

***Interactive comment on* “Characteristics of atmospheric ammonia over Beijing, China” by Z. Y. Meng et al.**

Anonymous Referee #1

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This manuscript describes a 2+ year record of ammonia measurements made at 2 sites (urban and rural) in Beijing with some ancillary measurements. This is clearly a useful dataset and the preliminary analysis shown here appears sound. While there are limitations to the analysis possible (i.e no particle measurements made at the urban site), I feel there are at least 2 avenues that could be further explored by the authors to put their observations in better context for future follow-on work. I have indicated these as "major revisions" as I believe they could take a bit of time for the authors to address.

1. The manuscript would benefit from a more thorough meteorological analysis, including information on wind direction (particularly relative to agricultural vs urban areas), wind speed and precipitation. Wind roses or back trajectories would be helpful in this context. Section 3.1.2 invokes precipitation as a major control on NH₃ concentrations,

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but without data this argument is not convincing. Similarly the argument regarding the correlation of CMA and SDZ observations at the end of Section 3.1.2 would be reinforced by some analysis of synoptic meteorological conditions and wind patterns. It is unclear what parameters were measured at the site - if met measurements at the site are not available, I would encourage the authors to take a look at some assimilated met products for this analysis.

2. It would be highly informative to investigate to what degree acids were neutralized by ammonia at the rural site. Analysis of the PM_{2.5} filters for sulfate, nitrate and chloride, would allow the authors to comment on whether the NH₄⁺ fully neutralized these species and/or whether excess NH₃ is available in summer as a result.

Minor Comments

1. Abstract: Lines 5,7,9,17: Missing 'the' in front of 'rural site' or 'urban site'
2. Page 3042, Lines 23-25: The list of neutralized species is incomplete (eg. ammonium bisulfate). I suggest that the authors indicate that the species given are examples of salts.
3. Page 3043: Lines 9-11 and line 25: According to what inventory? Indicate reference for specific percentages reported.
4. Page 3044, Line 14: grammar: "Recently, measurements of ammonia"
5. Page 3045, Lines 5-11: Could you tell us about agricultural activity in the area? Where and what type?
6. Page 3045, Line 21: grammar: "The concentrations of NH₃ were measured in parallel by a . . ."
7. Page 3045, line 23: grammar: "2010 at the top of the CMA Training Center Building (50 m), 200 m away . . ."
8. Page 3045, line 26: grammar "on top of the CMA Training Center Building."

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9. Page 3046, line 19, grammar: “and glass ware..”

10. Table 2: It would be helpful to understand what measurement techniques were employed when comparing previous studies to yours, could you add this information to Table 2?

11. Page 3049, line 10: grammar: “going back to their hometowns during. . .”

12. Figures 5 & 6: As the concentrations shown are independent the authors should use a 2-sided regression (reduced major axis technique) for their regression statistics

13. Page 3051, lines 15-19: I’m confused by these 2 sentences. The first indicates that 35% of local NO_x emissions comes from vehicles and the second indicates that 74% of “ground NO_x” results from vehicular emissions. Do the authors mean concentrations when they say “ground NO_x”? How are the numbers consistent with the previous sentence?

14. Page 3053, line 12: Suggest that you re-phrase this sentence which (as written) suggests that there is a weaker summertime traffic cycle, which may not be the case, it may simply be swamped by other sources. I believe that this is the authors’ intent and suggest this modification: “No bimodal pattern is seen in summer, which implies that traffic is not the dominant. . .”

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 3041, 2011.

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