

Offshore Angola: Exploring frontiers and fringes with new and reprocessed seismic

Offshore Angola remains a highly prospective hydrocarbon province, with new seismic data and fiscal incentives driving renewed exploration. From mature deepwater basins to underexplored frontiers, TGS’s recent projects are revealing new opportunities to extend proven play fairways

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ANGOLA’S CONTINENTAL margin hosts rich petroleum systems that have charged prolific reservoirs, creating a province with over 30 Bbbl of recoverable oil. Production, mainly from the Lower Congo Basin, peaked in 2008 at around 2 MMbbl/d and has since declined to 1 MMbbl/d. The offering of negotiable, incentivised terms from ANPG is helping to offset that decline by encouraging near-field and frontier exploration. To assist exploration and better identify new targets across deep and ultra-deepwater settings of the Angolan margin, TGS is acquiring and processing new modern 2D and 3D seismic data, and reprocessing over 45,000 km² of legacy 3D coverage (Figure 1). Fast-Track (FT) products are available now for several projects, with final deliverables due over the coming months.

INVESTMENT GROUNDWORK AND IN-COUNTRY ACTIVITY

In 2018, Angola introduced legislative reforms to boost investor confidence and reverse declining oil production. The reforms simplified block bidding, added incentives for marginal discoveries and near-field exploration, and allowed gas monetisation. ANPG was established in 2019 as the national concessionaire, overseeing the hydrocarbon sector and helping attract further investment. Eight years later, company activity is widespread across all areas of offshore Angola as operators pursue opportunities created by these reforms. Companies active in the deepwater Lower Congo Basin have explored near-field, looking for deeper reservoir systems and proven fairways in alternative trapping geometries to maintain and expand oil production.

Gas exploration and development are fully in focus, with first production recently from the Quiluma-Maboqueiro fields, and success through the first dedicated gas exploration well in the country, Gajajeira-1 in Block 1/14 of the Lower Congo Basin. Further drilling for gas is currently ongoing at Katambi-2 in the Benguela Basin, appraising the 2014 discovery made when gas could not be commercialised.

ExxonMobil, TotalEnergies and Azule Energy have been exploring the frontier Namibe Basin, and Shell has returned to Angola after a two-decade absence, taking a significant acreage position in the ultra-deepwater frontier and underexplored northern Kwanza Basin. The changes in policy are working, with many wanting a piece of the Angolan prize.

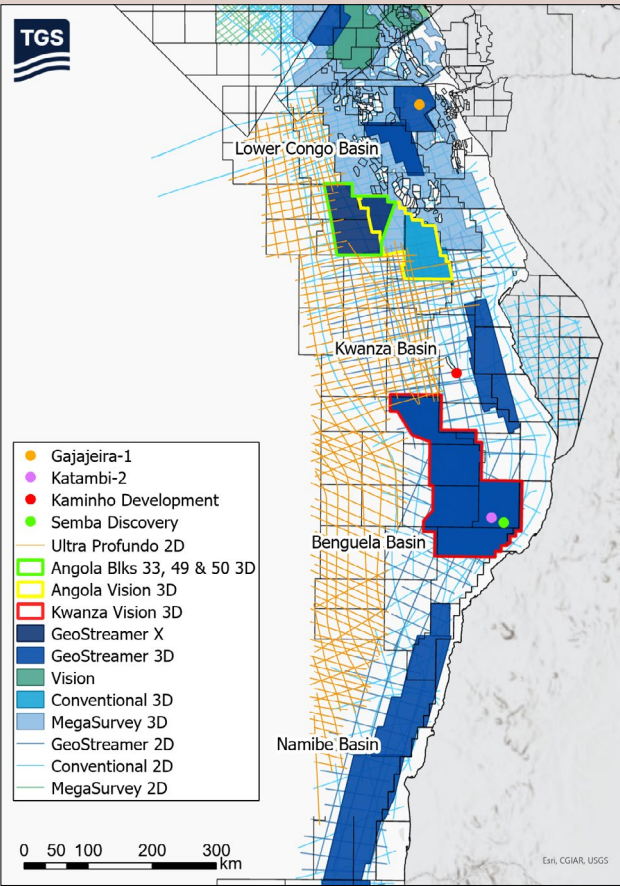


Figure 1: TGS data library with current projects highlighted: Ultra Profundo new 2D acquisition (orange), Angola Blocks 33/49/50 one-sided WAZ (green), Angola Vision block 33/34 reprocessing (yellow) and Kwanza Vision reprocessing (red).

EXPANDING PROVEN LOWER CONGO BASIN PLAY FAIRWAYS

3D seismic data was a game-changer for Angolan exploration in the 1990s, with huge success in blocks 15 and 17 of the Lower Congo Basin, derisked by amplitude-versus-offset techniques. Relatively simple trapping geometries were identified in the post-salt Oligo-Miocene section, where slope channel systems drape salt-induced pillows and turtle structures. As the easy-to-see prospects have been drilled out, legacy seismic data have become insufficient to identify and mature prospectivity in deeper

and more complex trapping geometries, often associated with the allochthonous salt bodies that are so prevalent in the deepwater part of the basin.

TGS currently has two recent / ongoing projects to help expand the proven fairways and identify new prospectivity in underexplored fringes and frontier regions of the Lower Congo Basin. In 2025, a multi-vessel one-sided Wide-Azimuth (WAZ) survey was acquired over blocks 33, 49 and 50 in the deep- and ultra-deepwater of the basin, and processing has just finished. The acquisition utilised deep tow multisensor GeoStreamer and six Gemini sources, providing an azimuth-rich dataset for improved subsurface illumination. Final deliverables include Kirchhoff Pre-Stack Depth Migration (KPSDM) and Reverse Time Migration (RTM) volumes, along with a Least-Squares RTM that has helped to resolve amplitude variations caused by acquisition and overburden complexities, in addition to improving vertical and spatial resolution.

