

Mass concentration and particle number of black carbon on glaciers in the eastern Alaskan Range, Alaska USA

*Keiko Konya¹, Takuma Miyakawa¹, Masayuki Takigawa¹, Masahiro Yamaguchi¹, Shad O'neel², Martin Truffer³

1. Japan Agency for Marine-Earth Science and Technology, 2. USGS, 3. University of Alaska, Fairbanks

Black Carbon (BC) on snow reduces albedo lower and accelerates ablation. The Arctic demonstrates susceptibility to albedo feedbacks from non-local sources. We have estimated BC mass concentrations in snow from glacier surfaces (0-2 cm depth) and at subsurface (2-10 cm depth) in the Alaska range. During April 2017, snow sampling was conducted on Gulkana, Black Rapids and Jarvis glaciers, which are all located within 50 km of each other. Between one and four sampling sites were selected at each glacier, at approximately 1500 m elevations. BC mass concentrations and particle size distributions was measured with a Single Particle Soot Photometer (SP2).

Measured BC mass concentrations are similar but less than previous studies. The mean value was about 6 $\mu\text{g/L}$ and size distribution shows two modes around 0.3 and 0.7 μm . We have also measured the number of all aerosols by coulter counter and revealed that BC particles are about 1% of all aerosols.

We compared our measurements results to simulated BC deposition using the Weather Research and Forecasting model coupled to Chemistry (WRF-Chem). The simulated BC mass concentration agreed well with observed. We also revealed by model result that contribution rate of biomass burning in Siberia was about 25 %. We will also estimate increase of surface melt rate caused by BC deposition.

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