Biogeosciences Discuss.,
doi:10.5194/bg-2016-424-RC2, 2016

Biogeosciences Discussions

Interactive comment on "Acidification counteracts negative effects of warming on diatom silicification" *by* Alexandra Coello-Camba and Susana Agustí

Anonymous Referee #2

Received and published: 9 December 2016

This paper deals with physiological response of Arctic diatoms to increasing of temperature and pCO2. Cell volume, valve thickness and silicon incorporation rate of diatoms were examined by using the natural diatom community. The authors showed that cell volume and valve thickness of diatoms were decreased as increase of temperature and pCO2, while silicon incorporation rates were increased. The authors described that increase CO2 and water temperature affect negative effect of diatom silicification. It has taken great efforts to incubate many large bottles in this study. Also, there is new information on silicon incorporation rates of diatoms using a novel fluorescence bye PDMPO. However, this manuscript contains significant problems in experimental designs and methods they used. Therefore, data the authors analyzed do not support

their conclusion and are inadequate to lead their conclusion. I suggest the current manuscript doesn't merit to be published. Please clarify my questions listed below.

Introduction P2 line 14-23. My main concern is that the reason why they used the natural phytoplankton community is unclear. In the introduction section the authors describes that they analyzed the effects of temperature and pCO2 on cell and valve dimensions and silicification, and possible interactions. For such purpose incubation experiments using unialgal strains in laboratory under severely controlled condition are appropriate to demonstrate physiological response of diatoms to environmental changes. Advantages using natural plankton community are to evaluate ecosystem responses, such as competition among the other phytoplankton, species succession among diatoms and effect of grazing by microzooplankton.

Methods

P2 line 33-P3 line 9. The authors should describe when, where and how they obtained water samples for general readers.

P2 line 31-32. While setup conditions of pCO2 were described to be 380 ppm and 1000 ppm in the materials and method section, the results at 217.7 ppm, 780.8 ppm and 1652 ppm were shown. Which is right?

P3 line 8. Was the setup condition of light intensity (200μmol, continuous light) appropriate? At least the authors should show daily PAR at the same latitude for reference.

P3 line 13. Why were the concentrated water samples frozen? This procedure would damage diatom frustules.

P3 line 14-15. Were the density of dead (empty) diatom cells checked before cleaning procedure?

P3 line 27-28. How did the authors measure height of diatom frustules to the pervalvar axis to calculate cell volume?

P3 line 38. The authors used 250 mL subsamples from 20L incubation bottles for measuring silicon incorporation rates. Did the authors conduct CO2 bubbling or monitor pH value in the subsamples?

Results

P6 line 10-15. I can't understand this sentence. Were the cell volumes of the centric diatoms 21.4μm decreased, although their diameters did not change? This means that height of diatoms to the pervalvar axis. Please clarify this more detail.

Discussion

P7 line 2-10. I disagree this conclusion. It is unclear whether size of the same species was decreased or the dominant diatoms successed from large species to small species because diatoms were not identified to species.

P7 line 24-26. I disagree this conclusion. It is possible that a decrease in silica incorporation rates was due to lower abundance of total diatoms at higher temperature. The authors should show the initial concentrations of biogenic silica or total biomass of diatoms in 250 mL subsamples before incubation with PDMPO.

P7 line 27-32. I disagree this conclusion. It is possible that an increase in silica incorporation rates was due to higher abundance of total diatoms at higher pCO2. The initial concentrations of biogenic silica or total biomass of diatoms in 250 mL subsamples should be shown.

Table 1 Please show the longitudes and latitudes at sampling locations.

Fig. 2A. Is this figure the result at 380 ppm or 1000 ppm? Please describe more details in the figure caption.

Fig. 2 B. Is this figure the result at 1.8°C, 6.7°C or 10.3°C? Please describe more details in the caption.

Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2016-424, 2016.