Geophysical Research Abstracts
Vol. 18, EGU2016-17167-3, 2016
EGU General Assembly 2016


# A preliminary experiment for the long-term regional reanalysis over Japan assimilating conventional observations with NHM-LETKF

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Several long-term global reanalyses have been produced by major operational centres and have contributed to the advance of weather and climate researches considerably. Although the horizontal resolutions of these global reanalyses are getting higher partly due to the development of computing technology, they are still too coarse to reproduce local circulations and precipitation realistically. To solve this problem, dynamical downscaling is often employed. However, the forcing from lateral boundaries only cannot necessarily control the inner fields especially in long-term dynamical downscaling. Regional reanalysis is expected to overcome the difficulty. To maintain the long-term consistency of the analysis quality, it is better to assimilate only the conventional observations that are available in long period.
To confirm the effectiveness of the regional reanalysis, some assimilation experiments are performed. In the experiments, only conventional observations (SYNOP, SHIP, BUOY, TEMP, PILOT, TC-Bogus) are assimilated with the NHM-LETKF system, which consists of the nonhydrostatic model (NHM) of the Japan Meteorological Agency (JMA) and the local ensemble transform Kalman filter (LETKF). The horizontal resolution is 25 km and the domain covers Japan and its surroundings. Japanese 55-year reanalysis (JRA-55) is adopted as the initial and lateral boundary conditions for the NHM-LETKF forecast-analysis cycles. The ensemble size is 10. The experimental period is August 2014 as a representative of warm season for the region. The results are verified against the JMA's operational Meso-scale Analysis, which is produced with assimilating observation data including various remote sensing observations using a 4D-Var scheme, and compared with those of the simple dynamical downscaling experiment without data assimilation. Effects of implementation of lateral boundary perturbations derived from an EOF analysis of JRA-55 over the targeted domain are also examined.
The comparison proposes that the assimilation system can reproduce more accurate fields than dynamical downscaling. The implementation of the lateral boundary perturbations implies that the perturbations contribute to providing more appropriate ensemble spreads, though the perturbations are not necessarily consistent to those of the inner fields given by NHM-LETKF.