Geophysical Research Abstracts, Vol. 8, 10926, 2006
SRef-ID: 1607-7962/gra/EGU06-A-10926

Inneralpine Speleothems constrain the end of Mis 5e

M. Meyer (1), C. Spötl (1), A. Mangini (2)

(1) Institut für Geologie und Paläontologie, Leopold-Franzens-Universität Innsbruck, Innsbruck, Austria (michael.meyer@uibk.ac.at), (2) Forschungsstelle Radiometrie, Heidelberger Akademie der Wissenschaften, Heidelberg, Germany

We report a study of speleothems from the Entrische Kirche, a cave situated at an elevation of 1040 m asl. at the northern margin of the Central Alps of Austria. We obtained five drill cores from two flowstones deep inside the cave, which were examined petrographically, microsampled for stable C and O isotopes and ^{230}Th-dated using TIMS.

A package of 27 cm of white, compact calcite was deposited between 126.1 +/-1.0 ka (near base) and 124.5 +/-2.7 ka (near top). The oxygen isotope values of this interglacial calcite deposit increase upsection and reveal regular high-frequency cycles of centennial origin. A remarkable decrease in δ^{18}O by 4L' (from -8 to -12L' VPDB) starts at ca. 120 ka and is completed within the uppermost 2 cm of the compact white calcite. Immediately subsequent to this isotopic shift the petrographic appearance changes and 2.5 cm of white and conspicuously laminated calcite with low δ^{18}O values formed between 115 and 116 ka. This white calcite is abruptly overlain by a complex succession of variably brown, detrital-rich calcite and δ^{18}O values remain low, but variable (-12 to -10 L' VPDB) for the rest of the core. Short growth intervals at ca. 80 ka and ca. 45 ka were identified (compromised by detrital Th), suggesting formation of this brown, detrital-rich calcite during late MIS 5 and MIS 3, respectively.

We attribute the remarkable and uninterrupted decline in δ^{18}O recorded in this flowstone between ca. 120 and 116 ka to the drastic climate deterioration during the MIS 5e/d transition. The timing of this glacial inception is in agreement with the Greenland ice-core record (North Greenland Ice Core Project members, 2004), speleothems from Soreq Cave (Bar-Matthews et al., 2003) and Dongge Cave (Yuan et al., 2004) as well as sea-level data derived from corals (e.g., Speed & Cheng, 2004). Enhanced seasonality most likely contributed to the 4L' fall in oxygen isotope values, and as a result

of atmospheric cooling the snow line in the Alps fell and the (small) recharge area of the cave became glaciated. This fundamental landscape change decelerated and apparently also intermittently stopped speleothem deposition and the influx of fine-grained glacially-derived debris by summer melt-water pulses resulted in episodic deposition of inclusion-rich calcite during major interstadials.

References

North Greenland Ice Core Project members (2004): High resolution record of Northern Hemisphere climate extending into the last interglacial period. *Nature*, 431, 147-151.

Bar-Matthews, M., Ayalon, A., Gilmour, M. and Hawkesworth, C.J. (2003): Sea-land isotopic relationships from planktonic foraminifera and speleothems in the Eastern Mediterranean region and their implications for paleorainfall during interglacial intervals. *Geochim. Cosmochim. Acta*, 67, 3181-3199.

Speed, R. C. and Cheng, H., (2004): Evolution of marine terraces and sea level in the last interglacial, Cave Hill, Barbados. *Geol. Soc. Amer. Bull.*, 116, 219-232.

Yuan, D., Cheng, H., Edwards, R. L., Dykoski, C. A., Kelly, M. J., Zhang, M., Qing, J., Lin, Y., Wang, Y., Wu, J., Dorale, J. A., An, Z., and Cai, Y. (2004): Timing, Duration, and Transitions of the Last Interglacial Asian Monsoon. *Science*, 304, 575-578.