8.1 OBSERVATION OF THERMAL EFFECT OF SHINJUKU GYOEN PARK

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1. Introduction

Urban climate brings the deterioration of urban thermal environment in summer. The existence of the green spaces is one of few measures against the deterioration of the urban environment as a cool island. There are uncertain points about the range of the influence of green areas. In this study, meteorological observation of Shinjuku Gyoen Park (9.1ha), which is one of the biggest green areas in the center of Tokyo, was done and the range of influence was estimated.

2. Measurement

The observation area of Shinjuku Gyoen Park and measurement points are shown in Fig. 1. The majority of the park consists lawn and the forest ground. Measured period was August, 15th to 18th, 1999. During the measurement, wind direction was for the south and it was constant.

We measured spatial distributions of temperature and humidity, profiles of ground temperature and surface temperature by infrared thermography. The measurement points of temperature and humidity were 23 (7 north side of the park, 10 in the park, and 6 south of the park) as shown in Fig 1.

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3. Results and Discussion

Fig. 2 shows the wind velocity of W2 point during the observation period. South wind blew mainly, and the wind velocity was relatively strong in the daytime compare to nighttime in nighttime for the observation period.

A cool island intensity was defined as difference of mean value of the temperature of urban points (S1,S2,S4,S6,N4,N5,N6,N7) and points inside the park (P7 is excluded). In Fig. 3, example of the cool island intensity variation is shown. There was a tendency that the intensity became strong from the morning to the afternoon on each day, and strength became weak in the early morning since nighttime.

The temperature distribution along the wind direction during low wind velocity is shown in Fig.4 and during high wind velocity is shown in Fig. 5. Advection from the park to the leeward urban area and the range of the influence was clearly indicated from the Figs.

In other analysis, at the center of the park, low soil temperature was observed, which indicates low temperature at the park for long-term trend. Heat balance calculations indicate that high sensible heat flux from the surrounding urban area and high latent heat flux from the park.

4. Conclusion

As a result, cool island effect of the park and cool air flow to the surrounding urban area were obvious. The influence is effective for the mitigation of heat island in summer.

