A tale of two molecules: leaf wax and lignin

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Plants make a host of biochemicals; some of these are of interest for ecohydrology and paleoclimatology. Two of the most resilient plant molecules to survive transfer to soil and through rivers to sedimentary deposits are *n*-alkanoic acids (FAs) and lignin.

Long chain FAs are derived primarily from the waxy coating on plant leaves and represent the most abundant leaf wax molecules in fluvial samples. FAs are prime targets for compound specific hydrogen, carbon and radiocarbon analyses, particularly where samples are small (e.g. fluvial suspended load), analytical demands are large (e.g. radiocarbon) or gymnosperms are present (alkanes low or absent). In sediments, FAs are some of the most abundant and analytically-tractable plant wax compounds, especially where petrogenic alkanes may obscure contemporary biospheric sources. FAs are common paleoclimate tools, but neglected in ecological work which historically focused on alkanes.

Lignin is derived mostly from the woody tissues of plants, and constituent lignin phenols provide information about plant type as well as isotopic analytical targets. This is of interest as studies on tree wood have shown that D/H ratios of lignin methoxyl groups present novel possibilities for ecohydrology.

I review prior work and unresolved questions on both proxies and further show how studies of biomarkers in transit in rivers can bridge the conceptual gap between modern plant ecology and paleoclimate reconstructions. To do this, I highlight our new work on a Peruvian fluvial system. A paired lignin and FA approach allows us to track both woody and leaf biomass as plant organic matter makes its way into soils, rivers and geological archives. I discuss the implications for hydrological interpretations of plant biomarker D/H ratios in modern and ancient deposits.