SERDP ESTCP HEADLINES

WINTER 2020 EDITION

DoD's Environmental Research Programs

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SERDP AND ESTCP ANNOUNCE 2019 PROJECTS OF THE YEAR

It is with great pride and pleasure that SERDP and ESTCP announce the 2019 Projects of the Year. This year's awards recognize scientific advances and technological solutions to some of the Department of Defense's (DoD) most significant environmental and installation energy challenges:

- remediation of contaminated groundwater
- classification of munitions in underwater and terrestrial environments
- restoration of degraded ecosystems on DoD lands
- understanding degradation mechanisms of DoD specialty coatings
- treatment of wastewater from DoD facilities
- improving energy security on DoD installations
- management of threatened and endangered species on DoD lands
- protecting DoD assets from the effects of corrosion

SERDP PROJECT OF THE YEAR RECIPIENTS

EMERGING CORE CONCEPTS FOR ASSESSMENT AND ENHANCEMENT OF ABIOTIC NATURAL ATTENUATION OF GROUNDWATER CONTAMINANTS

SERDP 2019 Project of the Year Award for Environmental Restoration

Abiotic processes play an important role in the natural attenuation of groundwater contaminants, and there is a demand for new and improved methods of measurement and/or enhancement of abiotic natural attenuation processes.

Dr. Paul Tratnyek from Oregon Health and Science University and his team led a SERDP-funded project that provided a more complete and coherent foundation for abiotic natural attenuation through a combination of data mining, bench-scale experimental testing, and method validation using field conditions and/or field samples.

Study results have shown that abiotic degradation rates follow the trend of nitro aromatics > chlorinated alkanes > chlorinated ethenes. Dr. Tratnyek and his team have developed an on-going database and summary graphs for contaminant removal kinetic data for representative DoD contaminants of concern as well as a conceptual model for assessing natural reductant demand aspects of abiotic natural attenuation. These findings helped to establish quantitative protocols that can be used by DoD site managers to advance the design of enhanced natural attenuation technologies. MORE

ACOUSTIC RESPONSE OF UNDERWATER MUNITIONS NEAR A WATER-SEDIMENT BOUNDARY

SERDP 2019 Project of the Year Award for Munitions Response

Many aspects of the underwater environment interfere with the detection, characterization, and recovery of military munitions. Except at very shallow sites, munitions underwater are difficult to access. The SERDP Munitions Response Program Area has been interested in exploring how best to detect and classify submerged munitions using acoustic methods for many years.

The 2019 SERDP Project of the Year for Munitions Response was headed by Dr. Steven Kargl from the Applied Physics Laboratory at the University of Washington. Dr. Kargl and his project team developed a Gaussian mixture model (GMM) classification scheme and collected low frequency and high frequency synthetic aperture sonar (SAS) data from objects within an acoustically hard environment. GMM is a probabilistic model for representing normally distributed subpopulations.

Dr. Kargl extended previous SERDP efforts that measured acoustic responses from a collection of inert munitions, scientific targets, and clutter items. The central hypothesis was that the environment and the scattering geometry within that environment can alter an object's acoustic response. MORE

RESTORATION OF SOIL MICROBIAL FUNCTION FOLLOWING DEGRADATION ON DOD LANDS: MEDIATING BIOLOGICAL INVASIONS IN A GLOBAL CHANGE CONTEXT

SERDP 2019 Project of the Year Award for Resource Conservation and Resiliency

Garlic mustard (Alliaria petiolata) is a textbook example of a plant that can overwhelm a landscape. A biennial plant from Eurasia, it has rapidly become a problematic invasive species in North America. It forms dense monocultures that enable it to invade forest interiors and threaten native plant community composition.

Dr. Kristina Stinson from the University of Massachusetts and her team led a SERDP-funded project that examined the interactive effects of biological invasion and abiotic global change factors on the functional diversity of soil fungi of Northeastern forest habitats. The focus was on management implications for forests disrupted by the invasive plant species garlic mustard. The team visited and sought permission to work at >15 candidate sites for this study and ultimately identified 8 study sites in locations with active garlic mustard invasions.

This is the first study to document impacts of garlic mustard on soil microbes with such high molecular resolution and at a broad landscape scale. The research team determined that climatic warming has the potential to promote garlic mustard invasion and negatively impact tree seedling performance. MORE

STANDARDIZED TEST METHODOLOGIES FOR SPECIALTY COATINGS DURABILITY

SERDP 2019 Project of the Year Award for Weapons Systems and Platforms

Replacing exterior coating systems that no longer meet their performance requirements generates a significant amount of environmentally hazardous materials. Specialty coating systems are proving to be much less durable in service than was predicted by current accelerated test methods, leading to increased frequency of replacing these coatings alongside increased costs and waste management issues for DoD depot maintenance and field operations. Understanding degradation and failures in these multilayer coating systems is critically important.

