

Thermal History of the Michigan Basin

By

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Previous studies of the thermal history of the Michigan Basin focused either on determining the tectonic evolution of the basin, or generating models that reproduce observed levels of thermal maturity. Temperature histories consistent with tectonic models do not account for observed levels of thermal maturity. Models that focus on reproducing observed data are moderately successful when elevated heat flow during the Paleozoic, or deposition and subsequent erosion of excess Late Paleozoic sediment are incorporated. None of the prior studies have, however, generated models that match observed data from the entire stratigraphic section.

Preliminary research conducted for this study led to the hypothesis that burial histories incorporating deposition and subsequent erosion of sediment at stratigraphic levels now represented by unconformities produce models consistent with observed levels of thermal maturity for the entire stratigraphic section.

The proposed research will investigate this hypothesis by collecting new thermal maturity data and constructing burial histories for several wells. Transmittance color index (TCI) and, where possible, vitrinite reflectance (R_o) measurements will be made on amorphous organic matter obtained from core and/or drill cuttings from both the pre-Devonian and post-Silurian section. Thermal modeling will be used to convert postulated burial and heat flow histories to temperature histories for the basin's strata and to calculate present-day thermal maturities. Calculated maturities will be compared to observed maturities to evaluate the appropriateness of a postulated burial and heat flow history.