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Ocean Science Discussions

Interactive comment on "Regional impacts of ocean color on tropical Pacific variability" *by* W. Anderson et al.

Anonymous Referee #1

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The paper presents results from a number of numerical experiments with a fully coupled global ocean-atmosphere-land-ice model. The results show that penetration of the short wave radiation is strongly influenced by the distribution of the ocean Chl-a. The main result appears to be that optical properties of the subtropical gyres have a strong influence on the ENSO.

I have one major comment which prevents me from recommending this paper for publication in the present form:

Numerical experiments show high sensitivity to the optical properties of the subtropical gyres. Morel(1988) parameterisation disregards the vertical structure of the Chl-a. However strong subsurface Chl-a maximum is a persistent feature of the subtropical

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gyres and not in any way reflected by the satellite-derived Chl-a concentration. Looking at the profiles on Figure 11, the maximum heating effect occurs at the depth 80-100m. The depth of the subsurface Chl-a maximum can vary between 30 and 100m and with values up to 3-4 times higher than at the surface it probably has a significant impact. I wonder if high sensitivity of the ENSO to the Chl-a concentration might be an artefact of the surface values being poor representation of the optical properties in these areas. I am not suggesting a run with a fully coupled biological model, I would however like to see some evidence at least from a 1D model that the subsurface Chl-a maximum is either irrelevant or it is indeed must be taken into account and a 3D structure taking into account its existence must be restored from the surface Chl-a. If the latter is true, I think sensitivity to the Chl-a distribution might be much lower than shown in the paper.

Minor comments

p.245 l 13-15: Explanation of this statement seems to come only on the p.246, so it leaves a reader to puzzle over this fact for a whole page. p.250 Section 2.2 I found myself constantly referring to the description of the experiments while reading the paper and find it rather difficult in its present form. A table with summary would make reading much easier. p.258 Conclusions: I find that conclusions could be expanded into recommendations for the climate models. It seems that the authors are suggesting that effect is rather strong and should be taken into account however which parameterised form is acceptable (if any) and do climate models need to be considering fully coupled biology?

Interactive comment on Ocean Sci. Discuss., 6, 243, 2009.