	2.4	7 59	V.C. 1.12 mm.			
At 20 <sup>h</sup> 30 <sup>m</sup> eqke., III at Catbalogan (W of Samar).														
5	7	I <sub>v</sub>	V.	4 42 08		4 42 56	4 43 00	.02	2.4	4 46	V.C. 0.01 mm. Eqke., IV in north-ern part of Luzon.			
6	7	II <sub>r</sub>	V.	10 19 10	10 23 44	10 28 51	10 37 04	.05	10	11 57	V.C. 0.01 mm.			
			H. NNW	10 19 13	10 23 37	10 28 53	10 33 00	1.35	8.1	11 52				
			H. WSW	10 19 13	10 23 54	10 28 08	10 37 09	1.51	9.6	12 06				
7	8	I	V.	17 06 13							17 12	V.C. 0.01 mm.		
			H. NNW	17 06 13								17 15		
			H. WSW	17 06 13								17 17		
8	10	I <sub>d</sub>	V.	16 24 04		16 24 17	16 24 46	.32	2.4	16 28	V.C. 0.12 mm.			
9	11	I	V.	0 35 23							1 04			
			H. WSW	0 35 37								1 08		
0	16	I <sub>r</sub>	V.	16 55 51	16 59 22	17 04 24	17 07 38	.03	10.8	17 34				
			H. NNW	16 55 52	16 59 29	17 04 31	17 08 16	.13	8.4	17 34				
			H. WSW	16 55 52	16 59 40	17 04 43	17 07 40	.45	9.0	17 47				

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## Seismological Bulletin, No. 1, b.



January, 1911.

No.	Date	Char-acter.	Instru-ment and Component	Beginning			Maximum range of motion			F	Remarks
				P	S	L	H. m. s.	A	T		
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	h. m.	h. m.	
11	17	I <sub>v</sub>	V.	6 57 34		6 59 42	7 00 12	.06	2.4	7 22	V. C. 0.01 mm. Eqke. V in the northeastern part of Mindanao.
			H. NNW	6 57 37		6 59 42	7 00 27	.16	7.2	7 16	
			H. WSW	6 57 37		6 59 19	7 00 37	.28	7.8	7 22	
12	19	I <sub>d</sub>	At 1 <sup>h</sup> 30 <sup>m</sup> Eqke., IV at Sarangani (S of Mindanao).								
13	19	I <sub>v</sub>	V.	11 04 43		11 04 57	11 04 59	.17	2	11 09	V. C. 0.05 mm. Eqke. III at Butuan (N of Mindanao).
			V.	13 47 20		13 49 19	13 53 11	.02	2.8	14 06	
			H. NNW	13 47 24		13 49 19	13 52 47	.04	8.4	14 07	
			H. WSW	13 47 24		13 49 35	13 52 46	.14	7.8	14 37	
14	24	I <sub>d</sub>	At 23 <sup>h</sup> 20 <sup>m</sup> Eqke., IV at Sarangani (S of Mindanao).								
15	25	I <sub>v</sub>	V.	3 04 39		3 04 59	3 05 11	.03	2.2	3 06	V. C. 0.01 mm.
			V.	8 47 24						9 27	
			H. NNW	8 47 24						9 22	
			H. WSW	8 47 24					9 28		
16	27	I	V.	4 57 07						5 02	
			H. WSW	4 57 08			5 01 11	.03	6	5 10	
28			At 4 <sup>h</sup> 30 <sup>m</sup> Eqke., IV at Sarangani (S of Mindanao).								

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## Seismological Bulletin, No. 2, a. February, 1911.



No.	Date	Char-acter.	Instru-ment and Component	Beginning			Maximum range of motion			F	Remarks.
				P.	S.	L.	Hour	A	T		
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.	
8		$I_v$	V.	3 11 26		3 11 34	3 11 39	0.04	1.8	3 14	V.C. 0.03 mm. Intensity I. Origin Taal
8		$I_v$	V.	9 15 38						9 17	volcano.
8		$I_v$	V.	9 23 34		9 23 39	9 23 53	.03	1.6	9 25	V.C. 0.01 mm. Int. I.
8		$I_v$	V.			12 11 38				12 13	V.E. 0.01 mm. Int. I
8		$I_v$	V.	14 05 10		14 05 15	14 06 06	.15	2.4	14 08	V.C. 0.11 mm. Int. II
8		$I_v$	V.	14 12 39						14 14	Intensity I.
8		$I_v$	V.	20 54 20						20 56	Intensity I.
8		$I_v$	V.	23 20 04						23 23	Intensity I.
8		$I_v$	V.	23 37 08						23 41	Intensity I.
9		$I_v$	V.	0 17 07						0 24	Intensity I.
9		$I_v$	V.	1 02 48						1 05	Intensity I.
9		$I_v$	V.	2 33 47						2 36	Intensity I.
9		$I_v$	V.	2 39 15						2 41	Intensity I.
9		$I_v$	V.	2 50 09						2 51	Intensity I.
9		$I_v$	V.	6 19 44						6 22	Intensity I.
9		$I_v$	V.	8 41 58						8 45	Intensity II.
9		$I_v$	V.	10 16 02						10 18	Intensity I.
9		$I_v$	V.	13 43 30						13 45	Intensity I. V.C. 0.01 mm.
9		$I_v$	V.	15 01 49			15 03 13	.09	2.4	15 05	Intensity I.

Origin Taal volcano.

Origin Taal volcano.

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No.	Date	Char-acter.	Instru-ment and Component.	Beginning			Maximum range of motion			F	Remarks.
				P	S	L	Hour	A	T		
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.	
9		$I_v$	V.	16 54 21						16 56	Intensity I.
9		$I_v$	V.	18 01 16		18 01 46	18 02 16	.18	2.4	18 04	Intensity I. V.C. 0.01 mm.
9		$I_v$	V.	23 59 37						0 01	Intensity I.
10		$I_v$	V.	0 28 14		0 28 20	0 29 12	.18	2.4	0 31	Intensity II. V.C. 0.07 mm.
10		$I_v$	V.	3 22 02		3 22 09	3 22 36	.30	2.4	3 25	Intensity II. V.C. 0.21 mm.
10		$I_v$	V.	6 42 52						6 45	Intensity I. V.C. 0.02 mm.
10		$I_v$	V.	11 06 45						11 09	Intensity I.
10		$I_v$	V.	14 41 47						14 44	Intensity I.
10		$I_v$	V.	22 00 43						22 04	Intensity I. V.C. 0.02 mm.
10		$I_v$	V.	22 08 09						22 10	Intensity I.
11		$I_v$	V.	8 08 32						8 10	Intensity I. V.C. 0.01 mm.
11		$I_v$	V.	18 31 05						18 33	Intensity I.
12		$I_v$	V.	0 05 16						0 7	Intensity I. V.C. 0.01 mm.
12		$I_v$	V.	23 58 31						0 0	Intensity I.
13		$I_v$	V.	4 58 05		4 58 11	4 58 28	.06	2.4	5 0	Intensity I. V.C. 0.02 mm.

Origin Taal volcano.

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## Seismological Bulletin, No. 2, c.



February, 1911.

No.	Date	Char-acter.	Instru-ment and Component	Beginning.			Maximum range of motion				Remarks.
				P	S	L	Hour	A	T	F	
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	°	h. m.	
17	14	I <sub>d</sub>	V.			10 42 48	10 43 09	.05	2.4	10 45	V. C. 0.01 mm.
18	15	II <sub>v</sub>	V.	18 04 03		18 04 14	18 05 27	1.50	2.4	18 17	V. C. 1.30 mm. Earthquake, IV. south Luzon and north Min- doro.
			H. NNW	18 04 03		18 04 15	18 04 48	2.69	8.1	18 20	
			H. WSW	18 04 03		18 04 15	18 05 13	3.80	8.4	18 25	
19	15	I <sub>d</sub>	V.			17 28 39				17 32	V. C. 0.01 mm.
20	15	I <sub>d</sub>	V.	21 33 10		21 33 19	21 33 58	.16	2.4	21 35	V. C. 0.13 mm.
	16	At	9 <sup>h</sup> 45 <sup>am</sup> Eqke., II at Zamagete (Negros Oriental).								
21	18	I <sub>d</sub>	V.			1 37 54	1 37 56	.05	2.4	1 40	V. C. 0.01 mm.
22	18	I <sub>d</sub>	V.	11 34 18		11 34 44	11 35 01	.53	2.4	11 37	V. C. 0.05 mm.
23	19	I <sub>d</sub>	V.			1 23 43	1 23 52	.02	2.4	1 26	V. C. 0.01 mm.
24	19	II <sub>v</sub>	V.	2 50 12	2 57 07	3 05 04	3 14 52	.04	11.6	3 58	Eqke. at Lahore (British India).
			H. NNW	2 50 12	2 57 00	3 05 00	3 14 53	.37	13.2	4 00	
			H. WSW	2 50 12	2 56 55	3 05 07	3 15 21	.48	11.4	4 14	
25	20	I <sub>d</sub>	V.	13 45 30		13 45 40	13 46 04	.44	2.4	13 54	V. C. 0.22 mm.
26	20	I <sub>d</sub>	V.			20 15 08				20 17	V. C. 0.01 mm.
27	21	I <sub>d</sub>	V.			0 22 07	0 22 09	.03	2.4	0 24	V. C. 0.01 mm.
28	21	II <sub>d</sub>	V.	4 32 11		4 32 20	4 32 58	1.68	2.4	4 39	V. C. 0.81 mm.
29	21	I <sub>d</sub>	V.	17 29 46		17 30 00	17 30 18	.25	2.4	17 36	V. C. 0.13 mm.
30	22	I <sub>d</sub>	V.			5 16 19	5 16 22	.03	2.4	5 18	V. C. 0.01 mm.

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## Seismological Bulletin, No. 2, d. February, 1911.



