

A New Polar Nephelometer Design for Measurements of the Angular Distribution of Light Scattered by Atmospheric Aerosols

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A polar nephelometer is under development for measurements of the angular distribution of light scattered by ambient populations of atmospheric aerosols. This is a new design that employs commercially available optical components and has few moving parts, offering the potential for a reliable, low-cost field instrument. Conventional integrating nephelometers measure total light scattering and the ratio of backscatter to total scatter. Polar nephelometers measure the entire angular scattering function, which can then be used to calculate other integral properties, such as the asymmetry parameter. The purpose of the project is to use the polar nephelometer in a network of global monitoring stations to provide radiative transfer models with additional aerosol scattering information, in the form of continuous measurements of the aerosol scattering distribution and asymmetry parameter, to improve aerosol radiative forcing estimates.

A photo of the instrument is shown below. The light source is a Nd:Yag laser at a wavelength of 532 nm. The laser beam traverses the perimeter of an air filled sample chamber. Molecules and airborne particles in the path of the beam scatter light in all directions, and a panoramic mirror positioned near the laser reflects the light to a CCD camera looking down on the mirror. The distribution of scattered light in the sample chamber is recorded as a CCD image. The instrument is approaching the end of the first year of development. The poster will discuss the current state of the project and present some preliminary data.

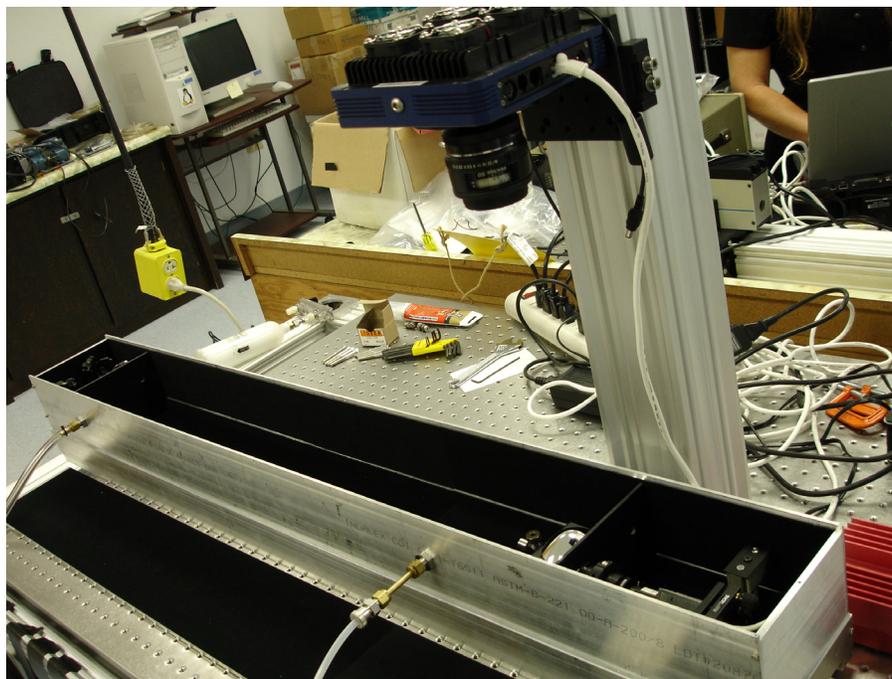


Figure 1. The photo above shows the polar nephelometer under construction. The Nd:Yag laser and beam stop can be seen in the foreground, partitioned from the panoramic mirror and sample chamber. The CCD camera is positioned above the panoramic mirror.