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Research Naval Postgraduate School (NPS Research Newsletter), 1

2011-11-01

Research Naval Postgraduate School, v.4. no.
1, November 2011

Monterey, California, Research and Sponsored Programs, Office of the Vice
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Energy in all its aspects will be a leading priority for the Navy and the DoD in the 21st century, and represents a major strategic opportunity for the University. NPS has taken a leadership role in standing up educational programs in energy, and seeks to expand its portfolio in energy research both to support our education programs, and to tap into a growing base of federal and private sponsors for energy-related work.

Towards this end, the Research Board has endorsed a proposal to use a portion of research initiative funding towards a competition for a limited number of awards for “seed funding” or “feasibility studies” in the area of energy. The purpose is to develop, or further advance, new concepts to a level of maturity such that they could be submitted

as highly-competitive proposals to sponsors for external funding.

It is envisioned that we will select a small number of for a modest level of funding, (e.g. \$25-50K), with the expectation that the work will be completed within 3-6 months, to enable external proposals to be submitted to sponsors within FY12.

A subcommittee of the Research Board will review the proposals, which will broadly represent areas of energy research with particular DON/DOD relevance. The primary metrics against which proposals will be reviewed are (i) originality of research, (ii) relevance to USN, USMC and DOD needs, (iii) the potential to answer a central ques-

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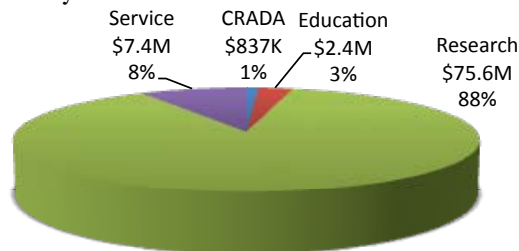
RESEARCH UPDATES

- **Who Can Be a PI?** The draft policy reviewed by the Research Board has been circulated for faculty comment. If you have not reviewed, please read the Dean’s transmittal memo and proposed policy at www.nps.edu/research/BoardReports.html. Forward comments to research@nps.edu.
- **Accelerating Technology Transfer and Commercial of Federal Research in Support of High-Growth Businesses:** President Obama recently released a memorandum calling for accelerated federal technology transfer and commercialization in support of high-growth businesses. Federal research and development (R&D) are at the forefront of the president’s Startup America initiative, designed to support high-growth entrepreneurship and innovation by increasing the rate of technology transfer and economic and societal impacts from federal R&D investments. See the memorandum at newslink.federallabs.org.
- **Annual Ethics Training:** The annual ethics refresher is a valuable tool that summarizes a highly regulated area and enables all of us at NPS to operate with greater consciousness about ethical standards in the federal workplace. The 2011 Department of the Navy online ethics-training module is now available. NPS employees can access the training from either the CAC ethics site at <https://donogc.navy.mil/Ethics/> or, for the first time, the public ethics website at <http://ethics.navy.mil/>.
- **NPS Energy Research Seed Funding Competition:** Proposals due 2 December 2011; see www.nps.edu/research/BoardReports.html.
- **Brown-Bag Seminar Series:** This series, covering topics of interest to NPS principal investigators, will resume in January 2012. Suggestions for future sessions can be sent to research@nps.edu.
- **FY12 Indirect Policy:** The draft FY12 policy has been released by VP/F&A and posted at http://intranet.nps.edu/ResAdmin/FY12/FY12_Indirect_Cost_Recovery_PolicyDraft.pdf

