



## **Transient perturbation of fluvial systems by landsliding: Examples from the Swabian Alb (SW-Germany)**

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In steep terrain landslides have a major impact on fluvial systems. They push river channels to the opposite slope or even block river and build landslide-dammed lakes. On the other hand rivers undercut slopes and thus prepare or even trigger landslides which will in turn impact the river. The response and relaxation times of the fluvial system are highly variable depending on their size, the magnitude of landslide impact, the material involved, the climate and human impact. In cases of erosive landslide sediments, it is assumed that erosion rates of river are high resulting to a fast adjustment of the longitudinal river profile. However, the landslide impacts are shown by long-lasting deep gorges cut into the landslide deposits.

In this study, ten rivers in the Swabian Alb are investigated towards the impact of landslides. The Swabian Alb consists of Jurassic sedimentary rocks (mainly clay, marls and limestone) building a Cuesta landscape.

The landslides are mapped based on aerial photographs and shaded reliefs of a high resolution DEM (1m x 1m resolution). Longitudinal profiles of the rivers are extracted from the DEM to analyse knickpoints caused by landslide. Along the river, the depth of the river channel was estimated based on the high differences between the river channel and the adjacent valley floor. Drillings available in the literature were used to check whether the impact of landslides can be found in the sediments. Finally, historical information on landslide dammed lakes was analysed.

Preliminary results indicate that numerous landslides impacted the fluvial systems in the Swabian Alb. Landslide-dammed lakes were built, but only few led to the aggra-

dation of lake sediments, which are still visible as steps in the longitudinal profile. To complicate matters such steps can also be built by the deposition of sinter from the waters showing a high lime component next to the springs. The surprisingly low number of steps initiated by landslide impacts leads to the conclusion that the rather soft material can be easily eroded by the river, so that the river can get relatively fast back to the original longitudinal profile. Thus, the relaxation time is relatively short. However, steps of the longitudinal profile of the adjacent valley floor last much longer. Additionally, a strong impact seems to be on the course of the river, so that it takes much longer to get back in the original channel (long relaxation time). In some cases the drillings show that landslide material can be found in the sediments below the river.

For the river Schlichem, historic information shows that this river was three times dammed by landslides at the same location in the 18th century. In 1787 and 1789 the landslide dam was removed with shovels by humans to prevent a catastrophic failure of the landslide-dammed lake. Such human activities, which are also reported from other landslide-dammed rivers, shortened the relaxation time of the natural fluvial system.

Absolute dating will be carried out in future to be able to quantitatively estimate the erosion rates and relaxation times.