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Interactive comment on “Modeling the marine aragonite cycle: changes under rising carbondioxide and its role in shallow water CaCO_3 dissolution” by R. Gangstø et al.

Anonymous Referee #1

Received and published: 18 June 2008

General Comments

The manuscript "Modeling the marine aragonite cycle: changes under rising carbon dioxide and its role in shallow water CaCO_3 dissolution" by Gangsto et al provides a thorough and helpful description of how to go about adapting biogeochemical models the addition of aragonite cycling over simply low Mg-Calcite and then provides a critically needed projection of diminishing Aragonite production in this century (29%). I have no major objections with the analysis and am confident that the manuscript will provide a valuable contribution to the growing field of ocean acidification. I recommend publication with minor revision to address the minor points of clarification below.

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Specific Comments

Abstract - add 29% global number and replace 'until' with 'by' in last sentence.

line 159 - How was k_{max} calibrated? Why was such a low value(0.4) chosen rather than something more consistent with Langdon, 2005 coral aragonite study? The authors have a sentence at the end (lines 491-494) that refers to calibration to coccolithophores (which are calcite rather than aragonite but planktivorous, I admit). I'm not arguing that the authors should have chosen a different value necessarily, but that they should be able to defend their choice.

line 165 - How was this sinking speed parameterization calibrated?

line 186 - 'n' is generally referred to as a reaction order, and the prefactor as a rate constant.

line 188 - The chosen value of $n=1$ is also supported by Hales, B., 2003. Respiration, dissolution, and the lysocline. *Paleoceanography*, 18, 1099-1113.

line 290 - To what data is the model output being compared for "equatorial areas"?

line 293 - A reference should be cited after 'are considered high', and 'assumed' should be replaced with 'suggested by others' or something akin.

line 399 - More description of the 'scenario' used by Gehlen is necessary - also SRES A2?

lines 407-410 - It should be specified that the authors are referring to pelagic dissolution only - otherwise I think one would NOT expect higher dissolution.

line 426 - Is lateral transport significant?

lines 456-457 and line 462 - Against what observationally-based estimates are the authors comparing?

line 472 - Use of the word 'moment' seems a bit overly specific. I would recommend

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omitting it.

line 478 and line 485 - I believe the authors intend 'estimated' in place of 'assumed'.

Fig 3 - I believe that the plots only show pelagic dissolution, rather than 'total'. If correct, then the caption should add 'pelagic'.

Fig 5. It would help the reader to have the y-axis in Figure 5c stop at zero rather than -0.1 since negative CaCO_3 production is undefined.

Interactive comment on Biogeosciences Discuss., 5, 1655, 2008.

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