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Sedimentary thermal maturation models for the deepwater eastern Gulf of Mexico

Heat flow measurements, collected by TDI-Brooks International, Inc., in the eastern Gulf of Mexico revealed significant spatial variation of values throughout the survey region. Using heat flow data, well logs, and previously published information, sedimentary thermal history and hydrocarbon maturation models were generated for the deepwater eastern Gulf of Mexico.

Histories of sediment accumulation and compaction were constructed for six areas exhibiting similar heat flow in the survey region. The effects of the cooling lithosphere, sediment burial, dewatering due to compaction, and radiogenic heat generation were added to the models to complete a sedimentary thermal history. Comparison of the six models revealed that rapid sedimentation over the Mississippi Submarine fan and different crustal types were responsible for the variation of heat flow across the region.

The depth, timing, and degree of maturation in terms of vitrinite reflectance, determined using the EASY%Ro method, showed that the relatively recent increase in sedimentation from the Mississippi River did not effect thermal maturation. However, high rates of radiogenic heat production in groups located above thin transitional crust greatly increased maturation. Although to varying degrees, all groups in the study area experienced enough thermal maturation to potentially form late mature oil and, in some areas, generate gas.