Paleoenvironmental reconstructions from biomarkers in fluvial-lacustrine sediments in eastern Africa

KEVIN T. UNO[1], PRATIGYA J. POLISSAR[1], RAYMONDE BONNEFILLE[2] AND PETER DEMENOCAL[1]

[1]Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY 10964, USA
[2]CEREGE, Aix-en-Provence, France

Biomarker stable isotope records from marine and lacustrine records have made significant contribtutions to our understanding of climate and vegetation change in eastern Africa during the late Neogene. A critical advance in biomarker-based paleoclimate reconstructions will be to generate isotopic records from hominin fossil localities in eastern Africa. Most localities are comprised of fluvial-lacustrine sediments, including abundant paleosols, that lithologically differ from previous biomarker study sites[1,2]. We extracted soluble lipids from Plio-Pliestocene paleosols to evalaute the distribution, concentrations, and preservation of *n*-alkanes and *n*-alkanoic acids and their utility for carbon and hydrogen isotopic analysis.

Both compound classes are preserved in paleosols and yield molecular distributions suggesting good preservation of long-chain terrestrial plant biomarkers in nearly all samples. Concentrations vary considerably based on lithology and compound class and are generally higher in lacustrine than in fluvial deposits and higher in *n*-alkanoic acids than in *n*-alkanes. The *n*-alkane bearing aliphatic fraction is often characterized by a large short-chain unresolved complex mixture.

Preliminary $\delta^{13}C$ data from *n*-alkanes and *n*-alkanoic acids in Shungura Formation sediments from the Turkana Basin range from -28.3 to -23.3‰ (nC31) and from -32.0 to -22.2‰ (nC30), respectively. The $\delta^{13}C$ data indicate significant C4 grasses on the landscape by 3 Ma, which contrast with existing soil carbonate $\delta^{13}C$ records from the Shungura Formation indicating a C3-dominated ecosystem through 1.8 Ma. Future work will focus on understanding the differences between the two isotopic proxies for vegetation.

[1] Feakins, S. J. *et al* Northeast African vegetation change over 12 my. *Geology* **41**, 295-298 (2013) [2] Magill, C. R., Ashley, G. M. & Freeman, K. H. Ecosystem variability and early human habitats in eastern Africa. *Proceedings of the National Academy of Sciences* **110**, 1167-1174 (2013)