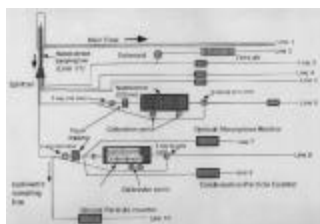


Multi-wavelength Integrating Nephelometer

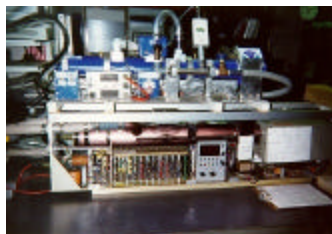
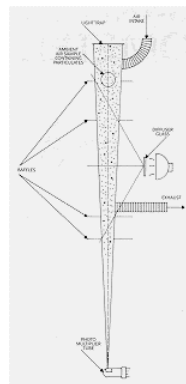
SITES



3-wavelength
Nephelometer at
the SGP Site



Different Types of Integrating Nephelometers



PURPOSE

The purpose of the project is to use an integrating nephelometer (located at the ARM Site in Lamont, OK.) to determine both the backscattering and light scattering coefficients. These coefficients will then be used to compare and contrast data from other instruments such as the Ramen Lidar and the Multi-filter Shadowband Radiometer.

Introduction

As a participant in the Earth Systems Science Research Experience for Undergraduate Students, I was told to work on finding information regarding the integrating nephelometer data at the SGP/CART Site at <http://www.arm.gov>. Backscattering data along with light scattering data was found and compared to other data from correlating instruments. The data that was analyzed was between May 10-25, 1998. This integrating nephelometer data is used to measure τ , the scattering cross section of particles that produce haze and/or cloudiness. One can use the scattering cross section to calculate τ , the optical depth of the atmospheric aerosol (used to calculate the amount of energy lost by light traveling through the atmosphere) or the visual range (the distance at which one can see using the unaided eye).

Conclusion

Beforehand we were told that there was a huge fire in Mexico during the month of May of 1998, which may or may not result in the transport of particles toward the ARM site in Oklahoma. Dr. Meng-Dawn Cheng from the Oak Ridge National Laboratory has demonstrated through the use of backward trajectory analysis that the air over the ARM site during those days could be traced back to Mexico. The data that was taken May 10-25, 1998 showed distinct correlations between the Integrating Nephelometer data, the Ramen Lidar data, and the Multifilter Rotating Shadowband Radiometer data. The Nephelometer data shows a drastic change in both the light scattering and backscattering coefficients when the Ramen Lidar showed a heavy dense haze at higher altitudes that drifted down towards the ground. In the same time period the Radiometer data indicated a great deal of attenuation of the direct solar beam when the Nephelometer indicated high values of the scattering coefficient. This serves to demonstrate the significant effect that the aerosol particles can have on the amount of solar radiation reaching the ground.

Plots

