

Interactive comment on “Assimilating water column and satellite data for marine export production estimation” by X. Yao and R. Schlitzer

Anonymous Referee #2

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The manuscript presents first results of combining observational water-column and satellite data, which differ in spatial, temporal and vertical resolution, into a global 3-D steady-state circulation model which estimates export production. The manuscript presents an improvement of the model by Schlitzer (2007) and is used to run two experiments either linking the export directly to POC or to NPP. Its focus fits well into the scope of the journal GMD. While the model development seems to be mostly done with overall care, the description of this really fails: Chapter 3 misses clarity and is written with quite poor English (especially regarding grammar and style). Similar are some parts of chapter 5 where the results are presented and discussed. Opposed to that the abstract and the chapters covering introduction, data, model experiments and conclusions are clearly and well written and tables and most figures are well presented. Therefore, the manuscript has to be improved in its presentation before it can be ac-

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cepted. Then it can be a helpful contribution for improving carbon export production in the global ocean.

In detail, the following points have to be improved: 1. Please revise chapter 3 completely. There are too many awkward sentences in order to list the mistakes. Also chapter 5.1, the 2nd paragraph (p. 2063, line 8ff.) needs revision to clarify the differences between Exp A and B in respect to their cost functions. Chapter 5.3 also needs better English: specifically please delete all the text with the colours (blue/red) and only describe the results as over- and underestimation.

2.p. 2050, line 2: I think the seasonal “variety” (please change the expression to “variability”) can only be seen in Fig.1 for the Arctic Ocean, and at least at this colour scale it is pretty weak for the other regions you state here.

3.p. 2056, line 21: What justifies to fill the missing data in the polar regions with 10% of the maximum NPP???

4.p. 2061, line 20: I cannot see anything in Fig. 5 showing that the adjoint model costs the same computing time as the simulation. Please clarify!

5.p. 2064, line 1: Obviously something is missing after “decreasing”

6.p. 2064, line 7: isn't it reduced by 99.8%?

7.p. 2063, line 14-16: these sentences are unclear??? please change to proper English.

8.p. 2063, line 18: what do you mean with “barrier for the descendent in the model”?

9.p. 2065, line 16ff: the negative values are not presented in Fig. 6!?

10.p. 2065, line 28: I guess here it is referred to Fig. 7 a and c?

Minor comments:

please write once the full name for CFCs (p. 2046, line 15 and p. 2052, line 14)

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Figure 1: please present these maps in the same way as Fig. 6 (Europe in the center) and add to Figure 1 caption that the data were taken from the WOA 2009. Also add at p. 2065, line 14 the citation of Fig. 1 after “WOA09”.

Figure 1 and 6: add units to the colour scales.

Other language issues:

p. 2050, line 17: change to “... are lacking data for a monthly climatology.”

p. 2050, line 20: add “concentrations” after “mean phosphate”

p. 2050, line 22: unclear!- maybe change to “... trustable and also infinitive values are avoided when inversed”

p. 2051, line 2: change “yr” to “years”

p. 2051, line 25: change to “Therefore, subsurface information is mostly very limited”

p. 2063, line 8: add “the” in front of “descent”

p. 2064, line 8: change to “... which are listed in Table 4.

p. 2066, line 13: change to “... changes were shown in Fig. 1”

p. 2067, line 18: change to “... calculated...”

I think chapter 5 should be named “Results and Discussions” because you include the discussion of your results.

Interactive comment on Geosci. Model Dev. Discuss., 6, 2045, 2013.