

## Cenozoic rifting in the northern Turkana depression (EARS, Kenya): new insights from the Oligocene (28-25 Ma) Ekitale basin

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The tectono-sedimentary evolution of the early phase of continental rifting remains poorly understood as potential related archives lie at deepest part of basins and rarely crop out at the surface. Yet, improving our comprehension of this evolution is essential first to constrain modes and timing of early extensional phase and second in term of potential resources.

The Turkana Depression is a rift system active since the Paleogene, which makes the connection between the Kenyan Rift Valley and the Main Ethiopian Rift. The southern Turkana Depression is a wide rift system consisting of four asymmetrical and juxtaposed grabens while the northern Turkana Depression is a narrow rift system in the form of a single asymmetrical graben. This contribution emphasizes on the early stage of the Cenozoic rifting in the northern Turkana Depression through the presentation of the Oligocene Ekitale Basin. Based on the investigation of the Ekitale basin, a new phase in the rift evolution is documented, characterized by a period of low extension rate and low differential stress. Subsequently, following stages of the Cenozoic rifting are also presented providing an example of evolution of a narrow rift system from pre-rift conditions to the development of mature continental grabens and half-grabens.

In details, four main rifting stages are identified. Between 28 and 25 Ma, a first extensional pulse was characterized by the development of non-optimal (regarding the E-W direction of extension) syn-rift basins – one of them is the Ekitale basin - due to the reactivation of pre-existing non optimal structures. Between 25 and 14 Ma, a relative tectonic quiescence led to the development of a significant weathering profile. From 14 Ma, a second extensional pulse created a large N-S oriented half graben referred to as the North Lake Basin. Eventually, the North Lake Basin was then segmented into two sub-basins prior to 4.2 Ma. And the resulting internal sub-basin became later the only active depocenter after 0.7 Ma. Finally, the Ekitale Basin represents the earliest expression of deformation associated with the Cenozoic rifting in the northern Turkana Depression. This field-based investigation dedicated to a recently identified basin provides valuable new results for refining models of early stage of continental rifting.

Further reading:

Ragon T. et al. 2018. Geological Journal, <https://doi.org/10.1002/gj.3339>