

## Local-climatological Study on the Heat Island Phenomena and its Factors in Ôme City, Tokyo

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**Local-climatological Study on the Heat Island Phenomena  
and its Factors in Ōme City, Tokyo**

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It is well known that the urban heat island phenomenon on urban area or the local circulation of mountain and valley wind have often occurred under the condition of anticyclone pressure pattern on weather map. But these themes have been treated in each individually from the viewpoint of a local-climatological study.

Therefore in this paper using data of our own meteorological field investigations, we tried to clarify the interaction between the heat-island phenomenon and the the local circulation over the Ōme city located on valley mouth settlement of Tama River in Tokyo.

The main results of this study are summarized as follows;

1. It is a tendency in the horizontal distributions of air temperature deviations that the relative warm area appears around Higashi-Ōme area as well as the south-eastern region along the JR rail way line, but in the other hand the cold area does in tea garden at the north-eastern part as well as along the Kasumi River in the north of Ōme. In addition these facts, the cold area also appears occasionally at the western valley area of Tama River.

2. Roughly speaking the regional difference in horizontal distribution of air temperature around Ōme city is coincident with the size of area in impermeable to rainfall.

3. It is recognized that at Higashi-Ōme near valley mouth the mountain wind blows from west direction during all night. By this reason around Higashi-Ōme the air temperature is low during clear night.

4. The westerly mountain wind from the upper stream of Tama River during night carries the relative warm air over urban district to leeward, that is, the east direction of Ōme City.

5. It will be able to point out that the formation of vertical air structure near the valley mouth of Ōme is constructed of difference three air flows: that is, the lower air equals to the inversion layer near ground, the middle air does the mountain wind and the upper air does the land breeze of more large scale, e.g. Kanto Plain.

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Keywords : local circulation, ground inversion, heat island,  
valley mouth settlement.

