Monday, February 24, 2020

HGS International Dinner Meeting

Live Oak Room • Norris Conference Center • 816 Town and Country Blvd #210
Social Hour 5:30–6:30 p.m.
Dinner 6:30–7:30 p.m.

Cost: $40 Preregistered members; $45 non-members/walk-ups

To guarantee a seat, pre-register on the HGS website & pre-pay by credit card.
Pre-registration without payment will not be accepted.
Walk-ups may pay at the door if extra seats are available.

If you are an Active or Associate Member who is unemployed and would like to attend this meeting, please call the HGS office for a discounted registration cost. We are also seeking members to volunteer at the registration desk for this and other events.

Jack Kenning
University of Houston

Tectonic Evolution, Hydrocarbon Potential and Play Prospectivity of the Deep-water Yucatan Margin, Southern Gulf of Mexico

The stratigraphy, structure, and hydrocarbon potential of the deep-water Yucatan margin is less understood than other provinces of the Gulf of Mexico as the area has a minimal history of hydrocarbon exploration and as a result very few well penetrations. Along the margin of the deep-water northeastern GOM offshore Florida, the post-salt section records late Jurassic-Cretaceous gravity sliding of rafted blocks along a basinward-dipping layer of middle Jurassic salt, which is mostly analogous to the deep-water Yucatan margin. Understanding the tectonic development of the Gulf of Mexico and this linked history between the northern and southern margins of the Gulf of Mexico is essential for developing play concepts in frontier areas of the basin. This study uses a grid of PSDM 2D seismic profiles covering an area of approximately 120,000 km² to map the structure and stratigraphy of the analogous area of gravity sliding and salt tectonics along the less-studied, conjugate Yucatan margin to the south. Two primary structural domains can be defined based on their distinctive salt structures and style of deformation: an up-dip, late Jurassic-Cretaceous section of gravity slides, associated salt-rollers, and their normal faults rooted to a basinward-dipping salt detachment, and a distal area exhibiting large salt diapirs and salt pillow structures in an outer marginal trough collapse located adjacent to the continent-ocean boundary. Despite the presence of widespread oil slicks along the continent-ocean boundary, the thermal maturity level and locations of source rock kitchen areas have not been well defined. Thermal 1D modeling of six pseudo-wells positioned along-dip was performed using estimates of lithospheric thickness and heat-flow. Integrated 3D model results indicate the principal Tithonian-age source rock reached the oil window over most of the deep-water salt diapiric province since the Oligo-Miocene. Inherent model uncertainty was addressed using a range of thermal scenarios, demonstrating that deeply-buried, salt-related mini-basins along the marginal rift are very low-risk, while the uppermost slope is much higher-risk for maturity. Large, salt-related structural traps are located directly adjacent to oil kitchens within deep

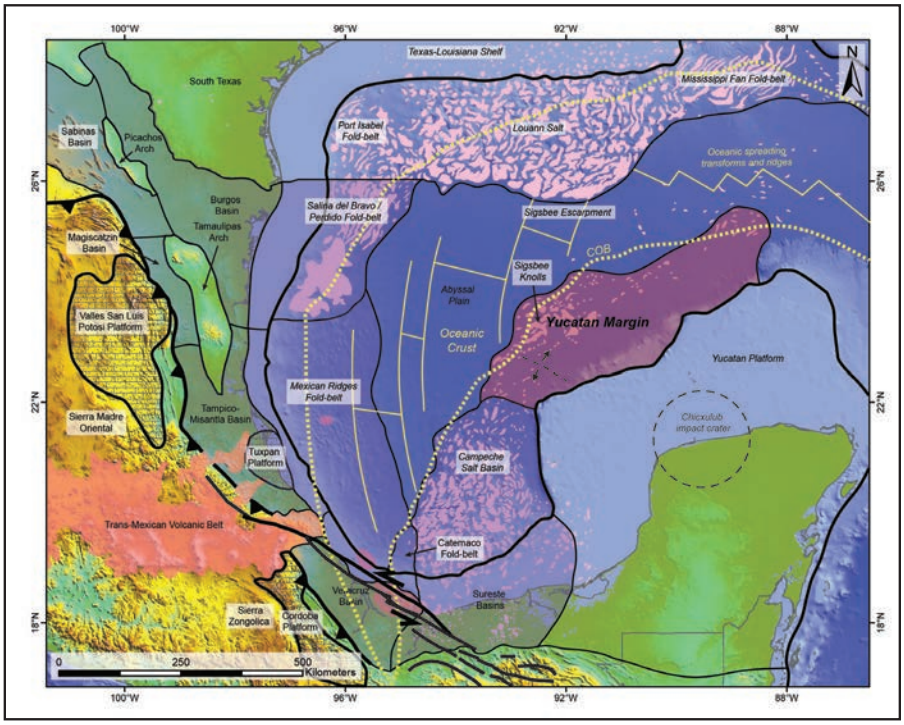

Figure 1. *Map showing the main structural and basinal provinces of the Gulf of Mexico and its onshore areas in eastern Mexico. The deep-water Yucatan margin is located along the northern continental margin of the Yucatan Peninsula and is bounded by the Yucatan Shelf to the south, the deep-water Campeche salt basin to the southwest, and the abyssal Gulf of Mexico to the north.*

