Atmospheric Chemistry and Physics Discussions

Interactive Comment

Interactive comment on **"Physical properties and concentration of aerosol particles over the Amazon tropical forest during background and biomass burning conditions"** *by* P. Guyon et al.

Anonymous Referee #3

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1) Abstract single-scattering albedo only lists values from the end of the dry season. They should probably give values from both time periods.

2) Methods: Index of refraction used to correct PCASP. This relates to the most significant weakness and or uncertainty of the manuscript. The authors are basing a great deal on their knowledge of the index of refraction of smoke particles and values they give are significantly lower than what is typically used (typically 1.5). (This is based on chemistry and AERONET inversions.) This is not to say that the employed values are not correct, but rather the uncertainty in the field needs to be fully explored and their ramifications discussed. These changes strongly influence the reported volume and hence all subsequent size and density parameters that are later derived. A propaga-

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tion of error assessment must be performed before the paper can be published.

3) Section 3.2, end of second paragraph: The authors may want to be careful about trying to pull two modes out of the PCASP. PCASP bin sizing is not optimal for typical accumulation volume distributions and particle index of refraction most likely varies between particles. There have never been any bimodal size distributions of smoke published (that I know of) from mobility analysers. As these are better instruments for the task I suspect artefact in the PCASP.

4) Index of refraction uncertainty in density calculation. This part of the analysis is a bit misleading. First by RAW PCASP I assume they mean calibration bead index of refraction of 1.59 (which is not in common use). It is noteworthy that the Radke/Stith derivation was also from a comparison of OPC data to filter mass. Hence the current estimate may be similar to Radke/Stith because there is a method bias. What can be concluded from this analysis is that the density derivation is highly uncertain and may be better left to mobility analysers than OPCs (which is much more closely related to physical size).

5) Page 18: The y intercepts for figure 5 regression are important. One should not simply force a regression through zero because it seems physical. The change in y with x is what is important. Leaving the y intercept in can be useful in detecting bias.

6) Discussion on density, page 19. Again, this density measurement hinges on using the correct index of refraction. This is a pretty big spread in values discussed.

7) Single scattering albedo discussion is relatively complete and error free.

8) Overall, a relatively complete and well-written paper although not, perhaps, a major advance. But, well documented findings in one of the larger data-void regions of the world. Nevertheless, one should not read too much into PMS probe data.

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 1367, 2003.

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