

Reconstruction of snow algal variations from an ice core drilled on an ice cap in Kyrgyz Tien Shan

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Snow algae are photosynthetic microorganisms and are living on the surface of glaciers. They grow on melting surface from spring to summer and their biomass and community structure are changed with physical and chemical conditions on glaciers. Ice cores drilled from glaciers also contain snow algae that grew in the past. Studying biomass and community structure of snow algae in ice cores could reveal the temporal variation in snow algae in the past, and also environmental conditions relating propagation of snow algae. In this study, we analyzed snow algae preserved in an ice core of Grigoriev Ice cap located in eastern Kyrgyzstan of the central Asia, and to describe their temporal variations for the last 200 years.

Microscopy revealed that the ice core contained three taxa of filamentous cyanobacteria, an unicellular cyanobacterium, and two green algae. They were also found on the ice or snow surface of the ice cap.

The quantitative analyses of the algae in the part of upper 64 m of the ice core revealed that the algal biomass varied significantly and showed many peaks. Furthermore, the biomass profile differed among the taxa.

Annual variation of the algal biomass was found to be significantly correlated with air temperature at the nearest observing station from the ice cap and hydrogen stable isotope in the ice core. The results suggest that the algal growth is more preferable in warmer year.

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