

Photosynthetic activity of microbes in cryoconite on the Issunguata Sermia Glacier, south-eastern Greenland Ice Sheet

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Cryoconite granule is a microbe-mineral aggregate found on glaciers around the world. It contribute to the darkening and melt enhancement of glaciers. The formation and development of granules is promoted with minerals and organic matters on glacier surfaces. Cyanobacteria, photosynthetic prokaryotes, often dominate both the biomass and the carbon fixation via photosynthesis in cryoconite holes. However, it is still not evaluated the effects of supraglacial environmental condition and geographical location on the photosynthetic activity of microbes in cryoconite. To evaluate their effects, we collected cryoconite granules from the ice surface and measured the carbon fixation activity of cryoconite at the Issunguata Sermia Glacier (67.10N, 50.66W) in the edge part of the southeastern Greenland Ice Sheet. The cryoconite granules often accumulated at the bottom of hole (cryoconite hole) on ice surface in this glacier. Therefore, we tried to measure the carbon fixation activity of cryoconites from the various diameter and depth of cryoconite holes. We measured carbon dioxide concentrations with gas chromatography and mass spectroscopy. Furthermore, in order to investigate the environmental factors influencing the photosynthetic activity of cyanobacteria in cryoconite, we analyzed a cultivated strain of filamentous cyanobacterium *Phormidesmis priestleyi* isolated from cryoconite on Qaanaaq Glacier, northwest Greenland. From the results obtained in *in situ* and the laboratory experiments, we discuss the growth and environmental response of cyanobacteria in cryoconite on glacier surfaces.