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Atmospheric Chemistry and Physics Discussions

Interactive comment on "CCN activity and organic hygroscopicity of aerosols downwind of an urban region in central Amazonia: Seasonal and diel variations and impact of anthropogenic emissions" *by* Ryan Thalman et al.

Anonymous Referee #1

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General comments:

Study by Thalman et al. presents results of κ_{CCN} and mixing state derived from size-resolved CCN observations collected during the GoAmazon2014/5 campaign. From κ_{CCN} and additinal aerosol chemical composition measurements, the authors then estimate the hygroscopicity of the organic fraction κ_{org}. The results presented in the study, together with those presented by Pöhlker et al (2016) in another experimental site, represent the first long-term measurement of hygroscopic behaviour of aerosols in the Amazon. Overall, it is a well written manuscript on an important subject. Therefore,

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Discussion paper

I recommend it for publication in ACP after minor corrections.

Specific comments:

Since chemical composition of aerosols in the study was largely dominated by the organic fraction, a discussion on the uncertainties related to limited solubility or surface active species could be relevant, even if no quantitative assessment of these uncertainties is provided.

P 21 L 431-440 Given that the importance of hygroscopicity to the aerosol CCN behavior is enhanced for κ values below 0.2, the choice of an adequate κ value to represent the Amazonian aerosol CCN behavior is important, for instance, to modeling studies. In this sense, it could be interesting to compare the presented results with κ_{HTDMA} results from campaigns previous to 2008 as well, since κ have already been calculated from the original data of some of these campaings in other works (see, for example, Gunthe et al. (2009) and the Supplement of Sánchez Gácita et al. (2017)). In the authors opinion, differences between presented results and κ_{HTDMA} from earlier campaigns are solely due to the use of H-TDMA or CCN technique, or other factors could be important as well?

Supp. P10 L172 Please provide a reference for equation S1 of supplement

Supp. P10 L174-175 The use of equation S2 of supplement was suggested by Petter and Kreidenweis (2007) for $\kappa > 0.2$. Considering that for most conditions in this study κ_{CCN} was below this threshold, perhaps an iterative approach on the original κ-Köhler equation (see, for example, Carrico 2008) would have been more adequate. A sensitivity test on a small fraction of the data would be desirable to show that uncertainties derived from the use of this simplified approach are indeed low or negligible.

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