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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Wet and dry deposition of atmospheric nitrogen at ten sites in Northern China" *by* Y. P. Pan et al.

Anonymous Referee #1

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General Comments

Although ten sites are far from enough to make clear the distribution of nitrogen deposition in Northern China, a very large area, the monitoring has been the most detail one in China till now, especially including dry deposition. Of course some uncertainty exists, however, the results, which show extremely high values, are of great importance.

Monitoring methodology is most important and need be described in detail. More information on emission inventory and site condition is necessary for analysis.

Specific Comments

P758, L8: Detail information on monitoring site, such as landuse type and local emission sources, is important and need included in the manuscript. In addition, it seems

that the monitoring is not focus on forest and grassland areas. However, the effects of nitrogen such as acidification and eutrophication are mainly related to natural ecosystems. Vegetation has also great effects on dry deposition. For forest and grassland, dry deposition can be easily measured by throughfall method.

P758, L25: How water examples delivered and stored before analysis need be introduced. How unstable NO2- can be well kept?

P759, L16: Since PM was analyzed monthly, how to reduce evaporation of NH4+ and transformation of other unstable component? The method was referred to Pan (2010b), which is however in Chinese and not easily read by international readers.

P760, L15: The dry deposition velocity is of great importance for the results. Here the data were based on modeling results, which is actually lack of test in China. I suggest adding uncertainty analysis in the discussion part.

P760, L21: Considering the seasonal pattern of deposition, paired t-test may be better than nonparametric tests for temporal and partial differences.

P761, L15: It showed no significant difference among the sites. How is it with paired t-test?

P762, L21: Here higher NH4+ deposition in winter was attributed to heating. I do not think heating is a major source of NH3. Rain wash may be the factor, same as for low NH4+ deposition in summer.

P762, L24: It should be explained why NO3- deposition was high in summer and fall, maybe relating to seasonal change of NOx emission?

P763, L17: I was very surprised that no yearly difference of NO2 dry deposition existed. As I know, emission of NOx in China increased in during 2006-2010, mainly caused by increasing consumption of coal.

P763, L24: The molar ratio of NH4+ to NO3- is too high. Is it reasonable?

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P765, L8: The conclusion of no significant year-to-year variations is suspicious.

P765, L15: Arithmetic average value for the whole region is not good enough since the sites represent different area. Suggest giving average values to different landuse types such as urban, rural, and forest, and compare with other studies type by type.

P769, L4: In China, large part of NOx comes from coal combustion, the same source of SO2, which has mostly from coal combustion. I suggest adding results on sulfur deposition (at least SO4 in wet deposition), if possible, to show the contribution of different sources.

PP770, L2: The contribution of NH4+ is less than NO3- in PM deposition!? Is it due to NH3 evaporation? Result here does not coincide with many studies on component of PM in this area.

P771, L1: Critical loads are evaluated for vegetation. For forest and grassland in this area, comparison of critical load to deposition derived in urban and agricultural area is not reasonable. The deposition in forest and grassland areas may be much lower than the results got here, it may thus overestimate the effects of nitrogen impacts.

P772, L13: The reference of Tang (2010) may be not available for most readers. Can you refer to some other studies?

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 753, 2012.