

Interactive comment on “Obstacles and benefits of the implementation of a reduced rank smoother with a high resolution model of the Atlantic ocean” by N. Freychet et al.

Anonymous Referee #1

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I enjoyed reading this challenging paper. The following are some critical comments and questions but I do understand that the smoothing problem with large DOF is not so easy. Please find smart ways to avoid this kind of criticism.

- Textbooks tell that the smoothing algorithms provide more accurate solutions dynamically and statistically compared to Kalman filtering. Thus the key phrase found in the abstract "Results show that the smoother leads to a better estimation ..." is too obvious.
- This paper should recognize another important obstacle: time length of lag used in the fixed-lag smoother. Considering the long time-scale of ocean current and waves,

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I cannot believe "We verified that extending the lag to more than 10 days does not improve the smoother results" (page 1203). Please show some evidences how the lag length affects the assimilated results and accuracy. It must be at least "Extending the lag to more than 10 days hardly (only weakly) improve the smoother results".

- One more obstacle may be the localisation. I do not find evidence or verification about the size of influence zone of 15x10 degrees. If the influence size were larger, the lag window should be longer.
- Contents of section 6 "Smoother based on a static filter" are interesting but very independent from the previous sections. It should be another article with more number of figures and equations to demonstrate the effectiveness of "half-fixed smoother".
- How did you estimate x_0 and P_0 (or S_0)? Their structure and accuracy are critical for the half-fixed smoother. This is actually a part of the "major obstacles" as the error sources linked to the initial condition. The related question arises to "One of the main obstacles ... the error covariances of the filter" in the abstract. This problem must be true for both constant and evolutive parts. How can you neglect the effect of the initial or fixed error by investigating the operational system?

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