



Universität
Basel

Research Project

COSIWAX - Compound Specific Hydrogen Isotope Analyses of Leaf Wax *n*-Alkanes as a Novel Tool to Assess Plant and Ecosystem Water Relations Across new Spatial and Temporal Scales

Third-party funded project

Project title COSIWAX - Compound Specific Hydrogen Isotope Analyses of Leaf Wax *n*-Alkanes as a Novel Tool to Assess Plant and Ecosystem Water Relations Across new Spatial and Temporal Scales

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Organisation / Research unit

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Department

Project Website <https://botanik.unibas.ch/forschungsgruppen-der-botanik/nachhaltige-landnutzung/projects/cosiwax/>

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Status Completed

Leaf wax *n*-alkanes are long-chained lipids that are vital components of plant cuticles. What makes leaf wax *n*-alkanes unique is that their stable hydrogen isotope composition ($\delta^2\text{H}$) contains information on precipitation and plant water relations. In addition, leaf wax *n*-alkanes are abundant in leaves, soils, sediments and even the atmosphere and can persist with their $\delta^2\text{H}$ values over millions of years. With this exceptional combination of properties, leaf wax *n*-alkanes and their $\delta^2\text{H}$ values are now being celebrated as the much-needed ecohydrological proxy. Despite the enormous potential that leaf wax *n*-alkanes have as ecohydrological proxy, the exact type of hydrological information that is recorded in the $\delta^2\text{H}$ values of leaf wax *n*-alkanes remains still unclear. This is because critical mechanisms that determine the $\delta^2\text{H}$ values of leaf wax *n*-alkanes are not understood.

This project will perform the experimental work that is now needed to resolve the key mechanisms that determine the $\delta^2\text{H}$ values leaf wax *n*-alkanes. These experiments will set the basis to develop a new numerical model that will allow to ultimately test the exact hydrological signal that leaf wax *n*-alkanes record in their $\delta^2\text{H}$ values: Is it a mere hydrological signal reflecting the amount or origin of precipitation or a plant-shaped signal indicating plant water relations such as evapotranspiration? Building on this new model, COSIWAX will set out to test the potential that leaf wax *n*-alkane $\delta^2\text{H}$ values hold as new ecohydrological proxy for ecology and ecosystem sciences. If successful, COSIWAX will establish with this research leaf wax *n*-alkanes $\delta^2\text{H}$ values as an innovative ecohydrological proxy that has extensive possible applications in paleoclimatology, ecology, earth system sciences.

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