

***Interactive comment on “Determination of the refractive index of insoluble organic extracts from atmospheric aerosol over the visible wavelength range using optical tweezers” by Rosalie H. Shepherd et al.***

**Anonymous Referee #2**

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Review of:

“Determination of the refractive index of insoluble organic extracts from atmospheric aerosol over the visible wavelength range using optical tweezers”

In this manuscript, Shepherd et al. present an optical trapping technique combined with white light spectroscopy to measure the real and imaginary parts of the refractive index for samples of insoluble material from ambient aerosol samples. They use the data to estimate the effects of organic film-coated particles in the atmosphere revealing

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significant changes in the top of the atmosphere albedo compared to an assumption of equal sized water droplets.

This work is interesting and relevant and should be published once the following minor points are clarified or addressed:

1. In the introduction, references to the work of Reid and coworkers on refractive index measurements should be included.
2. The statement of an “unparalleled level of accuracy” seems too strong given the much greater precision and accuracy achievable using cavity-enhanced Raman scattering in optical tweezers.
3. Was all the material extracted during sonication with chloroform and water? What about components that are insoluble in these solvents?
4. Did the authors observe any artifacts of the sonication process (due to formation of radicals) that indicate further chemistry was occurring and changing the samples? Was this controlled for (i.e. a short duration sonication versus much longer sonication)?
5. Why was the mass concentration of humic acid in the droplets so low? At 30% RH, surely most of the water is lost?
6. The x-axis in figure 5 is confusing – as it reads, if the shell and core volumes are equal, this parameters goes to infinity. Please clarify. The y-axis label does not match the text (should it be ARE\_TOT?). Further, in the caption, top, middle and bottom are referenced, but the figure is horizontal.
7. Are the droplets fully spherical in these experiments? What would be the signatures of asphericity and how would this impact the fitting of the data?

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