Biogeosciences Discuss., 12, C9867–C9869, 2016
www.biogeosciences-discuss.net/12/C9867/2016/

Biogeosciences
Discussions

Interactive comment on "Projections of ocean acidification over the next three centuries using a simple global climate carbon-cycle model" *by* C. A. Hartin et al.

Anonymous Referee #3

Received and published: 19 February 2016

General comments:

The paper presents a fast and, as it seems, relatively competent model tool for future projections. This is excellent, and something I think is needed as complement to the more complex, computationally expensive earth system models. It is however a letdown that this study doesn't actually use the model for anything new, a flaw that reduces its scientific value. The manuscript would greatly improve if the models capability was used to actually investigate something.

The paper is otherwise interesting, generally well written, and presents a promising concept, but it needs more work.

Specific comments:

In the introduction the authors mention the oceans storage capacity for carbon, and its potential decline of anthropogenic CO2 uptake. Since the model seems to calculate these fluxes anyway, why not show how they change over time? Maybe also with some different model-setting (i.e. wind speed, air-sea transfer velocities) and emission scenarios to see get an ensemble and see the sensitivity.

How realistic is it to keep the total alkalinity constant? I think this should be stated/cited in the manuscript.

The authors should really consider creating an appendix describing the model in full, and move some of the tables with model settings (and maybe also some of the equations) there, thus focusing the main manuscript on research questions.

Please specify throughout the manuscript that you with "carbon" mean dissolved inorganic carbon (DIC), as I assume you do. It is unnecessary unclear as of now.

Line-by-line corrections:

Line 10: "series" is probably a typo for "serious".

Line 20: (>55) indicate that the authors mean the high latitudes, not the low?

Line 97: Insert "latitude" after "low" to make the text clearer.

Line 101: Repeated info from line 96, please rewrite.

Line 112: Change to: "... simulating a simple thermohaline ...". I'm guessing you mean thermohaline instead of thermocline?

Line 155-156 I don't understand what you mean with this; "We assume surface waters are fully equilibrated with the overlying atmosphere ..." I agree that with that time step, yes, sure, it should be fully equilibrated, disregarding seasonal variations. But if it was equilibrated, shouldn't then the flux be zero and pCO2 in the ocean surface and air be

the same? Please correct me if I get this all wrong, or rewrite the text.

Line 168: Remove the second comma.

Line 242 and 244: The decreases are presented in different units, which makes it impossible to compare the two.

Line 286: Total alkalinity should be added to this list.

Line 300-302: I agree! Please add something of this sort to this paper.

Table 5: The table needs to be better organized/presented. Consider dividing into two.

Figure 2: Add units to the y-axis. Redo the colors so that all measurement data is clearly visible, the pink data in particular disappears into the light red fields. Have the data on top the model lines for better visibility. And remove the legend headline, all these data are not “Model”.

Figure 3: Add units to the y-axis. Have the data on top the model lines for better visibility. And remove the legend headline, all these data are not “Model”.

Figure 4: Redo the colors so that all measurement data is clearly visible, the pink data in particular disappears into the light red fields. Have the data on top the model lines for better visibility. And remove the legend headline, all these data are not “Model”.

Figure 5: Redo the colors so that all measurement data is clearly visible, the pink data in particular disappears into the light red fields. Have the data on top the model lines for better visibility. And remove the legend headline, all these data are not “Model”.

Figure 6: Redo the colors so that all measurement data is clearly visible, the pink data in particular disappears into the light red fields. Have the data on top the model lines for better visibility. And remove the legend headline, all these data are not “Model”.

Figure 7: Increase size of legend and preferably also the size of the markers.

Interactive comment on Biogeosciences Discuss., 12, 19269, 2015.