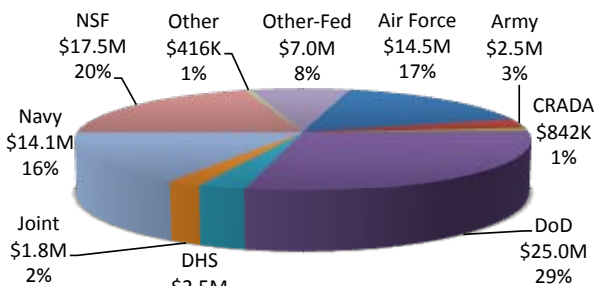
SPONSORED PROGRAMS STATUS, OCTOBER 2011

FUNDS AVAILABLE: \$86.2M

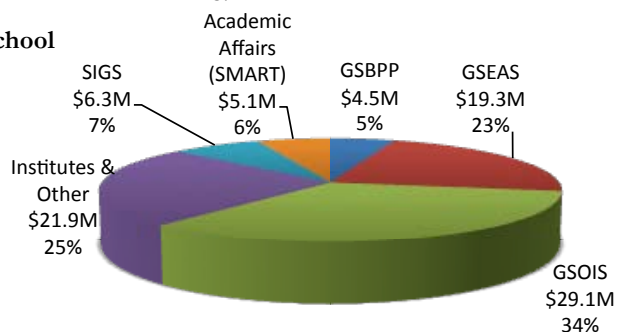
By Type of Activity



By Sponsor



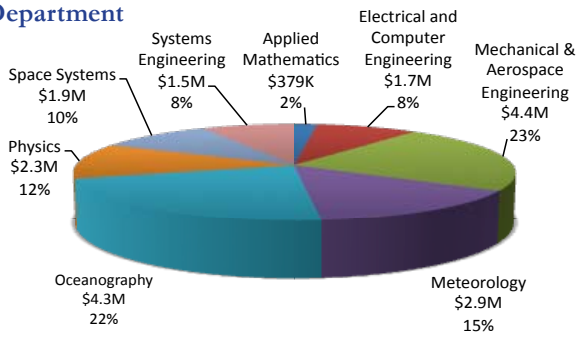
By School



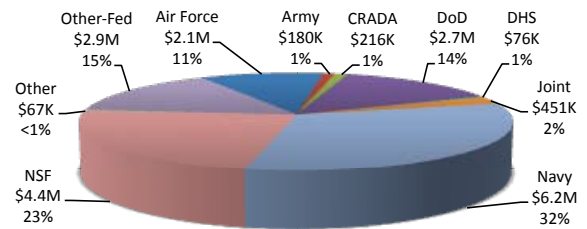
Graduate School of Engineering and Applied Sciences

Funds available to date: \$ 19.3M

By Department



By Sponsor



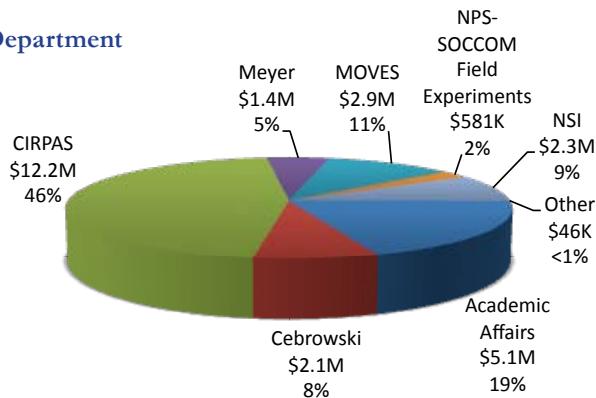
Projects funded in October

- Computational Mathematics for Storm-Surge Modeling, *Francis Giraldo, MA* (ONR)
- Aircraft Combat Survivability, *Chris Adams, MAE* (JASPO)
- Maritime Beam Control, *Brij Agrawal, MAE* (ONR)
- Flow Experiments on Rotor Issues, *Chandra Chandrasekhar, MAE* (US Army Aero-Flight Dynamics Directorate)
- Chip Scale Vacuum Pump; Numerical Investigation of Power Requirements and Starting, *Anthony Gannon, MAE* (DARPA)
- VSWMCM Support, *Doug Horner, MAE* (ONR)
- Effects of Fluid-Structure Interaction on Dynamic Responses of Composite Structures, *Young Kwon, MAE* (ONR)
- Intraseasonal Forecasts of Tropical Cyclone Events: Transition to Operations, *Russ Elsberry, MR* (ONR)
- Environmental Support for the Radar Drift Project, *Paul Frederickson, MR* (SPAWAR)
- State-Space Analysis of Model Error: Probabilistic Parameter Estimation with Spatial Analysis, *Josh Hacker, MR* (ONR)
- North Pacific Tropical Cyclone Formation and Change in TCS08 and Experiment Support, *Patrick Harr, MR* (ONR)
- Tropical Cyclone Formation in Western North Pacific Region as Part of TCS08 DRI, *Mike Montgomery, MR* (ONR)
- 11th International Symposium on Technology and Mine Problem, *Clyde Scandrett, MR* (ONR)
- In-Situ Wave Observation in ONR High Resolution Air-Sea Interaction DRI, *Tom Herbers, OC* (ONR)
- Maritime In Situ Sensing Interoperable Network, *Joe Rice, PH* (ONR)
- N8F Chair of Systems Engineering Analysis, *Jim Eagle, SE* (CNO)
- Naval Space Systems Academic Chair, *Rudy Panholzer, SP* (Navy Cyber Forces)
- Space Systems Operations Student Thesis Research/Experience Tour, *Rudy Panholzer, SP* (Navy Cyber Forces)
- National Systems Support for Space Systems Academic Group, *Rudy Panholzer, SP* (NRO)

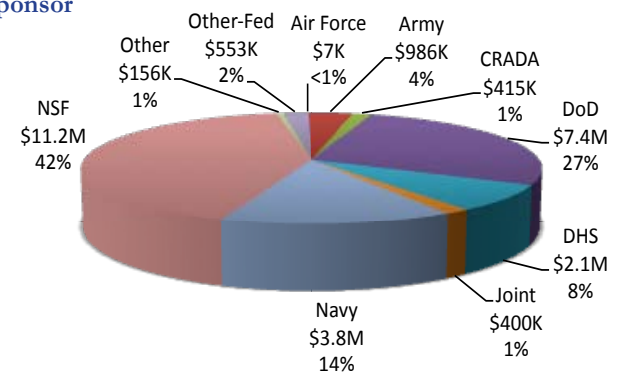
Research and Education Institutes, Centers, and Other