No.	Date	Char-acter.	Instru-ment and Component	Beginning			Maximum range of motion			Remarks.	
				P	S	L	Hour	A	T		F
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.	
31	23	I <sub>d</sub>	V.	8 39 01		8 39 13	8 39 21	.07	2.4	8 42	V. C. 0.04 mm.
32	23	I <sub>d</sub>	V.	9 24 43		9 24 52	9 25 15	.04	2.4	9 27	V. C. 0.02 mm.
33	23	II	V.	19 17 21						20 48	
			H. NNW	19 17 24						20 48	
			H. WSW	19 17 24						21 11	
34	25	I	V.			8 56 26				9 42	
			H. WSW			8 56 26					9 27
35	25	I	V.	22 05 28		22 05 38	22 05 49	.06	2.4	22 09	V. C. 0.01 mm.

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## Seismological Bulletin, No. 3, a.



March, 1911.

No	Date	Char-acter.	Instru-ment and Component	Beginning			Maximum range of motion.			F	Remarks.	
				P	S	L	Hour	A	T			
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.		
36	1	I <sub>d</sub>	V.			2 03 43	2 03 53	0.02	2.4	2 06	Vertical Component 0.01 mm.	
37	1	I <sub>v</sub>	H. WSW	13 16 00		13 16 48	13 17 00	.06	2.4	13 25	V. C. 0.03 mm. Earthquake, IV at Laoag (NW of Luzon).	
38	1	I <sub>d</sub>	V.	23 52 19		23 52 29	23 52 34	.06	2.4	23 54	V. C. 0.03 mm.	
39	2	I <sub>d</sub>	V.	4 33 11		4 33 22	4 33 28	.04	2.4	4 35	V. C. 0.01 mm.	
40	3	I <sub>d</sub>	V.	1 25 08		1 25 36	1 26 18	.07	2.4	1 27		
41	6	I <sub>d</sub>	V.	14 31 06		14 31 18	14 31 37	.16	2.4	14 37	V. C. 0.13 mm.	
42	7	II <sub>v</sub>	H. NNW	1 32 25		1 34 31	1 36 32	1.97	8.1	2 20	V. C. 0.10 mm. Eqke., IV at Bu-tuan (N of Mindanao).	
			H. WSW	1 32 25		1 34 21	1 37 52	1.72	8.1	2 42		
43	9	I <sub>v</sub>	V.	13 05 10		13 07 09	13 08 06	.10	2.4	13 52	V. C. 0.02 mm. Eqke., III in the Central Mindanao.	
			H. NNW	13 05 08		13 07 08	13 07 43	.28	7.8	13 43		
			H. WSW	13 05 08		13 07 04	13 08 23	.44	9	14 00		
44	10	At 3 <sup>h</sup> Eqke. IV at Cebu (E of Cebu I.)										
44	11	I <sub>d</sub>	V.			0 12 57	0 13 15	.01	2.4	0 16	V. C. 0.01 mm.	
45	11	I <sub>d</sub>	V.	8 37 19		8 37 49	8 37 55	.06	2.4	8 40	V. C. 0.04 mm.	
46	11	I <sub>r</sub>	V.	11 22 50	11 28 27	11 33 04	11 34 02	.01	15.6	12 08		
			H. NNW	11 22 50	11 28 31	11 33 06	11 34 12	.07	9	12 16		
			H. WSW	11 22 50	11 28 24	11 33 05	11 33 56	.13	8.4	12 33		
47	12	I <sub>d</sub>	V.	2 53 21		2 53 44	2 53 50	.28	2.4	2 56	V. C. 0.06 mm.	
13	At 2 <sup>h</sup> Eqke., III at Batangas (S of Luzon).											

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## Seismological Bulletin, No. 3, b. March, 1911.



No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion			F	Remarks	
				P	S	L	Hour	A	T			
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.		
48	13	II <sub>v</sub>	V.	17 37 39		17 38 02	17 38 19	1.70	2.4		V. C. 1.12 mm. Eqke., III at Nueva Caceres (SE of Luzon).	
			H. NNW	17 37 39		17 38 05	17 38 18	.71	7.2			
			H. WSW	17 37 39		17 38 05	17 39 09	.58	9.6			
49	13	I <sub>v</sub>	V.	17 48 13		17 48 39	17 48 43	.23	2.4		V. C. 0.09 mm. Eqke., III at Nueva Caceres (SE of Luzon).	
50	13	I <sub>v</sub>	V.	17 52 56		17 53 21	17 53 34	1.30	2.4	18 28	V. C. 0.28 mm. Eqke., III at Nueva Caceres (SE of Luzon).	
			H. NNW	17 52 56		17 53 21	17 53 38	.25	7.5	18 11		
			H. WSW	17 52 56		17 53 21	17 53 56	.25	8.1	18 30		
	13	At 18 <sup>h</sup> 53 <sup>m</sup> Eqke., III at Nueva Caceres (SE of Luzon).										
51	13	II <sub>v</sub>	V.	20 49 40		20 50 08	20 50 42		2.4	21 10	V. C. 1.05 mm. Eqke., III at Paracale (SE of Luzon).	
			H. NNW	20 49 41		20 50 07	20 51 00	.37	6.9	21 07		
			H. WSW	20 49 41		20 50 07	20 50 37	.42	8.1	21 14		
52	13	I <sub>d</sub>	V.			22 25 39	22 25 43	.03	2.4	22 28	V. C. 0.01 mm.	
53	13	I	V.		22 40 13					23 10		
			H. WSW		22 40 13					23 07		
54	14	I <sub>d</sub>	V.	9 57 30		9 57 38	9 57 41	.05	2.4	9 59	V. C. 0.01 mm.	
55	15	II <sub>d</sub>	V.	17 53 00		17 53 19	17 53 35	.20	2.4	17 57	V. C. 0.09 mm.	
56	16	I <sub>d</sub>	V.	14 16 42		14 17 05	14 17 07	.05	2.4	14 20	V. C. 0.02 mm.	
57	16	I <sub>d</sub>	V.	20 42 02		20 42 29	20 42 32	.58	2.4	20 50	V. C. 0.20 mm.	
58	17	I <sub>d</sub>	V.	15 26 25		15 26 36	15 26 44	.05	2.4	15 28	V. C. 0.01 mm.	



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March, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion			F	Remarks.
				P	S	I	Hour	A	T		
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	S.	h. m.	
59	17	II <sub>v</sub>	V.	21 45 20		21 45 29	21 46 36	.34	2.4	21 51	V. C. 0.17 mm. Logke., III at Balan- ga (SW of Luzon).
60	18	I <sub>d</sub>	V.	5 25 35		5 25 51	5 25 57	.11	2.4	5 28	V. C. 0.02 mm.
	20	At 19 <sup>h</sup> 56 <sup>m</sup> Logke., at Tacloban (NE of Leyte).									
61	21	I <sub>d</sub>	V.	7 04 44		7 04 53	7 04 59	.05	2	7 07	V. C. 0.05 mm.
			V.	11 21 26						11 53	V. C. 0.02 mm.
62	24	I	H. NNW	11 21 28						11 50	
			H. WSW	11 21 28						12 05	
			V.	17 44 33		17 48 44				18 02	
63	27	I	H. NNW	17 44 33		17 48 38	17 50 34	.06	8.7	18 04	
			H. WSW	17 44 33		17 48 41	17 50 42	.19	8.4	18 12	
64	28	I <sub>d</sub>	V.	23 06 17		23 06 34	23 07 32	.19	2.4	23 11	V. C. 0.13 mm.
65	29	I <sub>d</sub>	V.	12 18 59		12 19 15	12 19 23	.26	2.4	12 24	V. C. 0.05 mm.

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## Seismological Bulletin No. 4, a. April, 1911.



No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion		F	Remarks.			
				P	S	L	Hour	A			T		
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	S.	h. m.			
66	1	I <sub>r</sub>	V.	6 06 13							6 30		
			H. NNW	6 06 13		6 10 11					6 28		
			H. WSW	6 06 13		6 10 17	6 12 42	.15	9	6 37			
			W. E.	6 06 13		6 10 20	6 11 40	.01	6	6 20			
67	1	I	V.			10 20 55	10 21 39	.02	2.4	10 36	Vertical Component 0.01 mm.		
			H. WSW			10 20 56	10 21 31	.06	9	10 39			
			W. N			10 21 09	10 22 14	.02	6	10 35			
			W. E			10 21 09	10 22 05	.03	5.6	10 36			
68	3	I	V.	9 05 40						9 19	V. C. 0.01 mm.		
			H. WSW	9 05 40		9 09 36	9 09 55	.03	9.3	9 20			
			W. E	9 05 40		9 09 36	9 09 46	.03	6.6	9 19			
At 22 <sup>h</sup> Earthquake, II at Surigao (NE of Mindanao).													
69	4	I <sub>d</sub>	V.	3 06 01		3 06 14	3 06 42	.01	2.4	3 09			
70	4	I <sub>d</sub>	V.	22 45 49		22 46 01	22 46 16	.02	2	22 48	V. C. 0.01 mm.		
71	7	I <sub>d</sub>	V.			5 09 30	5 09 34	.01	2.4	5 11	V. C. 0.01 mm.		
72	7	I <sub>d</sub>	V.			13 33 46	13 34 15	.06	2.4	13 37	V. C. 0.02 mm.		
At 14 <sup>h</sup> 25 <sup>m</sup> Eque., III at Batangas (S of Luzon).													
73	7	I <sub>r</sub>	V.	14 53 52							15 39		
			H. NNW	14 53 52								15 20	
			H. WSW	14 53 51	14 59 06	15 03 09	15 06 37	.10	8.4	15 53			

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April, 1911.



