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## Origin of Heavy Oil Reservoirs in Mexico: Biodegradation versus Maturity

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### ABSTRACT

The volume of oil generated from a potential source rock is often estimated in risk analysis. If the quality can also be predicted more precisely, economic forecasts can be more accurate. Discovery of 'low' quality crude is certainly less desirable than crude of 'higher' value and in some regions can determine economic viability (i.e., deepwater environments). In this paper we summarize current knowledge about the origin of heavy oil reservoirs in Mexico, and the main factors that dictate their composition. Heavy oils in the Mexican southern side of the Gulf of Mexico are accumulated both offshore and onshore and throughout the different producing regions in Mexico: North, south, and marine regions. Heavy oils can be recognized in most of the different major genetic groups identified in the Mexican Gulf Coast Basin by means of geochemical and isotopic criteria. The principal geochemical/geological processes that have determined the origin of heavy oils in the Mexican reservoirs were: (1) source rock type, (2) early expulsion, and (3) biodegradation. Nevertheless, the biodegradation is the dominant process related to the origin of heavy oils in the north and south regions. The main factor inducing low gravities in the offshore heavy oils in the marine region is related to an early expulsion of the oil from a marine marl-dominated source rock. However, taking in account that in deepwater environments are expected low thermal gradients and shallow exploration targets which are ideal conditions for microbial degradation of crude oil, there are high possibilities to find biodegraded oils reservoirs in deepwater prospects. So, it is very important to incorporate into the deepwater exploration workflow in the Mexican prospects conceptual models of biodegradation in a consistent and quantitative way and to link these to up-to-date basin modeling software to more accurately predict fluid properties.