

Interactive comment on “Physiological response of a golden tide alga (*Sargassum muticum*) to the interaction of ocean acidification and phosphorus enrichment” by Zhiguang Xu et al.

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The authors grew an invasive *Sargassum* species under an ecophysiological reasonable matrix of pCO₂ and [phosphate]. They analyzed the growth rate, photosynthetic rates, nitrate uptake and reduction rates and composition of the algae. They show interactive effects of pCO₂ and [phosphate].

The study is well designed and potentially interesting. The current discussion spends words on entirely speculative interpretations that might well be true, but which are not directly supported by the data presented. On the other hand, intriguing ratios and discrepancies in the presented results are not discussed. For example, how can algal nitrate uptake rates exceed measured nitrate reduction rates? Does the tissue store

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NO₃⁻ differentially depending upon conditions? Are there variable rates of denitrification in the media?

What happens to the environmental effects upon photosynthesis if it is normalized to chlorophyll rather than freshweight?

I offer some suggestions below for the authors. best regards, Doug Campbell

Abstract: 'the development of golden tides...' (not 'evolvment')

39.31% etc. over precision. It is not possible to report such values to 1 part per 10,000 but that is what is implied by 39.31%

Introduction: '...it originates from Japan...' (not 'it origins...')

Materials & Methods line 155: units for total alkalinity?

Line 195: Decrease in NO₃⁻ in the media could result from microbial denitrification? A cross check would be whether nitrate reductase activity matched 1;1 with decrease in NO₃⁻ in the media?

Fig. 3: There is an inhibition response in HCLP that is not apparent in other treatments.

Fig. 4: Would a renormalization of photosynthetic rates (fig. 2) to chlorophyll content (fig. 4) eliminate some of the differences among treatments? I think maybe yes. Then some of the photosynthetic data can be explained by nutrient effects on content of photosynthetic units.

Fig. 5, Fig 6 There is a discrepancy. NO₃⁻ uptake from the media cannot exceed NO₃⁻ reductase rates, unless the tissue is storing NO₃⁻.

Fig 2 vs. Fig 8 dark respiration = ~1/2 of photosynthetic rates?

Results Lines 237-241 Over precision in reporting of results to 1 part in 10,000. This is a problem throughout.

Discussion Lines 428 to 440 are entirely speculative. They might be true, but there is

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no evidence supporting these specific interpretations, in this paper.

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