

Response to Anonymous Referee #1

We would like to thank the Referee for finding our paper well organized and the data clearly presented. The Referee has pointed to some very important issues in our paper mostly relating to the data interpretation and implications of the mesocosm results to the “real-world”. Addressing these points in the reworked manuscript considerably improved the paper.

General comments:

Referee comment: Unfortunately, I don't know how to relate the results of the mesocosm experiments to what might happen in nature with increasing pCO₂. The experimental outcomes were variable throughout various phases of the time course experiment. In considering the significance of these findings in a natural setting, I don't know if I should be considering the final incubation results (at day 27), or those at the end of one of the experimental phases.

Authors' response: Regarding our interpretation of the phase variability and the final results, we made it clear in the reworked manuscript that the phase analysis is important to interpret how bloom dynamics and species succession may respond to ocean acidification. The whole system response at the end of the experiment has important implications for biogeochemical feedbacks.

Referee comment: It is the responsibility of the authors to tell the readers how we should interpret the significance of the results. At present, the paper is more of a 'data dump' than it is an advance of our understanding of the system. The Summary simply restates the findings, and the findings are limited to quantifications, but no insights. The reader needs better guidance from the authors as to the real world/ocean meaning of the results. I do not object to this article being published since it is apparently complementing several other papers in a special issue. But to have some impact the article needs to do a better job of standing on its own; what did the authors learn from this work, other than just C:N and C:P drawdown ratios, etc? Given the results of this work, what do we now know about increasing pCO₂ in the Arctic in terms of its impact on NCP and elemental drawdown ratios? The paper would be much strengthened if those issues were addressed.

Authors' response: In the reworked manuscript the results are discussed more thoroughly. The reworked discussion puts greater emphasis on taking the results out of the mesocosms and into the real-world. This encompassed greater integration with the other key results from

the special issue and also it extrapolated the main findings to speculate on the consequences for Arctic biogeochemical cycling in the coming decades.

Referee comment: The Abstract, Intro and Methods have several grammatical problems.

Authors' response: The reworked manuscript was carefully checked.