THE UH DEPARTMENT OF EARTH AND ATMOSPHERIC SCIENCES *presents*

# ANNUAL R.E. Sheriff Lecture

**sponsored by the University of Houston Department of Earth & Atmospheric Sciences, the University of Houston Geosciences Alumni Association, and the International Division of the Houston Geological Society**

## MONDAY, NOVEMBER 28, 2011

### WESTCHASE HILTON
9999 Westheimer
Houston, Texas 77042

4:30PM - Poster Judging
5:30PM - Social Hour & Poster Viewing
6:30PM - Dinner followed by Lecture

To register, visit: *www.hgs.org*

### POSTER & STUDENT REGISTRATION INFORMATION

Poster Title & Abstract Submission Deadline: November 1, 2011

Submit your poster information by email to *tnguye36@mail.uh.edu*. Abstracts submitted by the deadline will be published in HGS Bulletin's November 2011 issue.

STUDENT REGISTRATION: Student registration is sponsored by Swift Energy and British Petroleum. Space is limited and will be given on a first-come-first-served basis. All requests for no-charge registrations must be sent to *tnguye36@mail.uh.edu* by November 21, 2011. Students who miss this deadline may still attend the lecture (pending space availability), but may be required to pay for their own registration at the door.
For more information, please contact Tram Nguyen at (713) 743-3402.

## Major Hydrocarbon Plays in the Mexican Sector of the Gulf of Mexico, the Caribbean, and Northern South America


# Dr. Paul Mann
PROFESSOR and CBTH DIRECTOR
UNIVERSITY OF HOUSTON


The Gulf of Mexico (GOM), Caribbean and northern South America form a geologic province (Fig. 1) that is strategically located to provide major sources of conventional and non-conventional hydrocarbons for western hemisphere markets (Fig. 2). Present production defines two separate and geologically distinct regions of giant oil and gas fields in the US and Mexican sector of the GOM and in Columbia, Venezuela and Trinidad & Tobago in northern South America. These two regions of major production are separated by a vast area of marginal or basent production in the Caribbean region extending from northern South America to Cuba and from Central America to the Lesser Antilles.

The Caribbean region formed in an oceanic setting in the eastern Pacific and was transported into its present position over the last 80 million years along complex plate boundary systems, some of which have remained active to the present day. The oceanic derived geology of the Caribbean differs completely from the passtive margin geology of GOM and northern South America.

Passive margins are likely the place where more hydrocarbons will be found because giant hydrocarbon deposits require a combination of time, burial and a minimal amount of ongoing tectonic activity that can disrupt the reservoir and allow hydrocarbons to leak to the surface. The dense cluster of hydrocarbons in the GOM reflects its passive margin pedigree and its tectonic setting well within the stable North American plate. The Caribbean plate has potential for hydrocarbons but its sources are of mainly of Cenozoic age and it lacks the older, world class late Jurassic source rocks that are commonly found in the passive margin settings.

It is apparent from Fig. 2 that the GOM has tremendous remaining potential. If the GOM is considered as a clock face, systematic exploration from shelf to deep basin has only been carried out in the offshore areas of the US states of Texas and Louisiana between 9 and 1 o'clock. The remaining areas of the clock face from 1 to 9 o'clock in Alabama, Florida, Cuba and Mexico await exploration on the slope and deep water. All these unproductive areas of the GOM are likely to benefit from the widespread distribution of high-quality late Jurassic source rocks that have been deeply buried and removed for many tens of millions of years from disruptive tectonic activity. Exploration of the passive margin of northeastern South America (NESA) has remained disappointing from wildcat wells drilled over the past decade. One explanation is that this passive margin formed by tectonic processes different than the Gulf of Mexico. In NESA, plates moved laterally along strike-slip faults parallel to the continental edge while in the GOM the continental blocks stretched orthogonally or at high angles. In the case of NESA, strike-slip faulting is fundamentally more complex and can lead to less laterally continuous areas of source rocks in comparison to more evenly distributed sources in rift and passive margin settings. I use seismic data to show and compare examples of the strike-slip vs. rift style that underlie NESA and GOM, respectively, and the impact these styles have on hydrocarbon occurrence.

