Evaluating Global Model Parameterizations of Aerosol Optical Properties Using *in situ* Data from ARCTAS

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We evaluate the externally-mixed, fixed size distribution aerosol optical property parameterizations used in the NASA GMI model [1, 2] and the GEOS-Chem model [3] with *in situ* data on aerosol scattering and absorption (at 3 wavelengths) gathered during the ARCTAS campaign [4]. We also compare the ARCTAS data with the size-resolved sectional Aerosol Simulation Program (ASP, [5]), and use the ASP results to evaluate the assumptions about the size distribution, hygroscopic growth, and the refractive indices of organic aerosols (OA) in the global parameterizations, as well as several possible mixing rules for black carbon. The models were intialized with *in situ* observations of aerosol mass and composition (and size distribution for ASP).

Our preliminary analysis suggests that the GMI and GEOS-Chem aerosol parameterizations show reasonable correlations with the observed scattering and absorption coefficients at all three wavelengths (r^2=0.5-0.75). Both models have slight positive mean biases in scattering and absorption coefficients (~0-40%), with about 70% of the model-observations differences within a factor of 2 of this mean bias. The GMI and GEOS-Chem model predictions of single scattering albedo (SSA) and asymmetry parameter (g) show little mean bias, however there is little correlation between the modeled and observed SSA and g.

[1] Duncan *et al* (2007) *ACP* **7**, 3713-3736 [2] Martin *et al* (2003) *JGR* **108**, 4097 [3] Heald *et al* (2013), *ACPD* **13**, 32925-32961 [4] Jacob *et al* (2010), *ACP* **10**, 5191-5212 [5] Alvarado & Prinn (2009), *JGR* **114**, D09306