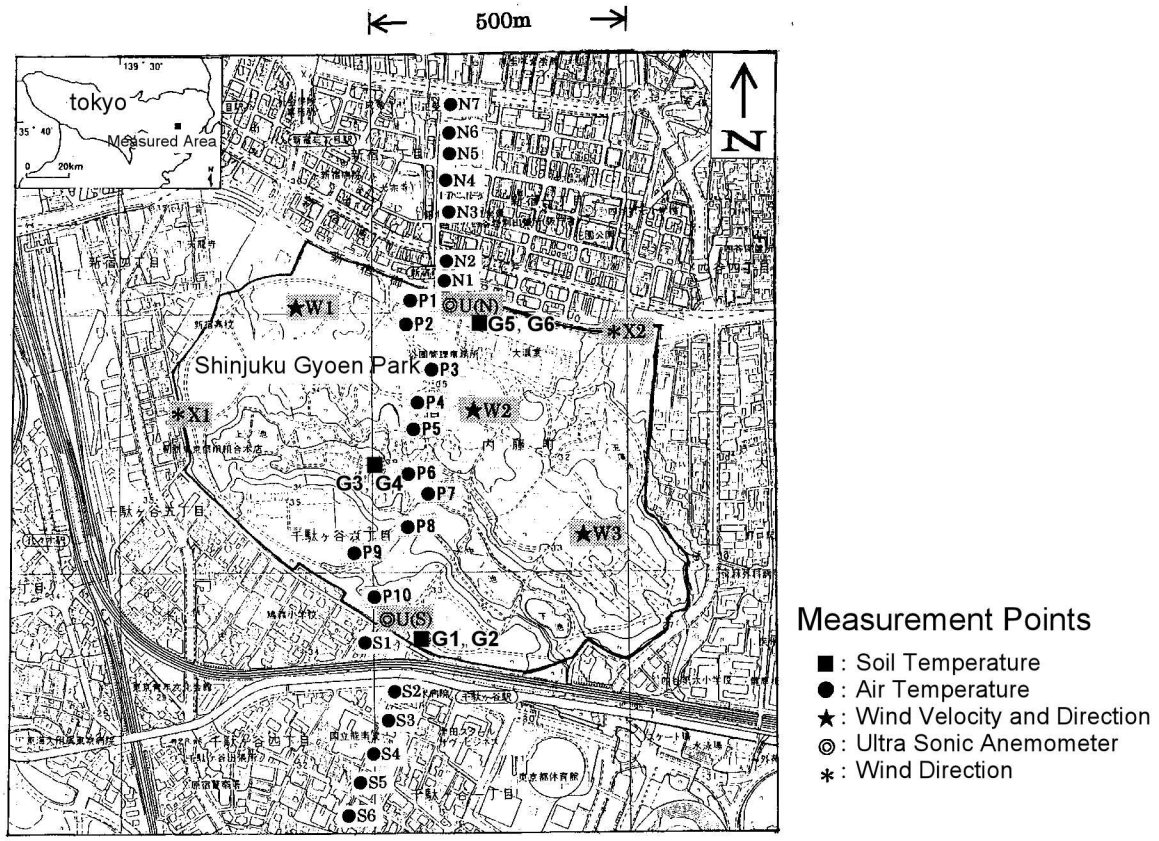

Fig. 1 Measurement Points.

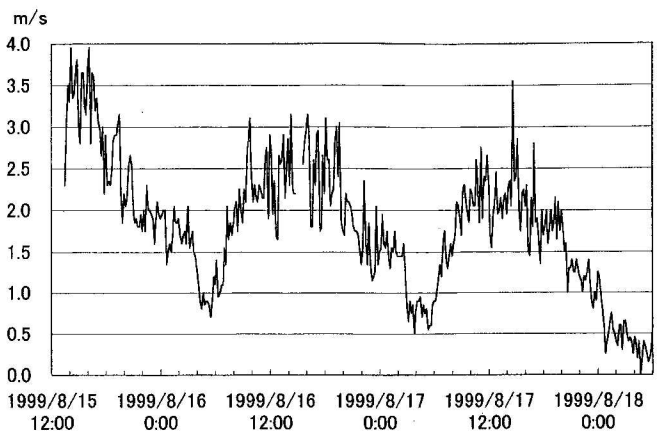

Fig.2 Wind Velocity During Measurement.

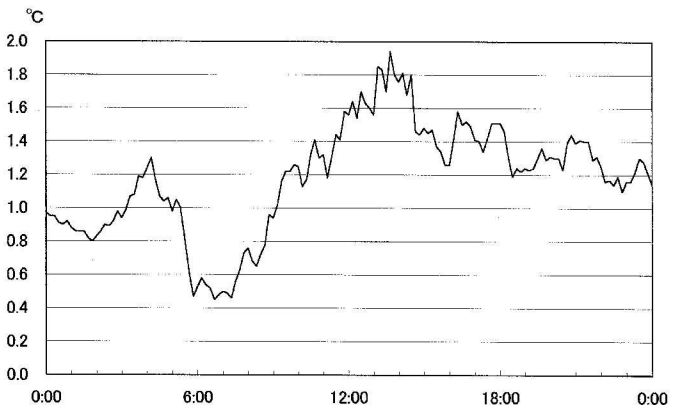

Fig.3 Diurnal Variation of Cooled Intensity. (Aug. 17th)

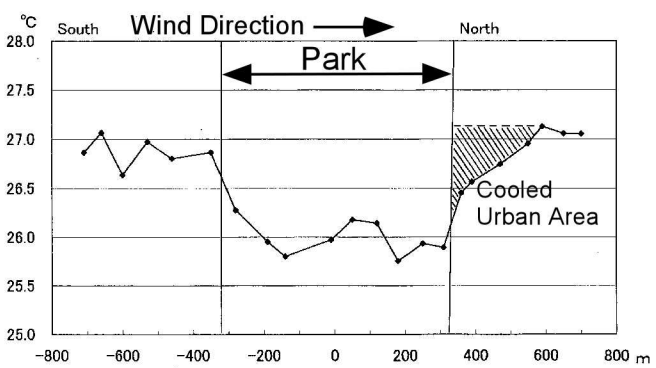

Fig. 4 Temperature Distribution During Low Wind Velocity. (0.5-1.0 m/s)

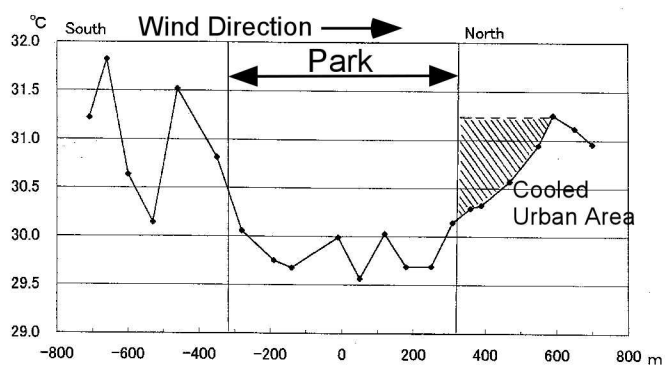

Fig. 5 Temperature Distribution During High Wind Velocity. (3.5-4.0 m/s)