Morphological evolution of the Mur valley, Austria. Constraints from cosmogenic burial ages

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The Mur is one of the largest rivers that drain the European Alps towards the Pannonian basin to the east. Near the city of Graz, the river crosses the orogen-basin transition. The basin itself was inverted some 7 m.a. ago and its topography fluctuates today between 300 m and 700 m above sea level. Obviously the shaping of this topography occurred in a close interaction between: (i) the incision history of the Mur and its tributaries and: (ii) the tectonic sculpting of the region. The Mur therefore provides a beautiful natural laboratory to study the morphological processes during basin margin inversion. In this contribution we present early results from a series of cosmogenic isotope derived burial ages from caves in the region.

Before the river Mur enters the basin, the river crosses limestone units of the "Palaeozoic of Graz". These limestones are heavily karstified and host more than 500 caves on less than 50 km of river length. Most of these caves have horizontal passages developed at distinct levels up to 600 vertical meters above the current river. The abandonment ages of these cave levels provides constraints on the incision history of the main valley. Although many of the caves are located in free standing limestone mountains, many of them contain crystalline basement pebbles indicating that these pebbles were washed into the cave before the adjoining valleys existed.

We have obtained cosmogenic burial ages for 10 samples from caves from various levels between the active caves on Mur and the highest caves 600 m above the current valley floor. Oldest ages are about 3.5 m.a. with a very rough trend of increasing age with elevation. Several ages from samples up to 50 m above active streams are 350 k.a. old, indicating that valley incision had reached these levels by this time.