

ANNUAL REPORT  
OF THE  
METEOROLOGICAL  
AND THE  
SEISMOLOGICAL OBSERVATIONS  
MADE AT THE  
INTERNATIONAL LATITUDE OBSERVATORY  
OF MIZUSAWA  
FOR  
THE YEAR 1928.

---

LATITUDE  $39^{\circ} 8' N.$ , LONGITUDE  $141^{\circ} 8' E.$ ,  
HEIGHT ABOVE MEAN SEA LEVEL 61 METRES.

---

PUBLISHED BY THE INTERNATIONAL LATITUDE OBSERVATORY  
OF MIZUSAWA.

---

1929.

The present report gives the results of the meteorological and seismological observations made at this observatory during the year 1928. No alteration has been made in the nature and methods of observation. The observations and the calculations were made by Messrs. S. Satô, I. Kumagai, and G. Obata under the superintendence of Dr. T. Ikeda.

The followings are to be noted with respect to the meteorological observations:

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

*Air Pressure*.—The barometric readings in millimetres are reduced to the freezing point of water, the corrections to sea level and to standard gravity are given at the bottom of the page for each month.

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

\* *Wind*.—The velocity is expressed in metres per second. The direction was observed relative to the sixteen points of the compass.

*Cloud*.—The amount is estimated by the scale 0–10, the forms are those of the *International classification*, and the direction of motion is indicated relative to the sixteen points of the compass.

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

*Relative Humidity*.—is given in percentages.

*Precipitation*.—The amount is given in millimetres. In the total number of days only those, on which the amount is 0.1mm or more in the day, are reckoned. But all the days, on which snow, hail, or graupel fell, are included without reference to the amount.

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

*Duration of Sunshine*.—is recorded by a Jordan sunshine-recorder.

*Amount of Evaporation*.—is given in millimetres, for each day,—that is from 10h of the preceding day to 10h of the day in question, according to the instruction of the Central Meteorological Observatory in Tôkyô.

The heights of the meteorological instruments are as follows,

*Barometer*.—63.1m above sea level.

*Air temperature thermometer*.—1.7m above the ground,

*Anemometer*.—15.4m above the ground,

*Wind vane*.—16.6m above the ground,

\* Note: The wind velocity is measured by the Robinson anemometer. Since January first of the year 1925 a new factor for this instrument has been used. The ratio of new factor to the old one is 0.7/1.0.

In recording meteorological phenomena the following symbols are used:—

●	Rain	⊕	Snow drift	○	Cirrus
✕	Snow	←	Ice crystal	CS	Cirro-stratus
⌘	Thunder storm	⊙	Solar corona	OK	Cirro-cumulus
⊥	Thunder without lightning	⊕	Solar halo	KC	Cumulo-cirrus
⋖	Lightning without thunder	∪	Lunar corona	SC	Strato-cirrus
△	Graupel	∩	Lunar halo	SK	Strato-cumulus
▲	Hail	↙	Gales	N	Nimbus
≡	Mist, fog	∩	Rainbow	K	Cumulus
⌊	Hoar frost	∩	Aurora	KN	Cumulo-nimbus
⋈	Dew	∞	Dust haze	S	Stratus
⋖	Silver thaw	⊠	Snow lying	m	Wave cloud
~	Glazed frost	⌋	Ice Column in the ground	⌒	Zodiacal light

The descriptions of the meteorological instruments are found in the annual reports for the years 1902, 1904, 1905, 1910, and 1916.

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 EW component, and the other the NS component, of seismological movements.

The time adopted in the Seismological observations is *Greenwich Local Time*.

	EW Component Apparatus		NS Component Apparatus	
Period of free oscillation	16	seconds	36	seconds
Multiplication of the pointer	100	times	20	times
Weight of heavy cylinder	45.0	kilograms	17.6	kilograms
Horizontal distance of the centre of the cylinder from the point of support	} 20	Centimetres	} 75	Centimetres
Vertical distance between the points of support and suspension				

July, 1929

H. Kimura, *Rigakuhakushi*

Director of the International Latitude Observatory

in Mizusawa.

