RESEARCH AT NPS

Capt Chad S Brodel, USAF (sep.) received his doctorate in applied physics at the June 2012 graduation. His dissertation research focuses on the characterization of gravity waves in airglow phenomena to improve the quality of remote-sensing systems. Brodel’s dissertation, “Characterization of Gravity Waves in Near-Infrared Airglow Using Novel Imaging Methods,” researches the use of 2-D Fourier filtering methods and data from multiple overhead systems and identifies higher-frequency acoustic gravity waves propagating in the vertical direction, providing the first steps towards developing airglow emission-intensity, variation-correction algorithms for future mesosphere and lower-thermosphere observation platforms.

A participant in NPS’s Remote Sensing Center, Brodel supported additional projects while in Monterey related to multispectral, hyperspectral, ...continued on page 3

BROWN-BAG SEMINAR SERIES
WA-302, 1200-1300
- Wednesday, 18 July, Research Initiation Program
- Wednesday, 8 August, Research Initiation Program

Proposed FY13 Indirect Cost Rates for Sponsored Activities: The methodology and rate structure for indirect recovery is scheduled to change for FY13. The proposed FY13 indirect rate structure is based on a fixed dollar amount per labor hour. Labor hours include both NPS faculty and staff (technical and administrative) and contract labor. The dollar amounts listed below will be added to each hour of labor executed on a sponsored activity. The proposed indirect fixed rates for FY13 are provided below:
- Research: $27.48
- Education: $27.53
- Professional development: $16.21
- Other sponsored activity: $6.11

FY13 proposal budget templates have been developed and will be released as soon as the rates above are confirmed by the president.

Proposal Routing Form: The proposal routing form for research has been completed. The new form captures areas of compliance and expands the R&D relevancy fields to include policy fields. In the past, most relevancy fields were geared to science and engineering.

A separate proposal routing form for sponsored education/professional development is still under review. The research proposal routing form will continue to be used for all sponsored activities until the education form is ready.

SPONSORED PROGRAMS STATUS, JUNE 2012
FUNDS AVAILABLE: $249.7M

By Type of Activity

<table>
<thead>
<tr>
<th>Activity</th>
<th>Funds Available</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Research</td>
<td>$180.6M</td>
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<tr>
<td>Service</td>
<td>$28.5M</td>
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<tr>
<td>CRADA</td>
<td>$1.9M</td>
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</tr>
<tr>
<td>Education</td>
<td>$13.2M</td>
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<tr>
<td>Air Force</td>
<td>$47.8M</td>
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<tr>
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</tr>
<tr>
<td>Other-Fed</td>
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By Sponsor

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<tbody>
<tr>
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<tr>
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</tr>
<tr>
<td>Joint</td>
<td>$21.9M</td>
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<tr>
<td>NSF</td>
<td>$18.5M</td>
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<tr>
<td>Other</td>
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<tr>
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<tr>
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</tr>
<tr>
<td>Army</td>
<td>$9.7M</td>
<td>4%</td>
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By School

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<th>School</th>
<th>Funds Available</th>
<th>Percentage</th>
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<tr>
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</tr>
<tr>
<td>Other</td>
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<tr>
<td>Academic</td>
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<tr>
<td>Affairs</td>
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<td>GSBPP</td>
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</tr>
<tr>
<td>GSEAS</td>
<td>$64.8M</td>
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</tr>
<tr>
<td>GSOIS</td>
<td>$77.2M</td>
<td>31%</td>
</tr>
</tbody>
</table>

SPONSORED PROGRAM STATISTICS

Graduate School of Engineering and Applied Sciences

Funds available to date: $64.8M

By Department

- Systems Engineering: $10.4M (16%)
- Undersea Warfare: $802K (1%)
- Applied Mathematics: $949K (2%)
- Electrical & Computer Engineering: $5.4M (8%)
- Mechanical & Aerospace Engineering: $11.2M (17%)
- Space Systems: $3.9M (6%)
- Physics: $14.6M (22%)
- Meteorology: $4.9M (8%)
- Oceanography: $12.7M (20%)

