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## Data assimilation experiments of intense rainfall event over western Japan on 28 July 2008 using LETKF system

Hiromu Seko<sup>1\*</sup>, Takemasa Miyoshi<sup>2</sup>, Yoshinori Shoji<sup>1</sup>, Kazuo Saito<sup>1</sup>

<sup>1</sup>Meteorological Research Institute, <sup>2</sup>University of Maryland

We performed data assimilation experiments using data from an intense rainfall event in western Japan on 28 July 2008 with the Local Ensemble Transform Kalman Filter (LETKF) and analyzed fields of the mesoscale 4-dimensional variational assimilation (4DVAR) system of the Japan Meteorological Agency (JMA). We supplemented conventional observation data with precipitable water vapor (PWV) data derived from the Global Positioning System (GPS) Earth Observation Network of the Geospatial Information Authority of Japan. Because the LETKF system assimilates fewer data than the 4DVAR system, ensemble mean fields of the LETKF cycle experiment were replaced with analyzed fields from the 4DVAR system each day at 12 UTC. PWV values were converted to relative humidity profiles for assimilation by the LETKF. The addition of PWV data tended to increase low-level water vapor and improve the precipitation forecast. We attempted to reproduce the intense rainfall band using downscale forecast experiments with the JMA non-hydrostatic model (JMANHM) with grid spacings of 5 km and 1.6 km. The experiment with 5-km resolution generated a rainfall band in western Japan that was not reproduced using conventional data, although the rainfall was smaller than observations. The experiment with 1.6-km resolution faithfully reproduced the observed band of intense rainfall.

Keywords: GPS-derived precipitable water vapor, Data assimilation, Mesoscale ensemble forecast, Heavy rainfall, LETKF