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Verification of urban wind profile from KMA-LDAPS using doppler wind lidar over Seoul Metropolitan Area

Seon-Ok Hong, Do-Hyoung Kim, Jae-Young Byon, HyangSuk Park, and Jong-Chul Ha

Applied Meteorology Research Division, National Institute of Meteorological Sciences, Jeju, Korea, Republic Of (seonok0421@korea.kr)

Urban areas have different surface characteristics such as roughness length, airflow in urban canopies, and evapotranspiration compared with their rural surroundings due to human factors like high population density, traffic, and high-rise buildings. This characteristics showed difference wind profile in urban areas compared to rural area. Therefore, The application of realistic urban land cover and building information on numerical model has a significant impact on model performance of wind profile. Korea Meteorological Administration (KMA) is operating 1.5 km resoultion Local Data Assimilation and Prediction System (LDAPS) with International Geosphere-Biosphere Programme (IGBP) land cover in 1980s. We updated land cover data of LDAPS with the latest Environmental Geographic Information Service (EGIS) land cover of Ministry of Environment (ME), Korea. In this study, we verified vertical wind profile of KMA-LDAPS with IGBP and EGIS land covers using doppler wind lidar (Windcube 200) of Urban Meteorological Observation System in Seoul (UMS-Seoul). The doppler wind lidar has 100m-6000m observation range with 50m resolution located at Jungrang station in Seoul. The verification period is August and December of 2016, and the urban fraction of the Seoul metropolitan area increased from 6.1% to 21.9% when IGBP changed to EGIS. The simulated wind speed using EGIS land cover was lower than the simulation using IGBP and it was consistent with the wind lidar observations. Because the length of roughness in Seoul Metropolitan area has increased by updating EGIS land cover data. And the peak of the wind speed profile (Low Level Jet) moved to the upper layer.