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Impact of vegetation dynamics on leaf wax stable isotopes since the Younger Dryas in central Switzerland

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The stable isotopic composition of leaf waxes ($\delta^{13}C$ and $\delta^{2}H$ values) in lake sediment sequences is a powerful tool for reconstructing local past climate and environmental conditions. However, changes in vegetation cover around a lake can directly impact leaf-wax isotopic records. Different plant types, such as trees and grasses, display distinct isotopic fractionation and use different internal water pools for lipid biosynthesis. Moreover, the relative abundance of plant types in a catchment area over time can also have implications for the provenance of these compounds, with more sedimentary leaf waxes from aerosols sourced from regional scales in grasslands relative to forests.

In this study, we examine how changes in the vegetation cover of central Switzerland have impacted the lipid biomarker signal in the sedimentary record. Specifically, we analyzed distributions and compound-specific $\delta^{13}C$ and $\delta^{2}H$ values of leaf wax *n*-alkanes and fatty acids of a 14 m-long lake sediment core retrieved from Rotsee. Our Bayesian-based ^{14}C age model and preliminary results give insights into regional vegetation dynamics and hydroclimate since the Younger Dryas (~12.9–11.7 ka), where relatively stable temperatures are inferred from brGDGT data throughout most of the Holocene. This information, combined with previous palynological records from the lake, such as the deforestation of beech forest and expansion of grasslands that began ~2.5 ka, provides a framework for the analysis and interpretation of the downcore leaf waxes data. Our work enhances our understanding of how these vegetation changes in the catchment affected the leaf wax sedimentary record and contribute to unveiling the past interplay between climate, ecology, and human-induced change in temperate sub-alpine regions.