High-resolution environmental record of the Acheulean-to-Middle Stone Age transition in the southern Kenya rift. African Quaternary Association Meeting, Nairobi, Kenya, 14-22 July 2018

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Environmental drivers of African hominin evolution may include heightened aridity, intensified moisture, or changes in habitat variability. Establishing a direct impact of environment on evolution demands highresolution climatic and ecological evidence that precisely connects local change in landscapes and biota with potential selective benefits and costs of novel hominin behaviors. The 2012 Olorgesailie Drilling Project recovered 216 m of sediment from two drill sites located 22-24 km from outcrops documenting the oldest well-calibrated replacement of the Acheulean by Middle Stone Age (MSA) innovations in eastern Africa, associated with an ~85% turnover in mammalian taxa. 40Ar/39Ar dates and the BM magnetic reversal are the basis for a 1-cmscale Bayesian age model for the 166-m-long core designated OLO12-1A. Although missing in nearby outcrops, the interval ~500-320 ka provides an especially high-resolution record of diverse lithologies, diatom assemblages, plant phytoliths, stable isotopes, and other measured environmental proxies during the evolutionary transition. Regional demise of the Acheulean, development of the MSA by at least ~320-305 ka, and the faunal shift took place following a marked change at ~400 ka in the drill core record from generally deep freshwater lake phases with infrequent desiccation, to highly variable lake levels and frequent, shortduration dry episodes. Grass expansion and intensified variability are also documented in the drill core and in outcrop and faunal records of the Olorgesailie Basin by 325-250 ka. The sediment core data point to (1) reliable freshwater supply 1 Ma to 490 ka when Acheulean hominins occupied the region, and (2) increasingly unreliable freshwater availability and frequent dry episodes 470-90 ka, as MSA innovations took root. MSA behavioral strategies are hypothesized to have succeeded in the southern Kenya rift in response to habitat/resource unpredictability and episodes of resource scarcity favoring wider hominin ranges, technological change, and social networking and communication.