

Interactive comment on “Physiological responses of *Skeletonema costatum* to the interactions of seawater acidification and combination of photoperiod and temperature” by Hangxiao Li et al.

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I am very happy to see a study of the interaction of increased pCO₂ with temperature and photoperiod on a model diatom. These multifactorial experiments are challenging but necessary. To limit the (infinite) range of possible combinations the authors matched photoperiod to expected seasonal temperature.

I think the data, as presented, is valuable, but under-analyzed. I offer some suggestions

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for some cross plots of physiological performance at growth condition with achieved growth rate. What is the growth return on O₂ evolution across the conditions?

Abstract: Good

Materials and Methods:

2.3 The authors need to describe whether the growth rates taken every 2 days were averaged within each growth condition, or whether the maximum measured growth rate for a condition is taken. The presented growth rates are fast for a diatom.

'2.7 Measurements of PSII Proteins' or '2.7 PSII Protein Measurements'

(current header is technically correct but is archaic usage).

Figures/Results; Figure 1: Amazing growth rate under summer conditions; the fastest I have ever seen I think for a diatom.

Figure 2: Lovely data, congratulations. Very surprising switch of the OA effect in winter. Suggested additional plot: V at growth pCO₂? After all, most of the curve as plotted is above even the OA range of pCO₂. So a hypothetical V_{max} may not be as important as the achieved V at growth conditions.

Then, I would suggest plotting growth rate vs. V at growth condition (pCO₂ and light)

Figure 4: Without standard curves, be very cautious in interpretation of the immunoblotting data. The example blot result shows near-saturation (non-linear response of signal to target abundance) for many of the bands. So the Y axis dynamic range of the greyscale plots may be considerably compressed relative to the actual change in protein target abundance. Once a band is black, it cannot get any blacker.

It is also very surprising that in winter OA increased RbcL signal.

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