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Exploration Significance of Petroleum Systems Evaluation in the Veracruz Basin, Mexico

Oil and gas source and maturity, oil-source correlation, source-rock maturity distribution, hydrocarbon generation modeling, and petroleum system evaluation have outlined the oil and gas potential of the Veracruz Basin and the hydrocarbon types to be found in different areas. Hydrocarbon generation/migration is active over the entire basin. Three petroleum systems contributed to hydrocarbon accumulations. The Mesozoic Petroleum System (MPS), containing Tithonian and Cretaceous source rocks, contributed to oil and thermogenic gas accumulations. The Paleogene Petroleum System (PPS), containing Paleocene, Eocene, and Oligocene sources, contributed to thermogenic gas accumulations. The Neogene Petroleum System (NPS), containing immature Miocene and Pliocene sources, contributed to biogenic gas accumulations.

Timing of oil and gas migration and trap formation, migration pathways, and petroleum system evaluation suggest oil and thermogenic gas from MPS can be found in the Buried Tectonic Front (BTF) and Homoclinal Trend (HT), and only gas from MPS can be found in the Loma Bonita Trend (LBT) and Tlalixcoyan Syncline (TS). Gas from MPS is expected in most of the Coatzacoalcos Reentrant (CR). Minor mature oil from MPS can also occur in southeastern CR. PPS contributed mainly thermogenic gas in LBT, TS, and CR. NPS contributed biogenic gas over the entire basin. Gases from different sources are often mixed in reservoirs.

Estimated thermogenic gas charges show that only a fraction of the available gas from MPS has been discovered in Neogene plays. The Veracruz Basin east of BTF has excellent potential for large to small gas discoveries. Future exploration should focus on progressively deeper plays.