***Figure 1***: Map showing plate structure and location of passive margins in GOM-Caribbean region. The light yellow-colored area is the Caribbean region that includes the active, fault-bounded Caribbean plate and an area in the Cuba region that once was part of the Caribbean plate but has now been transferred to the North America plate.

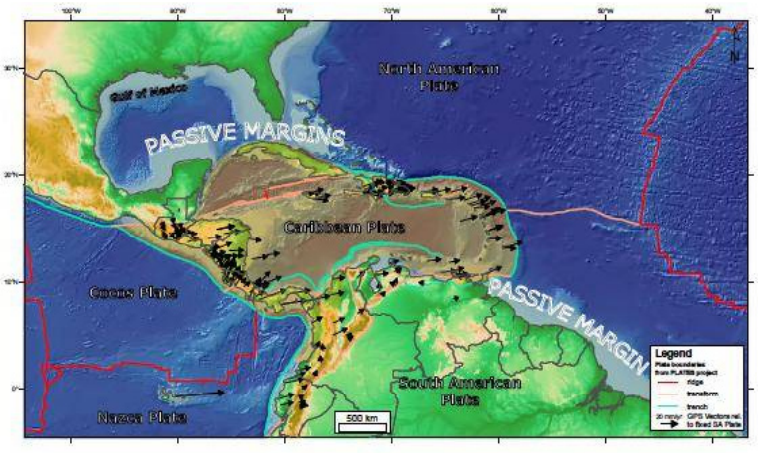
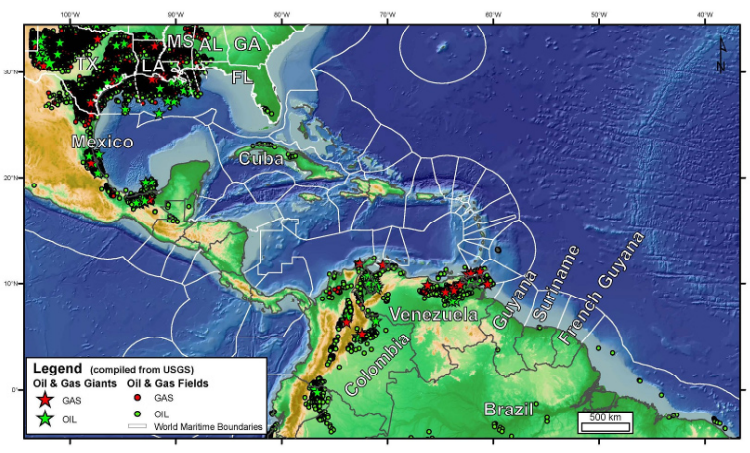



***Figure 2***: Political boundaries, offshore maritime boundaries and hydrocarbon accumulations in GOM-Caribbean area. Source of international offshore boundaries is the Flanders Marine Institute (VLIZ) Maritime Boundaries Geodatabase. Source of offshore state boundaries in the GOM is approximated from MMS (Mineral Management Services)




**Paul Mann is Professor of Geology at the University of Houson and Director of the Caribbean Basins, Tectonics, and Hydrocarbon (CBTH) Project. His recent arrival to UH represents a significant step for the university's new energy initiative. Mann's research interests include the tectonics of late Cenozoic deformation plate boundary zones, the geology and geophysics of strike-slip plate boundaries, structural styles of strike-slip, thrust and rift boundaries as expressed on seismic reflection data; and the tectonic setting of giant oil and gas fields found worldwide. The CBTH Project directed by Mann is a oil industry consortium and includes 15 members who are project sponsors. The project began under Mann's leadership at University of Texas at Austin in 2005. The goal of the project is to involve undergraduate, graduate and postdoctoral researchers in a major, GIS-based compilation of hydrocarbon-related information from a vast, hydrocarbon-rich region extending from the Gulf of Mexico to Brazil. Over the past six years, this data set has become the most complete source of information on hydrocarbon basins in this region. In addition to providing this information to oil company sponsors of the project, subsurface seismic reflection and well data compiled by CBTH researchers also provided the basis for original research used for completing M.S. theses and Ph.D. dissertations.**