By Sponsor

- Air Force: $5.5M (9%)
- Army: $1.3M (2%)
- CRADA: $550K (1%)
- DoD: $16.7M (26%)
- DHS: $75K (<1%)
- Joint: $1.4M (2%)
- Navy: $27.9M (43%)
- Other: $140K (<1%)
- Other-Fed: $6.1M (9%)
- NSF: $5.1M (8%)

Projects funded in June

- NCR Graduate Education Program, Jim Scrofani, ECE (Various)
- Multiscale Nonhydrostatic Models for Next-Generation Computers, Francis Giraldo, MAE (ONR)
- Spacecraft Systems, Brij Agrawal, MAE (NRO)
- Support for Preliminary Design Review of Airborne Mine Neutralization System, Knox Millsaps, MAE (NAVSEA)
- ONR INP DE/FEL Modeling & Simulation Research, Bill Colson, PH (ONR)
- In-Situ Molecular Diagnostics for Heterogeneous Polymer Composites, Joe Hooper, PH (DTRA)
- Enterprise Logistics Strategy, Chris Olsen, PH (USAF)
- Engineering & Testing Support to RRB, Chris Olsen, PH (USAF)
- DIA IT Development and Acquisition Support: Research, Operations Chris Olsen, PH (DIA)
- Support to NAVSEA Keyport NTPO, Chris Olsen, PH (NAVSEA)
- Technical Analysis for Target Detection and Identification, Chris Olsen, PH (OSD)
- NGA Spectral Intelligence Analysis, Chris Olsen, PH (NGIA)
- Deep Seaweb Hydro-Acoustic Modem, Joseph Rice, PH (SPAWAR)
- NPS Cubesat Launcher Flight Structure, Documentation, and Integration, Jim Newman, SP (NRO)

Research and Education Institutes, Centers, and Other

Funds available to date: $53.3M

By Department

- NPS-SOCOM Field Experiment: $3.2M (5%)
- NSI: $6.0M (10%)
- Other: $13.2M (23%)
- Academic Affairs: $5.4M (9%)
- CIRPAS: $14.3M (24%)
- NPS: $8.7M (15%)
- Global Policy Academic Group: $1.6M (3%)
- Cebrowski: $6.3M (11%)

By Sponsor

- NSF: $11.3M (19%)
- Other: $143K (1%)
- Other-Fed: $1.2M (2%)
- Air Force: $413K (1%)
- Army: $3.9M (7%)
- CRADA: $826K (1%)
- DoD: $22.4M (38%)
- Joint: $1.6M (3%)
- DHS: $2.5M (4%)

Projects funded in June

- NAVSEA Counter-Narcoterrorism Program Office Field Test SPT, Alan Jaeger, NSI (NAVSEA)
- AEA & Joint Electronic Attack & Compatibility Office Program, Alan Jaeger, NSI (NAWC-Weapons Division)
- Media-Independent Handover for Wireless, Full-Motion Video Dissemination, Geoffrey Xie, Cebrowski (DISA)
- Enabling Visual Detection of IED Indicators Through Perceptual Learning Assessment and Training, Ji Hyun Yang, MOVES (JIEDDO)

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

Graduate School of Operational and Information Sciences
Funds available to date: $77.2M

By Department

<table>
<thead>
<tr>
<th>Department</th>
<th>Operations Research</th>
<th>Computer Science</th>
<th>Defense Analysis</th>
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<td>$11.4M</td>
<td>$6.9M</td>
</tr>
<tr>
<td></td>
<td>63%</td>
<td>15%</td>
<td>9%</td>
</tr>
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</table>

By Sponsor

<table>
<thead>
<tr>
<th>Sponsor</th>
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<tbody>
<tr>
<td>CRADA</td>
<td>$390K</td>
</tr>
<tr>
<td>Army</td>
<td>$2.2M</td>
</tr>
<tr>
<td>Defense Analysis</td>
<td>$6.9M</td>
</tr>
</tbody>
</table>

