

Interactive comment on “SURFATM-NH₃: a model combining the surface energy balance and bi-directional exchanges of ammonia applied at the field scale” by E. Personne et al.

Anonymous Referee #1

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General comments:

The paper presents a one-dimensional, bi-directional model, which consists of two coupled models: an energy budget model and a NH₃ exchange model. SURFATM-NH₃ is a resistance analogue model treating separately the vegetation layer and the soil layer. The bi-directional NH₃ exchange between soil/plant system and the atmosphere depends on the compensation points of leaves, leaf litter and soil. The model allows to investigate the origin of the NH₃ flux density. The description of the model is adequate, and the paper is well structured, but some inconsistencies and several errors have to be corrected.

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Specific comments:

The results presented clearly illustrate, that NH₃ emissions occur from the soil as well as from the litter. Why are both sources not integrated simultaneously in the model?

The whole paper must be checked for typing and grammatical errors.

page 73 line 3: Wesely, 1989 is not cited in section References

page 73 line 5: replace "Grunhage" by "Grünhage"

page 75 line 7: The cuticular resistance describes the resistance of penetration of a gaseous species through the cuticle. The parameterization given in eq. (9) illustrates that the author's mean the deposition on external plant surfaces. Please clarify.

page 75 line 10: as ... at 25°C (Massman, 1998)

page 75 equation (1) - first term: replace "(Di/Dw)" by "(Di/DH)"

page 78 line 1: Sutton et al., 2001 is not cited in section References

page 79 line 1: Riedo et al, 2002 is not cited in section References

page 82 line 1: replace "Fig. 1" by "Fig. 3"

page 82 line 12: replace "Eq. (8)" by "Eq. (10)"

page 82 line 20: Loubet et al., 2007 is not cited in section References

page 87 line 17: replace "Eq. (8)" by "Eq. (10)"

page 89 line 25: Is there no deposition on external plant surfaces (non-stomatal deposition on external plant surfaces)?

page 90 line 17: Is the weight of the non-stomatal sink of the external plant surfaces unchanged?

page 96 line 2: replace Pleijel and al (2004) by Pleijel et al. (2004)

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page 96 equation (C1): How is g_{max} and the parameters of the other g functions derived? The Jarvis factors presented in Pleijel et al. (2004) are derived for wheat and potatoes.

page 96 equation (C2): The upscaling procedure presented assumes that all leaves of the canopy exhibit the same stomatal behaviour. That's not realistic. Upscaling according to eq. (2) overestimates the bulk stomatal conductance of the canopy.

page 99 line 30-33: Loubet et al. (2003) is not cited in the previous sections

page 103 line 22-28: doubled reference

page 105 table 1: replace "Grunhage" by "Grünhage"

page 105 table 1: replace "Bates and Pinching (1953)" by "Bates and Pinching (1950)"

page 105 table 1: replace "Characteristic width of a the leaves" by "Characteristic width of the leaves"

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