Interactive comment on "Processes of ammonia air-surface exchange in a fertilized *Zea mays* canopy" *by* J. T. Walker et al.

Anonymous Referee #1

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This paper deals with the description and the quantification of the ammonia (NH3) exchange between the soil-crop system and the atmosphere in a corn crop, grown in an agricultural site in North Carolina, USA. The crop was fertilized with urea ammonium nitrate solution (UAN) containing a urease inhibitor and the dynamic of NH3 exchange has been followed for 10 weeks. The work is excellent, both from the experimental and the results presentation points of view. All the sections are well written and clearly presented, with the right dose of details and synthesis when the ammonia exchange processes are described and illustrated for the different compartments: soil, soil-crop interface, foliage, canopy-atmosphere interface, atmosphere. The measurements of all the variables were carried out by well established methods and equipment, in order to minimize all the possible incertitude linked to the values determination. The interesting results, relative to the chance of improving nitrogen efficiency considering crop man-

agements to optimize the re-adsorption of soil NH3 by overlying vegetation, should be investigated also for other important agricultural crops, which need to be highly fertilized for assuring stable yields, also under different climates. Particularly important seems to be the outcome of the research concerning the NH3 emitted from the soil and its recapture by leaves in function of their moisture status. The study suggests that further research is needed for understanding the ammonia dynamics during the whole crop growth cycle, from plantation to harvest, by following the different sources/sinks by suitable measurement at different LAI values. New experimental approaches are requested by the authors in order to improve the parametrization in the models of the NH3 bi-directional exchange. Further, specific experiments should be performed for better understanding the role and the behaviour of a urease inhibitor, for different types of soils and under different climates. Considering the large number of reported results, the only improvement for helping the reader is to add letter label "a, b, c…" in Figures with more than one graph and to cite them in the text with the right number and letter label (e.g Figure 4 has to be cited as 4a, 4b and 4c). Moreover, maybe a few details about the cited source/sink model (Bash et al., 2010) could be added in an appendix. Therefore, this article is surely acceptable under the present form for the discussion on Biosciences.

Minor points

1. Page (P) 5 Line (L) 10: delete one comma. 2. P6 L21: a dot is missed after "…experiment". 3. P6 L23: delete comma before "and 500 ppb" and be coherent with unit for concentration (ppb or microg/m3). 4. P7 L2: delete comma before "and 2-D". 5. P10 L7: delete comma before"and moisture". 6. P11 L11: delete sentence "AMANDA …. 214", it is a repetition. 7. P12 L18 and L24: it is Wolff et al., (2010). 8. P18 L11: add "u*," after "Friction velocity," to introduce the symbol. 9. P19 L22: it is "emission". 10. P20 L24-25: in the section Material and method add how these analysis (K+, Mg2+, Ca2+) are performed. 11. P21 L24: add the range of night time temperature. 12. P22 L2: define RH. 13. P28 L18, L19 and L23: be consistent with the form of time

(hh:mm or hhmm). 14. P23 L25-27 and P24 L1-6: it is a repetition: you have already discussed it at P17 L3-13. 15. P25 L8: delete comma before "and the resistance to turbulent...". 16. P25 L16-19: define the average time of data plotted in Fig 10. 17. P26 L22: delete comma before "and Fw". 18. P33 L12: it is "Mecklenburg" 19. P37: add meaning of S.D and N. 20. P38: could you add pH in order to better follow the description in the text? 21. P43: there are not references to trend in RH in the text. 22. P44: indicate the period of senescence on Fig. 6. 23. P45: delete comma before "and leaf". 24. P46: could you plot also standard deviation? 25. P47: add meaning of N.