

**AAPG International Conference
Barcelona, Spain
September 21-24, 2003**

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Synthesis of Gulf of Mexico and Caribbean Tectonic Evolution: Pacific Origin Model for Caribbean Lithosphere

Starting from a palinspastic Pangean continental reconstruction, Gulf of Mexico (GoM) opened in two stages. Stage 1: Triassic-Oxfordian NW-SE asymmetric continental stretching (Yucatán=hanging wall), with minor CCW rotation of Yucatán, and SE-ward motions along Trans-Mexican Volcanic Belt and other lineaments. Stage 2: Oxfordian-Valanginian CCW rotation of Yucatán as seafloor crust formed in central GoM. During Stage 2, Yucatán-NoAm rotation pole migrated SE from the SE GoM to Isle of Youth, and the "East Mexican Shear Zone" along the Tuxpan margin accommodated transform motion between Yucatán and Mexico. From Valanginian to Aptian, an Inter-American Arc spanned the widening gap between Mexican and Andean arcs. Concerning Caribbean crust, evidence favours a Pacific origin allochthonous relative to North and South America, over an "intra-American" origin whereby Caribbean lithosphere formed between North and South America. Kinematic, geometric, geologic arguments for Pacific origin are presented, e.g., continent-verging arc-continent collisions between various portions of the Great Caribbean Arc and Proto-Caribbean margins are documented as younging east, from Chortis and Ecuador to Puerto Rico Trench and Trinidad, from Albian to Plio-Pleistocene, in accord with Caribbean-American relative displacement. This relative migration is outlined as a function of progressive westward drift of the Americas in the hotspot reference frame as the Atlantic opened, "engulfing" a piece of Pacific crust that is now Caribbean lithosphere. A "non-Caribbean" Paleogene tectonic event in eastern Venezuela and Trinidad explains geological relationships that do not otherwise fit into the Pacific-origin model. Implications for parts of circum-Caribbean structural development and hydrocarbons systems are highlighted.