

# Local Ensemble Transform Kalman Filter Data Assimilation System Implemented to a Next-Generation Global Model of KIAPS

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Korea Institute of Atmospheric Prediction Systems (KIAPS) has been developing a next-generation global numerical weather prediction (NWP) model as well as advanced data assimilation systems. As one of the most advanced data assimilation methods, Local Ensemble Transform Kalman Filter (LETKF) data assimilation [1] has been selected as the first data assimilation system implemented to the KIAPS global NWP model. Since the dynamic core of KIAPS global NWP model is very likely to have fully unstructured quadrilateral meshes based on the cubed-sphere grid, such as a spectral element dynamic core of NCAR's High-Order Method Modeling Environment (HOMME) [2], we have first examined a modified observation operator in terms of a horizontal interpolation method. We select four points of irregular model grids not only that are closest to the observation, but also that surround the observation in order to avoid an extrapolation. Because it is not guaranteed that those four points form a rectangle, we have attempted a different interpolation method, inverse distance weighted interpolation, from a standard bilinear interpolation. We have investigated an impact of the modified observation operator using a model with a regular grid system, by comparing its result with that of the standard observation operator. In addition, we expect to explore many interesting features introduced by the irregular grid system of the advanced KIAPS global NWP model during an analysis cycle. We have been testing the LETKF data assimilation using the simulated conventional observations and satellite data such as IASI and AMSU-A. We also plan to include an assimilation of Global Positioning System (GPS) Radio Occultation (RO) data. Progress of our LETKF data assimilation system for the KIAPS global NWP model will be presented at the symposium.

## References

- [1] Hunt, B. R., E. Kostelich, and I. Szunyogh. "Efficient data assimilation for spatiotemporal chaos: A local ensemble transform Kalman filter", *Physica D*, 230, 112-126, 2007.
- [2] Dennis, J. M., J. Edwards, K. J. Evans, O. Guba, P. H. Lauritzen, A. A. Mirin, A. St-Cyr, M. A. Taylor, and P. H. Worley. "CAM-SE: A scalable spectral element dynamic core for the Community Atmosphere Model", *The International Journal of High Performance Computing Applications*, 26, 74-89, 2012.