

NEW OBSERVATIONS OF TROPOSPHERIC AEROSOLS
MADE WITH THE U. OF A. BISTATIC LIDAR

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ABSTRACT

The University of Arizona bistatic lidar system^[1] has been improved in certain key areas to permit angular scattering measurements to be made more rapidly and accurately. Specific improvements include digital data acquisition systems to record both bistatic and simultaneous backscatter measurements. An optical communication link has been installed between the transmitter and bistatic receiver to time aperture the collection of bistatic signals and hence reduce shot noise contributions.

Example observations collected with the improved bistatic system are presented which display the aerosol number density fluctuations (both temporal and spacial) typically encountered in collecting a set of bistatic measurements. Ways of compensating for the effective errors introduced by such aerosol number density variations are discussed. Several sets of bistatic measurements are analyzed to obtain angular scattering curves of the parallel and perpendicular Stokes components, and combinations thereof, due to aerosol scattering for scattering angles ranging from approximately 100 to 160°. These angular scattering measurements are related to theoretical Mie

scattering calculations to obtain information about the size distribution and imaginary component of refractive index of the aerosol scatterers.

1. Reagan, J. A., and W. P. Webster; "A Bistatic Lidar for Measuring Atmospheric Aerosol Distributions," Paper presented at 3rd Conference on Laser Radar Studies of the Atmosphere, Ocho Rios, Jamaica, W.I., (1970).