



Closure field observations and controlled laboratory studies demonstrate chemical aging affects optical and microphysical properties of carbonaceous aerosols significantly

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The direct and indirect radiative forcing by carbonaceous aerosols (black carbon and organics) is significant and uncertain. We will report field observations and laboratory measurements from recent campaigns by our group demonstrating that models substantially underestimate both carbonaceous aerosol abundances (e.g. secondary organic aerosols in Mexico City [1]) and their specific light-absorption (e.g. brown carbon, uv absorption and coating enhancements in the Jeju Korea [2] and the laboratory [3,4]). In addition we will illustrate carbonaceous aerosols are hydrophobic near source regions (e.g. in Houston [5]) and become hydrophilic in the far field (e.g. marine stratus [1]) but the timescales of these transformations are ill-quantified. Our talk will underscore the climatic significance of carbonaceous aerosols and the urgency to elucidate the underlying chemical mechanisms altering carbonaceous aerosol optical and microphysical. I will also discuss how new optical, chemical and microphysical instrument combinations (multi-wavelength photoacoustic, SP2, AMS, HTDMA) in upcoming field campaigns (Ganges Valley Aerosol Experiment in India in 2012), laboratory studies and innovative modeling strategies will accelerate quantitative accurate representations of carbonaceous aerosols in climate models.

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[2] Flowers B., Dubey, M. K., Mazzoleni C. et al Optical-chemical-microphysical relationships and closure studies for mixed carbonaceous aerosols observed at Jeju Island; 3-laser photoacoustic spectrometer, particle sizing, and filter analysis, *Atmos. Chem. and Phys.*, 10, 10387-10398, doi:10.5194/acp-10-10387, **2010**

[3] Cross, E., Mazzoleni, C., Dubey, M. K. et al, Soot particle studies – Instrument Intercomparisons Project Overview, *Aerosol Sci. & Tech*, 44, 8, 592-611, **2010**

[4] Chakrabarty, R. K., Mazzoleni, C., M. K. Dubey et al. Brown Carbon in Tar Balls from Smoldering Biomass Combustion, 10, 13, 6373-6370, *Atmos. Chem. & Phys.*, **2010**

[5] Lance, S., A. Nenes, C. Mazzoleni, Dubey, M. K. et al, CCN Activity, Closure and Droplet Growth Kinetics of Houston Aerosol During the Gulf of Mexico Atmospheric Composition and Climate Study (GoMACCS) *J. Geophys. Res.*, 114, D00F15, 10.1029/2008JD011699, **2009**