# SEISMOLOGICAL OBSERVATIONS







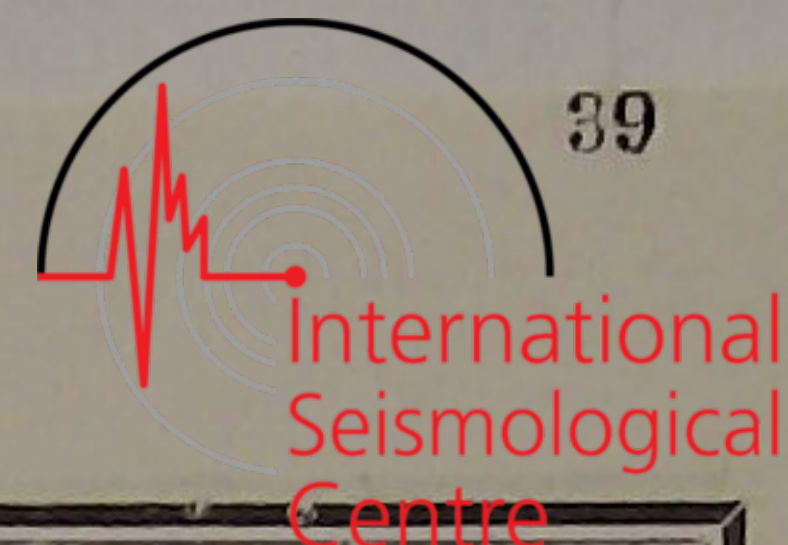




TABLE A. (Earthquakes)



No.	Date 1928	P				S				L				Duration of Total Earthquake (mean)	Maximum Range of Motion				Character of Motion	Intensity	Remarks
		E	W	N	S	E	W	N	S	E	W	N	S		E	W	N	S			
221	June 3	h	m	s	m	s	m	s	m	s	m	s	m	mm	mm	Slow	Feeble				
222	3	8	34	02	33.9	37	06	37	11	44	38	?	0.02	?	//	//					
223	4	9	?	?	—	?	—	—	—	—	—	?	0.01	—	//	//					
224	5	20	?	?	—	01	04	—	—	—	—	?	0.01	—	//	//					
225	5	5	?	?	—	58	32	—	—	—	—	?	0.01	—	//	//					
225	5	15	?	?	—	42	35	—	—	—	—	?	0.01	—	//	//					
226	5	19	37	54	?	38	20	?	—	—	—	4.7	0.05	0.03	//	//					
227	6	19	31	42	?	31	57	?	—	—	—	1.9	?	?	//	//					
228	7	6	17	56	—	18	20	—	—	—	—	2.4	0.01	—	//	//					
229	7	6	26	43	26	23	28	22	—	—	—	6.1	0.06	0.05	//	//					
230	7	23	06	41	?	07	06	?	—	—	—	3.3	0.02	0.01	//	//					
231	9	16	20	47	?	21	05	?	—	—	—	4.9	0.04	0.03	//	//					
232	11	9	?	?	—	07	34	—	—	—	—	?	0.01	—	//	//					
233	13	16	?	?	—	43	14	—	—	—	—	?	0.01	—	//	//					
234	13	21	?	?	—	?	—	—	—	—	—	?	0.01	—	//	//					
235	13	22	57	43	57	44	58	11	—	—	—	6.3	0.05	0.03	//	//					
236	14	13	08	18	?	08	42	08	38	—	—	?	0.09	—0.09	//	//					
237	14	16	54	20	—	54	47	—	—	—	—	?	0.02	—	//	//					
238	15	6	19	02	19	01	26	36	26	41	36	12	48.6	0.04	0.27	//	//				
239	15	17	22	50	22	47	27	34	27	34	31	11	33.3	0.04	0.20	//	//				
240	16	18	?	?	?	34	56	?	—	—	—	—	?	0.01	0.04	//	//				
241	16	18	?	?	?	41	57	?	—	—	—	—	?	0.01	0.05	//	//				
242	17	2	42	53	—	43	14	—	—	—	—	—	2.9	0.01	—	//	//				
243	17	3	?	?	—	38	12	—	—	—	—	—	?	0.01	—	//	//				
244	17	3	45	07	45	08	52	32	52	36	63	21	7.0	0.05	0.70	//	//				
245	17	6	?	?	—	52	21	—	—	—	—	—	?	0.01	—	//	//				
