IRS2012-233
International Radiation Symposium 2012
Dahlem Cube, Berlin, Germany, 06 – 10 August 2012

Assessment of aerosol hygroscopic growth using an elastic LIDAR and BRAMS simulation in urban metropolitan areas.

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Atmospheric aerosol particles have received much attention in recent years due to their importance in climate change and in cloud formation. The influence of these particles on Earth's radiative budget depends on a number of factors, including their size distribution and chemical composition.
The size increase of aerosol particles resulting from water vapor uptake has important implications for the direct scattering of radiation and cloud droplets formation. The extent to which these particles have affinity for water vapor is a property that depends on chemical composition and atmospheric parameters, such as availability of water vapor.
We used a single-wavelength backscatter LIDAR (532 nm) and relative humidity profiles obtained with radiosonde to study the growth of particles over Sao Paulo metropolitan region, Brazil, under different conditions of water vapor availability. In these days we had breeze onset over the metropolitan area, potentially bringing marine aerosols and humidity from the Atlantic Ocean. To simulate the breeze onset and the path of the air parcels, we runned BRAMS model for each day, including sources of marine aerosols in the model. In order to infer the hygroscopic growing factor, we developed a fitting model algorithm, already proposed in the literature, calculating the backscattering coefficient at 532 nm for thirty minutes periods after and during the breeze onset and comparing backscattering at various altitude levels with a reference backscattering at the lowest relative humidity level inside the breeze, i.e. below the top of the mixing layer. In addition, we performed a comparison between the thirty minutes backscattering profiles inside the breeze with a reference thirty minutes backscattering profile before the breeze.
With this assumptions we could infer some hygroscopic properties of aerosols over Sao Paulo urban area.