



Geomorphometric analysis of shallow landslides in the Walgau valley (Austria)

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Hydrologically triggered shallow landslides are a frequent natural hazard in the Eastern Alps and can cause severe damages to agriculturally used land, houses and infrastructure. Geomorphometric indices allow to estimate the spatial dynamics of shallow landslides based on recurrent landslide inventories. Previous studies found that the morphology of a landslide is closely related to its dominant genetic process. In this study, we focus on the calculation of established geomorphometric indices of the prevailing shallow landslides to assess the spatial landslide distribution in the Walgau valley in Vorarlberg (Austria).

Therefore, we compiled a multi-temporal landslide inventory based on eight orthophoto series from 1950 to 2015 and two digital terrain models derived from airborne laser scanning (ALS) data of 2004 and 2011. The 123 mapped landslides and adjacent areas were further distinguished in distinct geomorphic features, such as parent slope, landslide scarp, concave (surface of rupture) and convex (mass material) segments. Lithological settings and anthropogenic impacts such as land use change were also considered in the analysis. A geomorphometric assessment of the mapped landslides, in combination with land cover information yields insights on the spatial dimension of the shallow landslides and the potential fluidity of the materials involved. The geomorphometric analyses revealed that 96 landslides were classified as fluid-flows, 17 landslides were classified as viscous-flows, 8 landslides were classified as slide-flows and 2 landslides were classified as planar slides.

Our findings indicate that most of the shallow landslides display a flow-like movement with a rather low material plasticity. This leads to the assumption that the observed landslides in the investigated area might be of low kinetic energy despite their relatively long travel distances. Spatial disparities within the study area were not observable. We conclude that geomorphometric indices are a powerful tool to investigate and estimate the spatial distribution of shallow landslides.