Ultra-Deep-Water Somalia: The unexplored, 'final frontier' of the East African Passive Margin.

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Offshore Somalia remains one of the last truly 'frontier' passive margins in the world with seeps known onshore and offshore and only a single exploration well (Meregh-1) (Exxon 1980 (Dry Hole)) drilled offshore, along the entire 3,333 km-long coastal margin.

The collapse of the government in Somalia in 1991 ushered in a period where the entire offshore area remained inaccessible to exploration companies for more than 25 years with most of Somalia's legacy geological and geophysical data was either lost or destroyed.

To reinvigorate exploration, an offshore seismic acquisition of over 20,500 km 2D Multi-Client (MC) seismic was acquired in 2014 for Soma Oil and Gas, with a further 20,000 kms of acquired by *Spectrum Seismic* in 2015. This high quality 2D seismic showed stack reservoir/seals and many trapping styles, supported by surface oil seeps and subsurface AVO anomalies.

In 2020 the Somali Petroleum Law was constituted to provide a stable, long-term legal and regulatory framework and a revised Production Sharing Agreement (PSA) model and Tender Protocol was also designed to encourage exploration. Liberty Petroleum through its affiliate companies, PetroQuest Africa 1 & 2 under the 2020 Petroleum Law was awarded three offshore blocks in Q4 2023, with PSAs for the three blocks (131, 190 and 206) ratified in Q1 2024.

Offshore Somalia can be divided into three basins, each defined by their own individual structural regimes: The Obbia Basin in the north, the central Coriole Basin, and the southerly Juba-Lamu Basin.

The *Obbia Basin* comprises approximately 1.5 to 3 km of primarily calcareous mudstone that overlies numerous large Jurassic 'aged' tilted fault block structures, many of which are crowned by highly prospective carbonate bioherms. Both Karoo and Jurassic aged source rocks are likely sources for charging these potentially very large traps.

The *Coriole Basin* is characterized by large scale 'flower-structures' and inversion anticlines with stratigraphic traps present at both Cretaceous and Tertiary levels. All these traps have had prolonged access to oil-rich hydrocarbons generated from Jurassic and Cretaceous source rocks.

The *Juba-Lamu Basin* in the south has the thickest post-rift stratigraphy, up to 12 km. The Cenozoic section is characterized by mobile shales and large gravity slides that have created enormous, stacked toe thrust structures downdip. Thick Cretaceous sequences of basin-floor turbidite fans, drape tilted fault blocks and stacked post-rift mass transport systems are interpreted to be present.

Liberty Petroleum Corporation's (LPC) PSAs for blocks 131, 190 and 206 are sweet spots in all three basins that can be shown to contain strong evidence for extensive 'Play Fairways' (with abundant running room) and stacked Petroleum Systems.

Four source rock intervals in Somalia have been identified: a pre-rift Karoo source of Triassic age; a syn-rift Jurassic source, deposited in rifts formed at the breakup of the Gondwana super-continent, a post-rift early Cretaceous (Albian-Aptian) source and a late Cretaceous (Cenomanian) source rock, with all four source types being deposited during well-known global oceanic anoxia events.

Basin modeling has identified the potential for all four of these source rock systems to be (or have been) mature for oil and gas generation in discrete areas across the Somalian offshore realm.

The compendium of geological data offshore Somalia has revealed 'gigantic' structures in both deep and ultra-Deep water, in a part of the East African Passive Margin not seen in prior exploration. Many structures positively correlate across both potential field and new 2D seismic data.

LPC licensed PSA areas, have; 1) multiple reefal structures that have direct oil productive analogues within the Meso-Tethyan realm of the current Persian Gulf, 2) folded toe thrust anticlines (with AVO anomalies) directly analogous to large hydrocarbon accumulations offshore Mozambique that are currently being developed for LNG export and most interestingly, detached Basin Floor Fans (BFF) interpreted at both the Cretaceous Aptian and Cenomanian level that are directly analogous to the most recent oil discoveries offshore Namibia in the Orange Basin.

This paper will demonstrate how crustal underpinning, mantle morphology and basin architecture, coupled with stacked Petroleum Systems evidenced on high quality seismic data, all come together to make Offshore Somalia one of the world's last remaining final exploration frontiers!