SITE INVESTIGATION IN KARST TERRAIN ENVIRONMENT USING GEOPHYSICAL AND CONVENTIONAL TECHNIQUES

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Geophysical data were acquired using Electrical resistivity tomography (ERT) and multichannel analysis of surface waves (MASW) to investigate a karst terrain site in Greene County, southwestern Missouri. In addition, conventional data were acquired to constrain geophysical data interpretations using aerial imagery, and borehole control. This case study is aiming to achieve two main objectives using an integrated geophysical and conventional approach by first identifying potentially low resistivity zones associated with changes in moisture content due to being in proximity to or underneath natural and man-made activities using the ERT and aerial images. Second, verifying the ERT data interpretations in terms of determining depth to top of rock, and moisture variations using MASW and Borehole control as ground truth.

The outcomes of ERT survey were displayed as 2D resistivity images of the subsurface to a depth of approximately 100 feet while the outcomes of MASW survey were displayed as 1D shear wave velocity profiles of the subsurface to a depth of approximately 50 feet to100 feet. Aerial images were acquired using Google Earth to identified areas of interest of water catchments or impediment on the ground surface and Borehole control were acquired to evaluate earth materials changes in terms of their moisture content, possible presence of voids and fractures as well as verifying depth to top of rock.

The preliminary findings of this research indicate that there is a potential decrease in resistivity of soils and rocks underneath and in proximity to or underneath natural (e.g., natural surface runoff, etc.) and manmade (e.g., roadways drainage ditches, etc.) activities compared to elsewhere along the study site. This could be attributed to the increase in moisture content at these anomalous zones due to the great infiltration and percolation of water downward into the subsurface through porosity of earth materials and drainage networks or conduits formed by the interconnected fractures, voids, and joints in karst bedrock. The identification of these anomalous zones is critical to understand the potential of formation and development of karst features near locations of water impediments for karst mitigation and remediation endeavors.