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# Performance of a 5-km regional reanalysis over Japan with respect to summer precipitation

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## Abstract

We are conducting a regional reanalysis with 5 km grid spacing over Japan for investigating regional climate change. The reanalysis is produced using a system developed by Fukui et al. (2018). The reanalysis system is a one-way double nesting system consisting of regional model (Japan Meteorological Agency Nonhydrostatic Model) and local ensemble transform Kalman filter. The inner reanalysis covers Japan with a grid spacing of 5 km (RRA-5km). The outer reanalysis covers East Asia with a grid spacing of 25 km (RRA-25km), nested in the Japanese 55-year reanalysis (JRA-55), whose resolution is approximately 55 km. The assimilated data are limited to conventional observations, such as in-situ surface pressure observations and aerological sonde observations, and tropical cyclone center position data, in order to keep the long-term consistency in the analysis quality through the total reanalysis period.

Focusing on precipitation in summer seasons, we checked the performance of RRA-5km comparing with JRA-55 and RRA-25km. Higher resolution reanalysis improves representation of precipitations. RRA-5km fits to the rain-gauge data the best, and followed in order by RRA-25km and JRA-55, in terms of frequencies of heavy precipitation and spatial distribution of total precipitation. However, some problems still remain that it underestimates the frequencies of precipitations over 10 mm h<sup>-1</sup> and overestimates precipitations in the mountainous area in central Japan.

**Keywords:** regional reanalysis

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