Asian Transport Influence on Greenland Crustal Aerosols

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Long-term sampling of size- and time-resolved particulate matter at the Greenland Summit Camp has provided important chemical speciation data for the arctic regions. The continued use of DRUM (Davis Rotating-Unit for Monitoring, through 2021) sampling enables implementation of equipment and methodological upgrades that will increase sensitivity and reduce costs for the next 5 years as well as provide analysis for samples collected from 2014 to 2017. The key changes made include lengthening the time resolution bins from 6 hr to 12 hr samples, which will enhance detection of trace constituents by a factor of 4 and retain diurnal cycle resolution. Additionally, optical backscattering will be employed during optical analysis of collected samples in order to estimate single scattering albedo as a function of particle size. Recent efforts have focused on re-analysis and interpretation of samples collected from 2009 to 2013. Thus far, the most significant focus involved tracking crustal elemental signatures back to Asia. Annual dust storm events coupled with an arctic transport path have shown consistent spikes in industrial tracers (e.g. sulfur) and augmented elemental ratios (e.g. iron/calcium).

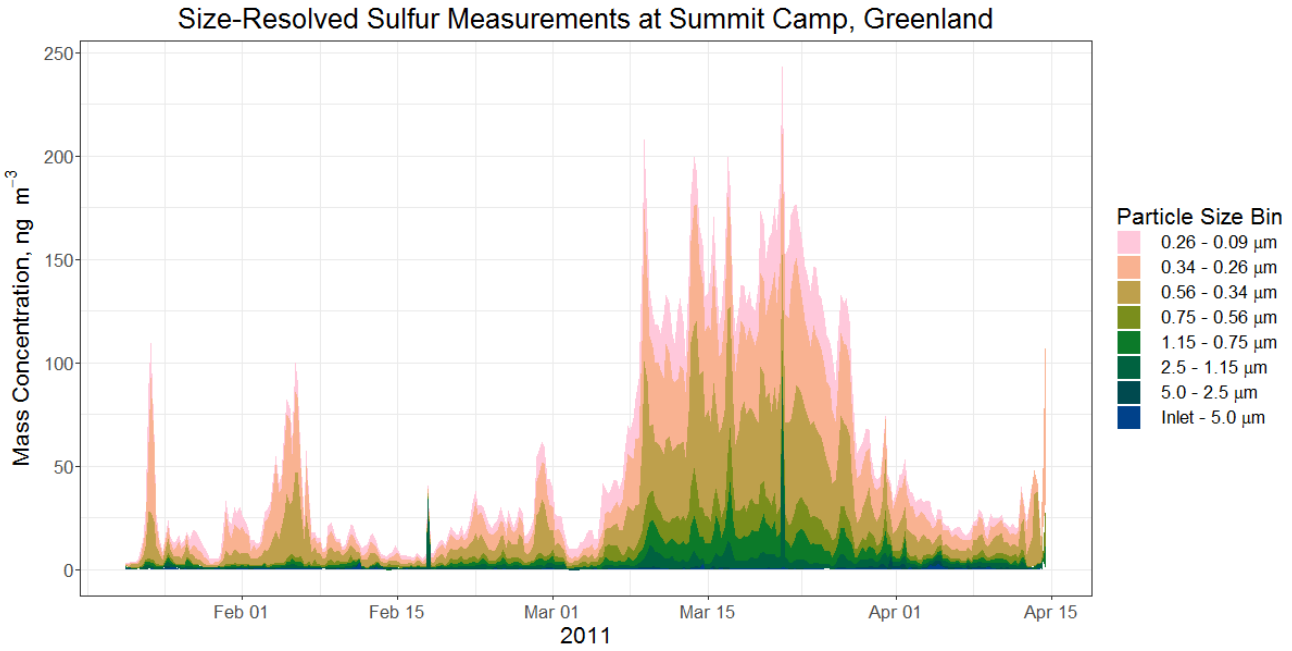

Figure 1. Stacked area mass concentrations (ng m^{-3}) of sulfur as a function of size (shown by color) and time (6 hr binning). Trajectory analysis using HYSPLIT indicates the spring enhancement of very fine sulfur may originate in Asia and transport through the Bering Sea.