



Timing of Neogene surface and karst forming processes on the eastern Schwäbische Alb, Germany

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During the Neogene landforms in southwestern Germany mainly have been sculptured by the river Danube, producing a low-gradient system of tributaries mainly oriented towards the Southeast. This old surface became undercut by high-gradient Rhine tributaries. During the Pleistocene, headward erosion locally experienced significant advancements. The present divide between Rhine and Danube is situated on an intensively karstified scarpland (*Schwäbische Alb*). Since early Miocene times the Danubian system recessed across a strip of surface about 100 km in width. Ancient Danubian sediments (gravels: *Juranagelfluh*) date 14.3 Ma; this episode of valley-floor choking was followed by rapid Danubian incision lowering baselines by about 50 to 80 m. At the beginning of the Pleistocene the headwaters of these Danubian rivers were captured along valley divides by rapidly incising Rhenish tributaries.

The aim of our study is to refine the timescale of choking/incision-processes between the Danubian entrenchment and the capturing through Rhenian rivers. We examined six caves in the surroundings of Geislingen/Steige near the valley divide of the Danubian rivulet *Lone* and the Rhenish tributary *Rohrach*. One of these caves is the naturally sealed *Laierhöhle*, which recently turned out to be the deepest cave of the *Schwäbische Alb* (126 m). Its situation near the *Lone* valley suggests that choking/incision events will have produced adequate documents within the cave. A first horizontal level with a length of about 220 m occurs at a depth of ca. 20 m and hence is diagnostic for a long-term stationary water table. At a depth of 50 to 60 m several short and often not directly interconnected horizontal passages indicate a second level of long-term activity. A similar situation can be observed at a third level in depths between 70 and 90 m. All parts deeper than 90 m are more or less vertical shafts and

plugged with mud at 126 m.

In a first tentative approach, we associate the mid horizontal level of the *Laiershöhle* with strath terraces within the *Lone* valley, and the deepest level with the final entrenchment of the rivulet *Lone* and hence the reversal from Danubian to Rhenian system at the end of the Pliocene and the beginning of the Pleistocene. The absence of horizontal passages at depths >90 m is a signal for a fast final overdeepening and the ensuing inactivation of the cave. The highest horizontal level, however, does not exactly fit any geomorphic surface features. It is situated slightly deeper than the *Juranagefluh*, so we propose an additional stage of terrace development in this area. The cave contains large amounts of very fine-grained sediments and some concentrations of coarse quartz grains. Our working hypothesis is that the cave sediments of each cave level accumulated during the final phase of an active cave-forming episode. Dating is performed using cosmogenic nuclides (^{10}Be and ^{26}Al).