ANNUAL REPORT

OF THE

METEOROLOGICAL

AND THE

SEISMOLOGICAL OBSERVATIONS

MADE AT THE

INTERNATIONAL LATITUDE OBSERVATORY

OF MIZUSAWA

FOR

THE YEAR 1909.

LATITUDE 39° 8′ N., LONGITUDE 141° 7′ E.,

HEIGHT ABOVE MEAN SEA LEVEL 61 METRES.

PUBLISHED BY THE INTERNATIONAL LATITUDE OBSERVATORY
OF MIZUSAWA.

1910.

The present report contains the results of the meteorological and the seismological observations in the observatory during the year 1909. No alteration is done in the kinds and the methods of observations. The observations and the computations were done by Messrs. T. Ito. K. Aoki (till Nov.) and, T. Oyama (From Nov.) under the superintendence of Dr. M. Hashimoto.

The following are to be generally noticed with respect to the meteorological observations:

Hours of observations.—The *Japanese Central Standard Time* (mean time of the meridian 9^h east from Greenwich) is adopted.

Air Pressure.—The barometric readings in millimetres are reduced only to freezing point of water; the corrections to sea level and to standard gravity are given at the bottoms of the respective pages.

Air and *Earth Temperatures.*—The degrees are given in Centigrades.

Wind.—The velocity is expressed in metres per second. The direction is observed according to the sixteen cardinal points.

Cloud.—The amount is estimated by the scale 0–10, the forms are classified according to *Howard*, and the direction of motion is observed according to the eight cardinal points.

Tension of Water Vapour.—It is given in millimetres.

Relative Humidity.—It is given in percentages.

Precipitation.—The amount is given in millimetres. The number of days is counted only when the amount is 0.1 mm. or more in a day; but for those days with either snow, hail, or graupel, the amount is not taken into consideration.

Clear and *Cloudy Days.*—The mean amount of cloud is less than 2 exclusive for the former, and more than 8 inclusive for the latter.

Duration of Sunshine.—It is recorded by a sunshine-recorder of *Jordan's* pattern.

Amount of Ozone.—It is observed by means of *Sedan's ozonometer*, and is given in scale of 0–10.

Amount of Evaporation.—It is given in millimetres, the daily amount being, according to the instruction of the Central Meteorological Observatory in Tokio, that which results from 10^h a. m. of the preceding day till 10^h a. m. of the day in question.

The *occurrence of meteorological phenomena* is recorded with the following *international symbols:*

●	Rain	~	Glazed frost	C	Cirrus
*	Snow	⊣	Snow drift	CS	Cirro-stratus
K	Thunder storm	←	Ice crystals	CK	Cirro-cumulus
T	Thunder without lightning	⊕	Solar corona	KC	Cumulo-cirrus
<	Lightning without thunder	○	Solar halo	SC	Strato-cirrus
△	Graupel	Ψ	Lunar corona	SK	Strato-cumulus
▲	Hail	Ψ	Lunar halo	N	Nimbus
≡	Mist, fog	⸗	Gales	K	Cumulus
⌴	Hoar frost	⌒	Rainbow	KN	Cumulo-nimbus
⌓	Dew	⋓	Aurora	S	Stratus
V	Silver thaw	∞	Dust haze		

The *descriptions* of the *meteorological instruments* are found in the annual reports for the years 1902, 1904, and 1905.

The *seismological instruments* in use are two *Omori's horizontal pendulums,* of the same type as that described in p. 8 of No. 5, "Publication of the Earthquake Investigation Committee in Foreign Language," one serving to register the NS component, and the other the EW component, of seismological movements.

The *instrumental constants* are as follows:

	NS Component Apparatus	EW Component Apparatus
Period of free oscillation	30 seconds	30 seconds
Multiplication of the pointer	9 times	20 times
Weight of the heavy cylinder	6.5 kilograms	15.0 kilograms
Length of the horizontal strut	79 centimetres	40 centimetres
Vertical distance between the points of support and of suspension	109 centimetres	87 centimetres

The *time* adopted in the seismological observations is the Japanese Central Standard Time *reckoned from midnight.*

April, 1910.

H. Kimura, *Rigakuhakushi*
Director of the International Latitude Observatory of Mizusawa.

SEISMOLOGICAL OBSERVATIONS.

TABLE A.

