
Characterization of Clastic Pseudokarst and Associated Phenomena in East Texas

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GCAGS Explore & Discover Article #00390*

http://www.gcags.org/exploreanddiscover/2018/00390_smith_and_stafford.pdf

Posted September 29, 2018.

* Article based on an abstract published in the *GCAGS Transactions* (see footnote reference below) and delivered as a poster presentation at the 68th Annual GCAGS Convention and 65th Annual GCSSEPM Meeting in Shreveport, Louisiana, September 30–October 2, 2018.

ABSTRACT

Pseudokarst occurs within clastic sediments deposited in cyclic transgressive/regressive sequences in East Texas. Minor variability in stratigraphy and structural geology of the area has a significant impact on pseudokarst speleogenesis, and groundwater flow and direction. The Carrizo Formation contains several known caves, sinkholes, springs, and related pseudokarst features. Numerous small features created by suffusion processes have been documented which act as piping systems that bypasses overland flow and permit direct groundwater recharge. Larger pseudokarst porosity features have been identified attesting to potential significant cave development; Gunnels Cave and Moon Cave have surveyed lengths of 164 m and 101 m, respectively. Documented springs in the region occur along preferential flow paths, where shallow unconfined aquifer systems discharge horizontally through low permeability horizons created by varying rock and sedimentary properties. Vertical movement of groundwater occurs where semi-confined and confined aquifer systems discharge to the land surface through fractured strata. This study is developing a speleogenetic model for pseudokarst development to characterize the stratigraphic and mineralogic controls on cave development. Macro-porosity phenomena will be incorporated into a refined hydrogeological model to better understand groundwater, surface water and fluid interface interactions in the study area. To develop these models, current research is integrating cave mapping, remote sensing, stratigraphic analyses, and geochemical variability of pseudokarst features and springs to delineate spatial and temporal variability associated with pseudokarst in Nacogdoches County, Texas. These models will be used to predict potential zones of increased pseudokarst occurrences throughout East Texas, as pseudokarst research pales in comparison to other geological features.