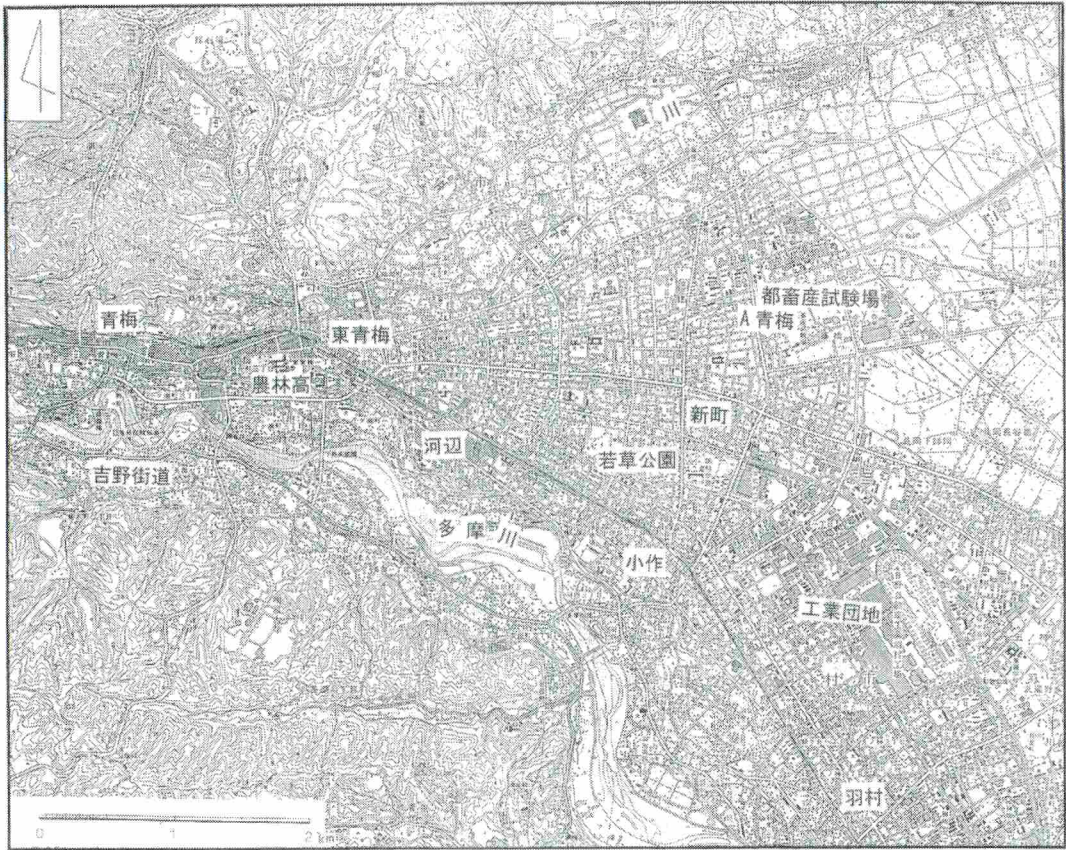


Fig.1 Observation area around Ōme City in Tokyo.

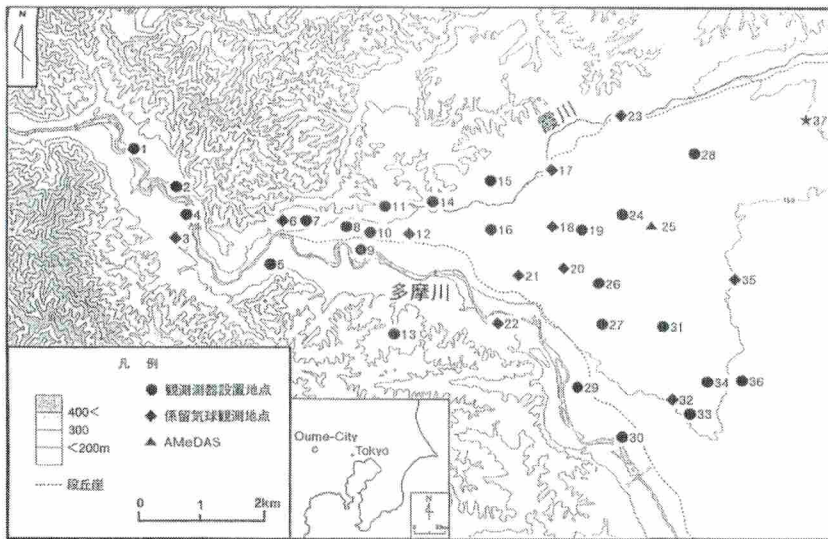


Fig.2 Distribution of our meteorological observation points around Ōme City.

- : fixed point observation, ◆ : station using balloon,
- ▲ : AMeDAS station of Ōme.

Tabel 1 Obsevation data and meteorological conditions.