Under her SERDP effort, Dr. Karen Schultz and her team from Boeing, Luna Innovations, North Dakota State University, Air Force Research Laboratory, and Naval Air Systems Command addressed this challenge by developing a new test method that combines the effects of dynamic mechanical strain and relevant environmental stressors of cyclic temperature and humidity to produce coating cracking with features similar to those observed in-service over structural discontinuities.

Leveraging in situ test methodologies developed under an earlier SERDP effort, the team created a suite of methods for both in situ monitoring of individual coating layers and ex situ measurements of physical and chemical changes to characterize moisture ingress in the individual coating system components and to determine the causes and damage modes of failure. MORE

ESTCP PROJECT OF THE YEAR RECIPIENTS

ANAEROBIC MEMBRANE BIOREACTOR (ANMBR) FOR SUSTAINABLE WASTEWATER TREATMENT

ESTCP 2019 Project of the Year Award for Environmental Restoration

The DoD currently uses aerobic treatment processes, such as activated sludge and oxidation ponds, to treat domestic wastewater generated at DoD facilities. These aerobic treatment processes have a number of undesirable characteristics and anaerobic treatment processes have been shown to have multiple benefits as an alternative.

Dr. Patrick Evans from CDM Smith (now retired) and his team led an ESTCP-funded project that demonstrated and validated the AnMBR technology for domestic wastewater treatment. Two pilot systems were demonstrated that used different methods of ultrafiltration (UF) membrane flux maintenance: gas sparging and granulated activated carbon (GAC)-fluidized.

Study results have shown that the GAC-fluidized AnMBR system achieved better energy efficiency and effluent quality at lower hydraulic residence times than the gas-sparged AnMBR system. The demonstration also identified that the integration of alternative methods for sulfide removal alongside bioenergy recovery is necessary for developing an AnMBR treatment process that is more sustainable than a conventional treatment approach. MORE

ADVANCING MICROGRID SOLUTIONS

ESTCP 2019 Project of the Year Award for Installation Energy and Water

The provision of secure, reliable, and resilient energy and water is critical to ensuring mission execution at our military installations. Fully enabled microgrids offer many benefits over current back-up power solutions; however, there are many technical challenges that need to be overcome for DoD to realize the full benefits of this technology.

This year's Installation Energy and Water award recipient was the Principal Investigator David Altman for three microgrid-related projects starting in 2013 and has recently been selected for another project to be kicked off early next year. The projects under his leadership have contributed significantly to the body of knowledge advancing DoD's and industry's understanding of microgrid design and operation.

Mr. Altman and his team started their work in 2013 at the Marine Corps Air Station Miramar where they demonstrated a building-level microgrid combining an existing solar photovoltaic array with a new zinc-bromide flow battery to provide back-up power to the Installation's Department of Public Works facility. They then moved to Otis Air National Guard Base at Joint Base Cape Cod to demonstrate a larger scale microgrid. Continuing the work on energy security solutions, ESTCP-funded Raytheon to perform a techno-economic analysis of large-scale energy storage integrated with microgrids. MORE

EFFICIENT AND SECURE CLOUD COMPUTING FOR UXO CLASSIFICATION AND PROJECT MANAGEMENT

ESTCP 2019 Project of the Year Award for Munitions Response

ESTCP invests in a variety of initiatives aimed at improving data quality and providing decision support tools to enhance the munitions response process. Current approaches in geophysical management and data analysis use networked, personal-computer-based software solutions, which create issues with security, collaboration, and communication.

The 2019 ESTCP Project of the Year for Munitions Response was headed by Dr. Dean Keiswetter from Acorn Science and Innovation, Inc., and his project team. Dr. Keiswetter's goal was to develop and demonstrate an effective, efficient, and secure cloud computing technology for classifying buried metal, as UXO or not, based on the analysis of multi-coil electromagnetic induction (EMI) data. The project team was able to bring the capabilities of the ESTCP-supported UX-Analyze package to a cloud computing environment.

