

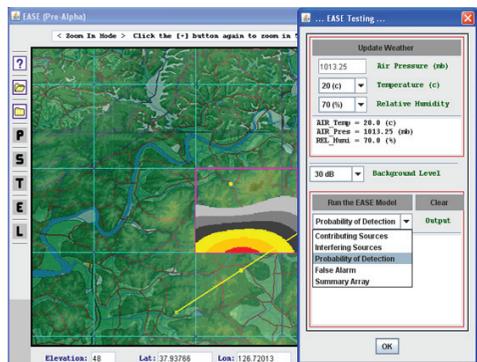
CRREL's Signature Physics Mission

To conduct research and develop decision-making and prediction products focused on the sensor-target interaction and influence of terrain and weather environment on signal propagation.

Fundamental research to increase knowledge and understanding of external perturbations to electromagnetic, acoustic, and seismic wave propagation and signatures in support of the military warfighter as well as civilian complex geometry and geology.

Core Competencies

- Seismic/Acoustic Sensing in Complex Environments.
- Sensor Performance Modeling, Decision Making and Uncertainty Analyses.
- Sensor Based Security.
- Unexploded Ordnance Discrimination and Assessment.
- All-Season Near Surface Phenomenology.



Environmental Awareness for Sensor Employment Decision Support Tool

Research Tools

- Ground penetrating radar
- Electromagnetic induction techniques
- Seismic and acoustic real-time data collection
- Intrusion detection systems
- High-performance computing capability
- Stochastic modeling of nonlinear effects

The Cold Regions Research and Engineering Laboratory (CRREL)

The Cold Regions Research and Engineering Laboratory (CRREL) in Hanover, New Hampshire and Anchorage and Fairbanks, Alaska is part of the US Army Corps of Engineers Engineer Research and Development Center (ERDC). Our mission is to solve interdisciplinary, strategically important problems of the US Army Corps of Engineers, Army, Department of Defense, and the Nation by advancing and applying science and engineering to complex environments, materials, and processes in all seasons and climates, with unique core competencies related to the Earth's cold regions.



BUILDING STRONG®

Contact

Chief, Signature Physics Branch
Cold Regions Research and Engineering Laboratory
72 Lyme Road, Hanover, NH 03755-1290
Phone: 603-646-4230, option 1
Email: CRREL-SP@usace.army.mil
<https://www.crrel.usace.army.mil>



US Army Corps of Engineers®



Sensing in Complex Environments

Sensor-Performance Modeling and Decision-Making

All-Season Near-Surface Phenomenology

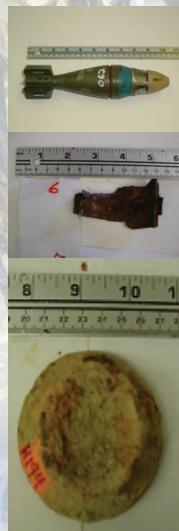
U.S. Army Engineer Research and Development Center
Cold Regions Research and Engineering Laboratory

Various Efforts Supported by Signature Physics:

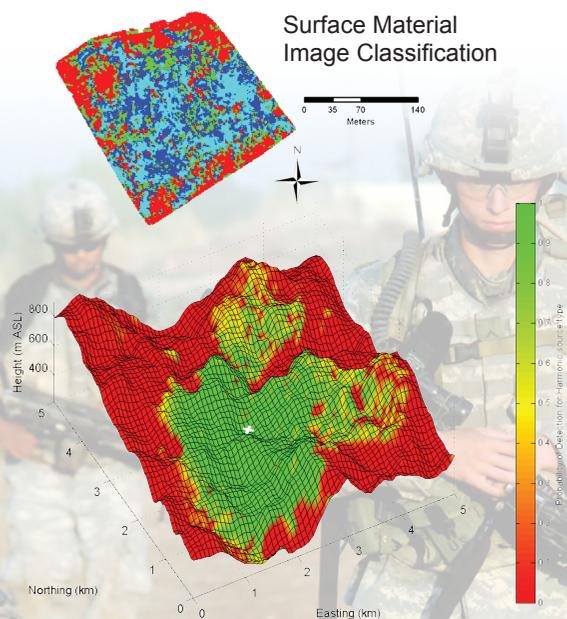
- Electromagnetic remote sensing and sub-surface detection of Unexploded Ordnance.
- Soil characterization in regions of the world of interest to the Army.
- Effects of electrical properties of vegetation and near-surface and sub-ionospheric atmospheric disturbances.
- Characterization of electromagnetic air/surface wave propagation.
- Electromagnetic remote sensing and sub-surface detection of Unexploded Ordnance.
- Environmental effects on seismic/acoustic wave propagation and sensors.



Ground penetrating radar test at Yuma Proving Ground to detect buried improvised explosive devices.



Seek Out Solutions to the Most Challenging Problems in Today's Army



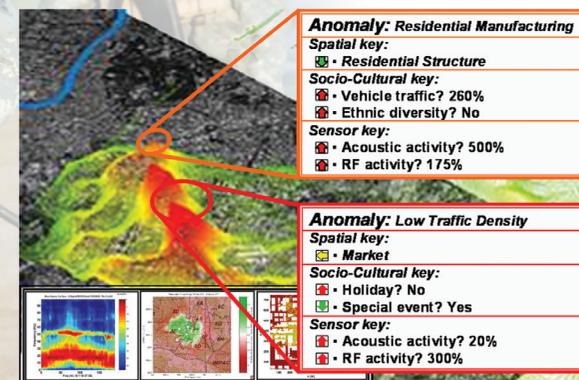
Probability of detection for helicopters

- Three-D expressions for seismic waves subject to strongly heterogeneous near-surface geological conditions for several scalings.
- Three-D expressions for acoustic waves affected by boundary layer meteorology, heterogeneous ground impedance and topographic and terrain feature controls.
- Personnel signatures (seismic, infrared, visual, and acoustic) due to weather, terrain and cultural activity.

Exciting new developments

- Seismic signal modeling for battlefield sensors.
- Electromagnetic modeling and numerical methods.
- Signature phenomena and other exploitation techniques for remote sensing of kinetic hazards.
- Infrasound propagation in complex environments.

GEOINT Exploitation in Man-made Environments: Nations to Insurgents (GEMENI)



Groundwater & contaminant transport flow model