Funds available to date: \$27M

By Department



By Sponsor



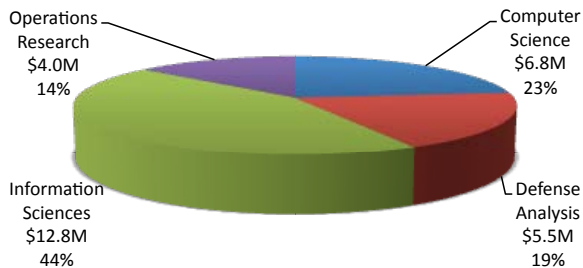
Projects funded in October

- Navy Executive Development Program-Strategic Thinking, *Ron Franklin, CEE* (NETSAFA)
- RT-19A SE Capstone, *Cliff Whitcomb, Meyer Institute* (OSD)
- Combat XXI Behavior Development and Technical Support, *Imre Balogh, MOVES* (TRAC Monterey)
- Data Visualization Tool, *Arnie Buss, MOVES* (TRAC Monterey)
- Field Experimentation Program for Special Operations, *Ray Buettner, NPS-SOCCOM* (USSOCOM)
- Joint Interagency Field Experimentation (JIFX) Program, *Ray Buettner, NPS-SOCCOM* (ARL)
- Joint Interagency Field Experimentation (JIFX) Project, *Bob Bluth, CIRPAS* (ARL)
- Scan Eagle Operations at Roberts, *Bob Bluth, CIRPAS* (NSWG TEN)
- I MEF Realistic Urban Training with Pelican SUAV, *Bob Bluth, CIRPAS* (I MEF HQ GROUP)
- Field Experimentation Program for Special Operations, *Bob Bluth, CIRPAS* (USSOCOM)

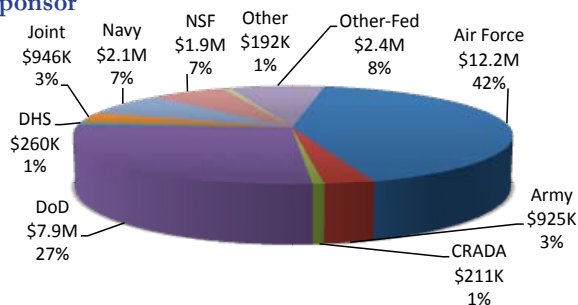
Graduate School of Operational and Information Sciences

Funds available to date: \$29.1M

By Department



By Sponsor



Projects funded in October

- Research on Software Vulnerability, *Chris Eagle, CS* (NSA)
- Random Sampling and Small Block Forensics Innovation, *Simson Garfinkel, CS* (FBI)
- MapReduce for Multilevel Secure Cloud, *Cynthia Irvine, CS* (NRO)
- Analysis of SNMP to Manage IPSEC Policies, *Cynthia Irvine, CS* (NRO)
- Web Application Platform for Multilevel Secure Cloud, *Cynthia Irvine, CS* (NRO)
- Cloud Technologies for Automated Tagging and Cryptographic Binding, *Craig Martell, CS* (NRO)
- Special Operations Academic Curriculum FY12, *Gordon McCormick, DA* (NAVSPEWARCOM)
- Sensor Optimization for Maritime, Littoral, and Urban Environments, *Mike Atkinson, OR* (ONR)
- Large-Scale Optimization, *Gerald Brown, OR* (ONR)
- Development of Operational Planning Decision Aids for Maritime Operations Center, *Gerald Brown, OR* (ONR)
- Chair of Applied Systems Analysis, *CDR Doug Burton, USN, OR* (CNO)
- Military Applications of Optimization, *Matt Carlyle, OR* (ONR)
- Explosive Ordnance Disposal Training Allocation, *Emily Craparo, OR* (EODTEU2)
- Africa Knowledge, Data-Source and Analytic-Effort Exploration, *Ron Fricker, OR* (TRAC MONTEREY)
- Optimal Surveillance Patrol, *Kyle Lin, OR* (ONR)
- Support to Development of Future Scenarios, *Tom Lucas, OR* (NSWC-Dahlgren Division)

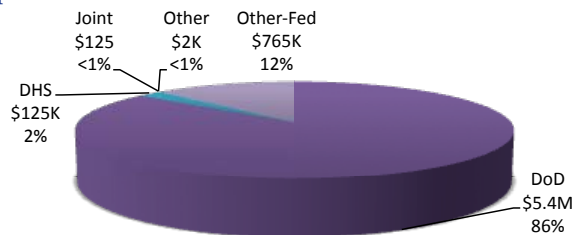
School of International Graduate Studies

Funds available to date: \$6.3M

Projects funded in October

- Project on Advanced Systems and Concepts for Combating WMD (PASC) FY11 Studies Dialogue, *Anne Clunan* (DTRA)
- Doing Lots and Lots of Testing, Testing, Testing, *Feroz Khan* (DTRA)
- Joint Foreign Area Officer (FAO) Skills Sustainment Pilot Program, *Tristan Mabry* (Defense Language Office)

By Sponsor



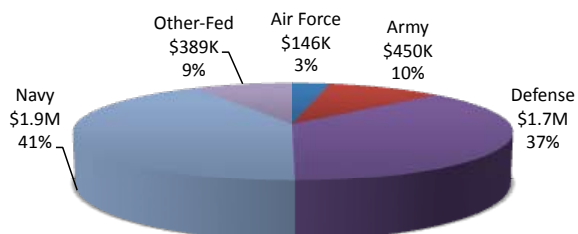
Graduate School of Business and Public Policy

Funds available to date: \$4.5M

Projects funded in October

- Civilian Executive Masters of Business Administration (EMBA) Program, *Bill Hatch* (OASN (FM&C))
- Instructional Support for the Financial Audit Short Course, *Bob Kaufman* (OASN (FM&C))

By Sponsor



APPLIED MATHEMATICS

Kilic, E. & Stanica, P. (2011). Factorizations and representations of binary polynomial recurrences by matrix methods. *Rocky Mountain Journal of Mathematics*, 41(4), 1247-1264.

