Impact of core-shell optical properties on photolysis and chemistry

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The abundance of many atmospheric pollutants (such as methane, ozone, CO, sulfate and some organic compunds) is controlled by emissions and the oxidizing power of the troposphere. All tropospheric chemical reactions are driven by photolysis. Aerosol particles can influence chemical processing in the atmosphere by affecting photolysis, via scattering and absorption of light [1].

Many models approach the treatment of optical properties differently. Particles are commonly treated as homogenous mixtures of different components, but there is evidence that many particles exist as core-shell mixtures [2]. Much of the discussion of the impact of aerosol on the atmosphere has focused on the direct radiative impact of particles, which core-chell treatment can significantly affect [3]. It has also been shown that absorption strengthens towards shorter (UV) wavelengths, more relevant to photolysis and thus drivers of tropospheric chemistry [4].

This study presents an analysis of the impact of treating aerosol as core-shell mixtures, more specifically on photolysis rates. We also addresses some of the variations in model aerosol optical properties. The impacts on pollutants and chemical processing are discussed

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