

# The Petroleum System and the Exploratory Reactivation of the Offshore Tuxpan Platform, Eastern Mexico

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The Tuxpan Platform is a Middle Cretaceous reef complex built on a basement high that bordered the Gulf of Mexico Basin during the Late Jurassic. Since 1996, offshore exploration of the Tuxpan Platform has been accomplished by the Petroleum System method. This approach has included seismic interpretation, analyses of wells, petrographic and petrophysical studies of reservoir rocks, geochemical analysis of oils, and 2D modeling of hydrocarbon generation and migration.

The interpretation of 110 seismic lines has allowed the identification of the reef facies: lagoon, reef crest, and talus. Petrologic and diagenetic studies led to an understanding of the evolution of reservoir porosity, which was linked to eustatic changes. These changes caused the sub-aerial exposure of the reef crest and consequent infiltration of meteoric water and karstification during the Paleogene. The Neogene shaly siliciclastic overburden formed fractures in the reef, enhancing its porosity and permeability. A 2-km-thick section of Tertiary rocks form a regional seal.

The biomarker and isotopic analyses of oils suggest the presence of two genetic families. One family is related to Upper Jurassic marine shaly limestones and the other one is associated with Tertiary marine siliciclastic shales. The age of this second genetic family was defined by the presence of oleanane, which, along with the low abundance of homohopanes also indicates that the source is rich in higher plant debris and contains Type II-III kerogen deposited in a sub-anoxic clay-rich environment. Modeling suggests that hydrocarbon generation from Upper Jurassic sources began since the Pliocene. Migration occurs from east to west along carrier beds, unconformities, and fault planes.

The evaluation team concluded that the oil fields on the Tuxpan Platform have considerable growth potential that must be determined by more reservoir characterization studies similar to those that led to additional reserves in two fields located in the central part of the platform.