Approaching completion is the Angola Vision product, a reprocessing of legacy seismic data over blocks 33 and 34 in an area where the salt is generally less complex but has been overlooked for exploration. Both projects have employed Elastic Dynamic Matching Full Waveform Inversion (E-DMFWI) technology, helping to more accurately image salt bodies and their geometries, carbonates and sediment features in both sub- and pre-salt settings.

REVISITING UNDEREXPLORED ACREAGE

The offshore Kwanza and Benguela basins are far more immature in terms of exploration than the Lower Congo, with only 109 wells drilled to date. The Kaminho project, which reached FID in 2024, is the first offshore development in the Kwanza Basin, with new fiscal terms for marginal fields and gas creating further production opportunities. These include both existing discoveries, e.g. Semba and Katambi on Block 24, and newly identified exploration targets. TGS is currently undertaking the Kwanza Vision project,

a modern depth reprocessing of 26,300 km² GeoStreamer data acquired in 2011–2012 and incorporating orthogonally acquired legacy data in the workflows to improve illumination and imaging. FT KPSDM, RTM and FWI-Derived Reflectivity data are available just four months after reprocessing commenced (Figure 2).

EXPLORING THE FRONTIER

Since the Venus discovery in the Orange Basin of Namibia in 2022, exploration activity in the distal parts of the West African continental margin has increased significantly, and numerous deals have been signed of late to evaluate their prospectivity. ANPG has recently delineated new acreage in their outboard EEZ, and to identify exploration opportunities, TGS has recently acquired the Ultra Profundo 2D survey, ~17,150-line km of long-offset data along the Angolan margin, from Lower Congo to Namibe basins. Acquired using Gemini sources and GeoStreamer, these data are already showing areas of interest. With data transmitted by Low Earth Orbit satellites for processing, Ultra Fast-Track PSTM images have been generated just two weeks after the last shot, enabling dynamic line position changes to ensure geological features of interest are surveyed and maximising exploration value. FT PSDM volumes are due for completion in July 2026, with final processed data due in 2027.

ANGOLA'S OFFSHORE RENAISSANCE

Angola’s offshore hydrocarbon sector has been an incredible success story since oil was first struck in the 1960s. The country’s legislative reforms have fuelled a reincarnation of its exploration landscape, and the showcased projects are enabling the continuation of that story. Legacy data, processed with modern techniques, continue to reveal new prospectivity insights in overlooked acreage, and newly acquired data are demonstrating significant potential for resources in new settings.

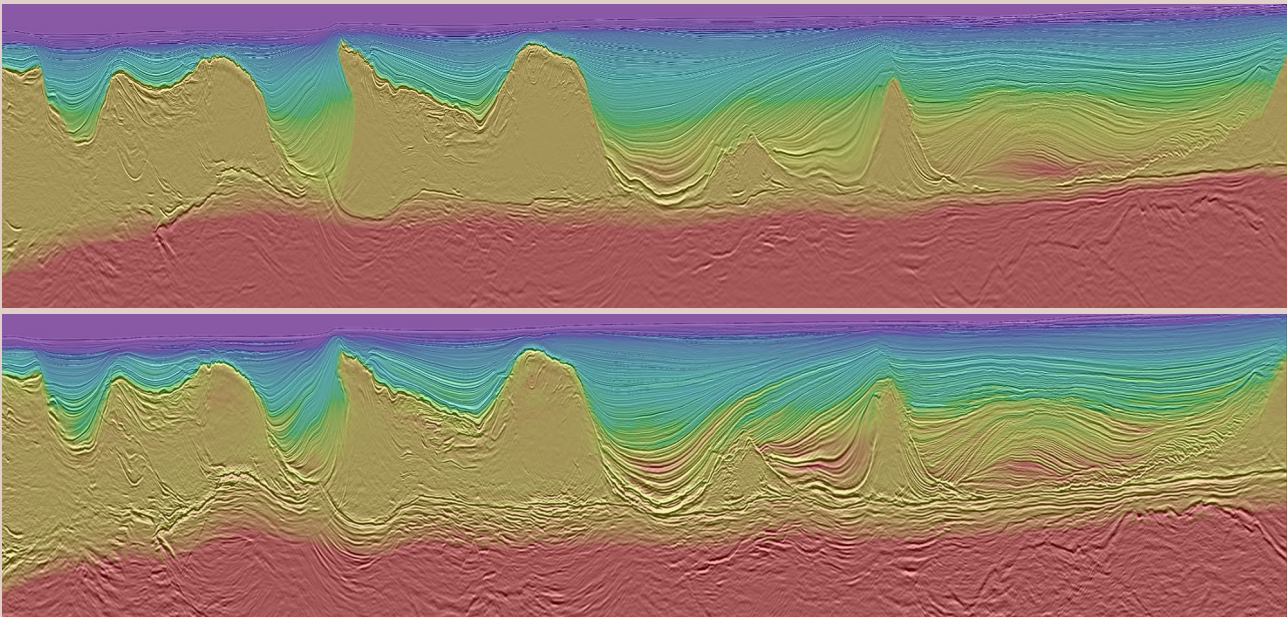


Figure 2: Comparison of legacy KPSDM stack / velocity model (top) and latest Kwanza Vision FT-KPSDM stack / E-DMFWI (12Hz) model.