3.059 Summertime observations of ultrafine particles and their growth to CCN sizes in the high Arctic marine boundary layer.

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Abstract:

The summertime Arctic atmosphere will experience considerable change as sea ice continues to melt in the decades to come. As a result, it is important to understand how the atmospheric aerosol in this region of the world responds to the switch from an ice-covered to an ice-free ocean. In 2014, a large-scale field campaign was conducted by the Canadian aerosol-climate research network (NETCARE) to assess the sources, properties, and potential climate impacts of Arctic aerosol particles. Aerosol particle, gas, and cloud measurements were conducted in the high Canadian Arctic from a research aircraft and an icebreaker, hoping to better connect emissions from the ocean to the overlying aerosol particles and their associated cloud and climate impacts. It was found that numbers of ultrafine particles are enhanced in the marine boundary layer relative to those in the free troposphere. As well, there is evidence for growth into CCN sizes, largely through the condensation of organic aerosol materials. Through assessing the composition of the aerosol and the nature of its growth, a local marine source of the condensing organic materials appears to be present. The implications of these novel experimental findings and their potential impacts on clouds and climate will be discussed.