Impact of dense radar observations on short-range rainfall forecasting with 4DVAR assimilation: Implementation of VDRAS radar data assimilation system and initial results

Soichiro Sugimoto
Central Research Institute of Electric Power Industry, Japan
Sun, Juanzhen (National Center for Atmospheric Research, USA)
Yin, Zhuming (National Center for Atmospheric Research, USA)

E-mail: soichiro@criepi.denken.or.jp

The potential benefits of high-density radar observations is examined in a context of short-range rainfall forecasting with the 4DVAR assimilation. VDRAS radar data assimilation system is used to retrieve and forecast for small-scale convections occurred over Tokyo metropolitan area of Japan. In this small region (approximately 200 km x 200 km), dense radar networking has been achieved with operational and research purposes, and data from one C-band Doppler radar and a large number of X-band Doppler radars are assimilated.

Experiments are performed under different configurations in terms of the grid size, the number of radars and data kinds to be assimilated, and the sequential application of 4DVAR. Initial results indicate that a higher performance is obtained with a finer grid resolution, possibly due to accounting a larger amount of radar data. The combined use of X-band Doppler radar data with operational C-band radar data also improves the accuracy of the wind retrieval and sequential rainfall forecast, because those radars can compensate for the sparse coverage especially of the lower atmosphere by the operational C-band radar. In case of polarimetric X-band radar data, the assimilation of polarimetric parameters of Zdr and Kdp is a key issue for further improvements and will be discussed in this communication.