

Soil structure and shallow landslides on hillslopes underlain by granite and hornfels

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In 22 August 2014, a heavy rainstorm triggered numerous shallow landslides and debris flows in hillslopes of granite and hornfels in Hiroshima, southwest Japan. The landslide density was larger in granite area than in hornfels area even they received almost same rainfall amount (~150 mm/3h). Soil thickness on hornfels was thicker than that on granite. We investigated hillslope with shallow landslides to understand the difference in soil layer structure and soil properties. In the granite area, hydraulic conductivity ranged 10^{-5} - 10^{-2} cm/s, decreasing gradually with increasing soil depth. In the hornfels area, hydraulic conductivity ranged 10^{-8} - 10^{-4} cm/s and impermeable layer emerged just below the slip surface. These results suggest that soil properties are different between granite and hornfels. The soil from hornfels contains finer in grain size, higher in clay and more cohesive minerals than that from granite. These differences may affect the subsurface water behavior and slope destabilization process in each area, and hence potential of shallow landsliding by heavy rainstorms.

Keywords: shallow landslides, granite, hornfels, soil structure