Projects funded in June

- Enterprise Monitoring Using AF DCGS Network Security Requirements, Luigi, CS (AF ISRA)
- Investigation of Timing as a Web Service, Man-tak Shing, CS (SPAWAR)
- ROI Comparison of Ship-Signal Exploitation Equipment

School of International Graduate Studies
Funds available to date: $35.8M

Project funded in June:

- PASCC Phase II, Anne Clunan (DTRA)
- Analytic Tradecraft Training for the Laboratory Analyst, Daniel Moran (DOE)

Graduate School of Business and Public Policy
Funds available to date: $13.2M

Projects funded in June:

- Multimodal Information Sharing Team (MIST) Workshops for a National Seaport and Geographically Proximal Airport, Susan Hocevar (ONI)
- Graduate Student and Acquisition Research Support at NPS, Keith Snider (DDACM, Army [AT&L])

Ph.Ds, continued from page 1

and thermal infrared research. Before NPS, Brodel spent seven years in the United States Air Force, supporting cathode-development research for high-powered microwave devices at the Air Force Research Laboratories in Kirtland AFB, NM. He subsequently offered deployable-system support for various commercial and national launch programs from remote locations. Following separation from the Air Force, he worked as a program manager and systems engineer for various research and acquisition programs under the National Geospatial Intelligence Agency (NGA). Professors Richard C. Olsen and Andres Larraza (Physics) advised.

LTC David Phillips, USA, also received his doctorate, awarded in physics. His dissertation, “Spatial Distribution of the Mobility-Lifetime Product in Bulk Semiconductors for Nuclear Radiation Detection,” advances the development of a microanalysis technique for characterizing the charge transport properties in bulk semiconductor materials for room-temperature nuclear-radiation detection. The technique is applied to bulk semi-insulating thallium bromide (TlBr) and cadmium-zinc telluride (CZT) and uses a two-dimensional diffusion model and transport imaging to make rapid, contact-free measurements of the magnitude and spatial variation in the mobility-lifetime product at 2 μm resolution. The product is a key measure of

...continued on page 6

LTC David Phillips, USA
Students taking the fall AY2012 Modeling, Virtual Environments and Simulations (MOVES) curriculum course MV4657, Modeling and Simulation for Stability Operations, investigated various simulations and modeling tools now in use throughout the Department of Defense. Best student papers from the class were submitted to the Spring Simulation Multi-Conference Military Modeling and Simulation Symposium, and three were accepted for presentation and publication in the conference proceedings: “Investigating the Extent that Religion is Considered: A Survey of Various SSTR Modeling Tool Literature” by LTC Glenn Hodges, USA; “A Comparative Study of Simulation Software for Modeling Stability Operations” by LT Jason Ross, USN; and “Analysis of UrbanSim as it Relates to Educational Goals” by MAJ Brian Vogt, USA.

LTC Glenn Hodges is a 2004 MOVES alumnus and current doctoral student in the MOVES program. LTC Hodges’s paper examines the extent to which various SSTR models attempt to represent or include aspects of world religions within their structures. He reviews modeling literature, including user documentation, informative presentations, and umbrella strategic documents, searching for keywords such as “religion,” “religious,” and “beliefs” as a starting point for deeper analysis. It was discovered that several modeling and simulation applications group religion with other concepts such as tribe, sect, or faction. Hodges’s analysis concludes that the modeling of religion as a standalone construct within SSTR models has not been overtly attempted, and that religion tends to be used as a data input with respect to ethnic and cultural evaluation instead of a core component of various models and simulations. Warfighters make decisions based on understanding how our doctrine shapes the way we fight and how our adversaries will fight us. Discounting religion in the models that we rely on to provide insight into this complex domain is reckless. While it is hard to capture the human behavioral dimension, it is less difficult to capture the fundamental doctrine of the major world religions. Improvements are needed.

