

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

O. H. TITTMANN, SUPERINTENDENT



RESULTS OF OBSERVATIONS MADE AT THE UNITED STATES
COAST AND GEODETIC SURVEY MAGNETIC OBSERVATORY
NEAR HONOLULU, HAWAII

~~1911 AND 1912~~

1903 - 1920

BY

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EARTHQUAKES.

In April, 1903, a Milne seismograph belonging to the Earthquake Investigation Committee of the British Association was transferred from Oahu College to the Magnetic Observatory mounted in a building constructed for the purpose near the north end of the Observatory grounds. All dirt and loose stones were removed so that the walls of the building, as well as the instrument pier, rest on the solid coral bed rock, about 2 feet below the surface of the ground. The walls are 16 inches thick, built of coral stone and mortar. The building is 14.5 feet, outside dimensions, with a vestibule 2.5 by 4 feet. The seismograph is mounted on a pier of broken stone and cement, which is fastened to the bed rock by means of iron bolts. The pendulum points north, thus recording east-west motion.

On most days there was an irregular disturbance, beginning about midnight or an hour or two later, and lasting up to the time of inspecting the instrument in the morning (8^h mean time), when it usually stopped abruptly. This disturbance is ascribed to the effect of air currents caused by falling temperature. It sometimes reached an amplitude of 0.5 mm, an amount sufficient to conceal small seismic disturbances and to confuse all but the principal portion of larger disturbances.

The following table contains the times of the principal phases of earthquakes recorded between April 1, 1903, and December 31, 1906. Most of these results have been published before, either in "Journal of Terrestrial Magnetism," June and December, 1905, "Circulars Nos. 14 and 15 of the Seismological Committee of the British Association for the Advancement of Science," but they are reprinted here in order to present them in a complete and continuous series.

The period of the pendulum has been kept between eighteen and twenty seconds, except for one or two short periods. The sensitiveness, i. e., the amount of tilt corresponding to a displacement of 1 mm. in the end of the pendulum, has varied from 0".3 to 0".4.

The table contains the times of beginning of first preliminary tremors, second preliminary tremors, and principal portion whenever they could be determined, the time of ending of the time and amount of the maximum displacement. The times are Greenwich mean time counted from midnight.

Register of earthquakes recorded at the Honolulu Observatory.

No.	Date	First P. T.	P. P.	Maximum	End	Amplitude	Remarks
	1903.	<i>h m</i>	<i>h m</i>	<i>h m</i>	<i>h m</i>	<i>mm</i>	
1	Apr. 3		9 50.0	9 51.6	9 55	0.7	Probably distant earthquake.
2	12	3 18.6	3 26.2	3 33.8		1.5	} Typical small earthquake. Two maxima. Second P. T. at 3:22.4.
				3 36.8	5 44	1.3	
3	21		9.24.1	9 26.6	9 30	0.5	Mere swelling of line.
4	29	0 16.8		0 43.9	1 41	0.4	Swelling.
5	29	4 18.4	4 31.4	4 34.3		0.5	} Three distinct maxima. Second P. T. at 4:25.9
				4 39.4		0.5	
				4 44.7	6 25	0.6	
6	May 8	4 12.6	4 21.9	4 24.4	5 36	0.8	Second P. T. at 4:18.9.
7	13	6 44.5	6 59.5	7 10.8	9 25	2.2	Second P. T. at 6:53.0.
8	15	11 57.3	12 04.1	12 04.7	12 58	1.1	
9	16		2 57.5		3 07	0.4	Swelling.
10	23	22 21.9	22 30.6	22 31.4	23 38	0.6	
11	June 2	13 25.8	13 31.3	13 32.3		1.9	} Typical large earthquake.
				13 36.8	15 12	4.4	
12	7	9 12.5	9 39.7	9 48.0	10 34	1.2	Second P. T. at 9:26.2.
13	8		7 20.4		7 42	0.3	Swelling.
14	10			17 06.2	17 39	0.8	{ Observer in room at beginning. Second P. T. at 16:59.7.
15	July 2	21 23.4	21 35.9	21 37.3		1.1	Second P. T. at 21:31.4. End indistinct.
16	Aug. 21	8 02.9		8 11.9	8 18	0.8	Doubtful.
17	Sept. 7	7 21.1			8 10	0.5	Record poorly developed.
18	10		10 55.5		11 01		
19	10		14 07.0		14 28	0.6	Swelling.
20	Oct. 4	5 06.2	5 10.2	5 17.6	6 04	0.5	

Register of earthquakes recorded at the Honolulu Observatory—Continued.

