Environmental Controls on Shell-Rich Facies in Tropical Lacustrine Rifts: A View From Lake Tanganyika's Littoral

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Abstract

Lake Tanganyika, the world's largest tropical rift lake, is unique among its counterparts in East Africa for the remarkable diversity of mollusk-rich sediments in its littoral zone. Molluscan shell beds are, however, a common feature of ancient lacustrine rift deposits and thus a better understanding of their spatial and temporal development is important. Targeted surveys across the littoral region of the Kigoma Basin reveal three surficial shell-rich facies that differ widely in depositional style and geometry. A unifying characteristic of these deposits is the volume of shells of Neothauma tanganyicense, a large, viviparous gastropod endemic to the lake. Reservoir-corrected radiocarbon dating indicates that Neothauma deposits in these surficial sediments are time averaged over at least the last ~1600 calendar years BP. Preservation of fossilNeothauma shells in the littoral zone depends on both environmental conditions and on post-mortem shell modifications. Interaction between shells and mobile siliciclastic grains, facilitated by wave action and storms, represents a particularly destructive taphonomic process in the study area. Rank scoring of damage to Neothauma suggests that stromatolitic encrustations or early calcite coatings may help mitigate shell destruction caused by hydraulic fragmentation and abrasion. Persistence of Neothauma in littoral beds has important implications for the structuring of specialized communities of shallow-water benthos, as well as for improving analog models for hydrocarbon reservoirs in lacustrine carbonates.