LT Justin Ross is a submarine officer and master’s student in MOVES. His paper looks at the strengths and weaknesses of several modeling and simulation tools for modeling stability operations. A segregation scenario and a civil-violence scenario are used to compare three software tools: NetLogo, Map Aware Non-Uniform Automata (MANA), and Pythagoras. LT Ross finds that all three models analyzed had potential uses in modeling SSTR operations. MANA is better suited for combat modeling, but can be used for modeling irregular warfare operations in an urban environment, which is an element of SSTR operations. Pythagoras is well suited for modeling stability operations and complex social interactions because of its soft decision rules and ability to model the varying sidedness of agents, but requires more experience to master. NetLogo was found to have the most potential for dynamically adjusting scenarios and studying the interactions of agents under various situations, but is only as good as the programmer creating the models. The main conclusion is that there are several tools already available to the warfighter for modeling stability operations, so the wheel does not have to be reinvented to model a relatively new concept in warfare.

MAJ Brian Vogt is also a student in the MOVES master’s program. His paper examines the use of UrbanSim as an educational tool. MAJ Vogt analyzed UrbanSim’s efficacy in achieving training objectives through a reward function, focusing on the question, does the simulation properly reward good student performance and penalize poor performance.

Counterinsurgency operations are exceptionally complex. Often these operations do not have clear indicators of success and failure, and the best solutions are not intuitive or obvious. Using a simulation/game presents a great environment for leaders to practice decision making and dealing with the consequences of their decisions. However, it is critical for this environment to correctly, and appropriately, reward good performance and penalize poor performance.

To investigate the model, MAJ Vogt conducted numerous runs using different strategies to obtain a score indicating the relative success of each strategy. He compared the outcomes to stated educational goals in the use of the model. Based on the results of seven different courses of action, he finds that good decision making (e.g., following a doctrinal ‘clear, hold, build’ strategy) was penalized and poor decision making (e.g., emphasizing essential services improvement ahead of clearing the insurgents) was rewarded. It would appear that UrbanSim promotes the least desirable outcome of using a simulation for education (note that UrbanSim was not designed as an trainer for individuals working without an instructor). UrbanSim has enjoyed success in the classroom primarily from its interactive nature and instructor skill. The UrbanSim training package is extensive and can transition to a successful individual training tool if the game’s performance-feedback mechanisms properly guide the student to better performance. This paper serves as a beginning of research to closely analyze the forms of performance feedback from the UrbanSim scenarios. Additionally, this research will perhaps better inform the means by which training and educational scenarios are developed and evaluated.

The MOVES curriculum provides valuable insights into the development and employment of models and simulation. The close relationship among all four branches of the military, as well as leading M&S professionals and organizations around the world, creates a cognitive environment that is unique and rewarding for students. Opportunities to take projects out of the classroom for interaction with leading professionals are a great way to enable graduates to make immediate contributions to the field of modeling and simulation.
THE EFFECT OF SHIPBOARD DESIGN DECISIONS IN AMPHIBIOUS WARFARE
Jessica L. Poniatoski–Lieutenant, United States Navy
Master of Science in Systems Technology–June 2012
Advisor: Steven Iatrou, Department of Information Sciences
Second Reader: LCDR David E. Roberts, USN, Department of Information Sciences

Recently, a major decision was made by the Navy to eliminate a key capability from the future ship of the amphibious fleet. The removal of the well deck from the future LHA (R) amphibious assault ship is attempting to change the way the Navy and Marine Corps have conducted amphibious operations over the past several decades. This thesis will look at the current and future amphibious capabilities in order to develop equations to quantitatively analyze the lift capabilities associated with future design choices to determine the effects of changing the design in the LHA (R) class of amphibious assault ships. A comparative analysis of the tradeoffs, capabilities, and limitations associated with and without having a well deck was completed in order to determine the most effective means to operate. By looking at data on the MV-22 Osprey and F-35 Joint Strike Fighter, such as lift capabilities and ranges, and comparing it to the various landing craft data, this thesis will determine the effects on mission capabilities of the Navy and Marine Corps. LT Poniatoski received the Surface Navy Association’s Award for Excellence in Surface Warfare Research.

