

## Aerosol Optical Depth from Passive and Active Measurements during the 2005 Aerosol Lidar Validation Experiment at the ARM Site in Oklahoma

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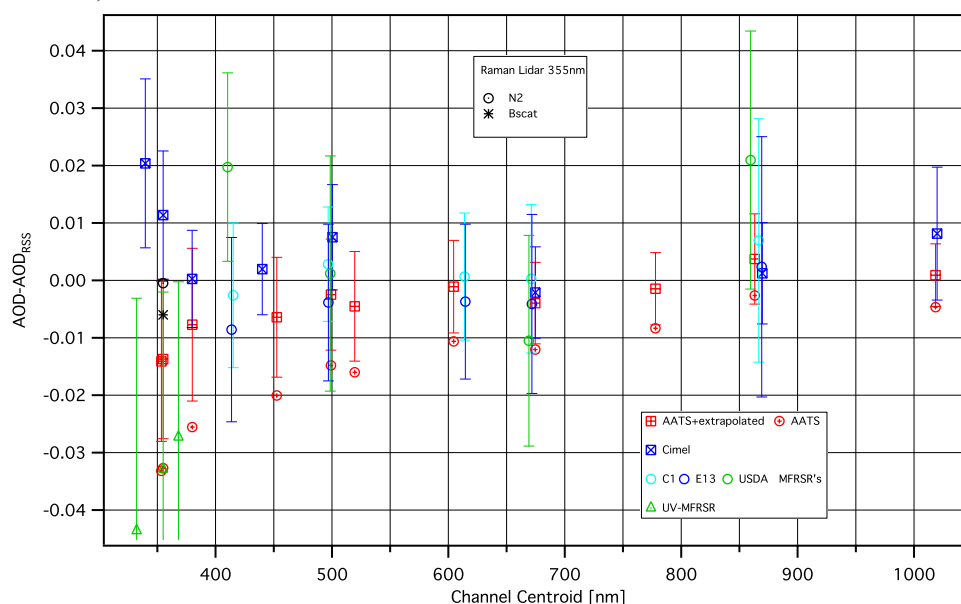
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During the Aerosol Lidar Validation Experiment (ALIVE) conducted from Sep 12 to 22, 2005 at the Department of Energy (DOE) Southern Great Plains (SGP) ARM Climate Research Facility (ACRF) in Oklahoma, the NASA Ames Airborne Tracking 14-channel Sun photometer (AATS-14) was flown aboard a profiling aircraft to measure aerosol extinction profiles. The chief goal of this experiment was to validate extinction profiles obtained with active measuring instruments: Raman Lidar (at 355nm) and Micro-Pulse Lidar (MPL at 523nm). Aerosol Optical Depth (AOD) was retrieved from the Raman Lidar through integration of vertical extinction profiles measured with the lidar. This integrated quantity was compared with column AOD retrieved from five independently calibrated passive radiometers and sun photometers: Two ARM and one USDA visible-wavelength (5 channels, 415 nm to 870 nm) Multi-Filter Rotating Shadowband Radiometer (MFRSR) from ARM, one USDA UV-MFRSR ( 6 channels, 305 nm to 368 nm), one Aeronet Cimel Sun Photometer (7 channels, 340 nm to 1020 nm), and one ARM Rotating Shadowband Spectroradiometer (999 pixels from 362 nm to 1070 nm). The AOD at 355nm from Raman Lidar was compared with interpolated values from AATS, UV-MFRSR and Cimel and the extrapolated values from RSS. All four Sun photometers correlate well at 355nm and AOD's agree within  $\pm 0.03\text{OD}$ . Raman Lidar results exhibit almost no bias ( $<0.006\text{OD}$ ) however they produce the largest standard deviation ( $>0.07\text{OD}$ ). For wavelengths longer than 380nm all five Sun photometers read within 0.01OD at all channels except for three channels of USDA's MFRSR at 415nm ( $+0.02\text{OD}$ ), 610nm ( $-0.09\text{OD}$ ) and 870nm ( $+0.02\text{OD}$ ).



**Figure 1.** Comparison of aerosol optical depths (AOD's) with respect to AOD obtained with the Rotating Shadowband Spectroradiometer (RSS).