No.	Date.	Character	Instrument and Component	Beginning			Maximum range of motion			Remarks	
				P	S	L	Hour	A	T		F
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	S.	h. m.	
74	7	$I_d$	V.	18 05 48		18 06 12	18 06 21	.30	2.4	18 11	V. C. 0.06 mm.
	10	At 16 <sup>h</sup> 52 <sup>m</sup> Eqhe., V at Surigao (NE of Mindanao).									
			V.	3 02 13						3 27	
75	11	I	H. WSW	3 02 10						3 36	
			W. E	3 02 11						3 36	
			H. WSW	21 41 14						22 06	
76	11	I	W. N	21 41 20						22 20	
			W. E	21 41 20						22 18	
			V.	8 54 22		8 58 34	8 59 05	.02	6.4	9 23	Eqhe., III at Guam (Marianas Islands).
			H. NNW	8 54 27		8 58 20	8 59 11	.11	7.2	9 15	
77	13	$I_r$	H. WSW	8 54 26		8 58 44	9 01 59	.14	7.8	9 30	
			W. N	8 54 22		8 58 18	8 59 00	.05	4.2	9 32	
			W. E	8 54 22		8 58 55	9 01 24	.04	6.4	9 38	
78	14	$II_v$	V.	20 12 12		20 12 29	20 13 00	1.80	2.2	20 24	V. C. 2.02 mm. Eqhe., III at Batangas (S of Luzon).
79	15	$I_d$	V.	8 25 06		8 25 12	8 25 17	.03	2.4	8 28	V. C. 0.02 mm.
			V.		20 04 35					20 24	
80	15	I	H. WSW		20 04 16					20 33	
81	17	$I_d$	V.	3 20 53		3 21 19	3 21 42	.40	2.4	3 26	V. C. 0.22 mm.
	18	At 1 <sup>h</sup> 36 <sup>m</sup> Eqhe., III at Guam (Marianas Islands).									



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## Seismological Bulletin No. 4, c.

April, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion				Remarks.
				P	S	L	Hour	A	T	F	
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.	
82	19	I <sub>u</sub>	V.	2 24 43	2 34 06	2 45 15	2 57 34	.01	13.6	3 32	
			H. WSW	2 24 49	2 33 50	2 45 05	2 56 22	.06	15.6	3 41	
83	19	I	H. WSW			22 22 19				23 02	
84	22	I <sub>d</sub>	V.	4 42 26		4 42 35	4 42 49	.22	2.4	4 47	V. C. 0.12 mm.
85	24	I <sub>v</sub>	V.	15 55 06		15 55 13	15 55 31	.09	2.4	15 59	V. C. 0.04 mm. Epke., III at Batangas (S of Luzon)
86	28	I	V.			18 11 24				18 55	V. C. 0.01 mm.
			H. NNW			18 11 21				18 54	
			H. WSW			18 11 21				19 06	
			W. E			18 11 24				19 00	
			V.			2 45 55				3 00	
87	29	I	H. NNW			2 45 58				3 01	
			H. WSW			2 45 59				3 11	
			W. N			2 46 00				2 49	

W. = Wiechert seismograph, 1000 kilograms. N = N-S component; E = E-W component. Period 7 seconds. Magnif. 98. Damping 4:1.

M. Sadera

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## Seismological Bulletin, No. 5, a.



May, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion				Remarks.
				P	S	L	Hour	A	T	F	
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	S.	h. m.	
	1	At 17 <sup>h</sup> 13 <sup>m</sup> 30 <sup>s</sup>		Earthquake, IV at Butuan (N of Mindanao)							
88	2	I <sub>d</sub>	V.	2 35 06		2 35 14	2 35 33	0.03	2.4	2 39	Vertical Component 0.01 mm.
89	2	I <sub>d</sub>	W. N	21 53 34		21 53 57	21 54 00	.02	2.2	21 55	
	3	At 11 <sup>h</sup> 54 <sup>m</sup> 20 <sup>s</sup>		Eqke., II at Vigan (NW of Luzon).							
			V.	21 34 00		21 38 15	21 41 04	.01	8.8	22 01	
			H. NNW	21 34 00		21 38 02	21 41 01	.08	7.5	22 02	
90	4	I	H. WSW	21 33 59		21 38 32	21 41 33	.19	8.7	22 19	
			W. N	21 34 16		21 39 06	21 40 34	.01	10.8	21 54	
			W. E	21 34 18		21 38 24	21 41 16	.03	12.8	22 04	
	5	At 3 <sup>h</sup> 54 <sup>m</sup> 05 <sup>s</sup>		Eqke., III at Butuan (N of Mindanao).							
			V.	7 45 23	7 48 34						
			H. NNW	7 45 23	7 48 47						
91	5	II <sub>r</sub>	H. WSW	7 45 23	7 48 08						
			W. N	7 45 23	7 48 22						
			W. E	7 45 23							
			V.	7 52 04	7 55 12	7 57 23	7 59 25	.02	17.6	9 06	
			H. NNW	7 51 51	7 54 57	7 59 21	7 59 55	.19	9.6	9 20	
92	5	II <sub>r</sub>	H. WSW	7 52 01	7 55 15	7 59 53	8 01 31	.29	9.6	9 58	
			W. N	7 52 00	7 54 36	7 58 07	7 59 18	.76	13.2	9 22	
			W. E	7 52 09	7 54 49	7 58 44	8 00 54	.80	12	9 15	

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## Seismological Bulletin No. 5, b. May, 1911.



No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion.			F	Remarks.
				P	S	L	Hour	A	T		
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.	
93	7	$I_d$	V.	18 17 26		18 17 37	18 17 44	.03	2.4	18 19	V. C. 0.01 mm.
94	8	$I_d$	V.	5 44 34		5 44 46	5 45 18	.18	2.4	5 50	V. C. 0.09 mm.
	11	At 1 <sup>h</sup> 57 <sup>m</sup> 30 <sup>s</sup> Eqke., III at Butuan (N of Mindanao).									
			V.	9 32 02		9 33 31	9 33 50	.03	3.2	9 46	Eqke., III at Santo Domingo (Bat- anes Islands).
			H. NNW	9 32 03		9 33 23	9 33 32	.06	5.1	9 43	
95	12	$I_v$	H. WSW	9 32 03		9 33 40	9 34 03	.05	8.1	9 49	
			W. N	9 32 02		9 33 24	9 33 31	.01	5	9 45	
			W. E	9 32 02		9 33 30	9 33 33	.01	4	9 42	
			V.	11 22 04		11 22 12	11 23 17	2.40	2.4	11 58	V. C. 2.50 mm. South Zamboales Range.
			H. NNW	11 22 08		11 22 16	11 23 28	5.30	5.4	12 05	
96	13	$II_v$	H. WSW	11 22 08		11 22 16	11 22 40			12 20	
			W. N	11 22 05		11 22 10	11 23 08	3.17	4	12 06	
			W. E	11 22 05		11 22 12	11 23 32	2.04	2.8	12 18	
97	14	$I_d$	V.			20 54 37	20 54 49	.02	2.4	20 57	
			V.	0 45 42			0 46 22	.04	2.4	0 50	
98	15	$I_r$	H. NNW	0 45 44						0 53	
			H. WSW	0 45 44			0 46 32	.02	8.7	1 04	
			W. N	0 45 48			0 46 12	.01	2.6	0 51	
99	15	$I_v$	V.	1 38 23		1 39 21	1 39 48	.32	2.4	1 46	V. C. 0.02 mm.
			W. N	1 38 28		1 39 28	1 40 56	.02	5.2	1 47	

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May, 1911.

No.	Date.	Character	Instrument and component	Beginning			Maximum range of motion			Remarks.		
				P	S	L	Hour	A	T		F	
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.		h. m.	
100	18	I <sub>v</sub>	V.	14 12 46		14 13 05	14 13 13	.30	2.4	14 19	V.C. 0.26 mm. Felt at Antipolo. Origin near the Pacific coast E of Manila.	
			W. N	14 12 40		14 12 57	14 13 10	.14	5	14 19		
			W. E	14 12 40		14 12 57	14 13 16	.13	4	14 20		
101	21	I	V.			23 18 01				23 26		
			H. NNW			23 18 14				23 27		
			H. WSW			23 18 14				23 32		
102	23	I <sub>d</sub>	V.	20 55 25		20 55 49	20 56 02	.05	2.4	20 59	V.C. 0.01 mm.	
			W. N	20 55 24		20 55 46	20 56 03	.01	2	21 00		
103	24	I	V.		6 59 07						7 16	
			H. WSW		6 59 09						7 19	
			W. E		6 59 00						7 18	
104	24	I	H. NNW	11 53 52		11 57 10	11 59 28	.05	8.1	12 08		
			H. WSW	11 53 40		11 56 31	11 58 40	.05	8.4	12 14		
105	24	I <sub>d</sub>	V.	15 34 01		15 34 18	15 34 46	.40	2.4	15 39	V.C. 0.11 mm.	
			W. E	15 34 00		15 34 14	15 34 17	.07	4.2	15 39		
106	24	I	V.	20 40 28		20 43 50	20 44 16	.01	11.2	20 58		
			H. NNW	20 40 30		20 43 58				20 57		
			H. WSW	20 40 22		20 43 51	20 45 48	.24	9.3	21 05		
			W. N	20 40 26		20 44 00	20 45 45	.04	10	21 05		
			W. E	20 40 30		20 43 00	20 44 06	.04	10.4	21 02		

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## Seismological Bulletin No. 5, d. May, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion			F	Remarks.	
				P	S	L	Hour	A.	T			
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.		
107	28	I <sub>d</sub>	V.	12 39 11		12 39 28	12 39 38	.34	2.4	12 45	V. C. 0.18 mm.	
108	28	II <sub>v</sub>	V.	17 47 34		17 47 50	17 48 33	2.20	2.2	18 42	V. C. 1.90 mm. Epke., III near western coast of Zambales.	
			H. NNW	17 47 34		17 47 50	17 48 34	1	8	18 10		
			H. WSW	17 47 34		17 47 50	17 48 31	.99	10	18 21		
109	28	I	V.	19 18 48		19 19 36	19 19 50	.08	2.4	19 25	V. C. 0.02 mm.	
			H. NNW			19 19 32				19 26		
			H. WSW			19 19 31				19 26		
110	29	I	V.			3 23 17				3 27		
			H. WSW			3 23 40				3 34		
111	31	I	V.			11 43 16				11 51		
			H. NNW			11 43 16				11 57		
			H. WSW			11 43 16				11 58		
			W. N			11 43 17				11 57		
			W. E			11 43 17				11 55		
112	31	I	V.			21 53 01				22 13		
			H. NNW			21 52 00				22 18		
			H. WSW			21 52 00				22 36		
			W. N			21 52 10				22 17		

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## Seismological Bulletin No. 6, a.

