

Interactive comment on “Comment on “Effects of long-term high CO₂ exposure on two species of coccolithophores” by Müller et al. (2010)” by S. Collins

Anonymous Referee #1

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This manuscript identifies some important discussion points arising from the original manuscript 'Effects of long-term high CO₂ exposure on two species of coccolithophores'. The author highlights the additional requirement for understanding the effects of genetic and community changes during such long-term studies in addition to any physiological changes. The author discusses the limitations and difficulties in trying to differentiate between these different factors in current experimental systems and proposes some potential solutions, most notably in the application of standard ecological theorems to long term experiments of this nature. In general, the manuscript provides a balanced discussion on the wider ecological considerations regarding the evolution of phytoplankton communities in response to a changing climate and raises

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some important considerations for the design of future experimental approaches. The author highlights some of the important limitations regarding the use of marine phytoplankton in traditional ecological studies and proposes that ecological tools such as the Price equation can be used to facilitate the study of evolutionary change in these organisms. However, it is unclear how this approach will overcome several of the limitations listed previously, such as the requirements for low cell densities, multiple independent replicates etc., as all these considerations still apply to the generation of data required for calculation of the Price equation. This should be clarified. The author also highlights that many marine phytoplankton exist in culture as asexual diploids which may mask novel mutations. This in turn raises an important point regarding the paucity of knowledge on the life cycle of many marine phytoplankton. I think the discussion would benefit from a comment on the validity of extrapolating from the study of long term evolutionary change in cultured asexual diploids to natural phytoplankton communities in which there may be high levels of genetic mixing.

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