

Permeability of residual granitic soils create landslide conditions on Mt.Ohfuji,Hyogo.

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A large-scale landslide occurred on Mt.Ohfuji of Kakogawa City following a major typhoon in 2011. However, no landslides occurred on the adjacent Mt. Takamikura, which has a similar slope. The main difference between these mountains is that Mt.Ohfuji is composed of granite while Mt.Takamikura is composed of tuff.In addition, landslides occurred in Hiroshima City in 2014. It is said that residual decomposed granite soil was one of reasons why they occurred.We thus thought that granite bedrock may be related to landslides.

First, we compared how samples of granite, tuff and rhyolite change when heated. Upon heating gaps developed between mineral grains in the granite.We determined the calcium concentration of surface water at Mt.Ohfuji and rainwater. The water flowing at Mt.Ohfuji contained a high concentration of calcium while rainwater did not. Calcium is easily leached as granite weathered by water.

We examined granite samples and tuff samples and measured their primary permeability. The granite samples were found to have low permeability, and standing water collected on granite samples easily. We then examined the grain size and permeability of soil samples from Mt. Ohfuji to determine their coefficient of permeability. We found that permeability decreases in a soil layer as the sand particles become finer. Because there is little fine sand in surface soils formed from altered granite, as is the case at Mt. Ohfuji, water easily reaches the bedrock layer, further weathering is promoted, and a thick soil layer is formed. Through these processes, the layer of soil just above the granite boundary quickly becomes saturated during a storm event. The result is a destabilization of the soil column in which the upper soil slips over the saturated lower layer, causing large-scale landslides to occur.

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