

Interactive
Comment

Interactive comment on “Modeling the dynamic chemical interactions of atmospheric ammonia and other trace gases with measured leaf surface wetness in a managed grassland canopy” by J. Burkhardt et al.

Anonymous Referee #4

Received and published: 18 June 2008

general comments

This paper compares experimental data and modeling results from a rather large grassland experiment. The focus lies on NH₃ fluxes. There must be 6 companion papers in the same journal, none of which were online when this reviewer wrote these lines. Unfortunately the general picture does not become evident from this manuscript alone.

The general point seems to be that the introduction of a second layer into pre-existing models leads to a significantly increased performance of the model to predicted NH₃

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fluxes between the grassland and the atmosphere. The reasoning and data are extensively shown. It is evident that the model performance could be enhanced. All data and conclusions are based on solid data. Therefore, the paper deserves publication in BGD. The point of view of this reviewer is that the paper could be shortened considerably. It is not a critical point, just a suggestion: The methods part sounds like a story book from the home laboratory. It seems like one does not want to leave out any single step once suggested in literature. However, because most of the material is based on self-citations, it may be shortened. Just say how it works, and why. From the information given alone it is not possible for the reader to mimic this model.

Most conclusions and data interpretation is performed in a highly non-quantitative manner. Not much uncertainty analysis is shown, correlation analysis, or other measures to quantify the quality of the model performance.

specific comments

p 2511, l 12 - 15: Please provide info about the uncertainty (accuracy and precision) of the flux measurements, based on the agreement/disagreement of individual techniques over time.

p 2513, l 24 and Fig. 1a: Having read the manuscript to this point, a number of notions and indexes in Fig. 1a lack explanation.

p 2513, l 23 - 24: This is too short. How is χ_c calculated? Why are ALL transfer resistances of the net needed for the calculation?

p 2515 l 23 - 24: This reviewer assumes that "(RH, 1 m)" means "relative humidity, measured at 1 m above ground". Please specify. "LW (30– 45 cm)" could mean that LW was measured at 30 - 45 cm above ground. However, on p 2512 it is said that it was measured at approximately 10, 25, and 40 cm. Why is there a disagreement? Why are the 10-cm-data not used?

p 2515, l 20: What is the reasoning for the second estimate: $LW = 0.15 \Rightarrow VH_2O =$

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0.08 mm

p 2516, l4: What is a BET isotherm?

p 2519, l 10 - 15: "It is obvious that leaf wetness depends more on air humidity for the upper leaves than within the canopy." For this reviewer, this is not obvious.

p 2520, l 21 - 22: "a general agreement with respect to deposition and emission episodes can be observed." This statement is extremely general. Why not be more quantitative? How often was agreement between the flux directions observed, how often was there a mismatch?

p 2520, l 25 - 26: "The aerodynamically maximum possible flux, $F_{max} = \rho C_d V_{max} a$ " This reviewer hypothesizes that you mean the maximum possible deposition flux. What is the maximum possible emission flux?

Section 3.2 (dew measurements) seems superfluous. It seems not to have to do very much with the rest of the paper, including the title

technical corrections

p 2513, l 19: Introduce ")" after "2008"

p 2519, l 13: Replace "rh" with "RH"

Fig. 1: Too tiny, extremely difficult to read. Please add some illustrations. These could help a reader not as familiar with the subject as the authors are.

Fig. 1: It is not clear in what sense these graphs show "two-layer" models.

Fig. 1: typo: "atmosphere"

Figs. 2, 4, 5, 6, 7, 8: The choice of colors of the graphs is unfavourable. Imagine someone prints the Figures on a b/w printer!

Interactive comment on Biogeosciences Discuss., 5, 2505, 2008.

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5, S881–S883, 2008

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