Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

U020-P11 Room:Convention Hall Time:May 24 10:30-13:00

Snow algae and mineral particles on the snow surface in the Tateyama Mountains in Toyama Prefecture, Japan

Tomoko Umino[1*], Nozomu Takeuchi[1]

[1]Chiba University Graduate School

Snow algae are photosynthetic microorganisms living on snow and ice and are specialized to harsh cold environment. Red snow is a well-known phenomenon due to bloom of red colored snow algae on the thawing snow surface. Since snow surface is usually extremely nutrient-poor condition, it is question how algae acquire nutrients on the snow. Wind-blown mineral particles such as clay particles, which are relatively abundant on snow surface, may play a role in acquirement of nutrients for algae. The purpose of this study is to describe how snow algae are associated with mineral particles on the surface in the Tateyama Mountains in Toyama Prefecture, Japan. In September, 2010, snow samples were collected in Kuranosuke and Hamaguri snow valleys in the Tateyama Mountains. The snow algae in the snow samples were examined with an optical microscope, and the mineral particles were analyzed by X-ray diffraction.

X-ray diffraction analysis showed that the snow samples contained quartz, plagioclase and clay minerals including chlorite and illite. These mineral particles are assumed to be derived from Kosa,which is a dust event from distant continental desert. Hornblend was also contained in the samples of Hamaguri snow valley. It is probably derived from debris derived from rock cliffs around the snow surface.

Microscopic observation revealed the abundant snow algal cells in the samples. Four types of algal cells were observed (1) a round cell with 15 micro-m diameter,(2) a small round cell with <10 micro-m diameter,(3) a spindle shape sell 20 micro-m long,(4) a round cell with red pigments (hypnozygote of Clamydomonas sp.). In Kuranosuke snow valley, type (1) accounted for 70% and type (4) for about 5%. In Hamguri snow valley, type (2) accounted for 90% and types (1) and (3) for the rest. A part of algal cells formed aggregations of algal cells and mineral particles. Size of the aggregations were approximately 50 micro-m x 50 micro-m. The aggregations was more abundant in the surface samples compared to the samples collected about 10 cm below the surface. Mineral particles in the aggregations may support the algae to acquire nutrients on the snow surface.

Keywords: mineral particles, snow algae, nutrient, clay minerals