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Relationship between Heat Island Phenomenon and Land and Sea Breezes in Hiratsuka, Kanagawa Prefecture in Japan

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Key words : sea water temperture, land and sea breeze, heat-island, Hiratsuka City.

Abstract

It has been well known that not only the urban heat island phenomenon but also the local circulation of land and sea breezes has occured frequently under the synoptic condition of migratory anticyclone patterns or weak pressure gradient. From this viewpoint the authors have tried to clarify the interaction between those two above mentioned phenomena around Hiratsuka C., Kanagawa Pref. Our own meteorological observations, especially air temperature, humidity and wind, were carried out in and around Hiratsuka C. from Feb.2005 to Oct.2006. The observation stations using mainly instrument shelter at elementary school were shown in Fig.1.

The main results of this study were summarized as follows.

1. The sea breeze has tendency to blow strongly in the case of large difference between sea temperature and air temperature on land in sring or autumn season (Fig.2,3).

2. Judging from our own meteorological observation data which done during several months from Feb.2005 to Oct.2006, it is apparent that the relative high temperature area in the nighttime apears over the central part of urban. But in the daytime the relative high temperature area is gradually displaced to inland direction being coincident with sea breeze blowing except area behind the Oiso Hills located near the western coast(Fig.1 & 4).

3. When the sea breeze prevails in this area, the rising of air temperature is often disturbed with its sea breeze.

4. After sunset the changing time from sea breeze to land one has a tendency to delay in summer season in comparison with in spring or autumn season. By this reason the appearance of nocturnal heat island phenomenon will be delay slightly too in summer season.

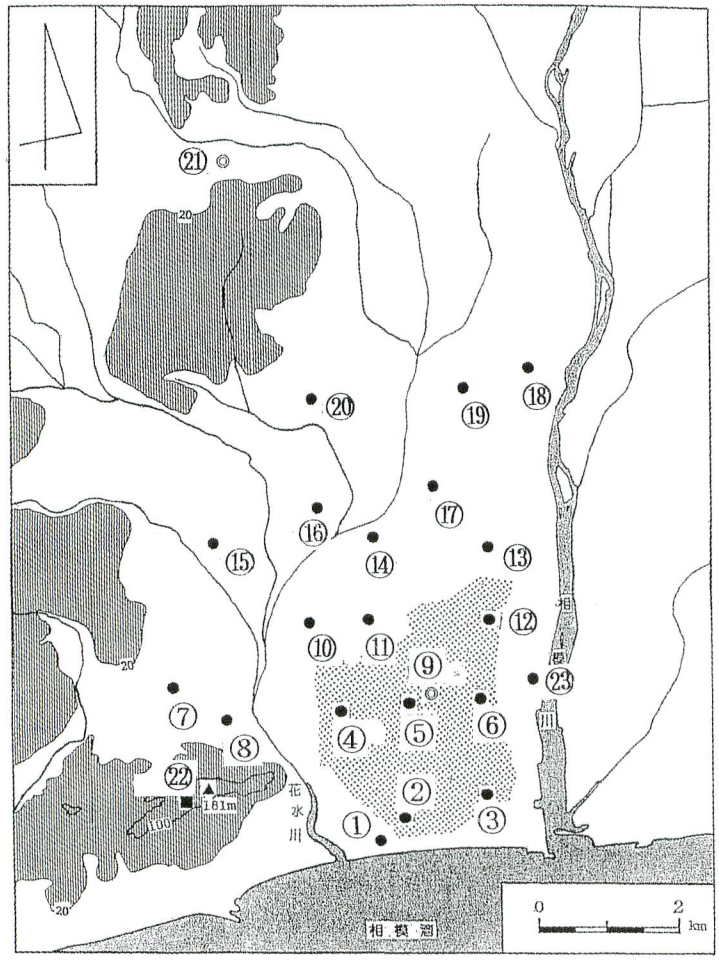

Fig.1 : Obsevation points in and around the Hiratsuka City.

① :NIED[～2008, 3]
② :Hanamizu E. S.
③ :Minato E. S.
④ :Fujimi E. S.
⑤ :Souzen E. S.
⑥ :Matsubara E. S.
⑦ :Asahi E. S.
⑧ :Yamashita E. S.
⑨ :Hiratsuka C. H.
⑩ :Nakahara E. S.
⑪ :Ohara E. S.
⑫ :Hachiman E. S.
⑬ :Ohno E. S.
⑭ :Matsugaoka E. S.
⑮ :Kaneda E. S.
⑯ :Toyoda E. S.
⑰ :Shindo E. S.
⑱ :Kanda E. S.
⑲ :Yokouchi E. S.
⑳ :Jogima E. S.
㉑ :Isehara C. H.
㉒ :Tower of TVK.
㉓ :The branch of MLIT

