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Holocene and Late Pleistocene climate record of a sub-Mediterranean continental environment, recorded by a stalagmite from Poleva Cave (Southern Carpathians, Romania)

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In the past years, an increasing number of papers have been made use of speleothems as paleoclimatic indicators by measuring the stable isotopes (usually $\delta^{18}O$ and $\delta^{13}C$) variations along their axis. These are considered to reflect variations in mean annual surface temperature (e.g. Gascoyne et al., 1980), and/or the changes of the continental ice volume or long-term shifts in moisture sources (Lauritzen & Lundberg, 1999; McDermott et al., 1999). The development of the U-series TIMS dating techniques often allowed very accurate time-calibrations of such profiles. Since the supply of percolation water (and thus, speleothem deposition) is generally prevented both during very cold or very warm climatic episodes, it appears very likely that speleothems formed either at northern latitudes (e.g. in the sub-Arctic) or southern latitudes (e.g. the Mediterranean) may only preserve incomplete records of the climatic variations. This study have focused on a speleothem (stalagmite PP10) collected from a cave located in the sub-mediterranean region of SW Romania, reasonably far from the influence of the NW Europe (Atlantic) circulation and also from the arid conditions of the SE Mediterranean.

A preliminary U-series alpha-spectrometric date of the base yielded an age of 61.7±11 ka with relatively high error due to the low Uranium content (~0.05 ppm) of the sample. Seven high-resolution TIMS-dates yielded ages in correct stratigraphical order, ranging from ~48 ka to ~3 ka with typical analytical errors of 1–2% (2σ) for ages younger than 15 ka. Along the speleothem axis, 154 stable isotopes samples were analyzed for $\delta^{18}O$

and $\delta^{13}C$. The time-resolution of the sampling corresponds to ~ 2 ka/sample for the lower part of the stalagmite (slow-growing) and to ~150–40 years/sample for the upper (candle-stick-like) part. This high resolution has enabled the identification of several clear-marked, rapid, climatic oscillations during the last 12,000 years.

The isotopic profile of the *lower part* of the stalagmite reveals several climatic oscillations during Marine Isotope Stages (MIS) 4 and 3, which are well-documented from other continental and marine records, such as the deglacial event at ~54 ka, an important glacial event between *c*. 47 and 41 ka, and the marked warming between ~ 32 and 28 ka (Denekamp).

The *upper part* of the stalagmite has delivered a detailed oxygen isotopic profile over the last 12 ka, recording several important rapid oscillations that may be correlated globally. The cooling event at ~8.2 ka (Alley et al., 1997) is clearly marked. A general trend of climate warming (including rapid variation episodes with amplitudes as large as ±1,5‰) then follows, culminating with two spikes at ~5.2 and ~3.2 ka. Overall, the isotopic profile recorded by stalagmite PP10 during the last 10,000 years is consistent with the one recorded by stalagmite PP9 form the same cave and reported by Constantin et al. (2001). The warm 3.3 ka-event seems to have a regional extent since it is clearly recorded, with roughly the same amplitude, in both stalagmites from Poleva cave and in PU2 stalagmite from western Carpathians (Onac et al., 2002) — a region that lies under the Atlantic climatic influence.

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