	date & time		$\bar{x}$ of temp.		cloud amount		
			$\downarrow$	S.D.	$\downarrow$	W.D.	W.V.
1	1993.10.02	1940	18.4	0.892	8/10	ENE	1
2	1993.10.03	0120	16.5	0.599	10/10	CLAM	0
3	1993.10.13	0530	14.9	0.809	10/10	CLAM	0
4	1993.10.16	1630	15.0	0.514	10/10	CLAM	0
5	1993.10.16	1900	13.9	0.677	10/10	CLAM	0
6	1993.10.16	2245	14.0	0.895	10/10	CLAM	0
7	1993.10.17	0200	13.7	0.507	10/10	CLAM	0
8	1993.10.17	0430	13.6	0.431	10/10	CLAM	0
9	1993.10.17	0530	14.2	0.385	10/10	WSW	1
10	1993.10.17	0630	13.9	0.305	10/10	CLAM	0
11	1993.10.17	0730	14.7	0.363	10/10	CLAM	0
12	1993.11.05	1700	15.7	1.900	0/10	W	1
13	1993.11.05	1900	13.8	1.613	0/10	W	1
14	1993.11.05	2040	12.6	1.918	0/10	W	1
15	1993.11.05	2300	11.1	1.502	1/10	W	1
16	1993.11.06	0040	10.1	1.717	0/10	W	1
17	1993.11.06	0240	8.4	1.497	0/10	CLAM	0
18	1993.11.06	0440	8.0	1.696	1/10	W	1
19	1993.11.06	0640	8.7	1.634	1/10	W	1
20	1994.04.29	1340	22.3	0.548	4/10	ESE	3
21	1994.04.29	1600	23.2	0.671	4/10	ENE	2
22	1994.04.29	1830	20.1	0.971	4/10	N	1
23	1994.04.29	2040	14.8	1.293	4/10	SW	1
24	1994.04.30	0100	11.3	1.372	2/10	WNW	1
25	1994.04.30	0300	9.9	1.060	5/10	CLAM	0
26	1994.04.30	0530	9.4	0.910	8/10	CLAM	0
27	1994.05.28	1210	21.0	0.554	10/10	E	4
28	1994.05.28	1440	20.5	0.466	10/10	SE	2
29	1994.05.28	2000	19.2	0.744	10/10	CLAM	0
30	1994.05.28	2210	18.3	1.140	10/10	ESE	2
31	1994.05.29	0140	17.3	0.512	10/10	CLAM	0
32	1994.05.29	0440	16.7	0.481	8/10	CLAM	0
33	1994.05.29	0810	19.9	1.304	8/10	NNE	1
34	1994.08.04	1430	36.2	0.711	5/10	SSE	2
35	1994.08.04	1630	32.4	1.111	10/10	WSW	2
36	1994.08.04	1830	30.5	0.906	9/10	CLAM	0
37	1994.08.04	2210	28.3	0.783	9/10	CLAM	0
38	1994.08.05	0050	27.6	0.809	2/10	CLAM	0
39	1994.08.05	0450	26.2	0.794	7/10	CLAM	0
40	1994.08.05	1015	33.3	0.904	4/10	NE	1
41	1994.11.04	1800	11.8	1.049	1/10	CLAM	0
42	1994.11.04	2120	8.7	1.090	0/10	CLAM	0
43	1994.11.04	2320	7.7	0.999	3/10	CLAM	0
44	1994.11.05	0110	7.6	0.843	8/10	W	1
45	1994.11.05	0230	7.8	0.932	7/10	CLAM	0
46	1994.11.05	0500	6.5	0.961	0/10	CLAM	0
47	1994.11.05	0700	7.4	0.634	5/10	W	1
48	1995.08.23	1430	29.4	1.087	10/10	ENE	1
49	1995.08.23	1910	27.0	0.688	10/10	CLAM	0
50	1995.08.23	2250	24.3	0.575	10/10	CLAM	0
51	1995.08.23	0210	23.3	0.593	0/10	CLAM	0
52	1995.08.23	0500	22.7	1.546	3/10	SW	1
53	1995.08.23	0950	30.5	0.655	0/10	ENE	1
54	1996.02.04	1410	8.9	0.954	3/10	SE	3
55	1996.02.04	1720	5.0	0.891	4/10	SSE	3
56	1996.02.04	2010	0.9	0.841	8/10	W	1
57	1996.02.04	2340	-0.5	0.856	5/10	CLAM	0
58	1996.02.04	0310	-1.8	0.932	3/10	WNW	1
59	1996.02.04	0620	-1.4	1.142	2/10	W	1

