

The distribution of rockfall and topographical change in Shirouma Daisekkei, the Northern Japanese Alps

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Shirouma-Daisekkei is one of the three largest snow patches in the Japanese Alps. More than 10,000 climbers pass on the snow patch every year. On the other hand, the rockfall accident at Shirouma-Daisekkei is the largest number of mountaineering accidents except for the slipping down accidents that occurred in 1992 - 2013 in the mountains of Japan. In August 2005, rock slip at the rock wall of Shakushi-dake causes injured two people, and also in August 2008, rock slip at upper part of snow patch causes two climbers sacrificed (Kariya et al. 2008). In this study, we carried out field survey 2014 - 2016 for the purpose of investigating the actual condition of rockfall and rock slip, and the topographical change around Shirouma-Daisekkei.

From the interval camera set up from July to August of 2014 images, the boulders produced from the rock wall onto the snow patch was slight, and most of the boulders scattered innumably on the snow patch were melted from the inside of snow patch. In 2015, there were more snow than usual, and melting line did not reach the surface of the snow rice at the end of the previous year's melting, so there were few boulders melted from the inside of the snow patch. Focusing on the surface inclination angle obtained from the 50 cm resolution DEM prepared using UAV aerial photographs, the gentle slope and the steep slope are alternately present in the Shirouma-Daisekkei main stream, and re-rolling and re-sliding of a lot of boulders was confirmed from the interval imaging to the steep slope. When erosion zones were extracted from the difference of airborne laser data DEM of plural years, there was a difference in erosion pattern depend on geology. In the geologic region of the felsic rocks, erosion (linear type) along the valley was observed in many cases. However, in the ultramafic rock and the felsic tuff, such features were not observed, and the surface erosion was unity. In addition, due to GPR investigation and distribution of crevasses, the location of the stream at the bottom of the snow patch and a huge tunnel were revealed.

Keywords: rockfall, Shirouma-Daisekkei, topographical change, ice radar, UAV