FREQUENCY-DOMAIN ELECTROMAGNETIC INDUCTION METHOD FOR PASSIVE ENVIRONMENTAL STUDIES

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Dual-coil frequency-domain electromagnetic induction systems are commonly used to detect buried metallic bodies, such as unexploded ordnance, because they are very sensitive to the presence of highly conductive structures. Besides, they are also useful for environmental applications like contaminant detection, waste sites exploration or archaeological prospecting, since they are an alternative method to delimit anomalous zones.

Data from these systems are usually analyzed by visualizing the In-Phase and Quadrature responses. In some cases, when frequency or coil separations may be varied, forward and/or inversion methods could be applied.

This method could be a valuable approach for engineering applications. Techniques including 2D and 3D data visualization are valuable tools for near real-time (i.e., same day) analysis, since it can provide a preliminary diagnosis and guide further data acquisition. Besides, once the anomalies have been identified from visualization of the data, a quantitative analysis can be done, with a better resolution in the characterization of the targets.

Within this context, we explored in this paper the usefulness and accuracy of electromagnetic induction method as a tool for the characterization of environmental passive in the subsoil of industrial plants.

We analyzed the best approach to interpret EMI data for two characteristic targets within a chemical plant: localization of buried tanks in indoor reduced rooms and characterization of contaminated plumes originated by spills at storage tanks.

We studied the influence of the environmental noise and the reduce dimensions of the rooms with respect to the equipment lengths. We varied coil configurations and applied different visualization techniques to look for the ones that best resolve low-contrast anomalies. Finally we applied 1D inversion codes, when required, to obtain a quantitative location of the embedded target.