Biogeosciences Discuss., 6, S306–S309, 2009
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Biogeosciences Discussions

Interactive comment on "Nitrous oxide emissions from riparian forest buffers, warm-season and cool-season grass filters, and crop fields" *by* D.-G. Kim et al.

Anonymous Referee #5

Received and published: 3 March 2009

General Comments: This paper presents a nice dataset that begins to address current concerns regarding IPCC estimates of nitrous oxide emissions from agricultural landscapes. Of special concern are possible emissions from riparian zones that are designed to reduce the delivery of nitrogen to downstream receiving waters. The topic is timely and important, especially given the newfound political will to address greenhouse gas emissions in the U.S., and is well within the scope of Biogeosciences. Overall, the writing needs to be tightened up quite a bit and perhaps reorganized. There are many repetitive sentences and others that lack clarity and these problems interfere with the authors' attempts to present a clear and compelling case that supports their conclusions.

Specific Comments: There are several places in the manuscript where more explanation is needed:

1. Please give full soil taxonomic designation when describing site characteristics. It would also be useful to include information on site topography.

2. An explanation of why litter-fall in riparian areas or crop residues in ag. fields are considered input N would be helpful. Those who think in terms of mass balance will feel that the N is being double counted since the crop presumably obtained N from the soil in situ. This is the terminology used by the IPCC and upon revisiting the text, it appears that the IPCC accounting is interested in the N that is present within an agricultural parcel of land at the beginning of a growing season, regardless of its origin. I would recommend a couple of sentences that clarify the two distinct meanings of the word "input". Perhaps a schematic could help with this?

3. It is unclear how you estimate N input with groundwater that is flowing from the presumably upgradient cropland into riparian zones. The phrase "averaging lost N load in groundwater" implies a host of possibilities, but the methodology is very unclear. You reference Kim et al., 2009, but the reader needs a little more help here. You describe wells under only two of the riparian zones. Where are these wells within the riparian zone? If you are trying to estimate incoming N, they ought to have been placed at the riparian-cropland interface.

4. In Section 2.4 it is unclear what time frame "cumulative" is referring to. A daily time period is implied, but at the end of the paragraph that follows equation 1 it is stated that daily N2O fluxes are integrated. What exactly is being integrated and how, and what is the result?

5. In equation 1, the explanation of how the parameter N2O(measured) is calculated is confusing.

Technical Corrections:

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1. The first figure referenced is numbered Figure 4. Generally figures are numbered in the order that they first appear.

2. The word "of" is missing from the title of Section 3.1.

3. The first sentence in section 3.1 should be moved to the site description in the Methods section.

4. Move the statistical methods explanations from within parentheses in the Results section to the Methods section.

5. If possible, use consistent units when discussing N2O emission rates to allow for easier comparison by the reader. Also, be consistent with the use of the word "emissions" vs. "fluxes". Choose one.

6. Once the abbreviation "N2O" is introduced, this should be used in place of "nitrous oxide".

7. Page 622, Line 3: flux unit is missing time unit (e.g., per day).

8. Page 627, last line: "within in" should be "within".

9. Page 628, Line 6: text is missing following the word "previous", leaving the reader stranded.

10. Page 630, Line 15 and following: the wording is confusing here. I think that you mean that your estimates of annual N2O emission from the crop field for 2006 may be lower than the actual emission rate because you missed collecting data during several periods of rewetting. It might be clearer to say that you suspect the actual emission rate is higher than your estimate.

11. Page 632, Line 3: "assistants" should be "assistance".

12. Page 632, Line 5: missing the word "by" before "US EPA".

13. Table 3: "Depo- sition" should be one word.

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14. Table 4: "riparian" is misspelled.

15. Figure 1: "dept" should be "depth".

16. Figure 3: What do you mean by "Daily N2O flux"? Is this the same as "cumulative diel"? If yes, please be consistent. If no, please clarify.

17. Figure 4: Are these daily N2O fluxes?

18. Figure 5: The figure caption is very confusing. Also, should the units on the y-axis be of N2O-N?

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