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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The effect of climate and climate change on ammonia emissions in Europe" *by* C. A. Skjøth and C. Geels

Anonymous Referee #1

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The manuscript 'The effect of climate and climate change on ammonia emissions in Europe' models the affect of climate change in the form of increased temperature on ammonia emissions from a typical Dutch 1000 animal pig stable. Because higher temperature increases the ammonia volatilization, ammonia emissions are found to increase with increasing temperature. The manuscript recommends that chemical transport models should use dynamical methodology to simulate ammonia emissions, similar to the methods used to simulate biogenic volatile organic compound emissions.

The manuscript is of interest to ACP readers. Editorial issues need to be addressed before publication.

The English grammar and spelling of this manuscript needs to be rechecked. For example in the abstract, line 5-6 'to investigating the spatio-temporal . . .' should be

changed to ‘to investigate’. There are numerous examples of misuse of verb number throughout.

In addition, throughout the manuscript, the authors unnecessarily state if a citation is from a high profile journal, i.e. ‘Nature’ or ‘Nature Geoscience’. Journal names are listed as part of the full reference and that is sufficient. Such usage in the following lines should be removed

P23405, line 23

P23407, line 14

P23417, line 15, In this line no actual papers are referenced only the journal Nature. It is necessary to reference the papers themselves.

P23419, lines 8 and 9.

In addition to superfluous usage of journal titles, the authors also refer to a scientific meeting on P23417, line 22-23 in a haphazard way. Many scientific meetings and conferences have sessions dedicated to the nitrogen cycle and ammonia emissions. If the authors feel it is necessary to cite the meeting, then some type of proceedings or abstract reference must be given.

General Comments:

How good are the ammonia emission inventories? The authors claim that emissions can easily vary 20% within a country due to climatic considerations. What is the uncertainty in the emissions inventories themselves? Recent work by Heald et al, ACPD 2012, Walker et al, ACPD 2012, and Nowak et al., GRL 2012 show that emissions inventories can be off well more than 20 – 40%. Is the problem for CTMs and CCMs that they do not account for climate change effects on ammonia emissions or that the ammonia emissions are not correct in the first place?

I understand the use of one standard farm type for this modeling study. However, how

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realistic is it that pig stables are that similar throughout Europe? What information is there on European farming practices that can be referenced? It is unclear to me whether the bigger influence on future ammonia emissions is temperature increases or farming practices. I suspect that market forces influencing farming practices can easily affect ammonia emissions by 20 – 40 %. I also think the manuscript could do a better job in identifying the other factors to ammonia emissions, such as animal diet and the differences in ammonia emissions from different livestock.

Nonetheless, this is an interesting manuscript and the authors do a nice job pointing out that temperature increases may cause an increase in ammonia emissions that is not being considered by current models. This is important information for policy makers to use in addressing the best farming practices to minimize future ammonia emissions.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 23403, 2012.