

Structural and Stratigraphic Evolution of the North Marine Area, Gulf of Paria, Trinidad, Since the Pliocene

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Abstract

The North Marine area is located in the east central part of the Gulf of Paria. Today the major structural elements are, from north to south, the Warm Springs Fault, the north marine syncline, the North Marine Master Fault, the Brighton / NM-5 High, the Jubilee Syncline and the Los Bajos Fault. These features are the result of the approach, arrival and continued interaction of the Caribbean plate with the South American plate. A tectonic event in the mid-Miocene created significant topography and lows that have influenced subsequent fault evolution and sediment deposition. The Warm Springs Fault represents the plate boundary between the Caribbean and South American plates and is believed to have about 60 km of right lateral motion. The Los Bajos fault has traditionally been interpreted as a right lateral strike slip fault with 10.4 km displacement. The motion of these two faults has created an area of stretching between them that results in the propagation from west to east of NW - SE trending normal faults with displacement down to the east. These faults merge at their southern ends to form a single fault, the North Marine Master Fault. Deposition of the Pliocene Manzanilla and Springvale Formations and the Pleistocene aged Talparo Formation was influenced by the availability of accommodation space formed by the mid-Miocene tectonics and subsequent extensional faulting. As the lows were filled, the Manzanilla and Springvale sediments overlapped these highs. The Springvale Formation and Durham Member of the Talparo Formation are fairly uniform in thickness through most of the area. The subsidiary faults associated with the North Marine Master generally show no change in sediment thickness on either the up thrown or down thrown sides, indicating that the faulting post dates sedimentation. There are, however, two faults that show increased thickness on the down thrown side in Springvale and Durham interval. The interaction of these mid-Miocene structures, Pliocene faults and sediments has influenced the accumulation and distribution of hydrocarbons.