The computational aspect of the SCLAE-LETKF data assimilation system for rapid-update-cycle, high-resolution radar data assimilation

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We have developed the SCALE-LETKF system, utilizing the Scalable Computing for Advanced Library and Environment-Regional Model (SCALE-RM) model and the Local Ensemble Transform Kalman Filter (LETKF). The initial purpose is to use this system for the rapid-update-cycle, high-resolution assimilation of the Phased Array Weather Radar (PAWR) data. An ultimate goal of real-time PAWR assimilation with 100 ensemble members, at 100-m model resolution, and with a 30-second update cycle, using the full capacity of the K computer, has been set for this development. This requires very careful design in every part of the code, including computation and I/O, to achieve high parallelization efficiency to meet the goal. Memory space needs to be thriftily used in single processes to allow processing the big observational data. Besides, separate execution of many small programs, which is typical in ensemble data assimilation systems, needs to be avoid; instead, only two MPI programs, the model and the data assimilation programs, are executed for the entire data assimilation cycles. In the past three some years, we have made remarkable progress of the code development towards this goal, although the actual real-time operation has not been achieved yet. Meanwhile, we believe that the SCALE-LEKTF system has become a useful tool for broad mesoscale data assimilation studies. This presentation will summarize our achievement so far with the SCALE-LETKF system in the computational aspect.

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