

Structural Evolution and Basin Development of the Rukwa Rift Basin, Southwest Tanzania

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The Rukwa rift basin is situated in southwest Tanzania and lies within the Western Branch of the East African Rift System (EARS). The main debate over the years relate to the opening dynamics of the rift and its significance to the evolution of the EARS. Two main models have been proposed in many studies: (a) an orthogonal to oblique-slip rift basin and (b) a strike-slip to oblique-slip pull apart basin. This study utilizes recently acquired, high resolution shallow infill grid seismic data combined with vintage seismic to evaluate and propose the extension direction under which the Rukwa rift was formed. The main control on sedimentation and depocentre distribution in the rift is the southwest dipping Lupa border fault, a Karroo-aged fault following the inherited trend of the Palaeoproterozoic Ubendian fabric. Subsequent reactivation of the border fault led to the deposition of the Karroo Supergroup during the Late Carboniferous-Permian, the Red Sandstone Group during the Cretaceous-Palaeogene and the Lake Beds

Sequence in the Late Cenozoic relating to the EARS. The basin geometry of the Rukwa rift varies considerably along-strike. To the southeast, a classic half graben geometry exists with overall thickening of sediments onto the Lupa fault and deposition concentrated in a narrow zone adjacent to the border fault. To the northwest, the basin widens with relatively shallow dipping beds dipping to the southeast towards the Lupa fault and thins onto the margin to the northwest, forming a full graben geometry. The central portion forms a transfer zone where displacement is accommodated by high frequency synthetic and antithetic faults as well as flower structures adjacent to the border fault. It is suggested that initial rift development occurred under orthogonal rifting from the Karroo (Late Carboniferous) to early Tertiary. The rift continued to develop in a pure extensional setting during the Late Cenozoic; however experienced a late stage localized dextral strike slip deformation.