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Biogeosciences Discussions

Interactive comment on "How will the key marine calcifier *Emiliania huxleyi* respond to a warmer and more thermally variable ocean?" *by* Xinwei Wang et al.

Anonymous Referee #1

Received and published: 1 July 2019

Review on: 'How will the key marine calcifier Emiliania huxleyi respond to a warmer and more thermally variable ocean?' by Wang et al.

The experiments are well designed and I have only a couple of smaller questions (see specific comments). The manuscript is well written. Overall, I found the discussion not extremely inspiring because I thought it missed a conceptual framework that helps to arrange the numerous datasets. Nevertheless, some of the key conclusions are interesting and the data is valuable. I therefore only have 'minor comments'

One major issue, however, is that the authors should deposit their data in a publicly accessible data repository and provide the link within the paper. This is important.

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Specific comments:

Line 132: How was light measured and kept identical between treatments? Measuring light in such blocks is challenging and there may be large differences between replicates and treatments. Please provide a detailed description. Line 135: Was the dilution medium also Aquil? Please clarify. Line 139: It is unclear to me from this description how negative growth was measured. Wasn't it just the reduction in cell numbers or in your case red fluorescence? Please explain this better. Line 146: Please indicate how long it took for the temperature block to reach the new temperature after switching the water bath temperature. Is there a significant time lag? I wonder if this could partially explain the lower response in the one day cycle, as the time lag may have promoted a weaker response. Line 154: Weren't the nutrients already in the dilution medium? Or did you adjust to 100 and 10 μmol/L? This is confusing. Please clarify. Line 167: It remains unclear if you always measured both fluorescence and cell number or if this varied between treatments? Please clarify and ideally give the reader an idea how similar the growth rates were when determined with these two measurements. Line 180: Please provide percentage of the HCl acid. Was it 37%? In this case fuming overnight is fairly extreme and may perhaps breakdown POC? Line 185: Not 100% sure but I assume Fu et al., 2007 did not invent this protocol. Please provide original papers here and also for POC,PON above. Line 188: See previous comment. Line 217: The description of the applied statistical tests needs a better description. Perhaps briefly go through the consecutive steps. Just for completeness. Only mentioning which tests were done may raise some eye brows. Line 227: What is the rationale behind showing the TPC/PON ratio? What meaning does it have and why is it important? I would intuitively say that this dataset could be removed from the results but I am of course interested what the authors think. Line 266: This may indicate a time lag until the high temperature was established so that the warm period was shorter than indicated by assuming an instant change in temperature. Please provide a retention time for how long it lasted until the new temperature was reached within the bottles. Line 267: This comment basically addresses all quota measurements and ratios. When you look at e.g.

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PIC/POC and do this for a one day period in the cycled experiments. To what extent is the response you measure and report here 'diluted' by the PIC/POC that manifested during the previous temperature that prevailed before? Is there a carry-over to the next day that needs to be accounted for? Line 380: The abbreviation TPCs is not ideal because it can be confused with total particulate carbon. I would suggest to use no abbreviation here. Line 406: A particularly comprehensive assessment was done by Zhang et al., 2014 from the Reusch group. This should definitely be considered here. Line 409: The Zhang et al., paper seems an overlooked but important paper here. Line 417: Schlueter et al., 2014 (also Reusch group) have shown that Ehux can quickly adapt to warming. Should be mentioned here, perhaps. Line 476: I don't understand how this trend can suggest these things. Isn't the damage of biochemical mechanisms simply your interpretation of what may have happened. Should be rephrased. Line 607: 'ectothermic' refers to animals or also plants/microbes? Please specify. Fig. 2 shows that the plasticity in PIC/POC is much larger than in the other ratios in this figure. I find this very interesting. Maybe it would be worth discussing this issue. Fig 6B: y-axis incomplete.

I hope my suggestions help the authors to improve their manuscript.

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