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Geoarchaeology of the Douglas Korongo East and Bell's Korongo East Sites, Olduvai Gorge: Preliminary results

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Douglas Korongo East (DKE) is located east of the junction, between the Third and Fourth Faults in Olduvai Gorge, Tanzania. DKE's exposed cultural and faunal material-bearing strata lie between the Bed I basalt (2.0 Ma) and Tuff I B (1.86 Ma). Previous excavation by Mary Leakey revealed a wealth of fossils, stone tools, and debitage in these sediments, including Oldowan tools and some *Homo habilis* remains [1]. Hay originally described the sediments making up the DK site as a series of four tuffs: the lowermost a mixed silt-clay-tuff, the middle two clayey tuffs, and the uppermost a tuff inter-lensed with brown clay [2]. Bell's Korongo East (BKE) is located west of the junction in Bed II deposits overlying Tuff II D. Hay noted the Leakeys' discovery of faunal remains, cultural artifacts, and hominin teeth at BK, and described the deposits as sandy channel-fill incising siliceous clay and siltstone [2]. More recent work at the BK main site uncovered *Paranthropus boisei* remains in the channel fill dating to 1.34 Ma [3].

Our current work at DKE and BKE in concert with The Olduvai Paleoanthropology and Paleoecology Project (TOPPP) has exposed deposits east of the main DK and BK sites. At DKE detailed study of two exposures 50 m apart confirms the presence of multiple tuffs and reveals a complex history of aggradation and landscape stability. Some thinner deposits are discontinuous over this scale, while some thicker deposits host paleosols that may be continuous throughout the site. These paleosols have well-developed blocky structure and host large concentrations of fossils. Overall the DKE locality appears to have been the locus of periodic volcanic ash and pyroclastic material deposition and subsequent pedogenesis, hosting a series of productive landscapes through time, and forming a set of andisols. At BKE detailed study of four exposures confirms previous descriptions of the site materials, with faunal remains in coarse fluvial deposits adjacent to siliceous siltstones that are free of cultural or faunal remains. Siltstones do show bedding and may be tuffaceous sediments, re-deposited ash-falls. Channel-fill is complex on the fine scale, featuring cross-bedding, density sorting, and carbonate rip-up clasts. These deposits indicate variable high-velocity water flow that would have attracted animals. Channels were active but contain what appear to be discontinuous pedogenetic lenses.

Profile descriptions include assessment of grain size classes, color, horizonation, and structure. We are currently analyzing profile samples with regard to pH, mineralogy, micromorphology, and ion content. Following assessment of overall site formation processes and artifact matrices, investigation of the continuity of tuffs and paleosols at DKE, and of channel-fill deposits at BKE may enable mapping of paleolandscape surfaces that would have been available to hominin populations. Additionally, dating and correlation of interbedded tuffs and tuffaceous sediments would narrow the ages of individual deposits and potential paleolandscapes at DKE and BKE.

References:

- [1] Leakey MD (1971) *Olduvai Gorge: Vol 3*: Cambridge University Press.
- [2] Hay RL (1976) *Geology of the Olduvai Gorge*: University of California Press.
- [3] Domínguez-Rodrigo M et al. (2013) PLOS One 8(12): e80347.