ETHNIC VIOLENCE IN SOUTHERN THAILAND: THE ANOMALY OF SATUN
Kevin T. Conlon–Major, United States Marine Corps
Master of Arts in Security Studies–June 2012
Advisor: Michael S. Malley, Department of National Security Affairs
Second Reader: Sandra R. Leavitt, Department of National Security Affairs

This research uses a historical comparative analysis to investigate differences between two specific Muslim-majority regions of Thailand: the province of Satun, along the western coast of southern Thailand, and provinces of Yala, Narathiwat, Pattani, and Songkhla, which border the Malaysian state of Kelantan and the Gulf of Thailand.

The formation of ethnic identities in Satun and Patani has followed different paths over time, and these variations in development have produced dramatically divergent outcomes in relation to observable communal violence and terrorist attacks. Satun has virtually no problem with ethnic or religious conflict when compared to the four other southern provinces that have suffered from multiple rebellions against the state, numerous incidents of violence and terrorism, and a pervading sense of instability and fear.

This pronounced difference in outcomes also reflects the degree to which various ethnic groups within the country have been able to integrate peacefully into the modern Thai state. Finally, an analysis of the Thai government’s effectiveness in managing this integration in both regions will provide insight into effective governance throughout the contested regions of southern Thailand, and the potential is for future resolution of this conflict. Maj Conlon won the Marine Corps Association Superior Service Award for Outstanding U.S. Marine Student.

LOCALIZATION OF SURFACE OR NEAR-SURFACE DRIFTING MINES FOR UNMANNED SYSTEMS IN THE PERSIAN GULF
Meng Wee Yau–Lieutenant Commander, Singapore Navy
Master of Science in Physical Oceanography–June 2012
Co-Advisor: Peter C. Chu, Department of Oceanography
Co-Advisor: Timothy Chung, Department of Systems Engineering
Second Reader: Ronald Betsch, MIW Program Manager, NAVO

This thesis investigates the combined use of ocean models, such as idealized surface current flows, and search models, including expanding area and discrete myopic search methods, to improve the probability of detecting a near-surface, drifting object over time. Enhanced search effectiveness is facilitated by the use of robotic search agents, such as a tactical unmanned underwater vehicle (UUV) or unmanned aerial vehicle (UAV), leveraging simulation methods to inform the search process. The presented work investigates the impact of using naïve versus optimized search patterns on localizing a drifting object, including a surrogate ocean model using idealized flow as well as historical data sets with Weibull-distributed perturbations. Numerical studies and extensive analysis using different permutations of model parameters (including the relative speed of the drifting object, time late in the searcher’s arrival to the search area, sensor sweep width, and duration of the search mission) identify the significant factors affecting the overall probability of detection. Such insights enable further explorations using empirical datasets for specific oceanographic regions of interest. LCDR Yau was awarded the Naval Postgraduate School Outstanding Academic Achievement Award for International Students.

COST-BENEFIT ANALYSIS OF A PORT VISIT: A DETERMINATION OF SUITABLE FACTORS
Myron E. Lind–Lieutenant, United States Navy
Master of Business Administration—June 2012
Advisor: Douglas Brook, Graduate School of Business & Public Policy
Co-Advisor: Dan Nussbaum, Department of Operations Research

Effective distribution of limited military assets is crucial to accomplishment of operational requirements. Inefficient deployment is wasteful of a command’s limited operational funding. Given current fiscal pressures, operational funding is expected to decrease in the near future, making effective employment of assets crucial to continue meeting established operational requirements.

A commander is faced with maximizing the benefits of sending U.S. Navy vessels to call on foreign ports, while balancing political and military objectives. At the same time, costs must be kept to a minimum to allow flexibility and continued operations. This study looked at identifying the suitable factors a commander must consider and weigh in deciding where to send a vessel.

This study sought to develop a framework for incorporation into future optimization model research using cost figures for various vessel classes and ports of call. For each stakeholder, an analysis was used to determine considerations that, when quantified, will allow a commander to determine the best locations to send vessels given changing objectives. LT Lind won the Louis D. Liskin Award for Excellence in Business and Public Policy, the Department of the Navy Award for Academic Excellence in Financial Management, the Monterey Council Navy League Award for Highest Academic Achievement, and the Conrad Scholar Award for Distinguished Academic Achievement in Financial Management.

