Geophysical Research Abstracts, Vol. 7, 09287, 2005
SRef-ID: 1607-7962/gra/EGU05-A-09287

Fast Ensemble Smoothing

S. Ravela, D. McLaughlin

Earth Systems Estimation and Inference Group, Parsons Laboratory, Massachusetts Institute of Technology (ravela@mit.edu)

Smoothing is essential to many oceanographic and meteorological applications. The interval smoothing problem seeks to update multiple, often all, states within a time interval using all available observations. The fixed-lag smoothing problem updates only a fixed number of states prior to the observation at current time.

The fixed-lag smoothing problem is, in general, thought to be better computationally than a fixed-interval smoother and may be an appropriate approximation for long interval smoothing problems.

In this paper, we pursue an ensemble based approach to fixed interval and fixed lag smoothing and synthesize two optimal algorithms. The first algorithm produces a O(W) solution to the fixed interval smoothing problem of interval length W. The second one produces a linear-time fixed-lag solution that is independent of the lag length.

Identical-twin experiments are conducted with the Lorenz-95 model suggest that both for modestly long lags and intervals the proposed methods provide significant computational savings over other known methods including 4DVAR, EnKS and FLKS. In comparisons with EnKS, the improvement in speed occurs without loss in accuracy.