Biogeosciences Discuss., 6, C1081–C1082, 2009
www.biogeosciences-discuss.net/6/C1081/2009/

Biogeosciences Discussions

Interactive comment on "Short-term response of the coccolithophore *Emiliania huxleyi* to abrupt changes in seawater carbon dioxide concentrations" *by* J. Barcelos e Ramos et al.

Anonymous Referee #2

Received and published: 8 July 2009

The potential impact of increasing atmospheric CO2 on primary productivity of phytoplankton is an extremely important issue. Marine algae are responsible for around half of the world's primary production and play a significant role in the global carbon cycle and biogeochemistry. The coccolithophorids are a significant group of marine algae that are not only responsible for a formation of organic carbon from CO2 but also form calcite scales (coccoliths) that represent a major sink for carbon in the oceans.

There has been a good deal of work on impacts of elevated CO2 on phytoplankton, with varying results. In particular the effects of high CO2 on calcification in coccolithophorids is controversial with contradictory data in the literature. This paper thus

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represents a useful contribution to the debate and show that short term responses reflect longer-term acclimation.

While the work is generally described clearly, well presented and the data thoroughly discussed there are a number of points that deserve some attention from the authors:

1) The C fixation data have been measured with differing incubation times. It is well known that short time intervals for 14C fixation reflect gross photosynthesis whereas longer-term incubations tend to indicate rates of net fixation. The authors need to address this and how it might impinge on the interpretation of their data (e.g. Fig 2).

2) Much of the data only shows very small differences with the various CO2 treatments. I would have liked to have seen some statistical analysis of the significance of these differences.

3) Although division rates decreased to a small extent at high CO2 (although with no error bars it is difficult to determine if this is meaningful) diameter increased so the net impact on carbon assimilation is presumably little affected (as indicated by Fig 1 c).

4) Again with Fig 4 b, no error bars are given so it is difficult to determine how significant any differences in Fv/Fm might be. Certainly changes (in this and other parameters) throughout the daily cycle seem much more significant than those caused by the CO2 treatments.

5) The electron micrographs in Fig 3 are not terribly convincing evidence of coccolith malformation. Are there specific traits (C/coccolith etc) that might be used to quantify any differences?

Interactive comment on Biogeosciences Discuss., 6, 4739, 2009.