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Stable isotope compositions of speleothems from Hungary: climate conditions and local variations

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In the past decade an increasing number of cave-related paleoclimatological studies have been published to use mostly stalagmites as excellent continental climate records. Well studied speleothem occurrences from Central Europe are scarce (e.g. Spötl & Mangini, 2002, Kacanski et al, 2001, Onac et al., 2002) and vary rare in Hungary. However, in the last years new projects have been started to cover and compare this region (Siklósy et al. 2005). Climate conditions in the studied area are in a special position between the Atlantic-Mediterranean-sub-Arctic influences.

In the present work we report isotopic profiles for some Hungarian, mostly contemporaneously deposited Holocene stalagmites. The U-Th analysis revealed that the samples studied were deposited mostly during *or before early Holocene.* All samples are younger than the cold and dry Younger Drias period - that has left traces all over the world - except one (Leany cave, North-Central Hungary) which started growing 12.500 years ago. This stalagmite shows no abrupt oxygen isotope shift at the oldest part spanning the major climate change during the termination of the Younger Drias and reveals only slight cyclical variation along the groth axis.

Another stalagmite sample collected from the same cave closer to the surface exhibits higher variability in carbon and oxygen isotope compositions. Besides isotopic pattern similarities at the contemporaneously grew sections (dated with MC-ICP-MS) the measured carbon isotope values are significantly higher in the case of stalagmite formed at higher level. This feature may be related to different infiltration pathways of

the seepage water within the karst aquifer, or to considerable 13C/12C fractionation due to the escape of dissolved CO2 along migration pathway.

Trace element (e.g. Mg, Sr, Ba, U) contents and stable C and O isotope compositions were determined across two active, syngenetic soda strow stalagtites from the Beke Cave (NE. Hungary) representing the last seven years to investigate the nature of these geochemical cycles and their potential for better understanding of past changes. The cold seasons are represented by low d18O values. The positive covariation of P concentration and d13C values of the soda straw suggest the presence of reduced activity in the soil zone during wintertime. Environment seasonality clearly shown by the Sr and Ba concentrations: higher values represent cold periods, suggesting that restricted infiltration caused higher salinity.

The observed variations call attention to the calibration of recent speleothems with well known local meteorogical records which is essential in trace element related paleoclimatological studies.

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