...continued on page 9
On May 21st, the Center for New Security Economics and Net Assessment (CNSENA), Defense Resources Management Institute, Graduate School of Business and Public Policy, and Global Public Policy Academic Group hosted a visit by economists Alice Rivlin, a senior fellow at the Brookings Institution, and Sidney Winter, a professor of management at the Wharton School, University of Pennsylvania. Associate Professor Mie Augier of CNSENA organized the event.

Rivlin has served as vice-chairman of the Federal Reserve and director of the Congressional Budget Office and Office of Management and Budget, while Winter is an theorist in firm behavior and was chief economist for the Government Accountability Office.

Over thirty NPS students and faculty attended a discussion of the differences between liberals and conservatives. Rivlin and Winters consider themselves centrists, but took left or right positions for the sake of argument. Differences lead to political gridlock that prevent the government from taking action. To surmount this problem, Rivlin and Winter advocate changing the conversation from highly polarized discussions towards more nuanced considerations in matters of fiscal policy, scope and size of the federal government, the nature of national defense, aspects of personal responsibility in relation to government, and intrusiveness versus non-regulation.

On fiscal policy, they noted that there are two possible conversations about public discourse. In a bipartisan group, all tend to agree that there are simple and attainable ways to solve budget deficits and national debt. The other, more public, conversation sees one side (Democrat or Republican) blaming the other. Ignored is the fact that an unbalanced, unsustainable budget is a collective failure due to unwillingness to deal with rising entitlement spending. Extreme partisanship leads to political deadlock, with both sides afraid to act for fear of political failure.

Also discussed was the extent to which government should help its citizens in times of need, vs. the intrusiveness of government. Liberals tend to view government as “us,” the collective will of the people to aid or regulate. Conservatives tend to see government as “strangers,” coming to unduly influence individuals and businesses.

Winter and Rivlin took questions on welfare, the problem of explaining political complexity, the causes of the 2008–2009 financial crisis, the European debt crisis, and more. It is hoped that this will be the first in a series on reconnecting economics and security.

PH.DS, continued from page 3

charge transport, and a uniform product is critical for optimum energy resolution in gamma-ray detectors. Spatial variations in the ambipolar diffusion length are observed in TlBr on a scale of ~10 μm, and the cathodoluminescence (CL) spectrum in TlBr at 5 K is reported. Using CL and photo-induced conductivity transient spectroscopy (PICTS), an empirical energy level diagram for Se and Pb defect levels in TlBr is reported. The product in TlBr is generally found to decrease with increasing impurities/defects. The product in TlBr and CZT is found to decrease with increasing temperature over the ranges of 8 K–102 K and 5 K–60 K, respectively. Transport imaging is applied for the first time to investigate the effects of Te inclusions in CZT and the role of photon recycling in TlBr and CZT. Distinguished Professor Nancy Haegel (Physics) served as advisor.

LTC Phillips’s next assignment is as chief of health physics at the Madigan Army Medical Center, Joint Base Lewis-McChord.
A manuscript by Nathan Moshman (MAE), Garth Hobson (MAE) and S. S. Sritharan (DRCSI), “Control of Shock Wave Attenuation using Liquid Water Droplets with Application to Ignition Overpressure in Launch Vehicles,” has been accepted for publication in the International Journal of Flow Control.

Statistician and probabilist Professor V. Mandrekar of Michigan State University will soon join DRCSI as an National Research Council Senior Fellow for three months.

S. S. Sritharan will be the featured speaker in the Defense Science Forum organized by the Defense Research Development Organization (DRDO) Headquarters in New Delhi, India. His talk, “Strategic Systems of the Future: Some Long Term Scientific Challenges,” will also be given at the DRDO Bangalore facility.

S. S. Sritharan delivered the Ramanujan Lecture series, “Mathematics of Turbulence, Random Waves and Quantum Fields,” at Bharathiya University, Coimbatore, India. India is celebrating 125th birthday of mathematician Srinivasa Ramanujan with a special year of mathematics all over India and many US scientists are involved.


S. S. Sritharan gave a colloquium at the probability seminar in Indian Statistical Institute (ISI) and give a talk entitled “Large Deviation Theory of Stochastic Navier-Stokes Equation.”

