Miocene Rift Initiation Signal in Lake Tanganyika

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The East African Rift (EAR) is commonly cited as a modern analog for early stages of continental rifting. Lake Tanganyika lies within the magma-poor western branch of the EAR. The modern Tanganyika rift consists of discrete normal faults that alternate facing direction down the rift axis, with footwall relief that exceeds 2.5 km and subsided hanging wall basins with > 5 km of sediment fill. However, the age of rift-related uplift and subsidence along Lake Tanganyika is poorly constrained and mostly derived from the basin-fill thickness that is dependent upon assumptions of long-term rates of sediment accumulation. Low-temperature thermochronology has long been used to establish timing and magnitudes of exhumation in extensional tectonic systems. Previous studies have applied low-temperature thermochronology in other rift segments of the western branch (Rwenzori Mountains, Uganda, and Lake Malawi, country), but no studies have included the footwall uplifts of Lake Tanganyika. Here, we present apatite fission-track (AFT) analyses were applied to riverine detritus along three different footwall uplifts of the Tanganyika rift axis, to establish the timing of normal faulting. Our detrital samples yield a broad range of single-grain AFT ages (XX – YY Ma) along the axis of the lake. The youngest segment is found in the central region and yields a clear Miocene (~13 Ma) AFT age population. Our northern and southern samples display yield Triassic (~227 Ma) and Pennsylvanian (~327 Ma) AFT ages, respectfully. The Miocene AFT age population (~13 Ma) in central Lake Tanganyika are consistent with previous interpretations of Miocene rift initiation derived from local basin-fill and basement AFT ages from the Albertine Rift to the north and Lake Malawi Rift to the south. However, the northern and southern samples preserve older AFT populations that could reflect erosion of a previously exhumed partial annealing zone and suggest propagation of rifting from the center to the margins along the axis of the lake.