



## **Decisive factors for risk management of slow moving landslides in varved clays**

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Around hundred landslides have occurred in the last century within in the Trièves Plateau in the French Alps, characterized by the outcrop of varved clays. The landslides are rotational or translational slides which present slip surfaces at different depths from relatively shallow ones (4 to 8 m) to more deeper ones (20 to 40 m). Most of these landslides show a more or less continuous moving pattern. It is controlled among others by fluctuations of the groundwater. The velocities range in most cases between 100 and 20 mm per year. In order to take appropriate decisions in risk management especially concerning strategies for mitigation it is important to analyse the relation between groundwater fluctuations and displacement velocities and other controlling factors of these deep seated landslides in varved clays.

In this presentation we will focus on the long-term evolution of these landslides. The following question will be addressed:

1. Are we able to forecast an increasing or decreasing trend in the mean velocity of these landslides?
2. Can we expect extreme meteorological conditions, which lead to intolerable damaging velocities of these landslides?

Both questions are important for a decision, whether mitigation measures and (or) evacuation are necessary.

A case study is carried out, which must give answers to these two questions. For an answer on the first question calculations are carried out to assess the degree of stability in relation to a change in the geometry of the landslide and to changes in material properties. Hydrological modelling was carried out in relation to dynamic modelling to assess the relation between rain input and groundwater fluctuations and to assess critical meteorological conditions generating intolerable rapid surges of the landslide.