

Interactive comment on “Imminent ocean acidification projected with the NCAR global coupled carbon cycle-climate model” by M. Steinacher et al.

Anonymous Referee #3

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Referee report for Steinacher et al.:

This paper is an extension and more detailed description of future scenarios on ocean acidification as also carried out in a previous intercomparison project (Orr et al., 2005, nature). As in such intercomparison projects, details about single models and the respective reproducibility of computations are not given, such a more in-depth publication with updates and new developments plus analyses is welcome. The study presented is carried out thoroughly. The text is easily understandable. The scientific procedure and the conclusions are sound. As the Arctic Ocean is a key area for the timing ocean acidification, I would appreciate to receive a bit more information on how well sea ice

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cover in general is handled by the model. Can the authors add figures of sea ice cover (thickness and/or compactness), comparing the present state with observations, and giving model results for the future (e.g. at years 2050 and 2100)? I recommend publication of the paper after minor revisions.

Further comments:

P 4354 | 22: cause (not causes)

P 4356 | 12: Currently, however, . . . (shift the “however”)

P 4357 | 25: next to Heinze (2004), you could add the references: Gehlen et al. (Biogosciences, 4, 505-519, 2007), Ridgwell et al. (Biogeosciences, 4, 481-492, 2007)

P 4359 | 14-16: please, give a reference for the sea ice characteristics of the NCAR model and discuss these with a figure (see main comment above).

P 4359 | 25: CaCO₃:orgC export ratio 0.07 may be relatively low; how does this compare to other studies/data analyses?

P 4361 and throughout: silicic acid is now usually reported as Si(OH)₄; PO₄ could be written PO₄³⁻

P4361, end: Please, describe a bit more in detail, how the production and export of CaCO₃ and POC are modeled (parameterisations)

P 4362 | 5: “reasonably well” is soft wording, can you find an alternative description?

P4362 | 9: Please, give the reference for Taylor diagrams to facilitate the use/understanding of this for non-modellers

P4364 | 3: Please give a reference for the Revelle factor for the non-carbon-cycle people

Figures 5 and 6: please, adjust color scale to better resolve undersaturation

P 4369 | 9: The ACIA report chapter 9, see: <http://www.acia.uaf.edu/pages/S2847>

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scientific.html describes a potential change in biological carbon cycle due to sea ice retreat away from the Arctic shelves and associated shift of highly productive regions along the marginal ice zone to deeper waters (with particulate fluxes of carbon and nutrients deeper down into the water column). Do you see such changes in your model results as well? (see Box 9.10, page 505)

p 4369 l 16: “corresponds” instead of “correspond”

Interactive comment on Biogeosciences Discuss., 5, 4353, 2008.

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