S4-02

Deep learning-based data assimilation using multi-source data

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Data assimilation (DA) improves the accuracy of numerical weather prediction by enhancing the initial field through fusing multi-source data. However, the existing DA approaches, such as Ensemble Kalman Filter (EnFK), requires lots of computing cost and various prediction models. To efficiently integrate the multi-source information, deep learning-based DA was proposed in this study. The Korean Integrated Model (KIM), GEO-KOMPSAT-2A (GK2A) AMI Atmospheric Profile (AAP) and radiosondes from NOAA Earth System Research Laboratories (ESRL) were utilized for the deep learning-based DA. The study area was East Asia, and DA was conducted every six hours. The DA for temperature and humidity at 250, 500, 850 hPa were conducted and evaluated using radiosonde observations. Temperature RMSEs for each level were 1.3591, 1.3678, and 1.6970 K, and humidity RMSEs were 27.6481, 23.9571, 20.3274 %. It achieved ~10% improvement comparing to GK2A AAP retrievals and comparable performance comparing to KIM forecasts.