CIRPAS

Zheng, X., Albrecht, B., Jonsson, H. H., Khelif, D., Feingold, G., Minnis, P., et al. (2011). Observations of the boundary layer, cloud, and aerosol variability in the southeast pacific near-coastal marine stratocumulus during VOCALS-REx. *Atmospheric Chemistry and Physics*, 11(18), 9943-9959.

COMPUTER SCIENCE

Denning, P. J. & Raj, R. (2011). The profession of IT managing time, part 2. *Communications of the ACM*, 54(9), 31-33.

DEFENSE RESOURCES MANAGEMENT INSTITUTE

Simon, J. & Melese, F. (2011). A multiattribute sealed-bid procurement auction with multiple budgets for government vendor selection. *Decision Analysis*, 8(3), 170-179.

Guysé, J. L. & Simon, J. (2011). Consistency among elicitation techniques for intertemporal choice: A within-subjects investigation of the anomalies. *Decision Analysis*, 8(3), 233-246.

GRADUATE SCHOOL OF OPERATIONAL AND INFORMATION SCIENCES

Cameron, K. L., Hsiao, M. S., Owens, B. D., Burks, R., & Svoboda, S. J. (2011). Incidence of physician-diagnosed osteoarthritis among active duty united states military service members. *Arthritis and Rheumatism*, 63(10), 2974-2982.

GRADUATE SCHOOL OF BUSINESS AND PUBLIC POLICY

Jalbert, T., J. Stewart and S. Landry. 2011. Hedging Against Post-age Rate Increases. *Journal of Corporate Treasury Management*. Vol. 4. No. 3. August. 272-284.

Shen, Y. & Hsia, R. Y. (2011). Ambulance Diversion and Survival Among Patients with Acute Myocardial Infarction Reply. *Jama-Journal of the American Medical Association*, 306(12), 1325-1325.

INFORMATION SCIENCES

Research Associate Professor Wolfgang Baer delivered the plenary lecture at the 4th Quantum Bionet Workshop, "The Dawn of Quantum Biology," at the University of Milan, Italy, on Sep 30th. The lecture discussed evidence for biological quantum computation in the brain for simultaneous evaluation of alternative possibilities in optimization problems. The use of first-person introspection in analyzing cognitive systems is with conventional third-person objective methodologies. Baer also gave a presentation at Professor Gustav Bernroider's Neural Signaling Seminar on Oct 13, 2011 at the University of Salzburg, Austria. Entitled "Cognitive Operations in the First Person Perspective: A context for physical theories," the talk discussed physical theories required to understand quantum to classic transitions in ion-channel proteins in biological quantum computer theories of the brain.

MECHANICAL AND AEROSPACE ENGINEERING

Dobrokhodov, V., Kaminer, I., Kitsios, I., Xargay, E., Hovakimyan, N., Cao, C., et al. (2011). Experimental Validation of L(1) Adaptive Control: the Rohrs Counterexample in Flight. *Journal of Guidance Control and Dynamics*, 34(5), 1311-1328.

METEOROLOGY

Park, M., Ho, C., Kim, J., & Elsberry, R. L. (2011). Diurnal Circulations and their Multiscale Interaction Leading to Rainfall Over the South China Sea Upstream of the Philippines During Intraseasonal Monsoon Westerly Wind Bursts. *Climate Dynamics*, 37(7-8), 1483-1499.

Riemer, M. & Montgomery, M. T. (2011). Simple Kinematic Models for the Environmental Interaction of Tropical Cyclones in Vertical Wind Shear. *Atmospheric Chemistry and Physics*, 11(17), 9395-9414.

MOVES INSTITUTE

Research Associate Professor Amela Sadagic, MOVES, attended a workshop entitled "Physiological Metrics of Immersion," organized by the Marine Corps Warfighting Laboratory-MCWL, San Diego, 12-13 October. Sadagic presented a joint paper with Mary Whitton, University of North Carolina at Chapel Hill, "Understanding What Affects Our Experiences in Virtual Environments: Basic Concepts & Definitions."

NATIONAL SECURITY AFFAIRS

Assistant Professor Victoria Clement has received an award from the U.S. Embassy Policy Specialist Program which will allow her to spend two months at the U.S. Embassy in Ashgabat, Turkmenistan in 2011-2012.

OCEANOGRAPHY

Gallagher, E. L., MacMahan, J., Reniers, A. J. H. M., Brown, J., & Thornton, E. B. (2011). Grain Size Variability on a Rip-channeled Beach. *Marine Geology*, 287(1-4), 43-53.

