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Interactive comment on "Diverse Chemical Mixing States of Aerosol Particles in the Southeastern United States" *by* A. L. Bondy et al.

Anonymous Referee #2

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The paper presents a highly detailed study on quantification of mixing states of individual aerosol particles collected during the SOAS field campaign in Centreville – an array of complimentary microscopic techniques is used along with appropriate statistical analysis across different sampling episodes and as a function of particle size and type. The paper is very well written, such detailed data sets will be of high relevance to the community and I recommend it for publication to ACP after authors address the following minor revisions:

MOUDI sampling – was it wet/dry deposition, please add information on the relative humidity during collection; in terms of the storage – could authors please elaborate on the storage conditions, in particular how samples were sealed and then frozen/unfrozen.

Fig. 2 b – biomass burning aerosol particle – size is ∼2-3 microns, not submicron –

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Discussion paper

perhaps select a smaller one

Fig. 3 – only supermicron classes of particles are shown – it would be valuable to add a similar figure but for submicron particles and discuss the differences/similarities SSA/aged SSA – how confident the authors are with this particle class assignment? Based on images shown in

Fig. 3 I am not sure I can see "aged" SSA, particles e-f don't appear to have noticeable amounts of Cl, which one would expect for a NaCl core.

STXM-NEXAFS results – it would be valuable to include NEXAFS Carbon K-edge spectra of representative particles (authors refer to these results throughout the paper yet do not show actual data) + chemical mapping to illustrate mixing states – in particular over similar particles as those analyzed by SEM/EDX – I would be very curious to see, if possible, same particles analyzed using these complimentary microscopic techniques

Fig 4 + corresponding text - The average particle specific diversity is calculated for each submicron and supermicron classes of particles – could authors comment how reproducible these values are? Perhaps add a standard deviation for each class?

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