Terrestrial paleoecology from stable isotope analysis of leaf wax n-alkanes in East African Paleosols

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Abstract. Stable isotope analysis of molecular biomarkers (e.g., leaf wax *n*-alkanes) derived from terrestrial plants is a widely used proxy in lacustrine and marine sediments. This study aims to extend the application of the method to fossil soils, or paleosols, from a continuous record of predominantly fluvial sediments in the Omo-Turkana Basin in East Africa. Isotopic records from paleosols differ from those in lacustrine and marine sediments because the majority of biomarkers in paleosols are thought to accumulate *in situ* as soils develop, thus circumventing the longstanding issue of uncertainty in biomarker provenance in sediments from marine and large lacustrine basins. The paleosol biomarker record will elucidate changes in vegetation and hydroclimate based on $\delta^{13}C$ and δD data, respectively, from approximately 3.5 to 1.0 Ma. This interval encompasses key periods of faunal turnover, including within hominin genera, such as the demise of *Australopithecus*, and the rise of *Paranthropus* and *Homo*. Robust local paleoenvironmental proxies are requisites to addressing the question "Did climate change and climate variability affect human evolution?" Biomarker $\delta^{13}C$ data will be used to determine the relative proportion of C_3 trees, shrubs, and herbaceous vegetation to C4 grasses present on the landscape throughout the record. The δD data from *n*-alkanes reflects soil water δD values and by extension, that of precipitation. Importantly, biomarker $\delta^{13}C$ data can be compared to pedogenic carbonate $\delta^{13}C$ data from the same locality, which are currently one of the main paleovegetation proxies utilized in East Africa, to test for consilience between the two isotopic proxies.