# Numerical computation of optical properties of biomass burning soot from morphological and mixing state information provided by field and laboratory observations

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Carbonaceous aerosol emitted from biomass burning (BB) contributes significantly to atmospheric aerosol loadings regionally and globally. Direct radiative forcing of BB aerosol can be positive and/or negative and this depends on its composition, morphology and mixing state. Soot particles are one of the major light absorbing constituents in BB smoke. Soot particles are normally internally mixed with other material in BB smoke and the mixing state can affect their light absorption and scattering properties.

In this study we investigate morphology and mixing state of soot particles emitted from BB smoke from field and laboratory measurements. Smoke particles were collected 1) during the Las Conchas wildfire in New Mexico (June, 2011) and 2) at the U.S. Forest Service's Fire Science Laboratory in 2012, during the fourth Fire Laboratory at Missoula Experiment (FLAME-4).

Individual particles were analyzed with electron microscopy, and were categorized and characterized by their morphology, aggregation and mixing state. Based on the characterization of soot morphology and mixing state, synthetic soot particles were generated and their optical properties were numerically simulated using a discrete dipole approximation model.

The aim of this study is to enhance our understanding of the effect of morphology and mixing on light scattering and absorption by soot particles and ultimately their effects on radiative forcing.