The Lone Ranger or a Posse of Prospects? A DeepWater Playground From Guyana to Cape Town

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Abstract

The Ranger reservoir is unique in a string of successes in Guyana's deepwater Stabroek block - a thick carbonate buildup rather than a clastic fan - and the Walker Prospect offshore Suriname holds similar promise. The authors see much broader scope for Ranger-inspired liquids success along the South Atlantic margins. We anticipate reservoir formation along continental crustal boundaries (COB), especially COB intersections with hot spot tracks and leaky oceanic fracture zones. Beyond formation of trapping features, prospectivity requires identified source and seal with generation/ migration/ trapping stories. We consider source potential of Cretaceous marine muds deposited inboard of but adjacent to these carbonate highs and speculate on heat flows necessary to achieve generation and expulsion. Beyond that, a second risk is the issue of finding non-hydrocarbon gases versus hydrocarbons. Offshore Brazil's Sergipe Basin, our geochemical analysis suggests a mature Albian marine source adjacent to untested buildups along the continental-oceanic crust boundary. The thermal regime needed for source maturity was extrapolated from 1-D modelling performed on the Santos Outer Basin High (OBH). Moving across the OBH towards the continental-oceanic transition, increased thermal input from interpreted mantle exhumation and associated shallowing of the lithosphere greatly expanded the area of source maturity. Similar crustal regimes have been mapped along Brazilian and West African margins south at least south to the Florianopolis/ Walvis Fracture Zones and north to the Guinean margin of West Africa (conjugate to the Demerara Plateau) offering an extensive playground. We illustrate with examples in map and section

view areas that fit our evolving criteria and offer indicators that may associate with CO2 problems.