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TITLE: Petroleum System Insights from the South Florida Basin with Implications to the Southern Gulf of Mexico

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ABSTRACT BODY:

Abstract Body: The prevailing paradigm of the South Florida Basin established by the USGS decades ago is focused on the generation of low API gravity high sulfur oil in Albian Lower Sunniland limestone source rocks with short distance lateral migration into Albian reservoirs. Episodic reports of gas and condensate exist in the literature, but these enigmas have not been documented with modern geochemical tools, nor explained in subsequent petroleum system studies. Using a combination of technologies to extract gas and liquid hydrocarbons from open and closed (i.e., fluid inclusion) pores of well cuttings and cores, at least 3 new petroleum systems are identified. The correlative source rocks are documented to charge reservoirs over a broad geographic extent with variable degrees of stratigraphic distribution.

This presentation affirms the distribution of Lower Sunniland source rocks deposited as algal mats in shallow marine water, but also identifies contemporaneous intermediate and deeper water source rock organic facies. Molecular proxies for water depth are applied that collectively enable the designation of proximal, transitional, and distal organic facies of Type II/I source rocks. While this refinement of the prevailing Sunniland source rock model is important, it is equally significant that this concept is also demonstrated to apply to sequences throughout the Albian as a function of eustatic sea level and/or accommodation space variations, dramatically expanding the total source rock volumetrics. Work programs in the deeper stratigraphic sequences identify oils that are assigned to additional petroleum systems designated to be part of late syn-rift marl and late syn-rift clastic source rocks. These oils have much higher API gravities and lower sulfur content, attributed to the source rock lithology (i.e., reduced carbonate), Type II to II/III source rocks deposited in dysoxic marine water columns (i.e., no evidence of lacustrine source rock contribution), and resultant hydrocarbon generation at higher degrees of thermal stress. These deeper petroleum systems are responsible for the enigmas recognized in the aforementioned Sunniland trend. The collective results of this study have implications to the broader southern Gulf of Mexico as correlative source rocks outcrop in both Cuba and the Yucatan Peninsula of Mexico.

PRESENTATION TYPE: Oral or Poster