Near-real-time SCALE-LETKF forecasts of the record breaking rainfall in Japan in July 2018

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Abstract

In July 2018, a stationary precipitation band associated with the Baiu front induced a record breaking rainfall and caused catastrophic destruction in Japan. This event was successfully captured by the near-real-time SCALE-LETKF system (Lien et al. 2017) consisting of the Scalable Computing for Advanced Library and Environment-Regional Model (SCALE-RM, Nishizawa et al. 2015; Sato et al. 2015) and the Local Ensemble Transform Kalman Filter (LETKF, Hunt et al. 2007; Miyoshi and Yamane 2007). This system has been operated since 2015 with an 18-km mesh model domain and the ensemble size of 50. In this system, only conventional observations are assimilated every 6 hours. This study aims to investigate predictability of this torrential rainfall event by conducting a series of 50-member ensemble forecasts from the 6-hourly SCALE-LETKF analyses. In general, the SCALE-LETKF system provides skillful ensemble forecasts of the rainfall a few days in advance. Interestingly, the forecast skill exhibits sudden improvement due to assimilating conventional observations far from the peak accumulated rainfall location. Forecast differences suggest that an extratropical cyclone over the Sea of Japan and a trough near Taiwan play important roles in determining the front location.

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