B10-O22

SNOW ALGAL COMMUNITIES AND ITS EFFECT ON MELTING OF GLACIERS IN SUNTAR KHAYATA MOUNTAIN RANGE IN EASTERN SIBERIA

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Recent climate warming in Arctic region causes significant melt of glaciers. Such climate warming can change physical and chemical conditions of glaciers, which further affect microbes living on glaciers. The microbes are cold-tolerant special organisms living on snow and ice and form closed ecosystems on glaciers. Organic matter produced by such microbes can acculturate on snow or ice surface, and it reduces surface albedo of glaciers. Thus, change of microbial communities on glaciers possibly has a feedback effect of glacier melting. In fact, bare ice surface of the Greenland ice sheet has been darkened recently due to biogenic impurities produced by snow and ice algae. However, there is still little information of microbial community on glaciers in other part of Arctic, for example, in Russian Siberia. Geographical distribution of microbial community is important to understand how the Arctic warming affects glacier ecosystems in Arctic region. In this study, we aim to describe snow algal communities on glaciers and evaluate their effect on glacier melting in Suntar Khayata Mountain Range, located in the Eastern Siberia (62°N to 63°N and 140°22‘E to 142°E). We conducted field investigations on glaciers in this range in 3 melting seasons of 2012 to 2014 as a part of GRENE project.

Snow algal communities on the glaciers were commonly dominated by mainly three taxa of green algae. The community structure did not largely change for the 3 years. On the other hands, the total algal biomass varied from year to year. The highest biomass was recorded in 2012 and this value was 1-10 times higher than that in 2013 and 2014. Measurements of reflectivity on glacier surface revealed that the darkening of glacier surface is also occurring on here. This darkening is remarkable at bare ice area of middle part of the glacier while bare ice area of lower part and snow covered area of upper part of the glacier were white. The positive degree-day factors (PDDF) showed high value especially at middle part and significant correlation to surface reflectivity. Spatial distribution of total algal biomass on the glacier surface agreed well with the reflectivity and PDDF. Results suggest that the snow algae is a primary factor of surface darkening and they are affecting the glacier melting of glaciers in this mountain range.