S. S. Sritharan gave a colloquium at the Tata Institute (TIFR) Bangalore Centre for Applicable Mathematics entitled “Martingale Problem for the Navier-Stokes Equation and Statistical Theory of Turbulence.”

S. S. Sritharan gave a colloquium at the Indian Institute of Science (IISC) in Bangalore, “Recent Advances in Control and Stochastic Methods in Navier-Stokes Equation.”

DRDO representatives and the leadership of Bharadhiyur University met with S. S. Sritharan to discuss the joint NPS–DRDO–BU Center for Advanced Theoretical Sciences proposed by Professor K. Balachandran, based on his ONR-Global supported month long visit to NPS in February 2012.

CONSTRUCTION SCIENCE


CENTER FOR DECISION, RISK, CONTROLS AND SIGNALS INTELLIGENCE (DRCSI)

**METEOROLOGY**

Chih-Pei Chang was named co-chairman of the Science Advisory Committee of the APEC Research Center for Typhoon and Society. The Asia-Pacific Economic Cooperation (APEC), an organization of 21 member economies in the Asia Pacific region, established two international centers under the APEC Industrial Science and Technology Working Group, focusing on climate and extreme weather that present increasing challenges to the society. The election was made at the APEC Climate Center (APCC) board meeting in Taipei in June 2012. Professor Chang holds the National Science Council Visiting Research Chair at the Department of Science and Technology, Republic of the Philippines, in leading the efforts of providing scientific guidance to ACTS. Professor Chang also serves as the chairman of the Monsoon Panel of the World Meteorological Organization, the UN weather and climate agency.

**MOVES INSTITUTE**


**NATIONAL SECURITY AFFAIRS**


**OCEANOGRAPHY**


W. J. Maslowski and colleagues J. Clement Kinney, A. Roberts and M. Higgins (University of Colorado) have published a review paper on state-of-the-art in modeling of the Arctic sea ice: challenges and needs. They argue that Arctic sea ice is a key indicator of the state of global climate because of both its sensitivity to warming and its role in amplifying climate change. Accelerated melting of the perennial sea ice cover has occurred since the late 1990s, which is important to the pan-Arctic region, through effects on atmospheric and oceanic circulations, the Greenland ice sheet, snow cover, permafrost, and vegetation. Such changes could have significant ramifications for global sea level, the ocean thermohaline circulation, native coastal communities, and commercial activities, as well as effects on the global surface energy and moisture budgets, atmospheric and oceanic circulations, and geosphere-biosphere feedbacks. How-

PHYSICS


Fred A. Kruse was elected as a Fellow of the Geological Society of America (GSA) for his contributions to development of image analysis software, user training courses, and scientific publications leading to worldwide use of remote sensing for geologic applications.


Senior Lecturer Daphne Kapolka gave a two-hour presentation on underwater acoustics to about 350 employees of the Bettis Atomic Power Laboratory on June 25. Bettis plays a key role in the development and maintenance of Navy nuclear propulsion. Kapolka provided insights into the fundamentals of sonar and radiated noise as well as some of the more recent developments in the field.

SYSTEMS ENGINEERING
Ray Madachy and Dave Olwell were featured in the Systems Engineering Research Center (SERC) 2011 Annual Report for their sponsored projects in Systems Engineering for an Agile and Lean World and Advancing the Discipline of Systems Engineering, respectively. The latter, led by Olwell, is the BKCASE project for the Systems Engineering Body of Knowledge (SEBoK) and Graduate Reference Curriculum for Systems Engineering (GRCSE). The SERC is a university-affiliated research center of the DoD.

Ray Madachy was an invited expert panelist on the International Conference on Software and System Process (ICSSP) 2012 panel “Software Process Simulation: At a Crossroads?”


