

COMPARISON OF LIDAR AND IN-SITU

MEASUREMENTS OF STRATOSPHERIC AEROSOLS

by

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ABSTRACT

This paper will present the results of a comparative study conducted in Laramie, Wyoming, during the summer and fall of 1972, as part of the Department of Transportation's Climatic Impact Assessment Program (CIAP). The study included independent, and nearly simultaneous, measurements of stratospheric aerosols using a LIDAR system and a balloon-borne in-situ particle counter.

The LIDAR provides a remote measurement of volume backscatter (aerosols and molecules) in a narrow wavelength region centered at the ruby wavelength (6943\AA); whereas the balloon-borne in-situ counter measures aerosol concentration by counting aerosols greater than $\approx 0.30 \mu\text{m}$ in a diameter as they are pumped through a chamber and scatter white light forward into photo-detectors.

The comparison of measurements that will be discussed using the two techniques involves formulating the LIDAR data so that it is compatible with the counter data. The formulation includes separation of the scattering due to aerosols from the total and displaying this in terms of aerosol scattering function. Aerosol scattering function is proportional to aerosol concentration if the aerosol parameters, such as size distribution and composition, are constant with altitude.

In separating the aerosol scattering from the total, the need for real atmospheric number density over the Standard Atmosphere is also discussed.