



Weathering profiles and related structures as basic causes of rain-induced shallow landslide – for the regional hazard assessment –

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Rainstorms usually cause distributed shallow landslides in areas of specific geology, because many of the shallow landslides are of weathered materials, which have characteristic properties according to geology. We have been studying weathering profiles of many rock types and have been analyzing the relationship between their structures and water filtration behavior leading to landslide. We have identified two types of weathering profiles that are preferable to landslide: one is a profile, in which surface layer consists of weak and permeable materials and has a well-defined base between the underlying less permeable material; and in another type of profile a surface layer consists of weak and finer materials than the underlying materials. First type of weathering profile is made in a certain type of mudstone, conglomerate, decomposed granite, micro-sheeted granodiorite, decomposed arkosic sandstone, and vapor-phase crystallized ignimbrite. In the above-listed rocks except for vapor-phase crystallized ignimbrite, mechanical disintegration probably due to the iteration of drying and wetting is the major cause of the formation of the surface, loose, permeable layer. Vapor-phase crystallized ignimbrite is chemically weathered to form a surface loose layer with well-defined front at the base. The surface layer is saturated and pore pressure rises to initiate shear failure for the landslide. Second type of weathering profile is somehow special and is made within unwelded ignimbrite; the constituting glass grains are hydrated and transform to clay minerals like halloysite and become finer than the original grains. This structure has a capillary barrier effect, which lead to increase the weight of the surface layer under unsaturated condition. The weight increase and the disappearance of suction are the major cause of shallow landslide of this type of weathering profile.