

Data assimilation and forecast experiments for the record-breaking rainfall event in Japan in July 2018 with NICAM-LETKF at 112-km and 28-km resolution

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In July 2018, an active Baiu front caused record-breaking rainfalls and disasters in broad areas in western Japan. This study performs data assimilation and forecast experiments using the NICAM-LETKF system (Terasaki et al. 2015, Terasaki et al. 2017) at 112-km and 28-km resolution with 32 ensemble members. The computational efficiency is essential to run the high-resolution data assimilation cycle. Yashiro et al. (2016) developed a new NICAM-LETKF system to reduce the computational cost of the LETKF part by considering a throughput-aware framework. Data assimilation experiments are performed with conventional observations and advanced microwave sounding unit-A (AMSU-A) satellite radiances for one month starting at 0000 UTC 10 June 2018. Next, forecast experiments are initialized every day at 0000 UTC on 1-5 July 2018. The results show that the 28-km resolution experiment outperforms the 112-km resolution experiment for the location and intensity of the heavy rainfall, although the precipitation amount is significantly underestimated compared with the observation. The locations of the Pacific and Okhotsk highs determine the location of the Baiu front. The 112-km resolution may be too coarse to resolve these phenomena sufficiently.

More than a half of the computational time of the LETKF was occupied by file I/O in the previous NICAM-LETKF system. The new NICAM-LETKF system successfully accelerated by reducing the I/O time to be about 20% of the computational time of the LETKF.

Keywords: Data assimilation, Numerical weather prediction, NICAM-LETKF, Heavy rainfall