

## ***Interactive comment on “Contrasting decadal trends of subsurface excess nitrate in the western and eastern North Atlantic Ocean” by Jin-Yu Terence Yang et al.***

### **Anonymous Referee #1**

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Review of ‘Contrasting decadal trends of subsurface excess nitrate in the 2 western and eastern North Atlantic Ocean’ by Yang et al.

This is a nice contribution that I recommend be published. I do have some comments that should be addressed and these are detailed below. Overall the manuscript is well written and the figures are clear and complete.

Line 45: ‘an evidence’ – change to just ‘evidence’?

Please include a short discussion on the potential for any bias as a result of not having reliable concentration data  $<0.1 \mu\text{mol kg}^{-1}$  for DIN and  $0.01 \mu\text{mol kg}^{-1}$  for DIP.

C1

Lines 125–128: Please make it clearer whether this procedure was conducted by the authors of the current manuscript, or if this is a correction made prior to publication of the datasets the authors use. I also do not fully understand what this correction does? Please explain in clear terms why this correction need to be performed (i.e., why do the datasets need this correction to be made comparable in the first place?). Some details for this might be shifted from the supplement to the main text. An alternative option would be to state explicitly that this is discussed in more detail in the supporting information, but it would be useful if the key reason behind the corrections could be summarized succinctly in the main text.

Paragraph stating line 130: What is the cause of this inter-dataset difference? Analytical measurement errors?

Line 151: “In addition, the effect of seasonal variations on DINxs signals at this depth layer is generally insignificant,” Please clarify, which layer are the authors referring too? Two different layers are discussed earlier in the paragraph.

Line 190: “Based on multiple cruises along each transect, changes in DINxs were discernable over the 191 decadal periods; these changes were most pronounced between 200 m and 600 m (Fig. 2)” How many data time points are these rate calculations based on? I understand this varies depending on the cruise line. I think it is important to include this information somehow on Figure 2.

Line 197: “Moreover, the  $\Delta\text{DINxs}$  values remained close to zero in the intermediate waters (1200–1500 m) in the western and eastern subtropical NATl (Fig. 2). This observation confirms that the marked changes in DINxs largely occurred in the subsurface waters.” This does not seem to be the case for the A16n line (i.e., deeper waters show the same trend as the surface waters here).

Line 203: “layer of the DINxs maximum decreased since 1997” Do the authors mean ‘increased’ instead of ‘decreased’?

C2

Paragraph starting line 220: Please attempt to describe N deposition rates quantitatively. i.e. to back up statements such as 'pronounced increase' and 'considerable AND input'

Paragraph starting line 234: Do the authors use the mean rate of deposition for the coastal AND sampling sites? Can an error bar therefore be added to the deposition trend in Fig. 5? This would help support the statement 'trend . . . commonly found at AND monitoring sites'

Line 264: "...although the mismatch between the observed time lag and the ventilation age of water masses may be due, at least in part, to the biological processes." For full clarity, please briefly specify the biological processing being referred to here.

Lines 274–278: But here anthropogenic nutrient input is from a different continent? Please clarify.

Line 320–322: Would the detection limit of phosphate in surface waters be low enough to detect this change due to increased N<sub>2</sub> fixation?

Line 429: "particularly in the USA" Rephrase to "particularly from the USA"?

Line 732: ". To ensure consistent comparisons between atmospheric N deposition rates and seawater DINxs anomalies, the seawater DINxs anomaly values were shifted by approximately 15 years." Please state exact time shift and if it was added or subtracted.

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