(Earthquakes)

No.	Date 1909	Time of Occurrence † (NS)	Time of Occurrence † (EW)	Duration of Total Earthquake	Maximum Range of Motion (NS)	Maximum Range of Motion (EW)	Character of Motion	Intensity	Remarks
		h m s	m s	m	mm	mm			
1	January 3	17 00 08	— —	1.6	0.02	—	Quick	Feeble	
2	3	21 01 36	— —	2.7	0.03	—	,,	,,	
3	4	08 13 24	— —	4.0	0.06	—	,,	,,	
4	13	20–22 — —	— —	2.0	0.02	—	,,	,,	
5	16	16 57 59	— —	7.0	0.17	—	Slow	,,	
6	19	04 39 36	39 39	2.0	0.04	0.05	Quick	,,	Felt
7	23	11 — —	59 53	75.0	—	0.06	Slow	,,	
8	29	20 31 52	31 44	1.4	0.03	0.05	Quick	,,	
9	February 6	00 36 31	36 34	5.5	0.08	0.10	Slow	,,	
10	8	17 — —	00 13	4.4	—	0.02	,,	,,	
11	9	13 02 58	02 57	3.3	0.08	0.10	Quick	,,	
12	9	19 — —	14 02	3.0	0.01	0.01	Slow	,,	
13	22	18 — —	30 09	50.0	—	0.25	,,	,,	
14	March 6	03 07 41	07 42	2.6	0.02	0.06	Quick	,,	
15	9	15 25 46	25 49	3.8	0.04	0.04	,,	,,	
16	10	13 18 51	— —	2.8	0.07	—	,,	,,	Felt
17	11	08 — —	58 22	44.0	—	0.08	Slow	,,	
18	11	23 02 32	02 41	12.9	0.24	0.30	,,	,,	
19	12	05 29 01	29 19	13.0	0.62	0.66	,,	,,	
20	12	08 29 04	29 26	9.2	0.10	0.10	,,	,,	
21	12	09 22 03	22 17	11.1	0.11	0.10	,,	,,	
22	12	10 01 04	01 26	10.5	0.13	0.10	,,	,,	
23	13	03 34 01	— —	11.0	0.18	—	,,	,,	
24	13	08 14 49	— —	100.0	2.33	—	,,	,,	
25	13	11 36 43	36 38	10.7	0.28	0.25	,,	,,	Felt
26	13	23 30 01	30 01	44.0	—	—	Quick	Weak	Felt
27	18	07 — —	27 44	8.0	0.28	0.30	,,	Feeble	
28	19	17 53 10	53 15	10.3	0.06	0.04	,,	,,	
29	22	04 00 26	00 25	5.9	0.06	0.07	Slow	,,	
30	22	13 27 14	27 14	52.0	0.33	0.30	,,	,,	
31	23	05 — —	04 35	60.0	—	1.66	,,	,,	
32	23	09 47 35	47 34	4.8	0.02	0.02	Quick	,,	
33	23	13 08 46	08 24	3.7	0.02	0.02	Slow	,,	
34	23	20 46 07	46 09	2.3	0.02	0.02	Quick	,,	
35	28	16 27 47	27 47	6.9	0.07	0.07	Slow	,,	
36	29	06 24 53	24 53	1.6	0.10	0.20	Quick	,,	Felt
37	29	17 31 19	31 19	8.8	0.06	0.04	Slow	,,	
38	29	22 41 50	41 52	3.1	0.04	0.01	,,	,,	
39	30	01 12 42	12 44	5.8	0.04	0.03	,,	,,	
40	30	06 29 40	— —	4.6	0.04	—	,,	,,	
41	April 2	20 32 35	— —	8.5	0.10	—	,,	,,	
42	5	20 50 54	50 54	5.6	0.11	0.16	Quick	,,	Felt
43	10	14 38 30	38 22	50.0	0.02	0.34	Slow	,,	
44	11	3–4 — —	— —	—	—	—	,,	,,	
45	11	4–5 — —	— —	—	—	—	,,	,,	
46	11	04 39 05	39 20	47.0	0.09	1.35	,,	,,	
47	12	21 01 55	01 50	2.1	0.03	0.03	,,	,,	
48	15	04 58 47	58 47	24.0	0·12	0.13	,,	,,	
49	23	23 36 25	— —	1.8	0.02	—	Quick	,,	
50	24	20 19 13	19 09	6.0	0.07	0.07	Slow	,,	
51	25	13 32 32	— —	3.0	0.02	—	,,	,,	
52	27	21 — —	50 53	50.0	0.09	0.25	,,	,,	
53	May 2	07 01 21	01 25	10.9	0.12	0.07	,,	,,	
54	2	16 16 15	16 14	4.1	0.07	0.05	,,	,,	
55	4	13 13 19	13 17	4.0	0.03	0.02	,,	,,	
56	5	20 05 30	05 31	5.4	0.11	0.11	,,	,,	
57	20	11 — —	18 10	4.5	—	0.06	,,	,,	
58	20	15 — —	13 30	4.5	—	0.02	,,	,,	
59	29	08 31 18	31 19	2.2	0.16	0.16	Quick	,,	
60	31	13 07 51	07 54	7.5	0.30	0.34	,,	,,	
61	June 1	14 43 53	43 53	4.1	0.19	0.15	,,	,,	
62	4	03 50 18	50 18	96.0	1.28	1.82	Slow	,,	
63	4	21 48 00	— —	5.0	0.04	—	Quick	,,	
64	6	06 23 30	23 30	9.4	0.33	0.29	,,	,,	
65	8	15 — —	06 44	60.0	—	0.12	Slow	,,	

† Japanese Central Standard Time (9h east from Greenwich), reckoned from midnight.