No.	Date	First P. T.	P. P.	Maximum	End	Amplitude.	Remarks
		<i>h m</i>	<i>h m</i>	<i>h m</i>	<i>h m</i>	<i>mm</i>	
21	1903. Oct. 17		1 46.3	1 51.8	2 17	0.5	Slight disturbance 2:36 to 2:42.
22	20	2 59.0	3 12.0	3 17.5	4 08	0.6	Second P. T. at 3:06.5.
23	29	14 29.2	14 42.0	14 53.1	16 08	1.5	Second P. T. at 14:37.1.
24	30	4 05.3	4 13.0	4 25.8	5 31	2.5	Slight disturbance 3:49 to 3:53.
25	Nov. 10	21 05.7	21 10.5	21 17.4	22 04	1.5	
26	17	20 37.3	20 55.3	21 01.3	21 31	0.5	Second P. T. at 20:43.8.
27	24	14 09.5	14 15.9	14 17.9	14 47	0.6	
28	Dec. 1	6 58.4	6 59.9	7 05.9	8 08	0.9	Beginning doubtful.
29	5	21 24.2	21 35.0		21 54		Swelling.
30	7		15 28.5	15 33.3		2.8	Beginning and end obscured.
31	10				19 29		Beginning obscured by air tremors.
32	23	1 11.9	1 17.3	1 22.5	3 01	3.0	
33	23	23 41.3	23 46.3		23 58		
34	24		21 31.3		22 11		Swelling.
35	28	3 08.3	3 29.1	3 38.5	4 30		Second P. T. at 3:17.3.
36	1904. Jan. 3		21 49.4	21 52.6	21 57	0.5	Swelling.
37	10	2 55.5	3 13.5	3 19.5	4 02	3.0	Second P. T. at 3:05.5.
38	20	15 04.2	15 14.1	15 16.7		1.6	} Typical earthquake. Two distinct maxima.
				15 31.3	17 41	4.4	
39	29	0 19.0	0 41.3	0 44.8	1 25	0.7	Second P. T. at 0:27.2.
40	Feb. 4	21 09.5	21 23.8	21 26.9			Beginning and end obscured.
41	8		5 47.5		6 11		Swelling.
42	18		6 15.2	6 19.8	6 26	0.5	Do.
43	Mar. 1	15 19.7	15 27.7	15 30.1		0.6	End obscured by air tremors.
44	1	16 23.4	16 31.1	16 36.5	17 00	4.0	
45	4		0 11.2		0 33		Swelling.
46	4	10 46.1	11 03.1	11 08.0	11 24	0.5	Do.
47	16		7 52.8	7 53.3		0.8	
				7 57.3		1.0	End obscured by air tremors.
48	16		22 08.8	22 10.3		0.6	
				22 12.8	22 35	0.6	
49	18	14 00.2	14 10.0	14 12.2	14 34	0.5	Swelling.
50	19	6 47.9	7 14.9	7 18.2	9 12	3.8	Typical. Second P. T. at 7:02.0.
51	21	7 09.4	7 10.4	7 14.1	7 50	0.5	Swelling.
52	31		3 02.4	3 10.9	3 40	0.6	Swelling. Beginning indistinct.
53	Apr. 4 ^a	10 39.5	11 04.5	11 32.0	12 53	1.6	Second P. T. at 10:51.8.
54	5	11 00.6	11 04.6	11 15.6	11 48	0.3	
55	12	18 59.6	19 04.4	19 07.4	20 43	2.3	Second P. T. at 19:01.4.
56	14	1 32.2	1 34.7	1 40.3	2 20	0.8	
57	May 1	15 52.0	16 05.4	16 09.6		3.0	Beginning and end indistinct.
58	1	23 42.8	23 55.1	24 00.1	24 30	0.8	
59	14		14 09.1	14 14.4		1.6	Beginning and end obscured.
60	June 4		22 58.5	22 59.0			Local; boom caught by spider web.
61	18	6 17.7	6 28.4	6 32.6	7 42	0.6	
62	24	1 20.4	1 28.4	1 33.9	2 25	2.0	Record indistinct.
63	25		2 41.9	2 50.5	2 58	0.3	Swelling.
64	25	21 08.8	21 15.4	21 15.8		2.6	Slight disturbance 20:13 to 20:24.
				21 18.9		2.0	
				21 21.0		2.0	
				21 22.8		2.5	
				21 27.8		11.4	
				21 32.2	25 03	5.9	
65	26	10 48.0	10 58.6	11 08.5	12 24	2.5	Second P. T. at 10:54.6.
66	27	0 09.8	0 23.1	0 24.7		2.0	Second P. T. at 0:14.6.
				0 29.1		3.0	
				0 30.4		4.9	
				0 31.9		10.1	
				0 37.4	4 00	14.0	
67	July 23	0 44.8		1 14.9	2 04	1.5	
68	24	10 59.8		11 10.3	12 14	1.0	
69	Aug. 8	23 10.3			23 41		
70	18	5 04.6		5 37.6	6 08	0.6	
71	24	21 10.7	21 26.3	21 38.3	24 10	3.0	Second P. T. at 21:19.5.
72	27	22 04.3	22 13.8	22 16.0	25 10	12.3	Second P. T. at 22:10.5.
73	30	12 07.6	12 29.6		12 54		Small. Second P. T. at 12:13.2.
74	Sept. 8	2 36.5		3 12.5	3 44	1.0	
75	11	6 16.1		6 40.3	7 05		Small.

^a Local earthquake at about 18:05. Instrument not recording at that time.