EGU24-18304, updated on 16 May 2024
https://doi.org/10.5194/egusphere-egu24-18304
EGU General Assembly 2024

Double negative peak of the 8.2 ky event and subsequent „overshoot" recorded in speleothems from Central Europe

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Several short-term climate anomalies occurred during the Holocene, of which the 8.2 k.y. event was the most pronounced. Several proxy records ranging from the North Atlantic to monsoonal regions indicate that this event had a semi-global impact. The release of large amounts of freshwater into the North Atlantic has been cited as a major cause of the slowing of oceanic thermohaline circulation (von Grafenstein et al., 1998; Barber et al., 1999), resulting in this climate perturbation. Despite the significance of this event, high-resolution speleothem records are relatively scarce (e.g. Duan et al., 2023; Wood et al., 2023). These high-resolution oxygen isotope records from eastern China to South America revealed the complex structure of the 8.2 ky event.

Here we present two high-resolution oxygen isotope records from Central Europe (Béke Cave, NE Hungary and Vacska Cave N Hungary), along with the chemical data of calcite and the hydrogen isotope composition of inclusion-hosted water. The high-resolution oxygen isotope time series reveals a double negative anomaly around 8.2 k.y., whereas a positive anomaly appears in the following period (8.1 k.y.). Similar patterns are also observed in the hydrogen isotope data series. Assuming that the temperature change was solely responsible for the observed systematics, this data is utilized to calculate the relative temperature increase/decrease. Apparently, a 1-1.5°C temperature decrease for the 8.2 k.y. event and a 2°C increase for the "overshoot" around 8.1 k.y. can be given. Moreover, the oxygen isotope composition may be affected not only by temperature but also by changes in the amount of precipitation and/or its seasonality, as well as by the shifting of the main route of moisture transportation (Atlantic vs. Mediterranean moisture sources). Calculated d-excess values might indicate some changes during these periods. Additionally, trace element composition suggests a shift in summer/winter precipitation amounts for the overshoot.

We are thankful for the support and permission of the Aggtelek National Park Directorate and the Duna-Ipoly National Park Directorate. The János Bolyai Research Scholarship of the Hungarian

Academy of Sciences financially supported György Czuppon's work.

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