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An Early Pleistocene high-resolution paleoclimate reconstruction from the West Turkana (Kenya) HSPDP drill site

Mona Stockhecke (1), Catherine Beck (2), Erik T. Brown (1), Andrew Cohen (3), Daniel M. Deocampo (4), Craig S. Feibel (5), Jon D. Pelletier (3), Nathane M. Rabideaux (4), and Mark Sier (6)

(1) University of Minnesota Duluth, Large Lakes Observatory (LLO), Duluth, USA (mstockhe@d.umn.edu), (2) Hamilton College, Clinton, NY, USA, (3) University of Arizona, Tucson, AZ, USA, (4) Georgia State University, Atlanta, GA, USA, (5) Rutgers University, New Brunswick, New Jersey, USA, (6) Utrecht University, The Netherlands

The Hominin Sites and Paleolakes Drilling Project (HSPDP), and the related Olorgesailie Drilling Project (ODP), recovered ~2 km of drill core since 2012. At the HSPDP West Turkana Kaitio (WTK) site a 216 m-long core that covers the Early Pleistocene time window (1.3 to 1.87 Ma) during which hominids first expanded out of Africa and marine records document reorganization of tropical climate and the development of the strong Walker circulation. WTK carries particular interest for paleoclimate and paleoenvironmental reconstructions as it is located only 2.5 km from the location of one of the most complete hominin skeletons ever recovered (Nariokotome Boy).

XRF core scanning data provide a means of evaluating records of past environmental conditions continuously and at high resolution. However, the record contains complex lithologies reflecting repeated episodes of inundation and desiccation along a dynamic lake margin. Here we present a methodological approach to address the highly variable lithostratigraphy of the East African records to establish comprehensive paleoclimate timeseries. The power spectrum of the presented hydroclimate record peaks at Milankovitch cycles, qualifying HSPDP drill cores from the Turkana Basin to be used as high-resolution Early Pleistocene paleoclimate archive. Comparing these data with marine climate reconstructions sheds light into athmospheric processes and continental climate dynamics.