

The Nemaha and Nearby Fault Zones in the Context of Midcontinent Strike-Slip Structural Geology

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The Nemaha zone has been described as an integral part of the mid-Proterozoic-aged Midcontinent Rift System. Neither geophysical analyses, geological dating nor tectonic framework support this. Detailed mapping of subsurface data from hundreds of wells in Oklahoma and Kansas show that the Nemaha zone has a structural style and history entirely different from that of the Midcontinent Rift. There is abundant evidence to demonstrate that the Nemaha may be either a right lateral, conjugate, Reidel R' shear fault or a second order right-lateral wrench fault. Data indicate that initial movement was at least as old as mid-Ordovician (Taconic), but it probably originated much earlier.

Evidence presented here will show that the Nemaha zone is a true wrench fault, of limited horizontal displacement and rooted in the deep crust. The fault dip along its trace flips from high-angle normal to high-angle reverse, with pull-apart grabens and pop-up structures along its length.

East of the Nemaha zone in Oklahoma, there are a number of less prominent faults and associated structures parallel to it which trap oil and gas fields. They also provide evidence of strike-slip movement.