

## The spatial variations in characteristics of cryoconite on glaciers in northwest Svalbard

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Cryoconite is insoluble impurity on glacier surface and consists of mineral particles and organic matter. They usually form spherical aggregates called cryoconite granules. Their size is approximately 1 mm and color is dark due to humic substances produced by bacteria. Structure and optical characteristics of cryoconite granules are generally uniform on Asian glaciers since abundant windblown dust is supplied from desert and microbial productivity is active. In contrast, they spatially vary on Arctic glaciers, probably due to relatively greater effects of local environments around the glaciers. The spatial variations in characteristics of cryoconite is important to evaluate an impact of cryoconite on surface albedo of glaciers. This study aims to reveal spatial variations in characteristic of cryoconite on three glaciers (Pedersenbreen, midtrelovenbreen, and AustreBroggerbreen) located in northwest Svalbard. Microscopy of cryoconite revealed that cryoconite granules of all of study site contained mineral particles and filamentous cyanobacteria. Microscopy of internal structure of granules revealed that most of them did not have specific inner structure, but some granules contained two or more subgranules, suggesting that life time of most cryoconite granules are one year. Analyses revealed that chemical and optical properties of cryoconite spatially varied on the glaciers. The cryoconite of the upper site of AustreBroggerbreen and on the sites on Pedersenbreen and midtrelovenbreen had greater organic matter content and lower optical reflectivity, while cryoconite of the lower two sites of AustreBroggerbreen had relatively less organic matter and higher reflectivity. Their optical reflectivity was also relatively lower. This difference is probably due to sources and abundance of mineral particles on the glaciers.

Keywords: cryoconite, spatial variations in characteristics, mineral particles