Measuring Aerosol Optical Depth (AOD) and Aerosol Profiles Simultaneously with a Camera Lidar

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CLidar or camera lidar is a simple, inexpensive technique to measure nighttime tropospheric aerosol profiles. Stars in the raw data images used in the CLidar analysis can also be used to calculate aerosol optical depth simultaneously. A single star can be used with the Langley method or multiple star pairs can be used to reduce the error. The estimated error from data taken under clear sky conditions at Mauna Loa Observatory is approximately +/- 0.01.

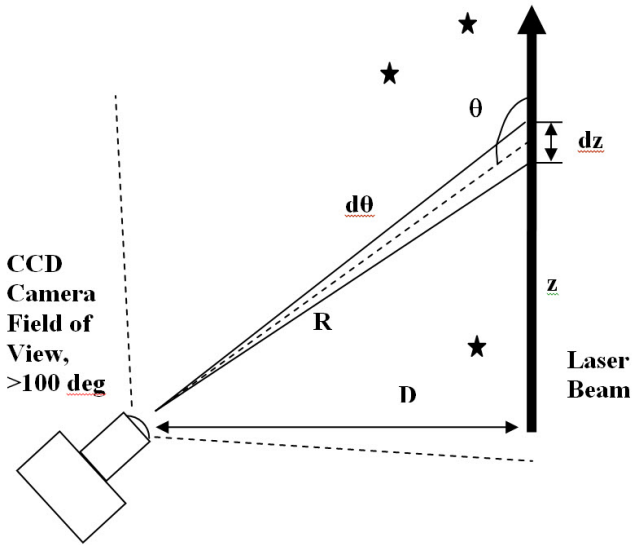

Figure 1. The geometry used for the CLidar technique along with three stars. The star brightness is a measured in the same images used for the CLidar aerosol profiles.

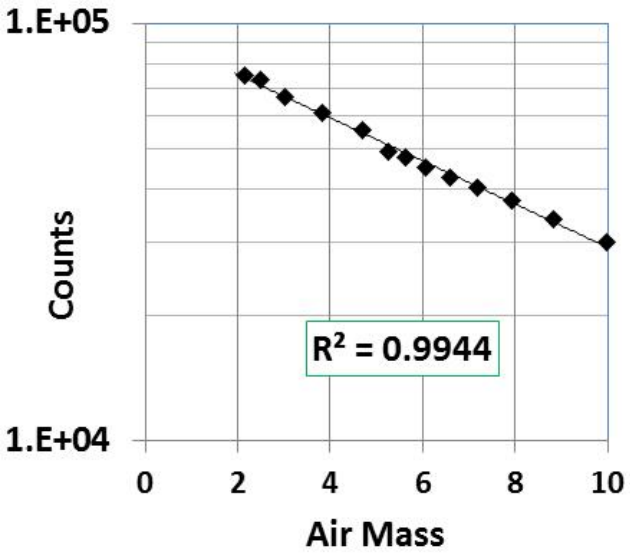

Figure 2. Langley plot using the star Rigel in Orion under very low aerosol conditions. The R2 of 0.9944 is equivalent to an AOD error of about 0.02.