Geophysical Research Abstracts
Vol. 13, EGU2011-1039, 2011
EGU General Assembly 2011

A variance limiting Kalman filter: Controlling overestimation of error covariance in ensemble Kalman filters with sparse observations

Georg Gottwald (1), Lewis Mitchell (1), and Sebastian Reich (2)
(1) Australia, University of Sydney (georg.gottwald@sydney.edu.au), (2) Germany, Universitaet Potsdam

We consider the problem of an ensemble Kalman filter when only partial observations are available. In particular we consider the situation where the observational space consists of variables which are directly observable with known observational error, and of variables of which only their climatic variance and mean are given. To limit the variance of the latter poorly resolved variables we derive a variance limiting Kalman filter (VLKF) in a variational setting. We analyze the variance limiting Kalman filter for a simple linear toy model and determine its range of optimal performance. We explore the variance limiting Kalman filter in an ensemble transform setting for the Lorenz-96 system, and show that incorporating the information on the variance on some unobservable variables can improve the skill and also increase the stability of the data assimilation procedure.