Black Carbon Detection: A Regional Snow Survey

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Black carbon (BC) aerosol particles originate from the combustion process and absorb wavelengths within the visible light spectrum which in turn warms the atmosphere and may contribute to an increase in global temperature. The purpose of this research is to develop a simplified technique for the identification of black carbon within a sample of snow and perform a black carbon deposition snow study. The researchers hypothesize that it is possible to identify black carbon within a sample of snow using a integrating-sandwich spectrophotometer technique developed by the researchers. Furthermore, that snow samples from late season will contain more undissolved material and detectable black carbon than fresh snow. Snow samples were taken from 32 sites over a period of ten months. Samples were melted and filtered and massed. Spectrophotometric analysis was conducted on each filter for the presence of black carbon. Our data, obtained from multiple sites in northeastern Colorado and southeastern Wyoming, shows that black carbon can be identified through the absorption of visible light wavelengths. Only the most pristine new snow samples from the Laramie Range, WY did not contain detectable black carbon. The snow samples obtained from 2016 late spring/early summer (Berthoud Pass, CO and Laramie Range, WY) contained the highest concentration of particulate matter per cubic centimeter of snow melt. It is possible to detect black carbon using the technique developed by the researchers. Black carbon is common throughout the region surveyed. Further research concerning the effect of long-term black carbon deposition on the rate of snow melt and snow albedo needs to be performed.