
Geology of the Alto Relex Area, Sierra del Carmen, Big Bend National Park, Brewster County, Texas

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ABSTRACT

Detailed mapping around Alto Relex in the western Sierra Del Carmen Mountains in Big Bend National Park, Texas, reveals Cretaceous rocks that have been folded, sheared, and thrust faulted by Laramide compression, intruded by Tertiary magmatism, and overprinted by high-angle normal faults from Basin and Range extension. Alto Relex is a prominent, near vertical, ~300 m high fault line scarp found on the westernmost uplifted block of the Sierra del Carmen mountain range. Upper and Lower Cretaceous units found in the area include the Santa Elena Limestone, Del Rio Clay, Buda Limestone, Boquillas Formation, and the Pen Formation. In some areas the thin-bedded, Boquillas Formation contains folds that have an average axial plane of ~N30°W, 86°SW, low plunge axes, an average inter-limb angle of ~95° with wavelengths around ~2 m. Minor thrust faults were found in the thick clay layers of the Del Rio Formation striking ~N18°W, 42°SW on average. A large sinistral strike-slip fault on the east side of Alto Relex has been traced for over 700 m, striking N40°W; it may be related to a similar feature found in upper Ernst Canyon a few km south. Distinctive reddish-brown knobs of fault breccia on the east side of Alto Relex appear to have been silicified, possibly by magma fluids. Some locations in the study area have slickensides and chatter marks with different orientations within a short distance, suggesting a complex structural history.