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Combining historic information and high resolution DEMs to improve the understanding of today's maximum possible landslide events and its relevance for hazard assessment

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Natural disasters often occur when events of an exceptional magnitude are triggered. The question is if such "extreme" events are really "extreme". Did similar events not occur in the past? Or did people and especially scientists think such big events are not able to occur under present environmental conditions? If recent geomorphic forms in the region indicate that similar large events occurred in the past, the main question is, when and under which conditions did these events occur. Sometimes scientific investigations might be misleading, concluding that large landslides are relict features from former extreme events and are not able to be triggered today. However, if the interpretations of the scientists turn out to be wrong, significant disaster might happen since no one is currently prepared for such "unforeseen" events. But are such events really unpredictable?

This study presents the preliminary results of two subprojects of the interdisciplinary project InterRISK (Integrative landslide risk analysis and evalution in the Swabian Alb (SW-Germany). Regarding the age of the landslides in the Swabian Alb the general assumption in the available literature is that especially the large landslides most likely occurred in the Pleistocene and just a few in the Holocene. Furthermore it is suggested, that if large events occur today, these are mainly landslide reactivations of Pleistocene age.

Within the geomorphic subproject, various landslide data sets were compiled using

already available landslide databases, literature review, aerial photograph interpretation, digitising of landslide information from geological maps and interpretation of high resolution DEMs (HRDEM). Especially the HRDEM provides an excellent resource for mapping landslides. Furthermore, relative ages can be estimated due to the freshness of the forms which - in most cases - can be much better determined in the HRDEM than even in the field itself. The relatively freshness of numerous big landslides indicate that some landslides might be much younger than Pleistocene age.

Within the historic subprojects, historical archives for the period 14th to 20th century were analysed towards historic landslide events. Numerous additional landslides were found so far. Results show that it is absolutely essential to investigate the primary sources of historical archives, since only these provide the detailed information on specific events, sometimes even a kind of metric information on the magnitude of the event. The analysis of old historic maps emerged to be beneficial as well.

Combining especially the historic information with some “extreme” landslide events mapped using the HRDEM, one previously Pleistocene dated landslides were newly dated to the 19th century, others at least to historic age. This indicates that the area is more active than previously assumed and that much larger events than commonly expected can occur even today. Future research and absolute dating is necessary to validate and extend the preliminary results. However, the new findings will have a major impact on the landslide risk management in the study area.