Nonlinear Processes
in Geophysics

Discussions

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Interactive
comment

Interactive comment on "Impact of Optimal Observational Time Window on Parameter Optimization and Climate Prediction: Simulation with a Simple Climate Model" *by* A. A. Yuxin Zhao

Anonymous Referee #1

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This study concludes that windowing data assimilation improves forecasts, when the models/dynamics in question have multiple scales. The main focus of the paper is on the role played by model parameters and their choices in achieving more fidelity when compared to a known "truth" time series. They also explore errors in uncertainties associated in the initial conditions.

To make their case the create a evolutionary multiscale dynamics problem with some basis in a couple ocean/atmosphere flow.

Does the paper contain new and significant results?

No. Windowing is a well-known strategy in time series analysis and in dynamic fore-

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Discussion paper

casting. It is seldom used because unless you know what the answer should be, it can lead to very fragile outcomes. In parameter and in data assimilation in general a less fragile approach is to use locality and tapering in the corvariance, as well as regularization as a preconditioner.

The persistent allusion to optimality is troubling, when there is no theoretical basis for this conclusion, and empiricism is unacceptable evidence when the experiment considers a particular model. Further, optimality is pressumed to be measured in terms of an L2 metric. Perhaps at long time scales this is adequate, but this is the easy part of the problem; there is no way to assess this since the model itself has not been thoroughly analyzed theoretically.

There is no doubt that they have demonstrated that optimal windowing can play a role in changing the outcomes of an assimilation process, particularly if the problem is multiscale. This is shown on a single equation in a very narrow range of operating parameters. To demonstrate this on an equation like the Navier Stokes equation, for example, justifies consideration of a single equation. However, the model in question does not raise to the level of this sort. So one would need to demonstrate results more generally. The implication that the results generalize is unacceptable in explicit or implied form. This needs to be carefully demonstrated.

I have to conclude that this paper is unacceptable in its present form for publication.

Is the paper of an international standard?

I am not sure that the issue of whether this paper conforms to international vs national standards apply, and which nationality is being implied.

If what is being asked is whether this paper conforms to scientific standards, unfortunately, the answer is no. The reasons are given above.

Is the presentation clear and concise?

The authors could have compressed significantly the details of the model and the back-

ground. Instead they should have spent more real estate at clarifying their tests and to a significantly deeper analysis of the results.

Does the paper put the obtained results into context, with relevant references? Is the length of the paper appropriate? See above

Is the text fluent and precise?

No. In addition to a plethora of acronyms and unnecessarily baroque symbols, the paper also needs to be revised to improve the grammar.

Are the title and the abstract pertinent and understandable to a wide audience?

Yes, however misleading: Optimal does not mean finding a window in an ad-hoc way that leads to preferred results on a specific model.

Are all figures necessary and of appropriate quality?

They are fine, but the captions could have been improved by directing the reader to what they should conclude from these, reinforcing the text.

Interactive comment on Nonlin. Processes Geophys. Discuss., doi:10.5194/npg-2015-76, 2016.