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Biogeosciences Discussions

Interactive comment on "Using satellite-derived backscattering coefficients in addition to chlorophyll data to constrain a simple marine biogeochemical model" *by* H. Kettle

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First of all many thanks to Dr Fennel for taking the time to review this manuscript.

Dr Fennel asks for further investigation of the errors of the optimized parameters. I hope I have now addressed this sufficiently by plotting the model sensitivity to variations in each parameter when the other parameters are at their optimised values (Fig. 7). I think this is a major improvement on the previous figure (previously fig 6) and shows clearly how well constrained the optimised parameters are.

Minor comments

General question the model was optimised independently for each station. This has been made clearer in the last paragraph of the Introduction

p4202-4203 L 26, L1-2: The sentences on export production in the Introduction have been reworded.

p. 4202 L5: 'Colur' has been changed to 'Color'. Have added 'absorption coefficient' in brackets.

Dr Fennel would prefer Geider's C:Chl model was used instead of Cloern's model. I completely understand this but unfortunately it is not possible for me to do all the model runs again (the optimization procedure is very CPU expensive).

P 4208, L21: The mixed layer temperature is simply the temperature over the mixed layer as predicted by the model (sorry I don't understand why the vertical resolution makes this confusing). Below the ML the C:CHl = 40 - I have now added this to the text.

p4211, L 10 No 1/J is not missing from the equation. J is the number of data types e.g. It is 1 when just chl is used but 2 when chl and bb are used.

P4211, L 12: Table of variances now added.

P4212 L 22-23: I have now included a fig to show convergence (fig 4).

P4213 L6-7 I have now removed this sentence.

p4213 L12-13. Now dealt with in the section on the optimised parameter values.

P4213 L14-15 This is only the case for the dataset tuned to Chl only (i.e. They are not tuned to any bb data so I compare the modelled bb with the mean of the observed bb).

P4213, L 16 Have now changed to 'worse'.

P4214 This has now been discussed in the section on optimised parameter values

P4215, L 6: Yes thanks - I have now changed text to 'insufficient dynamical range'

rather than noisy.

P4215 L14: I have not compared the model to in-situ data because this will not be conclusive as it will lead to issues about the accuracy of the satellite data which is not the aim of the study.

P4216, L 2-6 air-sea CO2 flux discussion has been removed.

P4216 L 10-11 The export flux would be calculated using the sinking rate parameter, since this can be very variable (see Table 4) I thought integrating the detritus below 200m was a more robust approach.

P4216, L14 and p4217, L1: references to seabed have been removed.

Fig 3 now has the axes labelled.

Interactive comment on Biogeosciences Discuss., 6, 4201, 2009.