E. S. =Elementary School
NIED=National Reseach Institute for Earth Science and Disaster Prevention
C. H. =City Hall
MLIT=Ministry of Land, Infrastructure and Transport

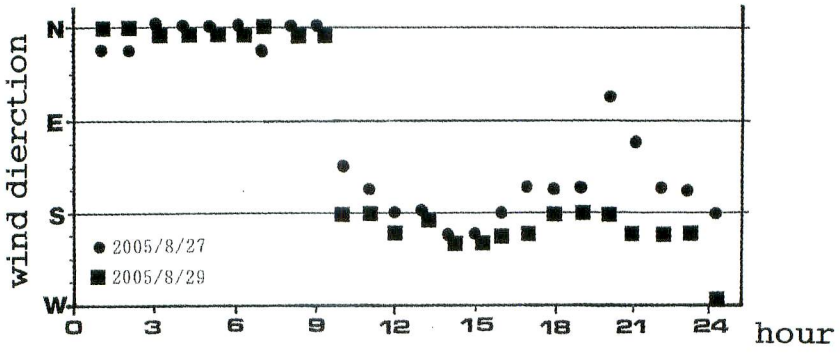

Fig.2 : Sea and land breeze variations of typical days at the point of TVK Hiratsuka Tower shown in Fig.1.

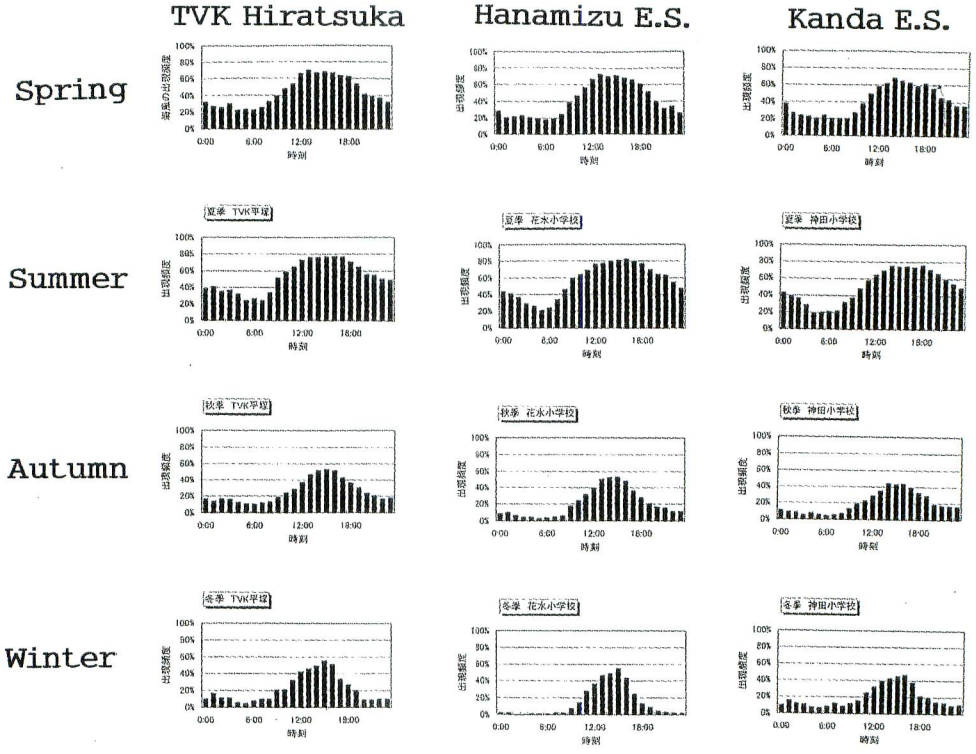

Fig.3 : Seasonal and hourly occurrence frequency of sea breeze (wind direction : SE~SW) at several points in the Hiratsuka City.

