

Gomez, S., Mann, P., and Bird, D. E., 2016, **Deep crustal structure and tectonostratigraphy at the leading edge of the Caribbean in basins offshore Barbados and Tobago: new insights from 2-D gravity modeling and 2-D seismic data** (abstract): American Association of Petroleum Geologists, Annual Meeting.

Major plays of the offshore Barbados accretionary prism (BAP) are related to a proven, world-class Cretaceous source rock, the La Luna Formation. This source and its equivalent formations charge deepwater clastic reservoirs deposited within the Orinoco delta system that becomes entrained in the Barbados accretionary prism. Traps are formed by folding and thrusting within the BAP. The complex geometry and structural styles observed in 2D seismic data are mainly controlled by variations in strain intensity within the evolving BAP. Due to the limited wells drilled offshore Barbados and the difficulty in interpreting deeper structures from seismic reflection techniques, we use potential field data as a new approach to understanding the subsurface geology in the area. This study integrates 1) six gravity transects ~500-1000 km in length, that extend from the Tobago Forearc Basin (TFB) across the Barbados Ridge, 2) ~10,000 km of deep-penetration, modern 2D seismic data, and 3) publicly available gravity and seismic refraction data to identify lateral crustal variations and depth to basement in the area. We propose that the Barbados Ridge, previously described as a continuous N-S trending feature that extends from 12N to 18N, terminates at ~12.5N where it transitions to the northern extent of the allochthonous metamorphic basement rocks of the Tobago Terrane. Bouguer anomalies were filtered and enhanced to produce the residual Bouguer anomaly, first vertical derivative, and total horizontal gradient (THG). These maps were used in conjunction with 2D gravity models and 2D seismic data to identify linear features, geologic boundaries and crustal variations. We interpret from west to east three crustal provinces: 1) anomalously thick, two layer, Caribbean oceanic crust beneath the TFB at ~11.75km; 2) an Albian accreted metamorphic component beneath the Tobago High-Barbados ridge interpreted as a detachment of the Pacific-derived Great Arc of the Caribbean, and 3) South American Atlantic oceanic crust that floors the accretionary prism and is undergoing flat slab subduction at a depth of 12 km beneath the Caribbean Plate.