30-second-cycle LETKF assimilation of phased array weather radar data

*Guo-Yuan Lien[1], Takemasa Miyoshi[1], Juan Ruiz[2]

1. RIKEN AICS, 2. CIMA, Univ. Buenos Aires, Argentina

Assimilation of meteorological radar data has been widely studied for short-range numerical weather prediction. Based on the knowledge gained from previous studies, we explore the assimilation of the dense phased array weather radar (PAWR) data, with a high-resolution model and rapid update cycles: The targeted model resolution is 100 meters and the targeted update frequency is every 30 seconds. To achieve this goal, our key investigation includes: 1) development of the high-performance regional data assimilation system capable of performing such big radar data assimilation, 2) studies on the data quality control, superobing, thinning, and localization schemes that are suitable for the dense radar data, 3) better use of both raining and clear-sky reflectivity data to initiate and suppress the convections, and 4) the balance issue for this super rapid-update ensemble data assimilation.
Successful results have been obtained with the 30-second-cycle PAWR data assimilation in a 1-hour cycling analysis period. The 3-dimensional movement of hydrometeors is nicely shown in the model analysis, which is not easily seen with the conventional radar data. Reasonable 30-minute forecast skill has also been attained. We plan to work towards performing longer analysis cycles, so that the potentials and challenges of the operational use of this 30-second-cycle PAWR data assimilation can be investigated.

Keywords: radar assimilation, LETKF, phased array radar, rapid-update cycle

