



## Seismothems reveal neotectonic activity along the Salzachtal-Ennstal-Fault-System

L. Plan (1), Ch. Spötl (2), **B. Grasemann** (1), K. Decker (1), G. Wiesmayr (1), K.H. Offenbecher (2)

(1) Institute for Geological Sciences, University of Vienna, Austria, (2) Institute for Geology and Palaeontology, Leopold-Franzens-Universität Innsbruck, Austria (lukas.plan@univie.ac.at, +43-1-4277-9534)

The Salzachtal-Ennstal-Mariazell-Puchberg-Line (SEMP) is one of the most prominent alpine strike-slip faults related to the Miocene lateral extrusion of the Eastern Alps (Linzer et al., 1991). The fault system runs near the southern margin of the Northern Calcareous Alps and has a cumulative sinistral offset of several tens of kilometres. Although several earthquakes have been recorded along the SEMP and GPS measurements suggest ongoing accommodation of extrusion of the Eastern Alps in this area (Grenerczy et al., 2000), no direct field evidence of active tectonics has been reported so far. We have recently found strong field evidence of seismic events in Hirschgrubenhöhle, a cave located in the centre of the karst plateau of the Hochschwab-Massif (Styria, Austria), about 8 km south of the SEMP master fault.

During the exploration of the 1.2 km long and 173 m deep cave, which follows a system of brittle faults associated with cohesive and non-cohesive cataclasites, abundant scratched, sheared and broken speleothems were found. Given the spatial relationships of these deformed speleothems processes such as cave ice movement, which is thought to cause deformation on speleothems, can be ruled out. We therefore regard these features as seismothems, i.e. speleothems (stalagmites, stalactites, flowstone) broken or deformed by seismic events. Seismothems are known to be important indicators of neotectonic and palaeoseismic activity (e.g., Delaby, 2001).

The seismothems in Hirschgrubenhöhle indicate sinistral strike-slip movement parallel to the SEMP and are overgrown by younger layers of calcitic flowstone, which allow to determine the age of the event using the U/Th disequilibrium method. Prelim-

inary results suggest that a seismic event with at least 20 cm offset occurred between 11 and 86 kyr.

The observation of neotectonic movements along the SEMP is consistent with GPS measurements, showing an offset of several mm/yr of the units south of the fault-line.

## References

Delaby, S. 2001. Palaeoseismic investigations in Belgian caves. *Geologie en Mijnbouw* **80**(3-4), 323-332.

Grenerczy, G., Kenyeres, A. & Fejes, I. 2000. Present crustal movement and strain distribution in Central Europe inferred from GPS measurements. *Journal of Geophysical Research* **105**(B9), 21835-21846.

Linzer, H.-G., Ratschbacher, L. & Frisch, W. 1991. Strike– slip faulting in orogen parallel motion: II. Displacement transfer and accomodation at different structural levels in the late stage history of the Alps. In: *GSA Annual Meeting* **24**. GSA Abstracts with Programs, San Diego, CA., A197.