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Towards a better understanding of a large rotational soil slide (Ludoialm Landslide, Austria)

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We investigate the geological and geotechnical characteristics of the Ludoialm Landslide (Tyrol, Austria), a very slow to extremely slow clay, silt rotational slide located in the Northern Calcareous Alps. With a length of 700 m and a maximum width of 300 m the landslide involves at least 500,000 m^3 of till and debris flow deposits. Given that the Ludoialm Landslide occurs in a relatively flat terrain with an average slope angle of 17°, a particular geotechnical and hydrogeological situation is assumed. This study focuses on processes and mechanisms which have triggered the soil slide. Several methods are applied to gain an integral understanding of the landslide including the analysis of historic documents and aerial views, geomorphological and geological field mapping, laboratory analysis of geotechnical parameters and clay mineralogy, numerical modelling and remote sensing.

The Ludoialm Landslide dates back at least to the time of the oldest campaign of aerial imagery in this area in 1952. However it can be assumed that the initial formation of the landslide is much older. Digital photogrammetry is applied to derive a sequence of terrain models from stereo pairs of historic aerial views. These terrain models are then used to simulate the deformation history of the landslide during the last decades. In the last sixty years, the landslide area has extended notably and was reactivated twice in 1967 and 1999 as a result of intensive snow melting in spring. Detailed field mapping showed that the landslide consists of several slabs of variable activity and secondary slides at the toe.

In order to improve the understanding of the geotechnical and hydrogeological characteristics of the landslide, samples for laboratory analyses were collected from the till and debris flow deposits as well as from the underlying marl. On the one hand, a mineral analysis using X-ray diffraction was performed whereas on the other hand, drained and undrained triaxial tests were conducted as well as permeability tests and particle size analyses.

The predefined parameters are used as a basis for numerical modelling as well as for limit equilibrium calculations to improve the understanding of the formation and deformation processes.