**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 Friedrichs for taking the time to review this manuscript.

General Comments

1. The zooplankton compartment in the model covers all zooplankton sizes... I based the assumption that POC only included phytoplankton and detritus on work done by Fujii et al (2007; Biogeosciences) but I am uncertain about this issue and have now included some statements about this in the section on Computing bbp(490) within GOTM-HadOCC.

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2. I agree using the model on unused data would be a good test. I therefore ran the models for 2004 at PAP (only 2003 data were used for tuning) and compared with satellite data but I wouldn't say it was very conclusive. The models predicted best the dataset they were tuned to with the chl only one predicting chl the best so I have not included this in the manuscript.

3. This is a very good idea and I have now done the student t-test to test whether the parameters for tuning to chl only, are significantly different to those for tuning to chl and bb data. This has been added to the start of section 5.2.

Specific Comments

abstract: I have removed 'four exist'

p4203 L15 I have added 'amount and rate'

p4204 L2 I have assumed zooplankton are not included but this is not part of the IOP algorithms so I have now mentioned this in section 4.2.3.

P4205-6 I have removed the detail on other wavelengths and I have added more detail on the PML model.

P4206 I have relabelled 'Loisel' to LP in fig 2.

p4209 I have mentioned the $b_{\{BG\}}$ parameter in the conclusions and the reader is referred to Fujii et al 2007 for details about its origins (not straightforward) in the text.

P4210 corrected diminishing.

P4210 I have added more info on depth resolution i.e. there are 10 levels above 10m and 16 levels above 100m and mentioned that this does not vary. Z90 varies in time as this is dependent on the amount of chlorophyll in the water (this is now mentioned in the section on optical weighting)

P4211 A Table has now been added containing variances

p4211 Thanks for the information - this reference has been added

p4213 I have now removed this statement as it is not necessary to the main message of the paper

p4213 L11 pre-assimilation simulations are very different (as the parameter sets are not appropriate) and so not easy to add to these plots.

P4213 L17 corrected to 'has'

p4215 L 19 removed 'depth'

p4216 L12 have removed this sentence based on another reviewer's comments

p4215 L21 (think this should be p4216 L21) I have now made it clear that this statement refers to concentrations in the mixed layer.

Table 2. I have used RMSE as it is something readers will be familiar with. I have now explained why number of data points differs in the text and have reduced number of significant figures.

Table 3 yes sorry, has been amended so there are less significant figures

Fig 3 now has labelled axes.

Fig 4 (now fig 5) now has lines removed from observed data

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