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Evidence of an early Termination II at 133 ka in a Swiss high alpine stalagmite

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The absolute timing of Termination II (T II) is the subject of controversial debate. Here we present the results from one of our samples collected in a Swiss high alpine cave. Stalagmite MF3 collected from Schafsloch Cave (Alpstein, Appenzell; 1890 masl) covers in fine detail the intervals of Marine Isotope Stage 5 to 7. This is the first high resolution record (20 year resolution for T II) documenting this time period in Switzerland, and one of the very few absolutely-dated records in Europe.

The high resolution oxygen isotope (δ^{18}O) profile of stalagmite MF3 indicates that T II is characterized by a distinct positive shift of around 4.5 ‰ from glacial values of around -12.0‰ to interglacial values of around -8.5 ‰ due to a temperature dependent positive shift (∼0.65 ‰ / °C) in δ^{18}O of local precipitation. Based on very precise Uranium-series ages with age uncertainties of only 500 to 900 years, this marked positive isotopic shift occurs at around 133 ± 0.8 ka BP. This age estimate for T II is in good agreement with other absolutely-dated stalagmite records from Austria (Spötl et al., 2002) and Italy (Drysdale et al., 2009), supporting the notion that glacial terminations are possibly driven by changes in Earth's obliquity. However, the timing of T II in central Europe contrasts with the timing of T II at around 129 ka in stalagmite records from China (Cheng et al., 2009) and Turkey (Badertscher et al., 2011). The age offset between the different absolutely-dated stalagmite records may be related to different regional climatic response to changes in temperature.

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