## June, 1911.



No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion			F	Remarks
				P	S	L	Hour	A	T		
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.	
113	2	I <sub>v</sub>	V.			21 24 35	21 24 37	0.05	2.4	21 27	Vertical Component 0.01 mm.
114	2	I	H. WSW	12 39 25						12 56	
			V.	23 41 30		23 42 13	23 42 47	.37	2.4	0 06	V. C. 0.07 mm. Egeke., III southeastern Luzon.
			H. NNW	23 41 30		23 42 12	23 44 00	.69	7.8	0 23	
115	2-3	II <sub>v</sub>	H. WSW	23 41 30		23 42 05	23 44 01	.82	8.1	0 45	
			W. N	23 41 24		23 42 07	23 43 43	.22	6.8	0 10	
			W. E	23 41 24		23 42 07	23 44 26	.13	6.4	23 57	
			V.	21 48 04		21 48 40	21 48 53	.73	2.4		V. C. 0.08 mm. Egeke., III northwestern Visayas.
116	3	II <sub>v</sub>	W. N	21 48 03		21 48 37	21 48 46	.07	2.8		
			W. E	21 48 03		21 48 34	21 48 44	.09	3.6		
			V.	21 51 13			21 53 00	.12	2.4	22 02	V. C. 0.01 mm. Egeke., III, NE Loyte Island.
117	3	I <sub>v</sub>	W. N.	21 51 12		21 52 00	21 52 05	.04	2.6	22 01	
			W. E	21 51 12		21 52 02				22 01	
118	4	I	H. WSW	4 31 20						5 08	
	4		At 7 <sup>h</sup> 51 <sup>m</sup> 12 <sup>s</sup> Egeke., III at Cuyo (Cuyo Island).								
			V.	17 39 55		17 41 34	17 42 46	.04	2.4	17 56	Egeke., III at Butuan (N Mindanao).
119	5	I <sub>v</sub>	H. WSW	17 39 55		17 41 40	17 42 52	.07	6.6	18 01	
			W. E	17 39 51		17 41 43				17 51	
120	5	I <sub>v</sub>	V.			19 19 07	19 19 12	.04	2.4	19 21	
	7		At 2 <sup>h</sup> 47 <sup>m</sup> Egeke., III at Calapan (NE Mindoro).								

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## Seismological Bulletin No. 6, b.



June, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion			F	Remarks.		
				P	S	L	Hour	A	T				
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.			
121	7	III <sub>u</sub>	V.	19 24 00	19 38 34	19 53 00	20 29 27	.03	19.2	21 40	Mexico.		
			H. NNW	19 24 00	19 37 50	19 51 21	20 29 14	.08	18.6	21 29			
			H. WSW	19 24 00	19 38 00	19 51 23	20 28 00	.13	18	21 40			
			W. N	19 24 12	19 38 10	19 51 24	20 28 07	.02	18.8	21 50			
			W. E	19 24 07	19 38 13	19 53 01	20 29 28	.07	16.8	21 51			
122	8	I <sub>v</sub>	V.	2 48 39		2 49 30	2 49 57	.42	2.4	2 54	V. C. 0.02 mm. Egke., IV Panay I.		
			W. N	2 48 36		2 49 35	2 49 50	.08	2.4	2 54			
			W. E	2 48 38		2 49 36	2 49 52	.06	2.4	2 54			
123	8	I <sub>d</sub>	V.	11 46 42		11 46 52	11 48 19	1.06	2.4	12 02	V. C. 0.95 mm.		
124	11	I <sub>d</sub>	V.	22 32 00		22 32 08	22 32 11	.02	2.4	22 33	V. C. 0.01 mm.		
125	12	I <sub>d</sub>	V.	2 05 26		2 05 36	2 06 05	.08	2.4	2 09	V. C. 0.09 mm.		
	13	At 3 <sup>h</sup> 34 <sup>m</sup> Egke., III at Tacloban (NE of Leyte).											
126	13	I <sub>d</sub>	V.	4 29 00		4 29 10	4 29 48	.04	2.4	4 31	V. C. 0.02 mm.		
127	14	I <sub>d</sub>	V.	20 56 01		20 56 19	20 56 21	.11	2.4	20 59	V. C. 0.01 mm.		
128	15-16	III <sub>v</sub>	V.	22 29 32		22 30 31					0 55	V. C. 0.92 mm. Felt with the intensity III and II in northeastern Luzon.	
			H. WSW	22 29 32		22 30 28					1 24		
			W. E	22 29 40		22 30 43					1 27		
129	17	II <sub>v</sub>	V.	13 13 35	13 17 16	13 19 54	13 21 04	.03	14.4	13 54			
			H. WSW	13 13 33	13 17 02	13 19 54	13 30 31	.64	8.4	14 32			
			W. N	13 13 20	13 17 01	13 20 06	13 21 28	.12	11.2	14 30			

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## Seismological Bulletin No. 6, c.



June, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion				Remarks								
				P	S	L	Hour	A	T	F									
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	mm.	h. m.									
	19	At 20 <sup>h</sup> 02 <sup>m</sup>	Eqke., II at Santo Domingo (Batanes Islands).																
	19	At 21 <sup>h</sup> 24 <sup>m</sup> 30 <sup>s</sup>	Eqke., II at Santo Domingo (Batanes Islands).																
130	19-20	I	W. N	23 40 32															
131	20	I <sub>d</sub>	V.	22 43 13			22 43 25	22 43 38	.05	2.4	22 45								V. C. 0.01 mm.
132	22	I	H. WSW	8 13 07			8 15 51	8 17 34	.13	7.8	8 35								
			W. N	8 13 05			8 15 54	8 16 48	.03	5.2	8 33								
133	23	II <sub>v</sub>	V.	3 27 23			3 27 32	3 27 54	1.70	2.4	3 40								V. C. 0.48 mm. Eqke., IV, southern coast Luzon.
			W. N	3 27 23			3 27 34	3 28 43	1.19	4.8	3 40								
134	26	II	V.	16 37 17			16 39 03	16 39 09	.72	2.4									V. C. 0.02 mm.
135	26	I	H. WSW	17 05 47			17 07 30	17 08 00	.25	9	17 34								V. C. 0.01 mm.
136	26	I	W. N	17 38 48															
	27	At 8 <sup>h</sup> 06 <sup>m</sup> 20 <sup>s</sup>	Eqke., III at Butuan (N Mindanao)																
137	27	I	H. WSW		12 12 47														
	27	At 12 <sup>h</sup> 22 <sup>m</sup>	Eqke., III at Baguio (NW Luzon).																
138	28	I <sub>d</sub>	V.	2 19 53			2 20 21	2 20 23	.18	2.4	2 22								V. C. 0.03 mm.
139	28	I <sub>d</sub>	V.	2 31 15			2 31 52	2 32 00	.04	2.4	2 34								
140	28	I	H. WSW	15 23 29															
141	29	I	H. WSW		1 56 58														
	29	At 4 <sup>h</sup> 04 <sup>m</sup>	Eqke., III at Baguio (NW Luzon).																

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## Seismological Bulletin No. 7, a.



International  
Seismological  
Centre

July, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion			F	Remarks.
				P	S	L	Hour	A	T		
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	mm.	h. m.	
1112	1	I <sub>d</sub>	IV. N	2 37 20		2 37 49	2 38 35	0.04	4.8	2 41	Vertical Component 0.03 mm.
143	3	I <sub>v</sub>	V.	0 09 57		0 10 20	0 10 32	.05	2.4	0 13	V. C. 0.02 mm. Earthquake, III at Nueva Caceres (SE of Luzon).
144	4	I	H. NNW	5 49 18		5 51 50	5 53 48	.15	7.5	6 18	
			H. WSW	5 49 18		5 51 53	5 56 40	.46	8.4	6 26	
			W. N	5 49 25		5 51 54	5 53 52	.08	7	6 22	
145	4	I <sub>v</sub>	V.	17 42 10		17 42 36	17 42 43	.10	2.4	17 46	V. C. 0.03 mm. Eqke., III at Baguio (NW of Luzon).
146	4	II <sub>u</sub>	V.	21 42 01	21 49 00	21 53 40	21 56 24	.02	6.8	22 37	V. C. 0.02 mm.
			H. NNW	21 42 02	21 49 01	21 54 07	21 57 09	.11	8.1	22 32	
			H. WSW	21 42 02	21 49 02	21 53 35	21 57 13	.60	8.4	22 51	
			W. N	21 42 11	21 49 10	21 53 45	21 57 06	.06	10	22 40	
			W. E	21 42 11	21 49 11	21 54 16	21 57 24	.05	10	22 38	
147	5	I <sub>r</sub>	V.	10 38 58		10 43 04	10 43 17	.04	7.2	11 00	V. C. 0.02 mm.
			H. NNW	10 38 59		10 43 09	10 43 25	.40	7.5	11 02	
			H. WSW	10 38 59		10 43 02	10 43 22	.48	8.4	11 10	
			W. N	10 39 03		10 43 18	10 43 32	.11	8	11 06	
148	6	II <sub>d</sub>	W. E	10 39 03		10 43 10	10 43 28	.09	7.2	11 06	
			V.	2 44 45		2 45 14	2 46 11	1.12	2.4	3 04	V. C. 0.70 mm.
	7		At 18 <sup>h</sup> 47 <sup>m</sup> Eqke., II at Laoag (NW of Luzon).								
149	8	I <sub>v</sub>	V.	2 07 15		2 07 43	2 07 45	.02	2.4	2 09	Eqke., III at Baguio (NW of Luzon).
150	8	I	H. WSW	9 45 45						10 10	
151	9	I.	V.	7 25 51		7 26 30	7 26 47	.12	2.4	7 28	

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## Seismological Bulletin No. 7, b.

July, 1911.

