SERDP & ESTCP Recognize Outstanding Efforts at Annual Symposium

Winners Include a Modeling Effort Which Distinguishes Between UXO & Harmless Metal Objects

SIX PROJECT-OF-THE-YEAR

Award recipients were announced at the 2010 Partners in Environmental Technology Technical Symposium and Workshop sponsored by the Strategic Environmental Research and Development Program (SERDP) and the Environmental Security Technology Certification Program (ESTCP) 30 November to 2 December 2010 in Washington, D.C. More than 1,200 environmental professionals from government agencies, academia, and the private sector were on hand for the opening plenary session at which the awards were presented. The awards honor principal investigators who, through their outstanding efforts, have helped the Department of Defense (DoD) achieve its mission while improving its environmental performance. Award recipients include:

Environmental Restoration, SERDP Project of the Year

Improved Understanding of the Biodegradation of cis-Dichloroethene and Vinyl Chloride

Mr. Evan Cox (Geosyntec Consultants, Inc.), Dr. James Gossett (Cornell University), Dr. James Spain (Georgia Institute of Technology), and their colleagues identified and explained how chlorinated solvents in groundwater can continue to degrade through biological processes even on sites that appear to lack the characteristics necessary for such processes to occur.

Chlorinated solvents are the most common source of contaminated groundwater on DoD lands. Most DoD sites are cleaned up by either introduced or natural biological processes that break down these contaminants to the point where the harmful chemicals are fully degraded and the site is remediated. But at a significant number of sites, the process appears to stall at a point where the solvents have been degraded into the toxic chemicals cis-dichloroethene (DCE) and vinyl chloride (VC). The possible routes and rate for the continued degradation of these chemicals have been a subject of great debate in the scientific literature with significant economic and risk consequences.

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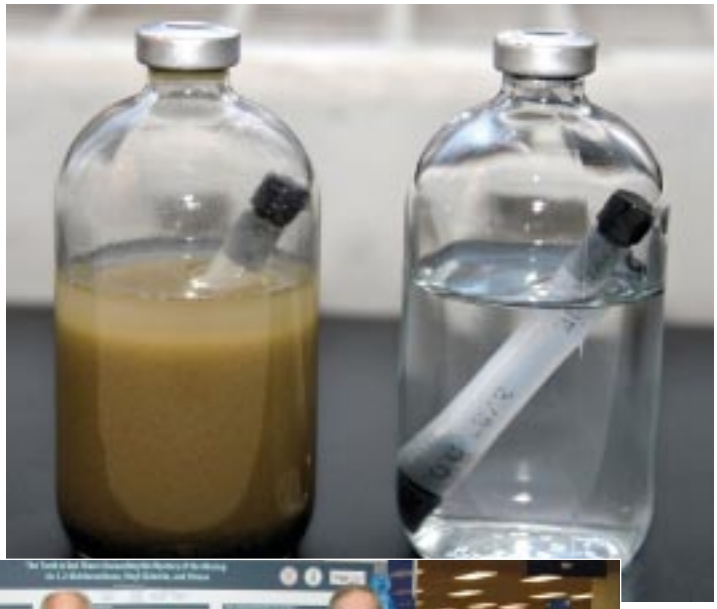


Having resolved a longstanding scientific question regarding cis-DCE and VC biodegradation, Mr. Evan Cox (center), Dr. James Gossett (right of center), and Dr. James Spain (left of center) were selected to receive the SERDP Environmental Restoration Project-of-the-Year Award. This new knowledge will enable DoD to improve management of chlorinated solvent-contaminated sites. Joining them here are Dr. Jeffrey Marqusee, SERDP and ESTCP Executive Director, and Dr. Anne Andrews, SERDP and ESTCP Deputy Director.

These researchers succeeded in identifying the organisms and elucidating the pathways by which these toxic chemicals may continue to break down at these sites. Through a series of elegant experiments, they determined that micropockets of oxygen, at very low concentration, do in fact exist in the subsurface at sites that appear to be anaerobic, thus resolving this longstanding scientific question.

This knowledge will directly reduce DoD costs for cleaning up chlorinated solvent sites and improve management of these sites. Managers will now be able to predict with confidence if a site will continue to remediate itself or if they need to introduce other processes to fully degrade these toxic chemicals.

Weapons Systems and Platforms, SERDP Project of the Year

Eliminating Chromium from Medium Caliber Gun Barrels

Mr. Mark Miller (U.S. Army Benet Laboratories) and his colleagues developed a method for gun manufacturing that eliminates a hazardous workplace risk, reduces costs, and improves weapons performance.

