



The role of pre-existing Precambrian lithospheric structures in the development of Rukwa Rift basin in the Western Branch of East African Rift System, SW Tanzania

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Continental rifts are inter-connected groups of half-grabens bordered by steep escarpments formed by border fault displacement. They often follow the pre-existing zones of weakness and/or tectonic boundaries diverging around the craton. In some areas it has been observed that border fault segmentation and rift basin asymmetry shows little or no correlation with basement structures, raising the possibility that continental rift development may in some cases at least be linked to deeper-seated lithospheric structures. The influence of pre-existing/inherited lithospheric structure remains a question for study in unravelling the evolution of continental rifts.

The Rukwa Rift Basin is a northwest trending half-graben developed along the trend of the Paleoproterozoic Ubendian belt in southwest Tanzania. This belt is a linear, NW-SE trending orogenic belt in western Tanzania. It is part of a larger Paleoproterozoic orogenic belt, developed around the west and south-western margin of the Archaean Tanzanian craton. This belt is characterised by a consistent NW-trending fabric and by the presence of large shear zones that persist along the whole of the belt. As such, it offers the opportunity to examine the role of pre-existing Precambrian structures on the development of the Rukwa Rift. Digital Elevation Models (DEMs) extracted from Shuttle Radar Topography Mission (SRTM) and aeromagnetic data are used in this study.

The results suggest that the orientation and geometry of Rukwa Rift basin has been influenced by the structural grains of the Paleoproterozoic Ubendian belt. Pre-existing structures within the Paleoproterozoic terrains facilitated the strain localisation within border faults that exploited the existence of inherited lithospheric heterogeneity. The southern border fault of the rift has been influenced by the NW-trending Mugese shear zone (MSZ). This shear zone has prominent NW-trending pre-existing structures in the form of transcurrent shear fabric and zones of Proterozoic cataclasites favouring a strong strain localisation during rifting leading to the development of Ufipa fault as a southern border fault of the rift. South of the Rukwa rift, the Mbeya fault zone develops between the Lupa terrane and the Mbozi block. This fault is parallel to pre-existing mylonitic structures flanking the Mesoproterozoic shallow level sedimentary basin at the southern part of the Rukwa rift. Therefore, aeromagnetic data together with SRTM provide substantial evidence for the role of pre-existing structures in controlling the geometry and development of the Rukwa rift and, accordingly, for continental rifts generally.