Enhancing Precipitation Prediction Algorithm by Data Assimilation of GPM Observations

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In precipitation science, satellite data have been providing precious, fundamental information, while numerical models have been playing an equally important role. Data assimilation integrates the numerical models and real-world data and brings synergy. We have been working on assimilating the GPM data into the Nonhydrostatic Icosahedral Atmospheric Model (NICAM) using the Local Ensemble Transform Kalman Filter (LETKF). We continue our effort on “Enhancing Precipitation Prediction Algorithm by Data Assimilation of GPM Observations” funded by JAXA, following successful completion of the 3-year project titled “Enhancing Data Assimilation of GPM Observations” from April 2016 to March 2019. The project first started in April 2013 on “Ensemble-based Data Assimilation of TRMM/GPM Precipitation Measurements”, where we developed a global data assimilation system NICAM-LETKF from scratch. This presentation will provide a summary of the past 7-year effort with more emphasis on the recent achievements, including JAXA’s near-real-time analysis called NEXRA (NICAM-LETKF JAXA Research Analysis) and new theoretical developments of Local Particle Filter to treat highly non-Gaussian distributions of precipitation variables in data assimilation.