Preservation of terrestrial plant biomarkers from Nachukui Formation sediments and their viability for stable isotope analysis

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Plio-Pleistocene sedimentary records from the Turkana Basin in eastern Africa provide a unique opportunity to compare a high-resolution record of climate and terrestrial vegetation with important changes in the record of human evolution. Molecular biomarkers from terrestrial vegetation can yield stable isotope ratios of hydrogen and carbon that reflect ancient climate and vegetation. However, the preservation of long-chain plant wax biomarkers in these paleosol, fluvial, and lacustrine sediments is not known, and this preservation must be studied to establish their utility for molecular stable isotope studies. We investigated leaf wax biomarkers in Nachukui Formation sediments deposited between 2.3 and 1.7 Ma to assess biomarker preservation. We analyzed *n*-alkane and *n*-alkanoic acid concentrations and, where suitable, molecular carbon and hydrogen isotope ratios. Molecular abundance distributions show a great deal of variance in biomarker preservation and plant-type source as indicated by the carbon preference index and average chain length. This variation suggests that some samples are suitable for isotopic analysis, while other samples lack primary terrestrial plant biomarker signatures. The biomarker signal in many samples contains significant additional material from unidentified sources. For example, the *n*-alkane distributions contain an unresolved complex mixture underlying the short and mid-chain *n*-alkanes. Samples from lacustrine intervals include long-chain diacids, hydroxy acids and (w-1) ketoacids that suggest degradation of the original acids. Degradation of poorly preserved samples and the addition of non-terrestrial plant biomarkers may originate from a number of processes including forest fire or microbial alteration. Isotopic analysis of well-preserved terrestrial plant biomarkers will be presented along with examples where the original biomarker distribution has been altered.