The Origin of Oil in the Mexican Coast Basins in the GOM

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Abstract

A geochemical and isotopic characterization of a wide selection of the produced oils in the petroleum subprovinces from the Mexican Gulf Coast Basin has distinguished five major genetic groups. Their distribution and chemical characteristics appear to reflect a range of ages, depositional settings, lateral facies variations, maturation histories, and post-filling alteration processes. Each oil group is correlated to a specific generative source or subsystem: (1) Oxfordian marine marl-dominated, (2) Oxfordian marine carbonate-dominated, (3) Tithonian marine marl-dominated, (4) Cretaceous marine carbonate-evaporitic, (5) Tertiary marine deltaic siliciclastic. The Tithonian generative subsystem has produced more than 80% of all oil reserves thus far encountered in the Mexican Gulf Coast Basins. Tithonian oils are found in accumulations from both onshore and offshore areas, from reservoirs that span the stratigraphic column (from Kimmeridgian to Pleistocene), and from a range of marine siliciclastic to carbonate reservoirs. The distribution of Tithonian oil accumulations suggests that vertical pathways are the principal secondary migration mechanism. Biomarker and isotope differences observed in the Tithonian oils are attributed to lateral facies variations. The volumetric importance of the Tithonian generative subsystem is consistent with the hypothesis that a thermally mature carbonate to marl sequence of Tithonian age is likely the main source of the oils and seeps in deepwater.