
Comparison of Methods for Reconstructing the Erosion and Thermal History in the Maverick Basin, South Texas, Using Vitrinite Reflectance, Bottom-Hole Temperature, and Well Log Data

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EXTENDED ABSTRACT

Observations of Cenozoic coal rank indicate anomalous, high thermal maturity near the surface in the Maverick Basin area in South Texas. Vitrinite reflectance values near the surface are about 0.5%, compared to normal, near-surface values of about 0.2% (Dow, 1977; Dow and O'Connor, 1982). The anomalous thermal maturity has been attributed to basin exhumation and/or a phase of heating, possibly related to nearby emplacement of Cretaceous-Paleocene magmatic rocks (Ewing and Barker, 1986; Hackley et al., 2012, and references therein). The thermal history of the Maverick Basin is important to modern petroleum exploration. For example, it may have influenced the petroleum generation and charge history of natural gas accumulations in Campanian-Maastrichtian reservoirs and Cenomanian-Turonian Eagle Ford shale oil accumulations, both located tens of miles to the southeast of the area of maximum anomalous thermal maturity in Maverick County. To the extent that the anomalous thermal maturity reflects basin exhumation, the development of anomalous thermal maturity may have also helped to expose oil to near-surface groundwater and bacterial alteration and contributed to the evolution of the heavy oil deposits in Campanian-Maastrichtian strata in the Maverick Basin (Ewing, 2011).

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