Temporal Variability of Aerosol Optical Properties, Ozone and CO Vertical Profiles over Rural Oklahoma

E. Andrews[1], L. Patrick[1], P. Sheridan[2], J.A. Ogren[2], S. Oltmans[2], and C. Sweeny[1]

[1]Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO 80309; 303-497-5171, Fax: 303-497-5590, E-mail: betsy.andrews@noaa.gov
[2]NOAA Earth System Research Laboratory, Boulder, CO 80305

Aerosol and gaseous constituents in the atmosphere influence the earth's radiative balance by scattering and/or absorbing radiation throughout the atmosphere. They also play a role in air quality with implications for human health, welfare and general aesthetics. In order to begin to understand how these atmospheric constituents affect radiative forcing and air quality it is necessary to know how much of each component is present and to connect that quantity with its impact. In the case of aerosol particles the impact is controlled not only by amount of particles present but also by inherent properties such as aerosol size and single scattering albedo. The spatial distribution (both horizontal and vertical) of these various gas phase and particulate components will also influence the atmospheric properties.

Here we present results from long-term measurements made by a light aircraft flying frequent vertical profiles over rural Oklahoma. The airplane was equipped with a suite of instruments including a nephelometer, a particle soot absorption photometer (PSAP) and an ozone monitor which provided continuous measurements of aerosol light scattering, aerosol absorption and ozone concentrations respectively. A programmable flask package (PFP) was also used to obtain discrete samples of various gas concentrations, including CO, at each flight level. Because of the long-term nature of this flight program we can address issues such as the seasonal variability of these constituents and look at how they co-vary with each other and various meteorological parameters.

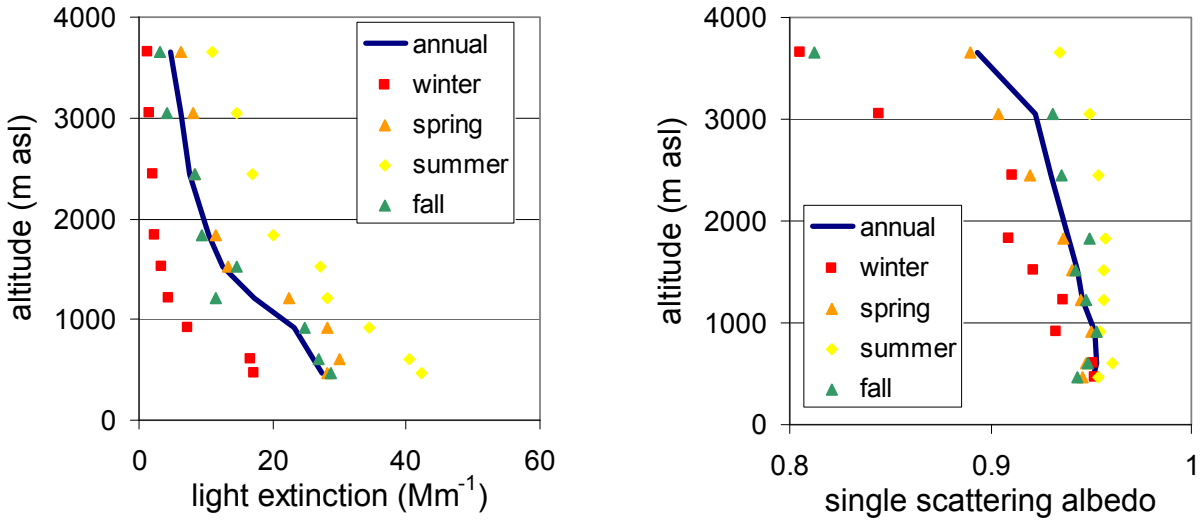

Figure 1. Median values of aerosol optical properties (extinction and single scattering albedo) plotted as a function of altitude and season.