A Dual Polarized Radar Data Assimilation for a Meso-scale Numerical Model

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A nationwide coverage of dual polarized (dual-pol) radar network has been established since 2018 in Korea. Dual-pol radar produces new variables such as differential reflectivity, specific differential phase and cross-correlation coefficient that can provide detailed information of precipitation particles that is not found in a single polarization radar. In this study, a new hydrometeor operator based on the background model temperature field was constructed using dual-pol radar data. Data assimilation (DA) was performed using the three-dimensional variational (3DVAR) method with the Advanced Research and Weather Forecasting Model (WRF-ARW). We analyzed the effect of dual-pol radar variables on the model initial condition and compared dual-pol radar DA experiment (DPX) with the control experiment without DA (CTRL) and the experiment with single-pol radar DA experiment (SPX) for four selected precipitation cases.

The results of the study show that when dual-pol radar variables are used in the DA cycle it improves initial conditions of the model. In addition, the rainfall simulation of DPX improved more CTRL and SPX in terms of rainfall amount and location.

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Keywords: Dual polarization radar, Data assimilation, Numerical modeling
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