We thank the reviewer for taking the time to examine our manuscript. Below, the reviewer's comments are reproduced in *green*, and our replies are in black.

Did the authors compare the E-AIM predictions for NH3 closure with those of another thermodynamic model, such as ISORROPIA?

We have not compared the results of E-AIM with other models such as ISORROPIA, and consider it well beyond the scope of the present manuscript to perform such a comparison, which would be a study in itself. An intercomparison has been done previously for several systems with each model (including AIM-2, a precursor of E-AIM), albeit some time ago, for example in Zhang et al. (2000), who found that the various models are generally comparable, with some differences arising due to the different equilibrium constants used, and the different equilibriums considered in the models. E-AIM's strength is in its accuracy; ISORROPIA's strength is in its speed and also its good accuracy. Since speed was not a concern here, we picked the thermodynamics code with the best accuracy. E-AIM has been described as a benchmark model (Zaveri et al., 2008) since it has been written with a minimum of assumptions and simplifications, without compromises to increase computational efficiency. Therefore we consider E-AIM to be a suitable model to perform these calculations with.

We have included the following text in the manuscript:

"E-AIM has been written with the aim of reproducing the thermodynamics of the aerosol system as precisely as possible, without making compromises for the sake of computational efficiency. It is therefore considered a benchmark model (e.g. Zaveri et al., 2008)"

This manuscript contains an overload of data and information. My recommendation is that technical figures that go towards characterizing the chamber rather than experimental data, such as figures 1 and 2, be moved to an online supporting information document. Tables 4 and 5 likewise contain far too much information and could be moved to the SI. A shorter table could be presented that highlights only specific experiments which are discussed in the modeling section.

We believe that the figures mentioned here are an important part of describing the experimental process, and are necessary for understanding what was done. We would like to keep them in the main text. Likewise for the tables mentioned, removing them to a SI section will not improve the readability of the manuscript, as the casual reader can easily skip them. On the other hand, it is frustrating to have to download the manuscript and SI separately and combine them manually if one wants to have the complete paper. Therefore we have not created a SI section.

Finally, the glyoxal experiments presented here are an afterthought, serving more as a proof of concept rather than providing new insight. It is my assessment that they should be removed from this manuscript, expanded upon, and published separately.

We appreciate the suggestion to publish a paper focusing on the glyoxal data, and we are certainly working in that direction, as these experiments are very interesting in their own right. We wish to retain the current plot in this paper however, as it illustrates an important point about the exchange between the gas phase and the chamber walls.

References

Zaveri, R. A., Easter, R. C., Fast, J. D., and Peters, L. K.: Model for Simulating Aerosol Interactions and Chemistry (MOSAIC), J. Geophys. Res.-Atmos., 113, D13204, doi:10.1029/2007jd008782, 2008.

Zhang et al., A comparative review of inorganic aerosol thermodynamic equilibrium modules: similarities, differences, and their likely causes, Atmospheric Environment 34 (2000) 117-137