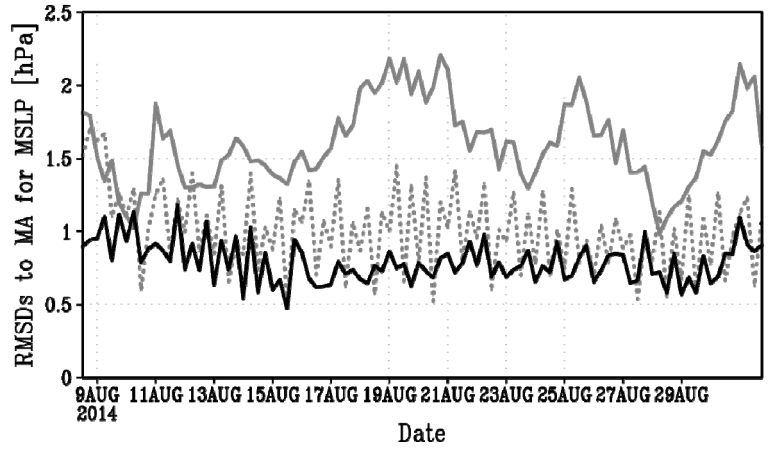
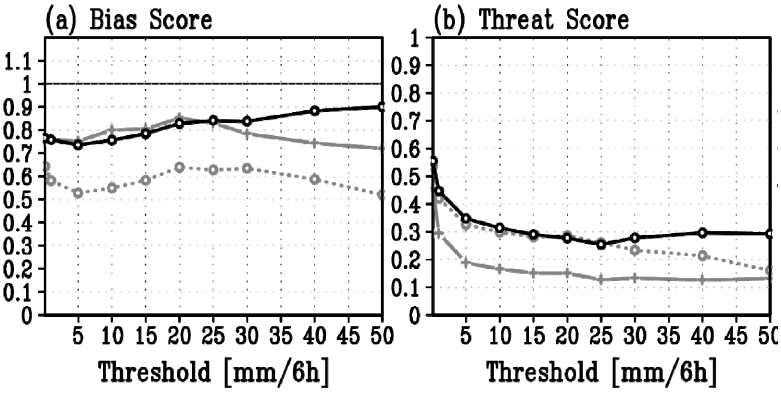
Fukui, S., T. Iwasaki, K. Saito, H. Seko, and M. Kunii, 2018: A feasibility study on the high-resolution regional reanalysis over Japan assimilating only conventional observations as an alternative to the dynamical downscaling. *J. Meteor. Soc. Japan*, **96**, 565-585.
https://doi.org/10.2151/jmsj.2018-056



← Figure 1. Time series of the root mean squired differences of the regional reanalysis (RRA) and the dynamical downscalings with a serial time integration (DS1) and with reinitializations (DS2) against the JMA's meso-scale analysis (MA) for mean sea level pressure. The black solid line is RRA; the gray solid line is DS1; the gray dotted line is DS2.



← Figure 2. (a) Bias and (b) threat scores of precipitation of RRA, DS1 and DS2 referring to the R/A for the period from 1200 UTC 8 to 1800 UTC 31 August 2014. The black solid line is RRA; the gray solid line is DS1; the gray dotted line is DS2.

- The feasibility of regional reanalysis assimilating only conventional observations was investigated through a one-month regional reanalysis experiment. The system was designed to assimilate surface pressure observations and radiosonde upper-air observations into the Japan Meteorological Agency's nonhydrostatic model (NHM) that was nested in the Japanese 55-year reanalysis, by using the local ensemble transform Kalman filter (LETKF).
- The regional reanalysis overcame the problems of dynamical downscaling approaches with a serial long-term time integration and with frequent reinitializations. It reproduced actual synoptic-scale systems (Fig.1) and precipitation intensity (Fig.2a) and patterns (Fig.2b) better than the downscalings.
- The higher-resolution regional reanalysis (dx = 5 km) reproduced frequency of heavy precipitation and anomalous local fields affected by the topography, such as near-surface circulations and solar radiation associated with low-level clouds, better than the coarser reanalyses.
- The NHM-LETKF was optimized for long-term reanalysis by sensitivity experiments in terms of first guess, lateral boundary perturbations and ensemble size.