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Leaf waxes of a high-mountain ecosystem in Western Iberia as a tool for understanding past climatic and vegetation dynamics

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Leaf wax *n*-alkanes have been widely used as vegetation biomarkers to reconstruct past climate and vegetation changes. The study of these compounds in modern plants is crucial to achieve robust downcore reconstructions in lake and marine records. Nevertheless, Iberia still lacks in modern *n*-alkane characterization despite its key location to the study of climate dynamics, and wide range of bioclimatic zones.

In this study, we analyzed and characterized the *n*-alkanes signals (relative abundance and compound-specific isotopic signals) of modern vegetation, soil, and surface sediment of Lake Peixão, a high-mountain lake in western Iberia (Portugal).

The modern oro-Mediterranean vegetation type is dominated by grasses/herbs and shrubs ecological forms which isotopic signals respond linearly to the environmental factors in the Lake Peixão ecosystem.

According to our findings, higher amounts of leaf waxes *n*-alkanes appear be linked with cold or dry tolerant plants. C_{31} is the most abundant homologue in modern settings, linked to the predominant C_3 heathlands and some grasses of the lake's catchment, and indicator of dry conditions. C_{29} is the second most dominant and most indiscriminately synthesized compound in the Lake Peixão ecosystem. This homologue show evidence to be the most robust compound to infer changes in downcore reconstructions in the terrestrial hydrology (δD_{terr}), which signal is highly controlled by the regional mean air temperature, but also an important indicator for terrestrial vegetation cover change.

C_{33} and C_{35} homologues are almost entirely associated with cold and drought-tolerant vegetation, such as *Juniperus*, while C_{27} and C_{25}, are related with aquatic-related plants, indicators of water availability.

Based on modern vegetation isotopic signal, the $\delta^{13}C$ of the surface lake sediment shows that the signal is dominate by C_3 heathlands, particularly *Erica*, controlling most of the total *n*-alkane inputs into the lake.

Our findings, supported by the modern settings, will contribute to a better assessment of how *n*-alkane signal could be used as a tool to infer climate and vegetations changes in Lake Peixão sediments and adjacent downstream areas.

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