

July 22, 2013

Editor review. NO<sub>x</sub> reduction is the main pathway for benthic N<sub>2</sub>O production in a eutrophic, monomictic south-alpine lake, by Freymond et al. BG 2013-89.

This article uses an experimental approximation to assess the role of terrestrial water bodies in the production of N<sub>2</sub>O. There are some issues that need to be clarified in a new version that should also contain responses to questions raised by Reviewer 1.

1. It will be very useful for the readers if you write the reactions you are studying with the possible outcomes in relation to isotope labeling. For instance, if the substrate is <sup>15</sup>N-NH<sub>4</sub><sup>+</sup>, what are the options?, etc.
2. Is one sampling site representative of the whole south basin? Is extrapolation of N<sub>2</sub>O production to the whole area a sensible calculation? Is there background information on the dynamic of the whole basin?
3. Since the concentration of added <sup>15</sup>N-NH<sub>4</sub><sup>+</sup> is 10-fold higher than ambient ammonium concentration, it is not straightforward to be claimed as “real rates” since they may be at saturating concentrations (in a Michaelis & Menten-type of kinetics). Are there literature data on half-saturation constants for these reactions? Regarding these fluxes across the treatments, the decrease in fluxes in the amended cores is peculiar. If anything, they should be similar. Could you provide an explanation for that?
4. Page 8, lines 20-23. I do not see the similarity in fluxes in experiments of unamended nitrate and ammonium compared to amended ones (Fig 3). For instance January 2011. Do you have an explanation?
5. Page 9, line 8. Add “Fig. 3” to direct readers
6. Page 9, line 17. Show numbers or delete the sentence. We cannot access Wenk in prep.
7. Abstract. It would be informative to see values comparing denitrification and ammonium oxidation in this section
8. Page 12, lines 22-26. The comparison is not very informative. Your fluxes are from sediment to water, soils fluxes are to the atmosphere. Which fraction of the bottom water N<sub>2</sub>O could reach the atmosphere? On the other hand, the total area of lakes and soil are very different therefore global fluxes of lakes could be small, especially if we consider only the eutrophic lakes. Are they?

Line 10, 11. Redundant with line 8-9. Delete one of them

9. No need to abbreviate south basin (SB). It makes reading more difficult, unless you live near Lake Lugano

Thanks for your interest in Biogeosciences. I am looking forward to hearing from you about this article

Yours sincerely

Silvio Pantoja  
Associate Editor