Evaluations of NICAM over the Kanto area using intensive observations and the Joint simulator

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It is important to evaluate and improve the cloud properties in global non-hydrostatic models like a Nonhydrostatic ICosahedral Atmospheric Model (NICAM, Satoh et al. 2014) using observation data. One of the methods is a radiance-based evaluation using satellite data and a satellite simulator (here Joint simulator, Hashino et al. 2013), which avoids making different settings of the microphysics between retrieval algorithms and NICAM.

The satellite data with active sensors has a limitation to observe the specific case of cloud and precipitation systems. And it is needed to validate satellite observations using in-situ observation. There are intensive observation stations over the Tokyo area, whose domain size is 100 km×100 km. For examples, the High Spectral Resolution Lidar (HSRL, 355 nm), Doppler lidar, and the Cloud Profiling Radar (CPR, 94 GHz) are located in Tokyo. The WInd profiler Network and Data Acquisition System (WINDAS) data is available in Kawaguchiko, Mito, and Kumagaya. The ULTIMATE (ULTra sIte for Measuring Atmosphere of Tokyo metropolitan Environment) is proposed to verify and improve high-resolution numerical simulations based on these observation data. In this study, we simulated the three convective precipitation cases in September 2019 like a tropical cyclone and a frontal system. We evaluate the simulation results using the Joint simulator and discussed how to improve the microphysics using these observation data.