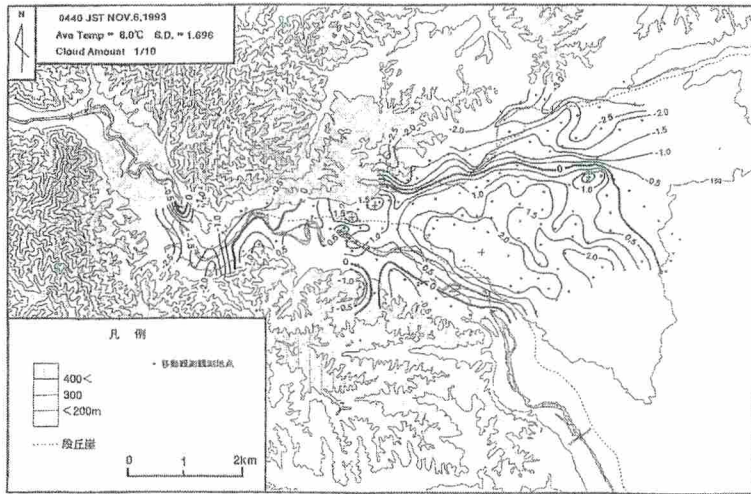


Fig.3 Distribution of air temperature deviations under the conditions of calm and clear night around Ōme City. (6,Nov.,1993)

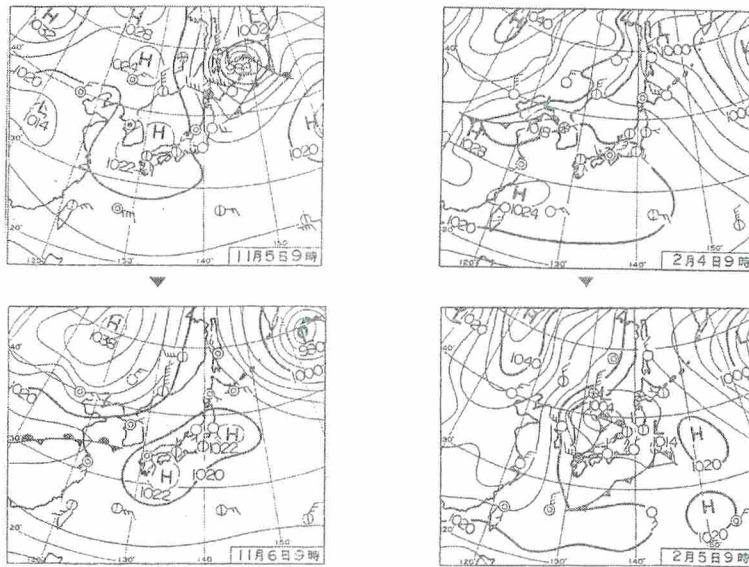


Fig.4 The weather maps of our own field research done. (upper : 5~6,Nov.,1993. lower : 4~5,Feb.,1996)

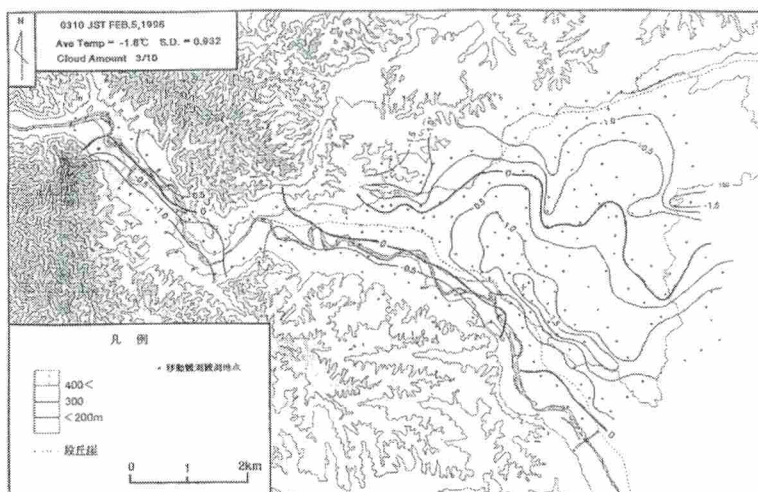


Fig.5 Distribution of air temperature deviations under the conditions of calm and clear night around Ōme City. (5, Feb., 1996)

