Interfaces: The Gordian Knots of Atmospheric Chemistry

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Atmospheric oxidants play a controlling role in global climate and regional air quality. The skill with which atmospheric models represent oxidant concentrations is limited by our understanding of the underlying chemical processes. Heterogeneous reactions, occurring at atmospheric interfaces, have been shown to be critical in regulating the concentration of oxidants in the atmosphere. To date, the vast majority of the molecular level information on these reactions has been determined through laboratory investigations using model interfaces. However, it is not clear whether reaction kinetics and mechanisms determined using simplified model systems will translate to complex interfaces found in the atmosphere. I will discuss a new framework for *in situ* investigations of chemical reactions at the gas-aerosol and gas-ocean interface directly. This methodology will be applied to the reactive uptake of nitrogen oxides to atmospheric interfaces found in coastal regions with specific attention paid to the potential formation of photo-labile halogen containing molecules. Our experimental results demonstrate that reactions occurring at atmospheric interfaces, as probed in their native state, not only proceed at different rates, but often follow completely unique trajectories when compared to *a priori* assumptions based on model systems.

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