

LOI analysis of three HSPDP drill core sites in Kenya and Ethiopia with implications of paleoclimate and paleoenvironmental forcing on early hominins.

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The Hominin Sites and Paleolakes Drilling Project (HSPDP) is an international collaboration whose goal is to collect drill cores from paleolake beds in an attempt to improve our understanding of the paleoclimatic and paleoenvironmental context of human origins in Africa during the Plio-Pleistocene. Using cores collected on the west side of Lake Turkana (northern Kenya-WTK), Tugen Hills/ Baringo Basin of central Kenya (BTB), and the northern Awash region of Ethiopia (NAO) we analyzed total organic carbon (TOC) and inorganic carbon (TIC) from sediment drill cores utilizing the Loss On Ignition (LOI) method. In combination with multi-sensor core logging (MSCL), and lithostratigraphic data this will provide a context for understanding controls on TOC/TIC records to understand the paleoenvironmental and paleoclimate history within each region.

Cores were sampled every 64cm to a depth of 215m for WTK (covering the interval ~2.0-1.4Ma) 227m for BTB (~3.4-2.5Ma) and 187m for NAO (~3.4-2.9Ma). In the WTK core site we observe a large decrease in TOC from 139m to 0m correlating with a large increase in magnetic susceptibility (MS) indicative of an increasing supply of terrigenous sediments. High TIC throughout the lacustrine interval results from abundant shelly material deposited under high pH conditions. Current data suggest a transition from a generally deeper lacustrine phase to a regressive shallow interval as the region became more arid. The BTB LOI record shows high and invariant MS and gamma density values in the lower portion of the core, indicative of a fluvial or alluvial dominated system transitioning into a more variable system with lower overall gamma density and MS. Variability in the top half of the core shows a correlation between insolation and diatomite intervals suggesting an influence of astronomical forcing (Kingston et al, 2007). The northern Awash LOI data suggests a persistent lake from 138MBS to 173MBS. The top third of the core shows an increase in variable TOC/TIC indicating floodplains and anoxic marshes. The BTB and NAO cores show increased variability after ~3Ma.