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# Spatial and Temporal Deformation of a Lake Malawi Accommodation Zone: Integration of Dated Scientific Drill Cores and Seismic Data

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## Introduction

The Lake Malawi Rift is located in the southern extension of the western arm of the East Africa Rift System (Figure 1a). At its northern end, this system contains the Albertine Graben (Figure 1a), where a large hydrocarbon province was recently discovered.

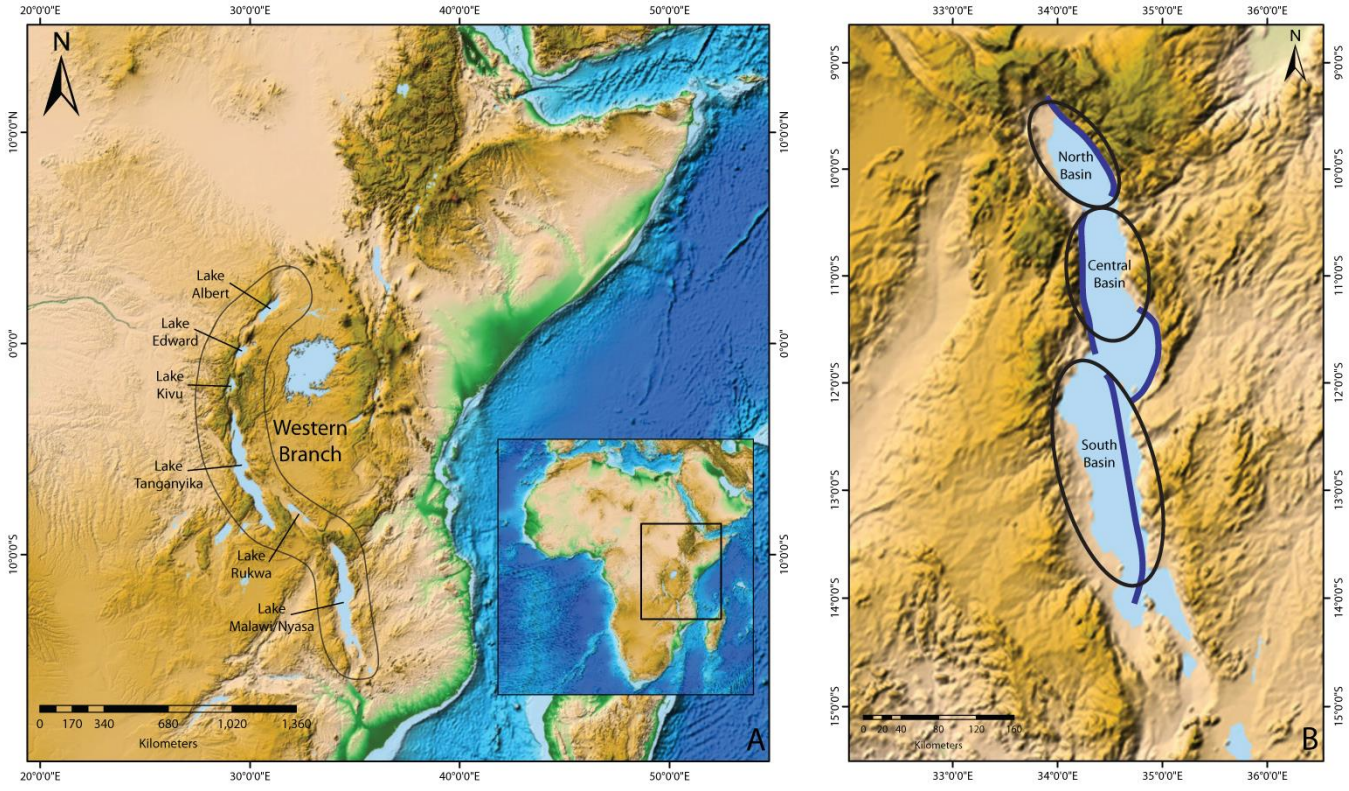


**Figure 1: ETOPO1 1 Arc-Minute global relief maps (Amante and Eakins, 2009) (A) The western branch of the East African Rift System. Lake Albert, at the north end of the branch, is in the Albertine Graben. Lake Malawi is in the south. (B) Lake Malawi, with the three principle half-graben basins circled (border faults in blue).**

## Method

Three vintages of seismic data have been collected in Lake Malawi. Project PROBE (1980s) collected low-resolution, high-penetration multi-channel seismic (6 second records). The Central Basin was the focus of a series of nested single-channel seismic surveys in the 1990s. In 2001 4-second multi-channel seismic with moderate resolution was acquired.

The single-channel data, collected using a small air gun with a bandwidth of 50-500Hz, is higher resolution and has greater fidelity than the multi-channel seismic acquired in the same region. An integrated interpretation of the single-channel seismic and the Project PROBE seismic is presented here.

## Discussion

Structural domains can be identified both laterally and temporally in the migrated single-channel seismic. On the hanging wall of the Central Basin border fault is a segmented accommodation zone characterized by a network of shallow synthetic and antithetic faults. This accommodation zone was uplifted in the last 50000 years; it is bounded to the northwest by a single fault and to the southeast by several linear fault segments. A rotated block beneath these faults is evidence for faulting that occurred over one million years ago.

The flanks of the accommodation zone contain a basin-fill facies (Lyons et al., 2011). Deformation on the northwest flank is associated with mud diapirs that have appeared in the last 50000 years. The southeast flank contains several faults but no apparent diapirs.

## Conclusions

The faults in the accommodation zone have a complex geometry; understanding their evolution is key to understanding the inception, subsidence, and propagation of continental rifts. New information from an actively deforming accommodation zone will help constrain an important part of rift basin petroleum systems.

#### References

Amante, C., and Eakins, B., 2009, ETOPO1 1 Arc-Minute Global Relief Model: Procedures, Data Sources and Analysis.: NOAA Technical Memorandum NESDIS NGDC-24,, p. 19pp.

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