AAPG Annual Convention
Salt Lake City, Utah
May 11-14, 2003

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Integrated Analysis of the Mars-Ursa Basin: Deep-Water Gulf of Mexico

The Mars-Ursa Basin is a prolific oil-producing basin with a complex stratigraphic, structural, and hydrocarbon charge history. Integrated analysis, however, helps to unravel this complex history and provides a framework to explain and predict reservoir and hydrocarbon distributions within the basin. In particular, defining areas of salt inflation or deflation is fundamental to understanding the complex interaction between salt movement and sedimentation.

Late Miocene to early Pliocene sediments of the Mars-Ursa basin can be subdivided into packages of genetically related strata on the basis of their seismic facies. Packages characterized by moderate to high amplitude, laterally continuous to semi-continuous reflectors correspond to sand-rich intervals. In contrast, erosionally based lower-amplitude to opaque (chaotic) packages correspond to finer grained sediments dominated by mass transport complexes. Internally, the sand-rich packages are composed of continuous to semi-continuous reflectors exhibiting compensation between major depositional sub-units.

Results from a three-dimensional, integrated basin model constructed over the Mars-Ursa Basin indicate that source rock generation began in the mid to late Miocene. Currently, the source rock is likely early to middle maturity in the region of the Mars Field and middle to late maturity in the Ursa Field. Modeling results also suggest that the proximity of sand influenced by topography allows fluids to flow over a large portion of the basin and explains the connectivity in the reservoirs. These results suggest that multiple migration pathways exist from source to trap throughout the basin.