Model Parameter Estimation with Data Assimilation Using NICAM-LETKF

*Shunji Kotsuki[1], Yousuke Sato[2], Koji Terasaki[1], Hasashi Yashiro[1], Hirofumi Tomita[1], Masaki Satoh[3], Takemasa Miyoshi[1]

1. RIKEN Center for Computational Science, 2. Graduate School of Engineering, Nagoya University, 3. Atmosphere and Ocean Research Institute, the University of Tokyo

This study aims to improve forecasts of numerical weather prediction (NWP) models by optimizing model parameters with data assimilation. Kotsuki et al. (2018a, JGR) succeeded in improving global precipitation forecasts at 112-km-resolution NICAM (Nonhydrostatic ICosahedral Atmospheric Model) by estimating a parameter called B1 of Berry (1967)' s large-scale condensation scheme using satellite-observed precipitation data and the Local Ensemble Transform Kalman Filter (LETKF).

Extending the previous study, this study explores to improve the forecasts further using other satellite observations. This study estimates the parameter B1 as a global-constant parameter with cloud liquid water (CLW) data observed by GCOM-W/AMSR2. The parameter estimation successfully reduces excessive bias in CLW although precipitation forecasts are degraded. In addition, this study extends to estimate spatial distributions of the B1 parameter. The spatially-varying B1 parameter shows the best agreement to the spatial pattern of observed LWP. This presentation will include the most recent progress up to the time of the meeting.

Keywords: Model Parameter Estimation, Large Scale Condensation, Ensemble Kalman Filter, Liquid Water Path, Radiation Budget, NICAM-LETKF

