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Interactive comment on "Secondary calcification and dissolution respond differently to future ocean conditions" *by* N. J. Silbiger and M. J. Donahue

Anonymous Referee #2

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This is a fairly straight-forward set of experiments examining the impact of climate change on secondary calcification and dissolution by coral rubble. I have a number of general questions about the study, although many have to do with problems of presentation.

As a more general question though I wondered the following: since the organisms being studied here are described as "secondary calcifiers" how do their responses impact coral reefs directly, which I'm assuming is thought of in this context as "primary calcification"? If I'm showing my ignorance of coral reef biology/ecology I apologize, but it would seem to me that this might have an impact on how these results can be used in a predictive sense for how coral reefs may respond to future climate change.

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In the rest of the comments, (x,y) refers to page x, line y.

1. (12802, 20) – Is it “increase to 557 ppm by the year 2100” (rather than “increase by 557 ppm the year 2100”)?

2. (12804, 9) – How long were the aquaria monitored without rubble to establish the stability conditions in Table 1? How many measurements were made to determine the mean values in this table?

3. (12807, 2) - Is there a reference for the technique used to determine pH?

4. (12808, 5) – I think there must be some words missing here in this description of how things were normalized to DIN.

5. (Eqn. 1) - I think a little more detail is needed for how the 3 measurements made per experiment (12805, 7-11) were specifically used in this equation (i.e., which values were used to determine the F values, and which were used for dTA/dt). The same is true for Eqn. 2 although I assume the same general approach was used in both cases.

6. (12810, 5) – I’m not sure I understand why a simple product of temperature and pCO2 was used as the independent variable (i.e., the one sentence explanation here seems inadequate to me).

7. It also occurred to me that if calcification rates vary differently in response to changes in temperature versus changes in pCO2, then this might explain the non linear response seen in Fig. 3A. I would think that this might be considered a bit more explicitly in the discussion starting on line 24, p. 12812.

8. (12811,15) – Which G values were used in Figs. 4 and 3A? Since Gnet = Gday + Gnight, using Gnet here (along with Gday and Gnight) would seem to be “double-dipping” with the data.

9. (12811, 21) –Maybe I’m getting caught up in semantics but referring to changes in carbonate system parameters due to calcificiation, dissolution, photosynthesis and

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respiration as “feedbacks” seems to imply a bit more complexity than is really occurring. I’m not sure I would use this word here and throughout the manuscript to describe how these biological processes affect carbonate chemistry.

10. (12811,17) - I think it would help if the data described here as “exceptions” were explicitly indicated on Figs. 4 and 3A (perhaps circled on the figure ?). This concern is also relevant to discussions on p. 12813, line 24 [‘This hypothesis . . .].).

11. In section 4.2, please don’t switch flux units. Mixing ‘per day’ flux units with ‘per hour’ flux units makes it very difficult on the reader. If necessary, convert data from the literature to the units you wish to use in the manuscript. 12. (12813,10) – “In the present study . . .”. Where is this shown? Is “net photosynthesis” actually NCP?

13. (12813,18) – ‘We saw a decline . . .”. Again, where is this shown?

14. (12814, 7) – How exactly is “strongly affected” defined here?

15. (12814, 15) – Talking about “distinct” responses here seems a little vague.

16. Figure 4 – Why is the color scale for standardized climate change multiplied by 10ˆ4?

17. Figure A3 – Is the y-intercept listed here (0.0016) correct? Also, it might be worth mentioning somewhere that you would expect the slope here to be roughly 2x that of the slope in Fig. 4 (which is what is actually seen), based on the way G and NCP are defined.

Interactive comment on Biogeosciences Discuss., 11, 12799, 2014.