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Interactive comment on "Hygroscopicity of urban aerosols and its link to size-resolved chemical composition during spring/summertime in Seoul, Korea" *by* Najin Kim et al.

Anonymous Referee #2

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This paper presents aerosol chemical and hygrosopic properties from a field measurement campaign in an urban setting. The authors do a good job of presenting the data, and the analysis and conclusions are scientifically sound and relevant. I recommend that the paper be published after the minor points listed below are addressed.

Measurements were made of non-refractory aerosol components as well as black carbon. While these likely account for the majority of sub-micron aerosol, dust and sea salt could also be present, and are not mentioned in the paper. What effect, if any, could these aerosols have on the results, especially the k-closure analysis. For sea salt, while it is likely not a major contributor to sub-micron aerosol, because of it's very

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high kappa even a small amount could influence the measurements. This should be discussed in the paper.

Measurements were made with an HTDMA at sub-saturated conditions (RH = 85%). However, previous measurements (Petters et al., 2009, Wex et al., 2009) have shown that organic aerosol does not always behave ideally and exhibits different hygroscopic properties at sub and supersaturated conditions. This is especially true for lower RH (<90%) as used in this study. This should be mentioned in the paper, at least as a caveat, and discussion added about how the limitation of the measurements might impact the conclusions.

More information is needed in section 4.4 about aerosol mixing state. Specifically, how were single vs multi-modal distributions determined? Was this just subjective classification or was a curve fitting routine used? Also, how often, and when, were Types 1, 2 and 3 observed? Trends in the diurnal pattern are discussed in the paper but not shown. A figure showing diurnal variability would be helpful. Also, how often were more than two modes observed? The paper only says that this occurred "occasionally". Finally, this section would benefit from more editing for clarity as it was hard to follow the analysis done here.

References:

Petters, M. D., Wex, H., Carrico, C. M., Hallbauer, E., Massling, A., McMeeking, G. R., Poulain, L., Wu, Z., Kreidenweis, S. M., and Stratmann, F.: Towards closing the gap between hygroscopic growth and activation for secondary organic aerosol – Part 2: Theoretical approaches, Atmos. Chem. Phys., 9, 3999–4009, 2009, http://www.atmos-chem-phys.net/9/3999/2009/.

Wex, H., Petters, M. D., Carrico, C. M., Hallbauer, E., Massling, A., McMeeking, G. R., Poulain, L., Wu, Z., Kreidenweis, S. M., and Stratmann, F.: Towards Closing the Gap between Hygroscopic Growth and Activation for Secondary Organic Aerosol: Part I – Evidence from Measurements, Atmos. Chem. Phys. Discuss., 9, 3987–3997, 2009,

http://www.atmos-chemphys.net/9/3987/2009/acp-9-3987-2009.html.

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