



Relation between the characteristics of shallow landslides and the degree of mountain denudation in non-granitic regions of western Japan

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There is a relation between the process of mountain denudation and the successive occurrence of shallow landslides. In addition, the characteristics of the soil layer structure vary with the degree of mountain denudation on granite slopes. However, there are some case studies on the relationship between the characteristics and frequency of shallow landslides and the degree of mountain denudation in different granitic regions. Therefore, this study was focused on the estimation of the aforementioned relationship in non-granitic regions.

The authors focused on the landform and the occurrence of shallow landslides in four regions, Hiroshima, Nachi, Shobara, and Hagi, which have ample rhyolite and mudstone that many shallow landslides had occurred following with granite in western Japan. In the landform survey, the authors estimated the characteristics and frequency of shallow landslides depending on the degree of mountain denudation. First, the slopes were categorized into gentle slopes at the summit (Gen-S), upper dissected slopes (Up-S), and lower dissected slopes (Low-S) in ascending order of denudation. The top convex line of Up-S represented the upper convex break of the slope (Up-C), which was the dissection front between the Pliocene and the Pleistocene. The top convex line of the Low-S represented the lower convex break of the slope (Low-C), which was the dissection front for the postglacial period. Second, the area ratio of the Low-S and distribution of the Low-C -which represented the degree of whole-mountain denudation in the postglacial period- were calculated. The occurrence frequency of the shallow landslides was determined from the landslide area ratio and the number of square kilometers. In the shallow landslide survey, two regions Shobara and Hiroshima were focused on in particular; Shobara is a rhyolitic region and Hiroshima is a mudstone region. The depth and area of the shallow landslides were measured, and the geological conditions of the scarp and the scale of the landslides were investigated on the each dissected slope.

According to the data thus obtained, greater numbers of shallow landslides had occurred on the Low-S regardless of the degree of whole-mountain denudation. Most landslides on the Gen-S and Up-S (which is located along the boundary of the Gen-S) occurred on the slopes formed valley in Shobara; moreover, the frequency distribution of the soil pipes on the Gen-S and Up-S was higher than that on the other slopes. Therefore, it was concluded that the characteristics and frequency of shallow landslides varied with the degree of mountain denudation.