

EGU24-7716, updated on 20 May 2024

<https://doi.org/10.5194/egusphere-egu24-7716>

EGU General Assembly 2024

© Author(s) 2024. This work is distributed under the Creative Commons Attribution 4.0 License.



MIS 8 to MIS 7 sub-orbital-scale climate variability along the northern Mediterranean borderland recorded in a Macedonian mammillary speleothem

Marjan Temovski, Kata Molnár, Danny Vargas, László Rinyu, and László Palcsu

Isotope Climatology and Environmental Research Centre (ICER), HUN-REN Institute for Nuclear Research (ATOMKI), Debrecen, Hungary (temovski.marjan@atomki.hu)

The central parts of Southeastern Europe, located along the northern boundary of the Mediterranean region, represent a transient zone affected by both Mediterranean and continental atmospheric influences. An impressive record of past climate variations in this region has been obtained mainly from lacustrine sediments in the southern parts and loess deposits in the northern parts. Although radiometrically dated speleothems provide higher resolution records with superior chronological constraints, not many published speleothem records are available from this region, with none covering Marine Isotope Stage (MIS) 7.

We present here a record of MIS 8 – MIS 7 sub-orbital-scale climate variations obtained from a U-Th dated Macedonian subaqueous speleothem composed of mammillary calcite that deposited between 246.0 ± 6.2 ka and 225.8 ± 5.4 ka, covering Termination III (T-III), MIS 7e and MIS 7d. Proxy records were obtained from conventional and clumped isotopes, with an additional insight from uranium isotopes and petrography. The stable isotope data has relatively high resolution (60-310 yr) allowing identification of millennial-, and at sections centennial-scale climate variations.

The speleothem record reflects an increased Mediterranean influence, as suggested also by other proxy records from the region, especially during MIS 7e. However, periodically increased continental influences are also identified, especially during T-III and MIS 7d. The calcite $\delta^{18}\text{O}$ values seem to reflect mainly temperature-controlled precipitation $\delta^{18}\text{O}$, with changes between Mediterranean and Atlantic moisture source also noticeable. The $\delta^{13}\text{C}$ values mainly reflect the alternating influence of continental and Mediterranean climates, expressed by summer moisture availability, partly overprinted by temperatures. Increased winter precipitation during MIS 7e is identified, corresponding to Sapropel 9. The abrupt climate change during T-III is represented in the stable isotope record with an event that corresponds to the S8.1 stadial event, as identified in a speleothem from Ejulve Cave (NW Spain), and the Younger Dryas-III weak monsoon interval, as identified by Chinese speleothem records, considered analogous to either Heinrich 1 or Younger Dryas in Termination I, respectively.