

Dual-Doppler lidar and helicopter measurements of horizontal convective rolls and streaks in sea-breeze layer

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Horizontal convective rolls (HCRs) are ubiquitous and common features in convective boundary layer. Many studies of HCRs were conducted by linear theories, numerical models, and observations. Large eddy simulation (LES) studies detailed the relation between HCRs and near-surface streaks that are formed in a moderately convective boundary layer. The wavelength and vertical extent of near-surface streaks are several-hundred meters. Their small scale has restricted the majority of studies to LESs rather than observations. Recently, it has been proved that a Doppler lidar has capability to detect streaks and measure some of their properties.

Dual-Doppler lidar and heliborne sensors were used to investigate the three-dimensional structure of the wind field over Sendai Airport from 18 to 19 June 2007. The three-dimensional structure of several-hundred-meter-scale HCRs and near-surface streaks in sea-breeze layer was observed by the dual-Doppler lidar in early afternoon on 19 June. The scale of the HCRs obtained by the heliborne sensors roughly agreed with that observed by dual-Doppler lidar. In presentation, we will present the spatial and temporal evolution of the observed HCRs and near-surface streaks.