



**THE 4TH GEOLOGICAL CONFERENCE
OF
THE GEOLOGICAL SOCIETY OF TRINIDAD AND TOBAGO**
June 17-22, 2007, Hilton Trinidad & Conference Center
Port-of-Spain, Trinidad and Tobago

“Caribbean Exploration – Planning for the Future”

ABSTRACT

**OVERVIEW OF THE SUBSURFACE GEOLOGY OF ON- AND OFFSHORE NORTHERN
SOUTH AMERICA: IMPLICATIONS FOR HYDROCARBON EXPLORATION**

Alejandro Escalona

University of Stavanger, Norway

Paul Mann

(Institute for Geophysics, The University of Texas at Austin)

A regional synthesis of subsurface data of northern South America shows the complex on- and offshore basin evolution and infilling history during the Late Cretaceous-Cenozoic time. Diachronous, west-to-east oblique convergence between the Caribbean and South American plates during the Late Cretaceous-Cenozoic produced a series of hydrocarbon-rich foreland basins along the continental margin of South America. The continental foreland basin area is bounded to the north by a series of active E-W- trending right-lateral strike-slip faults that separates the foreland basins from a series of unexplored transtensional basins to the north within the arc-related terranes of the Caribbean plate. Plate tectonic paleogeographic reconstructions, regional isochron and structural mapping are used to restore Cenozoic, east-west, lateral displacement between the Caribbean arc-related basins and the continental margin of South America. These tectonic restorations show that southeastward convergence of Caribbean related terranes during the early Tertiary (Lara nappes and Cordillera de la Costa) strongly modified the paleodrainage system of northwestern South America. During the Paleocene-Eocene, most of the northern South America paleodrainage was north-directed through the Maracaibo Basin (proto-Maracaibo). After late Eocene-Oligocene emplacement of the Lara nappes and the

Cordillera de la Costa terranes in northwestern and central Venezuela, the main paleodrainage system was diverted eastward to the Eastern Venezuela and Columbus basins forming the proto-Orinoco River.

The distribution of source and reservoir rocks is closely controlled by Late Cretaceous-Cenozoic tectonic events. Giant accumulations of mainly oil are restricted to the onland foreland basin area where the main source rock is Late Cretaceous marine organic black shale of the La Luna Formation. Few minor discoveries of oil and gas have been found in the coastal or offshore areas where no Late Cretaceous La Luna Fm. has been found (Guajira Peninsula, Tobago and Falcon basins). Source rocks in these areas are a mixture of Tertiary marine and terrigenous shale.