

A Mineralogical and Geochemical Analysis of Bed I in Olduvai Gorge, Tanzania

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Olduvai Gorge is located in northern Tanzania (3°S, 35.35°E) on the Serengeti Plain and on the margin of the East Africa Rift System. Seventy-nine sediment samples were collected during the 2015 field season from a 6-meter high section of lacustrine sediment (~1.9-1.86 Ma). Samples were collected at ~15 cm intervals from 50 cm to 580 cm. The purpose of these analyses are to determine the chemistry of clay minerals and whether, or not, authigenic clays can be used as paleoenvironmental proxies. Bulk mineralogy was obtained by XRD analyses of random-oriented powder. Samples were analyzed for 15 minutes from 10 to 65 degrees 2 θ . An abundance of K feldspars were found and a few samples contained zeolites (phillipsite). Calcite is common, whereas dolomite is rare. XRD analyses of oriented clays were conducted on additional Bed I sediments, located ~ 300 meters to the east. The samples were analyzed air-dried and ethylene glycol solvated from 3 to 45 degrees 2 θ for 15 minutes in order to identify the major clay mineral phases. Previous work has shown that the major clay phases are authigenic illite, smectite and illite/smectite. Preliminary results from this study are consistent with these findings. Samples were also analyzed from 59 to 63 degrees 2 θ for 30 minutes. The 060 peak positions varied from 1.510 Å to 1.522 Å. This likely corresponds to variations in octahedral Mg from 1.5 to 2.5 atoms per half formula unit. This variation in Mg suggests fluctuation in salinity of paleo Lake Olduvai over the ~35 kyr period represented by the ~5 m thick lake section. To conclude, preliminary results do suggest that clay chemistry and authigenic clay minerals can be used as paleoenvironmental proxies.