The Air-Sea Chemical Exchange in the Arctic Ocean: Lessons learned from the 2015 GN01 US GEOTRACES cruise

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The Arctic Ocean has experienced rapid alteration in recent decades, including significant sea ice melt and enhanced runoff, in response to climate warming. While atmospheric transport pathway is an important mechanism for natural and anthropogenic substances from the surrounding continents to enter the Arctic seawaters, many studies in the past focused on the Arctic winter and spring, fewer studies were conducted over the central Arctic Ocean in summer and fall while the polar front retreats to reduce the transport of atmospheric substances from mid-latitude sources, and this time period therefore provides a unique window to explore the background marine atmospheric composition over the Arctic and extent of the air-sea interactions.

Among the important processes occurring in the ocean-atmosphere interface is the air-to-sea input of nutrient elements, such as iron (Fe) in aerosol particles. Aerosol particle-size is an important property as it influences aerosol Fe solubility and consequently its bioavailability as well as the rate of air-to-sea deposition. To explore the particle-size distributions of aerosol Fe in the marine atmospheric boundary layer over the Arctic Ocean, size-segregates aerosol particles were collected during the 2015 GN01 US GEOTRACES cruise. This presentation will focus on the discussions of new results obtained from this cruise, particularly the spatial variability of particle-size distributions of aerosol Fe and its air-to-sea deposition with latitudes. Insights on the aeolian Fe sources and its alteration in the Arctic region as the consequence of climate warming will be shared.