

Interactive comment on “Dynamically constrained ensemble perturbations – application to tides on the West Florida Shelf” by A. Barth et al.

Anonymous Referee #1

Received and published: 9 March 2009

The paper presents a variational method to generate perturbations to a reference solution which approximately verify balance equations and a predefined coastline. Although the use of weak-constraint methods is not new, the method as applied to the generation of perturbations appear to be useful. In the paper, it is successfully applied to generate perturbations to a tidal model of the West Florida shelf.

I have general comments on the scope of the paper, which should be better defined. This might lead to relatively large changes in the contents and outline of the manuscript.

* The main focus of the paper is on the generation of perturbations of the initial conditions. In the case of the EnKF, other sources could be considered to generate perturbations: the wind stress, for instance; such a method would not be needed in the

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



case of wind stress errors only. Another potential error source impacting the initial conditions would be downscaling errors; assuming that perturbations or state error EOFs are available on a larger-scale model grid, the land-sea mask part of this approach (Section 3) could be useful while the balance constraints (Section 2) would not. So I believe that we are missing a general discussion on the applicability and usefulness of the approach.

* The main focus of the paper is on the generation of two-dimensional perturbations. In my view, section 3 should be treated as a full 3D problem including the bottom boundary condition (bathymetry).

* The main focus of the paper is on the generation of instantaneous perturbations. If we wished to implement an approach as in Auclair et al. (JAOT, 2000, not cited in ms.), how would we proceed to penalize the fast transients in (1)? Would we need to include the tangent linear model M^T as in Auclair, or an augmented perturbation vector?

Specific comments:

* The interest of balanced perturbations or a proper account of the sea-land mask in the case of the EnKF is mostly apparent at initial time. At subsequent filter integration times, the ECM will have been predicted by the EnKF. If necessary, a Sequential Importance approach could be used to improve the efficiency of the filter if needed.

* Most problems can be locally linearized. If the sought perturbations are small (3rd term in (2)), this should not be a problem.

Interactive comment on Ocean Sci. Discuss., 6, 1, 2009.

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)