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Geoscientific Model Development Discussions

Interactive comment on "Mechanistic site-based emulation of a global ocean biogeochemical model for parametric analysis and calibration" *by* J. C. P. Hemmings et al.

Anonymous Referee #2

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The manuscript presents a technique to quantify the errors associated with using 1D biogeochemical (BGC) models to approximate 3D models. This involves a comparison of the 1D model with output from a 3D model, with either identical or different parameters. THe error quantification is used to modify the 1D model, bringing it closer to the behaviour of the 3D model.

I think the technique is good, and the paper should be published after corrections. I have to admit that I found the paper extremely heavy going, which partly explains my slow response. I think it would be improved by a reduction in length wherever possible, and a stronger focus on the key points (i.e. how and how well the basic emulator works). Echoing the comments by Markus Schartau, are the comparisons

between the uninformed and informed emulators, and direct vs indirect uncertainties really necessary?

The discussion should focus more on the technique, and how well it works. It is not necessary to speculate at length on how the technique might (or might not) be improved. Additionally, the usefulness of the technique as a means to speed up a wide range of optimisation problems is quite clear, and it is not necessary to go into any details of what those various techniques are.

Specific points.

P6330 L18 and 22 - It would be helpful to introduce the terms variational and sequential, when comparing the two types of inverse methods.

P6339 L11 - The explanation of the choice of transformation function should come here, not on the next page.

P6341 - Please say how large the small ensemble is at this stage. Where any tests done to see if the ensemble was truly "representative".

P6342 to P6348 - This section is quite hardcore. Can it not be simplified a bit?

P6348 L12 - The use of satellite data doesn't seem immediately consistent with the idea of using 1D sites. Why where the locations of real time-series not used instead?

P6350 L12 to L19 - Please explain the reasoning behind these modifications. It does not seem to reduce the number of free parameters, so what is the point?

P6351 L5 - As previous comment.

P6365 L19 - How would one know what inflation factor to apply?

Interactive comment on Geosci. Model Dev. Discuss., 7, 6327, 2014.