Contribution ID: **62** Type: **Oral presentation**

Dual-frequency precipitation radar (DPR) for NWP data assimilation

Tuesday, 4 February 2020 11:00 (25 minutes)

A reflectivity data assimilation technique has been developed to enhance GPM/DPR assimilation in JMA. The data assimilation method is hybrid-4DVar using flow-dependent background-errors estimated from ensemble perturbations. This 4D-Var includes TL/AD of 3-ice cloud microphysics scheme as a strong constraint. In the TL of cloud microphysics scheme, the perturbations of thermodynamic variables were ignored and some approximations to prevent numerical divergence was implemented. As a result, the TL became possible to predict the linear-perturbation of hydrometeors while maintaining the practically sufficient accuracy during the 3-hour assimilation window in the system.

In addition, a radar simulator as observation operators has been developed. A function to simulate the melting layer and an artificial noise-filter to reproduce the detection limit of radar were implemented into the simulator. Using the radar-simulator and RTTOV, we verified the predictions of the operational regional NWP model of JMA called MSM against GPM satellite observation data. Compared to DPR, the amount of rain in the lower troposphere was underestimated, and compared to GMI using RTTOV-SCATT, the amount of cloud ice was further underestimated. We found that the reasons for the underestimation were due to the large evaporation rate of rain and the large conversion rate of cloud ice into snow. These errors were successfully reduced by revision to the PSD for rain and the conversion methods between water species. This improvement has a large impact not only for the nonlinear model forecasts but also for the TL predictions for hydrometeors.

In the presentation, I would like to demonstrate the impact of assimilation for GPM in the system including the modifications mentioned above.

Primary author: IKUTA, Yasutaka (Japan Meteorological Agency)

Presenter: IKUTA, Yasutaka (Japan Meteorological Agency)

Session Classification: Session 1b: Emerging observations

Track Classification: 4th workshop on assimilating satellite cloud and precipitation observations for NWP