TABLE A.

(Earthquakes)

No.	Date 1909	Time of Occurrence † (NS)	Time of Occurrence † (EW)	Duration of Total Earthquake	Maximum Range of Motion (NS)	Maximum Range of Motion (EW)	Character of Motion	Intensity	Remarks
		h m s	m s	m	mm	mm			
66	June 10	01 39 36	— —	2.0	0.06	—	Slow	Feeble	
67	14	00 48 39	— —	8.0	0.02	—	,,	,,	
68	18	02 — —	58 56	1.2	—	0.02	Quick	,,	
69	26	06 — —	42 56	3.3	—	0.02	Slow	,,	
70	27	16 — —	25 04	60.0	—	0.05	,,	,,	
71	29	04 46 37	46 37	2.7	0.03	0.03	Quick	,,	
72	July 3	05 55 33	55 34	19.0	0.77	0.78	Slow	,,	
73	8	00 59 14	59 14	11.9	0.08	0.08	,,	,,	
74	8	06 46 58	— —	18.6	0.08	—	,,	,,	
75	10	11 11 11	11 11	4.6	0.03	0.04	Quick	,,	
76	13	22 16 37	16 37	10.0	0.04	0.06	Slow	,,	
77	15	22 — —	10 22	3.0	—	0.02	Quick	,,	
78	17	12 41 29	41 25	10.8	0.27	0.23	Slow	,,	
79	17	19 55 33	55 30	4.5	0.03	0.02	,,	,,	
80	17	20 27 52	27 50	4.0	0.03	0.02	,,	,,	
81	18	00 28 30	28 31	7.0	0.04	0.04	,,	,,	
82	18	07 — —	49 53	2.6	—	0.01	,,	,,	
83	18	20 56 40	— —	6.3	0.11	—	,,	,,	
84	30	21 — —	02 44	12.0	—	0.09	,,	,,	
85	August 6	19 18 37	18 40	6.4	0.06	0.05	,,	,,	
86	8	1–2 — —	— —	40.0	—	0.02	,,	,,	
87	12	11 58 00	57 59	8.0	—	0.12	,,	,,	
88	14	15 32 14	32 13	63.1	1.00	1.32	,,	,,	
89	14	17 42 59	42 56	4.8	0.03	0.02	,,	,,	
90	15	13 54 43	54 45	6.5	0.14	0.15	,,	,,	
91	16	23 — —	29 59	8.0	—	1.27	Quick	,,	Felt
92	18	09 50 15	50 15	14.0	0.07	0.01	Slow	,,	
93	19	00 16 09	16 09	6.0	0.08	0.04	,,	,,	
94	20	19 57 40	57 55	3.9	0.02	0.02	,,	,,	
95	21	03 20 41	20 40	2.2	0.12	0.12	Quick	,,	Felt
96	22	17 08 54	08 53	3.5	0.03	0.05	,,	,,	
97	24	04 29 31	29 28	4.1	0.04	0.05	,,	,,	
98	24	12 51 19	51 18	8.3	0.16	0.15	Slow	,,	
99	24	13 46 19	46 22	6.0	0.03	0.03	,,	,,	
100	28	01 37 33	37 34	6.5	0.03	0.03	,,	,,	
101	29	19 33 15	33 19	13.6	0.03	0.02	,,	,,	
102	September 1	17 08 57	09 03	11.9	0.13	0.16	,,	,,	
103	7	11 11 43	11 42	15.0	0.11	0.10	,,	,,	
104	9	01 56 40	56 38	48.0	0.07	0.09	,,	,,	
105	11	03 12 16	12 18	6.6	0.04	0.04	,,	,,	
106	11	19 56 55	56 55	52.0	0.06	0.04	,,	,,	
107	12	00 35 18	35 19	7.4	0.04	0.04	,,	,,	
108	17	04 39 37	— —	23.5	2.52	3.60	,,	,,	Felt
109	18	18 57 55	58 02	6.7	0.04	0.03	,,	,,	
110	25	17 56 34	56 35	12.0	0.03	0.06	,,	,,	
111	October 1	08 — —	14 01	5.4	—	0.06	Quick	,,	
112	3	23 00 51	00 51	17.9	0.48	0.35	,,	,,	
113	4	01 00 11	00 15	4.1	0.02	0.07	,,	,,	
114	14	07 34 01	34 01	2.4	0.03	0.07	,,	,,	
115	27	00 52 55	52 48	1.7	0.08	0.13	,,	,,	
116	27	05 — —	24 00	3.5	—	0.03	,,	,,	
117	27	15 — —	45 27	3.0	—	0.06	Slow	,,	
118	28	09 59 06	59 09	3.9	0.03	0.07	,,	,,	
119	30	19 25 41	25 39	18.1	0.16	0.11	,,	,,	
120	November 10	15 16 08	16 07	22.8	3.11	2.38	,,	,,	
121	28	15 50 11	49 45	6.5	0.16	0.12	,,	,,	
122	30	08 — —	44 56	5.3	—	0.09	,,	,,	Felt
123	December 22	13 04 44	03 57?	6.1	0.04	0.04	,,	,,	
124	26	09 — —	42 24	1.8	—	0.02	,,	,,	
125	29	03 14 17	14 05	2.4	0.03	0.04	Quick	,,	
126	29	17 39 05	39 16	2.6	0.02	0.02	,,	,,	
127	31	16 36 26	36 26	3.0	0.02	0.03	,,	,,	

