

## ***Interactive comment on “Resilience to temperature and pH changes in a future climate change scenario in six strains of the polar diatom *Fragilariopsis cylindrus*” by M. Pančić et al.***

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Dear Anonymous referee,

We would like to thank you for your comments on the content. They are very helpful for us to improve the manuscript. Below you can find our response to your comments.

Page 4628 line 16-18 – Are there any field observations which can support our prediction? Field studies recording the presence of the species in question at different temperatures do exist. The species has most often been found widespread in polar and subpolar regions of the Arctic and the Antarctic (Lundholm and Hasle, 2008; Hasle, 1965; Poulin et al., 1990). Moreover, the records from more southern areas also exist,

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e.g. the Baltic Sea, North Atlantic (Hasle, 1965), although it has been hypothesized that the cells were carried to those areas by the southward currents (Hasle, 1965; Von Quillfeldt, 2001). As pH levels are rarely recorded and almost not-existing in the Arctic (Thoisen et al., 2015) we do not have an access to field data supporting the prediction regarding pH.

Page 4629 line 7 – Feng et al. 2008 paper is based on experimental researches other than modeling study. The citation of the paper will be removed since the paper is not a modeling study.

Page 4631 line 15 – Did the six strains also show big differences on morphology and molecular sequences. As mentioned in the Results, the molecular analyses showed that the ITS1. 5.8S and ITS2 sequences of all six strains were identical, showing that they belong to the same species. We did not characterize genetic differences any further, as this was not within the scope of the paper. With regard to morphology, we examined three of the strains (D10A12, D4D11 and D3G1). Their morphometric data were overlapping except for a difference in valve length (expected among strains of pennate diatoms) - all in agreement with *F. cylindrus* sensu in Lundholm and Hasle (2008).

Page 4632 line 17 – References need to be included to support the selection of light level. The light intensity level in this study (90-100  $\mu\text{mol photons m}^{-2} \text{s}^{-1}$ ) was selected based on the measurements of the surface irradiation in late summer in the Arctic regions, which is approximately 1000  $\mu\text{mol photons m}^{-2} \text{s}^{-1}$  (Platt et al., 1982), and according to Nielsen and Hansen (1999), approximately 5-10 % of the surface irradiance penetrates down to the depth of 20 m. Based on that, we assumed that the light level of 90-100  $\mu\text{mol photons m}^{-2} \text{s}^{-1}$  could be found in Disko Bay in April-May in the upper 20 m surface layer, when the day length reaches 17-18 hours.

Page 4638 line 7 and Page 4639 line 10 – Double check the data, the SD values of temperature and pH could be up to 0.6 °C and 0.03 units, respectively. We agree that

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the SD value of temperature in the text is wrong ( $\pm 0.05$  °C). The typo will be corrected to  $\pm 0.6$  °C, as presented in Table 2.

Page 4628 line 16-18, Page 4640 line 1-2, Page 4644 line 16-19. Due to complexity of nature, laboratory experimental design is incomplete to mimic real environmental change, and the lab data could not simply be used to predict what will happen in nature even prediction is under limited conditions. We agree with the reviewers point in as much as only temperature and pH as well as multiple strains were considered, whereas in the field, the situation is more complex compared to the experimental setup. Incubations of natural populations also have some their shortcomings (grazers, pathogens, etc.), which is why the following sentence will be added in the end of the discussion: 'Controlled laboratory experiments cannot mimic the real environmental changes, yet they are currently the only direct test for creating plausible future climate changes and examining their effects on marine phytoplankton.'

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Interactive comment on Biogeosciences Discuss., 12, 4627, 2015.

**BGD**

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