

Interactive comment on “Non-stomatal exchange in ammonia dry deposition models: Comparison of two state-of-the-art approaches” by Frederik Schrader et al.

Anonymous Referee #2

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Review on manuscript acp-2016-403. Non-stomatal exchange in ammonia dry deposition models: Comparison of two state-of-the-art approaches By Frederik Schrader, Christian Brümmer, Chris R. Flechard, Roy J. Wichink Kruit, Margreet C. van Zanten, Undine Richter, Arjan Hensen, Jan Willem Erisman. . .

The topic of the paper is about the comparison of two state of the art approaches for modeling non stomatal exchange in ammonia dry deposition. Several sensitivity tests have been performed to understand the role of biophysical parameters, such as temperature and concentration of ammonia, in five field sites in Europe.

General comments

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The paper is within the scope of ACP. The results are correctly presented; the figures illustrate the results in a clear way, but the order should be changed, as detailed in the specific comments. The paper is written in good English. I recommend this paper to be published in ACP, after some major corrections and improvements in the presentation of results. My main remarks concern principally the way results are presented. In my opinion the results could be presented in a more positive way. The reader cannot be convinced if the authors present their results without highlighting the advantages found after the sensitivity tests. This is detailed in the specific comments. Some bibliography about how these two models have been used until this study would have been necessary to help the reader understand where the authors want to go and why they have chosen these particular models and not others. Did these models give satisfying results in other studies and why did the authors choose them. Partial conclusions at the end of each paragraph need to be more clearly assessed. The go home message needs a clearer explanation.

Specific comments

Abstract. The abstract gives a clear idea of what is presented in the paper. The sentence line 25 page 1 “The proposed Γ_w parameterization. . .” needs to be detailed to let the reader know in what way it can be improved.

Page 3 line 13: could you explain how it is realistic or not to switch off the soil/leaf litter layer for natural ecosystems, where it can be an important source of NH_3 , such as mentioned for example in Wentworth et al., 2014.

Page 5 line 15: please give the NH_3 concentration under which clean conditions are considered.

Page 5 line 24: this term of “pollution climate” is difficult to understand because it is not precise enough. Do you mean “air pollution climate” as mentioned in Wichink Kruit et al. 2007? Is there a value for NH_3 concentration to define this threshold of pollution?

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Page 7 line 24 add “with” between “conjunction” and “leaf”.

Page 9. The “results and discussion” paragraph needs to be restructured. Uncertainties should be discussed in a specific sub-paragraph. It would be interesting to specify the conditions where these models have been applied, how successful they were, and where they cannot be applied, for example when emission occur instead of deposition.

Page 10 line 1: remove “and” at the end of the line.

Page 10 line 10: “a model”: what model exactly are you talking about?

Page 10 lines 10 to 15: This explanation is not clear. These lines have to be rewritten. Line 11, after the sentence “we do not feel confident...”, is it supposing that only NH₃ dry deposition is available? Line 14-15: “A detailed description...” if the investigation is beyond the scope of the paper why then talking about it and give the results of the sensitivity test if you do not give the reasons of why it could not work? Some ideas could be provided to help the reader understand.

Page 10 line 24-25: What do you mean by “very well”? Do you mean that the assumption of ground layer resistance = infinite is not realistic? And what about weak ground resistance and infinite stomatal resistance? The authors should give some more explanations and overall extract the main positive idea of such sensitivity tests explained in this paragraph. The reader is a bit frustrated not to know if good ideas have to be extracted from that.

Page 10 line 28: The reader cannot understand the ideas mentioned in this 3.2 paragraph if the authors do not explain in what purpose they use moving averages of NH₃ concentrations. What is the goal of this exercise?

Page 11 line 2: why this case is not shown? It would have been interesting to see the results?

Page 11 line 9 :The authors give indications of potential improvements and conclude by writing that no improvement is deduced. What is then the purpose of giving these

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results if they do not lead to improvement? It should be far better to highlight the advantages instead of giving the disadvantages.

Page 11 line 20: same remark as above. The way this paragraph is written does not give a positive issue. The authors should turn it differently to highlight the positive points. This part should follow figure 3.

Page 12 line 1: What do you mean by “the impact of this study’s main findings are negligible”?

Page 12 line 12: Again what is the advantage of doing this if no solution is going out?

Page 12 line 13: the title is not appropriated. Should be “conclusions”.

Page 12 line 17: “pollution climate” is not an understandable term. Conclusion needs to be more striking.

Page 12 line 27: “We strongly encourage” is not appropriate. Please reformulate.

Changes in the structure are needed. Figure 7 should follow figure 3, figure 8 should follow figure 4. Please adapt the text in function of these figure changes.

Technical corrections

Page 6 line 10 and line 26, *ibid* and *i.e.* have to be in italics. Throughout the text latin expressions should be in italics.

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