Interactive comment on “Nitrate assimilation and regeneration in the Barents Sea: insights from nitrogen isotopes” by Robyn E. Tuerena et al.

Patrick Rafter (Referee)
prafter@uci.edu

Received and published: 21 October 2020

Review of, “Nitrate assimilation and regeneration in the Barents Sea: insights from nitrogen isotopes”

Overall, I found this to be a useful study of nitrate supply to the Barents Sea. Among the interesting results are the seasonal surface nitrate d15N across the Barents Sea Opening and the full water column nitrate isotopes and particulate matter d15N.

I would like some clarification on a couple points. First, I don’t think the particulate matter sampling strategy is ever detailed—this is key to interpreting the particulate d15N measurements in relation to the nitrate isotopes. Is this entirely euphotic zone particulate d15N? Are these the same sample locations and depths as the nitrate samples? Or sub-euphotic zone? This is important—no, critical—for interpreting the particulate N measurements. Is this entirely euphotic zone particulate d15N? Are these the same sample locations and depths as the nitrate sam-

Title: It might be more accurate to describe this as insights from nitrate isotopes since it also includes nitrate O isotope measurements

Line 38-40: I understand the sentence, but others might not. Would clarify. And does the word “inflow” belong there? Line 54: Define “It” Line 68: Would insert more call-outs to figures throughout this description. Line 73: I really like this description of the water masses and their influence. Line 93: Is this acronym used more than once? 140: Wrong delta symbol? 141-142: Might want to be more explicit about why the filtration persisted until “good colour was obtained on the filter”. And where exactly are these samples? Are they at the same depths as the nitrate samples? 190: Entire sentence is passive and can be clearer. Also, callout to figure (e.g., “far right in Fig. 2A & 2B) 210-216: Would begin with the “Therefore,” sentence and be more active statement. 233: “in transit”? And does this refer to nitrate assimilation at depth? Or is the text calling on some earlier nitrate assimilation that was then mixed to depth? This latter seems the most likely considering seasonal North Atlantic mixing, right? There’s a lot of questions here and I think this statement needs to be supported and/or described in more detail. 291: These repeat transects are very cool. 308: I would want to qualify this statement with words like, “likely represents…” or “is consistent with.” 345: This equality between nitrate d15N and sediment d15N will only be the case where there is complete nitrate consumption. I think this is the case here, but this
should be clarified. 356: released in other regions? 380: This assumes that nutrient inventory is proportional to production, right? 385: “The N inventory is also dependent” right? 393: I feel that this last part of the manuscript is pretty speculative. I think it is ok, but can see how others might have a problem with it.