TROPOSPHERIC LIDAR MEASUREMENTS

M. P. McCormick and W. H. Fuller, Jr.
NASA Langley Research Center
Hampton, Virginia 23669, U. S. A.

ABSTRACT

The use of lidar to measure transmissivity by pulse shape analysis and horizontal-range ratioing has been reported in the literature. More recently, the idea of ratioing Raman-shifted nitrogen returns at different ranges or altitudes has been proposed and some preliminary data have been presented. This paper will present data using this technique and compare the results with simultaneous measurements of observer visibility, aerosol characteristics and meteorological parameters. It will show that a good correlation exists between meteorological range as determined by lidar and observer visibility. In addition, simultaneous aerosol characteristics such as size distribution, number density, β_{scat} (from an integrating nephelometer), mass loading and elemental analysis were measured. These have shed light on the variations aerosol characteristics can produce in observer visibility, mass loading, and lidar meteorological range data. Also, meteorological data such as temperature, humidity and wind speed and direction will be presented and correlated.

A description of a small compact tropospheric lidar utilizing a Fresnel-lens receiver, ruggedized dye-laser transmitter, and high-speed data acquisition system will be discussed. As a compliment to the data acquisition system, a color-coded isopleth display is under development and will be described. This compact lidar will be used to measure mixing layer characteristics.