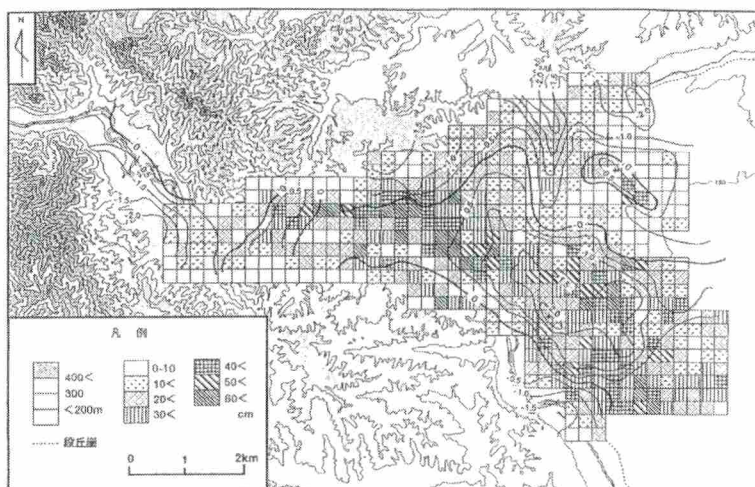


Fig.6 Relationship between  $Z_0$  values(=roughness parameter of W~E) and distribution of air temperature deviations. (5, Feb., 1996)

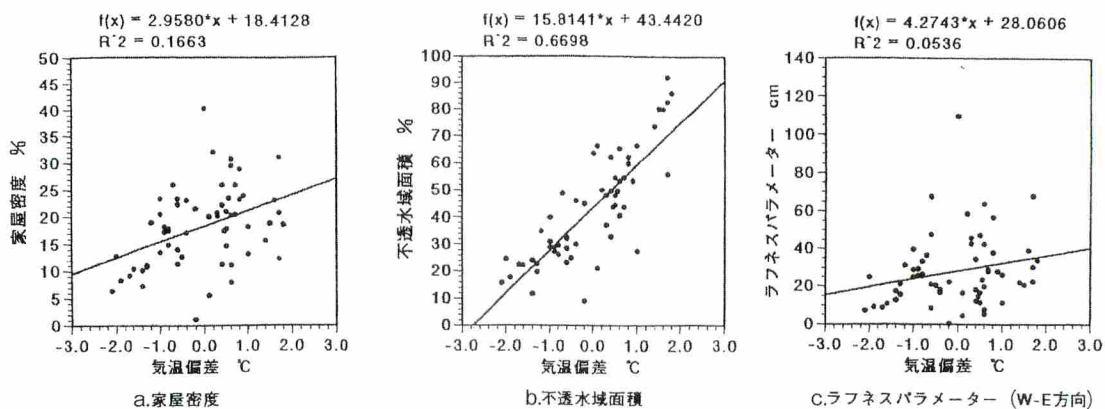


Fig.7 Relationship between air temperature deviations and some surface indices around Ôme City.  
 (a: density of house, b: size of area in impermeable, c: roughness parameter of W~E).

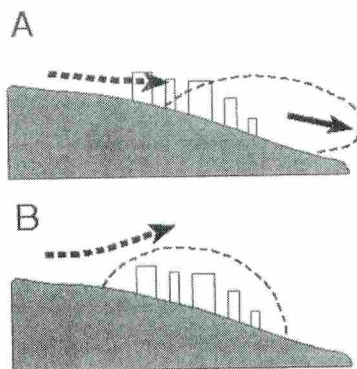


Fig.8 Model between the mountain wind blow and the heat dome on urban area of Ôme City.