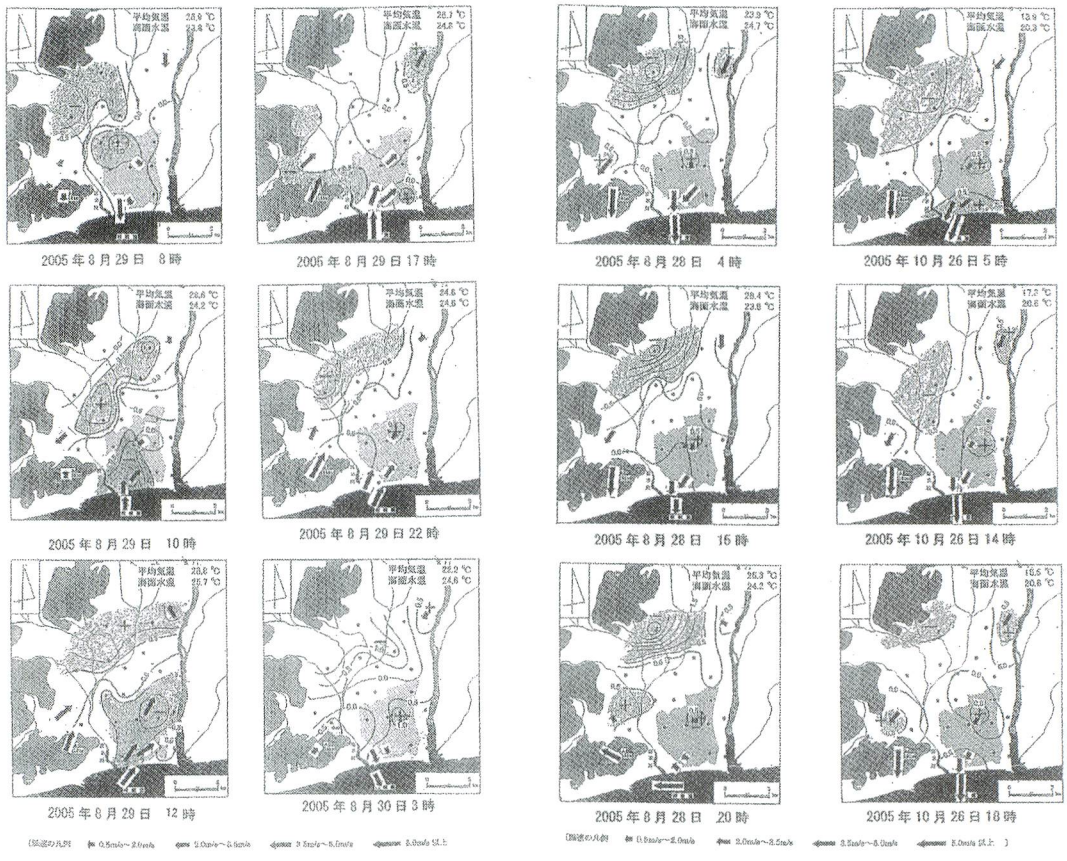

Fig.4 : Distribution of air temperature deviations in the cases of sea breeze days(left), no sea breeze days (right)as well as its diurnal variation in and around the Hiratsuka City.

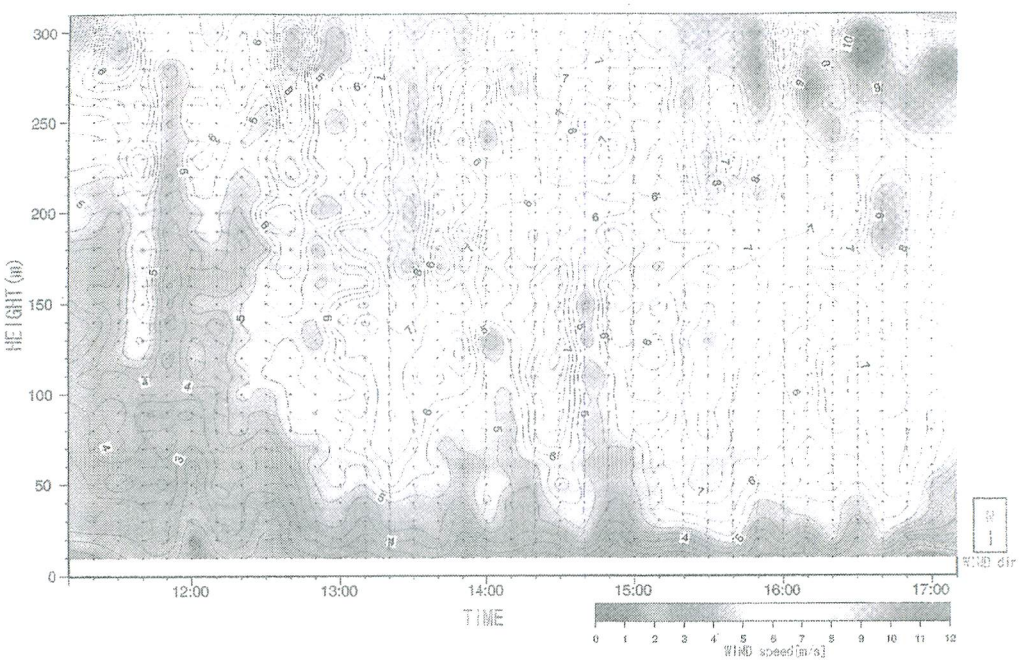

Fig.5 : Vertical and hourly variations of wind direction as well as wind velocity at Ohara E.S. using Doppler radar (1120～1700JST, 27, Mar., 2006)

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