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Observation of the Diurnal Variation of Boundary Layer Height using Remote Sensors and Radiosonde in Tokyo

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Atmospheric environment in urban area has serious problems such as the heat island phenomenon and air pollution. The atmospheric boundary layer (ABL) height is one of the key parameters to predict the atmospheric environment near the ground (e.g., pollutant concentration, temperature, mean velocity fluctuation). However, the dynamics of development of ABL is still insufficiently understood in urban area. For example, a mesoscale weather prediction model results different ABL height if different schemes are used to simulate the evolution of the ABL height. Although it is necessary to validate the physical models of the ABL development in urban area, the data are also not sufficient. Therefore, we provide the observation of the ABL height in urban area. In National Institute of Information and Communications Technology (NICT), which is located in Koganei-shi, Tokyo, atmospheric condition have been observed by some instruments of remote sensing; which are the ceilometer, wind profilers, and Doppler lidar. The temporal evolution of the ABL in this region is estimated by different remote sensing measurements. We compare these measurements with radiosonde sounding that is carried out simultaneously with the observations of the remote sensing in winter.

Keywords: atmospheric boundary layer, urban climate, remote sensing, radiosonde