

## ***Interactive comment on “Significant long-term increase of fossil fuel CO<sub>2</sub> uptake from reduced marine calcification” by A. Ridgwell et al.***

### **Anonymous Referee #4**

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The paper provides new information on the sensitivity of CaCO<sub>3</sub> production to increases in ocean carbon sequestration. The work involves an analysis of experimental data from manipulation experiments of marine calcifiers. Employing an ensemble Kalman filter calibration of ocean carbon cycle the authors claim to improve the present understanding of CO<sub>2</sub>-calcification feedback. The paper highlights the oversimplification of present incorporation of this feedback in global carbon models yet only goes as far as estimating the potential range of feedback over the range of experimental calcification sensitivities. It does not improve knowledge of the amplitude of CO<sub>2</sub>-calcification feedback per se. However, the work is a useful benchmark for future developments of how ocean biota may respond and feedback to continued anthropogenic carbon emissions. I recommend the publication of this manuscript after

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Interactive Discussion

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consideration of the following suggestions and comments.

Abstract 1. remove “available” - not all available experiments are included.

P1766 3.16. I would like to see a qualification here on how the authors feel that this work approaches the "solution" to the problem that no single estimate of the strength of CO<sub>2</sub>-calcification can currently be made with confidence.

P1768 19. The best fit line consistently overestimates the high sensitivity scenarios output in Figure 2. Is it not possible to find a better fit to the data?

P1769 4.13. This is misleading. Yes, the in vitro experiments on *Emiliana Huxleyi* (Zondervan et al., 2001) exhibit a low sensitivity. However, the results under larger scale mesocosm experiments (DeLille et al., 2005) showed a greater sensitivity that is comparable to those of *Orbulina universa*.

P1769 4.17- this discussion should also highlight the differences in methodologies to control CO<sub>2</sub> during the perturbation studies. e.g. Delille et al. bubbled CO<sub>2</sub> to achieve required CO<sub>2</sub> values where as Zondervan et al and Riebesell et al added acid and base (the latter also bubbled CO<sub>2</sub>).

Figure 1. The grey arrows are not distinguishable at 1994 and 2100. The values should, rather, be given in the text.

Figure 2/Table 1. The uncertainties for *O. universa* (#2) do not agree in Table 1 and Figure 2 (0.32+0.08)

Figure 2 legend. “The strength of the CO<sub>2</sub>-calcification feedback”. It is not defined either in the text or in the figure caption to which baseline this feedback is relative to.

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**BGD**

3, S953–S954, 2007

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