

## A quantitative analysis of the spatiotemporal variability of landslide risk in the Northern Walgau, Austria

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Shallow landslides are a frequently occurring phenomenon in the communities of Düns, Dünserberg and Schnifis, located in the Northern Walgau. They may endanger residents, private properties and infrastructure. On one hand, changes in heavy precipitation patterns could influence the frequency of landslides, on the other hand an increasing population density in the study area potentially affects the exposure of elements at risk as well as vulnerabilities and thus may alter their risk to landslides. Based on a multi-temporal landslide inventory covering a period from 1950 to 2015 and a statistically-based landslide susceptibility map, the elements at risk are identified and their values and vulnerabilities assessed. A quantitative risk analysis is performed for two 15-year intervals ranging from the 1980s to 2000 and from 2000 to 2015. Taking a changing precipitation regime and the expected population growth into account, the exposure as well as the vulnerability and the resulting risk is extrapolated for two time frames: 2015 to 2030 and 2030 to 2045. As a result, four risk maps are presented which indicate the areas that may be affected by landslides as well as the potential development of landslide-risk in the study area. Limitations and reliability of the conducted procedures as well as validity and practical applicability of the generated maps are discussed. The final maps might be considered for estimating present areas most at risk to allocate mitigation measures. In addition, they could provide a potential source for local authorities, decision makers and land owners when planning urban developments, but also when implementing warning systems and emergency plans in the future.