EGU21-15777
https://doi.org/10.5194/egusphere-egu21-15777
EGU General Assembly 2021

Conceptualising the effect of preferential flow on slow-moving landslides: from experiments to concepts and models.

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Precipitation is one of the main causes for the initiation or reactivation of deep seated slow moving landslides. Preferential flow paths can have multiple origins, they can be due to changes in soil water content such as desiccation, due to mechanical movement or due to biological activity. The overarching characteristic is that they strongly alter the hydraulic properties of the landslide material. This results in a complex hydrological behaviour of deep-seated slow moving landslides. Research has shown that for instance the porosity of the soil, the fissure distribution and fissure connectivity are very important to predict the behaviour of the hydrological response of precipitation within a landslide body. However, due to large heterogeneity of landslide lithology and spatial and temporal variation of a landslide, it is hard to model water levels in landslides. Cracks and fissures inside the landslide are the cause of preferential flow paths, which can work as infiltration networks to the groundwater, but also as drainage networks lowering the (perched) groundwater levels.

In the last decades, both methodological progress has been made and several case studies have been published. However, most are still somewhat anecdotic examples and a more overarching conceptualisation has not been made yet. In this overview I want to highlight the progress as well as obstacles and challenges ahead of us when assessing and quantifying the impact of preferential flow paths on the mechanisms of a slow moving deep-seated landslide and to improve our understanding and modelling of complex landslides.