

General comments

I would like to thank the authors for taking the time and effort to comprehensively address all the reviewer comments, I believe the revised paper is much improved as a result. The manuscript is clearer, with the experimental procedure better explained, and the addition of an experiment assimilating R551 adds greatly to the scientific achievements. I have a few remaining minor comments, plus technical corrections, but subject to these I am happy for the paper to be published in Biogeosciences.

Minor comments

- P10 L44-46: "EXP1-5 shows the progressive reduction in difference in kind error associated with each experimental configuration". Semantics, but I'm not sure this is exactly true as stated: if I interpret correctly, the difference in kind error (E_D) is set the same in EXP1-2 (artificially so in EXP2), and is set to zero in EXP3-5.
- P11 L1-2: Please clarify, either in section 2.5.2 or the caption to Table 1, whether E_{tot} is being expressed as a fractional or an absolute error. I assume it's fractional, so if 20% has been used for E_A for EXP5, and E_{tot} is 0.2, does this mean E_R is zero? I assume then this is the case for all experiments, has this been assumed due to the super-obbing?
- P12 L14-15: "we can conclude that the model represents accurately the general distribution of Chl-a throughout the region" - this should perhaps be clarified as "OC3M Chl-a", since a distinction's being drawn between the OC3M and surface Chl-a distributions.
- S3.2: Thank you for including more validation against in situ observations for the different runs. However, it's not made clear in the manuscript why EXP2-3 haven't been included in Fig. 7-11, and EXP1 in Fig. 8,10,11. I do appreciate that including all six runs would potentially make Fig. 8-11 unclear (Fig. 7 less so, but I'll leave that to the editor to decide), and there's not enough data to compare EXP1 (and EXP3?) to nutrients, so I'm happy for these to remain excluded unless the editor disagrees. However, please at least comment in the text on the relative performance of EXP2-3 against in situ data compared with EXP1 and EXP4. For instance, P15 L11 you attribute part of the success to "the inclusion of the TSS constituents in the state vector". This implies that EXP4 outperforms EXP3 - is this the case, that would be useful to know? Furthermore, EXP3 appears to have been stopped early, were there issues with this configuration?

- Fig. 16 and Fig. 17 could potentially be combined into a single 5-panel figure for easier comparison, but that's just personal preference, I'm happy either way.

Technical corrections

- P1 L21: "Color" - "Colored"
- P1 L24: "due the" - "due to the"
- P2 L8: "such" - "such as"
- P2 L34: "Evenson" - "Evensen"
- P2 L36: "variation" - "variational"
- P2 L43: here and in various other places, there's a rogue comma or similar in the reference.
- P3 L1/6: This may not matter, but in some places "OC" is used, in others "ocean color". Similarly with "BGC" and "biogeochemical", and "three dimensional", "three-dimensional", "3D" and "3-D". Other words and phrases are hyphenated inconsistently throughout.
- P3 L29: "assimilations" - "assimilation"
- P4 L20: "GMRMPA" - "GBRMPA"
- P4 L21: "sample" - "samples"
- P4 L22: "Greg" - "Gregg"
- P4 L23: "included a" - "included"
- P5 L31: "(" is unmatched
- P7 L25: "details" - "detail"
- P8 L41: "replacement. Where" - "replacement, and"
- P8 L43: I may be wrong, but the large and small parameter names appear to be the wrong way round.
- P9 L24: "host" - "hosted"
- P9 L39: " E_r " - " E_R "

- P10 L5: "ARGO" - "Argo"
- P10 L25: "Evenson" - "Evensen"
- P10 L37: "contains" - "contain"
- P10 L44: "progressively" - "progressive"
- P11 L39: "RMS" and "RMSD" are used from here, but not defined as acronyms until P15 L46.
- P11 L39: "Wilmott's" - "and Wilmott's"
- P12 L31: "over estimating" - "over-estimating"
- P13 L42: "sub sample" - "sub-sample"
- P13 L46: "sub grid" - "sub-grid"
- P14 L27: "due the" - "due to the"
- P14 L29: "adjacent" - "adjacent cells"
- P15 L9: "Figure 11" - "Figure 10"
- P17 L3: "of GBR" - "of the GBR"
- P17 L15: "this in" - "this is in"
- P18 L36: "in biogeochemical" - "in a biogeochemical"
- P19 L41: "possible consider" - "possible to consider"
- P19 L46x2 + P20 L3: "Figure 14" - "Figure 17"
- P20 L22: "advantage" - "advantage of"
- P20 L34: "(R)" - "(R) are zero"
- P21 L15: "predictions system" - "prediction systems"
- P21 L18: "Ford et al., (2016)" - "Ford and Barciela (2015)" [No need to change the text, but as a clarifying note any "advocation" in this report (the fairly general objective to "make further use of the information from satellite ocean colour"?) is system-specific and given the (current) lack of a complex optical model. More generally, I feel the

assimilation of PFTs, Chl-a, IOPs/AOPs, and RSR all merit investigation and inter-comparison, and I suspect RSR will win out in the long-run once complex optical models are commonly used within biogeochemical models. Your work nicely helps show this.]

- P22 L3/4: "Dr David Ford" - I'm afraid you've bestowed me with a qualification I don't possess. It's merely "David Ford" or "Mr David Ford".
- P28 L21: "multiply" - "multiple"
- P29 L7: "phorosythesis" - "photosynthesis"
- P29 L10: "Fig.2" - "Fig. 3"
- P29 L39/46: "Herzfeld et al. 2016", "Herzfeld et al., 2015" - these are mis-referenced or missing from the references
- P30 L13: "from CARS" - "from the CARS"
- P31 Table 3: "errors in EXP4" - "errors for OC3M in EXP4"
- P32 Fig 1: "each segments" - "each segment"
- P33 Fig 2: "markers denote" - "markers denoting"
- P39 Fig 9: "(cyan)" - "(cyan),"
- P41 Fig 12: "bottom depth depth" - "bottom depth"
- P42 Fig 13: "observatns" - "observations"
- P45 Fig 16: "Baird et al., 2016" - a or b?
- P46 Fig 17: "see Fig. 13" - "see Fig. 16"