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Biogeosciences Discussions

Interactive comment on "Dynamics of ammonia exchange with cut grassland: synthesis of results and conclusions of the GRAMINAE Integrated Experiment" *by* M. A. Sutton et al.

M. A. Sutton et al.

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We thank the reviewer for the comments on our paper published in Biogeosciences Discussions (BGD 6, 1121-1184, 2009). In particular, we note that the reviewer did not identify any scientific criticisms to the contents of our paper.

By contrast, the reviewer made a number of suggestions to re-structure the paper. The reviewer suggests that we should substantially extend the conclusions part of our paper, while recommending that we greatly reduce the overview of experimental findings. The reviewer also suggests removing all figures of key findings from the paper, while noting that a few synthetic graphics might be retained.

Careful reading of the report indicates that the reviewer is, in fact, proposing a complete

rewriting of our paper to provide: a) a short summary of the experiment (generally without graphics), followed by b) a more detailed discussion of general outcomes.

The report is thus critical, but actually gives little information on additional scientific points the reviewer would like to see covered, or on the scientific criteria for these proposed changes. Similarly, the reviewer commented that some graphics were rather busy, but did not indicate which graphics nor in which way.

In responding to these comments, we are pleased that the reviewer did not identify any criticisms to our scientific findings. In contrast, we disagree with the suggestion to rewrite the paper according to the proposed model. Commenting elsewhere in Biogeosciences Discussions (5, S1904-S1907, 2008), we noted that there are many different ways to write a scientific paper, and that we each have our own personal preferences. The reviewer appears to be requesting us to redraft our paper to match what he/she might have chosen to write. We would argue that this is missing the point of peer review, which should focus on whether the work is a novel contribution, soundly conducted, clearly described and the conclusions justified.

In our view, this paper fulfils an important role in reporting the findings of the GRAMINAE experiment. With 17 papers emerging in this Special Issue, it is essential to bring together the key findings of the different parts of the work. Thus our synthesis typically gives 1-2 sides of manuscript to each of the main topics, illustrating these with key graphics to help the reader along. The graphics also highlight novel elements of the synthesis that are NOT available in any of the other papers. For example:

* The results of three different micrometeorological flux methods are compared (AGM, REA and FIDES) in Figure 6 (from Milford et al., BGD, 5, 4699-4744, 2008; Hensen et al. BGD, 5, 3965-4000, 2008; Loubet et al., BGD, 6, 163-196, 2009). This unique comparison provides a basis to understand the uncertainty in the AGM reference method, especially the variable performance of the ammonia profile instruments.

* The results of three papers on foliar bioassays (Mattsson et al., BG, 6, 171-179, 2009;

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Mattsson et al., BG, 6, 59-66, 2009; Herrmann et al., 6, 15-23, 2009) are brought together in Figure 8, in a way which clearly highlights the effect of management treatments on different foliar nitrogen pools.

* A particularly novel synthesis of different Gamma values is provided in Figure 9, being the first time that simultaneous estimates of Gamma(apoplast), Gamma(bulk leaf), Gamma(litter), Gamma(soil) and the micrometeorological term Gamma(Zo') have been compared. This highlights how these estimates vary over 5 orders of magnitude, and illustrates the unlikelihood of Gamma(apoplast)-driven emissions during this experimental campaign. (This figure draws together results from 5 of the special issue papers.)

* The results of an application of the PASIM model are briefly reported and compared with two other models (SURFATM-NH3, DCC) for the same grassland and environmental conditions (Figures 12-15). The PaSim modelling was conducted specifically for this synthesis and is compared with Personne et al. (BGD, 6, 71-114, 2009) and Burkhardt et al. (BG, 6, 67-83, 2009). This is the first time that the PaSim simulation of NH3 fluxes has been tested against independent measurements outside the UK. It is also the first time that the application of these three models has been compared.

These four examples illustrate how our overview both synthesizes results from the component papers and provides new scientific information that is not available elsewhere.

In regard to the conclusions part of our paper, we are aware that there is always more that can be written. Indeed we considered it important to keep this section sufficiently short so that a general reader could also obtain the key messages. Once our paper is published it will be open for the reviewer and others to discuss and interpret our findings further.

As regards overall length, formally, our paper is within the requirements for Biogeosciences. Beyond that, the choice of paper length again comes down a balance between amount of information to convey and personal preference of optimum reading duration. In our view, the paper delivers this balance, providing a short overview of the

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many issues addressed in the GRAMINAE experiment, followed by a brief distillation of the key conclusions.

Finally, we have discussed these views with the lead editor of this Special Issue. In his opinion, we should nevertheless consider options for some shortening of the paper. Specifically, he has commented that Section 2 ("Summary of the Experimental Outcomes") and the associated Table 1 reads "more like a report" and would be of less interest to a general readership. He therefore suggests removing this section. We agree that this section can easily be removed, especially as the interested reader will be able to access it in BGD 6, 1121-1184, 2009.

In addition, in response to the referee, we have added an additional synthesis figure which summarizes visually the mean day and night fluxes for the main experimental periods. We trust that this is the kind of image that generalist readers will find useful. In order not to increase the overall number of figures, we have removed the graph comparing measured and modelled advection errors (Figure 4).

In summary, we therefore:

* cut out Section 2, and delete Table 1. A remaining short paragraph serves to guide the reader to the following sections and to the material annexed in BGD;

* remove Figure 4 and replace this with a new synthesis figure at the end of the paper, which is briefly discussed in the conclusions;

* update the literature citations. With references to 17 Special Issue papers gradually migrating through each stage of BGD and BG, this is not a trivial task;

* edit the text, references and figure captions, identifying areas for further shortening and tidying;

* where necessary, update the findings based on the ongoing responses to peer review of the other papers in the GRAMINAE Special Issue.

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