Medium caliber gun barrels, such as those mounted on trucks and helicopters, have historically been made using chromium as a coating on the interior bore surfaces. This hard surface protects against propellant gases and wear and tear from projectiles when the gun is fired. Although the coating provides the desired properties, the hexavalent chromium used in the plating process is a known carcinogen, requiring time-consuming and expensive precautions that protect workers, as well as incurring substantial disposal costs.

Mr. Miller and his team developed a new method for applying an environmentally benign tantalum-tungsten coating onto the interior surfaces of the gun barrels using an innovative explosive bonding process. Their work combined fundamental engineering, high-end computational modeling, and experimental research.

In addition to eliminating hazardous workplace exposure to hexavalent chromium and reducing costs, this new coating has the potential to enhance the military mission. Tests show that the tantalum-tungsten-lined gun barrels last three times as long as the chrome-plated tubes. This increased performance provides the basis for the development of more effective weapons in the future.

Resource Conservation and Climate Change, SERDP Project of the Year

Predicting Responses to Habitat Fragmentation, Restoration, and Management

Dr. Thomas Sisk (Northern Arizona University) and Dr. Leslie Ries (University of Maryland, College Park) together with their colleagues developed a modeling tool for DoD installation managers to manage land use and habitats in a way that improves both mission sustainability and conservation planning.

SERDP's Weapons Systems and Platforms Project of the Year, led by Mr. Mark Miller, developed a method for applying an environmentally benign tantalum-tungsten coating onto the interior surfaces of medium caliber gun barrels. Gun barrels coated with tantalum-tungsten last three times as long as barrels coated with hazardous hexavalent chromium.

SERDP's Weapons Systems and Platforms Project-of-the-Year Award recipient Mr. Mark Miller (center left) and his team were joined by Dr. Jeffrey Marqusee (far right), SERDP and ESTCP Executive Director, and Dr. Anne Andrews, SERDP and ESTCP Deputy Director, at their poster highlighting a novel approach to eliminating chromium from medium caliber gun barrels.
Craig Kellstrom

Military installations serve as the platform for meeting the Department's national security mission. The natural resources on these installations are critical to that mission. DoD has a responsibility to the nation to preserve the species that reside on the landscape and a responsibility to sustain it for military training.

These military installations often include a range of landscapes, from patches of pristine forest, to open fields, to parcels of lands heavily impacted by use. How birds and other animals interact with these landscapes depends not only on the type of landscape and its size but also on its configuration—on the areas where these varied landscapes connect or the "edges."

Dr. Sisk and Dr. Ries applied a fundamental understanding of different animals' response to edges to develop a practical and user-friendly approach to managing multiple species on varied landscapes within a military site. The resulting tool combines a landscape model that links field and remotely sensed data to assess impacts of land use strategies on animal populations and an ecologically based multispecies modeling approach to threatened, endangered, and at-risk species management.

SERDP's Resource Conservation and Climate Change Project of the Year, led by Dr. Thomas Sisk and Dr. Leslie Ries, developed a modeling tool that predicts responses to landscape changes and, in so doing, informs land use and habitat management decisions at military installations, improving both mission sustainability and conservation planning.

Dr. Leslie Ries and Dr. Thomas Sisk, recipients of the SERDP Resource Conservation and Climate Change Project-of-the-Year Award, showcased their research on different animals' response to areas where varied landscapes connect and development of a practical and user-friendly approach to managing multiple species within a military site.
Craig Kellstrom

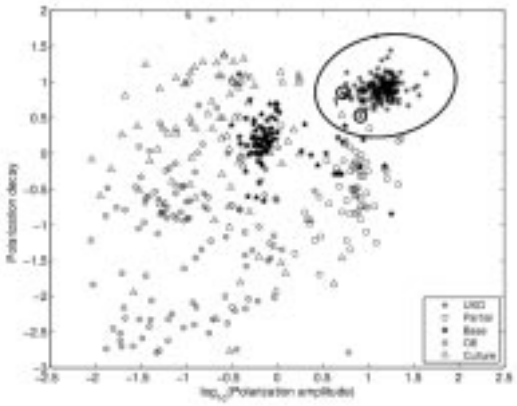
This tool enables researchers and land managers to determine the effects of habitat fragmentation, restoration, and management practices on multiple species and to translate that understanding to planning and on-the-ground management.

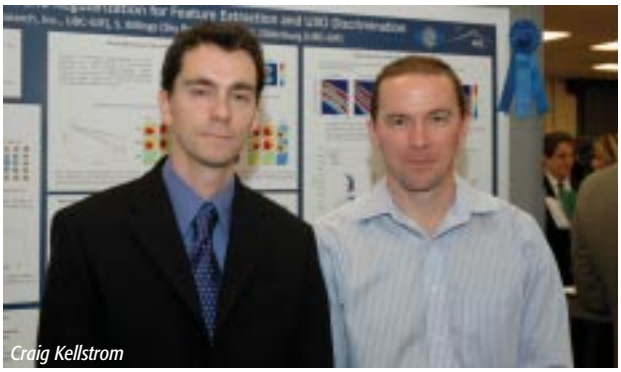
Munitions Response, SERDP Project of the Year

Robust Statistics and Modeling for Feature Extraction and UXO Discrimination

Dr. Stephen Billings (Sky Research, Inc. and University of British Columbia) and colleagues developed robust statistical methods and modeling techniques for improving unexploded ordnance (UXO) classification and discrimination.

