EGU24-18882, updated on 20 May 2024
https://doi.org/10.5194/egusphere-egu24-18882
EGU General Assembly 2024

Temperature evolution across the 8.2 ka event based on speleothem fluid inclusion water isotopes from Milandre Cave (Switzerland)

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Hydrogen (δD) and oxygen ($\delta^{18}O$) stable isotopes contained in speleothem (cave carbonate) fluid inclusion water allow the quantitative reconstruction of past temperatures. Reconstructions can be based either on the use of a regional modern transfer function between isotopes in precipitation and temperatures (expressed in ‰ / °C) or based on the fractionation between the oxygen isotopes measured in the calcium carbonate and in the corresponding inclusion water. One advantage of this proxy is that temperature reconstruction is constrained by chemico-physical processes. Based on a δD gradient of 3.84‰ / 1°C, we reconstructed quantitative temperature variations occurring during the interval 9.0 ka to 7.8 ka BP for the central and western Europe area with a mean temporal resolution of approximately 25 years. The isotope profile shows that the 8.2 ka cold event is characterized by negative shifts in δD and $\delta^{18}O$ consistent with numerous records from across the Northern Hemisphere such as for example Mondsee and Ammersee lake sediments in central Europe or at a larger scale in ice cores from Greenland. Across the 8.2 ka event, the new high-resolution Milandre Cave Fluid Inclusion Temperature (MC-FIT) shows a remarkable similarity with the physically constrained temperature reconstruction from Greenland ice cores that is based on nitrogen and argon isotopes of trapped air (Kobashi et al., 2017). This record, supported by additional speleothems from a neighboring cave, provides a better understanding of the continental temperature evolution across the 8.2 ka event.

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