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Biogeosciences Discussions

Interactive comment on "Effect of CO_2-related acidification on aspects of the larval development of the European lobster, *Homarus gammarus* (L.)" *by* K. E. Arnold et al.

Anonymous Referee #2

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General comments

The authors studied the effect of CO2 on larval development of the european lobster, Homarus gammarus (L.) focusing on the effect on calcification structures. This is an interesting and timely aspect with respect to the impact of ocean acidification on crustaceans. The critical point of the manuscript is the methodology. The description of methods is very unclear difffuse. Without adequate classification of larval developmental stages, it will be not possible to be certain about the correct larval age. This can influence the results with respect to larval composition and growth.

Specific comments and questions

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Introduction:

page 3090 line 10: the authors argue: “Early investigations suggest that early life stages developmen may be slowed ... or even completely disrupted ... at CO2 levels ... “ It will be not possible to make evidence about larval development times when moulted larvae were not seperated per larval stage and age. see methods...

Material and methods:

page 3091 line 20: How many larvae were used from how many females? Was the start and timing of the incubation the same for all treatments?

page 3091 line 21: 50 larvae in a 1 liter flask is a large biomass per volume of water. (The lobster zoea larvae stages have a size from 7 to 12mm from the rostrum to the end of the abdomen.) This density will lead to high mortalities and cannibalism among larvae.

page 3091 line 22: The relatively large temperature variability from 18 to 20 °C can lead to differences between larval development times in the flasks.

page 3091-92: The treatments were explained in a very preliminary and diffuse way. Did you close the flasks of the different treatments? Which flask did you acclimate for 2 h?

page 3092 line 17-22: Which age within larval stages did the sampled larvae have? Different ages within a zoea stage means different development times and, as a consequence, differences in the composition of larvae. How did you measure carapace length and carapace area?

page 3092 line 24-26: Did you use the same individuals for larval growth and measurements of mineral content? This is not clearly explained in this part.

Results:

page 3093 line 18: Which age did larvae have within each stage at the specific sample

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dates?

Fig.1b: It is better to depict the stages on the x-axis and the development time (in days) on the y-axis. For the different larval development times during one zoea stage it is important to show standard deviation. 1200ppm not 1000ppm CO_2

page 3093 line 20: What do you mean by "circa 28 days"? Specify your incubation and sampling in the material and methods part.

table 1: Why did you use 17 °C in your calculations and not 19°C? According to the text the control treatment occurs under 365ppm CO_2 (page 3092 line 8) but in the table under 315 $\pm$ 18,83ppm CO_2?

Interactive comment on Biogeosciences Discuss., 6, 3087, 2009.

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