No.	Date	Character	Instrument and Component	Beginning									Maximum range of motion				Remarks.			
				P			S			L			Hour	A	T	F				
				h.	m.	s.	h.	m.	s.	h.	m.	s.						mm.	s.	h.
152	11	I <sub>d</sub>	V.	1	10	00				1	10	20	1	10	34	.02	2.4	1	12	
			V.	5	31	29				5	38	44	5	39	19	.02	6	5	57	
153	12	I <sub>r</sub>	H. NNW	5	31	29				5	38	44	5	39	25	.12	7.5	5	55	
			H. WSW	5	31	30				5	38	45	5	39	15	.14	7.8	6	10	
			W. N	5	31	35				5	38	48	5	39	18	.01	8.8	6	05	
154	12	I	H. WSW							9	49	41	9	55	32	.06	8.4	10	12	
			W. N.							9	49	40	9	54	24	.02	9.7	10	09	
155	12	III <sub>v</sub>	V.	12	09	44				12	10	54	12	12	01	1.80	2.4	14	30	V.C. 0.40 mm. Epke., VIII-IX, Agusan River Valley, eastern Mindanao.
			H. WSW	12	09	44				12	10	51						15	12	
156	12	II <sub>r</sub>	V.	16	03	26	16	07	06	16	10	20	16	12	25	.03	10.4	17	24	
			H. NNW	16	03	26	16	06	46	16	10	46	16	13	36	.83	8.1	17	43	
			W. E	16	03	26	16	06	42	16	10	00	16	14	18	.18	9.2	17	31	
157	13	I	H. WSW							16	42	42	16	49	34	.10	12.6	17	17	
158	14	I <sub>v</sub>	H. WSW	9	47	22				9	49	24	9	52	43	.39	9.3	10	45	Epke., III, Agusan River Valley, aftershock.
159	16	I <sub>d</sub>	V.	13	00	43				13	00	57	13	01	11	.36	2.4	13	06	V.C. 0.24 mm.
	18	At 1 <sup>h</sup> 57 <sup>m</sup> Epke., III, Agusan River Valley, aftershock.																		
			V.	18	12	11												18	42	V.C. 0.02 mm.
160	19	I	H. NNW	18	12	10												18	48	
			H. WSW	18	12	10												19	15	

# Manila Observatory. - Philippine Islands.

## Seismological Bulletin No. 7, c.

July, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion		F	Remarks.		
				P	S	L	Hour	A			T	
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.		
161	20	I <sub>v</sub>	V	4 22 55		4 25 13	4 29 01	.08	12			V.C. 0.01 mm. Egke., III, Agusan River Valley, aftershock.
			W. E	4 22 53		4 25 04	4 28 33	.70	8			
162	20	I <sub>r</sub>	V	5 23 00		5 25 09	5 26 28	.02	11.6	6 28		V.C. 0.01 mm.
			H. NNW	5 23 00		5 25 09	5 26 57	.20	10.5	6 55		
163	21	I <sub>v</sub>	W. N	5 23 00		5 25 00	5 27 00	.04	14	6 30		
			V	18 59 39		19 01 27	19 04 52	.02	4.8	19 32		Egke., IV, Agusan River Valley, aftershock.
			H. NNW	18 59 39		19 01 31	19 04 04	.11	7.5	19 24		
	22	At 4 <sup>h</sup> 36 <sup>m</sup> 11 <sup>s</sup> Egke., III at Zamboanga (W of Mindanao).										
164	22	I <sub>d</sub>	V	8 13 47		8 14 22	8 14 56	.05	2.4	8 18		V.C. 0.03 mm.
165	22	I	H. NNW		11 13 56					11 45		
166	22	I <sub>v</sub>	V	13 18 55		13 20 52	13 22 10	.08	2.4	14 12		V.C. 0.02 mm. Egke., IV, Agusan River Valley, aftershock.
			W. N	13 19 00		13 20 45	13 23 08	.05	12.4	14 11		
167	22	I <sub>d</sub>	V	17 49 07		17 49 19	17 49 34	.03	2.4	17 52		V.C. 0.01 mm.
	25	At 12 <sup>h</sup> 15 <sup>m</sup> Egke., III at San Fernando-Union (NW of Luzon).										
168	28	I <sub>d</sub>	V	10 19 35		10 19 45	10 19 53	.03	2.4	10 22		V.C. 0.02 mm.
169	28	I <sub>d</sub>	V	10 46 38		10 46 49	10 46 51	.05	2.4	10 50		V.C. 0.02 mm.
	30	At 18 <sup>h</sup> 02 <sup>m</sup> Egke., III at Baguio (NW of Luzon).										
170	30	I <sub>r</sub>	H. NNW	19 54 42		19 57 18	19 58 05	.05	9.6	20 36		
171	30	I	H. WSW			21 52 29				22 11		
172	31	I <sub>r</sub>	H. NNW	8 11 55		8 14 37	8 14 44	.16	7.8	8 28		



# Manila Observatory. - Philippine Islands.

## Seismological Bulletin No. 8, a.

### August, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion				Remarks.									
				P	S	L	Herr	A	T	F										
												h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.		
172	2	I <sub>r</sub>	V.	8	44	19	8	50	08	8	51	01	0.01	10.8	9	21				
			H. NNW	8	44	19	8	50	18	8	51	01	0.08	9.3	9	15				
			H. WSW	8	44	19	8	50	23	8	51	57	.09	9.3	9	23				
3	Elt 17 <sup>h</sup> 01 <sup>m</sup> Earthquake, at Butuan (N of Mindanao).																			
173	4	I	V.	9	16	35	9	20	36	9	21	14	.03	6	10	06				
			H. WSW	9	16	36	9	20	16	9	23	13	.15	9	10	33				
174	8	I	H. WSW	22	30	03									23	22				
175	9	I <sub>r</sub>	H. WSW	2	23	47	2	27	56	2	29	45	.21	5.1	3	04				
			W. E	2	23	47	2	27	46	2	28	52	.05	6.8	2	56				
176	9	I <sub>d</sub>	V.	14	47	56	14	48	15	14	48	17	.62	2.4	14	52	Vertical Component 0.16 mm.			
10	Elt 10 <sup>h</sup> 45 <sup>m</sup> Eqke., II at Butuan (N of Mindanao).																			
177	10	I	H. WSW				11	09	33							11	35			
178	10	I <sub>d</sub>	V.	13	18	30	13	18	49	13	18	55	.14	2.4	13	22	V. C. 0.03 mm.			
179	13	II <sub>o</sub>	V.	13	57	30	13	57	46	13	58	21	1.50	2.4	14	24	V. C. 1.93 mm. Eqke., III at Calapan (NE of Mindoro).			
180	14	I <sub>d</sub>	V.	8	15	35	8	15	48	8	16	01	.80	1	8	20	V. C. 0.80 mm.			
181	15	I <sub>o</sub>	V.	4	54	34	4	56	33	4	57	07	.12	2.4	5	10	Agusan Valley, eastern Mindanao.			
			H. NNW	4	54	39	4	56	38	4	58	43	.27	7.5	5	15				
15	Elt 12 <sup>h</sup> 03 <sup>m</sup> Eqke., III in Romblon Island.																			
182	17	II <sub>r</sub>	V.	6	45	22	6	50	07	6	53	37	6	57	15	.27	9.6	9	00	V. C. 0.21 mm. Felt in Jaro, intensity V, western Carolines.
			H. NNW	6	45	22	6	49	54	6	53	34	6	57	10	3.13	9	9	10	
			W. N	6	45	22	6	49	47	6	53	31	6	57	26	.18	8	9	05	

# Manila Observatory. - Philippine Islands.

## Seismological Bulletin No. 8, b.



August, 1911.

No.	Date.	Character	Instrument and Component	Beginning			Maximum range of motion			Remarks.									
				P	S	L	Hour	A	T		F								
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.		h. m.								
	17	At 10 <sup>h</sup> 33 <sup>m</sup>	Eqke., II at Butuan (N of Mindanao)																
	17	At 15 <sup>h</sup> 10 <sup>m</sup>	Eqke., III at Laoag (NW of Luzon).																
183	17	I <sub>d</sub>	V.	15 53 40			15 54 36	15 55 28	.08	2.4	16	00	V. C. 0.03 mm.						
184	18	II <sub>v</sub>	V.	10 56 30			10 58 16	11 00 02	.29	2.4	11	57	V. C. 0.02 mm. Origin north of the Agusan River Valley.						
			H. WSW	10 56 30			10 58 05	10 59 30	1.47	7.8	12	17							
	18	At 16 <sup>h</sup> 02 <sup>m</sup>	Eqke., III at Aparri (NE of Luzon).																
185	18	I <sub>d</sub>	V.	17 29 38			17 30 33	17 36 49	.18	2.4	17	40	V. C. 0.01 mm.						
186	19	II <sub>v</sub>	V.	8 05 01			8 05 37	8 06 30	1.30	2.4	8	19	V. C. 0.00 mm. Eqke. in Comarines (SE of Luzon).						
187	19	I	V.	8 25 09			8 25 43	8 25 45	.03	2.4	8	50	V. C. 0.02 mm.						
188	19	I	V.	10 06 03			10 06 47	10 07 13	.15	2.4	10	11	V. C. 0.03 mm.						
189	19	I	V.	12 20 52			12 21 34	12 21 36	.03	2.4	12	23	V. C. 0.01 mm.						
190	20	I <sub>v</sub>	V.	7 54 06			7 54 42	7 55 05	.06	2.4	7	58	V. C. 0.01 mm. Eqke. in Comarines.						
191	20	I <sub>d</sub>	V.	13 57 20			13 57 44	13 57 47	.03	2.4	13	59							
192	20	I	V.	16 34 41			16 35 22	16 36 07	.04	2.4	16	38	V. C. 0.02 mm.						
193	22	II <sub>v</sub>	V.	0 39 51			0 48 34	0 49 26	.42	2.4	1	26							
			H. NNW	0 39 55			0 48 37	0 50 35	.81	7.8	1	20							
			H. WSW	0 39 55			0 48 38	0 49 32	2.01	7.8	1	42							
			W. N	0 39 52			0 48 36	0 49 27	.18	2.4	1	24							
			W. E	0 39 52			0 48 39	0 49 43	.39	5	1	30							
	22	At 8 <sup>h</sup> 20 <sup>m</sup>	Eqke. in Comarines.																
194	22	II	V.	9 20 58			9 21 49	9 22 34	.96	2.4	9	38	V. C. 0.15 mm.						



