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A COMPARISON OF NEAR SIMULTANEOUS LIDAR RETURNS AND PARTICULATE COLLECTIONS ON FILTERS FLOWN AT SIX STRATOSPHERIC ALTITUDES

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ABSTRACT

Collections of particulates on both Los Alamos Scientific Laboratory (LASL) and National Center for Atmospheric Research (NCAR) filter systems were made from an RB 57F aircraft flown at one tropospheric and six stratospheric altitudes over the Boulder, Colorado, area. This daytime flight was spanned by lidar returns on evenings before and after the flight.

Scanning electron microscope examination of the LASL filters showed no evidence of solid particulates greater than .2 μm (the instrumental resolving power). Quantitative analysis of the NCAR filters yielded chemical composition and mass. The mass values were normalized to the total air flow through the filters to yield mass mixing ratios at the various altitudes. The lidar returns, normalized to molecular densities obtained from sonde data, were put in the form of particulate scattering divided by molecular scattering, i.e., an optical mixing ratio. A plot of the optical mixing ratio versus mass mixing ratio, in the stratosphere, yielded linear relationship, for five of the six data points, going through the origin.

*The National Center for Atmospheric Research is sponsored by the National Science Foundation.

**The Los Alamos Scientific Laboratory is operated under AEC contract by the University of California.