Biogeosciences

Discussions

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Interactive comment on "A perturbed biogeochemistry model ensemble evaluated against in situ and satellite observations" *by* Prima Anugerahanti et al.

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We would like to thank the reviewers for taking the time to read the manuscript and for giving constructive comments.

Reviewers 1 and 2 have raised their major concern regarding the default run, its discrepancy with the in situ data, and the parameter values. In an initial experimental run of the model, we use similar parameters as the MEDUSA model however, when the 1D model is run in the oligotrophic regions (station ALOHA and BATS) and in L4 with these parameters the model produces too low chlorophyll, a low correlation coefficient, and a high RMSE, although in PAP the 1D model worked well. We decided to use compro-

mise default parameters which would be the same for all stations, but then see if the ensemble structural variations would lead to improvements. We change the maximum rate of nutrient uptake and grazing at all of the stations along with sinking rate in the coastal station as they have shallower depths, in order to produce a better model run. We have not done a detailed optimisation as we recognised these parameters would not perfectly suit any one station.

Reviewer 2 and 3 also raised some concerns about the function fitting and the large range of phytoplankton and nitrogen concentrations used during the fitting exercise. This large range of phytoplankton and nitrogen concentrations (shown in Figure 1 in the original manuscript) ensures that we captured all the possible concentrations across different stations, and to be consistent on when the functions saturate. If we reduce the range, the parameter values for the particular functional forms do not change too much, and still tend to deviate most strongly when phytoplankton or nutrients are scarce.

All the reviewers agreed that the discussion section needed some major improvements. We will include the studies mentioned by reviewer 3, and we will elaborate on which aspects the ensemble was unable to capture, the benefits of using the ensemble approach compared to one model output, and the importance of conducting structural sensitivity analysis. In the revised manuscript, we will:

- Include a table describing the location, data source, and maximum depth (as suggested by reviewer 3).

- Include annual and seasonal boxplots for nitrogen, annual predicted primary production, and an additional boxplot to highlight the range obtained when changing only one process at a time (as suggested by reviewer 1).

- Change the colour scales in figure 7 and 8, splitting figure 8 into two figures so that the text won't get too small (as suggested by reviewer 2).

- Make the results more concise and the discussion more explicit.

Please see the attached file for our specific response to reviewer comments. The reviewer comments are included in italic, and the responses are in blue.

Please also note the supplement to this comment:
https://www.biogeosciences-discuss.net/bg-2018-136/bg-2018-136-AC1-supplement.pdf

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Interactive comment on Biogeosciences Discuss., https://doi.org/10.5194/bg-2018-136, 2018.