# Manila Observatory.- Philippine Islands.

## Seismological Bulletin No. 8, c.

August, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion.			F	Remarks.
				P	S	L	H	A	T		
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.	
195	22	I <sub>v</sub>	V.	12 09 18		12 10 18	12 10 25	.08	2.4	12 14	V. C. 0.01 mm. Eqke., III at Virac (Catanduanes).
196	22	II <sub>v</sub>	V.	13 32 52		13 33 28	13 34 29	1.12	2.4	13 54	V. C. 0.11 mm. Eqke. in Camarines.
197	22	I	V.	14 12 28		14 13 07	14 13 18	.04	2.4	14 18	V. C. 0.01 mm.
198	22	III <sub>v</sub>	V.	14 26 52		14 27 28	14 28 06	1.80	2.4		V. C. 1.00 mm. Eqke. in Camarines (SE of Luzon).
	22	At 14 <sup>h</sup> 28 <sup>m</sup> Quake, II in Camarines.									
199	22	II <sub>v</sub>	V.	14 36 10		14 37 00	14 37 32	1.60	2.4	15 28	V. C. 0.28 mm.
200	22	I <sub>v</sub>	V.	18 35 33		18 36 16	18 36 37	.02	2.4	18 40	Eqke., III at Aparri (NE of Luzon).
201	22	I	V.	19 56 30		19 57 25	19 57 49	.26	2.4	20 04	V. C. 0.05 mm.
202	23	I <sub>v</sub>	V.	4 23 20		4 23 58	4 24 39	.06	2.4	4 27	V. C. 0.02 mm. Quake in Camarines.
	23	At 5 <sup>h</sup> 46 <sup>m</sup> 30 <sup>s</sup> Eqke., III at Butuan (N of Mindanao).									
203	23	I <sub>2</sub>	V.	15 45 30		15 45 47	15 46 02	.04	2.4	15 49	V. C. 0.01 mm.
204	23	I <sub>v</sub>	V.	17 12 17		17 12 52	17 13 43	.12	2.4	17 18	V. C. 0.02 mm. Quake in Camarines.
205	24	I <sub>2</sub>	V.	3 17 50		3 18 05	3 18 07	.07	1.2	3 21	V. C. 0.05 mm.
	24	At 9 <sup>h</sup> 05 <sup>m</sup> Eqke., II at Pasacale (SE of Luzon).									
206	31	I <sub>v</sub>	H. WSV			2 55 53				3 16	

M. Sidera

# Manila Observatory. - Philippine Islands.

## Seismological Bulletin, No. 9, a.

## September, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion			F.	Remarks.	
				P.	S.	L.	Hour.	A.	T.			
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.		
		At 8 <sup>h</sup> 38 <sup>m</sup> Earthquake, III at Locog (NW of Luzon).										At 3 <sup>h</sup> 21 <sup>m</sup> Eqke., III at Guam (Marianas Islands).
208	1	I <sub>d</sub>	V.	12 40 22		12 40 39	12 40 43	0.09	2.4	12 43		Vertical Component 0.07 mm.
209	1	I <sub>d</sub>	V.	23 44 15		23 44 32	23 45 08	.34	2.4	23 49		V. C. 0.11 mm.
210	2	I	H. WSW			8 01 48				8 30		
211	2	I <sub>v</sub>	H. WSW	16 34 47		16 36 37	16 38 18	.05	6	16 55		Eqke., IV Agusan River Valley, aftershock.
		At 6 <sup>h</sup> 37 <sup>m</sup> Eqke., III at Butuan (N of Mindanao).										
212	5	I <sub>v</sub>	{ V. H. WSW	10 08 48 10 08 48		10 10 08 10 10 02	10 13 00 10 12 03	.02 .12	7.6 9.6	10 25 10 31		Eqke., VII in the western and central part of Leyte.
		At 15 <sup>h</sup> 02 <sup>m</sup> Eqke., III at Ormoc (W of Leyte).										
213	5	I	H. WSW		17 25 03					17 43		
			V.	9 01 04		9 06 15	9 07 02	.04	2.4	9 27		V. C. 0.01 mm.
			H. NNW	9 01 06		9 06 21	9 06 27	.12	7.2	9 26		
214	6	I <sub>r</sub>	{ H. WSW W. N W. E	9 01 06 9 00 57 9 00 57		9 06 22 9 06 07 9 06 08	9 08 21 9 07 06 9 06 17	.20 .04 .11	7.8 2.8 4.8	9 33 9 28 9 32		
215	6	I <sub>v</sub>	H. WSW	10 14 47		10 16 27	10 17 41	.07	8.1	10 36		Eqke., IV Agusan River Valley, aftershock.
216	7	I <sub>d</sub>	V.	6 47 09		6 47 33	6 47 41	.05	2.4	6 50		V. C. 0.03 mm.
		At 20 <sup>h</sup> 02 <sup>m</sup> Eqke., III at Catbalogan (W of Samar).										
		At 4 <sup>h</sup> 57 <sup>m</sup> 10 <sup>s</sup> Eqke., V at Ormoc (W of Leyte).										
217	8	I	V.	18 40 55		18 41 10	18 41 25	.03	2.4	18 43		V. C. 0.02 mm.
		At 0 <sup>h</sup> 13 <sup>m</sup> Eqke., IV at Ormoc (W. of Leyte).										
218	9	I	H. WSW	6 52 43						7 19		

# Manila Observatory. - Philippine Islands.

## Seismological Bulletin, No. 9, b.

September, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion			Remarks.		
				P.	S.	L.	Hour	A.	T.		F.	
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.		h. m.	
219	9	I	V.	18 57 57			19 02 58	19 03 04	.04	2.4	19 12	V. C. 0.04 mm.
				H. WSW	18 58 02			19 02 58	19 03 13	.04	9	
220	9	I <sub>2</sub>	V.	19 47 21			19 47 40	19 47 46	.07	2.4	19 50	V. C. 0.04 mm.
221	10	I <sub>2</sub>	V.	14 51 06			14 51 24	14 51 34	.02	2	14 54	V. C. 0.01 mm.
222	11	I	W. E	4 24 58			4 25 34	4 25 56	.01	3.6	4 27	
223	12	I	V.	2 35 33			2 35 47	2 35 55	.02	2.4	2 38	
12	At 3 <sup>h</sup> 05 <sup>m</sup> Eqke., III in the western and central part of Leyte.											
12	At 14 <sup>h</sup> 38 <sup>m</sup> 15 <sup>s</sup> Eqke., III at Ormoc (W of Leyte).											
12	At 17 <sup>h</sup> 36 <sup>m</sup> Eqke., II at Vigan (NW of Luzon).											
12	At 18 <sup>h</sup> 54 <sup>m</sup> 10 <sup>s</sup> Eqke., III at Ormoc (W of Leyte).											
224	12	I <sub>r</sub>	V.	21 03 32	21 06 41	21 10 52	21 12 26	.01	6	21 22		
				H. WSW	21 03 32	21 06 55	21 10 52	21 12 21	.05	6.9	21 30	
13	At 18 <sup>h</sup> 54 <sup>m</sup> Eqke., IV at Ormoc (W of Leyte).											
13	At 23 <sup>h</sup> 35 <sup>m</sup> Eqke., III at Honolulu.											
14	At 23 <sup>h</sup> 53 <sup>m</sup> Eqke., III Agusan River Valley.											
225	14-15	I	V.	23 50 58							0 01	
226	15	I	V.	0 06 19							0 27	
227	15	I	H. WSW	21 30 18							22 15	
				W. E	21 30 18						22 12	
228	17	I <sub>r</sub>	V.	11 38 49	11 42 50	11 47 42	11 50 40	.03	8	12 35		
				H. NNW	11 38 45	11 42 44	11 47 27	11 48 13	.21	7.5	12 31	
				W. N	11 38 39	11 42 42	11 47 41	11 52 53	.01	8	12 39	

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Seismological Bulletin No. 9, c.

September, 1911.

No.	Date.	Character	Instrument and Component	Beginning			Maximum range of motion			F.	Remarks.
				P.	S.	L.	How	A.	T.		
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.	
229	17	I <sub>r</sub>	H. WSW	12 43 37		12 55 52	12 57 09	.14	8.7	13 33	
	17	At 16 <sup>h</sup> 37 <sup>m</sup> 50 <sup>s</sup> Eqke., II at Cinnoc (W of Leyte).									
	18	At 4 <sup>h</sup> 32 <sup>m</sup> Eqke., II at Butuan (N of Mindanao).									
	18	At 5 <sup>h</sup> 30 <sup>m</sup> 05 <sup>s</sup> Eqke., IV in the western and central part of Leyte.									
230	18	II <sub>r</sub>	V.	21 35 40		21 37 07	21 37 50	.84	2.4	22 07	V.C. 0.07 mm. Eqke., IV at Aparri (NE of Luzon).
			W. E	21 35 40		21 36 50	21 39 25	.97	3.6	22 09	
	20	At 6 <sup>h</sup> 07 <sup>m</sup> Eqke., II at Guam (Marianas Islands).									
231	20	I <sub>d</sub>	V.	13 35 26		13 35 44	13 36 04	.16	2.4	13 40	V.C. 0.07 mm.
232	21	I	V.	15 22 25						15 54	
			H. WSW	15 22 26							16 20
233	21	I <sub>r</sub>	V.	21 57 54		21 59 12	21 59 56	.05	2.4	22 06	V.C. 0.01 mm. Eqke., IV in the western and central part of Leyte.
			W. E	21 57 54		21 59 00	21 59 24	.03	4	22 06	
	21	At 22 <sup>h</sup> 43 <sup>m</sup> Eqke., III at Tacloban (NE of Leyte).									
234	22	I	W. E	13 13 30						13 38	
	23	At 2 <sup>h</sup> 19 <sup>m</sup> Eqke., II at Tacloban (NE of Leyte).									
235	24	II <sub>d</sub>	V.	6 45 18		6 45 37	6 46 23	1.18	2.4	6 51	V.C. 0.99 mm.
236	24	I <sub>d</sub>	V	11 57 13		11 57 55	11 58 09	.06	2.4	12 26	V.C. 0.01 mm.
237	25	I <sub>r</sub>	W. E	2 57 20		2 58 30	2 59 37	.05	4	3 22	Eqke., V. Agusan River Valley.