STUDENT RESEARCH, continued from page 5

DECEPTION: THEORY AND PRACTICE

Second Reader: Kalev Sepp, Department of Defense Analysis

This thesis explores the history of U.S. Army deception and doctrine and combines the insights gained with the various works on deception, cognitive psychology, communications, and decision-making to distill a handbook for deception practitioners. A longitudinal review of Army doctrine reveals wide variation in the treatment of deception, which can be primarily explained by a preference for the cumulative destruction style of war and the perceived balance of power between the U.S. and its adversaries. This thesis fills the doctrinal gap by distilling the body of work to create a theory of deception, providing a structure, taxonomy, lexicon, and emphasis on how deception functions within the communications and decision-making. A synthesis of the practice of deception is presented, with a focus on planning and the essential elements of deception practice. Examples of U.S. use of deception from the Revolutionary War to Operation Desert Storm are presented to illuminate the utility and use of deception. The thesis makes recommendations on how to organize for deception operations. MSG Monroe won the Association of the U.S. Army, General Joseph W. Stilwell Chapter, Award for Outstanding Army Student.

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MEMORANDA OF AGREEMENT (MOAS)

Title: Reimbursable Assignment of NPS Employee Keenan Yoho to U.S. Special Operations Command
Partner: United States Special Operation Command
PI: William Gates, Graduate School of Business and Public Policy
Summary: This MOA outlines the responsibilities, procedures, and relationship between NPS and USSOCOM with regard to support of reimbursable detail of Keenan Yoho from NPS, Monterey, CA, to USSOCOM, Tampa, FL. The period of assignment is three years.

Title: Memorandum of Agreement between the Central Intelligence Agency and NPS to Establish an Office for the Director, Central Intelligence Representative, at NPS
Partner: Central Intelligence Agency
PI: John Arquilla, Department of Defense Analysis
Incumbent: Randy Burkett, Chair for National Intelligence
Summary: This MOA outlines the responsibilities and functions of the Central Intelligence Agency and the Naval Postgraduate School to organize and sustain the National Intelligence Chair position that will serve as the director, CIA (D/CIA) representative to the president, Naval Postgraduate School.

TECHNICAL SERVICE AGREEMENTS

Title: Hat Trick UAV Flight Testing

TECHNICAL REPORTS PUBLISHED

| NPS-IS-12-001 | Joint Intelligence Operations Centers (JIOC) Business Process Model & Capabilities Evaluation Methodology | G. Schacher, N. Irvine and R. Hoyt |

STUDENT RESEARCH, continued from page 9

DERIVATION OF RIVER BATHYMETRY USING IMAGERY FROM UNMANNED AERIAL VEHICLES
Matthew Pawlenko–Lieutenant Commander, U.S. Navy B.S., Purdue University, August 2002
Master of Science in Meteorology and Physical Oceanography–September 2011
Co-Advisor: Philip Durkee, Department of Meteorology
Co-Advisor: K. Todd Holland, NRL, Stennis Space Center
In many places where U.S. forces operate, there exists an insufficient amount of data regarding river water depths, which is a necessity for safe operational planning. Satellite sensors and airborne manned platforms have been used for bathymetric derivation, but are not in abundance, nor do they have the spatial resolution required to examine smaller rivers. Using unmanned, aerial vehicles (UAV), this research examines the feasibility of using a ratio method with digital imagery to derive water depths, as well as a simpler polynomial regression to create a lookup table for use in the field. The results show that the ratio method of red to blue had higher correlation than the red color band on its own, and that the simple polynomial regression using a ratio of red to blue had higher correlation than more widely accepted methods. However, both methods are limited by a maximum depth, which is defined as the point where color no longer changes with depth. All depths beyond this point appear as this maximum depth. These findings show that using imagery from UAVs for bathymetric derivation could be a feasible alternative to accepted satellite imagery methods, but further research is needed to demonstrate operational utility. LT Pawlenko received the Oceanographer of the Navy Award for Outstanding Academic Performance in Meteorology and Oceanography.

THESIS STATS FOR MARCH 2012

* Other master’s degrees: applied math (1), defense analysis (10), electronic warfare systems engineering (1), physical oceanography (1), software engineering (1), space systems operations (1), engineering acoustics (2), information systems and operations (2), program management (2), systems engineering management (2)

Degrees Conferred in March 2012 (165 Degrees Conferred)