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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 #2

Received and published: 23 May 2008

Review of Gangsto et al.

PISCES model of carbonate system in global ocean, this paper applies this model to examine parameterization of aragonite production and dissolution in the context of the global carbonate budget, both at present and in a higher CO_2 world.

Some specific comments: Aragonite production is linked to concentration of mesozooplankton and saturation state. The factors that control mesozooplankton density need to be more completely discussed. Particles sink with a range of velocities, but the functional velocity vs. depth relationship seems pulled out of thin air.

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Aragonite dissolution is first order dependent on undersaturation and dissolves with a rate constant of 11 d⁻¹. This is also a very important model constraint that is not fully explained.

The deepest model cell returns all alkalinity except that which equals riverine input (mass balance). Does this produce an odd distribution of alkalinity in the deep ocean and not allow for high carbonate burial rates on shelves??

I don't understand, page 1663, how the model can be tuned to generate aragonite production equal to 1/3 total carbonate production, I thought aragonite production was free to vary as a function of mesozooplankton density.

I don't understand the categories labeled in Table 1 in the middle portion of the table, what boundary is referred to as 'lower boundary'?

In Fig. 5e, why is calcite dissolution/net production higher than aragonite dissolution/net production?

Table 2 needs more header differentiation to help read the rows.

It is not clear how carbonate production and dissolution on margins and shelves impact the results discussed here. Some comments to this effect would be helpful.

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

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5, S651–S652, 2008

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