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Suitability and reliability of isotopic biogeochemistry studies in paleoclimatology: focus on protocols.

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Since the beginning of the 1990's, isotopic organic geochemistry studies on sediment are more and more common to access to paleoclimatic and paleoenvironmental information. These studies are performed as well on soil, paleosol, lacustrine, marine as loess total organic carbon and δ^{13}Corg fluctuations, even very slight, are interpreted in terms of changes in paleoenvironment. If some studies take into account a possible isotopic distortion resulting from organic matter degradation and/or samples storage, so far no studies aim to characterize impact on isotopic signature of the chemical treatment applied prior physical measurement. Amounts of protocols are present in literature, from mild to highly drastic. Few seem to be adapted to the samples specificity: mature or early degraded organic carbon, carbon rich or poor sediment, wet or dry sediment, ...

Here we present influence of drying, storage, handling and chemical conditions on isotopic composition of modern temperate soil (A-Horizon, early diagenesis, 0.7%wt organic carbon) and of typical glacial loess (mature organic carbon, 0.1%wt organic carbon). The distortion resulting of inadequate procedure on the original isotopic signature is shown as potentially be as high as 0.75 ‰!

After an exhaustive review of the different impacting factors effects and considering biogeochemistry fundamentals, we discuss their origin and consequently propose a way to adapt protocols to samples specificities.