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Paleotemperature reconstructions from speleothem fluid inclusions between 14 – 10 ka BP in Milandre cave (NW Switzerland)

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In cave environments, speleothems constitute a well preserved and precisely dated continental climate archive that record past environmental changes such as paleotemperature or moisture source, namely through oxygen and hydrogen isotopes variations. Fluid inclusions are common in speleothems and they correspond to micrometric voids that often contain fossil liquid water representing past precipitation falling above the cave nearly at the time the inclusions were sealed. To measure the δD and δ^{18}O isotopic composition of speleothem fluid inclusions, we extracted submicrolitre amounts of water from stalagmites (old and recent) coming from Milandre cave (Switzerland) using a new online method developed at the University of Bern (Affolter et al., 2014). The released water is then flushed directly to a Picarro L1102-i or L2140-i laser based instrument that allows to simultaneously monitor hydrogen and oxygen isotopes. At Milandre cave site, a two year isotope monitoring campaign has confirmed that isotopes in precipitation for northwestern Switzerland are principally controlled by air temperature (Affolter et al., 2015). Therefore, when combined with calcite δ^{18}O, the fluid inclusion water isotopes can be used to calculate paleotemperatures. We reconstructed a cold season biased (roughly autumn – winter – spring) paleotemperature trend for the time interval covering the Allerød, the Younger Dryas cold interval and the early Holocene (13'900 – 9'900 BP).

References:

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