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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 #6

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General comments

This paper compares the nitrous oxide emission from forest buffers grass filters and crop fields and evaluates the IPCC methodologies estimating soil N2o emissions. Besides regular flux measurements specific attention was given to variations in nitrous oxide emissions at short time scales by intensive diel variation measurements. Furthermore the paper discusses the possible underestimation of nitrous oxide emissions from cropland since hot moment for nitrous oxide emissions as occur after soil rewetting or thaw are not included. To include these hot moments in the IPCC methodology is very complex. However this is an important issue and recently scientists as Groff-

man and others did publish a paper on how to include hot spots and hot moments of denitrification in models. This approach might be a first step. The paper is well written but long and due to the detailed description of the calculations used it was sometimes difficult to keep track of the main message. The paper is based on a nice series of measurements and results are promising for buffer zones for water quality improvement since nitrous oxide emissions in the studied sites are far from alarming. However some aspects in this paper need additional clarification.

Specific comments and questions

Nitrous oxide emissions from the riparian zones are low however the calculations used to determine the nitrate loading of these riparian zones were not clear and it would be interesting to know nitrate concentrations instead of total N input.

The authors analyze the diel variation in nitrous oxide emissions in terms of temperature effect and use the intensive series to come up with a soil –temperature correction factor using a Q10 relationship. What I do know from literature (Castaldi 2000) and my own field experience near hot springs in Icelans is that nitrous oxide emissions in natural systems are somewhat diffuse, however in agricultural fields Castaldi model experiments showed an almost exponential nitrous oxide increase following the Arrhenius equation. Q10 values for nitrous oxide production are increasing from a value of 2.0 in the range of 2.0 -25 degrees to 3.4 for the temperature range from 25040 degrees celcius. This is no where close to the observed 12.78 or 12.28 that are used in this paper for the temperature range between 10 and 20 degrees. I also do not understand why a more realistic factor of 2.27 is found in the temperature range above 20 degrees. Although intensive nitrous oxide emission measurements resulted in significant correlations it is tricky to use these data for correction.

More attention has to be given by the authors on the differences between 2006 fluxes and 2007 fluxes .

Detailed comments:

BGD

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Page 613 line 14-16 use usda soil classification Page 613 did you consider to use a stratified random setup as riparian zones have a clear gradient from the cropland to the creek.

Page 617 line 18 an has to be rain?

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