Response to Reviewer 1:

R1.1 *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.*

R1.2 *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.*

- We thank the reviewer for taking the time to read the manuscript and for offering their constructive criticisms.

R1.3 *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.*

- We agree that the many abbreviations used throughout the ms can be cumbersome. Most of the abbreviations are used for referencing the seven different water masses, and are listed in Table 1. We will defer to the editor's recommendation as to whether an additional table of abbreviations would be appropriate.

R1.4 *Additional figure showing water masses in-depth with characteristics; e.g., NE-SW transect along the margin vs water depth showing* δN_{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.*

- We agree that section plots, in general, help to illustrate water mass distributions as a function of depth and distance. However, with the great geographic expanse and complex circulation in our study region, it would be difficult to portray the water masses in one section. The oceanography is best shown as a series of meridional transects, as for example in Fratantoni and Pickart (2007) Jones et al. (2003) and Tang et al. (2004). Moreover, the stations represented in our dataset were sampled opportunistically during four different expeditions and thus are not appropriately aligned along any particular transect. As a result, a section plot through any subset of our stations, whether oriented N-S or E-W, would produce an overly artificial representation of $\delta^{15}N_{NO3}$ variability. This would be particularly problematic in plotting a section along the margin, as the stations were located variously on- and off-shelf, which represent distinctly different oceanographic regimes. This is why we opted to show only the depth profiles (Fig. 3). The colour scheme with purple and blue for the more northerly/colder regions and orange and red for the more southerly/warmer regions is intended to help facilitate the visual distinction of depth profiles by region.

R1.5 *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.*

- We will revise the phrasing of in-text figure references and improve the clarity of the figure captions, as suggested.

R1.6 *Do authors plan to store the dataset on a public platform? I highly encourage this.*

- Yes. The data were uploaded to Dryad at the time of submission, and a link is provided in the manuscript "Assets" page via: https://bg.copernicus.org/preprints/bg-2021-45/

R1.7 *Abstract: Line 20: change N/P to N:P*

- We thank the reviewer for catching this inconsistency. We will correct this and all other inconsistencies throughout the manuscript.

R1.8 *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.

- We propose to revise the introductory paragraph and merge it with paragraph 2. We will more briefly introduce the fact that Pacific water constitutes an important fraction of the slope and shelf waters of the NW Atlantic, but move the more specific details of the circulation pathways to section 3.1.

R1.9 *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.*

- Agreed. A reference to Fig. 1 will be added to the introductory paragraph.

R1.10 *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.*

- We will elaborate and expand on the goal and objectives with particular reference to the topics discussed in sections 3.4 through 3.8.

R1.11 *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.

- We thank the reviewer for the positive appraisal of the structure of the Results and Discussion.
- We will revise the phrasing of in-text figure references and improve the clarity of the figure captions as suggested.

R1.12 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.

- We agree that the terms "near surface" and "sub-surface" are unclear. We will change the title of section 3.2.1 to "Nutrient concentrations in the biologically productive zone" and we will reiterate that this zone refers to depths < Zp, as defined in section 2.3. Similarly, we will change the title of section 3.2.2 to "Nutrient concentration below the biologically productive zone" and clarify that this depth encompasses depths > Zp.

R1.13 Why are $\delta^{18}O_{NO3}$ *results not shown at all? I think it is worth mentioning them in the supplementary material.*

- The $\delta^{18}O_{NO3}$ data are presented in Table 1, and in Figures 3, 5, and 6, and discussed in sections 3.3.1 and 3.3.2. But please see our response to Reviewer 2 regarding our discussion of the $\delta^{18}O_{NO3}$ data.