

Interactive comment on “Ammonia sources and sinks in an intensively managed grassland using dynamic chambers” by M. David et al.

Anonymous Referee #1

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Review of the manuscript “The effects of management on ammonia fluxes over a cut grassland as measured by use of dynamic chambers” (bgd-2008-0182)

This manuscript reports results from short-term field campaign assessing episodic events of ammonia emissions following cutting and fertilization of grassland. Measurements were performed using static chambers and it is concluded that both cutting and fertilizing induce significantly ammonia emissions. Moreover, the authors emphasize that emissions are underestimated due to constraints with the chamber technology.

The paper addresses an important issue concerning biosphere-atmosphere N-interactions of relevance in the context of regional and global N cycling in relation to management and land use practices. From this point of view, the work should be

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made public accessible through publication in BG. Unfortunately, however, I do find the current work relatively weak on two important issues that do not favor publication unless major revisions can be applied. Firstly, the question appears to which extent this presentation adds new information to current knowledge on controls on ammonia emissions from managed grasslands, or it rather confirms previous findings. I do not find that the authors emphasize this. It is evident from the discussion that much information already exists on this topic, including much detailed knowledge on driving parameters. This is well presented in the paper, but at the same time raises the questions if this little experimental evidence is significantly needed to demonstrate that cutting and fertilization stimulates ammonia emissions. This could perhaps be emphasized through a proper hypothesis building for the current work.

Secondly, the work apparently lacks replication, or at least from the description it is difficult to understand if chambers were replicated in individual treatments. It is stated that three chambers were available simultaneously for treatment comparisons (8/1603), and since treatments were imposed successively through late May early June, it could be anticipated that three chambers were deployed simultaneously. However, there is no mentioning of any kind of statistics whatsoever. This needs to be included. The discussion, for example on differences in RH inside and outside chambers is not justified by any statistical evaluations of data. The presentation of the data is given in rather general terms …much less above…than… (4/1605). I don’t agree that this statement is so apparent based on the graphing (Fig. 1 mid panel) and strongly push for a more concise presentation of the data, supported by the statistics.

Finally, in the discussion (18/1607) the authors mention the need to remove data due to constraints of the chamber technique when condensation inside the chamber occurred. It is stated this mainly occurred on “sunny and warm days above mature sward”. However, the authors show data only from one day of records in the mature sward despite the fact that measurements were performed for four days (29.05 – 01.06). To support such statement it would be very useful to include to

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6, S394–S397, 2009

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entire dataset.

Specific comments

5/1602 Here and in other places, minutes should be abbreviated min

8/1603 Please, explain if the chambers were moved around or installed permanently in the same spot.

4-8/1605 As mentioned above, the presentation of the RH data should be more specific. It is not very clear from the figures that humidity was much less; changed above cut plants compared to tall plants.

19/1605 Here, and throughout the manuscript, please specify units (flux of NH₃ or N)

24/1605 Please, explain why you think a N content of 1.82% is low?

18/1606 I strongly recommend that all observations are presented graphically, including all dates (7-10 June) and treatments (0, 100 and 200 U). At least, if data are not available, this should be explained.

24/1606 You need to show NH₃ emission measurements the night before water addition in order to support this statement.

7/1609 & Fig. 4 This is interesting data. But it needs to be explained in Materials and Methods how these data were achieved.

9/1611 The supplementary measurements were supposedly carried out under dark conditions (stainless steel box). Has the exclusion of light any influence on NH₃ emissions from detached, green plant tissue kept under moist conditions? In the field, NH₃ emission in the cut sward was much related to radiation. It would be interesting if the authors could elaborate a bit more on this issue.

2/1612 It is unclear how fertilizer dressings of 300 kg N ha⁻¹ could be obtained. Was fertilizer added in succession? In materials and methods (18/1603) it is stated that

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6, S394–S397, 2009

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plots were fertilized with either 0, 100 or 200 kg N ha⁻¹. Please, explain.

4/1612 Why is it assumed that losses were larger during the day of fertilization and the next one and not based on observations. It is stated that fluxes were measured beginning 07.06. Please, explain.

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