

## ***Interactive comment on “Application of an online ion chromatography-based instrument for gradient flux measurements of speciated nitrogen and sulfur” by Ian C. Rumsey and John T. Walker***

**Anonymous Referee #1**

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This paper is a hybrid instrument/application description of the Applikon MARGA online IC system for the measurement of reactive gas and aerosol concentrations and fluxes (by AGM). The authors are among those who previously described the one sample box version of the instrument for the measurement of concentrations. Overall the paper is a good description of the technique which builds on the previous papers and extends them to include an assessment of the capability for measuring fluxes using the aerodynamic gradient method. Recommendations. The section on accuracy, which to some extent is a repeat of the work in the original MARGA description, would benefit from an extended assessment of the accuracy. All the tests published so far on the ECN annular denuder (GRAEGOR, MARGA) do not deal with real samples in all conditions

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and the uncertainty added by the sampling of a real matrix, i.e. the atmosphere. In this paper, liquid standard are used instead of stripping solution and the inlet effects, cross sensitivities to other species and any effects due to the stability of SJAC and denuder sampling efficiencies are not dealt with. This is a major issue for these type of techniques which the authors should address as they directly relate to the warrant one should give to interpretation of results derived from denuder instruments. There is at least one published cross-sensitivity (hydrolysis of N<sub>2</sub>O<sub>5</sub>) which is not mentioned in the paper and could not be tested for using the methods described in this manuscript. The flux measurement is built on the foundation of the analytical certainty of the wet chemistry including sjac and denuder systems and the authors should discuss the possibility of cross sensitivities with other molecules in the section on accuracy and be clear about what issues remain when using the MARGA instrument for the measurement of fluxes. This survey of possible interferences would be an really useful addition to the paper and would give added confidence in the results from such systems.

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