

The manuscript of Valiente et al. investigates pathways of nitrate removal in a saline lake with a particular focus on exploring the role of DNRA and anammox. As these processes have not been yet investigated sufficiently in saline lakes, scientific novelty is substantial. In general, authors have performed quite comprehensive experiments and did a fairly good job on thoroughly reporting and discussing the results. However, the manuscript is lacking a good structure, especially in the Results and Discussion section. Also, Tables and Figures should be reconsidered. I also encourage authors to check the manuscript for use of abbreviations and definitions and consistency of the terms you use. I therefore recommend a major revision of this otherwise very interesting study.

Major comments:

Line 26: 'N₂O-denitrification' is unclear term. Is it incomplete denitrification to N₂O or the last step of denitrification (N₂O reduction)? Although you explain it later in the introduction, it should be clear in the abstract itself.

Lines 26-29: from these two sentences it looks like DNRA was important both under light and in dark. So it is not clear how you make the conclusion in your next sentence about coupling on the anammox and DNRA.

Line 47: removing fixed N by producing N₂ and N₂O gas.

Line 60-63: it is not clear as an advance of recent studies at what exactly (supposedly lower than 0.25 mg/L?) O₂ concentrations can nosZ function; you should provide the concentrations, otherwise this sentence does not make any sense.

Lines 75-78: these sentences are not build logically; a previous sentence does not support the following, and the role of light on coupled DNRA-anammox is not well explained

Line 90-91: your hypothesis is not very clear from the practical point of view. Would these results help to calculate mass balance of a saline lake? Or what is the ultimate goal for the measurements based on this assumption? Elaborate more clear research objectives.

Line 135: why were the mesocosms incubated at +25 °C? What conditions is this temperature representative of?

Line 148: what is the percentage (atom-%) of ¹⁵NO₃⁻ in added NO₃⁻?

Line 155: how much water was taken?

Line 163: why was salinity not measured?

Line 237: this chapter of the results and discussion consists of the results only. Furthermore it is not easy to follow when the information about differences between phases and treatments is given so early at the beginning. In this case a reader has to return constantly from the following subchapters of the discussion to this, first subchapter. I suggest that you incorporate this statistical information into the subchapters 3.2 and 3.3 when discussing results of a specific parameter.

You have too many figures and not all of them provide important enough information to be in the main body of the paper. I suggest you to move Figure 3 to Supplementary information. Also, rethink other ones.

Lines 239-240: you did not provide in the M&M how you measured salinity

Line 264: what do you mean by 'N₂-anammox' here? That suggests like there is another end product of anammox possible?

Line 314-315: you should explain what are the possible nitrogen converting processes that produce ⁴⁵N₂O and what processes result in ⁴⁶N₂O. Furthermore, it doesn't look like ⁴⁵N₂O and ⁴⁶N₂O increased at all after time 15 hours. Then your assumption about ¹⁵N recirculation by coupled DNRA nitrification does

not seem to be supported by the data. Instead you should find an explanation that would fit increase in N₂O concentration but not in the ¹⁵N in N₂O.

Line 324: the same comment with the previous one, you should assign specific processes to ²⁹N₂ and ³⁰N₂ production.

Lines 340-341: why would there be an increase in release of CO₂ and organic acids after your incubations as compared to natural conditions? Please explain.

Lines 369-371: I guess you could make a more robust assumption here about the N₂O as a product of partial nitrification based on evidence that N₂O concentration was increasing over the incubation time but not the ¹⁵N in N₂O. I suggest you rethink this and probably also make calculations to assume quantitative contribution of other sources (such as nitrification) to N₂O production.

Table 3: it is not clear what you mean here by 'canonical anammox' and 'N₂-anammox'. You also do not explain this in the text.

Minor comments:

Lines 53-54: this sentence does not seem necessary.

Line 59: this sentence seem disconnected from the previous ones. Use a connector like 'also' or 'furthermore'

Line 84: it is questionable if a paper from 2003 can be called 'recent'

Line 85: it isn't clear here why anammox was underestimated. It is more logical to place this sentence at the end of line 88.

Lines 253-254: you should state here what kind of differences (i.e., where pH was found to be the highest, and where the lowest).

Lines 337-338: these changes were not statistically significant (Line 248-250), therefore this discussion does not seem necessary.

Line 345: it is not clear here to what ANOVA results you are referring to.

Abbreviations (examples of misuse):

Line 22, 90, 188, 191, 274: 'nitrate' should be abbreviated

Line 27: no need to introduce 'N' abbreviation here as you don't use it in the abstract anymore.

Line 50: dinitrogen should be N₂

Line 60, 86: nitrous oxide should be 'N₂O'

Line 173, 400: replace 'nitrogen' with 'N'