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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Real-time measurements of ammonia, acidic trace gases and water-solubleinorganic aerosol species at a rural site in the Amazon Basin" *by* I. Trebs et al.

S. Martin (Editor)

smartin@deas.harvard.edu

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PLEASE FIND BELOW THE REVIEW SUBMITTED BY REVIEWER #3

Trebs and collaborators describe their semi-continue measurements of inorganic aerosol species and corresponding gas-phase concentrations in the Amazon. The major strengths of the paper are the high quality measurements. Its major weakness is that it presents only a preliminary analysis of the results. The authors plan to discuss the detailed analysis in subsequent papers. However, despite this the paper makes a significant contribution to our understanding of the chemistry of an important area of our planet and should be published.

The authors report that the concentration of NH4+ exceeded the concentrations of the acids by a factor of 4 to 10. Some additional discussion of the ionic balance is necessary. Can organic acids explain the apparent excess of ammonium?

The site has significant local ammonia sources (the 200 Blanco cattle) and therefore the measurements are not representative of Amazonia in general. This should influence the partitioning of nitrate and chloride in the area (their aerosol concentrations should be higher than in the surrounding area). These issues should be discussed. It would be great if the authors could use their semi-continuous ammonia measurements to separate the local contribution from the background for the three periods examined.

Ammonium nitrate is often encountered at its aqueous form at RH below 60% in the atmosphere. Without the help of ammonium sulfate it remains as a metastable solution down to almost zero RH (Martin, S.T., Schlenker, J.C., Malinowski, A., Hung, H.M., and Rudich, Y. "Crystallization of atmospheric sulfate-nitrate-ammonium particles," Geophysical Research Letters, 2003, 30, 2102). The statement in page 1205 about the state of NH4NO3 should be corrected.

The ammonia spikes observed during the study are quite interesting. They could be due to the wind direction or they could be revealing something about the details of ammonia emission in the area. The authors propose that the spikes were due to the evaporation of NH3 from wet surfaces after sunrise. Given the variability of the time of the peak is there any correlation between the temperature change that day and the time of the peak. Is there some correlation with wind direction or speed? These patterns are a major feature of the data set (they affect the other aerosol components too) so some additional analysis is necessary.

The changes in HNO3 and nitrate are determined both by chemistry and losses and also by changes in the partitioning. It is worth examining the sum of the two (the total nitrate) in order to remove the partitioning from the picture. A graph and some discussion of the total HNO3 could be a useful addition to the paper. The same should be the

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case for chloride. Is the diurnal pattern of HCl related to chemistry, emission/removal, or just transport from the aerosol to the gas phase and vice versa?

The discussion of the diurnal patterns focused on September 17-20 and I am assuming that these days are representative of the dry season. There is little information presented about the patterns during the wet season.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 1203, 2004.