

Responses to interactive comments by Yong Zhang on our manuscript 'The Arctic picoeukaryote Micromonas pusilla benefits synergistically from warming and ocean acidification'

I think that the manuscript is already there, and it deserves to be published. The manuscript is well written, well structured and clearly concluded. I only have a few comments.

We thank the reviewer for his kind words.

Line 97: Please provide the (mean) seasonal CO₂ levels and temperature range in the sampling location.

Unfortunately, seasonal CO₂ data for the sampling area is not available. While we do know that such a dataset is under progress (PJ Gattuso et al.), it is not available and citable right now. The local temperature ranges between -1.5 and +8°C, and we added this information to the manuscript (new L97-98).

Line 167: Please show the unit in 'μmol photons m⁻² s⁻¹'.

Following the reviewers' suggestion, we have converted this unit, and this section now reads "the applied light intensity was 21587 μmol photons m⁻² s⁻¹" (L168).

Line 309: Please add 'and nutrient uptake' after 'enzymatic reactions'.

We disagree with the reviewer that this should be added here, as we do not discuss nutrient uptake kinetics in this section, but rather refer to metabolic reactions in the cells in general. The general statement that "enzymatic reactions run faster under these conditions" (L310) certainly includes active nutrient uptake mechanisms.

Lines 336-342: Sett et al. (2018) reported that high CO₂ and warming increased the percentage of larger diatom species in indoor mesocosm experiment with nutrient-replete conditions. Wu et al. (2014) reported that rising CO₂ showed larger positive effect on growth rates of large diatom species than small diatom species. Please compare your results with the data of Sett et al. (2018) and Wu et al. (2014).

Following the reviewers' suggestion, we now compare our results to those of Sett et al. (2018) and Wu et al. (2014) by writing "While this could be related to the large surface to volume ratio of small cells, opposite trends within the group of diatoms (i.e. higher sensitivity of larger compared to smaller diatoms; Wu et al.; 2014; Sett et al. 2018) suggest more complex underlying mechanisms at play" (L343-346).

Lines 451-452: Please delete '(e.g. due to higher turnover rates of RuBisCO)'.

We do not understand why this information should be deleted, and think it adds a good level of detail to our statement. We therefore prefer to keep this half-sentence in the manuscript. If the editor insists, however, we would be willing to omit it.

Table 3 in page 26: Please change 'ETR_{max}' to 'rETR_{max}'.

Following the request by one of the reviewers in the first round of revisions, we are now consistently using the unit 'ETR_{max}' instead of 'rETR_{max}'.

In figure legends in pages 27 and 28 : Please exchange the 'open' and 'filled'. As I seen, 'open symbols' represent high temperature, and 'fill symbols' represent low temperature in figures 1 and 2.

We thank the reviewer for spotting this typo, which has been corrected in both figure legends.