

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

**Anonymous Referee #2**

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### GENERAL COMMENTS

The authors used a number of vertical profiles from BIO ARGO floats (1314 profiles) in the Mediterranean and merged them with a one dimensional biogeochemical model. The aim of the study was to alter the optical component of the model and study the effect it has on model simulations, specifically on the chlorophyll profile. The authors also showed the effect vertical mixing has on the shape of the chlorophyll profiles. They have demonstrated that bio-optical data from the floats are useful not only for model data comparison, but also as forcing in the model, which in my take is the biggest plus of the work. I complement the authors on their effort combing the data with the model.

The work is well presented and concise. I think the manuscript is well suited to be published in this journal. My suggestion would be to expend some technical aspects,

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which I outline in more detail with specific comments. These comments are aimed mostly to expand the information in the text.

### SPECIFIC COMMENTS

P5 L30 How good is the matchup between the measured chlorophyll profiles and the modeled profiles taken for the initial conditions from the reanalysis?

P5 L22 If I am correct the governing equations for photosynthesis can be found in Lazari et al. (2012) Appendix B and the remaining equations in Supplementary material of that paper? Please indicate this in more details.

P7 Perhaps writing a generic one dimensional equation for the vertical distribution of phytoplankton would be of some help to the non-expert readers of the paper. It would also help to elucidate the mathematical formulations of the various processes which are referred to later on in the text, such as mixing and light attenuation.

P17 Section 3.2 Some good references for this discussion are: Ryabov & Blasius (2014) *The American Naturalist*, Huisman et al. (2002) *The American Naturalist*, Huisman et al. (2004) *Ecology*, and one with a historical note: Ryabov & Blasius (2008) *Mathematical Modelling of Natural Phenomena*.

P7 L19 Does this imply that you have also averaged measured chlorophyll in the 15 m depth intervals along with calculated  $K_d$  and then pared them up in the regression? Please clarify.

P7 L24 Why are there brackets around  $\ln(E_d)$ ?

P9 Figure 2 The depth of the deep chlorophyll maximum is taken as a metric for the model and the model is proven to be very good at predicting the deep chlorophyll maximum depth. However, there are other measures beside this that can be used: surface chlorophyll concentration, chlorophyll concentration at the depth of the maximum and width of the profile. It would be interesting to see this comparison as a scatter plot.

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P26 L8 Not quite sure if “irradiance propagation” is a correct term. Light propagates and irradiance is a measure of the light intensity per unit surface. Please change to “irradiance profile”.

P26 L9 Change “position” to “depth”.

#### TECHNICAL CORRECTIONS

I have noticed that in some places units are written with superscript (e.g.  $m\ s^{-1}$ ) and in some with a slash (e.g.  $m/s$ ). Please opt for one to be consistent.

Also, in the figures chlorophyll concentration is written with small case letter c as “chl” and in the text it is written with capital letter C as “Chl”. Again, please opt for one to be consistent. I would advise “Chl”.

P6 Table 1 Wrong location of table caption. Should be above the table.

P6 Table 2 Wrong location of table caption. Should be above the table.

P3 L7 Units are in italics. Please change to upright.

P3 L10 Units are in italics. Please change to upright.

P7 L7 Missing full stop at the end of the sentence.

P7 L16 Change “BCG-Argo” to “BGC-Argo”.

P8 L22 Units are in italics. Please change to upright.

P10 L6 Units are in italics. Please change to upright.

P10 L18 Missing full stop after “sections”.

P17 L9 Remove extra spacing before “where”.

P26 L9 Change “what found” to “what was found” or “what has been found”.

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