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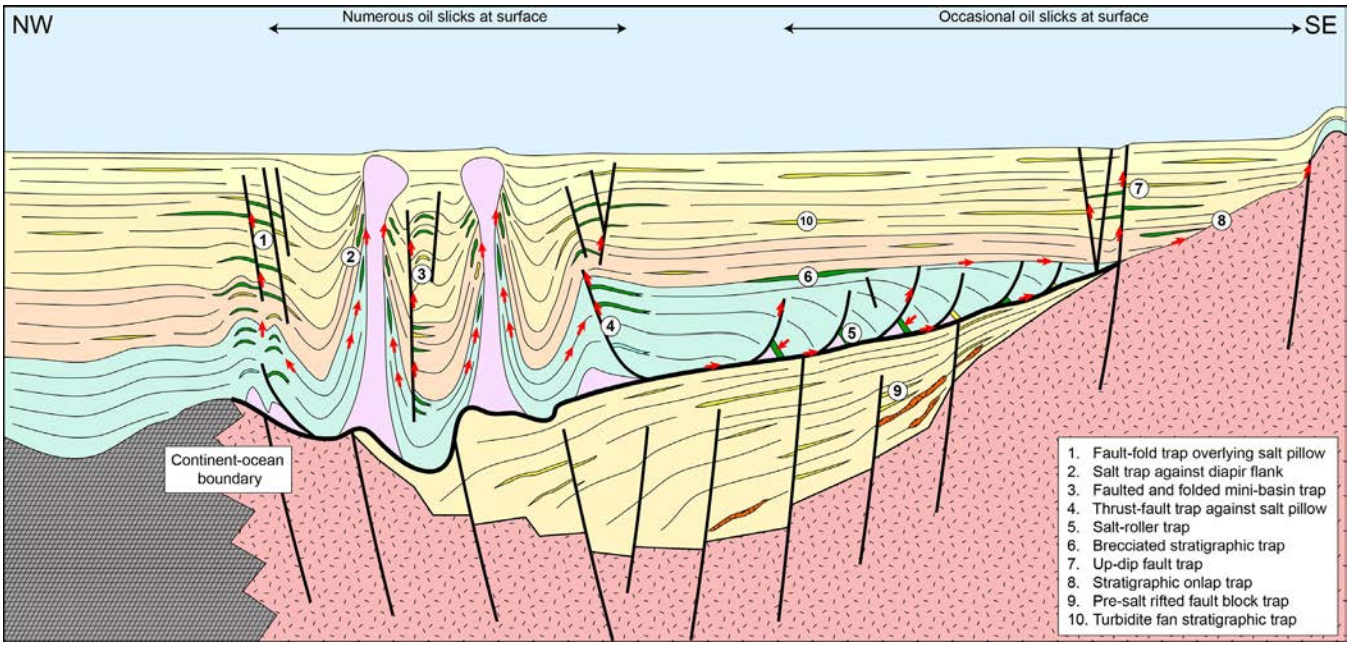

Figure 2. *Play schematic summary profile across the deep-water Yucatan margin illustrating a variety of potential structural and stratigraphic trapping configurations identified across the area from the seismic data. Potential routes for hydrocarbon migration from deep, thermally mature kitchen areas, via both vertical fault conduits, and through long-distance lateral migration are characterized.*

salt-withdrawal mini-basins, where accompanying vertical faulting allows for effective migration pathways – as supported by structurally-associated clustering of numerous oil slicks at the sea surface. Evidence suggests the possibility for long-distance lateral migration of hydrocarbons up-dip along the detachment, where reconstruction of the conjugate margins suggests a potential play fairway for Norphlet-equivalent aeolian reservoirs across the salt-roller province. While hydrocarbon modeling suggests the pre-salt is unlikely to be charged by the late Mesozoic petroleum system, if Triassic lacustrine source rocks are present in this section, as have been encountered along the northern Gulf Coast, significant parts of the syn-rift sequence are still predicted to be gas mature at present day. ■

Biographical Sketch

Jack Kenning is a PhD candidate and research assistant working in the Conjugate Basins, Tectonics, and Hydrocarbons (CBTH) research group at the University of Houston. His research focuses on the tectonics, structural development, and hydrocarbon prospectivity of the under-explored Mexican sector of the deep-water Gulf of Mexico. Mr. Kenning has prior experience working in the oil and gas industry for Anadarko Petroleum and ConocoPhillips. He has worked in both Europe and the USA in several roles ranging from international exploration, operations, unconventional development and research.