Santos Basin, Brazil: The Last Frontier, Beyond the EEZ

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From the surface, Brazil's offshore exploration and production industry portrays robust activity and fruitful opportunities, however a dive into publicly available data illuminates a more critical perspective of the industry while highlighting the imperative need for steadfast exploration. Brazil's impressive creaming curve displays ~ 67.5 billion barrels of discovered, offshore oil equivalent, however 34% is from just three discoveries, Tupi, Buzios, and Libra with no other major discoveries since 2012. Over a dozen years have passed without a discovery greater than 1.5 billion boe leaving the industry longing for a change in the narrative.

Drilling results in recent years have encountered challenges from CO2 contamination in outboard Campos Basin / Cabo Frio blocks, lengthy environmental permitting uncertainty in the Equatorial Margin, and yet unproven resources in Pelotas Basin, ultimately leading to a road back to the Santos Basin Pre-Salt. Another contributing factor to the dwindling discoveries was the absence of a 2024 Bid Round. Moreover, Brazil's extrapolated production model exhibits virtually no extended production plateau, but an extreme increase in production throughout the late 2020's, from about 3.5 million boepd currently to about 6 million boepd in 2032, followed by an equally rapid decline in production just 7 years from the writing of this article (Wood Mackenzie Lens, 2025). This reiterates the necessity for consistent, annual exploration on a foundation of innovative seismic data solutions.

For over two decades, Brazil's offshore salt basins have been a hotspot for frontier, multi-client seismic vessel activity. Two-dimensional seismic dominated the 1990's and it wasn't long into the 2000's before the Pre-Salt Polygon was almost entirely covered in 3D surveys. In the prolific Santos basin outer high, seismic acquisition companies have proceeded to the 200 nautical mile Exclusive Economic Zone limit (EEZ), and beyond, setting the stage for the next phase of Pre-Salt exploration. Yet still, the year is 2025 and the risk-averse industry is desperately searching for a new discovery, but hesitant on a new frontier.

Luckily, the Commission of the Limits of the Continental Shelf (CLCS) of the United Nations is amenable to exploration beyond Brazil's EEZ and allowed the release of blocks such as Equinor's prospective Block S-M-1378. In this complex subsurface domain, the stakes are high, and companies must reduce risk by obtaining technologically advanced and cost-effective seismic data to ensure the highest probability of commercial success. Regional reprocessed 3D data, and modern 3D acquisition, complimented by 2D seismic where 3D is unavailable, reduces uncertainty and provides exploration confidence.

Cross sections of 3D pre-stack depth migrated 2D and 3D seismic reveal the potential of the outboard area with 4-way closures from 150 km2 to almost 4,000 km2 (Zalan 2019). Further interrogation of the data shows the differentiation between the internal rift kitchen and the external rift kitchen and implications on the latest Bid Round where one concession block is outside of the 200 nautical mile limit but inside a modern 3D seismic that was completed in 2021.

The data show confident evidence of new play types in compressional zones across strike-slip faults, positive flower structures, reverse faults, and 4-way structural closures that are more analogous to Tupi and Buzios than Safira and Citrino.