246	17	7	?	?	—	?	—	—	—	—	—	—	?	0.01	—	//	//				
247	17	18	?	?	—	24	35	—	—	—	—	—	?	0.01	—	//	//				
248	17	22	41	57	—	42	20	—	—	—	—	—	4.0	0.02	—	//	//				
249	17	23	21	09	—	21	36	—	—	—	—	—	3.5	0.01	—	//	//				
250	18	17	?	?	?	45	21	45	21	—	—	—	?	0.02	0.03	//	//				
251	20	6	?	?	—	10	31	—	—	—	—	—	?	0.01	—	//	//				
252	20	21	?	?	?	?	02	05	—	—	—	—	?	0.01	0.05	//	//				
253	21	11	—	—	?	—	08.7	—	—	—	—	—	?	—	?	//	//				
254	21	14	?	?	—	58.2	—	—	—	—	—	—	?	0.01	—	//	//				
255	21	16	?	?	?	?	42.9	57.6	52.3	—	—	—	?	?	?	//	//				
256	22	7	56.4	?	—	57	06	—	—	—	—	—	?	0.01	—	//	//				
257	22	12	?	?	—	54	11	—	—	—	—	—	?	0.01	—	//	//				
258	22	16	?	?	—	26	25	—	—	—	—	—	?	0.02	—	//	//				
259	25	15	?	?	—	49	24	—	—	—	—	—	?	0.01	—	//	//				
260	27	2	15.7	?	?	16	10	16.2	—	—	—	—	?	0.03	0.06	//	//				
261	27	18	17	18	17	18	17	51	17.8	—	—	—	3.4	0.03	0.03	//	//				
262	29	22	59.9	?	60.1	68	10	68	14	76	51	76	04	?	?	0.30	//	//			
263	30	22	?	?	?	28	28	28	29	—	—	—	—	?	0.05	0.05	//	//			
264	July 3	0	25	04	?	25	40	25	44	—	—	—	—	6.9	0.06	0.05	//	//			
265	3	1	19	41	—	20	13	—	—	—	—	—	5.1	0.02	—	//	//				
266	3	1	26	48	—	27	13	—	—	—	—	—	4.5	0.02	—	//	//				
267	5	7	53	14	?	53	49	53	50	—	—	—	3.6	0.04	0.03	//	//				
268	7	18	01	31	01	30	02	13	02	12	—	—	—	14.2	0.19	0.18	//	//			
269	8	11	31.3	?	—	31	47	—	—	—	—	—	?	0.01	—	//	//				
270	9	21	32	44	32	43	39.9	40	05	44	28	45	13	51.6	0.04	?	//	//			
271	10	20	?	?	?	41	33	?	—	—	—	—	?	0.01	0.02	//	//				
272	12	15	17	41	17	40	18	15	18	14	—	—	—	11.6	0.34	0.28	Quick	Weak	Felt		
273	14	7	59	49	59	48	60	08	60	07	—	—	—	6.0	0.19	0.24	Slow	Feeble			
274	17	19	48	25	—	48	47	—	—	—	—	—	2.8	0.01	—	//	//				
275	18	19	24	19	—	27	49	—	—	—	—	—	?	?	—	//	//				

