NEW DATA ON THE CHRONOLOGY OF THE TERMINATION II AND PALEOCLIMATE DURING MIS 5, BASED ON THE STUDY OF A STALAGMITE FROM CLOŞANI CAVE (SW ROMANIA)

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Several paleoclimatic and paleogeographic studies based on cave deposits from the karst of Romania have been carried out during the last 10 years but they are mostly focused on Holocene and Late Pleistocene speleothems (Lauritzen and Onac, 1999; Onac et al., 2002; Constantin, 2003, Tămaş et al., 2005). Here, we present the first isotopic profile of a stalagmite from Romania that grew during Marine Isotope Stage (MIS) 6–3.

The stalagmite C6 was collected from Cloşani Cave (Southern Carpathians, Romania). This cave has been used since the 1960s as an underground laboratory by the "Emil Racoviță" Institute of Speleology and its mineralogy and climatology were studied in great detail (Diaconu, 1990; Racoviță et al., 1993). It is a dry cave located at about 80 m above the current Motru riverbed and, except for the entrance area, shows remarkable microclimate stability with a multi-annual mean temperature of ~11°C and a relative humidity of 99–100%.

The 25 cm length of C6 speleothem represents the tip of a longer stalagmite whose basal 90 cm was covered by overgrown large pool-spar crystals. The whole sample is of translucent columnar calcite. The upper part displays very fine lamination. Despite a low U-content (between 0.02 and 0.06 ppm), a series of eight U-series thermal ionization mass-spectrometry (TIMS) dates was successfully measured at Bergen University (Norway). The dates showed that the speleothem grew continuously between c. 183 ka and c. 39 ka with growth rates varying between 0.63 and less than 0.1 cm/kyr. A stable isotope profile was measured at 0.5 cm intervals (also at Bergen University) yielding the best resolution record for the highest growth period: this was between c. 183 ka and c. 103 ka, which corresponds to MIS 6 to 5c. The $\delta^{18}O$ record and the growth rates (Figure 1) represent the average paleoclimatic conditions during the transition to the Eemian in Romania (Figure 1). The basal part of the profile displays several oscillations that may be attributed to MIS 6 stadials at ~180 ka and ~166 ka respectively which were recognized in several other records (e.g. Winograd et al., 1992; Desmarchelier et al., 2000). A clearly-marked cooling period follows between ca. 166 and 156 ka, followed by an abrupt isotopic increase of ~3 permil during only ~7000 years which may be interpreted as the onset of the Termination II.

In contrast with the "classical" SPECMAP chronology (Schackleton and Opdyke, 1973; Martinson et al., 1987; Schakleton et al., 2002) which broadly places the beginning of the Eemian at some point in time between 140 ka and 130 ka, numerous speleothem records show an earlier warming. The Devils Hole profile shows an early warming at ~140 ka (Winograd et al., 1992), while studies of speleothems from North Norway have shown that the deglaciation must have occurred at high latitudes as early as 145 kyr ago (Lauritzen, 1995; Berstad et al., 1997). The C6 speleothem profile suggests an even earlier warming at ~45 °N that may be placed as early as 155 ka, well in advance of the SPECMAP chronology.

However, the C6 profile also shows a plateau and relatively slow growth during ~150 and ~135 ka which is followed by a short and rapid cooling recorded at c. 132 ka. This may suggests a "two-step" pattern of the deglaciation similar to the "Zeiffen-Kattegat" episode (Seidenkranz et al., 1996).

After this oscillation, growth rate increased markedly and the isotopic signal rises again to reach a maximum at c. 126–123 ka. This correlates with both the "classical" MIS 5e

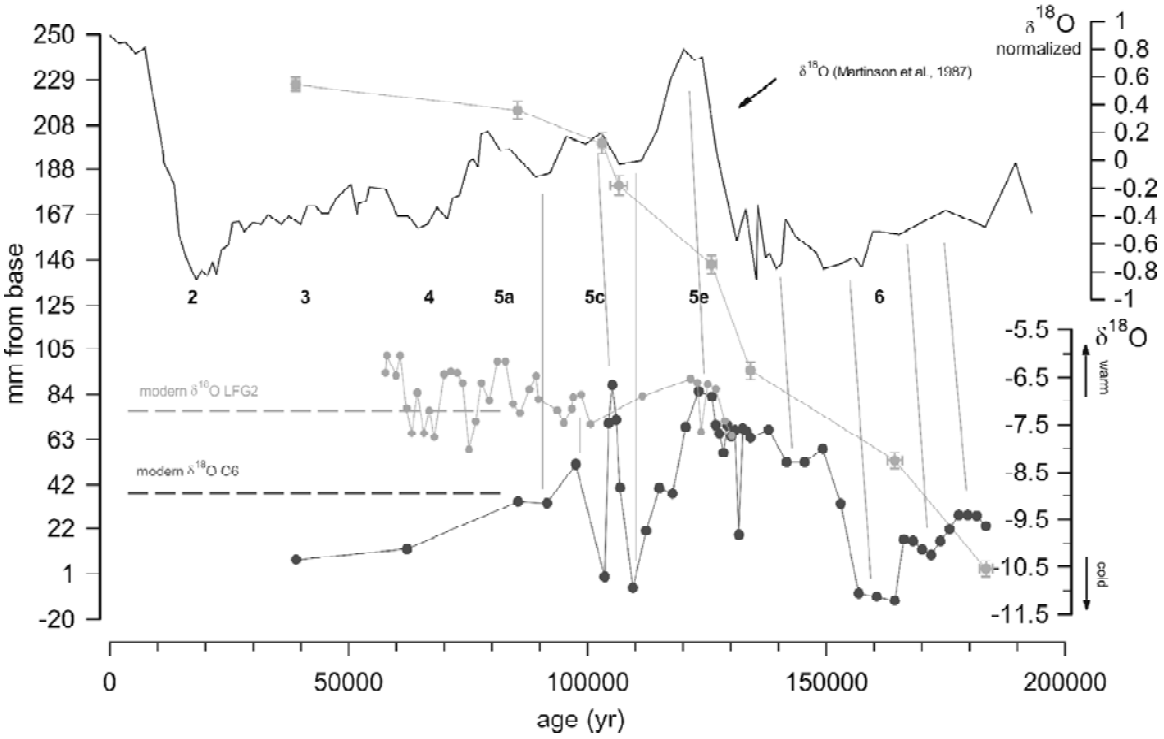

Figure 1. The $\delta^{18}O$ profiles of the Southern Carpathian C6 stalagmite (thin line at the base of the graph) and of the Western Carpathian LFG speleothem (Lauritzen and Onac, 1999) (middle, gray line) compared with the global $\delta^{18}O$ curve of Martinson et al. (1987). The age model vs. stratigraphy is also shown. Note the abrupt increase of the growth rates during the warming events MIS 5e and 5c.

maximum in the SPECMAP profiles and also with the isotopic signal of the LFG stalagmite from the Western Carpathians (Lauritzen and Onac, 1999).

For the next 20 kyr, the climatic oscillations corresponding to interstadials 5d and 5b appear surprisingly large as compared with the LFG record. LFG grew in the Western Carpathians while C6 grew in the Southern Carpathians: it is possible that the mountain chain may have acted, at different times, as a barrier between two different sources of atmospheric circulation, depending on the position of the wind systems.

Acknowledgements

This work was partially supported by CNCSIS Grant 1258/2005 to SC.

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