



## Molecular proxies in soil science research

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All organisms contain unique combinations of organic compounds and as such, each may provide a unique input of organic matter into soils during the lifetime of the organism and after its demise. Under normal environmental conditions, a large proportion of this organic matter is rapidly degraded. However, in most cases a proportion of more persistent components remain extant within the soil. When organic molecules persist, either wholly or as a recognizable transformation product, they can serve as molecular proxies (or biomarkers) for identifying previous inputs of organic matter and various biogeochemical processes stimulated by such inputs. Furthermore, such biomarkers may serve as an aid to reconstructions of paleo-vegetation and -climate and/or archaeological activities/land-use. At the same time the input differentiation and biogeochemical transformation of organic molecules helps elucidate past and present environmental conditions and shed light on carbon cycling in soils. The last decades have seen a rapidly increasing application of molecular proxies in soil science in the identified areas; amongst others because of the availability of increasingly sophisticated analytical tools. Compound specific determination of  $^{13}\text{C}$  and  $^{14}\text{C}$  signatures as well as new computational methods to unravel mixed biomarker signals into their most likely sources of origin are examples of such tools. In this presentation, important recent developments in the application of molecular proxies in soil science research will be highlighted.