

## ***Interactive comment on “Chronic exposure of the North Atlantic copepod *Calanus finmarchicus* (Gunnerus, 1770) to CO<sub>2</sub>-acidified seawater; effects on survival, growth and development” by S. A. Pedersen et al.***

**Anonymous Referee #1**

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**General comments** This is a simply study examining effects of very high CO<sub>2</sub> concentrations (3300, 7300 and 9700 ppm) on development of a copepod. I have some concern about (1) the usefulness of the data obtained under those levels, and (2) the novelty of the study. (1) Why did the authors select these levels? In page 5285, Vetter and Smith (2005) is cited to argue that the highest level used is relevant to estimate impacts by CO<sub>2</sub> leakage from a subsea CCS site. But the paper does not say anything about expected CO<sub>2</sub> levels due to leakage. How can these data contribute to risk assessment of CO<sub>2</sub> leakage from a CCS site? The authors are encouraged to state

C1763

more clearly rationale for their choice of CO<sub>2</sub> levels. (2) There are published studies on copepods that examined CO<sub>2</sub> effects, and we know already something about their responses to acidified environment. Then, what is the new knowledge we can learn from this study? Is this not a repeating of what has already been done with just another species? Please stress any new insights generated by this study.

**Specific comments** Title: I think that the word “chronic” is not appropriate because it means “marked by long duration or by frequent recurrence over an extended period of time and often by slowly progressing seriousness : not acute”(Merriam-Webster Unabridged). The authors may use “medium-term exposure” or “28-day exposure” instead.

**Abstract:** The use of “microcosm” is disturbing. The words “microcosm”, “mesocosm” and “macrocosm” are most often used when studying interactions of different species in an enclosure of different size. Why do not the authors call it just as an experimental setup/system?

**Methods:** In 5281 L12, it is stated “240 newly laid eggs were...transferred to each incubation chamber...”. And there were 12 chambers (4 CO<sub>2</sub> levels x 3 replicates). This means that at least 2880 eggs were used. Were all the exposure experiments conducted on the same dates? Or there were some staggering? And from how many females were these eggs originated?

**Results:** In 5282 L13 The authors stated “Copepodites stage and sex of adults were determined...”. Were there adults after 28 days of exposure? If so, please state the number of males and females in each condition.

5279 L1 What is “mature water”? 5279 L8 How many females did the authors use? 5279 L8 Did the authors used only one tank? In this way, it seems not possible to estimate eggs originated from how many females. 5280 L4-11 Did the authors measured CO<sub>2</sub> concentrations of these gas mixtures? If not, how the authors confirmed? 5281 L1-10 Did the authors confirmed plankton concentrations? The food was always suffi-

C1764

cient? 5281 L12 Was the exposure to all CO<sub>2</sub> levels started on the same day? If so, the authors must have needed about 3000 eggs (240 x 12). For what did the authors sort the eggs? Did the authors confirm the eggs were all fertilized? 5281 L26-27 Without water renewal, there might have been accumulation of waste materials in the experimental seawater. Do the authors have data for ammonia etc in seawater? 5282 L24 “derived species”? 5283 L17 What are “two single nauplii”? Was there one nauplius or two nauplii? 5284 L25 “suggest” > “suggests” 5286 L19-22 When the authors had already realized this, why then did not the authors employ an experimental protocol to reveal this? 5286 L23-5287 L5 Why did not the authors attempt to do this?

Table 1 Add units. Fig. 4 Add number of individuals.

Technical corrections 5275 L1 “middle”? “mean”? 5275 L2 “is” > “has been” 5281 L1 “feed” > “fed” 5284 L16 “more short-term” > “shorter-term” 5284 L18 Delete “the survival in terms of low” 5285 L3 Delete “a” before CO<sub>2</sub>. 5285 L3 Delete “it”. 5285 L7 “is” > “are”. 5285 L11 “within” > “by”. 5285 L12-13 Delete “survival, in terms of”. 5285 L29 “retards” > “regards” 5289 L8 “ration” > “ratio”

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