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Interactive comment on "Trimethylamine emissions in animal husbandry" *by* J. Sintermann et al.

J. Sintermann et al.

joerg.sintermann@art.admin.ch

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reviewer: This paper measured the TMA emission with a few other trace gases in a dairy farm, and thus inferred the formation mechanism of TMA, which is mainly due to the mixing of urine and faeces. The TMA emission rate and lifetime were also estimated and its influences on SOA formation were discussed. Overall, this is a well-written paper and i second its publication on BG, yet i still have a few comments before its publication

reviewer: 1) The authors should make it clear that this study is only a case study, that its results should be used with cautions when scaling to a global level.

- authors: We fully agree with this remark and we will add a statement pointing this

out. However, as amine measurements, especially flux measurements, are rare our up-scaling exercise is intended to give the case of an order of magnitude.

reviewer: 2) The discussions on TMA influences on particle formation are a bit skeptical as all the discussions are based on previous studies, without a clear connection with the findings of this work. The authors give no details on their estimated lifetime of 30-1000s using the model of Kulmala et al. (2012). TMA and other amines may have a longer life time as it neutralizes the acids rather than being attacked by oxidants (such as OH radicals), its partitioning may be influenced by the RH, temperatures, etc.

- authors: It is right that our discussion on TMA influencing particle formation is based on previous studies. We point out how the identified emissions of agricultural TMA, and according ambient concentrations, which are at maximum only a few percent than that of ammonia, behave in the atmosphere according to recent findings. This discussion, which has not been elaborated with focus on agricultural emissions elsewhere, sets the context of how to interpret the relevance of the presented agricultural TMA emissions and we thus consider it relevant. The abundance of TMA in the gas phase is crucial for enhanced aerosol particle formation rates and the lifetime of gas-phase-TMA is determined by both oxidization and condensation. We agree with the reviewer and state that it amounts to 4.6-7.7 hours due to oxidation in atmospheric conditions. This is orders of magnitude slower than the calculated loss due to condensation and thus we neglect it in the lifetime calculations. Changes in RH and temperature influence e.g. the OH oxidation capacity and evaporation rate. However, they do not affect the condensation sink. Formation of amine salts is indeed a possibility to promote transport of amines further downwind. However, after TMA has formed a cluster with a neutralizing acid, re-evaporation of the TMA it is thought to be unlikely. The lifetime of TMA due to condensation is determined by 1/CS (condensation sink). The CS itself can be calculated as stated in Kulmala et al. (2012), PROCEDURE, Step 9: Calculate the size distribution–dependent particle loss parameters.

reviewer: 3) The correlation coefficients should be provided for Figure 3.

- authors: as suggested we provide the correlation coefficients

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Interactive comment on Biogeosciences Discuss., 11, 6519, 2014.