

Interactive comment on “Short wave radiative impact of liquid-liquid phase separation in “Brown Carbon” aerosols” by Mehrnoush M. Fard et al.

Anonymous Referee #1

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Review of “Short wave radiative impact of liquid-liquid phase separation . . .” by Fard et al.

This manuscript investigates the impact of liquid-liquid phase separation in particles containing organic and inorganic material on scattering efficiencies, absorption efficiencies, and radiative forcing. Although liquid-liquid phase separation has been studied extensively, the impact of this phase transition on radiative forcing of particles containing molecular absorbers has not been studied until now. As a result, this manuscript is important and timely. I highly recommend this manuscript for publication after the authors have had a chance to address the following comments.

1) Page 4. Check spelling of “Zhnag”.

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2) Page 4, line 10. The authors indicate that the k -values correspond to SOA from different locations. Does this include brown carbon from biomass burning and smoldering combustion? Do the k -values used in the simulations cover the full range of k -values observed in the atmosphere? Although not absolutely necessary, it would be very helpful if the authors discussed k -values and AAE-values corresponding to different types of brown carbon found in the atmosphere. For example, what are typical values for biomass burning, smoldering combustion, SOA generated in environmental chambers, and organic material collected in the atmosphere? A small table would be very helpful. This would make it easier for a non-expert to put the results into context.

3) Figure 3. What is plotted on the x-axis (include units)?

4) Page 10, line 15, delete “with”.

5) Equation 4. On the denominator should “betaLLPS” be replaced with “betaHomo”?

6) AAE values ranging from 2 to 6 where used. References for these values should be included. Sorry if I missed the references.

7) Figure B1. Shown is the refractive indices for pure SOM from Lienhard. What type of SOM (e.g. pinene or toluene SOM) was used to determine these refractive indices? Also how do these refractive indices compare with what is observed in atmospheric particles? Will the authors reach different conclusions if a different type of SOM is used?

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