

U022-P06

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Structure of nocturnal turbulent mixing in Tokyo

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Localized heavy rain is one of the serious atmospheric environmental issues in urban area. Some recent studies have indicated a possibility that vertical wind velocity is enhanced in the build-up area due to their large roughness and trigger localized heavy rainfall. However, the contribution of the building roughness on the turbulent process is not fully understood especially concerning the height of the mechanical mixing and its time-scale since the field observation has not been enough conducted.

In this study, Doppler lidar measurement was conducted in urban area to investigate the characteristics of the turbulent mixing process during nocturnal periods. The Doppler lidar developed by National Institute of Information and Communications Technology (NICT) is stationed on the rooftop of NICT's building at Koganei-shi, Tokyo.

Vertical distribution of the vertical velocity was measured above 150m from the ground. This experiment was carried out in February and October 2010. The horizontal wind and temperature profile were also measured by radiosonde during the same experimental period.

The timescale of the mechanical turbulence was about seconds to few minutes up to 300m from the ground, in which nocturnal jet has a maximum wind speed (neutral case). In case of the stably thermal stratification which extends from 100 to 300m at close to the ground, the mixing height cannot be explicitly determined from the turbulent signals obtained by the Doppler lidar measurement. These results indicate that the mixing height determined by the Doppler lidar measurement depends strongly on the meso-scale atmospheric condition.

In the presentation, a nocturnal turbulent mixing determined from the Doppler lidar measurement and that from the in situ sonic anemometer measurement at 60m on the NICT's tower are compared.

Keywords: nocturnal turbulent mixing, Doppler Lidar, roughness, urban