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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Characterization of the size-segregated water-soluble inorganic ions at eight Canadian rural sites" *by* L. Zhang et al.

Anonymous Referee #4

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The manuscript entitled “Characterization of the size-segregated water-soluble inorganic ions at eight Canadian rural sites” reported size-segregated water-soluble inorganic ions, which were measured using a Micro-Orifice Uniform Deposit Impactor (MOUDI) during fourteen short-term field campaigns at eight locations in both polluted and remote regions of eastern and central Canada. This reviewer agrees that the type of data is still limited in the North America, especially in the last five years. However, the analysis is preliminary. This reviewer expects a deep analysis on these data.

My major concern is following: Although the authors analyzed the aerosol acidity based on the ionic balance, the analysis did not sound scientific because analytical error was ignored. The analytical error of ions should be always present and the error may signif-

icantly affect the calculated ionic balance. For example, Yao et al. (2006, Atmospheric Environment, 40, 2835-2844) reported that about 50% samples had a >30% difference between the measured strong aerosol acidity and the estimated aerosol acidity from ionic balance. Ionic balance alone should not be used an indicator of aerosol acidity. Alternatively, Kerminen et al (2001, Atmospheric Environment, 35, 5255-5265) and Yao et al. (2007, Atmospheric Environment, 41, 382-193) discussed aerosol acidity based on size-dependent ionic balance. Aerosol acidity should be size-dependent when the aerosol was acidic. This is because the gas-aerosol equilibrium would not be achieved for acidic aerosol. Due to the mass transfer limit, the smaller aerosol would be less acidic. Considering the analytic error, the authors should include either both ionic balance and the measured strong acidity or the size-dependent ionic balance to discuss aerosol acidity.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 13801, 2008.

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Interactive Comment