

PALEOTOPOGRAPHIC CONTROLS ON FRAC SAND DEPOSITION AND ANCIENT AND MODERN FLUID FLOW IN CENTRAL TEXAS

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The Cambrian Hickory Sandstone exposed on the flanks of the Llano Uplift in central Texas is the basal member of the Riley formation and serves as an important groundwater aquifer and source of industrial sand, especially proppants for hydraulic fracturing. Previous studies have shown that the topography of the eroded Precambrian basement controlled the deposition of the overlying Hickory. The purpose of this research is to create a three-dimensional (3-D) model of a portion of the Hickory Sandstone and underlying basement to better understand the effect of paleotopography on the deposition of the Hickory. Ground-based LIDAR or high-resolution photogrammetry will be used to create scans of the Hickory exposed in 15 to 20-m-high walls of sand quarries that will allow 3-D stratigraphic correlation across the Voca Frac Sand District. Drilling reports from completed water wells in the area will be used to interpolate the top of the basement in the subsurface. This data will be analyzed in a GIS to characterize relationships in paleotopography and the overlying Hickory. The result of this work will be an improved understanding of how the basement topographic variation affects the deposition of a transgressive coarse-clastic succession. The work will also demonstrate a method for pairing scanning LIDAR and nonremotely sensed data in a GIS to better understand their spatial relationships. This work has practical implications for the frac sand industry, groundwater supply, and potentially other resources in central Texas.

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