



EGUsphere, community comment CC1
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Comment on egusphere-2022-947

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Community comment on "Reallocation of elemental content and macromolecules in the coccolithophore *Emiliana huxleyi* to acclimate to climate change" by Yong Zhang et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-947-CC1>, 2022

The manuscript reported a practical finding that responses of elemental content and macromolecule of the *Emiliana huxleyi* to reduced phosphorus availability and ocean acidification depend on light intensity. The results of the study showed that under future ocean acidification and increasing light intensity conditions, enhanced carbon fixation could increase carbon storage in the phosphorus-limited regions of the oceans where *E. huxleyi* dominates the phytoplankton assemblages. This research could provide vital information for evaluating carbon cycle in marine ecosystems under global change.

The paper is well structured, the data are presented well, and the figures are well organized. However, some parts of the manuscript need further explanation and to be improved before acceptance for publication.

Line 60-61, 63-64: Please specify the light levels for "low light" and "high light".
Particulate organic nitrogen and protein contents at a cellular basis or on a total scale?

Line 62: I was wondering if it is more appropriate to use the term of "elevated pCO₂" rather than "ocean acidification", which has not been introduced in the text before. In fact, the authors used the terms of elevated pCO₂ and ocean acidification (used in a broad sense to include effects of both elevated dissolved CO₂ and the resulting decrease in pH) in the text, which is confusing. So, I would suggest the authors to select one term and use it consistently throughout the whole manuscript.

Line 140-141: Under reduced phosphorus availability, increasing light intensity and ocean acidification conditions. Should be cellular POC content? Please check this issue throughout the whole manuscript.

Line 143: Cellular PIC content?

Line 283-287 The method described in the paper is very similar to the phenol-sulfuric acid method for the determination of polysaccharides. Is the carbohydrate assay the same as the polysaccharide assay?

Line 158-214 The description of At LL intensity (Part 1) is too tedious and complicated, please simplify. Just explain the reasons for selecting the light intensity, phosphate concentration, acidification conditions and the approximate experimental steps. Or put the picture of the experimental method in the supplement to the manuscript, after all, there are only three figures in the manuscript.

Line 290-292 The percentages of carbon and nitrogen contributed by carbohydrate and protein were an important element of this study. Please provide more details of this method.

Fig 2 and 3, if the purpose of the authors is to compare the different responses between the light level 40 and 300 $\mu\text{mol photons m}^{-2}\text{s}^{-1}$, it would be better to merge Fig 1a and 1b.

Line 330-333: The p-values (0.48 and 0.68) indicated that the differences are not statistically significant. Also see this issue at Lines 365, 407, 413-414, 430 etc.

Line 337: See my comment above

Line 338-340: As the author concluded that there was significant interaction between CO₂ and P (acted synergistically), it would be better to present the results of three-way ANOVA analysis in the text to support this statement. This issue occurred at Lines 360-362, and Lines 415-417 (included but not limited, please check throughout the whole manuscript).

Line 385-388: Please rephrase the wordings here.

Line 484-487: Please rephrase the wordings here.

Line 520-521: I cannot see any "regulation mechanisms" that were proposed in the present study.

Q8. Line 524 'Therefore, the reduced phosphorus availability dominantly reduces the RNA content (Fig. S5)'. Was the algal cell RNA content also measured in this study? The method for this determination was not described in the M&M section, at least.

Line 545: '(Rokitta et al., 2016; Zhang et al., 2020; Wang et al., 2022) (Fig. S6)'?

Line 555 '.....and small subunit ribosomal protein S3E, S5E, SAE (PR-S3E, PR-S5E, RP-SAE) in *E. huxleyi* (Fig. S7)'. Please provide references for this statement.

Line 574: The authors found that more POC were allocated to carbohydrates but not to protein under high light intensity, reduced phosphorus availability and ocean acidification. This is a quite interesting finding. So, what is the possible reason for this? Could you please explain?