

Interactive comment on “Ocean-related global change alters lipid biomarker production in common marine phytoplankton” by Rong Bi et al.

Anonymous Referee #2

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The manuscript by Bi et al. describes the response of three species of phytoplankton to a combination of three parameters relevant for the adaptation of algae to future climate change. The highlights of the manuscript are the multifactorial nature of the experiments and their meticulous execution, including a full account of carbonate system parameters. That being said, the manuscript is a little lean on the methods section such as details of the cultivation. I have only minor comments on the manuscript and believe that all conclusions are sound, but I have the feeling that major opportunities to derive novel and far-reaching insights were missed. For instance, the discussion could be more specific on the geological implications of changing alkenone ratios and sterol compositions and abundance. Similarly, the impacts on the food web (past and present) could be discussed in more detail. I was also expecting an analysis of the

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caloric content or of energy storage molecules (e.g. triacylglycerols), which could be a great addition to the study.

Line comments:

Line 65-70: It would be useful to describe the directionalities of these changes. Were these changes significant so that they prompted the present study?

Line 102-139: Were the culture axenic? If not, how was bacterial growth controlled?

Line 103: Could more information be supplied for the identity of the *Rhodomonas* strain such as a strain number and/or statements on deposition in a culture collection?

Line 117-132: It is not clear how target pCO₂ was maintained in the semi-continuous cultures.

Line 134: From the description it is not quite clear why these cultures are considered semi-continuous. Was a large volume of sample withdrawn directly from the reactor? How much volume was taken and what was the sampling interval? After what interval (turnovers?) was the culture considered to be back in steady state?

Line 141: How were cells counted/fixed

Line 153-154: What was the volume of the samples?

Line 278: POC is mentioned here for the first time but it was not described in the methods how it was determined.

Line 310-313: Would this comparison change if the maximum growth rates of the batch cultures would be used for comparison? Can a stationary batch culture be reasonably compared to a continuous culture in terms of energy availability for remodeling?

Line 410-412: Could this be expanded on by considering expression of lipid biosynthesis genes and/or energy storage?

Line 417: Unclear if the “strong increase” in PUFAs is significant.

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Line 810: Spell out Dims.

Figures 1-3: It would be great to add information on error bars (standard error? triplicates?) to all figure and table captions.

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