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Geotechnical and mineralogical sliding zones properties of rockslides in paragneissic rock masses

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Generally, rockslides are characterized by deformation along one or several shear zones where most of the measured total slope displacement localizes. Such shear zones contain fault breccias or gouges i.e. material that is newly formed through cataclasis and fragmentation of the rock during deformation and shearing, and which possesses soil-like mechanical properties.
In this study the results of a comprehensive investigation of fault breccias and gouges (kakirites) obtained from sliding zones of slowly creeping rock slides and brittle tectonic shear zones and in paragneissic rocks are presented. On the one hand the study focuses on the qualitative and quantitative mineralogical analysis by using x-ray diffraction. On the other hand the residual shear strength was determined for large strains by using a ring shear device. A correlation between the mineralogical compositions and the shear strength properties were established.
Generally, the testing results show that the fault breccias and gouges are rich in quartz, feldspar, mica and chlorite. It was found that the majority of the samples do not contain any swellable clay minerals. Results from seven ring shear tests show residual friction angles varying between 19° to 27°. Remarkably, the friction angle remains constant over large shear displacements i.e. no strength reduction occurred. Fault samples containing no swellable clay minerals are characterized by a nearly linear correlation between the mineral composition and the residual shear strength. In addition, similar results but in a non-linear manner were observed for samples containing swellable clay minerals e.g. smectites.
These correlations can support the proper strength assessment of basal sliding zones required for slope stability analysis.