Delineating Subsurface Karst Potential Using Electrical Resistivity in the Shell Mountain Region, Fort Hood Military Installation, Texas

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ABSTRACT

The Fort Hood Military Installation is located within the Lampasas Cut Plain in Coryell County, Texas, and is characterized by exposures of Lower Cretaceous Trinity and Fredericksburg Group carbonates. The Shell Mountain region is an elevated plateau located in western Fort Hood utilized by the military for heavy mechanical (troop and wheeled) maneuver training and hosts significant surficial and subsurface karst manifestations. Ongoing karst inventories in western Fort Hood conducted by range managers have documented over 100 individual karst features, including caves, shelter caves, sinks, and springs. Recent studies utilizing LiDAR and remote sensing techniques delineated karst potential in this area and identified over 13,909 discrete features, indicating karst development is significantly more extensive in western Fort Hood than predicted by field surveys.

This study used electrical resistivity to characterize subsurface karst potential associated with four known caves in the Shell Mountain region. Existing cave maps from the Division of Natural Resource Management at Fort Hood were used to delineate areas in which there may have been inaccessible or infilled passages. For locations that had significant soil cover, the AGI SuperSting was implemented using the Wenner array method; locations that were dominated by exposed bedrock were investigated with the Geometrics Ohm Mapper. Using these methodologies, a minimum of three survey lines were completed at each cave, with a total of fifteen lines for the area. Results show significant subsurface inaccessible karst features associated with known caves, including mega-porosity and potential infilled cave passages. These data will be utilized to create karst management plans in Fort Hood training areas in order to support military readiness and personnel safety.

Robison, A. P., and M. S. Faulkner, 2019, Delineating subsurface karst potential using electrical resistivity in the Shell Mountain region, Fort Hood Military Installation, Texas: GeoGulf Transactions, v. 69, p. 597.