MASTER'S THESIS

Sedimentology and palaeoenvironments of late Pleistocene tufas, western Olorgesailie, southern Kenya

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ABSTRACT

Sediments in western Olorgesailie (southern Kenya Rift Valley) contain several types of tufa and travertine deposits of late Pleistocene age (220,000–493,000 years old). These deposits rest on the well-studied Olorgesailie Formation and formed various types of tufa and travertine according to their locations. Three sites, namely, the Meandering Tufa, Tufa Plateau and Tufa Ridge Sites, are variously comprised of massive, bedded, and laminated to stromatolitic tufa and/or travertine, diatomaceous silts, gravels and sands. The contrasting types of tufa suggest variations in the biology, water temperature, water composition and flow related factors (velocity, depth & path). Stratigraphic analysis, petrography; XRD, SEM studies, stable isotope and fossil remains (diatoms, gastropods, ostracods) reveal that tufa was formed in fluvial environments, with multi-spring sources; successions of pools that formed behind arcuate rimstone dams; ponds, locations near fissures and at spring vents. Faulting controlled many of the spring locations. $\delta^{18}O$ and $\delta^{13}C$ ratios show no major trends between the three sites, however, $\delta^{18}O$ values are most enriched at the Tufa Ridge Site, suggesting stronger evaporation and perhaps hotter water conditions. Meanwhile, $\delta^{18}O$ values at the Meandering Tufa Site do not show any downstream enrichment trend, possibily related to decreasing residence time or addition of spring water from multiple spring sources along the palaeostream.

Diatom assemblages from the three sites are characterized by fresh to mildly saline species. The more dominant taxa include: *Epithemia adnata, E. argus, Rhopalodia gibberula, Synedra ulna* and *Nitzschia amphibia*. In particular, *Encyonema muelleri* is abundant in Meandering Tufa and Tufa Ridge samples, and *Gomphonema parvulum* is common as well. These taxa indicate shallow freshwater conditions with common macrophytes.

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