High-resolution stalagmite record of the Penultimate Glacial climate for the North-Atlantic realm

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U/Th dated stalagmites from NW Spain are used to reconstruct climate variations continuously through glacial-interglacial cycles. In this work a combination of high-resolution stable isotope and trace element records of three stalagmites are used to reconstruct the climate on different time scales through MIS6.

On orbital time scales climate variations are controlled by solar insolation. Since the North Atlantic is the moisture source for water feeding the NW Spain stalagmites we show that the $\delta^{18}O$ stalagmite signal is controlled by northern hemisphere ice mass. Unexpected freshening events are simulated with GCM models.

On millennial time scales cold/warm events occur which we record with the $\delta^{13}C$ signal. Comparison with marine SST reconstructions corroborates that the $\delta^{13}C$ signal is controlled by temperature. Thus, we interpret $\delta^{13}C$ as a qualitative temperature proxy and resolve millennial scale climate events for MIS6. The striking similarity with the Greenland synthetic $\delta^{18}O$ record further strenghtens a climate controlled $\delta^{13}C$ proxy [1]. To minimize in-cave CO_2 degassing effects a degassing correction is applied to $\delta^{13}C$ using Mg/Ca ratios.

With the absolutely dated chronology and reproducibility of three stalagmite records we establish a continuous climate record for the Penultimate Glacial that could be used as reference chronology in the North Atlantic realm.

[1] Barker et al. (2011), Science, Vol. 334, Issue 6054, pp. 347-351