Forensic target detection with electrical tomography at the controlled site of the Federal Brasília University (Foren/UnB)

Ana Clara de Araujo Sousa*[1], Luciano Soares da Cunha[2], Kimberly Coutinho Paes Leme de Castro[2], Daniela Serrão Liaffa[2], Caio Benevides[2], Fernando Victor Trindade Gomes[2], [2] Universidade de Brasíla- UnB

Abstract

In the area of forensic research, the use of geophysical methods has been one of the main lines of research. However, there is a need for a better understanding of the influence of physical parameters on geophysical responses. Thus, using Electrical Tomography, the main objective is to evaluate the influence of physical parameters, moisture, and clay content on forensic target identification. At the Forensic Geophysics Controlled Site, an experiment was installed to advance this knowledge in forensic research. The experiment comprises 04 Experimental Graves (SEPs) with prismatic geometry of 3.0m long x 1.0m wide x 1.5m deep. The targets were set at depths of 0.50m or 1.0m, with the clay percentage varying between 30%, 50%, and 70%. Medium sand was used to complete the cover material. The spatial-temporal variation of moisture is being monitored through laboratory analyses of soil samples and electrical resistivity sections, and radargrams. The equipment being used was the SuperSting R8 (AGI instruments). Dipole-dipole and Wenner-Schlumberger electrode arrangements with 28 electrodes spaced every 1.0m are being used. The first data acquisition campaign was conducted at the beginning of the dry season (May/2023). The raw field data were filtered and inverted following the sequential transformation steps from .stg to .dat format, altimetry insertion, standard deviation, most minor square inversion, graphical analysis, and percentage reduction of the divergent points between the measured and calculated electrical resistivity values. The partial results of the SEPs 1 and 2 profiles show a small anomalous region represented by a lateral and vertical variation of lower electrical resistivity.