



# INTEGRATED TERRAIN ANALYSIS PROGRAM

[WWW.DRI.EDU/TAP](http://WWW.DRI.EDU/TAP)

**D**ESERT RESEARCH INSTITUTE (DRI) scientists provide the U.S. Department of Defense (DoD) with a wide range of science-based information in support of global military objectives. DRI support ranges from enhancing sustainability of military installations, to test and evaluation of military equipment, to providing soil and terrestrial data in support of military tactical operations.

The variable nature of terrain (topography, ground/vegetation cover, soil condition) will greatly impact the success of military operations, including operational mobility, weapon performance, communications, and counter IED/landmine. Because accurate terrain data in areas of strategic interest is commonly limited or inaccurate, DRI developed the Integrated Terrain Analysis Program (ITAP) to advance technology that provides prompt and accurate characterization of all terrain types and conditions using a combination of space- and airborne- information and science-expert analysis.



**PHOTO CAPTIONS** DRI scientists measure the potential for wind erosion and dust emissions from desert soils similar to those found in military zones in the Middle East and Southwest Asia.

## TARGETED SOLUTIONS & CONTRIBUTIONS FOR THE U.S. DEPARTMENT OF DEFENSE

- Developed new methods for rapid terrain characterization of deserts, temperate, tropic, and cold region environments for test, training, and tactical operations.
- Produced the “Catalog of Analogs” for ATEC that compares terrain in CENTCOM to terrain used for testing and training in the southwestern U.S.
- Developed soil-dust emission maps for Air Force Weather Agency to forecast hazardous dust/sand storms in CENTCOM AOR.
- Provided terrain analysis for test and evaluation of military equipment including MRAP (Mine-Resistant Ambush Protected) and Up-Armored HUMVEE vehicles, counter-IED technology, the Intelligent Munitions System and technology to decrease fuel use.
- Developed new sensor technology to measure dynamic environmental parameters from soil dielectric/permittivity to real-time measurement of dust cloud concentration.
- Critical characterization of airborne dust at Forward Operating Bases in Iraq and Afghanistan to evaluate potential health impacts to military personnel.
- Using field, remote sensing, and laboratory characterization of soils, terrain, and climate to support a wide range of test operations from vehicle mobility to ground robotics.
- Advancing UAS-based optical, thermal, and infrared sensor analysis of surface conditions.

## NEVADA SCIENCE, GLOBAL SOLUTIONS

The Desert Research Institute (DRI) is a recognized world leader in basic and applied interdisciplinary research. Committed to scientific excellence and integrity, DRI faculty, students, and staff have developed scientific knowledge and innovative technologies in research projects around the globe. Since 1959, DRI's research has advanced scientific knowledge, supported Nevada's diversifying economy, provided science-based educational opportunities, and informed policy makers, business leaders, and community members. With campuses in Reno and Las Vegas, DRI serves as the non-profit research arm of the Nevada System of Higher Education.

[www.dri.edu](http://www.dri.edu) | Follow us @DRIScience |    



## SERVICES

- Comprehensive characterization of dust and aerosols: mineralogical, emissions, airborne transport, modeling
- Terrain and environmental evaluation and mapping for U.S. military operations and training (tropic, desert, cold-region, and temperate environments)
- Field and laboratory characterization of soil, sediment, and rock properties
- Comprehensive environmental analysis (climate, vegetation, hydrology, cultural resources) to support range operations and sustainability
- Global to local: remote-sensing, terrestrial image analysis, and UAS airborne production and analysis of optical, thermal, and digital elevation models of military terrain
- Hydrological modeling, evaluation, monitoring, analysis (surface and ground water)

**PHOTO CAPTIONS** Bottom left & right: Research and development of technology in C-IED and countermine detection.



## UNIQUE CAPABILITIES AND AREAS OF EXPERTISE

### DEGRADED VISUAL ENVIRONMENTS (DUST BROWNOUTS)

- Advancing capabilities and methods to predict location of Go/No Go landing zones
- Science-based assessment of dust and dust-producing processes that cause brownouts
- Developing technology to actively monitor dust cloud concentration and size

### ENVIRONMENTAL SUPPORT OF TEST OPERATIONS FOR SENSORS & ELECTRONICS

- Research on how soils and ground cover limit propagation of radio waves in tropical, cold-region, temperate and desert environments
- Instrumentation and characterization of sites used to test RF, electromagnetic, and optical processes for C-IED and Countermine technology
- Development of Master Environmental Reference Sites (MERS) to energy and mass balance processes for tropical, cold-region, temperate and desert environments

### CHARACTERIZATION OF GLOBAL MILITARY OPERATING ENVIRONMENTS - TERRAIN & ENVIRONMENTAL VARIABLES

- Work with Engineer Research & Development Center CRREL for research, development, test and evaluation of material for extreme climatic conditions
- Develop global database of critical soil and terrain characteristics of all global military operating environments for access by all RDT&E activities
- Rapidly characterize and assess terrain conditions using UAV/UAS based sensor data

### MODELING AND SIMULATION OF GROUND-BASED VEHICLE & ROBOTIC MOBILITY

- Develop and characterize soil and terrain attributes that impact mobility of ground-based vehicles and robotics
- Working with ERDC to update and improve the NATO Reference Mobility Model
- Advance new modeling techniques for rapid assessment and application of LiDAR remote sensing data for characterization of terrain roughness



## CONTACT US

Eric McDonald, Ph.D.  
Terrain Analysis Program Manager  
(775) 673-7302  
eric.mcdonald@dri.edu

Desert Research Institute  
2215 Raggio Parkway  
Reno, NV 89512  
(775) 673-7300