By switching to a cloud-based data management system, there is improved efficiency, greater business agility, increased data availability, increased collaboration, increased processing speed, and cost savings. The analysis technology located in the Cloud can be used on all DoD sites that require underwater (or terrestrial) geophysical project work for UXO detection and classification. MORE

REMOTE SENSING TECHNOLOGY FOR THREATENED AND ENDANGERED PLANT SPECIES RECOVERY

ESTCP 2019 Project of the Year Award for Resource Conservation and Resiliency

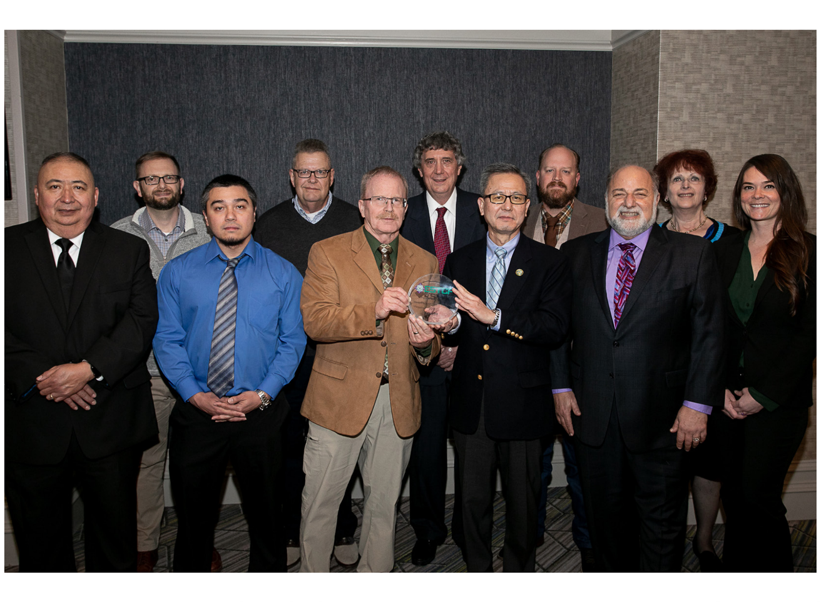
With more than 100,000 plant species worldwide thought to be at risk of extinction, a lack of suitable habitat is the major barrier to their continued existence or recovery. Overcoming barriers to plant establishment in dryland environments is critical for threatened, endangered, and at-risk species (TER-S) management. In fact, DoD installations with the greatest number of federally listed species are in dryland ecosystems.

Dr. Erin Questad from California State Polytechnic University, Pomona and her team led an ESTCP-funded project that addressed a major challenge to reintroduction success: finding suitable habitats in fragmented and degraded landscapes. Using remote sensing, the team increased the success of TER-S planting programs in dryland ecosystems in general and in Hawaiian dryland ecosystems specifically.

The team successfully demonstrated the use of habitat suitability modeling (HSM) technology, which formally incorporates the importance of wind into topographic modeling to improve plant growth and survival. In turn, the technology provides critical information for landscape planning and management of at-risk species. This project demonstrates how habitat HSM technology can inform TER-S reintroduction programs to increase plant performance and survival across DoD installations. MORE

IMPROVED MAGNESIUM PROTECTION FOR DOD AVIATION AND WEAPON COMPONENT TECHNOLOGY

ESTCP 2019 Project of the Year Award for Weapons Systems and Platforms



All military aviation platforms have magnesium components; however, magnesium is a very electrochemically "active" metal that leads to moisture-induced corrosion and galvanic corrosion due to mating with dissimilar metals. During the overhaul phase, the protective inorganic coating, primer, and topcoat paint on these aviation magnesium components are stripped off to allow visual and penetrant inspection of the casting. After passing the inspection, the magnesium castings are dipped in a chemical conversion coating such as DOW 7 or DOW 19 before being placed back into service. Both of these DOW coatings contain hexavalent chromium.

Under his ESTCP project, Mr. Kyu Cho from the U.S. Army Combat Capabilities Development Command Army Research Laboratory, led the Tagnite Technical Working Group (TWG) in the development of an innovative technology to mask off dissimilar metals such as steel in completed magnesium components in order to apply the Tagnite coating to legacy components without harm to the dissimilar metals.

This successful immersion Tagnite technology transition project achieved the primary objective of eliminating the use of hexavalent chromium in DOW 7 and DOW 19 tanks for the treatment of magnesium aviation components at the Corpus Christi Army Depot Plating Shop while providing the additional benefit of better corrosion resistance. MORE

CALENDAR

March 5: ESTCP FY 2021 Solicitation Pre-Proposals Due
December 1-3: SERDP & ESTCP 2020 Symposium

ANNOUNCEMENTS

SERDP and ESTCP Webinar Series: View Schedule

RELATED EVENTS

March 8-13:
North American Wildlife and Natural Resources Conference, Omaha, NE
April 28-30:
Navy Remedial Project Manager Training Workshop, Norfolk, Virginia
May 11-15:
179th Meeting Acoustical Society of America, Chicago, IL

STRATEGIC ENVIRONMENTAL RESEARCH AND DEVELOPMENT PROGRAM (SERDP)
ENVIRONMENTAL SECURITY TECHNOLOGY CERTIFICATION PROGRAM (ESTCP)

(571) 372-6565
www.SERDP-ESTCP.org
4800 Mark Center Drive,
Suite 16F16, Alexandria, VA 22350