

Author's Response to the Associate editor and Reviewers

Associate editor: The manuscript was evaluated once again by two experts in field. The reviewers and I agree that the authors overall did a good job addressing the comments provided to them during the first rounds of reviews. However, both reviewers provided some additional suggestions to improve the clarity of the text, in particular with respect to the Materials and Methods used. I kindly ask the authors to address these minor revisions. Once they do so, the manuscript will be ready to be accepted for publication in Biogeosciences.

Thank you for your positive assessment, we are happy to make these last changes. As suggested below

Reviewer 1: The authors have generally done a good job of addressing the previous comments. I would recommend the manuscript for publication pending correction of a few very minor errors.

- The response to review states that Rae et al., 2018 has been added to the Ms, but as far as I can tell, it hasn't. If the authors have elected not to add this reference, ok, but please be accurate in the response to review.

We are very sorry for this oversight. We are happy to include the reference as suggested in the first review. It is now inserted in 11.43 of the revised manuscript

- Fig caption 1. The plankton tow sites have been added – great. However, the caption says “red circles” when the points are black. “pCO₂” needs a subscript both times it has been added here.

The figure caption has been revised as suggested

- Table 1 and methods:

- o Please refer to “NIST RM 8301 (Coral)” by its full name rather than just the ambiguous “NIST-C”.

Done as suggested

- o The table says Stewart 2020. This should be 2021 I think.

It is cited as Stewart et al 2021, and yes that is the correct reference

- o Please also be consistent in reference to the “Southampton” lab. When the text says samples were measuring in “Southampton” and the table says “NOC” this is unclear to the reader. Best to use Southampton throughout. Perhaps also add “this study” to the relevant box in the table 1 as there are two examples of Southampton reproducibility.

Done as suggested

- o What are the $\pm$ values in table 1? This isn't mentioned in the caption. Are they 2 sigma or 1 sigma? Are they SE or SD? I am not sure like-for-like is being compared here, particularly when inter-lab consensus values are being compared to individual lab reproducibility. Please be clear on what is being presented.

The reviewer is correct. In the revised Table 1 we have specified exactly what the uncertainty refers to (e.g., SD, Robust SD and Residual SD) as it was originally reported.

- Table 3. Please add somewhere that these slope and intercept values are “linear” calibration fits to the data (i.e. in the form $y=mx + c$)

We have added this information as requested in the Table title. Specifically, we added: Slopes and intercepts were fitted with a York linear regressions of the type: $y=mx+c$.

- The number of significant figures in the reported Ba/Ca values in Table 2 have not been addressed. For example, if quoting 3 sig figs, then the value 601.80 should just be 602 $\mu\text{mol/mol}$.

We have amended the table and presented all Ba/Ca data with 3 significant figures.

Reviewer 2:

The authors addressed most of my comments from my last review. I am happy to recommend acceptance of the manuscript with some minor revisions to the method section.

Detailed comments Section 2.3 I acknowledge that the analytical methods of this work are a bit difficult to summarize, as it was done in two different labs. Some of the methods are repeated (e.g., d11B measurements); some can be moved to somewhere else for a better flow (e.g. 274-279). I suggest the authors reorganize and shorten this section for better readability.

Since the methods are quite different between the two laboratories, we were only able to make moderate changes. But we have shortened the text when possible (line 323-325) to avoid repetition during sections 2.3.1 and 2.3.2

L266: break this sentence into 2.

Done as suggested.

L269: not sure what bracketing standards are.

We have corrected this typo to “consistency standards” and amended the text to “consistency standards in-house standards placed at the beginning and end of each sequence were measured at the same concentration as samples to assess accuracy.” We have clarified this in the revised manuscript.

L269 “sample below 1mM” is not clearly written

We have amended the text to “1 mmol/mol”.

L295: My previous comments on the propagation of the uncertainties in d11B were not addressed.

The description is contradictory to itself as currently presented.

The JCP-1 measurements were only used to define the relationship between d11B uncertainty and 11B signal intensity (published in Anagnostou et al., 2019). We have rearranged the text as follow to clarify this point.

“The uncertainty on foraminifera $\delta^{11}\text{B}$ is dependent on the boron content (Rae et al., 2011), i.e. the intensity of the ^{11}B signal of each sample. The relationship between ^{11}B signal and sample uncertainty was empirically determined based on the uncertainty of repeated measurements of JCP-1 Coral (Porites sp.) that has undergone the same chemical purification. It is defined by the following equation (Anagnostou et al., 2019)”.

L 410: add “respectively” after uncertainty

Done as suggested

L488: caveat is not a verb

We have replaced “caveat” with “note”

L683: add “strong” before “sink”. Nuanced writing would be helpful if you are not presenting detailed arguments against the previous study.

Done as suggested