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SUN AND SKY RADIOMETRIC MEASUREMENTS AT THE CART ARM SGP SITE

R. N. Halthore, S. E. Schwartz, Y. Liu, P. Daum,
B. Holben[1], and J. J. Michalsky[2]
Brookhaven National Laboratory
Department of Applied Science
Environmental Chemistry Division
Upton, NY 11973-5000

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[1] NASA Goddard Space Flight Center
[2] SUNY at Albany

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ABSTRACT

A Sun/sky scanning radiometer (Cimel sunphotometer, CSPHOT) has been operating as a facility instrument at the ARM SGP site since April, 1998. It provides measurement of the atmospheric transmittance, from which it is possible to calculate apparent aerosol optical thickness and precipitable water, and sky brightness along the solar almucantar and along the solar principal plane, from which column averaged size distribution can be obtained by inverting the solar aureole measurements. Here we illustrate the quality of CSPHOT measurements. Specifically, measured transmittance data will be compared with those obtained from an independently calibrated and continuously operating multi-filter rotating shadowband radiometer, MFRSR, situated close to the CSPHOT at the Central Facility. Aerosol size distribution inferred from solar aureole measurements will be compared to that inferred from direct solar extinction measurements and in-situ nephelometer measurements. Precipitable water inferred from the 940-nm band will be compared with that of the radiosonde and/or microwave radiometer values. Measured atmospheric transmittance in narrow bands will be shown to be consistent with broadband measurements of direct-normal solar irradiance. The CSPHOT is also part of AERONET, a worldwide network of sunphotometers maintained by NASA GSFC. Thus ARM measurements of atmospheric optical properties can be related to those measured elsewhere, thereby providing a global data set for extending applicability of algorithms that are evaluated using measurements at SGP. Efforts are currently underway to install and maintain two additional sunphotometers at the TWP and NSA.