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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 #1

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This manuscript by Ford and Heald investigates the seasonality of aerosol loading in the Southeastern United States, with a particular focus on an aloft feature that is not captured by the GEOS-Chem chemical transport model during summer. It is generally well and concisely written. I would recommend some minor changes; mostly clarifications, after which it would be appropriate for publication.

Specific Comments

P9926, L26-27 – It seems to me that GEOS-Chem shows far less seasonal change in the diurnal and seasonal variation as compared to observation. It would be helpful to

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have a more quantitative metric to support the statement that GEOS-Chem “captures the observed spatial, seasonal, and diurnal variation in PM2.5”.

P9928, L15 – Please quantify the variability in PM2.5.

P9928, L16-18 – It seems inconsistent with the premise of this paper that little diurnal variability in surface PM2.5 can be used to infer little diurnal variability in AOD. If a significant aloft source of aerosol is missing, I see no reason to assume it follows the same diurnal variability as near-surface PM2.5, especially when the authors find that adjustments to surface sources are insufficient to reproduce this discrepancy.

P9928, L19-24 –Where is the contradiction between this and previous studies in the correlation of satellite-observed column AOD and surface concentrations? Figure 1 clearly shows enhanced AOD and PM2.5 in summertime compared to wintertime. While this study suggests that a greater fraction of organic AOD may be apportioned aloft during the summer, this does not negate a correlation between total column and surface values due to surface sources of sulphate and other aerosol. Please clarify your statement and quantitatively demonstrate that a good correlation is not found between AOD and PM2.5.

Figure 6 – CALIOP’s extinction decreases rapidly near the surface, whereas modelled values increase sharply, yet modelled surface PM2.5 is shown to be underestimated in Figure 3. Some explanation needs to be made about these diverging features and tied to the agreement found with PM2.5.

Technical Corrections

P9927, L11 – I am unclear as to the meaning of “(~55% in the mean)”. Does this mean that modelled summertime PM2.5 are ~55% of the observed mean?

P9927, L17 – “captures” should be “capture”

P9928, L3 – suggest remove “even”

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P9931, L25 – should “twice” be “half”?

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

ACPD

13, C2470–C2472, 2013

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C2472