TABLE B.

(Pulsatory Oscillations)
EW Component.

Beginning			Ending			Maximum			
Date 1909		Hour	Date 1909		Hour	Date 1909		Hour	Double Amplitude
		h			h			h h	mm
January	1	5	January	3	13	January	2	10–15	0.02
	5	9		7	5		6	1– 3	0.01
							14–15	13– 1	0.03
	12	11		23	13		20	8–17	0.04
							22	4– 7	0.02
	24	15		28	18		26–27	8–13	0.04
	29	4	February	1	17		30	1–10	0.02
February	4	1		10	1	February	4–5	17– 1	0.03
							7	4– 8	0.01
	11	8		14	13		12	19–23	0.02
	15	9		18	19		17	20–23	0.01
	19	13		24	6		20	1– 7	0.02
							21	9–20	0.02
	25	17	March	4	19		28	13–20	0.03
March	5	8		9	3	March	7	2– 6	0.02
							11	17–20	0.01
	9	9		19	11		13–14	9– 1	0.03
							21–22	15– 3	0.03
	20	21		27	1		25	2– 5	0.02
							30–31	20– 3	0.01
	29	13	April	12	10	April	7– 8	13– 1	0.05
							11	1– 7	0.02
April	13	20		17	4		15	19–24	0.02
	19	8		22	7		20	10–14	0.02
	28	9	May	1	6		30	6–11	0.02
May	8	3		9	6	May	8	14	0.01
	15	1		19	22		17	18–23	0.02
	20	10		28	12		20	17–18	0.02
							26	14–19	0.02
	28	20		31	0		29	3– 5	0.01
June	5	23	June	6	20	June	6	2– 7	0.02
	9	15		10	22		10	1–11	0.02
	14	4		16	19		14	15–24	0.03
	20	1		22	3		20	12–16	0.02
	24	21		29	11		25–26	10– 2	0.01
	30	3	July	1	18		30	9–15	0.03
July	2	16		5	8	July	3–4	8– 2	0.01
	8	1		9	11		8–9	23– 2	0.01
	16	2		17	8		16	7–11	0.01
August	1	19	August	5	21	August	2	14–17	0.01
	9	23		13	7		10–11	18– 0	0.02
	17	14		18	8		18	1– 4	0.01
	18	19		22	10		19–20	20– 1	0.01
	29	5	September	2	11		30	18–23	0.01
September	5	1		6	2	September	5	11–15	0.01
	12	4		11	4		12	10–13	0.01
	15	7		17	9		16	17–21	0.01
	19	21		22	18		20–21	20– 2	0.01
	23	21	October	3	11		25	8–13	0.02
							28	14–21	0.01
October	5	1		8	0	October	1	4–12	0.02
	8	5		10	17		6	8–14	0.02
							8	19–23	0.01
	11	7		17	4		11	13–16	0.01
	26	20		28	13		27	2–11	0.03
November	4	5	November	6	7	November	4–5	22– 3	0.02
	9	2		16	9		10–11	15– 3	0.05
							13	3– 6	0.03
	17	2		29	4		18	7–12	0.02
							20–21	14– 4	0.01
							25	7–21	0.04
							30	6–11	0.02
	29	7	December	19	16	December	7	1– 8	0.01
							11	12	0.01
							14	7–14	0.02
December	21	19		28	17		22	5– 9	0.02
							24	2– 8	0.01