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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Water Uptake by Fresh Indonesian Peat Burning Particles is Limited by Water Soluble Organic Matter" *by* Jing Chen et al.

Anonymous Referee #2

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This is a very interesting study focusing on the water uptake of organic-dominated biomass burning aerosols in Indonesia. The very low hygroscopicity was attributed to the small fraction of water soluble organic matter. The authors also demonstrated the importance of biomass types in controlling the kappa and water soluble organic matter fraction and the role of highly oxygenated organic compounds in controlling aerosol hygroscopicity. Overall, it is a convincing study that may help improve our understanding on hygroscopicity of aerosol particles, especially organic aerosols. Previous work was properly referred and the paper was well written. I would recommend its publication if the authors could address a couple of minor issues listed below.

Based on correlations between WSOC fraction and kappa, the authors suggested the importance of WSOC fraction in determining kappa of organic aerosol particles. My

question is if and how we can use the WSOC fraction and kappa of A0 and A1 aerosols to predict kappa, for example under the Zdanovskii, Stokes, and Robin (ZSR) assumption? Do we need additional information to improve the kappa prediction?

Page 3 line 17, can the authors clarify how "hygroscopic" particles or "CCN-active" are defined here? Because a kappa of 0.02 was considered as hygroscopic while a higher kappa of 0.05 was considered as CCN inactive. Concerning the range of kappa in literature, a lower kappa of 0.01 has been reported for low-volatile biomass burning aerosol particles in Rose et al. (2008).

Reference: Rose, D., Gunthe, S. S., Su, H., Garland, R. M., Yang, H., Berghof, M., Cheng, Y. F., Wehner, B., Achtert, P., Nowak, A., Wiedensohler, A., Takegawa, N., Kondo, Y., Hu, M., Zhang, Y., Andreae, M. O., and Pöschl, U.: Cloud condensation nuclei in polluted air and biomass burning smoke near the mega-city Guangzhou, China – Part 2: Size-resolved aerosol chemical composition, diurnal cycles, and externally mixed weakly CCN-active soot particles

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