Gangopadhyay, A., Lermusiaux, P. F. J., Rosenfeld, L., Robinson, A. R., Calado, L., Kim, H. S., et al. (2011). The California Current System: a Multiscale Overview and the Development of a Feature-oriented Regional Modeling System (FORMS). *Dynamics of Atmospheres and Oceans*, 52(1-2), 131-169.

Ramp, S. R., Lermusiaux, P. F. J., Shulman, I., Chao, Y., Wolf, R. E., & Bahr, F. L. (2011). Oceanographic and Atmospheric Conditions on the Continental Shelf North of the Monterey Bay During August 2006. *Dynamics of Atmospheres and Oceans*, 52(1-2), 192-223.

OPERATIONS RESEARCH

Assistant Professor LT COL Scott Nestler, USA, "Reproducible (Operations) Research: A primer on reproducible research and why the O.R. community should care about it," *OR/MS Today*, October 2011. This article draws from medical, bioinformatics/computational biology, signal processing, and statistical work to discuss which operations researchers should care about "working in a reproducible manner" as well. The article can be found online at <http://viewer.zmags.com/publication/16a9b968#/16a9b968/24>.

Lin, K. Y., & Wei, Y. (2011). Optimal Probing Control for Wireless Transmission When the Payload Is Negligible. *Optimal Control Applications & Methods*, 32(5), 558-573.

O'Connor, P., & Long, W. M. (2011). The Development of a Prototype Behavioral Marker System for US Navy Officers of the Deck. *Safety Science*, 49(10), 1381-1387.

Vieira, H., Jr., **Sanchez, S.**, Kienitz, K. H., & Neyra Belderrain, M. C. (2011). Generating and Improving Orthogonal Designs by Using Mixed Integer Programming. *European Journal of Operational Research*, 215(3), 629-638.

PHYSICS

Cinotti, L., **Smith, C. F.**, Sekimoto, H., Mansani, L., Reale, M., & Sienicki, J. J. (2011). Lead-Cooled System Design and Challenges in the Frame of Generation IV International Forum. *Journal of Nuclear Materials*, 415(3), 245-253.

Please submit your faculty and research news (published articles, conference proceedings, conference presentations, books, honors received, accomplishments, milestones, etc.) to research@nps.edu.

Energy Call for Proposals, continued from page 1

tion that establishes or strengthens feasibility of the concept, and (iv) overall promise to lead to external support.

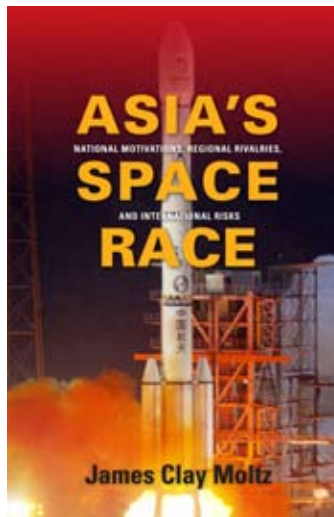
The Research Board welcomes any proposal in energy research, but especially those responding to the ‘goals and gaps’ identified by the Secretary of the Navy, Chief of Naval Operations, and the Commandant of the Marine Corps.

Further details on this solicitation and submission requirements can be found at www.nps.edu/research/BoardReports.html.

BOOK HIGHLIGHTS ASIAN SPACE RACE



Author Clay Moltz



Cover, Asia's Space Race

Associate Professor Clay Moltz (National Security Affairs) has published a new book, *Asia's Space Race: National Motivations, Regional Rivalries, and International Risks* (Columbia University Press, 2012).

Moltz makes the first in-depth policy analysis of Asia's fourteen leading space programs, concentrating on China, Japan, India, and South Korea. He investigates these nations' space histories, goals, and rivalries, and contrasts this rivalry with the space cooperation seen in Europe today and the civilian space links and military restraint seen even in the otherwise hostile U.S.-Soviet relationship. He concludes with recommendations for improved intra-Asian space cooperation and regional conflict prevention, as well as possible initiatives that might be undertaken by the United States.

An article summarizing the findings of his book has been accepted by *Nature* magazine and will appear in the Dec. 8 issue.

NASA/NPS SPACE SYSTEMS CHAIR PROFESSOR JOINS SSAG



Jennifer Rhatigan

Jennifer Rhatigan of NASA Johnson Space Center (JSC), Houston, has accepted the Michael J. Smith and William C. McCool Space Systems Chair Professorship, jointly sponsored by NPS and NASA.

This chair was established in memory of NPS alumni who perished in space-shuttle flights. Rhatigan was selected in a NASA-wide competition and is

detailed to serve as a faculty member dedicated to space-systems curricula and Space Systems Academic Group activities.

The chair promotes cooperation between NASA and NPS by encouraging NPS faculty and student participation in NASA

research projects and exchanging information between the two entities.

Chair responsibilities include teaching in the Space Systems Academic Group, increasing student and faculty education and expertise on outer space, thesis advising and developing new topics with potential sponsors, and serving as NASA liaison.

Rhatigan comes to NPS with extensive project management and engineering experience and many awards: recent examples are the NASA Special Act Award for outstanding leadership in development of ISECG reference architecture for human lunar exploration and the NASA Blue Marble, the highest agency award for energy and environment.