**TABLE A.**  
*(Earthquakes)*


No.	Date 1928		P				S				L				Duration of Total Earthquake (mean)	Maximum Range of Motion				Character of Motion	Intensity	Remarks
			E	W	N	S	E	W	N	S	E	W	N	S		E	W	N	S			
276	July	28	h	m	s	m	s	m	s	m	s	m	s	m	mm	mm	Slow	Feeble				
277		31	17	31	37	—	—	31	59	—	—	—	—	3.1	0.01	—	//	//				
278		31	9	53	34	?	?	53	56	?	?	—	—	?	0.06	0.04	//	//				
279		31	10	19	17	?	?	19	37	?	?	—	—	?	0.03	0.05	//	//				
280	Aug.	1	19	29	02	29	02	29	23	29	21	—	—	11.7	0.69	0.45	//	//				
281		1	2	55	01	?	?	55	50	55	51	—	—	?	0.09	0.10	//	//				
282		1	23	?	?	—	—	41	36	—	—	—	—	?	0.01	—	//	//				
283		2	2	?	?	—	—	53	51	—	—	—	—	?	0.01	—	//	//				
284		2	3	10	47	?	?	11	09	?	?	—	—	?	0.04	0.06	//	//				
285		3	7	55	59	56	00	56	18	56	22	—	—	6.2	0.12	0.15	//	//				
286		3	13	40	49	?	?	41	09	?	?	—	—	4.9	0.02	0.03	//	//				
287		3	18	18.0	?	—	—	18	21	—	—	—	—	?	0.01	—	//	//				
288		4	15	?	?	—	—	?	?	—	—	—	—	?	0.01	—	//	//				
289		4	19	?	?	?	?	?	?	08	57	18	26	?	?	0.20	//	//				
290		5	14	48	03	?	?	52	58	52	56	—	—	?	?	?	//	//				
291		5	15	?	?	—	—	?	?	—	—	—	—	?	0.01	—	//	//				
292		5	22	?	?	—	—	30	35	—	—	—	—	?	0.02	—	//	//				
293		12	8	16	15	16	19	22	06	22	05	26	46	?	?	?	//	//				
294		14	8	26	57	?	?	27	36	?	?	—	—	4.8	0.02	0.04	//	//				
295		16	3	51	39	51	38	53	37	53	37	—	—	5.9	0.08	0.09	//	//				
296		16	16	44	57	44	54	45	14	45	11	—	—	?	0.78	0.90	Quick	Weak	Felt			
297		16	16	?	?	?	?	48	14	?	?	—	—	?	0.08	?	Slow	Feeble				
298		18	1	?	?	—	—	56	18	—	—	—	—	?	0.01	—	//	//				
299		18	14	?	?	—	—	03	46	—	—	—	—	?	0.01	—	//	//				
300		20	1	59	38	—	—	60	57	—	—	—	—	7.8	0.03	—	//	//				
301		21	12	47	06	—	—	47	29	—	—	—	—	3.7	0.01	—	//	//				
302		22	17	?	?	—	—	02	22	—	—	—	—	?	0.01	—	//	//				
303		22	23	16	56	—	—	17	19	—	—	—	—	4.0	0.01	—	//	//				
304		23	1	20	26	20	25	22	31	22	31	—	—	9.8	0.10	0.07	//	//				
305		23	21	?	?	—	—	?	?	—	—	—	—	?	0.00	—	//	//				
306		24	7	50	23	?	?	50	38	?	?	—	—	3.8	0.03	0.03	//	//				
307		24	21	53	16	53	15	61	06	61	06	—	—	?	?	?	//	//				
308		25	1	?	?	—	—	52	59	—	—	—	—	?	?	—	//	//				
309		26	0	03	53	—	—	04	03	—	—	—	—	2.8	0.02	—	//	//				
310		26	8	?	?	—	—	17	01	—	—	—	—	?	0.01	—	//	//				
311		26	13	?	?	—	—	31	45	—	—	—	—	?	?	—	//	//				
312		26	18	12	13	?	?	12	42	12	42	—	—	10.5	0.08	0.08	//	//				
313		27	18	00	25	?	?	01	39	?	?	—	—	5.1	0.02	?	//	//				
314		28	8	32	23	—	—	38	59	—	—	—	—	?	?	—	//	//				
315		29	4	?	?	—	—	10	37	—	—	—	—	?	0.02	—	//	//				
316	Sept.	30	6	36	17	—	—	40	32	—	—	45	10	?	0.01	—	//	//				
317		1	7	?	?	?	?	?	?	?	?	40	38	?	0.03	0.15	//	//				
318		3	4	34	08	?	?	34	49	?	?	—	—	5.0	0.02	0.04	//	//				
319		3	16	23	44	?	?	24	30	?	?	—	—	4.7	0.02	?	//	//				
320		4	17	14	11	?	?	14	28	14	27	—	—	3.4	0.04	0.04	//	//				
321		6	5	31	49	?	?	32	09	?	?	—	—	4.6	0.02	?	//	//				
322		6	6	29	04	29	03	29	26	29	25	—	—	17.1	0.55	0.46	//	//				
323		6	8	?	?	—	—	?	?	—	—	—	—	?	0.01	—	//	//				
324		6	9	36	37	—	—	37	07	—	—	—	—	3.6	0.01	—	//	//				
325		6	9	50	05	—	—	50	21	—	—	—	—	3.3	0.01	—	//	//				
326		6	12	56	11	—	—	56	27	—	—	—	—	3.2	0.01	—	//	//				
327		6	16	?	?	—	—	28	05	—	—	—	—	?	?	—	//	//				
328		6	19	15	11	?	?	15	26	15	25	—	—	?	?	—	//	//				
329		7	2	57	30	?	?	58	00	?	?	—	—	3.2	0.03	0.05	//	//				
330		7	3	?	?	—	—	?	?	—	—	—	—	6.0	0.02	0.06	//	//				
331		7	8	09	50	?	?	10	14	10	14	—	—	?	?	?	//	//				
332		7	8	09	50	?	?	10	14	10	14	—	—	4.1	0.02	?	//	//				



TABLE A.  
(Earthquakes)



