Background:
Technologies are needed that can detect and discriminate unexploded ordnance (UXO), which can range in size from 20 mm shells to 2000 lb bombs, from other items in the subsurface. The development of cost-effective detection and discrimination technologies is needed in the following three categories: (1) integrated systems that can cost-effectively survey large tracks of land, detect potential UXO, and discriminate UXO from clutter, (2) systems that are cued by other survey technologies that can cost-effectively and non-invasively interrogate the suspected item, and (3) processing technologies that can exploit the current state-of-the-art sensors to improve discrimination capabilities.

Objective:
The objective of this project is to demonstrate a matched-filter data processing technique applied to measure synthetic aperture ground penetrating radar (GPR) data. This technology may significantly reduce the number of false positives identified when characterizing UXO contaminated sites.

Summary of Process/Technology:
The project involves the development of a matched filter processing technique to improve the discrimination of UXO targets detectable by an existing GPR. This processing technique exploits target-specific radar scattering features directly in the image formation process. The GPR to be used for this project, previously developed by Mirage Systems, is a mobile standoff system (i.e., the GPR antenna is remote from the ground surface) that uses synthetic aperture radar (SAR) techniques to form true three-dimensional imagery of the subsurface environment.

Benefit:
Development of an effective matched filtering processing technique for use with a SAR GPR offers the potential for significant improvement in UXO discrimination with this type of sensor. When coupled with the high surveying productivity of a standoff GPR, the technique could produce very useable and reliable site characterization reports featuring good detection and low false positive rates in a cost-effective manner.

Accomplishments:
This is an FY00 New Start project.

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