Offshore Tanzania: Regional Seismic Perspectives on Exploration Opportunities

Introduction

For the first time, a comprehensive regional dataset encompassing offshore Tanzania has become available (Figure 1). Analysis of this dataset provides fresh perspectives on undeveloped gas fields discovered during the mid-2010s and highlights additional opportunities within Palaeogene and Cretaceous deep-water marine sandstone reservoirs. Furthermore, the data enable assessment of higher-risk, frontier plays that remain largely untested. This evaluation draws on an extensive collection of legacy 2D and 3D seismic surveys of varying vintages, totalling approximately 53,000 km of 2D lines and 27,300 km² of 3D coverage, supplemented by data from six offshore wells (Figure 1).

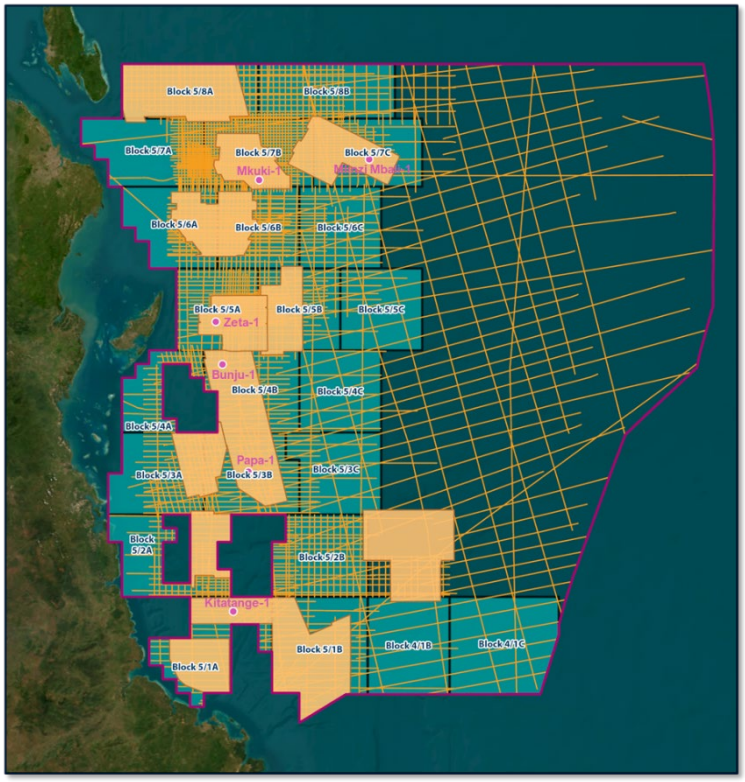

Figure 1: *Regional seismic and well coverage used in this study, including proposed block outlines for Tanzania's 5th License Round.*

Tectonic Evolution of the Tanzanian Margin

The offshore Tanzanian margin originated as a transform boundary during the separation of Madagascar from the African Plate. Its evolution can be divided into three principal stages:

Karoo Rifting Phase – Characterised by northeast–southwest trending basins formed through intracontinental rifting, accompanied by volcanism and deposition of fluvial, deltaic, lacustrine, and restricted marine sediments.

Drift Phase – Initiated in the Lower to Mid-Jurassic (183–165 Ma) as seafloor spreading began between Madagascar and Africa, creating the West Somali Oceanic Basin while Madagascar migrated south along the Davie Transform (Davie Fracture Zone). Seafloor spreading continued until the Aptian (~120 Ma), when spreading ceased.

Passive Margin Phase – Following cessation of spreading in the Albian, the margin underwent thermal subsidence, with associated deposition of major Cretaceous deep-water turbidite systems. Subsequent Tertiary uplift of the African continent increased coarse clastic input into the basin.

Exploration History

Exploration offshore Tanzania commenced in 1974 with two wells, resulting in the Songo Songo discovery. Activity remained limited until 2010–2018, when exploration drilling campaigns led by BG (Shell)/Ophir and Equinor yielded numerous gas finds. To date, 46 wells have been drilled, discovering approximately 42 TCF of gas in place (32.3 TCF recoverable) across 19 fields. No exploration drilling has occurred since 2018.

Petroleum System & Plays

Current discoveries are sourced primarily from Lower Jurassic lacustrine and restricted marine shales located beneath the total depth of drilled wells. The region exhibits a high geothermal gradient (~42°C/km), rendering these source rocks highly mature and actively generating gas. All confirmed offshore discoveries occur within Cretaceous, Palaeogene, and Neogene marine sandstones, typically in structural-stratigraphic combination traps. Cretaceous reservoirs comprise amalgamated channels and ponded fan systems, while Palaeogene reservoirs consist of stacked lobes and channel complexes. These gas-charged sandstones exhibit strong AVO anomalies. Source rock candidates include Permo-Triassic (Karoo) syn-rift deposits, Middle and Upper Jurassic restricted marine shales, Cretaceous marine shales, and Eocene–Palaeocene marine shales. Potential reservoir targets include Triassic and Lower Jurassic fluvial-deltaic sandstones, Middle Jurassic shallow marine carbonates and clastics, and Palaeocene–Eocene carbonates.

Summary

The release of this extensive seismic and well dataset marks the first opportunity since the 2010–2018 drilling campaigns to evaluate the entire offshore Tanzanian margin. Interpretation of these data sheds light on the margin's tectonic and depositional history and identifies prospective targets in both established and frontier plays.