No.	Date 1928	P				S				L				Duration of Total Earthquake (mean)	Maximum Range of Motion				Character of Motion	Intensity	Remarks
		E	W	N	S	E	W	N	S	E	W	N	S		E	W	N	S			
386	Dec. 7	h	m	s	m	s	m	s	m	s	m	s	m	s	m	mm	mm	Slow	Feeble		
		22	42	58	—	—	43	03	—	—	—	—	—	—	2.0	0.01	—	//	//		
387	10	9	16	02	16	00	16	24	16	25	—	—	—	—	4.1	0.13	0.15	//	//		
388	10	15	29	28	?	—	29	46	29	43	—	—	—	—	3.6	0.13	0.15	//	//		
389	11	18	?	—	—	—	32	10	—	—	—	—	—	?	0.01	—	//	//			
390	12	20	31	44	31	40	41	14	42.6	?	56	52	?	49.9	?	?	//	//			
391	13	20	06	53	06	57	07	49	07	52	—	—	—	—	7.9	0.10	0.10	//	//		
392	18	16	05	27	05.4	—	05	59	06	02	—	—	—	—	6.6	0.06	0.06	//	//		
393	19	4	?	—	—	—	45	53	—	—	—	—	—	?	?	—	//	//			
394	19	11	44	18	—	—	52	59	—	—	59	37	—	—	44.6	0.10	—	//	//		
395	19	15	19	50	—	—	22	53	—	—	—	—	—	—	8.3	0.07	—	//	//		
396	20	3	01	49	—	—	02	28	—	—	—	—	—	—	3.1	0.01	—	//	//		
397	20	6	49	19	—	—	49	58	—	—	—	—	—	—	4.9	0.02	—	//	//		
398	20	17	?	—	—	—	05	11	—	—	—	—	—	?	0.01	—	//	//			
399	21	1	41	36	—	—	42	26	—	—	—	—	—	—	9.0	0.14	—	//	//		
400	22	17	41	07	41	05	42	12	42	06	—	—	—	—	7.9	0.10	0.10	//	//		
401	22	21	?	—	—	—	10	51	—	—	—	—	—	?	0.01	—	//	//			
402	26	18	26	16	?	—	26	27	26	26	—	—	—	—	2.6	0.04	0.05	//	//		
403	28	13	?	—	—	—	26	21	—	—	—	—	—	?	?	—	//	//			
404	28	14	26	39	26	36	31	41	31	42	34	29	34	21	45.3	0.09	0.38	//	//		
405	29	13	?	—	—	—	43	39	—	—	—	—	—	?	0.01	—	//	//			

**TABLE B.**  
(Pulsatory Oscillations EW Component)

Beginning			Ending			Maximum				Double Amplitude
Date			Date			Date				
Month	Day	Hour	Month	Day	Hour	Day	Hour	Day	Hour	μ
January	2	1	January	3	9	2	17	2	21	
	6	21		8	11	6	13	7	16	3
	9	0		12	21	11	19	12	1	11
	16	13		17	5	16	19	16	23	6
	18	9		22	4	19	17	19	23	5
	24	1		24	13	24	5	24	8	6
	27	17		30	21	28	6	28	17	9
February	6	16	February	9	13	7	13	7	23	10
	14	16		16	5	14	21	15	5	25
	17	1		19	1	17	17	17	21	8
	23	13		26	17	24	6	24	11	8
	26	21		28	5	27	5	28	9	2
March	2	13	March	4	17	2	21	3	5	24
	10	13		14	5	10	21	11	5	14
	21	5		22	13	21	21	21	23	5
	25	21		26	21	26	6	26	13	12
	31	13	April	2	1	31	19	31	21	7
April	22	13		24	17	22	21	23	13	80
May	9	9	May	10	9	9	11	9	14	10
	16	14		17	9	16	16	16	23	4
	25	17		26	14	25	21	26	1	5
June	2	11	June	4	5	2	22	3	5	7
	13	9		15	1	13	17	14	1	8
	20	15		22	9	21	9	21	21	14
	25	1		26	1	25	5	25	9	6
	20	2	July	22	21	20	14	20	17	5
	25	14		26	17	25	21	26	1	4
	30	1	August	5	9	31	16	1	1	10
August	8	17		13	14	11	17	11	23	7
	17	21		21	11	20	5	20	9	6
	31	23	September	2	2	1	13	1	17	5
September	18	21		20	5	19	5	19	9	4
	24	9		26	9	25	5	25	17	12
October	6	21	October	10	1	8	13	9	3	20
	18	1		19	21	18	19	19	1	7
	29	5		31	1	29	21	30	1	7
November	2	9	November	4	13	?		4	1	11
	8	21		10	7	9	5	9	9	10
	14	21		17	9	15	21	16	10	5
	18	19		20	17	20	5	20	9	5
	21	9		23	21	22	9	22	17	10
	26	1		28	1	27	5	27	11	8
December	29	21	December	1	1	30	5	30	9	3
	3	5		7	9	3	15	4	1	18
	9	17		11	1	9	23	10	7	13
	15	19		18	1	16	2	16	10	10
	22	17		24	5	23	13	23	21	9
	29	1		30	21	29	6	29	13	7