Biogeosciences Discuss., 6, C2605–C2607, 2009
www.biogeosciences-discuss.net/6/C2605/2009/


Biogeosciences Discussions



# *Interactive comment on* "Effect of carbonate ion concentration and irradiance on calcification in foraminifera" *by* F. Lombard et al.

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Received and published: 21 October 2009

General comments: The paper by Lombard et al. addresses an important research question which is related to the ongoing ocean acidification. Is there an effect of the carbonate ion concentration in marine waters on the calcification rate of planktonic foraminifera? The authors reinterpret earlier published results and add unpublished data in the framework of the research question of this paper. It is an attempt to contribute to the mechanistic understanding of observations by other authors who claim that a reduction in the calcification of marine organisms indeed has taken place and is ongoing since industrialization.

In the performed culture experiments two parameters were taken as variables: carbonate ion concentration and high and low light conditions (irradiance



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level).Globigerinoides sacculifer is the species not considered before and the results obtained for this species should be the basics of the paper. Discussion and conclusion are based on the data listed in two tables and three figures. I would like to concentrate on their table 1 and figures 2b and 3b as these give information on G. sacculifer.

Authors claim that the final shell weight as well as the calcification rate clearly depend on the concentration of the carbonate ion. To my opinion the presented data do not allow such a firm conclusion: The experimental conditions for the carbonate ion concentration seem to have been chosen in two clusters, low (71-233 micromol/kg) and high (455-566 micromol/kg). When looking into the data of the final shell weight, these two clusters cannot be easily identified. In other words is there such a strong relationship? In the figures, regression lines are plotted for all individual data sets. Does the r2 of the regressions justify further interpretation and conclusions about the "slopes"? Seven data points with six degrees of freedom need and r2 of >0.5 at the 95% and >0.7 at the 99% confidence level, respectively to be significant. At least one new dataset (Fig.2 G.sacculifer 700micrometer LL) does not fulfill the condition to be significant at the 95% confidence level and should be disregarded for further interpretation as there is no relationship between mean shell weight and carbonate ion concentration.

Specific & technical comments p. 8593, 24-26 maybe I do not get the authors' point clearly, but: is final size not a direct function of delta t?

p.8594, 1-4 These two sentences should be checked for grammar, they do not read well.

23 Figure 2 shows weight only and not length. Authors probably mean fig 1?

26 "for a similar size"

p. 8596, 14/15 add "of" between "rate" and "calcification"

p. 8597, 20-29 see my comments above

p. 8598, 7-11 de Moel et al. present the weights for G. ruber: modern, thin individuals



BGD

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10 microg, thick preindustrial ones 13 microg, LGM 15 microg all data from sediments, recheck the calculated percentages

20 change one of the two “numerous” into “many”

A question in general: Is it possible that the gam-calcite hides potential effects of reduced calcification of earlier formed carbonate, specifically for G. sacculifer?

In general the paper presents some new evidence for the effect of the carbonate ion concentration in marine waters on the calcification rate of planktonic foraminifera. However, it is difficult to extract which new data contribute to the final conclusions, certainly with regard to the partly weak correlation(s) as shown in the figures 2 and 3. A better substantiation of the interpretation by additional data or reconsidering the existing data set should be done. Nevertheless the paper gives a good summary of the work done so far and clearly points us into the direction for future research and as such is valuable. The paper further could be improved by some grammar and language polishing of a native English speaker.

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Interactive comment on Biogeosciences Discuss., 6, 8589, 2009.