

Interactive comment on “Effects of light and temperature on Mg uptake, growth, and calcification in the proxy climate archive *Clathromorphum compactum*” by Siobhan Williams et al.

Anonymous Referee #2

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It is important to understand how different environment parameters affect proxy organism responses as this allows improvements in determining what signals the proxy is recording. This study investigates how light and temperature affect the growth and mineralogy of the coralline alga, *C. compactum*, which is used as a marine environmental proxy.

General comments: PAR vs lux: as alga will be responding mostly to the PAR, it is worth including some context of the relationships between lux and PAR in the context of this study. Maybe some PAR data are available that could be included from the field.

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Wound recovery vs Mg-light relationships: of course, both of these are important, however, in the context of the title, at points they seem to overlap during the manuscript making it a little tricky to work out which question is being answered and if there is an interaction between the two (in terms of the algal responses). I wonder, if having two separate sections on these in the Results-Discussion would help with this. It will be important to clarify if the wound recovery material was also the material used for the Mg analyses.

Figures: there are probably too many figures and the MS would benefit from combining some and moving others to a supp material. This will allow the reader to focus in on the key results being presented. For example: Fig 5 is valuable to explain sampling strategy but could go in supp material also, are fig 10, 11 and 13 needed in the main manuscript or could portions of the three be combined? Results section: good to see detailed results, however, in some cases (see below) I think there is a little too much detail and the key points being made are lost.

Details:

P2 L9, I would call these mesocosms, applies throughout.

P2 L9, replace word numerous with the exact number

P2 L13-15, probably better as two sentences

P2 L31, not yet been fully established

Paragraphs at P2 L30 and P4 L15, seem like they should be next to each other

P4 L28, maybe summarise this paragraph to the key questions being asked, a little too much detail at present

P4 L31, is there evidence that the scarring affected their mineralogic responses?

P5 L7, describe how the specimens were identified

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P5 L11, lux can be different to PAR, is there a difference at this site? Algae will respond more closely to PAR than lux so this should be expanded.

P5 L25-28, please also give the PAR (if possible) gradient in the tanks including how this compares to the field.

P6 L10, this is reasonable.

P8 Section 3.1.1: good to see all the details, but I do think the main points are lost a little in all the information. I think the key results would stand out a little more if the section was shortened.

P8 L22-25, could be moved to the discussion

P10 L10, comment regarding how this was handled statistically in the methods section

P10 section 3.2, maybe I misunderstood, but could multiple factors (light and temp) be included in the same analysis to account for any interactions? This may help frame the role of light more succinctly using interaction terms.

P30 & 31 fig legends, concentrations rather than values?

P30 fig legend, could b and c be combined and present as mean \pm SD?

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