

Processes forming interfingering distribution of moor and forest on volcanic plateaus in a subalpine zone with heavy snowfall

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Many moors distribute on gentle volcanic slopes in the subalpine zone along the Japan Sea, where a large amount of snow accumulates in winter. Some moors are interrupted by forests, each of which stands in a line, and they show an interfingering pattern of the distribution. This study discusses the processes that form this unique pattern.

On the studied volcano, Mt. Naeba, moors spread out on nearly flat summit plateau, whereas forests line the convex edge of steps several meters high on the plateau and bamboo grasses (*sasa*) cover the slope of the steps. The interfingering pattern, however, was also found on some flat places without any steps. In addition, such an interfingering pattern is unclear on the volcanic plateau called Komatsubara located about 3 km north of Mt. Naeba. To discuss the interfingering pattern, the topography, snow depth and soil moisture of the three types of the vegetation were quantitatively compared, and the thickness and structure of their soils were also studied.

Digital maps of the three types of the vegetation were made on aerial photographs displayed on a GIS software. Then, altitudes, slope angles, curvatures and slope directions for each vegetation were statistically analyzed. Along four transects perpendicular to linear forests on Mt. Naeba and one on Komatsubara, topography, snow depth, soil moisture and soil thickness were measured. Soil structure of each vegetation was also described on the transects.

On Mt. Naeba, the differences in slope direction, angle and curvature depending on the distribution of the steps controlled the amounts of snow cover and soil moisture. The convex edge and windward slope of the steps covered with trees had less snow in spring and dry soil in autumn. The long season without snow must be the key process to allow the forest growing. In contrast, the moors located on the leeward flat surface had thick snow in spring and saturated soil in autumn. In addition to the limited growing season by the long-lasting snow, the saturated soil probably prevents trees from growing on the moors. The bamboo grasses are the best vegetation on the leeward slope covered with thick snow in spring and well drained in autumn. Through the above mentioned processes, small steps on the plateau form the interfingering pattern of the vegetation.

The area occupied by moors decreases downward on Mt. Naeba, and the interfingering pattern become unclear as the moors on Komatsubara are. Peat developed in the moors was, however, widespread even below the humus of the bamboo grasses and forests on the plateau. This peat suggests that moors have shrunk from the lower elevation possibly because of the earlier invasion of the forests and drying of moors after earlier snowmelt. Along the two transects without any step, the soil below the moors was deeper than that of the other vegetation. The original reliefs were probably buried by the accumulation of peat after the forest formation on the convex part.

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