

Two-year analysis experiments with NICAM-LETKF

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We applied the Local Ensemble Transform Kalman Filter (LETKF) to the Non-hydrostatic ICosahedral Atmospheric Model (NICAM). Observation operators to assimilate the conventional observations, satellite-borne Atmospheric Microwave Sounder Unit-A (AMSU-A), and the Global Satellite Mapping of Precipitation (GSMaP) data were developed. The purpose of this study is to verify the long-term stability of the NICAM-LETKF system. We performed experiments to assimilate all observations for two years and two months from June 2014 to July 2016.

The first experiment was not successful. We found that the NICAM-LETKF system became unstable due to an extreme outlier of the 100-member ensemble. Therefore, we applied the relaxation to prior spread (RTPS) instead of the default setting of an adaptive multiplicative inflation method, and found that the NICAM-LETKF system was stable for more than two years. The analyzed atmospheric fields were largely improved by assimilating the AMSU-A radiances. The humidity bias is also improved by assimilating the GSMaP data while the NICAM is known to have a dry bias, especially over land.

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Keywords: Data assimilation, NICAM, Satellite observation