Issues regarding the high-performance computing associated with the rapid-update-cycle ensemble data assimilation

*Guo-Yuan Lien[1], Takemasa Miyoshi[1], Seiya Nishizawa[1], Ryuji Yoshida[1], Hisashi Yashiro[1], Takumi Honda[1], Hirofumi Tomita[1]

1.RIKEN Advanced Institute for Computational Science

We have developed the SCALE-LETKF system, utilizing the Scalable Computing for Advanced Library and Environment (SCALE)-LES model and the Local Ensemble Transform Kalman Filter (LETKF), aiming to conduct ensemble data assimilation with very high resolution and rapid update cycle. The system has been used for several different studies, including the assimilation of the phased array weather radar (PAWR) and the Himawari-8 satellite radiance data. Although the peak computational speed of the K computer is powerful enough to run a very large problem, but the early version of the SCALE-LETKF system showed several issues to cause poor computational performance and low parallelization efficiency, or even to inhibit us from running a big problem. These issues include the memory overflow with huge observation files, heavy disk I/O and inter-process communication, and the load imbalance among processes. Some issues have been solved by the improvement of the code design, and the others are being investigated. We will discuss the issues and solutions up to the time of the presentation.

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