

## Publication

## Stable isotopes in leaf water of terrestrial plants

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Leaf water contains naturally occurring stable isotopes of oxygen and hydrogen in abundances that vary spatially and temporally. When sufficiently understood, these can be harnessed for a wide range of applications. Here, we review the current state of knowledge of stable isotope enrichment of leaf water, and its relevance for isotopic signals incorporated into plant organic matter and atmospheric gases. Models describing evaporative enrichment of leaf water have become increasingly complex over time, reflecting enhanced spatial and temporal resolution. We recommend that practitioners choose a model with a level of complexity suited to their application, and provide guidance. At the same time, there exists some lingering uncertainty about the biophysical processes relevant to patterns of isotopic enrichment in leaf water. An important goal for future research is to link observed variations in isotopic composition to specific anatomical and physiological features of leaves that reflect differences in hydraulic design. New measurement techniques are developing rapidly, enabling determinations of both transpired and leaf water  $\delta(18) \text{ O}$  and  $\delta(2) \text{ H}$  to be made more easily and at higher temporal resolution than previously possible. We expect these technological advances to spur new developments in our understanding of patterns of stable isotope fractionation in leaf water.

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