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Biogeosciences Discussions

Interactive comment on "Use of remote-sensing reflectance to constrain a data assimilating marine biogeochemical model of the Great Barrier Reef" *by* Emlyn M. Jones et al.

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Reviewer: Emmanuel Boss, University of Maine.

This paper shows how assimilation of remote sensing data improve a model performance. It finds that using assimilating a reflectance based algorithm product for chlorophyll to the same product computed from model reflectance outperform assimilating the reflectance algorithm to the model chlorophyll.

This paper should not have made it past into BGD. Not because its science is flawed but because it was obviously not ready. Figure references are missing (left blank) and figure 15 is referred to directly after figure 1. In short, it is clear that this paper was not

fully edited by the co-authors. This, in itself, could cloud my judgment of the science, but I will assume that the science does not suffer from the same 'rush job'.

I do believe that the subject of the paper is of interest to some constituents of BG. I also believe this paper could be improved significantly if the comments below are addressed.

1. Chlorophyll fluorescence is strongly affected by ambient light (called non-photochemical quenching). It seems (from your plots) that it has likely affected the glider data near the surface yet you do not mention it or a correction for it. This will result in a significant bias.

2. It is obvious to practitioners that OC3M does not provide reasonable chlorophylls when CDOM or bottom reflectance contributes significantly to the signal (and in way not captured by the CDOM/chl relation in the open ocean). In addition, local algorithms (as built into your model's optics) are likely to work better than any global model (by design). There are, however, other products (the IOPs, Chlorphyll or OC3M are not IOPs) which are designed w/o assumptions of co-variability of IOPs, e.g. that reflectance spectra are only a function of chlorophyll (called, for example GIOP). Have you tried to see if their product (when tuning the IOP shapes as you did in your model) provide you more useful outputs from Rrs to assimilate?

3. Assimilating a single value out of 6bands of reflectance (the OC3M) seems too limiting, particularly wrt TSM who is usually inverted from magnitude of reflectance (rather than band ratio). This can give you another and independent information to constrain your model with (particularly near the coast where sediments become an important part of the model).

I am adding an annotated PDF where I jolted down comments and signaled typos as I read the paper.

I will stop here and wait (unless the authors would rather I don't review for them) for a

better edited version to review.

Dear authors: I am often wrong. If you feel my review is off the mark, please contact me, and if convinced, and I will be happy to change my review.

Please also note the supplement to this comment:
http://www.biogeosciences-discuss.net/bg-2016-168/bg-2016-168-RC1-supplement.pdf

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