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The Dynamic Interaction of Chemistry and Phase Partitioning in Atmospheric Organic Aerosols[1]

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Atmospheric organic aerosols are a dynamic, chemically evolving mixture in equilibrium between the gas and condensed phases. This applies equally to primary emissions, which span a huge range in volatility, as well as secondary oxidation products generated by chemical reactions in both phases. The degree of volatility of primary emissions has been historically underappreciated, and the role of oxidation reactions has been considered in almost all cases only through their first one or two generations. We have recently developed a 'volatility basis set' to address both primary volatility distributions and secondary volatility evolution (sometimes called primary organic aerosol and secondary organic aerosol). Here we shall discuss both facets of this framework as they apply to problems in organic aerosols on all scales, from emissions measurements to global organic aerosol loadings. We shall describe ongoing experimental work to constrain volatility distributions and volatility evolution through chemistry as well as extensions to the basis-set framework to more fully describe evolving aerosol properties.

[1]In collaboration with Allen Robinson, Carnegie Mellon University.