A SENSITIVITY COMPARISON OF TWO COMMERCIAL TIME-DOMAIN EMI SENSORS FOR UXO DETECTION


Abstract: In live-site unexploded ordnance (UXO) remediation, digital geophysical mapping (DGM) must be accomplished to assess potential targets of interest (TOI) in the affected area. The DGM process is extremely time-consuming and subsequently an expensive endeavor. To minimize the costs associated with DGM, towed electromagnetic induction (EMI) sensors or sensor arrays are employed to increase the coverage rates and provide large sets of data for “post-processing” evaluation. The performance of these DGM studies in effectively detecting TOI is largely dependent on the sensor characteristics, in particular the Signal-to-Noise Ratio (SNR) achieved across targets of varying size and depth. Additionally, the spatial resolution of the sensor arrays determines the accuracy with which TOI can be localized, potentially saving time in the UXO extraction phase. In this project, we collected data over UXO test lanes with two commercially available EMI sensors - the Geonics EM61-MK2 and the Minelab Single-Transmit Multiple Receive array. Interrogated targets range from 40mm projectiles to 81mm mortars buried at multiple depths and different orientations. These tests were conducted using the Scout UXO detection system, a trailer unit originally developed by Applied Research Associates, Inc. for the U.S. Army Night Vision Electronic Sensors Directorate Humanitarian Demining division to perform DGM on live-site, overseas clearance areas. The performance of these sensors are presented and compared based on the criteria of SNR, rate of coverage, TOI localization capability, and the ability to detect “difficult” (small) targets.

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