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グリーンランド，カナック氷河におけるクリオコナイトホールの時間変化と表面アルベドへの影響
The temporal variation in cryoconite holes on Qaanaaq Glacier, in Gleenland, and its effect on the surface albedo

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Cryoconite holes are cylindrical melt-holes on glacial ice surface. Their size is usually several centimeters in diameter and depth. At the bottom of the holes, dark-colored sediment called cryoconite is deposited. Cryoconite absorbs solar radiation and promotes melting of the ice beneath it, consequently the cylindrical holes are formed.

Diameter and depth of the holes are known to change temporally with weather conditions. It is particularly important to understand their dynamics because development and collapse of the holes possibly affect surface albedo of the glacial bear ice. In this study, we aimed to clarify the weather conditions causing collapse of the holes and effect of the collapse on surface albedo by time-laptse photographing of cryoconite holes on the Qaanaaq Glacier in northwestern Greenland.

The photography revealed that cryoconite holes collapsed twice on 7/25 and 7/27 during the study period. As compared with weather conditions observed on the glacier, both collapses took place under the conditions of cloudy and strong wind. The air temperature and relative humidity were lower and higher in the first collapse, respectively. In contrast, they were higher and lower in the second collapse, respectively. The heat balance on the glacier surface showed that the total melt heat was relatively lower due to lower solar radiation when the holes were collapsed. The collapses were likely to be caused by the relatively higher latent heat on the first collapse, and higher sensible heat on the second collapse.

The image processing of the captured photographs showed that the dark-colored pixels, which correspond to the cryoconite-covered areas, increased when the holes were collapsed. This is probably due to spreading of cryoconite to the outer ice surface from the holes. The increase of cryoconite-covered area suggests that the collapses of holes can reduce significantly surface albedo on the ice area.

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