

Seasonal Aerosol Distributions at Summit, Greenland: EC, OC, ^{14}C and Individual Particle Analysis

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Aerosol is known to affect the Earth's atmosphere and surface albedo thus having an influence on climate. In the case of carbonaceous aerosol, Organic Carbon (OC) tends to scatter sunlight while Elemental (soot) Carbon (EC) aerosol absorbs light. Considering the importance of these aerosols on snow and ice albedo (Hansen and Nazarenko, 2004), $\text{PM}_{2.5}$, $\text{PM}_{2.5-10}$ and snow-melt filters were collected at Summit, Greenland from August 2000 to August 2002 to measure particulate EC, OC, and ^{14}C of total carbon; the latter to assess natural and anthropogenic source contributions. Additional source information was gleaned from scanning electron microscopy images (SEM) of single particles from selected filters. All samples were collected within a clean air sector upwind from the campsite only when winds were within-sector ($180^\circ \pm 150^\circ$) and wind speed ($> 1.3 \text{ m s}^{-1}$). Preliminary analyses of $\text{PM}_{2.5}$ results suggest spring-summer maxima of EC and OC (Figure 1). Summer concentrations are consistent with summer 2006 measurements reported by Hagler et al. (2007). The average percent modern carbon from a subset of filters over the two-year period was 44% (SD=18%; n=19). Figure 2 shows focused ion beam SEM images of soot (left) and likely mineral dust (center, right).

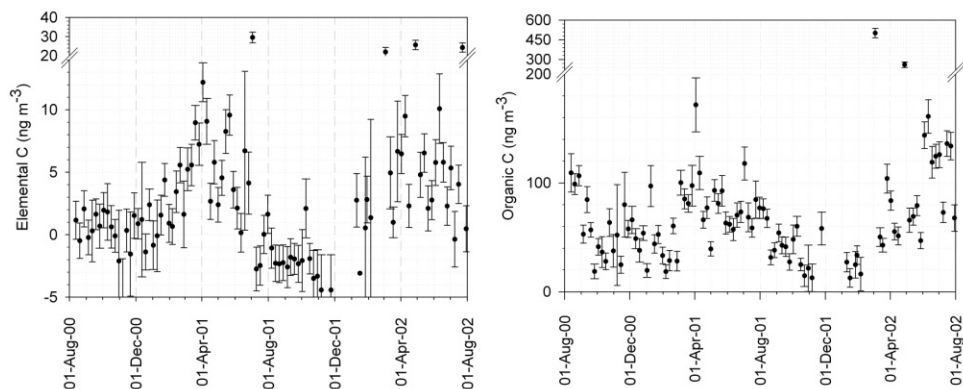


Figure 1. Greenland $\text{PM}_{2.5}$ EC, and OC concentrations.

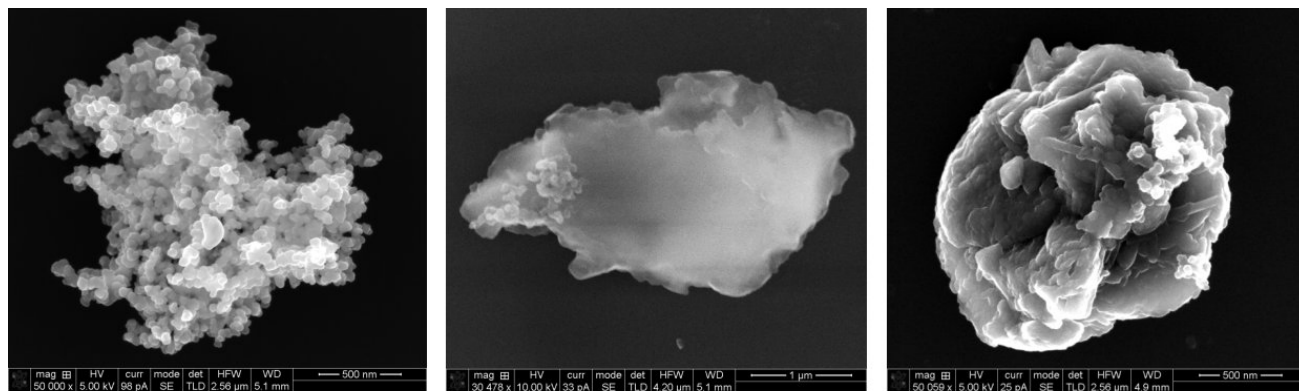


Figure 2. FIB-SEM images of $\text{PM}_{2.5}$ collected during 3 – 10 July 2001.