AOGS 2005

Application of Ensemble Data Assimilation in Mesoscale Simulation of Tropical Cyclone

DUSANKA ZUPANSKI[1], SEON K. PARK[2], and EUNHEE LEE[2]

[1]*Cooperative Institute for Research in the Atmosphere, Colorado State University*
[2]*Department of Environmental Science and Engineering, Ewha Womans University*

An ensemble-based data assimilation and prediction algorithm has been developed at CIRA/CSU. The algorithm employs a framework formulated as Maximum Likelihood Ensemble Filter (MLEF) [1, 2]. It provides maximum likelihood solution for the atmospheric state, model error, and empirical parameters, employing an iterative minimization of a cost function. The algorithm also calculates the analysis and forecast error covariance matrices as measures of the analysis and forecast uncertainty.

In this study, the MLEF approach is applied to the problems of simulation and prediction of a tropical cyclone case occurred in the northwest Pacific basin, employing a mesoscale atmospheric model (MM5). Benefits of using ensemble data assimilation in simulation of tropical cyclones will be discussed. Preliminary results involving simulated observations will be presented as well.

References

[1] M. Zupanski, Maximum likelihood ensemble ¯lter: Theoretical aspects. Mon. Wea. Rev., Submitted (2004).

[2] D. Zupanski, A. Y. Hou, S. Zhang, M. Zupanski, and C. D. Kummerow, Ensemble data assimilation: experiments using NASA's GEOS column precipitation model. Presented at 9th Symp. on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface, 9-13 Jan. 2005, San Diego, CA, Amer. Meteor. Soc. (2005).