U.S. Military Research Initiatives at DRI

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’s unique, interdisciplinary capabilities address the needs of all critical scientific aspects of land, air, and water. DRI support ranges from enhancing sustainability of military installations, to testing and evaluation of military equipment, to providing terrestrial data in support of military tactical operations.

Targeted Solutions & Contributions for the U.S. Department of Defense

- Developed the most accurate terrain maps for Iraq and Afghanistan used by the Army Test and Evaluation Command (ATEC)
- Improved testing of military equipment including MRAP (Mine-Resistant Ambush Protected) and Up-Armored HUMVEE vehicles, counter-IED technology, the Intelligent Munitions System

- Developed soil maps for weather models that predict occurrence of hazardous dust/sand storms in Middle East/SW Asia
- Air Force Weather Agency reports significant increase in accuracy of storm prediction, reducing impact of dust storms to military operations

- Investigated the source of dangerous combat weapon jams in Iraq and Afghanistan
- Determined desert dust mixed with gun lubricants, new field standard operating procedures established to decrease jamming of weapons

- Produced the “Catalog of Analogys” for ATEC that compares the terrain of key countries in the Middle East/SW Asia to terrain used for testing equipment in the United States
- Commonly used by Test Operation Officers to select most applicable terrain at Yuma Proving Ground to test military systems prior to development

- Provided critical characterization of airborne dust for multiple FOBs (Forward Operating Bases) in Iraq and Afghanistan
- Established key background and in-theater levels of dust mineral content and dust concentration for assessing potential health hazards from dust inhalation to military personnel

Terrain Analysis Program

The highly variable nature of terrain (e.g. topography, ground/vegetation cover, soil type) can greatly impact global military operations. Mission success, including operational mobility, weapon performance, communications, and counter IED/landmine, all depend on accurate knowledge of terrain conditions. Unfortunately, accurate terrain data in areas of strategic interest is commonly limited or inaccurate.

DRI developed the Terrain Analysis Program (TAP) to advance technology to provide prompt and accurate characterization of all terrain types and conditions using a combination of space- and airborne- information and science-expert analysis. The objective of TAP is to provide customer-focused, science-based knowledge of terrain conditions tailored to specific military issues and challenges.
Unique Capabilities and Areas of Expertise

DEGRADED VISUAL ENVIRONMENTS (BROWNOTTS)
- Development of technology and methods to predict location of Go/No Go landing zones
- Science-based assessment of dust and dust-producing terrains for development, test and evaluation of aircraft technology to avoid brownouts

PERFORMANCE OF RADIO FREQUENCY PROPAGATION FOR C-IED/C-MINE
- Research on how soils and ground cover limit propagation of radio waves in tropical, cold-region, temperate and desert environments
- Instrumentation and characterization of test sites used to monitor and evaluate technology using RF and electromagnetic, and optical processes
- Continued operation of Master Environmental Reference Sites (MERS) to monitor ecological processes for tropical, cold-region, temperate and desert environments

CHARACTERIZATION OF GLOBAL MILITARY OPERATING ENVIRONMENTS (TERRAIN AND ENVIRONMENTAL VARIABLES)
- Work with ERDC CRREL to complete revision of AR-70-38: Research, Development, Test and Evaluation of Material for Extreme Climatic Conditions (latest version dates from 1979)
- Improve incorporation of soil and terrain, physics-based processes into more realistic simulation and scenario modeling
- 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 MOBILITY OF VEHICLES AND ROBOTICS
- Apply and develop new methods to characterize soil and terrain attributes that impact mobility of ground-based vehicles and robotics
- Work with ERDC GSL to update and improve NATO Reference Mobility Model (circa 1970)
- Advance new modeling techniques for rapid assessment and application of LiDAR remote sensing data for characterization of terrain roughness

Eric McDonald
- Research Professor specializing in soil science and geology
- Conducted upwards of $7M in support of testing and evaluation of military equipment at the Army Yuma Proving Ground (YPG) since 2003

Primary DoD Projects: Sponsors and Principal Activity

ARMY RESEARCH OFFICE

ARMY YUMA PROVING GROUND
- Natural Environments Test and Evaluation (2004–2013)

JOINT IMPROVISED EXPLOSIVE DEVICE DEFEAT ORGANIZATION (JIEDDO) (2009–2012)
- Support of C-IED test and evaluation on global scale

U.S. AIR FORCE WEATHER AGENCY, OFFUTT AFB (2009–2011)
- Development of dust emission data for dust storm forecasting in USCENTCOM

- Enhanced particulate matter surveillance for Southwest Asia

OTHER DoD PROJECT SPONSORS
- RDECOM, NVS, ERDC, ARL, SERDP, LEGACY, USMA, NGA, AFRL