

Interactive comment on “Arctic microbial community dynamics influenced by elevated CO₂ levels” by C. P. D. Brussaard et al.

Anonymous Referee #1

Received and published: 2 November 2012

1. Does the paper address relevant scientific questions within the scope of BG? * The paper addresses a very important scientific question regarding the effect of elevated CO₂ levels on the dynamics of the Arctic microbial food-web. This should be within the scope of BG.

2. Does the paper present novel concepts, ideas, tools, or data? * The paper does not present any novel concepts, idea or tools; however, the data per se is novel as it provides a more comprehensive picture of the interactions between communities in the microbial food-web and how this is influenced by changes in CO₂ levels.

3. Are substantial conclusions reached? The conclusions are in general substantial reached, with some exceptions: * Page 12316, line 15 and 16, and page 1231711-13. I am not convinced that the concentration of Nanophytoplankton III group was

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highest in the high pCO₂ mesocosms. In fig 1e, the abundance of Nanophytoplankton III in the high pCO₂ is similar as found in the intermediate pCO₂ mesocosms. * Page 12318, line 2. To strong statement. I do agree that these groups are most probably algal viruses, based on the dynamics in these two viral groups and the nano- I and pico- I phytoplankton group. However, the authors can't totally rule out the chance that these two groups consist of viruses infecting other hosts. Please de-emphasize the statement. * Page 12320, line 23. To speculative. It is not possible to give a measurement on the grazing of HP as these results were not presented in the paper. Is the pers com based on measurements from the same experiment? If so, would it be possible to include these data in the present manuscript? * Page 12321, line 12. Why is only Nanophytoplankton mentioned? In Fig 1b, there is also a high dominance of Phytoplankton II in Phase 1. The abundance of the Nanoplankton group is actually much lower compared to the Phytoplankton II group in this phase. In addition, figure 2 is confusing as the labeling of figure 2a reads Nanophytoplankton whilst the figure legend tells that this is Picophytoplankton. Are the labels of the y-axis in the two figures reversed? Please correct. * 12325, line 8-13. It is a bit speculative to assume that grazing was a major regulating factor on the HP community when it was not measured.

4. Are the scientific methods and assumptions valid and clearly outlined? * Yes

5. Are the results sufficient to support the interpretations and conclusions? Some of the conclusions need rephrasing/ clarification based on the results: * Page 12326, line 9-10. Why was grazing pressure measured only on the Phytoplankton groups and not on the heterotrophic prokaryotes? Such data would have provided a more comprehensive picture of the top-down effects in the microbial food web. * Page 12326, line 16-19. The conclusion on Carbon transport due to viral lysis should be more balanced as grazing was also mentioned to be an important loss factor of these populations at e.g. page 12318.

6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? * Yes 7. Do the

authors give proper credit to related work and clearly indicate their own new/original contribution? * Yes

8. Does the title clearly reflect the contents of the paper? * The title reflects the contents of the paper.

9. Does the abstract provide a concise and complete summary? * The abstract is clear and complete partly the summary. However, the last conclusion regarding viral lysis and effect of carbon cycling should be modified as grazing also was reported to be a major top-down predator on the phytoplankton community.

10. Is the overall presentation well-structured and clear? Some parts need to be clarified: * How was virus to prokaryote ratios calculated? Was it calculated based on the total viral count or only the smaller viral groups (V1, V2,V3) ? * Page 12311, line 11-27: unclear, please rewrite. * Page 12318, line 19. The heading for part 3.4 does not cover the content of the section as HP dynamics is discussed together with viral dynamics and VBR.

11. Is the language fluent and precise? In general the language is fluent and precise, but some parts need some more attention: * Page 12311, line 7-10, unclear. * Page 12312, line 15; include “and” before screened through a 3mm mesh. * Page 12314, line 4 and 5: Is it correct to have the cell size group 3-5 um as the last? Why is this size group not following 2-3um in line 4? * Change virus to bacterium ratio (VBR) to virus to prokaryote ratio (VPR) * Page 12313, line 13; write heterotrophic prokaryotes (HP) as this is the first time HP is mentioned. * Page12319, line 22, “some viral lysis” imprecise, please rewrite.

12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? * To my knowledge, this is correct.

13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? * Some parts need to be clarified as mentioned above. Fig

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1 might be reduced by combining the groups Nanophytoplankton III and IV as the abundance of these groups are very low and with similar dynamics.

14. Are the number and quality of references appropriate? * Ok.

15. Is the amount and quality of supplementary material appropriate? * OK.

Interactive comment on Biogeosciences Discuss., 9, 12309, 2012.

BGD

9, C5420–C5423, 2012

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