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# Ascending Water of the Delaware Basin, Southeastern New Mexico, and Far West Texas [Abstract]

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Ascending water of the Delaware Basin, southeastern New Mexico, and far West Texas  
[Abstract]

The Delaware Basin of west Texas and southeastern New Mexico is a deep, enclosed basin that formed during the Permian as a result of the final assembly of Pangaea. The Delaware Basin is defined by the Capitan Reef, which forms a nearly continuous carbonate reef complex that encloses a thick sequence of evaporite deposits in the basin interior. Inland of the Capitan Reef, interbedded gypsum/dolomite facies indicate Permian deposition in shallow, restricted shelf environments. All of the Permian facies of the Delaware Basin region show evidence of speleogenesis associated with ascending fluids. Much of this hypogene karst appears to be related to the genetic evolution of the Pecos River, which has been a significant potentiometric low driving the upward migration of fluids throughout the Cenozoic. North of the Capitan Reef, karst development proximal to the Pecos River in the San Andres, Seven Rivers and Rustler Formations shows morphological evidence of dissolution within a sluggish flow regime exhibiting mixed convection. Within the Delaware Basin, large subsidence features and intrastratal breccia occur in the Castile, Salado and Rustler Formations which attest to ascending fluid paths, many of which appear associated with the migration of the Pecos River. In the western Delaware Basin, complex hypogene caves and evaporite calcitization within the Castile Formation indicate the updip migration of hydrocarbon-rich fluids, which likely mixed with shallow surface waters. The world famous hypogene caves of the Guadalupe Mountains appear to be related to the eastward migration of the Pecos River in the Cenozoic, which provided the potentiometric low for ascending fluids rich in hydrogen sulfide. The source of hydrogen sulfide, which formed aggressive sulfuric acid-rich waters when mixed with oxygenated fluids at shallow depths, was originally attributed to evaporite calcitization in the Castile Formation. However, recent work suggests that this is not a geologically feasible source for significant amounts of hydrogen sulfide to be delivered to the Capitan Reef. Epigenic processes are currently overprinting evidence for hypogene origins for much of the karst development within the Delaware Basin region. However, enough evidence exists in both the carbonate and evaporite facies of the region to attest to the importance of ascending fluids in the speleogenetic evolution of the region.