Dear Editor,
We are grateful for the constructive and insightful reviews of our manuscript "Effects of photosymbiosis and related processes on planktic foraminifera-bound nitrogen isotopes in South Atlantic sediments", and for the opportunity we were given to revise the manuscript and respond to questions and comments.
We carefully considered the comments and suggestions of both reviewers, which improved the manuscript, and we give detailed responses to their comments in the response to reviews. In addition, we added a few editorial changes to improve readability of the text.
In the response to reviews, **black** text is the original comment from reviewers, and **green** text is the associated response from the authors.
On behalf of all the authors,
Alexandra Auderset

Reviewer 1 (Rocco Gennari)
Dear Authors and Editor,
I found the manuscript entitled "Effects of photosymbiosis and related processes on planktic foraminifera-bound nitrogen isotopes in South Atlantic sediments" by Auderset et al. very interesting as it shed light on potential bias in using the FB-∂15N in particular oceanographic areas. The manuscript also explain clearly how this method has the potential to discern among different type of symbiont hosted in foraminifera and non symbiont-bearing foraminifera. The manuscript is well written and clearly present data and discuss them. I just found several unclear aspect in some sentences, figures or references to figures, which were highlighted as comment or insert in the attached PDF. For this reasons I think that after the review of the authors the manuscript could be ready for publication, depending on the comments of other reviewers and of the editor.

Line 104: You could list some more bias about the relation of ∂13C and symbiont, including DIC variation (e.g.: upwelling), see Schiebel and Hemleben 2017, pag. 293 fig. 9.3
Added a sentence about this ": The foraminiferal test size can be influenced by environmental conditions like surface water stratification with smaller test sizes reported during periods of upwelling (Schmidt et al., 2004)."

Line 207: I had to read this part more than once, as it seems that you are comparing slopes and regression coefficient. Maybe you can rephrase this sentence and delate "In contrast".
Removed "in contrast". We have now re-phrased this section to more accurately represent the statistics in response to reviewer #2's first comment (see below).

Line 212: My impression is that the slope of this correlation lines is very low, O fractionation doesn't change much with size and this is different from the carbon isotope. I think this could be observed already in the results.
Agreed. Will be addressed with comments from Reviewer 2 (see below).

Line 235: Why is the Sargasso value much lower than the global pycnocline nitrate? Because of fixation, as well?
Yes. Adjusted the sentence to make it more clear that the Sargasso Sea is a hotspot for N2-fixation: “For comparison, in the Sargasso Sea – an ocean region with persistent N_2 fixation, shallow thermocline nitrate…”

Line 255: I could not find any reference to Fig. 4a in the text. Tha should be before 4b.
Added a reference for Fig. 4a and 4c and changed the previous 4a into 4b to have all the panels referred to in the text in order.

Line 271: This is quite surprising because, being a deep dweller it should form the shell in a light ∂13C DIC environment. In a low productivity environment the effect of remineralization can be reduced?
To clarify this, we moved the discussion around depth habitat influence on d13C from the supplements into the main text (Lines 339-344).

Line 301: 5a?
Done

Line 313: Please, add also here reference to fig. 6
Done

Line 383: I don't think you need to introduce the next section here. At least, that's how I understand this sentence.
Removed the sentence.

Line 396: these are not shown in fig S9, either add the curves or refer to this figure un line above
Added Figure reference to line above.

Figure 6: The green and blue of bulloides and truncatulinoides, respectively, is difficult to distinguish. I suggest to make the green more green.
Done

Figure 7: The interpretation of this figure is not clear to me. All the triangle, excpet those indicated as 516 are from the same source as Fig. 5? The FB∂15N for dino bearing foram is an average and I didn't catch this at first sight, maybe it could be specified in the bold part of the caption.
Adjusted the Figure caption to make it more clear where the data is coming from:
“Figure 7. FB-δ^{15}N offsets between non-dinoflagellate-bearing foraminifera *vs* dinoflagellate-bearing foraminifera (the average of *G.ruber albus*, *T.sacculifer* and *O.universa*), with DSDP Site 516 indicated having uniquely high FB-δ^{15}N offsets.
DSDP Site 516 exhibits stronger ^{15}N enrichment for non-dinoflagellate-bearing foraminifera than other sites from the global core top compilation (see Table S1 and Figure S5).”

References

Schmidt, D. N., Renaud, S., Bollmann, J., Schiebel, R., and Thierstein, H. R.: Size distribution of Holocene planktic foraminifer assemblages: biogeography, ecology and adaptation, Marine Micropaleontology, 50, 319-338, 2004.