MITT.ÖSTERR.MINER.GES. 161 (2015)

RADIOMETRIC DATING AND ENVIRONMENTAL INFORMATION FROM TWO ACTIVE STALAGMITES IN KATERLOCH CAVE

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Katerloch Cave located north of Graz at the SE-rim of the Alps is well known for its impressive dripstone occurrence, e.g. up to several metres tall candle-stick-type stalagmites. Research activities in recent years focused on utilizing such speleothems from Katerloch as a high-resolution paleoclimate archive (Boch et al., 2009) and for studying the particular stalagmite growth dynamics and omnipresent seasonal lamination found in these chemical sediments (Boch et al., 2011).

In the course of a M.Sc. thesis project, we collected two actively-forming stalagmites from different cave sections combined with monitoring of major environmental parameters including automatic logging of drip-rates and temperature, as well as chemical- and isotopic compositions of drip waters. Stalagmite K10 (71 cm in length) was recovered from the deepest cave section showing a nearly constant temperature of 5.7 °C, while K8 (40 cm) was located in the largest chamber growing at 3.7 °C. In order to constrain the age of the growth inception and older stalagmite portions we applied MC-ICP-MS ^{238}U-^{234}U-^{230}Th dating in connection with careful petrographic inspection. K10 revealed relatively low U concentrations of 19-127 μg/kg and low detrital Th contributions, resulting in typical age-uncertainties (2σ) of 0.7 to 3 %. Several time intervals from 129.1 ±1.2 kyr before present (Last Interglacial) up to now are represented in the stalagmite calcite separated by distinct growth interruptions and mostly reflecting relatively warm and humid climate intervals favourable for speleothem deposition. Stalagmite K8, in contrast, captured a relatively short time interval of the last ca. 2000 years, but suffers from overall less precise age constraints.

Focusing on the most recent, historical and Late Holocene time intervals of stalagmite growth and associated (paleo) environmental conditions we conducted high-resolution, micromill-based carbonate sampling along the stalagmite growth axes for stable carbon and oxygen isotope analyses. K10 isotope profiles obtained at 0.25 mm resolution show $\delta^{13}C$ values ranging from -9.3 to -4.6 ‰ and $\delta^{18}O$ from -8.0 to -5.1 ‰ VPDB. K8 (0.1/1 mm res.) revealed values from -11.0 to -3.8 ‰ and -7.4 to -4.5 ‰ for $\delta^{13}C$ and $\delta^{18}O$, respectively. These highly variable isotopic compositions are discussed with regard to temporal variations of the determining environmental conditions, as well as spatial differences within the cave system. Moreover, the isotopic composition and evolution of the younger stalagmites K10 and K8 are compared to data from Katerloch stalagmites of older time intervals and further to multi-annual monitoring data.

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