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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Impact of agricultural emission reductions on fine particulate matter and public health" *by* Andrea Pozzer et al.

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We thank the reviewer for her/his positive comments.

1. **Please state if the ammonia reductions in this study are feasible, especially for different regions**.
   This has been mentioned in the manuscript (Page 7, line 16-20). The abatement processes for ammonia emissions are numerous and with different efficiencies. As shown by Webb et al. (2006), ammonia from livestock production (accounting for 75% of European anthropogenic emissions of ammonia) can be reduced between 20% to 80% depending on the technique adopted. It is shown that slurry stores emissions can be reduced by 80% if a solid roof, tend or lid is applied to

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the storage, while an abatement efficiency between 30 to 80% can be achieve by different techniques following spreading of livestock manures to land. It it therefore reasonable to assume that the 50% reduction in agricultural ammonia emissions can be achieved with existing technology, although unclear is the real cost-efficiency of such reduction. Following Webb et al. (2006), who studied different reduction methods for the UK "[...]While there is scope for reduction in NH_3 emissions at moderate cost, to achieve large ($> 25\%$) reductions costs are likely to increase exponentially." A further study in this direction is under preparation, to estimate the costs of such strong reduction. The text in the manuscript will be extended and this point will be clarify (as requested also from referee #1).

2. **Section 3.2, the aerosol pH would be determined by aerosol water, which also depends on the secondary nitrate and sulfate concentrations, relative humidity etc. Further, rich or poor ammonia in different regions should have markedly different effects on aerosol pH. Please have some discussions on them.**
   Indeed aerosol water plays a major role in determining the aerosol pH (Guo et al., 2015; Hennigan et al., 2015). As noticed by the referee, rich or poor ammonia in different regions have different effects on aerosol pH. This has also been mentioned in the manuscript (Page 10 line 20-22), where the large ammonia emissions from South Asia (one of the largest ammonia emitter worldwide) have strong role in reducing sulfate and nitrate. Once agricultural (and hence ammonia) emissions are reduced, the pH decreased drastically (up 1.72 pH-unit for a 100% reduction).

3. **The epidemiological studies did find the secondary inorganic aerosols could have negligible effects on human health.**
   Indeed, the referee is correct, although our sentence "it is expected that some aerosol components may be more toxic than others" does not affirm the contrary. We thank the referee for the references suggested which will be implemented

in the revised manuscript, adding that secondary organic aerosols could have negligible effects on human health.

References

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