Biogeosciences Discussions

Interactive
Comment

Interactive comment on "The annual ammonia budget of fertilised cut grassland – Part 1: Micrometeorological flux measurements and emissions after slurry application" *by* C. Spirig et al.

Anonymous Referee #2

Received and published: 4 December 2009

Comments on "The annual ammonia budget of fertilised cut grassland - Part 1: Micrometeorological flux measurements and emissions after slurry application"

General comments

This paper presents the methodology employed to measure and calculate ammonia emission fluxes during a long-term campaign of slurry applications on grassland, and the results obtained. The companion paper deals with the further analysis of these fluxes.

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Interactive Discussion

Discussion Paper

This paper addresses relevant scientific questions as few ammonia flux measurements are obtained on the field scale and very few over long experiment time. It also addresses relevant technical questions, as concerns the gradient measurement system by itself and the calculations to take account for the heterogeneous application of slurry (footprint considerations) and missing data (gap-filling). The paper is a very new and original contribution and will help to carry out further field measurements at field size and

Specific comments and suggestions

The large use of abbreviations makes it sometimes difficult to follow: to my opinion, this use should be limited to few cases or a synthetic table would help.

Some "Materials and Methods" items are described within the "Results" part. They should be re-arranged, as suggested in the following.

I am not sure of the expression "background conditions".

Replace "l" by "L" for litre

Why "( )" are often used within the text (e.g. p 9591 l7 "(response)"; p 9592 l 7 "(height-independent)"; p 9600 l 6 "(gas phase)"; p 9606 l 7 "(relative)"?

p 9584:

l 17: replace "thin" by "liquid" (see comment p 9604)

p 9587:

l 3: add "(NH3)" after "Ammonia"

l 20: add "ammonium nitrate" before "NH4NO3"

p 9588:

l 9: add "ammonium" before "NH4+"

p 9591:

l 20: the title could be "Micrometeorological flux measurements and calculations"

p 9593:

l 28: replace "min." by "min"

p 9597:

paragraph l 19 - l 26 could rather be inserted between l 7 and 8 (and figures 4 and 5 exchanged)

l 27 and followings: the value of the uncertainty should be quoted, or even a frame reporting its variation above the one of the repartition should be added in figure 6

p 9598:

l 10: it should be explained how "a precision of concentration measurements" can be translated in "a flux detection limit", rather than in a precision of flux measurement (or term changed)

l 11: the title should be changed, as most of the part deals with methodological questions. I suggest that this part concentrates on the methodological questions, and the particular concentrations, fluxes and losses measured in the study context are described in part 3.4 only

paragraph l 12 to beginning of l 17: should be in the "2-Materials and Methods – 2.1 Site description" part

paragraph l 17 to l 24: should be in the "3.4 NH3 losses after slurry applications"

part 3.3 p 9599 l 17-9602 l 10 should be in the "2-Materials and Methods – as part of 2.3.3 or new part 2.3.4 and a little bit arranged to consider information from literature rather from the experiment to explain the choices made (for example, p 9600 l 12 to 16, this pattern of ammonia volatilisation is well documented in literature, even if

emphasised in the particular case of this study)

p 9600:

l 10 equation 11 should be made more explicit, with both partition equations developed for example; the authors should be aware of the fact that they do not account for adsorption to organic matter (grass or slurry itself) which would decrease the concentration calculated

p 9601:

l 9: the authors should give quantitative information on "smaller " and "larger"

p 9602: methodological considerations should be more clearly separated on the ones on the device (from l 7 to l 19) and the ones on the methods for flux measurement/calculation (from l 25)

paragraph l 20 to l 24: surprising after considerations on the device. Could be inserted at the end of part 4.1

p 9604:

l 18-19: the term "thin" is confusing, and can be interpreted as "low application rate". The authors should rather refer to the low DM content of the slurry, or explain it

p 9605:

l 13-15: the fact that infiltration rate and CEC are negatively correlated is linked to the fact that soils with high CEC retains ammonium ions at the surface, which does not allow them to infiltrate.

P 9605-9606: "5 Conclusion"

the authors could have highlighted the possibility to use in a more generic way the methods developed in this paper (i) to take account of heterogeneous distribution of the slurry at the beginning of application and (ii) for ammonia fluxes gap-filling

p 9606:

paragraph l 9 to l 22 could be inserted at the end of the conclusion as a more general out-come of the study

p 9614: Table 1

replace "1.06" by "1.1"

replace "0.99" by "1.0"

explicite what "Tair" means in the legend and give the unit in the table

p 9615: table 2

Could the authors add a column giving the mean wind direction encountered during the volatilization event?

p 9619: Figure 4

Replace "top" by "left" and "bottom" by "right"

p 9621: Figure 6

not easy to see when printed in black and white

Could the authors add a frame showing the evolution of ïȦşF?

p 9622: Figure 7

Rain is not easy to see

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