Rhatigan holds a PhD from Case Western Reserve University, an MS from North Carolina State University, and a BSME from the University of Florida. She has served at the NASA Glenn Research Center and NASA Headquarters, in addition to JSC. She has garnered numerous NASA Awards for excellence and teamwork and is a registered professional engineer.

LARGE-SCALE COHERENT FLOW STRUCTURES IN A NATURAL BRAIDED REACH SECTION OF A GRAVEL-BED RIVER

William F. Ashley—Lieutenant, USN

Master of Science in Physical Oceanography—June 2011

Advisor: Jamie MacMahan, Department of Oceanography

Second Reader: Edward Thornton, Department of Oceanography

Stream-wise length scales of coherent flow structures were examined to test the hypothesized 2 to 6 times the depth scale in relatively deeper (~1 m) and faster (~1.5 m/s) flows in a braided reach of the Kootenai River, Idaho. Velocities were measured using a custom Acoustic Doppler Current Profiler, an array of six electromagnetic current meters, and an Acoustic Doppler Velocimeter in a variety of river depths (0.6–1.7 m) and velocities (0.3–1.6 m/s). Energetic (50% of total energy), coherent (along the array), low-frequency (< 0.05 Hz) motions were found for all deployment locations. Coherent times and lengths were 5 s and 10 m in the ~1.5 m/s flows and 45 s and 22 m in the ~0.5 m/s flows. Multi-resolution decomposition provided coarse low-frequency limit for the coherent motions and suggests the temporal scales range from 10 to 1000 s. Length scales of the low-frequency motions determined by frequency-wave-number spectra indicate that the motions are longer than hypothesized. The coherent times and lengths were consistently less than the computed time and length scales, suggesting the energetic low-frequency motions evolve as they propagate downstream. *LT Ashley received the Chief of Naval Operations Undersea Warfare Award.*

MINE BURIAL EXPERT SYSTEM FOR CHANGE OF MIW DOCTRINE

Christopher M. Beuligmann—Lieutenant, USN

Master of Science in Physical Oceanography—September 2011

Advisor: Peter C. Chu, Department of Oceanography

Second Reader: Ronald Betsch, Naval Oceanographic Office

Second Reader: Peter Fleischer, Naval Oceanographic Office

Mine impact burial models such as IMPACT25, IMPACT28, and IMPACT35 have been used in the MIW community in an attempt to calculate the percentage of impact burial for sea mines. Until recently the models have been deterministic, using parameters such as sediment type, air and sea trajectories, drop angle, and mine type to calculate the percentage of burial. These models have been relatively effective in calculating impact burial, but little attention has been given to the temporal effects on mine burial, known as scour burial. Another shortfall of the deterministic modeling approach is the inability to capture the stochastic nature of the input parameters. To address these issues the John Hopkins University—Applied Physics Laboratory (JHU-APL), in conjunction with the NRL has developed the Mine Burial Expert System (MBES).

The MBES is a Bayesian network of physics based, deterministic models, observational data, and expert opinion. It provides the opportunity to give input parameters as probability density tables (PDTs) and receive a burial percentage as an output distribution. This allows its user to capture the variability of input parameters and converge them into variability in the burial prediction, providing valuable risk data to the mine countermeasure (MCM) Commander. The MBES has been incorporated into the Environmental Post Mission Analysis (EPMA) tool for Naval Oceanographic Office (NAVO), which could give the MCM planners an idea of the con-

fidence level of its predictions. To understand how the variability and confidence levels can be used and how it may affect current doctrine, a series of tests have been run through the MBES. A thorough review of the results can have a significant effect on future use of the system and subsequent changes to MIW doctrine. In particular, current doctrinal sediment categories are not sufficient in capturing the resolution of the MBES predictions. *LT Beuligmann was awarded the Surface Navy Association's Award for Excellence in Surface Warfare Research.*

ASSESSING VULNERABILITIES IN INTERDEPENDENT INFRASTRUCTURES USING ATTACKER-DEFENDER MODELS

Cory A. Dixon—Commander, USN

Master of Science in Applied Science (Operations Research)—September 2011

Advisor: David Alderson, Department of Operations Research

Advisor: Matthew Carlyle, Department of Operations Research

Second Reader: Gerald Brown, Department of Operations Research

Our economic and social welfare depends on certain critical infrastructures and key resources. Protecting these infrastructures is a challenge because they are complex, and as systems they are difficult to understand, predict and control. In addition, they do not operate in isolation, but are interdependent with other infrastructures. This presents a challenge for their modeling and analysis. Due to the complexity of modeling the operation of just a single infrastructure, most research to date has analyzed infrastructures in isolation. This thesis introduces a taxonomy of dependence relationships and incorporates these relationships into an attacker-defender model of interdependent infrastructure operation. We formulate and solve a sequence of models to illustrate how dependence relationships between infrastructures create vulnerabilities that are not apparent in single-infrastructure models, and we use the results to assess the consequences of disruptions to a system of infrastructures. We provide complete documentation for how to apply these techniques to real infrastructure problems and include a discussion of the necessary assumptions, as well as the pros and cons of our methods. Finally, we present examples of how to provide relevant, understandable results to help decision makers, such as where to make limited investments to increase resilience. *CDR Dixon received the USN Monterey Council Navy League Award for Highest Academic Achievement.*

