Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2018-880-RC1, 2018

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Rapid SO_2 emission reductions significantly increase tropospheric ammonia concentrations over the North China Plain" *by* Mingxu Liu et al.

Anonymous Referee #1

Received and published: 16 October 2018

General comments (overall quality)

The paper addresses an important issue relating to atmospheric pollution with ammonia, namely the interaction with SO2 emissions. The material is highly relevant to the subject matter covered by the journal and the results represent a useful contribution to knowledge concerning the interaction between tropospheric ammonia and SO2 emissions. The level of English in the manuscript is fulfilling and the length of the submission seems appropriate. The recommendation is for publication of the paper.

Specific comments (individual scientific questions/issues) The manuscript states that intensive farming results in lower volatilization rates of NH3. This may be true, but I

associate intensive farming with an increased number of livestock, which has the opposite effect, i.e. more livestock increases ammonia emissions. Already in the abstract it would be interesting to get an indication of how the number of livestock has changed over time, as this is an important factor when it comes to emissions of ammonia. It would be interesting to get an indication of the increase (in percentage) on page 5, row 5, that states: The number of some livestock increased slightly.

In the background or discussion, it would be interesting to read more about other similar studies (outside of China), relating to the result in this study, e.g. Aneja et al (2003), Agricultural ammonia emissions and ammonium concentrations associated with aerosols and precipitation in the southeast United States, or Ferm & Hellsten (2012), Trends in atmospheric ammonia and particulate ammonium concentrations in Sweden and its causes.

The authors state that "the increase in ammonia concentrations was highest in summer". However I lack some reasoning regarding seasonal variations in ammonia emissions (e.g. more fertilization of the fields, and higher temperatures in summertime). It would be useful also to mention this in the discussion and its implications on the result.

Technical corrections

Page Row 1 24 Remove "s" in "increases" 2 14 Consider changing "NH3 emission has" to "NH3 emissions have" 3 2 Change "2000" to either "year 2000" or only "2000" 4 13 Change "were" to "was" 5 5 Remove "animals" 5 6 Change "system" to "systems" 5 7 Change " The increased livestock animals raised but more effective...." to "Despite increased livestock numbers, more effective...." 6 17 Change "hotpot" till "hotspot", and change "had" to "have" 6 18 Consider changing "over" to "in" and "into the atmosphere". We noted...." 6 20 Consider adding "s" to emission, i.e. "emissions" 6 21 Consider changing to "it has not been fully included...." 7 16 Change "disappeard" to "stopped" 9 22 "increase in troposheric" 10 3 "....the entire NH3 increase."

Figures Not consistent when it comes to the units, sometimes writing "μg/m3" and

sometimes “μg m-3”, please consistently use the latter.

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