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Hydrological controls on the mobility of a slow-moving landslide in the Austrian Alps: Pore-pressure, preferential flow and snow cover

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Slow-moving landslides are a wide-spread type of active mass movements and can cause severe damages in infrastructure. Pore-water pressure is mostly regarded as the most important among a number of possible factors controlling landslide velocity. We use high resolution monitoring data to explore relations of landslide mobility and hydrological processes at the Heumöser landslide in Austria, which is characterized by slow movements along a shear zone with varying rates of up to about 0.25 m per year.
Analysing the data with statistical and slope mobility models shows that movement rates are not only controlled by elevated pore-water pressures within a confined and separated aquifer system, but also by preferential infiltration and subsurface flow processes not captured by pore-pressure monitoring, as well as by the additional load of snow cover during winter time which slows down the slope movement.
The case study of the Heumöser landslide shows how hydrological processes delicately act together in influencing the mobility of slow-moving landslides, as these are not only controlling pore-pressure dynamics, but also changes in the weight of the landslide body.