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Excess warming in Central Europe after the 8.2 ka cold event: evidence from a varve-dated ostracod δ^{18}O record from Mondsee (Austria)

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As evidenced by numerous palaeoclimate records worldwide, the Holocene warm period has been punctuated by several short, low-amplitude cold episodes. Among these, the so-called 8.2 ka cold event represents a particularly prominent climate anomaly. Accordingly, several proxy-based and modeling studies have addressed its causal mechanisms, absolute dating, duration, amplitude, spatio-temporal characteristics and environmental consequences so far. However, knowledge about the dynamics and causes of subsequent climate recovery is still limited although this is essential for understanding rapid climate change. Here we present a new sub-decadally resolved and precisely dated oxygen isotope (δ^{18}O) record for the interval 7.7–8.7 ka BP derived from benthic ostracods preserved in the varved lake sediments of pre-Alpine Mondsee (Austria), providing new insights into climate development around the 8.2 ka cold event in Central Europe. The high-resolution Mondsee δ^{18}O record reveals the occurrence of a pronounced cold spell around 8.2 ka BP, whose amplitude ($\sim$1.0 ‰ , equivalent to a 1.5–2.0 °C cooling), total duration (151 years) and absolute dating (8231–8080 varve years BP, i.e. calendar years before AD 1950) agrees well with results from other Northern Hemisphere palaeoclimate archives, e.g. the Greenland ice cores. In addition, the Mondsee data set provides evidence for a 75-year-long δ^{18}O overshoot directly following the 8.2 ka event (between 8080 and 8005 varve years BP), which is interpreted as a period of excess warming (about 0.5–0.6 °C above the pre-8.2 ka event level) in Central Europe. Though so far not been explicitly described elsewhere, this observation is consistent with evidence from other proxy records in the North Atlantic realm, therefore likely reflecting a hemispheric-scale signal rather than a local phenomenon. As a possible trigger we suggest an enhanced resumption of the Atlantic meridional overturning circulation (AMOC), supporting assumptions from climate model simulations.