

Preliminary Kinematic Study of the “Kartchner Block”, Southeastern Arizona¹

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A group of structurally isolated hills, composed of mostly Paleozoic limestone formations, resides along the eastern flank of the Whetstone Mountains in southeastern Arizona. The newly-developed 550 acre Kartchner Caverns State Park (KCSP) encompasses several of these hills. The hills comprise a fault-bounded block that is sometimes referred to as the “Kartchner block”. Recent mapping and field investigations indicate that the fault density across the block is greater than previously interpreted and that fault kinematics are more complex.

Guided by detailed aerial photo interpretation, field mapping and a re-examination of fault surfaces above and below ground were completed. Our preliminary findings indicate that an undetermined amount of oblique-slip was an important component of the predominate normal faulting that deformed the block. A pervasive oblique component had not been previously documented across the block, except for two faults splays within the caverns. This component is characterized by the prevalence of brecciated and Fe-rich fault zones, anastomosing distribution of some major faults, en echelon arrangement and/or lateral offset of joints and veins, tiled and folded calcite-rich veins, drag folding, and oblique orientations of fault grooves and slickenlines.

How this oblique component relates to the structural evolution of the block and cavern formation is the focus of on-going study. Future results may contribute to an improved understanding of the geologic, geomorphic and hydrologic evolution of the adjacent San Pedro Valley. The research may also prove useful to future cavern management and planning.

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