Probing complex single particles one at a time: What can we learn about the troposphere?

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As demonstrated for the stratosphere decades ago, heterogeneous reaction processes can profoundly impact our atmosphere. Over the past several decades, lab studies have shifted their focus from stratospheric to tropospheric reactions on aerosols including dust, soot, organic carbon, and sea salt particles. However, one common challenge in such studies involves replicating the chemical complexity of atmospheric aerosols so the results can be used to explain field observations. Most studies treat the aerosol as an "average" composition comprised of all particle species that are present. However, atmospheric aerosols are comprised of external mixtures of many particle types with different surface properties that will react differently, even for one source such as sea spray. This presentation will focus on results from studies that are now addressing how these different complex particle types react and behave in the atmosphere on an individual basis. New results will be presented from a new ocean-atmosphere lab designed to simulate the complexity of real world sea spray aerosols in a controlled laboratory setting.

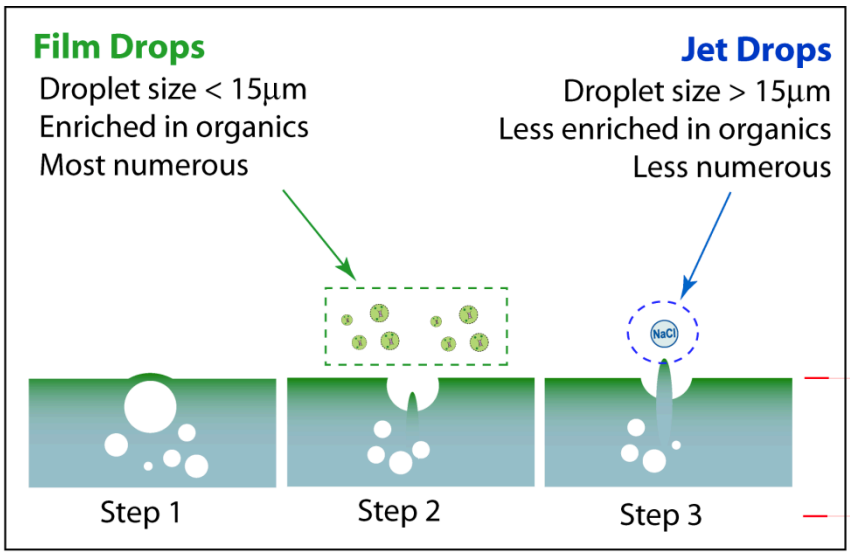

Figure 1. Steps involved in sea spray generation showing how individual particles have different sizes and chemical compositions depending on the bubble bursting production mechanism.