

Geomorphic evolution of glacial and peri-glacial environments and rockglacier formation in Mt.Mibu.

Yosuke Abe^{1*}, Kyoko S. Kataoka², Tatsuto Aoki³

¹Course in Geology Niigata University, ²N.H.D.R. Niigata University, ³R.D.S. Kanazawa University

Higashimata Cirque in Mt. Mibu, Japanese Southern Alps, has landforms formed under glacial and peri-glacial environments, although, they have been interpreted only by geomorphic aspects. A tongue-shaped depositional landform with traverse ridges and furrows on the surface resembles rockglacier derived from surface creeping by gravity force. This study shows formation processes of landforms in the cirque and geomorphic evolution with geomorphological and sedimentological viewpoints. Fabric of boulders comprising the landform with ridges and furrows, indicates dominance of a-axis direction parallel to the flow direction, and a-axis tends to plunge more steeply than the slope angle where the slope is gentle. Size of boulders decreases downslopedward. These characteristics show that this landform was formed by influence of surface creeping, rather than saltation or rolling processes resulting in talus formation. Therefore, the tongue-shaped morphology is interpreted as a rockglacier formed under peri-glacial environments. Based on thickness of weathering rinds of boulders, radiocarbon dating, and age of found widespread tephra, periods of each event can be estimated as follows. The formation age of moraines in the tip of Higashimata cirque can be estimated at 24 ka, and lateral moraines in the side of the cirque occurred during 23~19 ka. The accumulation of rockglacier ended in the eastern Umata cirque at 19 ka, in Higashimata cirque at 18 ka. Rockglacier became fossilized and peri-glacial environments terminated around Higashimata cirque at 15 ka. In the eastern Umata cirque at 13 ka, and the end of peri-glacial environment around Umata cirque is 7 ka. This shows that the period from formation of lateral moraines in the side of Higashimata cirque to accumulation of rockglacier in Higashimata cirque is about 1,000 years. Hence, velocity of the rockglacier is estimated more than 40 cm/year. The rate of movement is extremely higher than that of known European rockglaciers with about 10 cm/year. This suggests that rockglacier in the Higashimata cirque was derived from a debris-covered glacier. The debris-covered glacier coexisted in the upper part of Higashimata cirque when rockglacier had begun to form.

Previous researches indicate that glaciers in the Japanese Alps were well developed during the period of MIS 4. However, this study shows possibility of presence of glaciers on Mt.Mibu in LGM stage of MIS 2.

Keywords: rockglacier, fabric, glacial landform, peri-glacial landform, geomorphic evolution, last glacial period