A PRELIMINARY TECTONOSTRATIGRAPHIC FRAMEWORK FOR ONSHORE TRINIDAD

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ABSTRACT

Preliminary analysis of data collected from 60 field localities, combined with limited well, seismic, and published data, indicates that the tectonostratigraphic history of onshore Trinidad can be divided into four broad developmental phases. These are as follows:

1) a Middle Jurassic through Late Cretaceous rift/passive-margin sag phase, related to the creation of proto-Caribbean oceanic crust, with sediments in central and southern Trinidad being sourced from terrains to the south* or southwest* underlain by South American crust. Apparent stratigraphic and structural continuity between eastern Venezuela and Trinidad, and lateral persistence of large-scale gravity anomalies are used to suggest that the greatly shortened Jurassic-Cretaceous terrains of most central and southern Trinidad are neither wildly allochthonous (i.e., hundreds of Km of lateral translation) nor significantly rotated. However, because Trinidad is situated within a 150-250 Km-wide plate boundary zone that has accommodated significant Cenozoic transform motion, major translations and rotations south of the El Pilar Fault System cannot be ruled out.

Terrains north of the El Pilar are almost, undoubtedly, relatively far travelled. For example, preliminary 40Ar/39Ar incremental release and standard K/Ar radiometric age data indicate that the Jurassic-Cretaceous rocks of the Northern Ranges were dynamothermally metamorphosed by the end of the Cretaceous. Because the older strata of central and southern Trinidad show no strong evidence of major nearby Cretaceous tectonism, it is reasonable to assume that rocks of the Northern RAnges were deformed at some unknown distance west or northwest of Trinidad, and subsequently translated into their present position.

2) a latest Cretaceous through mid-Early Miocene episodic transpressional phase, possibly related to the formation of a proto-Caribbean transform/incipient arc system, in front of an east-facing, proto-Antilles Arc System. The deformational scheme of Trinidad, was probably one of basement-involved strike slip and oblique subduction of continental and/or oceanic lithosphere to the north* and generally detached thrusting and folding to the south*. Sedimentary polarity reversed at this time with the development of a rising tectonic terrain to the north* or northwest*. Thick shale sequences and fairly thin shallow and deep-water sands were deposited in the foreland troughs formed by this event. These sub-basins were characterized by narrow shelves and rapid lateral facies changes. Greatly different strengths and ductilities give rise to structural disharmony between the jurassic-Cretaceous and Paleocene-Miocene units.

3) a mid-Early Miocene to late Middle Miocene extensional phase probably related to large-scale transtension as Trinidad moved past the lesser Antilles arc. Sediments were derived from both the north* or northwest* and south* or southwest* as the Caroni and Tobago basins were formed. This phase may or may not have affected rocks south of the Caroni basin.

4) a late Middle Miocene to present transpressional phase with local transtension that emplaced and uplifted the Northern Ranges, inverted the southern edge of the Caroni basin, and shortened the sedimentary sequences of central and southern Trinidad. Stratal shortening from the Central Ranges to the south coast of Trinidad exceeds 11Km, while basement-related strain of inknown magnitude is taken up along major oblique-slip fault systems. Deltaic sediments of this filled the Caroni, Southern, and Columbus basins.

* Relative to present day coordinates (i.e., no rotational effects are considered).