

Interactive comment on “Impact of CO₂-driven ocean acidification on invertebrates early life-history – What we know, what we need to know and what we can do” by S. Dupont and M. C. Thorndyke

Anonymous Referee #3

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The paper entitled [Impact of CO₂-driven ocean acidification on invertebrates early life-history - What we know, what we need to know and what we can do] by S. Dupont and M.C. Throndyke review studies evaluating the effects of ocean acidification expected to occur by the end of this century on survival, development and calcification of the early life stage of several different calcifiers and non-calcifier (tunicates).

As the author mentioned, evaluation of the effects of ocean acidification on these early life stage is a highly important and interesting topic to be studied because these stages could be the most sensitive stage to the environmental change, and effects on these

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stage can affect the population dynamics.

However, my major concern of this paper is that among the 17 paper referenced, 6 are “personal communications”, 3 are “submitted”, 1 is “in preparation”, 1 is “abstract of conference” and only 6 papers are already pressed. Hence, although this paper could be a very interesting paper a few years later (after all these “personal communications” and “submitted” paper has been published), at this moment, it is impossible to evaluate the effectiveness of this paper as it is unable to confirm the accuracy of the methods and results of most of studies referenced here. Additionally, authors should explain more carefully what is the difference and novelty of this paper compared to the recently pressed paper by Kurihara (2008) entitled [Effects of CO₂-driven ocean acidification on the early development stages of invertebrates]. Most of the pressed paper (4 out of the 6 papers) referenced here are also discussed at Kurihara (2008) and most of the topics such as [impacts on physiology], [adaptation potential], [synergetic effects of OA and temperature], [importance of studying non-calcifiers], [importance of evaluating the whole life cycle], [ecological implications] are also discussed in the paper Kurihara (2008), and hence it is hard to figure out the originality of this paper.

My another major concern is that although authors has pointed out that they [focused on studies evaluating effects expected by 2100 (pH decrease of 0.3/0.4, pCO₂ of 750ppm) and in experiments manipulating CO₂] to [predict climate impacts on ecosystems at ecologically realistic conditions] at p. 3 line 1-10, most of the discussion are focused on physiology or adaptation or tipping point rather than on ecological or ecosystem point of view. Though I agree that to predict “what will happen in marine ecosystem by 2100” is essential to focus on studies evaluating effects at CO₂ value expected for 2100, in terms of physiological or mechanistic or adaptive studies, I could not understand why authors should exclude all published data (there are several interesting data that could be discussed here) evaluating effects of higher CO₂ levels (e.g. 2000ppm; pH > 7.3) expected to occur in the far future (e.g. 200 or 300 years later). Actually, though authors dwell on “realistic pCO₂ level” the studies discussed

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about end-Permian extinction at p. 9 line 15 deal with CO₂ concentration higher than 2,000 ppm. Hence I consider that the paper would benefit from discussion focused on ecological or ecosystem implication rather than mechanistic or adaptive potential.

Other specific comments 1. What is the relationship between the figure 1 and the sentence [Calcification also involves different processes including ion pumps and the maintenance of a suitable microenvironment local to the site of skeletogenic calcification] at p. 6 line 10. I could not understand what authors want to mean by the figure 1. Please explain. 2. It is hard to understand what authors want to say at the sentences p. 6 line 15-24. 3. Although authors pointed out the importance of [not focused only on calcifiers and more energy should be invested in the potential “winners”] at p. 9 line 20, they had completely ignored a mass of studied evaluating effects of hypercapnia on fish physiology (e.g. Ishimatsu et al. 2008). These studies could be a good example to understand why some species are very “strong” to the ocean acidification.

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