Distribution of Cryoconite on the Surface of a Glacier Derived from a Landsat TM Image

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Cryoconite, biogenic surface dust on the glacial surface, can affect the surface albedo of snow and ice thereby accelerating ablation. Distribution of cryoconite on the surface of an Alaska glacier (Gulkana Glacier in the Alaska Range) has been analyzed using Landsat TM band 2 and 5 ratio. The band ratio was relatively lower in the area near terminus and snow line in the ice area, suggesting higher cryoconite concentration in this area. In situ measurement of cryoconite on the glacier agreed with the cryoconite distribution derived from the band ratio. The biological analysis of the cryoconite collected from the glacier revealed that the cryoconite distributed in the area near the terminus mainly consisted of mineral particles, and that the cryoconite near the snow line, on the contrary, contained large amounts of snow algae and dark-colored organic matter. Results suggest that the albedo reduction by biological activity is significant in the area near snow line on the glacier.