Comment on bg-2021-45 Stable isotope ratios in seawater nitrate reflect the influence of Pacific water along the Northwest Atlantic margin by Sherwood et al.

Anonymous Referee #1

Referee comment on "Stable isotope ratios in seawater nitrate reflect the influence of Pacific water along the northwest Atlantic margin" by Owen A. Sherwood et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2021-45-RC1, 2021

This study presents an extensive dataset focusing on N-dynamics along the NW Atlantic margin where water masses play an important role in nutrient distribution. The topic fits with the objectives of Biogeosciences even though there is the minimum amount of biology mentioned. Nitrogen and related nutrient dynamics are crucial elements to improve our understanding of biogeochemistry in the marine realm. Therefore, I think this study is an important input to our current knowledge on N-cycling.

The manuscript is well-written, figures and tables are structured nicely and representative enough. The dataset is extensive and the structure chosen here for results & discussion complicates the reading a little bit. However, I am aware that such extensive information is difficult to present. Accordingly, I have few suggestions to improve the MS for the different target audiences (e.g., ecologists, paleoceanographers) and to make it a bit more reader-friendly.

- Appendix with all the abbreviations used in the MS. Table 1 is really helpful, but if it fits with the journal regulations a list of all the abbreviations used would be nice.
- Additional figure showing water masses in-depth with characteristics; e.g., NE-SW transect along the margin vs water depth showing $\delta^{15}$N NO$_3$ (or other parameters to visualize the water masses in-depth and latitude). I am aware that Figure 3 aims and shows that, but I think such a transect would make it easier to visualize the different water mass dynamics and geographic distribution of stations for such a region. Station names could be also be shown on this transect figure.
- Ignore the use of sentences like “Figure XX shows this” e.g., lines 324 and 418. A reference to figures within the text should be sufficient.
- Accordingly, figure captions can be more informative and descriptive.
- Do authors plan to store the dataset on a public platform? I highly encourage this.
Abstract: Line 20: change N/P to N:P

Introduction:

I recommend changing the structure of the introduction. If the target audience is ecologists and paleoceanographers, I would start with a short introduction of the use of 15N in these fields and then focus on the region; why here? And later on, give this regional information that is now at the start of the section.

The current structure of the introduction; starting right away with water masses in the study area, also requires a reference to Figure 1. For someone interested in N, particularly in such a dynamic system, I find the current structure of the introduction is distracting.

The last paragraph of the section (starting from line 74): This part needs more information on the overall objectives of the MS including ecologic perspective as well as mentioned in the beginnings of sections 3.4 and 3.5 for instance.

Results & Discussion:

Full of information and well-designed in terms of structure. As I mentioned above, the description of figures shouldn’t be given in the text though. If the figure captions are improved then such sentences (Line 324-326) could be removed from this part and the overall text can be simplified.

Does “near-surface” mentioned in subsections always consider the same water depths? E.g., in section 3.2.1 I am missing the information on Zp.

Why are $\Delta^{15}$O$_{NO_3}$ results not shown at all? I think it is worth mentioning them in the supplementary material.