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A multi-proxy record of Lateglacial climatic and environmental changes from Lake Mondsee (Upper Austria)

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Within the frame of the ESF EuroCLIMATE project DecLakes (*Decadal Holocene and Lateglacial variability of the oxygen isotopic composition in precipitation over Europe reconstructed from deep-lake sediments*), the sediment record of pre-alpine Lake Mondsee (Upper Austria) has been investigated with a special focus on the Lateglacial. The use of a multi-proxy approach, including microfacies analysis, high-resolution μ-XRF element scanning, stable isotope analyses on valves of benthic ostracods, carbon geochemistry and analysis of pollen and ostracods enables the identification of major climatic fluctuations during this period. Furthermore, the parallel sampling strategy allows direct comparison of sensitivity of different proxies to climatic and environmental changes. The basal clastic-detrital facies of the profile is dominated by proglacial varves. The gradual onset of biochemical calcite precipitation is paralleled by a rapid shift in oxygen isotope ratios of benthic ostracod valves which marks the abrupt warming at the onset of the Lateglacial Interstadial. However, the allochthonous sediment input from the catchment shows no rapid shift but a gradual decrease. During the Allerød biozone sedimentation is dominated by homogeneous endogenic calcite with a very low detrital component. At the onset of the Younger Dryas cold period a marked decrease in oxygen isotope ratios within ca. 100 years occurs, followed by a reduction in the amount of endogenic calcite and the increase of detrital flux with a lag of about 100 years. The clear vegetational shift towards higher proportions of herbs and *Juniperus* and the frequency increase of detrital event layers lag the δ^{18}O signal by about 250 years. In contrast, the rapid Holocene warming within 20–30 years is well reflected by the parallel δ^{18}O rise and the establishment of a vegetation adapted to a warmer climate with the onset of massive calcite precipitation and the cessation of detrital input lagging by only few decades. The Holocene climatic amelioration is also well reflected by changes in the ostracod assemblage of the profundal zone from an oligotrophic and psychrophilic fauna to one which favours benthic substrates with higher organic input.

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