DoD's liability for munitions response is estimated in the tens of billions of dollars. With resources constrained, munitions response actions on many sites are forecast to be decades out. One of the most promising technology advances for reducing the cost per site and accelerating the pace of cleanup is in the use of classification to distinguish the buried UXO from the vast quantity of harmless pieces of metal found on any site, allowing resources to be directed to real risk reduction.





SERDP Munitions Response Project-of-the-Year Award recipient Dr. Stephen Billings (right) and team member Dr. Laurens Beran presented their robust statistical methods and modeling techniques that significantly improve efforts to distinguish UXO from harmless metal objects.

Key to UXO classification is the ability to fit geophysical data to a model that accurately represents parameters of a physical object. Such parameters include the object's length and shape and the material it is made of. Complicating the task are real-world factors, such as surveying over uneven ground, that affect the quality of data that can be collected in the field.

Dr. Billings and his team combined fundamental understanding of the underlying physics with their experience in the practicalities of gathering field data to develop robust statistical methods and modeling techniques that will improve parameter estimates and ultimately provide DoD with significant improvements in its ability to distinguish between UXO and harmless metal objects.

ESTCP Project of the Year

Composites with Low Hazardous Air Pollutant Compounds for Military Platforms

Dr. John La Scala (U.S. Army Research Laboratory) and his colleagues demonstrated and validated the use of more environmentally benign composite materials for high-performance military applications.

The military is rapidly moving to more and more advanced composite materials that offer great advantages over traditional materials such as steel. But as these new lightweight and high-performance composite structures are exploited for military applications, the environmental consequences associated with their applications need to be reduced. Current liquid resins are a significant source of hazardous air pollutant (HAP) emissions. As a result, extensive and costly measures are required to protect workers from being exposed to these harmful chemicals.

Dr. La Scala and his team demonstrated and validated low-HAP resins for the manufacture and repair of composite components used in military applications. These components include ballistic hardtops for the Marine Corps Humvees, hoods for Army vehicles, and an F-22 canopy cover for the Air Force.

Their work has shown that these resin formulations meet the critical military requirements and that the green low-HAP composites have improved weatherability and durability relative to the baseline composites. These composites will significantly decrease worker exposure

As demonstrated by a 2010 ESTCP Project of the Year, low-HAP resins for the manufacture and repair of composite components significantly decrease worker exposure, while meeting critical military requirements. Components demonstrated by Dr. John La Scala and his team include ballistic hardtops for the Marine Corps Humvees, hoods for Army vehicles, and an F-22 canopy cover for the Air Force shown here.

ESTCP Project-of-the-Year Award recipient Dr. Mark Prouty (left) and his team developed and commercialized MetalMapper, a sensor built specifically for munitions classification. Deployment of MetalMapper can dramatically improve and accelerate DoD's ability to effectively remediate former military sites across the nation.

during manufacturing and minimize the expense and time associated with managing permits and air pollution recovery units.

ESTCP Project of the Year

MetalMapper

Dr. Mark Prouty (Geometrics) and his team developed and commercialized MetalMapper, a time-domain electromagnetic system that transmits and receives on multiple axes to provide a much richer data set that can be exploited for UXO classification.

Commercially available geophysical sensors that are generally used for munitions response were developed for other applications. They offer only a limited amount of information that can be used for classification to distinguish buried UXO from harmless pieces of metal found on a site.

In MetalMapper, Dr. Prouty and his team developed a purpose-built sensor for munitions classification. The technology builds on many years of combined efforts of scientists in university, government, and industry laboratories conducting the fundamental research that provided the basis for the sensor system.

MetalMapper is now being demonstrated at former military sites across the nation in collaboration with state and federal regulators. The deployment of MetalMapper can dramatically improve and accelerate DoD's ability to effectively remediate former military sites, reducing risks to the people who use and live on these sites and enabling redevelopment of these lands.

Symposium Presentations & Webcasts Available

Additional information about the 2010 symposium, including plenary and technical session presentations and short course webcasts, as well as preliminary information about the 2011 event to be held 29 November—1 December 2011, in Washington, D.C., is available at www.serdp-estcp.org/symposium. The Call for Poster Abstracts will be posted at the end of May 2011.

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