ABSTRACT

Aerosol absorption and scattering coefficients measured at ground sites and by the DOE G-1 aircraft during the Carbonaceous Aerosols and Radiative Effects Campaign (CARES) of summer 2010 are analyzed. We report wavelength-dependent single-scatter albedo (\(\sigma_{\text{sca}}/\sigma_{\text{ext}}\)) from simultaneous measurements of aerosol absorption and scattering at nine wavelengths between 1047–355 nm by eight separate integrated photoacoustic/nephelometer (IPN) instruments. The 9-\(\lambda\) absorption coefficients are combined with black carbon mass measurements from single-particle soot photometers (SP2) to derive wavelength-dependent mass absorption coefficients, including new results at UV wavelengths. The absorption and scattering data are combined with concurrent particle size distributions to estimate complex refractive indices (n-ik). The imaginary part of the complex refractive index (ik) is sensitive to enhanced absorption by organic coatings on soot cores and/or directly emitted primary and secondary organic particles. Closure studies will compare the estimated top-down refractive indices with bottom-up calculations using the observed chemical composition from aerosol mass spectrometers (e.g., Flowers, et al. ACP 2010). The wavelength dependence of optical properties and MACs for fresh and aged urban and rural emissions, including biomass burning, will be presented to help models accurately estimate net radiative effects for carbonaceous aerosol.