Geophysical Research Abstracts
Vol. 21, EGU2019-5326, 2019
EGU General Assembly 2019

On the localization in strongly coupled ensemble data assimilation using a two-scale Lorenz model

Zheqi Shen (1) and Youmin Tang (2)

(1) State Key Laboratory of Satellite Ocean Environment Dynamics, Second Institute of Oceanography, Hangzhou, China (zqshen@sio.org.cn), (2) Environmental Science and Engineering, University of Northern British Columbia, Prince George, Canada

In the data assimilation of coupled models, the strongly coupled data assimilation (SCDA) is much more complicated than the weakly coupled data assimilation (WCDA), since it involves the cross-domain error covariances which could be very inaccurate when the ensemble size is small. In this study, the SCDA experiments are conducted using a two-scale Lorenz '96 model, which is a coupled system composed by two Lorenz '96 models in two domains have different temporal and spatial scales. A localization strategy is specially designed for the cross-domain error covariances when the ensemble adjustment Kalman filter (EAKF) is used for the coupled data assimilation (CDA) experiments. The formulas for computing the localization factors that can deal with multiple spatial scales and provide essential information are developed to improve the quality of analyses. The result shows that the SCDA can provides much more accurate estimation of the states than the WCDA when the localization for the cross-domain error covariances is used. Moreover, it is found that the advantage of the SCDA over the WCDA for this model is attributed to the assimilation of small scale observations into the coupled system, whereas the contribution of the assimilation of the large-scale observations to the coupled system is not obvious. This current study provides a possible strategy or idea for developing operational CDA using realistic coupled models.