ABSTRACT

TITLE:	Kinematic Compatibility Analysis of the Ouray Fault, Southwestern Colorado
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ABSTRACT: The Ouray fault is one of the best exposed structures in southwestern Colorado. The fault has controlled geomorphic expression and drainage evolution around the town of Ouray. Although the fault has been described in publications for over half a century, no previous research documents strike-slip or curved slickenlines. There has been speculation regarding the timing of movement, and there has not been any detailed study of the fault's kinematics. This information is important for understanding the fault's history and the influences of faulting on other geologic events. In this investigation, a compatibility analysis was conducted from discretely analyzed data sets of normal and dextral slickenlines on the Ouray fault to test whether these features are linked by a common deformation source, or heterogeneous deformation. Orientation measurements of the fault surface and slickenlines provided data for stereographic paleostress analyses. The Ouray fault is defined by a N70W general strike, steep to vertical dips, 100 meters average stratigraphic separation, dominant two-mile trace bounding the northern basement extent, and splays on its east and west extents near contact with 28-26 Ma volcanic rocks. Quartz vein surfaces confine and reasonably constrain the strike-slip component to Cenozoic Laramide events or later (approximately 70-30 Ma). The compatibility analyses suggest these features are incompatible as indicated by the orientation discrepancy between compared normal and dextral P-T axes data sets. Discretely analyzed data sets yielded averaged shortening orientations of 48,173 for normal, and 3,144 for dextral slickenlines. It is hypothesized that incompatible principal stresses acted on the fault during the latest period of major displacement, changing the shortening and lengthening directions of the fault, and consequently slip sense. Strongly curved slickenlines documented at the fault further support interpretations of slip sense change and may also suggest a single event contributed to fault failure and reactivation. The analytical and field data in this research suggest during Cenozoic time, there was a temporal and spatial slip direction change to the Ouray fault that may have contributed to the fault's dextral slip component.