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Interactive comment on "Analysis of passive-sampler monitored atmospheric ammonia at 74 sites across southern Ontario, Canada" *by* X. H. Yao and L. Zhang

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We greatly appreciate all the comments, which improved the paper. Our responses are detailed below.

General comment

The paper titled "Analysis of passive-sampler monitored atmospheric ammonia at 74 sites across southern Ontario, Canada" by authors X. H. Yao and L. Zhang presents the ammonia measurements made at 74 sites obtain by passive samplers across southern Ontario, Canada. This is clearly a useful dataset and the analysis shown here appears sound.

As a conclusion the manuscript may become acceptable for publication after minor revisions.

Specific comments

1. Section 2 Experiments: Contamination is constantly a problem with ammonia passive samplers. The description about Quality Assurance and Quality Control of the passive sampling and analyses in the measurement campaigns should be given as such information is important for determining valid data.

Response: We agree with this comment. We used commercially-available Ogawa passive samplers to make the measurements in the high concentration areas of the network during the warm months and used slightly-larger custom-designed passive samplers in the low concentration areas and throughout the winter period. The description of the Ogawa sampler and sampling methodology is documented in Roadman et al. (2003). For the custom designed passive sampler, we had conducted an extensive comparison of using different instruments at one selected site before the campaign started. Besides, comparability of passive samplers to complex methods has also been well established in literature (Cape et al., 2004; Puchalski et al., 2011; Sutton et al., 2001). We have added the above information and a description of our own method-comparison results in the revised paper.

2. Section 4 Discussion: The manuscript would benefit from a detailed analysis to provide more supportive evidences for the assumption, e.g. difference in ambient conditions between source and receptor regions and its impact on the transport of NH3 in the cold seasons.

Response: All these agriculture and non-agriculture sites in southern Ontario are situated at the Great Lakes-St. Lawrence Lowlands. In the cold season, the weather in the whole southern Ontario is usually under on the control of synoptic systems. Thus, the ambient conditions at these sites were generally similar to each other in the cold season. For example, the weekly averaged ambient temperature at these sites was

almost same during the whole period of the cold season. The information has been added in the revised paper.

The rationale of selecting the remote non-agricultural sites to interpolate the transport machismos is clarified in the revised paper, as summarized here. Because there was no manure or fertilizer application at these sites, the measured ammonia should have come from three major sources: (i) local emissions including natural emission or reemission of pre-deposited nitrogen converting to ammonia, (ii) regional transport of ammonia from agriculture zones, and (iii) evaporation from ammonium particles which should have also been from transport from agricultural zones. The maximum emissions from local nature sources should have occurred in summer when the ambient temperature was the highest. Thus, the maximum concentration of the observed ammonia in summer at these remote non-agriculture sites should reflect the maximum contribution from the local natural emissions. The concentration of ammonia observed in cold seasons that were higher than in summer season should have been associated with the contribution from regional transport, either ammonia gas or ammonium particles.

Technical correction:

Response: Thanks for your careful reading. The reference list has been updated in the revised paper.

Interactive comment on Biogeosciences Discuss., 10, 12773, 2013.