

Interdiurnal Temperature Variabilities and Temperature Singularities in Japan

by

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(Received December 23, 1950)

As a climatological factor the mean interdiurnal temperature variabilities are computed as differences of the mean temperatures of two consecutive days and these differences averaged for each month. Some of the results are shown in Table I, where the interdiurnal temperature variabilities are given for Japanese representative stations for the ten years period from 1937 to 1946.

This table reveals a number of interesting details:

1) The mean interdiurnal variability of air temperature in winter is of the order of about 3°C in the central interior of Hokkaido (northern Japan), and decreases from there in all directions, to about $2^{\circ}\text{C}\sim 2\frac{1}{2}^{\circ}\text{C}$ on the coast of Hokkaido. The variability is naturally least in those districts which are most susceptible to marine influences, and greatest in the interior. The mean interdiurnal variability in summer is usually about one half of that in winter.

2) In Japan proper, the maximum interdiurnal variability is in early spring (March—April), which suggests a dependence of the interdiurnal variability upon the frequent progression of cyclone and anticyclone and the consequent occurrence of cold waves in spring. The mean interdiurnal variability in summer is usually about one half of that in spring. These results are quite different from those obtained by Dr. K. Nakamura.

3) Ordinarily the absolute value of the mean interdiurnal temperature change seems to increase with the elevation above sea level in the colder half of the year. For example, decidedly higher values of the interdiurnal temperature variation are observed on Mt. Ibuki compared to the nearby base station—Ibuki-Shunjō—in the colder half of the year.

The temperature singularities are also studied for some thirty stations in Japan. Fig. 1a is the mean annual course of temperature for Tokyo according to means derived from 71 years' (1875~1945) observations, and Fig. 1b is the mean annual course for Osaka according to daily means derived from 63 years' (1883~1945) observations. These curves are not smooth at all, but like saws with irregular teeth. To mention a few irregularities of this sort, there are peaks in mid February, at the beginning and 21st~22nd of April and there are drops, the signs of cold spells at about 20th of February, 7th and 24th of April. It should at least be mentioned that there is a correspondence between the maximum interdiurnal temperature variabilities and the marked peaks and drops of temperature singularities

