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Interactive comment on "The Arctic picoeukaryote *Micromonas pusilla* benefits from Ocean Acidification under constant and dynamic light" *by* Emily White et al.

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Abstract: Good

Introduction: Good overview of a scattered field.

Figures + legends: Good.

Materials & Methods: "well as with macronutrients in Redfield proportions (containing 100 μmol L-1 of nitrate and silicate, and 6.2 μmol L-1 phosphate)."

The goal is to understand what Micromonas might do in a changing Arctic ocean. So how does 100 uM NO3- and 6.2 uM PO4 3- compare to natural levels?

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We live in an imperfect world, but responses to an increase in pCO2 (or to fluctuating light) might be very different under a situation of luxury accumulation of excess protein, vs. nutrient limits on protein accumulation etc. Just dimly remembering that 80 uM NO3- is about the equivalent of the Pearl River Delta, so.... pretty high?

I know we face compromises in culture work at getting enough biovolume in a reasonable culture volume, but these points might influence/alter/limit the findings?

In contrast the fluctuating light regime is nicely justified in terms of realistic approximations of the environment.

Eqn. 3 would benefit from an additional set of parentheses around the denominator terms to clarify the order of operations.

Eqn. 4 should use sigmaPSII', otherwise you are not accounting for any non-photochemical down-regulation of sigmaPSII under illumination. If I entered the equation incorrectly in Xu et al. 2017, I apologize, my papers have been filled with equations typos lately.

Line 195: Do these dyes enter cells, or stay outside? or both? I am recently learning that superoxide radical has a very short diffusion length, whereas H2O2 can move a fair ways.

Results: Line 245 The indicator dyes show the standing pool of reactive oxygen, which is the outcome of production rate - detoxification rate. Picky point, but it is possible the effects result from changes in detoxification, rather than production. Also, standing pool of a ROS species is not necessarily the same as oxidative stress...

Lines 285 etc. increased tau under fluctuating light, compared to decreased flow to POC & growth strongly suggests an induction of dissipative electron transport capacity under fluctuating light, leading to 'dumping' of electrons under the high light periods.

Consider that you actually have all the data to estimate the Oxborough proxy for PSII l-1 (based upon F0/sigmaPSII). It is far from perfect, but, if you estimated it, and mul-

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tiplied by your e- PSII-1 s-1, you could get e- l-1 s-1 Then you can compare electron generation rate with growth rate or with POC accumulation and get an electron quotient for growth. I bet it increases under fluctuating light.

This is perhaps a more defined restatement of your lines 292 etc.

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