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Abstract title

STRUCTURAL INFLUENCE ON DEFORMATION MECHANISMS OF SLOPE INSTABILITIES IN CRYSTALLINE ROCK (TYROL/AUSTRIA)

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Abstract

The study area is situated in the Silvretta crystalline complex, next to the Ötztal-Stubai crystalline basement and in the Lower Engadine Window as a spacious NE-SW striking antiform-structure. In this region the NE-SW striking Engadine fault zone and the E-W striking Inntal shear zone form the main structural lineaments in a strike-slip mode. Within tectonic units, polyphase deformation processes formed ductile and brittle structures that control the failure and deformation mechanisms i.e. sagging, sliding, rock fall and toppling of slopes. Three different case studies of rock slope instability, each characterized by a particular failure and deformation mechanism and their interrelationship to structural and geological factors are presented.

The landslide "Niedergallmigg" with a volume of 0.2 km3 is characterized by sliding deformation. The difference in elevation between the landslide toe and main scarp reaches about 1400 m. Phyllit-gneises, phyllits and amphibolites cover the lower to median range of the study area where the upper part is build up by paragneisses and two-mica schists of the Silvretta crystalline basement. Generally the main foliation strikes E-W and is characterized by intensive internal folding. Conjugated joint sys-tems combined with E-W striking brittle shear zones were observed. Results from geodetic measure-ments i.e. applying terrestrial and GPS methods showed average surface displacements in the range between 5 and 10 cm/a.

Only one kilometre east the second investigation site "Pillerhöhe" is characterized by rock fall, block toppling and rock sliding. The SW facing scarp shows an elevation difference of 720 m and is build up by phyllitgneis and quarzphyllit. The dominant tectonic structures show two main orientations: steeply dipping E-W striking joints and brittle faults and in addition the similar orientated b-axes - and a N-S striking joint set. The 65° to 90° inclined and from SE to S dipping foliation forms a north-vergent anti-cline-structure resulting in a core of brittle sheared amphibolites.

The third example "Burgschrofen" focuses on a deep-seated sagging-type deformation mechanism. There foliated "Bündnerschiefer" favours the movement of an 800 m high rock slope including a mass volume of 0.035 km3. The NE-SW striking foliated rock mass contains conjugated joint sets and slick-enside planes.

Geophysical investigations and drilling are planned to study in more detail the underlying deformation and failure mechanisms.

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