AUTOMATING IDENTIFICATION OF ROADS AND TRAILS UNDER CANOPY USING LIDAR

Charles F. Harmon III—Major, USA

Master of Science in Space Systems Operations—September 2011

Master of Science in Remote Sensing Intelligence—September 2011

Advisor: Richard C. Olsen, Department of Physics

Second Reader: Kristen Tsolis, Department of Defense Analysis

Analysis techniques are developed to automatically extract roads and trails under thick forest canopy. LiDAR data were taken over the Swanton Pacific Ranch in the Santa Cruz Mountains from an airborne laser mapping system, the Optech 3100, on March 9–10, 2010. Collected data were characterized by point densities of 5–10 m². Point cloud data were reduced to digital surface models using

ARCMAP (from ESRI). The DSM was calculated at 1 meter spacing. These surface models were analyzed using topographic tools in ENVI, allowing for calculation of curvature, slope, convexity, and shaded relief. A multi-layer dataset was built and analyzed using spectral analysis tools in ENVI. The classification technique used was a combination of maximum likelihood classifier and a decision tree after use of erosion/dilation operators. Results are compared to ground truth collected in 2011. Classification resulted in 83.6% true positive rate, and the image processing result reduced the false positive rate to 3.0%. *CDR Harmon received the Association of the United States Army, General Joseph W. Stilwell Chapter, Award for Outstanding Army Student.*

PROBABILISTIC SEARCH ON OPTIMIZED GRAPH TOPOLOGIES

Christian Klaus—Major, German Army

Master of Science in Operations Research—September 2011

Master of Science in Applied Mathematics—September 2011

Co-Advisor: Timothy H. Chung, Department of Systems Engineering

Co-Advisor: Craig Rasmussen, Department of Applied Mathematics

Second Reader: Nedialko Dimitrov, Department of Operations Research

Second Reader: Ralucca Gera, Department of Applied Mathematics

This thesis investigates how the performance of a mobile searcher is affected by altering the search environment. We model the search environment as a simple connected, undirected graph. By adding new edges to the graph, we change the search environment. Our objective is to optimize search performance, that is, to minimize the (expected) time needed to find the target, in the context of probabilistic search. We first analyze two different methods to generate random connected graphs, then evaluate a number of methods to augment the graph, typically by considering the algebraic connectivity of the graph and its associated (Fiedler) eigenvector. Extensive simulation studies and resulting statistical and theoretical models show that adding a few wisely chosen edges to a sparse graph is sufficient to dramatically increase search performance. Further, we propose a novel method for incorporating prior information about the target's likely location by defining a subgraph on which the presented approach is performed, resulting in even greater improvements in search performance. *MAJ Klaus won the Naval Postgraduate School Outstanding Academic Achievement Award for International Students.*

HOW CAN OFFICERS BE BETTER PREPARED TO INTERACT WITH NON-GOVERNMENTAL ORGANIZATIONS IN A POST-CONFLICT ENVIRONMENT?

David M. Matvey Jr.—Lieutenant Commander, Civil Engineer Corps, USN

Master of Arts in Security Studies—September 2011

Co-Advisor: Sophal Ear, Department of National Security Affairs

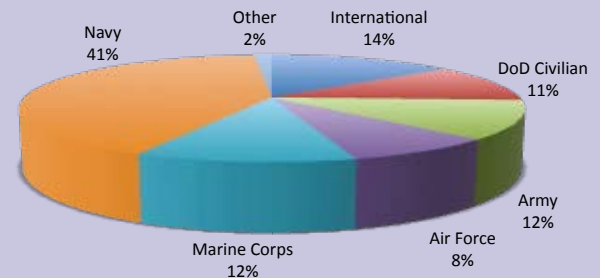
Co-Advisor: Natalie Webb, Defense Resources Management Institute

This thesis examines the state of relations between the military and non-governmental organizations (NGOs). My argument is that the military-NGO relationship can be improved in specific ways. The

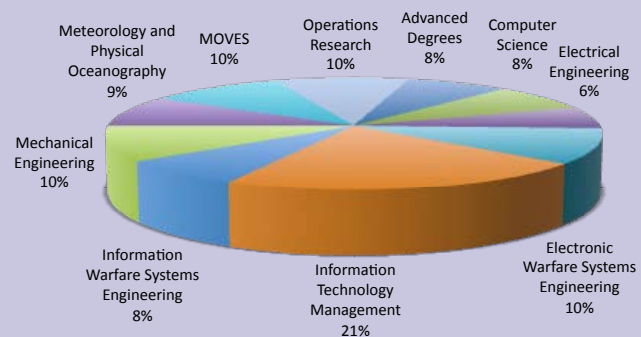
involvement of the military in post-conflict reconstruction efforts is required due increasingly tenuous security situations and the need to achieve stabilization of the post-conflict society. I argue that an effective way for increasing cooperation/coordination is by improving the preparation of the military officer expected to operate in that cooperative environment.

