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Interactive comment on “Aerosol loading in the Southeastern United States: reconciling surface and satellite observations” by B. Ford and C. L. Heald

Anonymous Referee #2

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Comments on “Aerosol loading in the Southeastern United States: Reconciling surface and satellite observations” by B. Ford and C.L. Heald” submitted for possible publication in ACP.

This paper analyses an apparent inconsistency between the surface concentration of aerosol at the surface and the total column optical depth over the South-Eastern United States. This paper shall serve as a justification for a field experiment (SOAS) that shall take place in 2013 to resolve the issue. In short, the surface measurements of aerosol concentrations show limited seasonal cycle while the total column optical measurements (either from satellites or from ground based sunphotometers) indicate a much

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larger aerosol load during the summer than during the winter. The paper analyses in detail the potential causes from discrepancy, guided by GEOS-Chem simulations.

This is an excellent, very well presented, paper. My only significant concern is that the paper rules out a number of potential hypotheses, and concludes that their must be a “missing source of aerosol above the surface”. This should be somewhat expanded. What kind of “source” can that be (aerosol are not generated out of blue sky) ? What flux is needed to explain the aerosol load ? I strongly suggest that the authors add one or two paragraphs in the discussion detailing the kind of process that may explain their observations and that the plan to validate/invalidated during the field experiment.

Other comments I do not like Figure 5. The scatter plots use a huge number of points. Over plot area with a large density of points, the information on the number of points is fully lost. On the other hand, the outliers are still visible. As a consequence, the figure gives a false impression of large mean: See the upper left figures in Fig 5. From these scatter plots, it seems that the typical extinction in the lower atmospheric layers is 0.2 to 0.4. et, the average (lower right) shows that it is 0.1 or less. I suggest to reduce (sample) the number of points used in the scatter plots.

P9920 I15-16: Not clear. What are the level 2 data with a standard deviation “of greater than 2.5” ? P9921 I12: CALIOP measures scattering, not extinction. Extinction may be estimated but is not directly measured. P9926 I14 : Diurnal cycle. Aeronet makes measurement every 15 minutes. Why not used these observation, and rely on measurements from different sources (satellite, surface) acquired at different times, to study the diurnal cycle. P9931 I20. Biased => bias P9932 I6: Several studies indicate that the aerosol type from Calipso shall not be trusted

P9932 I22 : This is likely BE due to. . . Correct

At several places in the paper, it is referred to “aerosols above the surface”. Aerosols are ALWAYS above the surface so that this does not provide any relevant information. It should be rather referred to the “lowest atmospheric layers” and even better if some

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height could be defined

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 9917, 2013.

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