

Interpreting Lidar Measurements to Better Estimate Surface PM_{2.5} in Study Regions of DISCOVER-AQ

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The use of satellite AOD data to estimate surface PM_{2.5} has been broadly studied in various regions. Some showed good results while some showed relatively poor with the simple relationship between AOD and PM_{2.5}. The key factor is the aerosol vertical distribution. Lidar extinction profiles provide insights into the aerosol mixing not only in the boundary layer but also quantifying residual aerosol abundance above boundary layer with e-folding scale height. The normalizing AOD by hazy layer height is proven better in correlating with PM_{2.5}. In other words, extinction measurements near the surface can be a proxy for surface PM_{2.5}. In this study, we will use NASA airborne HSRL (High Spectral Resolution Lidar) during SJV2007 (San Joaquin Valley, February 2007) and surface MPLNet (Micropulse Lidar Network) at GSFC between 2007 and 2010 to characterize the relationship for the DISCOVER-AQ (Deriving Information on Surface Conditions from COLumn and VERTically Resolved Observations Relevant to Air Quality) field experiments; the first over Baltimore-Washington was conducted in July 2011.