

## **Polyhistory Oils in the Northern Gulf of Mexico Basin: An Indicator of Remigration and Multiple Migration Events**

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The main vector of oil and gas migration in the northern Gulf of Mexico Basin, and in other basins characterized by salt tectonics and growth faulting, is vertical or cross stratigraphic. Geochemistry of oils from Neogene reservoirs located in the deep shelf and shelf-edge areas of the northern part of the basin provides evidence of oil mixing. Oils in this area are compositionally intermediate between Jurassic-derived oils occurring basinward, and Cretaceous-derived oils occurring in shallower parts of the shelf. The existence of mixed oils indicates a complex migration-accumulation history. Some of the mixed oils are bacterially altered, but possess a "fresh" gasoline range chemistry. This pattern is more complex involving oil-oil mixing, bacterial alteration, and introduction of condensate or light oil into the reservoir.

The polyhistory compositional pattern helps recognition of complex migration-accumulation histories. The pattern can result from direct migration of fluids from the source or sources, or by remigration of fluids contained in older reservoir sections to younger reservoir sections. Multiple fluid migration-accumulation episodes are certainly more common than generally recognized, and probably, most common in densely faulted offshore areas. Also, many biodegraded oils are presently at reservoir temperatures that are too high for active biodegradation (>60 C or 140 F) suggesting the oil was biodegraded at shallower depths with remigration subsequent to intense Pleistocene sediment loading.