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Biogeosciences Discussions

Interactive comment on "Comment on "Effects of long-term high CO_2 exposure on two species of coccolithophores" by Müller et al. (2010)" *by* S. Collins

Anonymous Referee #2

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The MS of S. Collins addresses one of the most important questions in the field of phytoplankton: response towards global change. Since the majority of work has been done by biological oceanographers, ecologists or physiologists generally lack a data-set which allows for clear and concrete evolutionary conclusions, which are needed for future scenario predictions. I agree that we must integrate experimental evolutionary approaches and concepts into our ongoing work. In this sense, S. Collins' contribution and the hopefully-induced discussion are very much appreciated.

Collins' motivation stems from primary conclusions of the publication by Müller et al. 2010 (BG) where the authors present the question concerning the possible nature of

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their findings due to acclimation or adaptation. From what I can personally see, there is no evidence of this, due to the selection pressure release between days 73 and 80, followed by a total recovery of the growth rate to that of the starting/control conditions. However, this study was indeed beneficial for future interdisciniplary research teams studying the impact of high CO2 levels on phytoplankton community evolution as suggested by Collins.

Here are a few critical points that might be discussed in order to further the progress:.

Abstract: The abstract is rather short and could contain more detailed information. There is no doubt that marine microbes have the potential to complicate experimental evolutionary experiments, however, as single celled organisms have a high division rate, they represent at the same time many advantages in comparison to other organisms (see details in Elena and Lenski 2003, cited also in the MS).

Collins correctly stated that there are at least two concepts of studying potential evolutionary response to selection. Firstly a competition experiment between the evolved genotype and its own ancestor and secondly a comparison of fitness parameters under the given conditions. I do not however agree that the first named approach is impossible, due to the fact that for some microbes—perhaps not for coccolithophores (here *Emiliana huxleyi)*—many necessary tools are at our disposal. The MS, in particular the discussion, would further benefit from a more general discussion of not only coccolithophores, but perhaps all major planktonic groups such as diatoms, dinoflagellates and even other haptophytes.

Interactive comment on Biogeosciences Discuss., 7, 2673, 2010.