M. Ladera M.

# Manila Observatory.- Philippine Islands.

Latitude: 14° 34' 41" N. Longitude: 120° 58' 33" E. Gr.

Time of the one hundred and twentieth meridian east of Greenwich. Midnight = 0<sup>h</sup>.

## Seismological Bulletin No. 10, a. October, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion			F.	Remarks.		
				P.	S.	L.	Hour.	A.	T.				
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.			
	2	At 2 <sup>h</sup> 50 <sup>m</sup>	Earthquake, III at Guam (Marianas Islands).										
	5	At 4 <sup>h</sup> 21 <sup>m</sup>	Eqke., II at Tacloban (NE of Leyte).										
238	5	I	V	10 28 35							10	38	
239	5	I	V	14 30 45							14	47	
240	6	I <sub>r</sub>	V	18 35 54							18	54	Agusan River Valley.
			W. E	18 35 54							18	55	
241	6	I <sub>r</sub>	V	22 31 20		22 35 45	22 38 12	0.01	10	23	04		
			W. E	22 31 21		22 35 32	22 37 07	.01	8.8	23	08		
242	7	I <sub>r</sub>	V	12 48 45		12 52 24	12 54 26	.02	9	13	26		
			H. NNW	12 48 45		12 52 04	12 55 22	.07	8.4	13	20		
			W. E	12 48 45		12 51 26	12 53 44	.01	11.2	13	23		
12	At 13 <sup>h</sup> 56 <sup>m</sup>	Eqke., III at Laoag (NW of Luzon).											
13	At 5 <sup>h</sup> 37 <sup>m</sup>	Eqke., III, Agusan River Valley.											
243	13	I <sub>r</sub>	V	5 37 56		5 38 51	5 40 40	.07	2.4	5	52	V. C. 0.01 mm. Eqke., III at Aparri (NE of Luzon).	
			H. NNW	5 37 59		5 39 04	5 41 21	.07	6	5	56		
			W. E	5 38 00		5 38 56	5 40 33	.05	2.8	5	50		
244	13	I <sub>r</sub>	V	10 41 45	10 46 24	10 51 26					11	29	
			H. NNW	10 41 45	10 46 30	10 51 57	10 53 37	.04	8.4	11	32		
			W. E	10 41 45	10 46 39	10 52 06	10 54 01	.01	14.4	11	30		

# Manila Observatory. - Philippine Islands.

## Seismological Bulletin No. 10, b. October, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion			Remarks.				
				P.	S.	L.	How	A.	T.		F.			
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	S.		h. m.			
245	14	I	H. NNW	0 41 00										
246	14	I <sub>d</sub>	V.	7 41 08		7 41 14	7 41 16	.52	2	7 44			V. C. 0.38 mm.	
247	14	I <sub>v</sub>	V.	11 02 30		11 03 17	11 04 28	.06	2.4	11 15			V. C. 0.01 mm. Ephe., IV, N Luzon.	
248	14	I <sub>r</sub>	V.	20 34 55		20 40 45	20 44 15	.01	7.2	21 41				
			H. NNW	20 34 55		20 40 51	20 44 37	.05	6.6	21 33				
249	15	I <sub>r</sub>	V.	7 31 41	7 37 48	7 42 09	7 43 22	.01	7.2	8 30				
			H. NNW	7 31 41	7 38 03	7 42 13	7 43 24	.13	7.2	8 28				
250	15	I <sub>r</sub>	V.	15 35 47		15 38 23	15 40 02	.02	11.2	16 03				
			H. NNW	15 35 47		15 38 44	15 40 38	.07	7.5	16 08				
251	16	II <sub>d</sub>	V.	13 27 27		13 28 01	13 28 13	1.20	2.4	13 51			V. C. 0.42 mm.	
			W. E	13 27 24		13 28 03	13 28 28	.36	4.8	13 54				
252	17	I	H. NNW	17 26 52						17 57				
253	17	I	W. E	20 01 00						20 20				
18	At 0 <sup>h</sup> 17 <sup>m</sup> Ephe., II at Tacloban (NE of Leyte).													
254	19	I <sub>v</sub>	V.	4 08 39		4 09 01	4 09 05	.03	2.4	4 11			V. C. 0.02 mm. Ephe., III at Baguio (NW of Luzon).	
255	20	I <sub>d</sub>	V.	22 07 42		22 08 10	22 08 15	.18	2.4	22 13			V. C. 0.09 mm.	
			V.	1 53 02		2 00 22	2 01 40	.02	9.6	2 38			V. C. 0.05 mm.	
256	21	I <sub>r</sub>	H. NNW	1 53 08		2 00 22	2 01 08	.39	10.2	2 31				
			W. E	1 53 00		2 00 22	2 00 52	.19	6.4	2 40				
22	At 22 <sup>h</sup> 15 <sup>m</sup> Ephe., III at Guam (Marianas Islands).													
257	23	I <sub>1</sub>	V.	0 52 00		0 52 24	0 52 28	.02	2	0 54			V. C. 0.01 mm.	
258	23	I <sub>1</sub>	V.	4 01 46		4 03 24	4 03 38	.24	2.4	4 10			V. C. 0.15 mm.	

# Manila Observatory. - Philippine Islands.

## Seismological Bulletin No. 10, c.



October, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion.			F.	Remarks.	
				P.	S.	L.	How	A.	T.			
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.		
259	24	I <sub>d</sub>	V.	2 09 18		2 09 36	2 09 54	.26	2.4	2 13	V.C. 0.24 mm.	
260	24	I <sub>r</sub>	V. H. NNW	8 17 23		8 22 51	8 25 59	.01	7.6	8 51	V.C. 0.01 mm.	
				8 17 24		8 23 01	8 24 33	.24	7.2	8 56		
				At 14° 45' Egke., III at Butuan (N of Mindanao).								
261	26	I <sub>v</sub>	H. NNW	19 54 11		19 56 12	19 58 22	.06	7.5	20 18	Egke., IV, east Mindanao.	
262	27	I <sub>v</sub>	H. NNW	5 31 51		5 33 50	5 36 06	.05	6.6	5 52	Egke., IV, east Mindanao.	
				At 11° 30' Egke., III at Butuan (N of Mindanao).								
263	28	I <sub>v</sub>	V.	17 37 56		17 38 19	17 38 37	.58	2.4	17 46	V.C. 0.28 mm. Egke., III at Baguio (NW of Luzon).	
264	30	I	H. NNW			21 11 02				21 35		
265	31	I <sub>d</sub>	V.			19 11 41	19 11 43	.07	2.4	19 15	V.C. 0.03 mm.	

Horizontal Pendulums (H.): period of oscillation, NNW-SSE pendulum, T=8.4 seconds; WSW-ENE pendulum, T=8.2 seconds.

M. Saderra M.

# Manila Observatory. - Philippine Islands.



Latitude: 14° 34' 41" N.; Longitude: 120° 58' 33" E. Gr.

Time of the one hundred and twentieth meridian east of Greenwich. Midnight = 0<sup>h</sup>.

## Seismological Bulletin No. 11, a. November, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion.			F.	Remarks.
				P.	S.	L.	Hour	A.	T.		
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.		
266	1	I	V.	5 25 42						5 37	
267	1	I <sub>d</sub>	V.	16 06 09		16 06 27	16 07 45	0.61	2.4	16 13	V. C. 0.42 mm.
268	2	I	V.	6 58 55						7 15	
			H. NNW	6 58 59							7 18
269	2	I <sub>d</sub>	H. WSW	6 58 59						7 16	
			V.	13 35 26		13 35 51	13 36 11	.14	2.4	13 40	V. C. 0.09 mm.
270	6	I	V.	3 10 49		3 12 25	3 14 28	.02	6.4	3 27	
			W. N	3 10 54		3 12 18	3 16 24	.04	8.2	3 25	
271	6	II <sub>v</sub>	V.	23 26 56		23 27 21	23 28 54	1.97	2	23 42	V. C. 1.25 mm. Epke., IV in Pangasinan and Benguet Provinces.
			W. N	23 26 56		23 27 20	23 28 54	.93	7.6	23 39	
272	9	I	V.	12 28 27						12 56	
273	11	I <sub>d</sub>	V.	1 51 54		1 52 11	1 52 14	.20	2.4	1 55	V. C. 0.06 mm.
274	11	I <sub>v</sub>	V.	5 45 02		5 46 50	5 47 13	.04	2.4	5 56	Epke., III at Tacloban (NE of Leyte).
275	11	I	V.	20 49 17		20 50 14	20 51 12	.04	3.6	20 56	V. C. 0.02 mm.
276	12	I <sub>d</sub>	V.			1 30 01	1 30 04	.02	2.4	1 32	
			V.	0 23 11	0 30 51	0 36 21	0 38 47	.01	15.2	1 40	
277	14	I <sub>u</sub>	H. NNW	0 23 11	0 30 48	0 35 35	0 40 55	.04	10.8	1 26	
			H. WSW	0 23 11	0 30 53	0 35 28	0 37 17	.04	9.3	1 24	
			W. E	0 22 52	0 30 42	0 36 30	0 37 04	.07	9.6	2 02	
278	17	I <sub>d</sub>	V.	9 35 42		9 35 54	9 36 16	.14	2.4	9 40	V. C. 0.15 mm.



