Geophysical Research Abstracts
Vol. 13, EGU2011-13157-1, 2011
EGU General Assembly 2011

Implementation of the Implicit Particle Filter for a Model of Nearshore Circulation

Robert Miller (1), Ethan Atkins (2), Alexandre Chorin (2), Matthias Morzfeld (2), Yvette Spitz (1), and Brad Weir (1)

(1) Oregon State University, College of Oceanic and Atmospheric Sciences, Corvallis, OR, United States (miller@coas.oregonstate.edu), (2) University of California, Berkeley, CA, United States

The implicit particle filter differs from most proposed particle filters in that the trajectory of each particle is informed by observations. For this reason, it has the promise of avoiding the problem of sample impoverishment, at the cost of requiring the solution of an algebraic equation for each sample. In simple test cases, the implicit particle filter required fewer particles than other particle filtering schemes such as Successive Importance Resampling (SIR), but more computational effort per particle.

Here we address the problem of efficient implementation of the implicit particle filter in a model with large state dimension, specifically, in a shallow water model of nearshore circulation, a highly nonlinear model with 2m grid spacing on a 128 x 98 grid. This model has approximately 30,000 state variables. In addition to exhibiting a practical example of the implicit particle filter for a highly nonlinear model with a very high state dimension, our implementation include the following novel features: (i) The model which enters the computation is sampled by dimensional factorizarion; (ii) the efficiency of the filter is enhanced by sequential rejection.