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Ocean Science Discussions

Interactive comment on "An eddy resolving tidal-driven model of the South China Sea assimilating along-track SLA data using the EnOI" *by* J. Xie et al.

Anonymous Referee #2

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There are two aspects of this paper that make it particularly interesting, and worthy of publication. Firstly, this is an example of a model that explicitly resolves tides, but attempts to only constrain the sub-tidal variability with data assimilation. This approach has been widely discussed in the operational community, but seldom attempted. This paper is the first that I know of. Secondly, the implementation of EnOI uses a modified asynchronous approach, where observations are taken from a long observation window (7 days) and the model is interpolated to the observations at the observation time (so-called FGAT). However, instead of using time-lags in the ensemble, the observations are penalised with an "age error" (the authors describe this as a "new formulation (P877, L9) – I agree, so they should evaluate it more completely). Both of these factors

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make this paper relevant and interesting. However, the papers needs two additional experiments before publication. It needs a data assimilating run without explicit tides, so the impact of the explicit tides can be demonstrated and the impact of the method of removing tides from the model can be assessed. The paper also needs a data assimilating run without the asynchronous implementation, to evaluate the impact of this original implementation. I recommend that the authors perform and describe these runs before publication.

Specific comments

P875, L25: The extensive references to papers authored by Wang, Wu, and Xiao, as examples of papers that assimilate altimetry seems out of place, and is clearly an example of self-promotion. There are many examples of studies that assimilate altimetry in the literature.

P876, L10: The authors correctly point out that "it is not realistic to run tidal model and eddy resolving model separately because the two can interact". I think the authors are referring top the fact that when tides are included, the sub-tidal variability is impacted, through enhanced mixing, transports etc. However, despite this, the authors use a non-tide resolving model to construct their ensemble (P886, L15). They acknowledge this in the paper (P887, L9), but it represents an inconsistency that could be addressed to improve the paper.

P879, L14: Why restrict the mean SSH to 11-years, when a 26-year run is available?

P882, L3: Data assimilation is really only "optimal", when error statistics are well known. I would delete this unnecessary claim.

P882, L13: What is mean by "multi-Gaussian"? Do you mean that the errors of the state variables are Gaussian? If so, why not just say that?

Interactive comment on Ocean Sci. Discuss., 8, 873, 2011.