# Manila Observatory - Philippine Islands.

## Seismological Bulletin No. 11, b. November, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion			F.	Remarks.	
				P.	S.	L.	Hour	A.	T.			
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.		
279	17	I <sub>d</sub>	V.	13 44 50		13 45 01	13 45 17	.10	2.4	13 49	V. C. 0.06 mm.	
280	17	I <sub>d</sub>	V.	20 07 20		20 07 32	20 07 39	.07	2.4	20 11	V. C. 0.08 mm.	
281	18	I <sub>d</sub>	V.	13 10 32		13 10 43	13 11 01	.05	2.2	13 14	V. C. 0.05 mm.	
282	19	I <sub>r</sub>	V.	10 12 00						10 40	V. C. 0.01 mm.	
			H. WSW	10 12 00							10 38	
			W. E	10 12 00							10 50	
19	At 22 <sup>h</sup> 50 <sup>m</sup> Epke., III at Tacloban (NE of Leyte).											
20	At 2 <sup>h</sup> 16 <sup>m</sup> Epke., III, Cuyo Island.											
283	20	I <sub>d</sub>	V.			18 00 51	18 00 53	.02	2.4		V. C. 0.01 mm.	
284	20	I <sub>v</sub>	V.	18 01 31		18 02 02	18 02 12	.05	2.4	18 06	V. C. 0.03 mm. Epke., III at Nueva Caeres (SE of Luzon).	
285	21	I <sub>r</sub>	V.	15 40 03		15 43 58	15 44 09	.08	2.4	16 00		
			H. NNW	15 40 02		15 43 52	15 45 59	.04	6	16 01		
			W. E	15 39 56		15 43 55	15 44 05	.10	3.8	15 59		
286	22	II <sub>v</sub>	V.	3 23 34		3 24 24	3 24 54	1.95	2.4	4 29	V. C. 1.02 mm. Origin near the extreme NE Luzon.	
			H. NNW	3 23 36		3 24 27	3 25 20	2.07	7.8	3 55		
287	22	I <sub>d</sub>	V.	22 02 04		22 02 30	22 02 37	.04	2.4	22 05	V. C. 0.02 mm.	
288	23	I <sub>r</sub>	V.	7 14 38	7 18 37	7 22 04	7 22 16	.06	2.4	7 48		
			H. NNW	7 14 43	7 17 53	7 22 05	7 22 22	.33	7.5	7 47		
			H. WSW	7 14 43	7 18 14	7 22 09	7 24 06	.27	7.8	7 55		
			W. N	7 14 42	7 18 12	7 22 00	7 24 24	.08	6.4	7 57		
			W. E	7 14 42	7 18 12	7 22 04	7 22 38	.35	5.6	7 54		

# Manila Observatory, - Philippine Islands.

## Seismological Bulletin No. 11, c. November, 1911.

No.	Date	Character	Dist. (miles) and component	Beginning			Maximum range of motion			Remarks.		
				P.	S.	I.	Hour	A.	T.		F.	
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.		
289	24	I <sub>d</sub>	V.	12 41 52		12 42 03	12 43 25	.03	2.2	12 45	V. C. 0.01 mm.	
	26	At 2 <sup>h</sup> 03 <sup>m</sup> Eque., II at Tacloban (NE of Leyte).										
290	26	I <sub>d</sub>	V.	10 31 10		10 31 24	10 31 25	.08	2.4	10 34	V. C. 0.02 mm.	
291	27	I <sub>d</sub>	V.	21 32 13		21 32 19	21 32 20	.12	2.4	21 34	V. C. 0.03 mm.	
292	28-29	I	V.	23 52 04						0 40		
			W. E	23 51 27						0 32		
	29	At 20 <sup>h</sup> 24 <sup>m</sup> Eque., III at Aparri (NE of Luzon).										
293	30	I <sub>d</sub>	V.	13 54 28		13 55 00	13 55 08	.07	2.4	13 57	V. C. 0.06 mm.	

Strong pulsations from 9<sup>h</sup> of the 3<sup>rd</sup> to 12<sup>h</sup> of the 11<sup>th</sup> due to a wide barometric depression in the Pacific Ocean, which on the 6<sup>th</sup> reached at the least distance of 390 miles from the eastern coast of Luzon.

M. Sadava H.



# Manila Observatory.- Philippine Islands.

Latitude: 14° 34' 41" N.; Longitude: 120° 58' 33" E. Gr.

Time of the one hundred and twentieth meridian east of Greenwich. Midnight = 0<sup>h</sup>.

## Seismological Bulletin No. 12, a.

December, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion			F	Remarks
				P	S	L	Hour	A	T		
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.	
	2	At 2 <sup>h</sup> 40 <sup>m</sup>	Earthquake, III at Aparri (NE of Luzon).								
	4	At 16 <sup>h</sup> 56 <sup>m</sup> 35 <sup>s</sup>	Eqke., II at Butuan (N of Mindanao).								
294	5	I <sub>v</sub>	V.	12 26 04		12 26 50	12 27 05	0.02	2.4	12 29	Vertical Component 0.02 mm. Earthquake, IV at Aparri (NE of Luzon).
295	6	I <sub>d</sub>	V.	19 01 06		19 01 17	19 01 19	.16	2.4	19 04	V. C. 0.06 mm.
296	7	I <sub>d</sub>	V.			0 26 04	0 26 09	.03	2.4	0 28	V. C. 0.01 mm.
	8	At 3 <sup>h</sup>	Eqke., II at Butuan (N of Mindanao).								
	8	At 21 <sup>h</sup> 24 <sup>m</sup> 15 <sup>s</sup>	Eqke., III at Butuan (N of Mindanao).								
297	10	I <sub>d</sub>	{ V. W. N	5 07 33 5 07 32		5 07 47 5 07 48	5 08 11 5 08 12	.01 .01	2.4	5 14 5 14	V. C. 0.02 mm.
298	10	I <sub>d</sub>	V.	7 32 24		7 33 17	7 33 38	.08	2.4	7 38	V. C. 0.03 mm.
299	10	I	{ H WSW W. N	18 05 00 18 05 00						18 25 18 28	
			V.	19 07 06	19 14 53		19 32 06	.02	16		
			H NNW	19 07 08	19 15 00		19 32 37	.12	13.2		
300	11	I <sub>u</sub>	{ H WSW W N W E	19 07 08 19 07 10 19 07 10	19 15 03 19 15 06 19 15 24		19 32 00 19 32 36 19 31 47	.16 .09 .05	14.7 12 16		

# Manila Observatory. - Philippine Islands.

## Seismological Bulletin No. 12. b.

December, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion			F.	Remarks.		
				P.	S.	L.	Hour	A.	T.				
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.			
301	11	I <sub>r</sub>	V.	19 46 27		19 48 50	19 50 54	.01	7.2	20 38	V. C. 0.01 mm.		
			H. NNW	19 46 27						20 17			
			H. WSW	19 46 27							20 19		
			W. N	19 46 26		19 48 37	19 50 33	.06	9.6	20 27			
302	12	I <sub>v</sub>	W. E	19 46 26		19 49 00	19 50 54	.03	9.6	20 25			
			V.	0 05 01		0 05 31	0 05 36	.04	2.4	0 07	V. C. 0.02 mm. Epke., IV at Cuyo.		
303	13	I <sub>r</sub>	V.	17 05 09						17 33			
			H. NNW	17 05 08							17 31		
			H. WSW	17 05 08							17 33		
304	13	I <sub>d</sub>	W. N	17 05 02						17 34			
			V.	20 30 20		20 30 35	20 30 39	.02	2.4	20 33	V. C. 0.01 mm.		
305	14	I <sub>r</sub>	V.	6 37 42						7 03			
			H. WSW	6 37 42							7 15		
			W. N	6 37 44							7 06		
306	16	II <sub>v</sub>	W. E	6 37 44						7 21			
			V.	5 04 15		5 05 07	5 05 32	.80	2.4	5 15	V. C. 0.05 mm. Northeastern Luzon.		
			W. E	5 04 13		5 05 04	5 06 44	.37	5	5 18			
307	17	I <sub>u</sub>	V.	3 36 37?									
			H. NNW	3 36 37?									
			H. WSW	3 36 37?									
			W. N	3 36 00?									
			W. E	3 36 00?									

# Manila Observatory. - Philippine Islands.

## Seismological Bulletin No. 12 c.

December, 1911.

No.	Date	Character	Instrument and Component	Beginning			Maximum range of motion			Remarks		
				P.	S.	L.	Hour.	A.	T.		F.	
				h. m. s.	h. m. s.	h. m. s.	h. m. s.	mm.	s.	h. m.		
308	17	I <sub>u</sub>	V.	4 07 31?		4 25 24?	4 35 18	.01	18	5 28		
			H. WSW	4 08 53?		4 23 41?	4 35 26	.05	17	5 20		
			W E	4 07 00?		4 23 56?	4 35 20	.01	16.2	5 25		
309	18	I <sub>v</sub>	V.	20 04 38		20 05 28	20 05 49	.04	2.4	20 09	V. C. 0.02 mm. Northern Luzon.	
310	19	I <sub>d</sub>	V.	22 56 49		22 56 59	22 57 02	.05	2.4	22 59	V. C. 0.03 mm.	
311	20	I	H. WSW	14 00 50						14 50		
			W N	14 00 48						15 17		
312	22	I <sub>d</sub>	W. N	11 40 07		11 40 34	11 41 20	.01	3.2	11 45		
313	23	I <sub>d</sub>	W. N			7 56 00	7 56 42	.01	3.6	7 58		
314	30	I <sub>r</sub>	V.	17 11 14		17 15 34	17 16 17	.01	7.2	17 54		
			W. N	17 11 14		17 15 34	17 16 48	.01	7.2	17 45		
			W. E	17 11 14		17 15 56	17 18 10	.01	8	17 47		
315	30	I <sub>d</sub>	V.	23 04 42		23 05 19	23 05 57	.06	2.4	23 09	V. C. 0.02 mm.	
316	31	II <sub>r</sub>	V.	14 12 44	14 17 10	14 20 59	14 22 05	.03	12.2	15 26	V. C. 0.02 mm.	
			H. NNW	14 12 44	14 17 12	14 20 59	14 22 18	.19	10	15 22		
			H. WSW	14 12 44	14 17 08	14 20 56	14 22 07	.43	10.8	15 24		
			W. N	14 12 40	14 17 08	14 20 48	14 22 11	.04	9.2	15 31		
			W. E	14 12 40	14 17 12	14 20 57	14 22 00	.12	11	15 42		

M. Ladera M.