

The authors of this manuscript collected rhodoliths along a latitudinal gradient in the Northeast Atlantic and analyzed the stable carbon isotope signatures to indicate the carbon concentrating mechanisms. The study bears very useful information for potential adaptation of rhodoliths to future global changes. I suggest publication of this manuscript after revisions.

General comments:

1. As the title of the manuscript is “Latitudinal trends in stable isotope signatures and carbon concentrating mechanisms of northeast Atlantic rhodoliths”, one would expect to see what kind of latitudinal trends are discovered by the authors and what the mechanisms behind these trends are. In the results and discussion parts of this manuscript, these core issues are somewhat not clearly targeted and/or not well presented/interpreted. For example, the authors better add a map showing location of the sampling sites and better move Figure S2 into the manuscript (it is the latitudinal trend!). I would suggest the authors either change the title of the manuscript or re-organize the results and discussion parts a little bit.
2. Materials and methods. The authors claimed that the samples are sent to UC Davis for stable isotope analysis. Since isotope signatures are vital to the discussion of this manuscript, the authors better give a brief introduction of the analytical methods or add some references about the analytical methods although the analysis might be done in prestige institutions. This way readers can trace the quality of the data. This is also necessary for other parameters like %N_{org}, %C_T and %C_{org}.
3. pH drift experiment and light exposure experiment. It is not so clear why the drift experiments can help to determine if an efficient CCM is present. As the incubation was done just over a 24hr light cycle. Is the incubation in a closed system resembling that in the real environment? If this incubation time is long enough for to yield robust results? As for the light exposure experiment, the authors did not describe how they were done in the “Materials and methods” part, and they did not explain why these light intensities were chosen for the experiment.

Minors:

Page 1 line 25: “CCMs” should be “carbon concentrating mechanisms” as CCMs were not defined before.

In the whole text, one would get confused by the mixing use of $\delta^{13}\text{C}$, $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ for the isotope signatures!

Page 4 line 5: what the figures in the parentheses behind “Kobbel Ford” and “Akia Peninsula” mean?