PHYS721–Atmospheric Radiative Transfer Homework 2

Phase Function Data From Aeronet Sunphotometers:

The idea is learn how to use the NASA Aeronet Sunphotometers to study aerosol phase function results. Aeronet is a global network of instruments measuring direct solar radiation and angular radiation scattered by gases and particles in suspension in the atmosphere. The angular sky radiation produce enough information for the inversion of properties relative to the particles in suspension in the atmosphere (mainly aerosol optical depth, the volume size distribution, refractive indices, and the relative probability of particles being scattered or absorbed by the particles, and the phase function). The aeronet web page will also direct you to some important references on this subject.

Lets first download some Aeronet data:
1 – Go to http://aeronet.gsfc.nasa.gov
2 – Select "Data", then "Aerosol Inversions, the "Download Tool"
3 – Select the Station of Interest (MD_Science_Center)
4 – Select Date (between 1/Jul/2006 – 31/Aug/2006)
5 – Select – Phase Function (and/or other variables of interest)
6 – Download,

Open the downloaded file in Excell or any other graphics software. You can also plot the graphs manually. Lets take Aug/7/2006 daily average as an example (if no data, move to next day). The file will give you the phase function as a function or the scattering angle.

Analysis procedure:

1 – Plot the phase in the way you find most appropriate for convenient visualization
2 – Determine if the phase function is normalized
3 – Calculate the asymmetry parameter g
4 – Compare in the same plot the normalized phase function that you have downloaded with the Henyey-Greenstein phase function for the same g, and the normalized Rayleigh phase function.
5 – Look for another Aeronet station where you expect to see high concentrations of dust in the atmosphere. Check the size distribution for a case with predominant coarse mode aerosols. Download one phase function for this station and compare with the phase functions you plotted previously.