

***Interactive comment on “Investigation of water adsorption and hygroscopicity I of atmospheric particles using a commercial vapor sorption analyzer” by W. Gu et al.***

**Summary:**

This work proposed a method to quantify water adsorption and mass hygroscopic growth of atmospheric particles. This new experimental method can be easily applied with a commercial vapor sorption analyzer. The manuscript fits well to the scope of AMT and presents valuable methods. Thus I recommend it to be published after the following comments listed below have been adequately addressed.

**Comments:**

1. Regarding to the title or the key points of this manuscript: Investigation of water adsorption and hygroscopicity of ***atmospheric particles*** using a commercial vapor sorption analyzer: the materials the author used in this study are not atmospheric particles, but actually bulk samples. Please clarify how these results represent atmospheric conditions.
2. In section 2.2.1 and 3.2, the authors demonstrate how to determine the DRH and the results seem agree well with the literature. I am wondering could you use the similar procedures to determine ERH?
3. In section 3.3, only ammonium sulfate and sodium chloride are atmospheric-relevant species. I would suggest the author also present the results for atmospheric-relevant compounds, for instance, organic compounds to represent low-hygroscopic species.
4. Please also give detailed definition of mass hygroscopic growth factor in your case as people are using hygroscopic growth factor directly to express hygroscopicity of particles when using e.g. HTDMAs.
5. How did the author come up with using E-AIM model? This is not a good choice to use to validate your results as E-AIM represents better for mixtures rather than single compound. Hence, I suggest the author either gives better description of E-AIM model to prove you have good knowledge of this tool or compares the results from other techniques.
6. I would strongly suggest the author plot a complete humidograms of each compound measured by the vapor sorption analyzer, i.e. the mass growth factor as a function of different RH. The author stated that this commercial instrument provides a robust method to

investigate water adsorption and hygroscopicity. However, only DRH and one MGF point above DRH were reported. I do not think this is enough. Meanwhile, the reported MGF seems higher than the E-AIM results for AS. Please consider fulfilling the datasets and plotting similar figures as Fig. 3 and Fig. 4 for MGF values. Without the comparison of growth factor values from your instruments and other researches, it is difficult to validate your results.

7. There are several grammar mistakes in the text, please carefully check.

## References