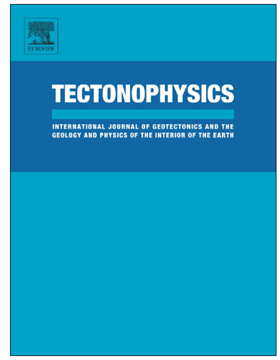

Kinematic evolution of a regional-scale gravity-driven deepwater fold-and-thrust belt: The Lamu Basin case-history (East Africa)

F. Cruciani, M.R. Barchi, H.A. Koyi, M. Porreca

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Kinematic evolution of a regional-scale gravity-driven deepwater fold-and-thrust belt: the Lamu Basin case-history (East Africa)

F. Cruciani[a], M.R. Barchi[a], H.A. Koyi[b], M. Porreca[a]

[a] *Department of Physics and Geology, Perugia University, I-06123 Perugia, Italy*

[b] *Department of Earth Sciences, Uppsala University, SE-752 36 Uppsala, Sweden*

Corresponding author: Francesco Cruciani, email francesco.cruciani1985@gmail.com

Highlights:

- Bulk shortening varies from 48 km to the north to 13 km to the south of the basin
- Percentage shortening of ca. 20% is similar to the other gravity-driven thrust belts
- The higher percentage shortening occurs at the down-dip outer part of the belt
- Shortening rate reached the maximum value of 5 mm/yr during Paleocene
- Fold wavelength and the stratigraphic thickness are positively correlated

Abstract

The deepwater fold-and-thrust belts (DWFTBs) are geological structures recently explored thanks to advances in offshore seismic imaging by oil industry.

In this study we present a kinematic analysis based on three balanced cross-sections of depth-converted, 2-D seismic profiles along the offshore Lamu Basin (East African passive margin). This margin is characterized by a regional-scale DWFTB (more than 450 km long), which is the product of gravity-driven contraction on the shelf that exhibits complex structural styles and differing amount of shortening along strike.

Net shortening is up to 48 km in the northern wider part of the fold-and-thrust belt (≈ 180 km), diminishing to less than 15 km toward the south, where the belt is markedly narrower (≈ 50 km). The three balanced profiles show a shortening percentage around 20% (comparable with the maximum values documented in other gravity-driven DWFTBs), with a significant variability along dip: higher values are achieved in the outer (i.e. down-dip) portion of the system, dominated by basinward-verging, imbricate thrust sheets. Fold wavelength increases landward, where doubly-verging structures and symmetric detachment folds accommodate a lower amount of shortening.