
Detrital Origin of a Sedimentary Fill, Lechuguilla Cave, Guadalupe Mountains, New Mexico

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Abstract: Lechuguilla Cave is a hypogene cave formed by oxidation of ascending hydrogen sulfide from the Delaware Basin. A unique sediment deposit with characteristics suggesting derivation from the land surface, some 285 m above, was investigated. At this location, the observed stratigraphy (oldest to youngest) was: bedrock floor (limestone), cave clouds (secondary calcite), calcite-cemented siltstone, finely laminated clay, and calcite rafts. Grain-size analysis indicates that the laminated clay deposits are composed of 59– 82% clay-size minerals. The major minerals of the clay were determined by X-ray diffraction analysis and consist of interstratified illite-smectite, kaolinite, illite, goethite, and quartz. Scanning electron microscopy observations show that most of the clay deposit is composed of densely packed irregular-shaped clay-size flakes. One sample from the top of the deposit was detrital, containing well-rounded, silt-size particles.

Surface soils are probably the source of the clay minerals. The small amount of sand- and silt-size particles suggests that detrital particles were transported in suspension. The lack of endellite and alunite is evidence that the clays were emplaced after the sulfuric-acid dissolution stage of cave formation. Fossil evidence also suggests a previously existing link to the surface.

Key Words: Caves • Cave Sediments • Lechuguilla Cave

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