Geophysical Research Abstracts,
Vol. 10, EGU2008-A-08413, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-08413
EGU General Assembly 2008


# Model error and sequential data assimilation: A deterministic perspective.

**A. Carrassi** (1), S. Vannitsem (1) and C. Nicolis (1)
(1) Royal Meteorological Institute of Belgium, a.carrassi@oma.be

Data assimilation schemes are confronted with the presence of model errors arising from the imperfect description of atmospheric dynamics. These errors are usually modelled on the basis of simple assumptions such as bias, white noise, first order Markov process. In the present work, a formulation of the sequential extended Kalman filter is proposed, based on recent findings on the universal deterministic behavior of model errors in deep contrast with previous approaches (Nicolis 2004). This new scheme is applied in the context of a spatially distributed system proposed by Lorenz (1996). (i) It is found that for short times, the estimation error is accurately approximated by an evolution law in which the variance of the model error (assumed to be a deterministic process) evolves according to a quadratic law, in agreement with the theory. Moreover, the correlation with the initial condition error appears to play a secondary role in the short time dynamics of the estimation error covariance. (ii) The deterministic description of the model error evolution, incorporated into the classical extended Kalman filter equations, reveals that substantial improvements of the filter accuracy can be gained as compared with the classical white noise assumption. The universal, short time, quadratic law for the evolution of the model error covariance matrix seems very promising for modelling estimation error dynamics in sequential data assimilation.