

ANALYSIS OF CONCENTRATIONS OF BLACK CARBON
IN THE ARCTIC

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Abstract

Black carbon (BC) is produced when fossil fuels and/or biomass is burned. Its dark color absorbs sunlight and releases heat. This feature is problematic when BC is deposited on snow because it can melt ambient snow by releasing heat. Despite the significance of black carbon, properties of BC have not been completely understood. This research focuses on concentrations of BC in northern Canada and in Greenland.

By using a single-particle soot photometer (SP2), we analyzed concentrations of BC in snow from northern Canada. We also analyzed snow samples from Greenland to compare, and we found that concentrations of BC from Greenland are lower than those from Canada. Presumably this is because Greenland is an isolated place compared to Canada, and thus less BC is trapped in snowpack.

Since we had a problem in calibration, we were not able to get real BC concentrations from snow samples. Hence, we decided to use arbitrary BC concentrations. We found spatial trends of concentrations of BC in Canada. Amongst samples from Canada, the closer to continental Canada samples are collected from, the more BC concentrations were found. Presumably the reason BC concentration in continental Canada is higher is that continental Canada is closer to urbanized areas and boreal forests that can have forest fires. This experiment reveals that our method (using a SP2 system to analyze BC concentration of snow samples) can be used for analyzing real soot concentration. The resolution of this calibration problem is expected.