Biogeosciences Discuss., 6, S139–S140, 2009
www.biogeosciences-discuss.net/6/S139/2009/

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 #3

Received and published: 20 February 2009

This paper describes a very nice dataset and addresses some important issues. There is great interest in the processing of nitrate that leaves crop fields in riparian buffer zones. These zones have been shown to have great potential to prevent the movement of nitrate into streams, but there is concern that much of this nitrate might be transformed in nitrous oxide, a potent greenhouse gas. There is further concern that these “indirect emissions” of nitrous oxide may be significant relative to “direct” emissions from fertilized crop fields. This paper describes an extensive dataset that shows that there is not significant transformation of nitrate into nitrous oxide in two riparian zones in Iowa and that the IPCC methodology for estimating indirect nitrous oxide emissions overestimates indirect emissions in this system.

I have a few minor suggestions for improving the paper and one substantive concern:

1. The English grammar and usage need improvement. They are not terrible, but one of the more senior authors needs to give the paper a thorough edit.

2. Section 2. Are these crop fields underlain by artificial drainage? Is the groundwater flow being measured in the monitoring wells a significant percentage of the flow moving from these fields towards the stream?

3. My substantive concern is why crop residue in considered an input. It seems to me that FRACLEACH should be calculated by expressing hydrologic losses as a fraction of fertilizer input, unless these residues were imported from outside the system. Perhaps this explains why you get such a low estimate of FRACLEACH. Aren’t these estimates of FRACLEACH unrealistically low given what we know about these crop production systems, i,e., how is it possible to have such a low value for FRACLEACH when you know that in these systems, only 50% of the fertilizer you add ends up leaving as grain. Where does all the N go? I think you need to reconsider your calculation of FRACLEACH and all subsequent calculations that rely on this.

4. These is lots of interesting seasonal and annual variation in N2O, DO and nitrate dynamics that are not discussed. For example, why is N2O higher in the winter? Why is N2O higher in 2005 – 2008 than in 1997-1999?

Interactive comment on Biogeosciences Discuss., 6, 607, 2009.