Neogene-Holocene rift propagation in central Tanzania: Morphostructural and aeromagnetic evidence from the Kilombero area

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Abstract

Based on field studies supplemented by remote sensing and aeromagnetic data from central Tanzania, a Phanerozoic structural history for the region can be developed and placed in a broader rift context. The major contribution of this work is the recognition of rift morphology over an area lying 400 km beyond the southern termination of the Eastern, or Kenya, Rift. The most prominent rift structures occur in the Kilombero region and consist of a wide range of uplifted basement blocks fringed to the west by an east-facing half-graben that may contain 6–8 km of sedimentary strata. Physiographic features and river drainage anomalies suggest that Holocene/Neogene deformation occurs along both rift-parallel and transverse faults, in agreement with the seismogenic character of a number of oblique faults. The present-day rift pattern of the Kilombero extensional province results from the complete overprinting of an earlier (Karoo) rift basin by Neogene- Holocene faults. The Kilombero rift zone is assumed to connect northward into the central rift arm (Manyara) of the Eastern Rift via an active transverse fault zone. The proposed rift model implies that incipient rifting propagates throughout the cold and strong lithosphere of central Tanzania following Proterozoic basement weakness zones (N140°E) and earlier Karoo rift structures (north-south). An eventual structural connection of the Kilombero rift zone with the Lake Malawi rift further south is also envisaged and should imply the spatial link of the eastern and western branches of the East African Rift System south of the Tanzanian craton.