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Atmospheric
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Discussions

Interactive comment on "Technical Note: The application of an improved gas and aerosol collector for ambient air pollutants in China" *by* H.-B. Dong et al.

Anonymous Referee #2

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This note describes development of an in-situ instrument named GAC-IC for measuring soluble acid gases and ionic species in aerosols. The major improvement is having the inner surface of the wet denuder "dull published" and thereby enhancing the scavenging capability and efficiency of the water film. Measurements SO2, HONO, and soluble ionic species in aerosols from the newly developed instrument were compared with results from traditional SO2/HONO analyzers, filter based aerosol measurements as well as AMS during two field campaigns in China. Considering the potential application of this technology in atmospheric chemistry and air quality investigation, this inter-comparison paper deserves to be published. However, before that, a careful revision upon the following issues should be made.

1. My major concerns are upon the assumption of collection of gaseous species. In sec 3.3.1, it was addressed that "because of the low diffusion coefficient of SO2, the other acid gases (HNO3, HONO and HCl) should be collected more efficiently and measured precisely with Na2CO3 solutions as absorptions in the GAC-IC system". This assumption implies that solubility is the single factor controlling the collection efficiency. However, as shown in the HONO cases, there are indeed some other key factors in the system, photo-stability and chemical stability for instance. Thus, in expectation of to be cited as the major reference of this instrument, a detailed inter-comparison should be performed for each species in this study. 2. In sec 3.2.2, it was indicated that "The GAC-IC system measurement was about 10% higher than the LOPAP in the night which was primarily attributed to the 3-m long inlet tube connected in the GAC-IC system". I'm confused that how the inlet loss resulting in higher levels of HONO measured in the GAC-IC system? It seems being opposite to general understandings. 3. Moreover, the lower levels of HONO measured by GAC-IC during daytimes were attributed to O3-HONO reaction. However, the O3-HONO reaction could be still there during nighttimes. Actually, as the O3 data of the campaigns are available, you can calculate this chemical sink to validate your argument. 4. The agreement between GAC-IC and filter-based measurements was good for sulfate, whereas significantly higher concentrations of nitrate and chloride were reported by GAC-IC. The authors argued that the differences were caused by evaporation loss of nitrate and chloride species during filter sampling processes. Besides that, I wonder if the GAC-IC measurements could include positive bias from the penetration of HNO3 and HCl, in particular during daytimes. 5. The inter-comparison between GAC-IC and AMS looks good. However, given that there should be a substantial amount of aerosols existing in the size range of 1-2.5 microns, the measurements of GAC-IC (PM2.5) are expected to be equal or larger than those of AMS (PM1). In this context, size distribution of each aerosol species is very important to complement the results presented in this manuscript. Otherwise, the current comparison could be unfair. 6. Technical correction: Page 7761: "A Scanning Mobility Particle Sizer and a Condensation Particle Counter…" should be "SMPS

consisting of a DMA and a CPC. . .”

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 7753, 2012.