Measurements of Aerosol Optical Proeprties Using Broadband Cavity Enhanced Spectroscopy

Michel Flores[1], Lior Segev[1], Steven S. Brown[2,3], Rebecca A. Washenfelder[2,3], Yinon Rudich[1]
[1]*Weizmann Institute, Rehovot, Israel*
[2] *University of Colorado, Boulder, Colorado*
[3] *National Oceanic and Atmospheric Administration, Boulder, Colorado*

The optical properties of organic aerosols are important for determining their radiative forcing in the atmosphere and, subsequently, their impact on climate. The high abundance of natural and anthropogenic volatile organic compounds in the atmosphere leads to formation of secondary organic aerosols (SOAs) via photochemical reactions with OH, NO_3, and O_3. In the atmosphere, aerosols undergo further processing with oxidizing species, thus changing their chemical, physical, and optical properties. Despite their acknowledged importance, understanding the optical properties of aerosols with good precision, and how these properties depend on chemical composition and structure remain poorly understood. We will describe the use of broadband cavity enhanced spectroscopy to investigate the optical properties of different model aerosols upon atmospheric reactions. We will describe a newly developed broadband aerosol spectrometer that can retrieve aerosol optical properties at short wavelengths, from 320 nm, a less explored wavelength range. We will describe closure studies between this instrument and a photoacoustic cell and cavity ring down spectrometer. Finally, we will present an overview summary of SOA optical properties from several sources and aging pathways.