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CONCENTRATIONS OF BLACK CARBON IN THE ARCTIC SNOW ANALYZED WITH A SINGLE PARTICLE SOOT PHOTOMETER (SP2)

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Black Carbon (BC) could decrease snow albedo and accelerate snow melt, thus acts as a positive feedback in the global warming. Accurate measurements of mass concentrations of BC in snow and its deposition fluxes are important for the assessment of its impacts on climate.

We collected snow samples in the Arctic during 2012 to 2014. Sampling sites are in Alaska, Siberia, Finland and Svalbard. BC particles in melted snow were aerosolized by a nebulizer and then masses of individual BC particles were measured with a single particle soot photometer (SP2; *Droplet Measurement Technologies*), which is based on the laser-induced incandescence technique. With this method BC concentrations and size distributions were measured without being affected by other particles such as dust. We also analyzed stable water isotopes, dust and ionic species.

The total BC mass concentrations in the snow from Alaska were 0.39-3.29 (median 2.40) $\mu\text{g L}^{-1}$ in 2012, 0.54-13.24 (median 3.55) $\mu\text{g L}^{-1}$ in 2013 and 0.79-21.56 (median 6.17) $\mu\text{g L}^{-1}$ in 2014. The total mass concentrations in the snow from Siberia and Finland in 2013 were 4.68-78.12 (median 11.28) $\mu\text{g L}^{-1}$ and 1.33-66.10 (median 8.28) $\mu\text{g L}^{-1}$, respectively, which were higher than those from Alaska. The snow from Ny-Ålesund, Svalbard showed the lowest concentrations in the four regions (0.10-6.12, median 1.18 $\mu\text{g L}^{-1}$). BC particles larger than 600nm in the snow from Ny-Ålesund account for 10% of total mass concentrations on average, and the peak diameters of the mass size distributions were around 200nm. These size distributions are similar to those of typical atmospheric BC. In contrast the snow samples from other three regions contained a lot of BC particles which were larger than atmospheric BC particles. Contributions of BC particles larger than 600nm to the total mass concentrations in the snow from Alaska and Siberia were on average 41% and 38%, respectively.