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Biogeosciences Discussions

Interactive comment on "The metabolic response of pteropods to ocean acidification reflects natural CO_2-exposure in oxygen minimum zones" *by* A. E. Maas et al.

Anonymous Referee #3

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General comment

This paper investigates the effect of high CO2 (1000 ppm) on the respiration and ammonium excretion of 5 temperate pteropods species. The main novelty of this study is that 4 of the species investigated are known to cross oxygen minimum zones during their diel migration. These zones are of particular interest due to their natural low pH / high CO2 conditions. The authors results tend to show that the respiration and excretion of the 4 species naturally migrating through the OMZ are not affected by increasing CO2 level whereas respiration and excretion of the non-migrating species was impacted by high CO2. The investigation of zooplanktonic organisms crossing this

layer of low pH is of particular interest in the context of ocean acidification. This study show that the history of an organisms can mitigate it s response to low pH. Furthermore this new set of data on pteropods and the response of their physiology to high CO2 is an important contribution to the understanding of this potentially highly sensitive species. However, I regret that experimental limitations (only two CO2 levels, 1 non migrating species, very few replicates) do not allow to draw strong conclusions. Furthermore data on the carbonate chemistry are missing and limit the potential impact of this study. More details on the differences between surveys, collection methods, etc, as well as their potential impact on the results are also necessary.

Introduction

l-18-p 10296: Feely et al., 2004 is not a good reference for the increase of CO2 from 280 ppm to 390 ppm.

-l-20-p 10296: Maybe you should include a reference here.

-l-16-p 10298: Is 400 ppm significantly different from the "normal" CO2 concentration?

-l-18-p 10298: The fact that $\Omega a < 1$ at 1000 ppm is highly dependent on TA and temperature. Are you sure that it is true at 10 °N? This statement need more details or it should be removed.

Materials and Methods

-l-10-p 10299: More details on the collection of the organisms will be welcome. What was the depth of collection of the organisms? Which species were collected by scuba, which one by trawling?

-l-13-p 10299: Why did you work at 20°C? I am a bit concerned by the temperature choice since you worked on species that can leave at much cooler temperature. For example if your organisms were collected at 50- 100 m deep, the temperature at the collection depth was $\sim$ 15 °C. Temperature could have a strong impact on your results, since the non-migrating species is the only one that is living at 20 °C.

-l-21-p 10299: Complementary information on the carbonate chemistry are critical to better assess the impact of reduced pH on pteropods. Please specify the pH scale use, the calibration method used, . . . Did you measure an other parameter of the carbonate chemistry (DIC, TA,..)? Without these information it is difficult to place this study in the context of ocean acidification.

Results

- The small dataset might have a huge impact on your results. Can you specify the power of your statistical test?

-l-10-p 10301: The figure 5 do not show the differences in vertical distribution between species since the species are not specified on the figure.

-l-22-p 10301: Could you specify the pH scale of these measurements?

Discussion

- Discussion on the effects of the sampling (difference scuba / plankton net), temperature, small dataset should be included.

-l-22-p 10301:More details in the results would be necessary to do this statement.

-l-08-p 10302: Since Diacria quadridentata was collected close to the surface, this species was probably less stressed by the sampling than the species collected deeper. Furthermore it is the only species living continuously at $\sim$ 20 °C, the incubation temperature. Could you discuss this issue?

Interactive comment on Biogeosciences Discuss., 8, 10295, 2011.