Biogeosciences
Discussions
Open Access
EGU

Interactive comment on "Merging bio-optical data from Biogeochemical-Argo floats and models in marine biogeochemistry" *by* Elena Terzić et al.

Elena Terzić et al.

plazzari@inogs.it

Received and published: 24 August 2018

We thank the reviewer for the detailed comments, which will be surely incorporated into a new revision. Below we list the major points raised by the reviewer with our propositions to fulfil the requirements (the comments of the reviewer are between quotes).

1 - "The text is unclear on a few key issues related to the protocol followed for the simulations including time scale of the simulation and initial conditions"

REPLY: we agree, and we are going to better specify the simulation protocols.

2 - "The indicator for testing the performance of the models is the DCM depth, that obtained by the simulations vs. the observed depth, while a minor relevance is given to the DCM amplitude."

REPLY: actually, in addition to the DCM depth we considered and showed also the correlation between simulated versus observed Hovmoeller diagrams for chlorophyll (point to point match), in this case the model skill results to be fairly good at R=0.75. Therefore, we considered not only the depth variability of DCM, but the whole signal (DCM amplitude, thickness, temporal dynamic). In any case, in the revised version we will further extend this part and make it more clear.

3 - "Indeed, testing different formulations and parametrizations in a model is useful not only to find the best performing model but, more importantly, to analyze the interplay among different mechanisms in generating observed pattern or dynamics. This part is often lacking in the discussion. For example, the reason why different optical models produce different depths of the DCM varying with the area is not discussed."

REPLY: we agree with the reviewer that the modelling approach here described can be useful to analyse the interplay between different mechanisms. We will expand this interesting part and further analyse the mechanism of the DCM gradients formation, including relevance of nutrients dynamics and grazing.

4 - "The effectiveness of a bio-optical model should be tested against IOPs or AOPs, as it has already been done also for BGC-ARGO profilers, not via an end product, i.e., chlorophyll a, whose concentration depend on many other processes. This would also help in clarifying which mechanisms drive the differences reported in Figs. 10 through 12."

REPLY: we agree with the reviewer and we are going to expand the manuscript, also accordingly to what planned for point 3.

5 - "While acknowledging the effort invested in the study it looks a bit empirical and I am not convinced that it adds new knowledge to the existing one."

REPLY: to the best of our knowledge, this is the first time that such a model configuration is presented. Moreover, the skill of the model is good, and our approach is

potentially applicable to other regions covered by BGC-Argo floats. Therefore, we believe that the present work adds new knowledge to the existing one. In particular, the good fit between observed data and the Reference simulation (forced by experimental BGC-Argo float data) support the underpinning assumptions related to: 1) relevance of vertical versus horizontal processes on spatial and temporal scales considered, 2) essential processes and kinetics coded in the biogeochemical model.

Additionally, we provide estimates on the impact of different bio-optical modules when data are not available.

We will surely improve the text of the manuscript to make these results more evident.

Minor comments will be also thoroughly addressed in the review.

Best Regards