

The 8.2 event as recorded by combined H-C-O isotope composition in speleothem in Central Europe: Implications for changes in moisture sources and precipitation seasonality

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During the Holocene several short term climate anomalies have been recognised, among which the 8.2 ky event was the most pronounced. Here we present new isotopic data of calcite and inclusion hosted water of stalagmite from Béke Cave (NE Hungary, Carpathian Basin) that covers the time interval from 10500 to 4500 yr BP. The oxygen isotopic composition of the stalagmite calcite recorded the 8.2 ky event by elevated $\delta^{18}\text{O}$ values between 8000 and 8400 yr BP, while the carbon isotopic compositions do not show significant changes during this period.

Beside the C and O isotope compositions of the speleothem calcite, hydrogen and oxygen isotopic compositions of the inclusion hosted water of the studied stalagmite have been determined by using vacuum crushing and cavity ring-down spectroscopy. The relatively high water content allowed us to achieve ~5 mm sampling (and hence ~ 50 year age) resolution. Both hydrogen and oxygen isotopic compositions of inclusion hosted water show positive excursions around 8.2 kyr where the host calcite yielded elevated oxygen isotope compositions.

The observed positive anomalies in O isotopic compositions in both the host calcite and its fluid inclusion content is in contrast to other western European speleothems which recorded this cooling event by marked decreasing of $\delta^{18}\text{O}$ values of the calcite. The different response to this event in the Carpathian Basin might be caused by 1) increased aridity during the cold event leading to strong evaporation; 2) seasonality change resulting in higher summer/winter precipitation ratio; 3) changes in the moisture transport trajectory with more Mediterranean moisture arriving to the Carpathian Basin.

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