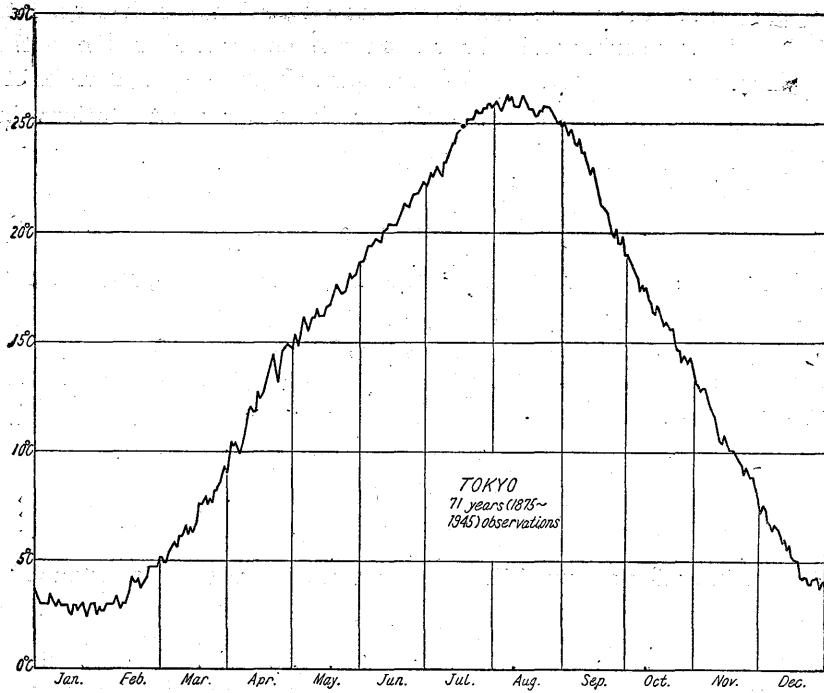


Fig. 1

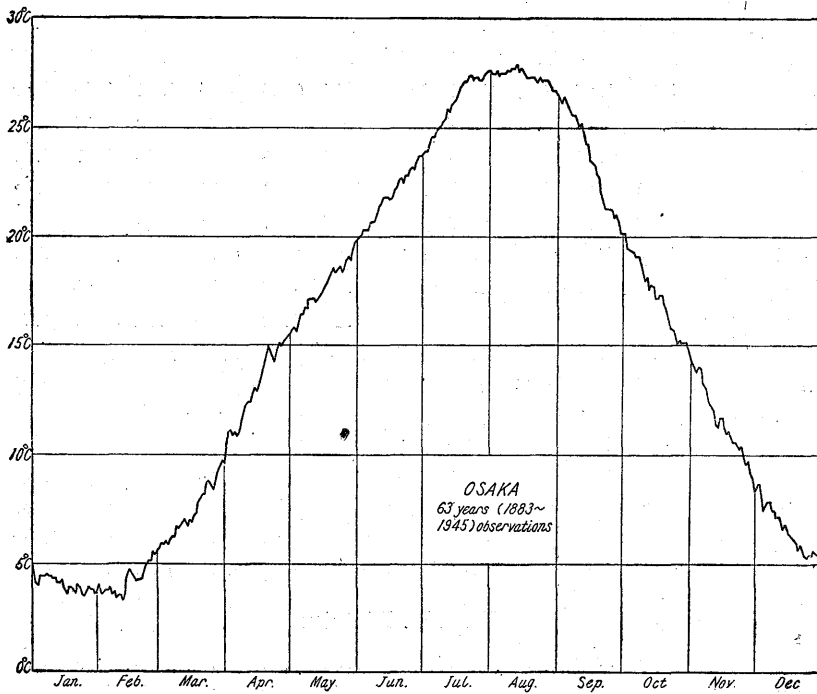


Fig. 2

in early spring and winter, which fact suggests a dependence of the large interdiurnal variabilities of early spring and winter upon the occurrence of the outbreaks of cold and warm air. It should also be mentioned that these singularities of weather are more likely to happen in certain calendar dates for most stations in Japan, simultaneously.

References

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- (3) T. OKADA: The Climate of Japan, Bulletin of the Central Meteorological Observatory, Tokyo, Vol. 4, pp. 168—169, 1931.

The mean interdiurnal variability of air temperature (°C) in Japan (1937—1946)

Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Kyushū District												
Makurazaki	2.05	2.12	2.16	1.79	1.35	1.07	0.70	0.74	1.01	1.46	1.67	2.28
Miyazaki	2.06	2.14	2.25	2.01	1.52	1.29	0.92	0.77	1.16	1.59	1.77	2.17
Kumamoto	1.93	1.86	2.02	1.91	1.48	1.17	0.88	0.85	1.24	1.46	1.62	2.03
Asosan	2.45	2.47	2.61	2.24	1.80	1.20	0.76	0.70	1.04	1.51	1.87	2.60
Ōita	1.83	1.95	2.31	2.16	1.60	1.25	1.06	0.84	1.26	1.57	1.67	1.93
Saga	1.62	1.69	1.78	1.75	1.39	1.20	0.88	0.77	1.12	1.29	1.47	1.69
Unzendake	2.23	2.25	2.25	2.16	1.72	1.15	0.77	0.73	1.01	1.48	1.76	2.35
Nagasaki	1.79	1.89	2.01	1.91	1.38	1.20	0.94	0.75	1.07	1.29	1.47	1.99
Tomie	1.92	1.98	1.93	1.71	1.25	0.99	0.76	0.73	1.01	1.25	1.60	2.09
Izuhara	2.04	1.92	1.83	2.02	1.61	1.27	1.04	0.81	1.14	1.41	1.76	2.20
Fukuoka	1.77	1.82	2.12	2.23	1.72	1.36	1.06	0.81	1.19	1.60	1.70	1.86
Iizuka	1.84	1.75	2.07	2.12	1.66	1.36	0.93	0.86	1.26	1.61	1.79	2.05
Chūgoku District												
Shimonoseki	1.61	1.55	1.58	1.57	1.21	1.02	0.83	0.75	1.01	1.21	1.41	1.66
Hiroshima	1.63	1.64	1.81	1.77	1.35	0.97	0.87	0.77	1.12	1.41	1.56	1.65
Hamada	1.88	1.89	2.26	2.35	1.71	1.29	1.18	0.85	1.29	1.61	1.74	1.94
Sakai	1.58	1.59	1.91	2.30	1.71	1.23	1.11	0.83	1.03	1.41	1.48	1.63
Shikoku District												
Kōchi	1.81	1.83	2.12	1.64	1.30	0.86	0.81	0.76	1.16	1.48	1.69	1.78
Tokushima	1.68	1.68	2.07	1.94	1.39	1.10	0.93	0.76	1.13	1.54	1.53	1.55
Uwajima	1.82	1.89	2.16	1.99	1.41	1.19	0.95	0.82	1.16	1.48	1.62	1.87

Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Matsuyama	1.72	1.75	1.90	1.88	1.43	1.17	0.97	0.84	1.17	1.40	1.63	1.88
Tadotsu	1.72	1.63	1.85	1.64	1.32	1.01	0.85	0.83	1.25	1.70	1.88	1.77
Kinki District												
Sunoto	1.57	1.63	1.91	1.95	1.45	1.20	0.97	0.73	1.03	1.43	1.39	1.56
Kobe	1.74	1.67	2.10	1.94	1.40	1.16	0.93	0.80	1.10	1.62	1.53	1.60
Toyouka	1.53	1.51	2.01	2.48	1.86	1.30	1.16	0.89	1.32	1.62	1.48	1.66
Osaka	1.56	1.49	1.88	1.80	1.43	1.17	0.92	0.81	1.15	1.57	1.62	1.55
Wakayama	1.63	1.61	2.09	1.98	1.43	1.06	0.93	0.85	1.19	1.57	1.61	1.63
Ōdaigahara	2.95	2.90	3.05	2.78	1.97	1.24	1.00	0.83	1.16	1.93	1.95	2.35
Kashihara	1.67	1.63	2.01	1.98	1.50	1.28	0.96	0.90	1.22	1.65	1.74	1.55
Kyoto	1.47	1.53	2.01	1.97	1.52	1.38	1.06	0.92	1.16	1.60	1.64	1.41
Miyazu	1.64	1.56	2.27	2.82	2.19	1.57	1.27	0.97	1.42	1.71	1.67	1.83
Hikone	1.44	1.40	1.71	1.89	1.39	1.23	0.93	0.84	1.12	1.58	1.69	1.43
Mt. Ibuki	2.11	2.38	2.76	2.75	2.07	1.49	1.03	0.81	1.18	1.71	1.82	2.02
Ibuki-Shunjō	1.52	1.69	2.27	2.37	1.67	1.44	1.06	0.91	1.31	1.76	1.88	1.68
Owashi	1.96	2.10	2.24	2.06	1.34	1.16	0.97	0.80	1.20	1.61	1.78	1.89
Tsu	1.68	1.60	1.71	1.78	1.43	1.27	1.03	0.83	1.06	1.48	1.58	1.61
Kameyama	1.65	1.67	1.77	1.75	1.47	1.31	1.03	0.86	1.08	1.44	1.64	1.56
Chūbu District												
Nishiura	1.51	1.42	1.60	1.52	1.20	1.14	0.96	0.77	0.99	1.32	1.59	1.42
Nagoya	1.59	1.53	1.80	1.85	1.40	1.37	0.97	0.83	1.02	1.38	1.45	1.41
Takayama	2.10	2.03	2.03	2.25	1.74	1.36	0.95	0.88	1.34	1.71	1.75	1.64
Hamamatsu	1.63	1.64	1.77	1.77	1.27	1.08	1.01	0.71	1.03	1.28	1.50	1.49
Mishima	2.19	1.92	2.24	2.03	1.54	1.15	0.99	0.77	1.25	1.65	1.84	1.97
Hakoneyama	1.86	1.98	2.38	2.21	1.70	1.21	0.98	0.76	1.23	1.67	1.89	1.73
Itō	1.88	1.83	2.23	2.37	1.85	1.58	1.25	0.97	1.37	1.64	1.76	1.82
Iida	2.05	1.85	2.01	1.97	1.72	1.52	1.09	0.91	1.21	1.69	1.89	1.86
Matsumoto	2.46	2.42	2.63	2.71	2.19	1.62	1.28	1.00	1.60	1.88	2.18	2.70
Nagano	1.64	1.78	2.33	2.69	2.29	1.42	1.23	1.00	1.47	1.77	1.84	1.57
Kōfu	1.62	1.62	1.89	1.97	1.60	1.30	0.96	0.89	1.36	1.69	1.66	1.44
Funazu	2.30	2.23	2.46	2.46	1.88	1.53	1.24	0.95	1.59	2.05	2.20	2.17
Tsuruga	1.50	1.66	2.23	2.71	2.10	1.67	1.29	0.95	1.39	1.80	1.89	1.66
Kanazawa	1.74	1.75	2.24	2.47	1.94	1.31	1.13	0.82	1.23	1.63	1.76	1.92
Wajima	1.76	1.70	2.13	2.80	2.14	1.31	1.14	0.97	1.38	1.97	1.96	1.93
Fushiki	1.57	1.62	1.98	2.40	1.89	1.32	1.14	0.93	1.14	1.58	1.70	1.76
Toyama	1.81	1.84	2.35	2.94	2.26	1.42	1.19	1.00	1.39	1.80	1.95	1.96
Takata	1.59	1.59	2.16	2.57	2.26	1.47	1.17	1.06	1.45	1.81	1.99	1.92
Niigata	1.38	1.33	1.78	2.20	1.95	1.30	1.06	1.00	1.33	1.70	1.68	1.57
Aikawa	1.95	1.80	2.32	2.71	2.26	1.53	1.17	1.10	1.40	1.77	2.14	2.14
Kwantō District												
Yokohama	1.59	1.58	2.08	2.29	1.77	1.32	1.18	0.87	1.45	1.71	1.77	1.61
Tokyo	1.35	1.52	1.96	2.18	1.80	1.38	1.19	0.92	1.47	1.62	1.65	1.34

Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Hachijo-jima	1.99	2.18	1.96	1.63	1.10	0.81	0.69	0.61	0.89	1.20	1.37	1.75
Tomisaki	2.28	2.22	2.52	2.07	1.46	0.96	0.82	0.77	1.37	1.84	2.19	2.33
Tateyama	2.46	2.30	2.59	2.40	1.66	1.13	1.00	0.84	1.48	1.92	2.23	2.71
Katsuura	2.24	2.20	2.47	2.10	1.54	1.01	0.95	0.76	1.30	1.83	2.09	2.22
Chichibu	1.63	1.63	1.94	2.22	1.85	1.45	1.29	1.00	1.44	1.73	1.77	1.46
Kumagaya	1.64	1.58	1.93	2.02	1.73	1.39	1.29	1.99	1.35	1.72	1.77	1.56
Maebashi	1.78	1.74	2.06	2.26	1.84	1.52	1.29	0.93	1.31	1.66	1.85	1.57
Ashio	1.98	2.11	2.25	2.33	1.93	1.25	1.19	0.98	1.39	1.80	2.05	2.02
Utsunomiya	1.74	1.80	2.07	2.22	1.77	1.29	1.21	0.91	1.39	1.83	1.82	1.63
Tateno	1.93	1.97	2.15	2.54	1.99	1.41	1.30	0.98	1.54	1.96	1.99	1.78
Tsukubasan (Base Station)	1.95	1.96	2.28	2.37	1.81	1.36	1.21	0.97	1.45	1.71	1.77	1.78

Tohoku District

Inawashiro	1.82	1.73	2.18	2.60	2.12	1.35	1.14	0.99	1.46	1.86	2.01	1.83
Fukushima	1.74	1.60	1.97	2.55	1.90	1.75	1.44	1.25	1.69	1.88	1.93	1.92
Sendai	1.70	1.61	1.93	2.28	1.76	1.31	1.29	1.03	1.48	1.79	2.06	1.86
Ishinomaki	1.88	1.73	1.78	1.99	1.56	1.23	1.22	1.11	1.41	1.82	2.12	1.87
Morioka	2.04	1.86	1.75	2.09	1.85	1.40	1.31	1.24	1.63	2.11	2.14	1.79
Akita	1.82	1.77	1.82	2.08	1.96	1.38	1.05	1.03	1.50	2.03	1.98	1.67
Aomori	1.98	1.90	1.67	2.01	1.70	1.30	1.28	1.09	1.27	1.93	2.01	1.87
Hachinohe	2.00	1.86	1.91	2.59	2.24	1.81	1.90	1.57	1.46	2.18	2.30	1.93

Hokkaidō District

Hakodate	2.15	2.01	1.82	1.76	1.42	1.24	1.19	1.27	1.40	2.14	2.43	2.33
Muroran	1.73	1.52	1.36	1.52	1.62	1.61	1.44	1.23	1.11	1.88	2.29	2.04
Urakawa	1.88	1.81	1.50	1.71	1.61	1.39	1.18	1.13	1.31	2.18	2.57	2.10
Asahigawa	3.32	3.07	2.32	2.00	2.11	1.78	1.46	1.49	1.55	2.23	2.25	2.56
Obihiro	3.10	3.05	2.02	1.93	2.09	1.94	1.80	1.74	1.53	2.12	2.27	2.55
Kushiro	2.53	2.39	1.81	1.39	1.30	1.22	1.33	1.38	1.44	2.26	2.38	2.43
Suttsu	1.85	1.61	1.51	1.67	1.70	1.35	1.15	1.12	1.11	1.88	2.23	2.17
Sapporo	2.19	2.06	1.74	1.79	1.97	1.49	1.26	1.36	1.34	2.28	2.45	2.18
Haboro	2.40	2.24	1.86	1.90	2.02	1.48	1.23	1.33	1.46	2.27	2.36	2.11
Abashiri	2.10	2.43	2.09	2.66	2.67	2.42	2.13	1.88	1.43	2.14	2.35	2.02
Nemuro	2.08	2.28	1.69	1.64	1.56	1.56	1.75	1.64	1.33	1.82	2.35	1.90