This research investigates the effectiveness of the existing practices of preparing the military officer for NGO interaction and provides recommendations for improving the preparation through utilization of an anonymous survey provided to a cross-organizational audience. The lessons learned through this research will provide a foundation for military decision makers to properly allocate funding towards these efforts. *LCDR Matvey is the winner of the Hans Jones Award for Excellence in Thesis Research in Special Operations and Irregular Warfare or Security, Stabilization, Transition and Reconstruction.*

THESIS STATS FOR SEPTEMBER 2011



*Army Reserve, Army Reserve National Guard, Coast Guard, NOAA Resident Student Population for September 2011 (1,765 total)



* Advanced degrees: doctorate in mechanical engineering (1), meteorology (1), modeling, virtual environments and engineering (2), security studies (1); electrical engineer, mechanical engineer (1) ** Other master's degrees: aeronautical engineering (2), applied math (2), applied science (1), business administration (2), contract management (4), defense analysis (1), engineering acoustics (1), engineering science (1), information sciences (1), information systems and operations (1), meteorology and oceanography (2), physical oceanography (2), software engineering (4)

Degrees Conferred in September 2011 (184 Degrees Conferred)

COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENT (CRADA)

Simulation Model for Fully Burden Cost of Fuel and Alternative Energy Analyses

Partner: Advanced Concepts and Technologies International, LLC.

PI: Alejandro Hernandez, Department of Systems Engineering

Summary: ACT I and NPS will collaborate to provide an effective cost-analysis tool for the integration of alternative-energy, non-tactical vehicles to multiservice joint installations in support of the Alternative Energy Ground Vehicle-Power Grid Interface Program.

MEMORANDUM OF UNDERSTANDING/AGREEMENT (MOU/MOA)

Naval War College at NPS Program

Partner: Naval War College

NPS POC: Pete Boerlage, Executive Director, Administrator, Office of the Vice President for Finance and Administration

Summary: The agreement establishes responsibilities for the partnership between the Naval War College (NWC) and the Naval Postgraduate School (NPS) to provide PME, including Joint Professional Military Education (JMPE) Phase 1, for eligible officers at NPS.

TECHNICAL SERVICES AGREEMENT (TSA)

PARC Civilian Unmanned Aerial Systems Project

Partner: Palo Alto Research Center (PARC)

PI: Robert Bluth, CIRPAS

Summary: NPS/CIRPAS will provide pre-flight coordination, flight coordination, management, flight safety, and facility management of customer activities at the CIRPAS facility and ensure compliance with all CIRPAS policies and procedures

PATENTS

“Spacecraft Docking Interface Mechanism”

Navy Case No. 99171, U.S. Patent No. US 8,006,937 B1

Inventors: Marcello Romano, Department of Mechanical and Aerospace Engineering and Paul Oppenheimer, Naval Research Laboratory

“Active Feed-forward Disturbance Control System”

Navy Case No. 97767, U.S. Patent No. US 8,019,090 B1

Inventors: Brij N. Agrawal, Department of Mechanical and Aerospace Engineering and Suranthiran Sugathevan

“Inductive Pulse Forming Network for High-Current, High-Power Applications”

Navy Case No. 95865D1, U.S. Patent US 8,018,096 B1

Inventor: William Maier, Department of Physics

TECHNICAL REPORTS PUBLISHED

NPS- CS-11-005	Biometric Challenges for Future Deployments: A Study of the Impact of Geography, Climate, Culture, and Social Conditions on the Effective Collection of Biometrics	P. Clark, H. Gregg, C. Irvine
NPS-OC-11-007	Monthly Distribution of Shipping Vessels within the Monterey Bay Marine Sanctuary, January –December 2010	C. Miller
NPS- OR-11-004	An Assessment of the Relationship between Safety Climate and Mishap Risk in U.S. Naval Aviation	P. O’Connor, S. Buttrey, A. O’Dea, <i>et al.</i>
NPS-IS-11-003	BRITEdge 11-1 Limited Objective Project	B. Roeting, C. Manza

Technical reports may be obtained at <http://www.nps.edu/Research/TechReports.html>

ANNOUNCEMENT/CALL FOR PROPOSALS: ACQUISITION RESEARCH

The Graduate School of Business & Public Policy announces the 9th Annual Acquisition Research Symposium to be held May 16-17, 2012 in Monterey, California. This symposium serves as a forum for the presentation of acquisition research and the exchange of ideas among scholars and practitioners of public-sector acquisition. We seek a diverse audience of influential attendees from academe, government, and industry who are well placed to shape and promote future research in acquisition.

The Symposium Program Committee solicits proposals for panels and/or papers from academicians, practitioners, students and others with interests in the study of acquisition. The following list of topics is provided to indicate the range of potential research areas of interest for this symposium: acquisition and procurement policy, supply chain management, public budgeting and finance, cost management, project management, logistics management,

engineering management, outsourcing, performance measurement, and organization studies.

Proposals for papers and panels should include an abstract along with identification, affiliation, and contact information for the author(s).

- Proposals for papers: plan for a 20-minute presentation.
 - Proposals for panels: plan for 90-minute duration. Please include description of panel subject and format, with participants’ names, qualifications and specific contributions each participant will make to the panel.
 - Submit proposals no later than November 2, 2011.
 - The Program Committee will make notifications of accepted proposals no later than December 14, 2011.
 - Final papers submitted no later than April 2, 2012.
- Submit proposals to www.researchsymposium.com