
Allison B. Marquardt Collow¹,², Virginie Buchard¹,², Peter R. Colarco², Arlindo M. da Silva², Ravi Govindaraju²,³, Edward P. Nowottnick², Sharon Burton⁴, Rich Ferrare⁴, Chris Hostetler⁴, and Luke Ziemba⁴

¹University of Maryland Baltimore County, Baltimore, Maryland, USA  
²NASA Goddard Space Flight Center, Greenbelt, Maryland, USA  
³Science Systems and Applications, Inc., Lanham, Maryland, USA  
⁴NASA Langley Research Center, Hampton, Virginia, USA

Figure S1: Median backscatter at (a) 355 nm, (b) 532 nm, and 1064 nm during all research flights from the HSRL2, GEOS 5.22, GEOS 5.25, GOCART2G, and GOCART2G without aerosol assimilation (No GAAS). Profiles are shaded between the 25th and 75th percentiles. Mixed layer height (MLH) from the HSRL2 and planetary boundary layer (PBL) height in GEOS are added for reference as dashed lines. Note that PBL height for GOCART2G is the same as GEOS 5.25.
Figure S2: Vertical profile of the count of observations from the HSRL2 for each aerosol type
Figure S3: The aerosol speciation in GEOS GOCART2G composited based on the aerosol ID provided by the HSRL2. The values in parentheses indicate the total number of data points with each aerosol type.

Figure S4. Median extinction at 532 nm during all research flights from the HSRL2, GEOS 5.22, GEOS 5.25, GOCART2G, and GOCART2G without aerosol assimilation (No GAAS) filtered based on the HSRL2 aerosol ID for (a) marine, (b) polluted marine, (c) smoke, (d) fresh smoke, and (e) urban aerosols. Profiles are shaded between the 25th and 75th percentiles.
Figure S5. Median extinction at 532 nm for all research flights from LARGE, GEOS 5.22, GEOS 5.25, GOCART2G, and GOCART2G without aerosol assimilation (No GAAS) for (a) ambient, (b) dry, and (c) observation corrected relative humidity. Profiles are shaded between the 25th and 75th percentiles.