OPTICAL MODELLING OF THE STRATOSPHERIC AEROSOL DERIVED FROM RECENT COMPARATIVE MEASUREMENTS

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ABSTRACT

A number of comparative measurements of the stratospheric aerosol have been carried out at the University of Wyoming under the United States Department of Transportation Climatic Impact Assessment Program. These include simultaneous lidar soundings, filter sampling, impactor sampling, and in-situ particle counting. From the in-situ and the impactor measurements exponential, power-law, and log-normal size distribution models have been obtained. These aerosol models are constrained to fit the filter sample mass density data and available measurements of condensation nuclei concentration. Absolute Mie theory aerosol backscatter cross sections for representative particle compositions for these models are compared to the absolute lidar returns as a function of altitude. The comparison is fair to good.

It is shown that the Mie theory cross sections are sensitive to the material composition (refractive index), and to aerosol size distribution, particularly for particles with diameter greater than 1μm. In addition, recent measurements of stratospheric aerosol extinction are compared to Mie theory calculated extinction cross sections for these particular aerosol models.