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New Structural Data Constraining the Kinematic Evolution of the Kalya Ridge, Slope and Platform, Lake Tanganyika Rift Basin, East Africa

The Nyanza Project, an NSF-supported training program, conducted bathymetric surveys in 2000 and 2001 of the Kalya Ridge (Horst Block) and Platform/Slope. The NW-SE trending ridge, located in the Southern Lake Tanganyika Rift Basin, forms the northern extent of the previously described Moba high-relief accommodation zone. The ridge trends parallel to the Precambrian Mahale Mountains, dips northward, and is segmented into a series of en-echelon faulted blocks stepping to the northwest, with decreasing offsets from 3 to 0.5 km.

On the slope and platform, uplifted blocks are expressed as a series of alternating smaller horsts and full-grabens. Bordering fault planes are 10 km long and have symmetrical, lens-shaped profiles with greatest offset at the center.

The Sibwesa Strike-Slip Zone (SSSZ) contains ENE-WSW-trending, sinistral transform faults crossing the rift axis perpendicularly. These faults traverse the Kalya region, consistently displacing the slope and platform fault segments by 5 to 7 km. Relay ramps form where offsets are small within overlapping fault zones. Within these relatively low-relief areas, sub-surface canyons are evident. In between the NW-SE faults and atop tilted blocks, pull-apart-type basins are formed.

The structural response to pre-rift basement grid reactivation depends in part on the type of structure formed during rifting. In the SSSZ, the northern transform faults offset the alternating horst/graben structures by a constant amount. Conversely, the en-echelon faulted blocks are decreasingly offset to the northwest. Therefore, one must take into consideration the type of tectonic structure when trying to understand and map fault reactivation in extensional settings.