Biogeosciences Discuss., 8, C4082–C4084, 2011
www.biogeosciences-discuss.net/8/C4082/2011/


**Biogeosciences Discussions**

# *Interactive comment on* "Non-lethal effects of ocean acidification on two symbiont-bearing benthic foraminiferal species" *by* A. McIntyre-Wressnig et al.

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Received and published: 2 November 2011

This review was compiled by Jason Hall-Spencer and Laura Pettit at the University of Plymouth.

General comments

This paper examined the effect of high pCO2 levels on the survival, fitness, growth and calcification of two species of benthic foraminifera. This study is a useful contribution to ocean acidification research, although we offer some criticisms that we hope are constructive and flag some concerns regarding the methodology.



It is not clear how growth was measured in the experiments.

In each experiment, a rebound treatment was conducted whereby the foraminifera were left to "re-equilibrate to atmospheric conditions for ∼24 h prior to subsequent analysis'. It is unclear why rebound treatments were performed. The applicability of rebound conditions with future ocean acidification is questionable as, presumably, suddenly changing the experimental conditions to ambient pCO2 levels will have subjected the foraminifera to yet more stress.

Seawater for analysis of carbonate chemistry was kept in a separate 22ml container, whereas individual foraminifera were kept in plate wells with 1.7 ml of seawater. The seawater which the foraminifera were directly exposed to was not recorded. Was the carbonate chemistry in the smaller volume of water in the plate wells likely to change to a greater degree and be affected by photosynthesis and respiration of the foraminifera and their symbionts? The pH and calcium carbonate saturation states were only reported for week 1 due to salinity changes in the vials used for seawater analysis. It is not known, therefore, what the seawater carbonate chemistry conditions were at week 6. The timing of the experiments could be clarified. Were the 1000 ppmv and 2000 ppmv treatments conducted at the same time, or one after another? This should be stated in the methodology.

The control (385 ppmv) pCO2 levels were achieved by aerating the plate wells with laboratory air. Was variability in CO2 concentrations in the laboratory air measured?

Additional comments

P9166, line 20: Rodolfo-Metalpa et al. (2011) Nature Climate Change 1, 308-312 describes how calcification rates can increase, yet tests dissolve at increased CO2 levels.

P9167, line 27 there has been considerable work on the effects of ocean acidification on algae but very little on plants.

P9168, lines 10 and 26 Dias B et al. (2010). Modern seawater acidification: the response of foraminifers to high-CO2 conditions in the Mediterranean Sea. Journal of the Geological Society, London. 167, 843-846. This reference describes benthic foraminiferan community response to ocean acidification and is relevant to the paper.

p9170, line 20: How were 'healthy-appearing' individuals determined?

P9175, line 15-18: The contribution of cytoplasm to the overall volume was estimated by the mean difference between dry weight and wet weight (when all chambers were filled with water), but the cytoplasm does not normally fill all chambers.

P9178, lines 25-26: Test microfabric alterations were observed in some of the offspring incubated at 2000 ppmv CO2 after 6 weeks, but it is not clear when the reproduction occurred. The offspring may not have been subjected to experimental conditions for 6 weeks.

Table 2: More offspring were present in the week 6 rebound treatment. Does this mean that reproduction occurred once the specimens were removed from high pCO2 conditions?

Figure 5: What does C show?

Figure 7: The arrows which should point to the test aperture are not present.

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Interactive comment on Biogeosciences Discuss., 8, 9165, 2011.