



## **Development of the Nonstationary Incremental Analysis Update Algorithm for Sequential Data Assimilation System**

Yoo-Geun Ham (1), Hyo-Jong Song (2), Jaehee Jung (3), and Gyu-Ho Lim (3)

(1) Faculty of Earth Systems and Environmental Sciences, Chonnam National University, Gwangju, Republic of Korea, (2) Korea Institute of Atmospheric Prediction Systems, Seoul, Republic of Korea, (3) Seoul National University, Seoul, Republic of Korea

This study introduces an altered version of the incremental analysis updates (IAU), called the nonstationary IAU (NIAU) method, to enhance the assimilation accuracy of the IAU while retaining the continuity of the analysis. Analogous to the IAU, the NIAU is designed to add analysis increments at every model time step to improve the continuity in the intermittent data assimilation. Still, unlike the IAU, the NIAU method applies time-evolved forcing employing the forward operator as rectifications to the model. The solution of the NIAU is better than that of the IAU, of which analysis is performed at the start of the time window for adding the IAU forcing, in terms of the accuracy of the analysis field. It is because, in the linear systems, the NIAU solution equals that in an intermittent data assimilation method at the end of the assimilation interval. To have the filtering property in the NIAU, a forward operator to propagate the increment is reconstructed with only dominant singular vectors. An illustration of those advantages of the NIAU is given using the simple 40-variable Lorenz model.