

Geschichten, die man versteht, wenn man die Sprache der Steine beherrscht.

Geowissenschaftler sind selten Pädagogen oder Didaktiker. Wie gelingt es also, unser umfangreiches, geowissenschaftliches Wissen das wir aus den spärlichen Archiven unserer Erde haben, spannend zu vermitteln und noch dazu Begeisterung zu wecken? Ist uns bewusst, dass räuberische Libellen mit einer Flügelspannweite wie Falken oder Tausendfüßer so lang wie Krokodile die Erde bevölkert haben, oder dass Teile von Europa eine Reise von 7.000 km hinter sich haben?

Nur was man begreift, versteht man. Um die Dimensionen der Erdgeschichte begreifen zu können ist es wichtig diese in geeigneter Form „begreifbar“ zu machen.

Welche didaktische Methoden dafür entwickelt wurden und wie man sie umsetzen kann, soll Inhalt dieser Präsentation sein. – Ein Experiment unter Fachleuten.

FRITSCH, E. & SULZENBACHER, G. (Hrsg.) (2003): Geo-Reise in die Alpen. - 43-96, (Folio Verlag) Wien/Bozen.

U/Pb isotopic dating of brittle deformation

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U/Pb isotopic dating of calcite has been successfully applied to constrain ages of speleothems, paleosols and calcite tufas (COLE et al. 2005, WOODHEAD et al. 2006). In this study, we attempt to apply the technique for the first time to gain insight in the dynamics of brittle deformation.

During brittle deformation, fibrous calcite grows abundantly as slickenfibres and tension gashes, recording not only the direction, but possibly also time and rates of deformation.

Under favourable conditions, calcite may contain high uranium concentrations in its crystal lattice (KELLY et al. 2003), and its Pb isotopic composition is sufficiently protected against secondary influences to make it suitable for dating. Our preliminary findings suggest that the main factor limiting uranium concentration in newly grown calcites is host rock composition, particularly organic content.

The study comprises samples from several areas along the Alpine orogen, to record a wide range of different lithologies, tectonic settings and deformation ages.

Initial trace element profiling of samples by Laser-Ablation Inductively-Coupled-Plasma Mass Spectrometry (LA-ICPMS) reveals element distribution and concentrations, allowing for a quick overview aiding in further planning of workflow for each individual sample. Uranium concentrations of 1 to >3ppm and low Pb contents (approximate ²³⁸U/²⁰⁴Pb-ratios of up to ~9000, with variations spanning 3 orders of magnitude) are well comparable to published data of successfully dated calcites (COLE et al. 2005, RICHARDS et al. 1998). Dating several points along a continuous calcite fibre may yield information on deformation rates and (minimum) durations.

Here, we present current results and preliminary interpretations of data from sampling localities in the Cretaceous Gosau basin, Salzburg, Austria.

COLE, J. M., RASBURY, E. T., HANSON, G. N., MONTANEZ, I. P. & PEDONE, V. A. (2005): Using U-Pb ages of Miocene tufa for correlation in a terrestrial succession, Barstow Formation, California. - Geol. Soc. Am. Bull., 117: 276-287.

KELLY, S., NEWVILLE, M., CHENG, L., KEMNER, K., SUTTON, S., FENTER, P., STURCHIO, N. & SPÖTL, C. (2003): Uranyl Incorporation in Natural Calcite. - Environ. Sci. Technol., 37: 1284-1287.

RICHARDS, D. A., BOTTRELL, S. H., CLIFF, R. A., STRÖHLE, K. & ROWE, P. J. (1998): U-Pb dating of a speleothem of Quaternary age. - Geochimica et Cosmochimica Acta, 62: 3683-3688.

WOODHEAD, J., HELLSTROM, J., MAAS, R., DRYSDALE, R., ZANCHETTA, G., DEVINE, P. & TAYLOR, E. (2006): U-Pb geochronology of speleothems by MC-ICPMS. - Quaternary Geochronology, 1: 221.

Are the major structures of the Eastern Alps recorded in river profiles?

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The Eastern European Alps are known to be tectonically very active. This is in contrast to the Western Alps which appear to act tectonically in passive response to erosion. This difference in tectonic activity between Western and Eastern Alps is now being increasingly well documented, but differences in the morphological response between west and east have not been investigated. Here we study the morphology of the major rivers draining the Eastern Alps to test if the activity of major structures is reflected in channel profiles of the major rivers. Active tectonics of this part of the orogen is reflected in the shape of the channel profiles. In our approach we compare channel profiles measured from digital elevation models with numerically modeled channel profiles using a stream power approach. Interestingly, most knick points, wind gaps and other non-equilibrium features of the rivers may be correlated with features related to the last glacial maximum and appear unrelated to the young tectonic activity. Only a long wavelength uplift of the alps as a whole is reflected in a close correlation between stream power of rivers and geodetically measured uplift rates.

Textural, chemical and microstructural records during snowball garnets growth

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The growth history of two populations of snowball garnets from the Lukmanier Pass area (central Swiss Alps) was examined through a detailed analysis of chemical zoning, crystallographic orientation and 3D geometry. The first population was collected in the hinge of a chevron-type fold and shows an apparent rotation of 360°. Microstructural and chemical data reveal a modification of the stress field regime during garnet growth occurring after 270° of relative rotation and for XMn = 0.009. Crenulated inclusion trails indicate that the last 90° of the spiral curvature was formed under a non-rotational regime associated with flexural folding. Electron Backscattered diffraction (EBSD) maps reveal a crystallographic central domain exhibiting 270° of relative rotation and distinct smaller crystallographic domains at the end of the spirals. A second population collected on the limb of the folds exhibits a spiral geometry that does not exceed 270°. Here, the garnet microstructures do not record any evidence for a modification of the stress field regime during garnet growth, and a single crystallo-