Geophysical Research Abstracts
Vol. 19, EGU2017-12128, 2017
EGU General Assembly 2017


# Broadband Measurement of Aerosol Extinction in the Visible Range

Quanfu He (1), Nir Bluvshtein (1), Lior Segev (1), Michel Flores (1), Yinon Rudich (1), Rebecca Washenfelder (2,3), and Steven Brown (3)

(1) Weizmann Institute of Science, Environmental Science Department, Rehovot 76100, Israel, (2) Cooperative Institute for Research in Environmental Sciences, University of Colorado, 216 UCB, Boulder, CO 80309, USA, (3) Chemical Sciences Division, Earth System Research Laboratory, National Oceanic and Atmospheric Administration, 325 Broadway, Boulder, CO 80305, USA

Atmospheric aerosols influence the Earth's radiative budget directly by scattering and absorbing incoming solar radiation. Aerosol direct forcing remains one of the largest uncertainties in quantifying the role that aerosols play in the Earth's radiative budget. The optical properties of aerosols vary as a function of wavelength, but few measurements reported the wavelength dependence of aerosol extinction cross section and complex refractive indices, particularly in the blue and visible spectral range. There is also currently a large gap in our knowledge of how the optical properties evolve as a function of atmospheric aging in the visible spectrum. In this study, we constructed a new and novel laboratory instrument to measure aerosol extinction as a function of wavelength, using cavity enhanced spectroscopy with a white light source. This broadband cavity enhanced spectroscopy (BBCES) covers the 395-700 nm spectral region using a broadband light source and a grating spectrometer with charge-coupled device detector (CCD). We evaluated this BBCES by measuring extinction cross section for aerosols that are pure scattering, slightly absorbing and strongly absorbing atomized from standard materials. We also retrieved the refractive indices from the measured extinction cross sections. Secondary organic aerosols from biogenic and anthropogenic precursors were "aged" to differential time scales (1 to 10 days) in an Oxidation Flow Reactor (OFR) under the combined influence of OH, $O_3$ and UV light. The new BBCES was used to online measure the extinction cross sections of the SOA. This talk will provide a comprehensive understanding of aerosol optical properties alerting during aging process in the 395 – 700 nm spectrum.