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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Long-term observations of cloud condensation nuclei in the Amazon rain forest – Part 2: Variability and characteristic differences under near-pristine, biomass burning, and long-range transport conditions" *by* Mira L. Pöhlker et al.

Anonymous Referee #1

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General comments: The paper "Long-term observations of cloud condensation nuclei in the Amazon rain forest – Part 2: Variability and characteristic differences under near-pristine, biomass burning, and long-range transport conditions" by M. Pohlker, et al. 2017 provide comprehensive surface CCN measurement dataset in the Amazon rain forest. The authors present very useful observations on CCN activation properties and the results are consistent with the previous studies. However, the paper did not clearly address the main effects on CCN properties for different conditions, such as

distinguishing the effect of chemical composition from size distribution or mixing state of aerosol.

Specific comments: P4, section 1.2: Please provide additional information about how four cases are representative the typical CCN variability in the Amazon basin. For example, how many days are dominated by NP or BB condition?

P6, section 2.3, The definition of the near-pristine periods is a little bit weak. It seemed that it was only based on BC. Will other urban pollution tracer be considered?

P7, section 2.4: ATTO tower is 325 m tall. What is the uncertainty we expect from the BT analysis start height of 1000 m?

P13, line 5-10, What is the percentage of stable northeasterly wind direction for the periods in Figure 5a?

Figure 5, 7 and 8, If possible, please do not overlap k(S, Da) with the size distribution plot. It is very hard to read the color map in k(S,Da).

P15, line 5-10, The results here are not well supported. Andreae et al. 2017 showed that the UT particles consist predominately of organic material for aerosol size larger than 90 nm. For aerosol less than 60 nm, AMS had a hard time to determine chemical composition with good sensitivity.

P16, section 3.5, The Saharan dust confirmed by EDX are larger than 1 micron. The CCN discussed in this section are in much smaller size range. It is confusing to classify the LRT influence as Saharan dust influence.

P18, line 23-24, from Table 3, except LRT case, the rest of cases all have reasonably good agreement between kp and k(0.11%). It is very stretching to state the LRT case is in a good agreement.

P19, section 31, authors said that "...correspond to a clear drop in aerosol hygroscopicity...". Please clarify the "drop", compared to what cases?

P22, line 37, what is the OA/SO4 ratio for LRT pollution periods in Figure 7? Are they consistent with this case, around 3?

Figure 10, the different shape of the CCN efficiency spectra may related to the mixing state of aerosols for each case. It will be interesting to include that discussion.

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