Conditions of Shallow Landslides on Hillslopes Underlain by Accretionary Sedimentary Rocks –A Case of Heavy Rainfall in Hiroshima Prefecture in 2014–

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Many shallow landslides occurred due to heavy rainfall in Mt. Abu located in Asaminami and Asakita districts in Hiroshima city, Hiroshima Prefecture, Japan on August 20, 2014. The landslides occurred on slopes underlain by granite, sedimentary rocks and metamorphic rocks. This study focused on topographic features and conditions of shallow landslides on slopes underlain by the accretionary sedimentary rocks of Mt. Abu. Landslides on granite slopes nearby Mt. Abu were also investigated for comparison. Topographic features of total 54 landslides were analyzed by using a 1-m DEM. Field survey and soil sampling were conducted at 7 landslide sites. Direct shear test were conducted by using slip-plane samples taken at 3 landslide sites. Morphology of landslides in sedimentary-rock slopes was classified into the following two types; flat type and funnel-shaped type. Topographic measurement using DEM revealed that slope angle of most landslides in sedimentary-rock slopes exceeded 30˚ regardless of the types of landslide morphology, and catchment areas of the landslides exceeded 10^3 m^2. For two flat-type landslides in sedimentary-rock slopes, an impermeable clay layer with permeability of 10^{-7}-10^{-5} cm/s exists below a slip plane. Shear strength parameters of slip planes of sedimentary-rock slopes were larger than those of granite slopes. Infinite slope stability analysis for some flat-type landslides in sedimentary-rock slopes revealed that soil layers with slope of 30˚-35˚ and depths of 1.5-2.0 m become unstable when the soil layers are fully saturated. Therefore, an impermeable clay layer must act as a hydrological boundary of permeability, and cause the flat-type landslides. For funnel-shaped landslides, existence of a permeable gravel layer instead of an impermeable clay layer implies that funnel-shaped landslides would occur due to the influence of concentration of groundwater flow.

Keywords: 1-m DEM, permeability, impermeable clay layer, catchment area, slope stability analysis

