THE DATA PROCESSING CHALLENGE POSED BY ADVANCED TEM SYSTEMS

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Within the SERDP/ESTCP program, a number of advanced electromagnetic (EM) systems are being developed or demonstrated to assess their efficacy for applications in UXO site characterization. These advanced systems typically have complex antenna geometries involving multiple transmitter and receiver antennas that have been integrated with a high-speed data acquisition (DAQ) system. With these systems, broadband secondary EM fields are simultaneously sampled from an array of receiver coils. At the same time, the primary field excitation can be electronically multiplexed between several transmitter coils. The systems can be deployed in both the dynamic-mode for mapping (detection) and in the static-mode for Cued ID (discrimination). The principal advantage of these systems lies primarily in their ability to acquire sufficient data at a single spatial location (station) to fully characterize the target using simple physics-based models.

With these systems, the rate of data production in the field as measured by line-km/day or static data points/day is not significantly different from EM systems (e.g., EM61-MkII, EM63, GEM-3, etc.) that are currently being deployed for routine UXO site investigations. The challenge posed by these advanced systems is to efficiently process the large volume of data that they acquire in order to minimize the added data processing burden that comes with their deployment. Secondly, the processing software supporting these systems must provide a simple realization of the added value for both target detection and discrimination that these systems can provide.

In this paper, we discuss the framework that we have developed for processing data acquired with the MetalMapper™ (MM) system, one of the advanced EM systems currently being demonstrated by Geometrics, Inc. with ESTCP support (MM-0603). We discuss the processing steps involved in using MM in both the map and static acquisition modes. We will illustrate the processing with examples drawn from demonstrations performed at the Standardized UXO Technology Demonstration sites at Yuma, AZ and Aberdeen, MD earlier this year.