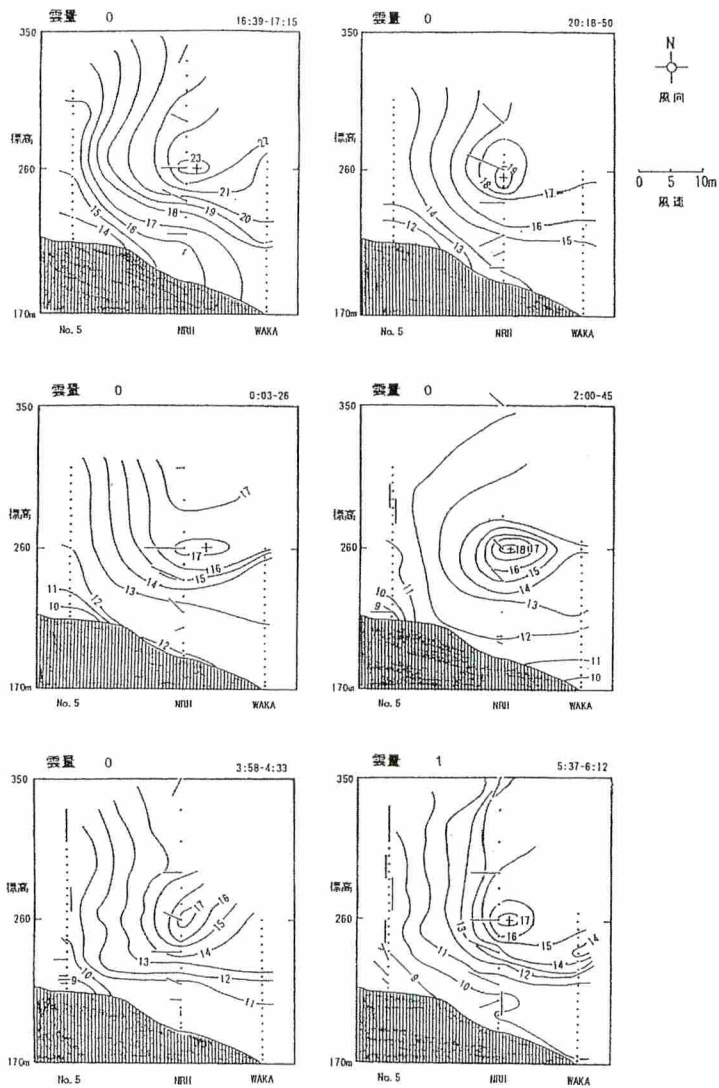


Fig.9 Vertical sections along the W~E direction of air temperature distribution and wind-direction & velocity in Ome City. (5~6,Nov.,1993)



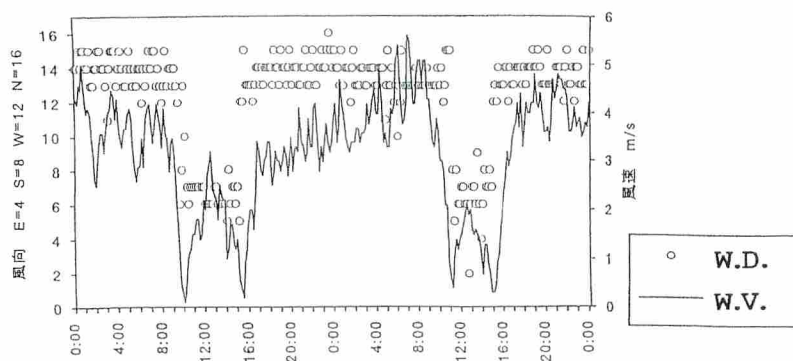


Fig.10 Temporal change of wind direction & velocity above rooftop level in the 6th Elementary School of Ôme City. (11~12,Nov.,1994)

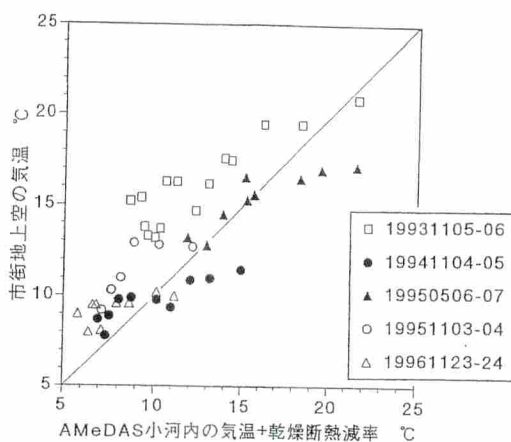


Fig.11 Relationship between air temperature over Ôme City and that of AMeDAS station at Ogôchi Dam site.

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