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# Weathering processes of pelitic schist and its role in landslide development

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A large number of landslides have occurred in pelitic schist areas, but their mechanisms have not been sufficiently clarified. We challenged this issue by using undisturbed high-quality cores drilled from two landslide sites in the Sambagawa Metamorphic Belt in Shikoku, Japan.

Physical, chemical, and mineralogical analyses of the drilled cores clarified that the chemical weathering of pelitic schist is characterized by the oxidation of pyrite and graphite, which are commonly contained in pelitic schist, by the oxidizing water infiltrated from the ground surface. Oxidizing surface water reaches to the oxidation front, where chlorite is altered to Al-vermiculate, carbon and pyrite are oxidized and depleted, and goethite precipitates. The oxidation of pyrite also occurs just below the oxidation front probably by ferric iron without the precipitation of goethite. The oxidation of pyrite yields sulfuric acid, which penetrates further downward, interacts with rocks, and weakens the rocks. In addition to this chemical weakening, stress release and shearing along schistosities form an incipient shear zone, which propagates to a sliding zone of a well-defined landslide. At the incipient stage, shearing along schistosities likely to occur along a graphite-rich layer, which is a typical solid lubricant. Then, deformation and pulverization of rock would proceed to develop the shear zone, which is a sliding zone. Once the sliding zone has developed, it would be impermeable and hence prohibits downflow of groundwater across it. Weathering, therefore, slows down until this filtration barrier is broken by the movement of the landslide. Pyrite and graphite have thus important roles in weathering and also in shear deformation, hence might determine the location of first shearing at an incipient stage of a landslide.