Aerosol optical depth variation observed using Sun-Photometer over Indore (22.67 °N, 75.87 °E)

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Introduction: Aerosol optical depth (AOD) is an important parameter which tell us about the amount of incoming solar radiation which is attenuated in the earth’s atmosphere due to aerosols and hence column aerosol loading. Daily monitoring of AOD can tell us about the variation in column concentration of aerosols over measured site. AOD is mainly due to scattering and absorption of incoming solar radiation by aerosols and these processes depends on the size and composition of particles and wavelength of incoming solar radiation. Hence monitoring AOD at different wavelengths gives a rough idea about the type and size distribution of aerosol particles, which can help us to find the source of particle emission in the atmosphere and its strength.

In India there are Multi Wavelength Radiometer (MWR) stations like at Trivandrum, Mysore, Visakhapatnam, and Pune, which are continuously monitoring the AOD since last one decade or so, but they all are at low latitudes in southern part of India. There is no station in the middle part of India except recently started station at Jodhpur, so in this manner Indore is an important stations to monitor the AOD in order to get an over all picture of India. Indore is a rapidly growing industrial area hence it is important to see the contribution of Anthropogenic activities in aerosol loading, which can directly affect the local climate, and health related problems too.

Methodology Used: In the present work a Hand held Sun photometer developed at Physical Research Laboratory, Ahmedabad was used to measure the direct solar radiation intensities at four wavelength band that are 400, 499, 668, and 858 nm with bandwidth between 13nm to 29 nm. Accuracy in time is very crucial for the calculation of the Sun position at the time of observation hence chronometer was synchronized with a GPS receiver and hence optical depth. Observations were taken for all the filters at an average interval of 15 minutes starting from 0830