



NAVAL POSTGRADUATE SCHOOL

IN REVIEW

MAGAZINE

JANUARY 2011

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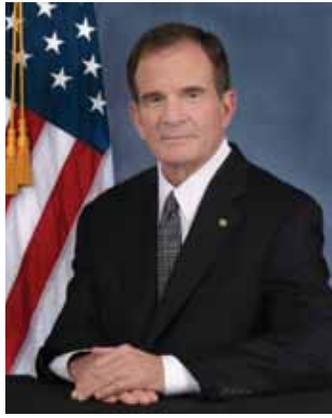
Groundbreaking Research on Satellite
Maneuvers

Alumni Headline San Francisco
Fleet Week

NPS Welcomes Three
New Hall of Famers

The Warrior MBA

In the Classroom, In the Fleet - This is DoD's Niche MBA



Daniel T. Oliver
Vice Adm., United States Navy (Ret.)
President, Naval Postgraduate School

NPS' Graduate School of Business and Public Policy (GSBPP), led by Dean Bill Gates, has been recognized as one of the best public administration schools in the nation. One of only a few in the world that holds dual accreditation, GSBPP applies specialized defense-based education to traditional business school curricula.

PRESIDENT'S MESSAGE

As we enter the new year, I cannot help but look back and reflect upon successes and challenges of the months behind us, and welcome prospects and opportunities that lie ahead. This past year was an exciting one for the Naval Postgraduate School. We reveled in our history through the close of the Centennial Celebration, marking the end of our first 100 years and the beginning of many great things to come.

NPS is an educational institution with a clear and important mission, and it is quite critical that we successfully execute that mission. While men and women from across the country continue to defend our nation and our freedom around the world, the Department of Defense has asked us to do our part in ensuring they are safe, successful and well led.

Just a couple of weeks ago, in early January, Secretary of Defense Robert Gates and Chairman of the Joint Chiefs of Staff Adm. Mike Mullen briefed the nation on a plan that will save more than \$150 billion in defense spending over the next five years. They outlined an effort that included some fairly significant measures – disestablishment of the U.S. Joint Forces Command and proposed closing of the Second Fleet Headquarters in Norfolk mark just a couple of many aggressive plans noted in the cuts. The four military services have been asked to find more than \$100 billion in savings and efficiencies. These are extreme, but as Gates and Mullen noted, they are simply and absolutely required.

Where does the Naval Postgraduate School fit into this effort? While we will sustain our own budget reductions, our mandate is more than a line item on the Navy's budget. We are an educational institution – this is our strength, and there is no better way to impart change, to make an impact, than by doing what we do best.

NPS' Graduate School of Business and Public Policy (GSBPP), led by Dean Bill Gates, has been recognized as one of the best public administration schools in the nation. One of only a few in the world that holds dual accreditation, GSBPP applies specialized defense-based education to traditional business school curricula.

In this edition of In Review, you will read about our Master of Business Administration (MBA), and Executive MBA, programs that prepare students for the challenges of overcoming budgetary and management challenges in their roles within DoD. On campus or off, students in these programs are exposed to traditional practices and policies of business in the private sector, but with a distinct focus on business in the public sector. These specialized programs allow junior and senior level DoD civilian and military leaders to leave NPS with tools and knowledge to manage public resources in the most efficient ways possible. They examine programs and policies at the individual level and in minute detail, always looking outside traditional ways of doing business to discover how to do things better.

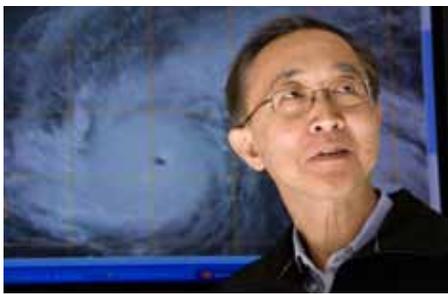
Last year proved to be an exceptional year for the collective NPS community. But I believe our impact on the Navy, the Department of Defense, and on global security will only continue to grow. We are not in a business of dollars, but of knowledge, and that is how our impact will be felt across the world.



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NAVAL POSTGRADUATE SCHOOL **IN REVIEW** MAGAZINE

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ON THE COVER

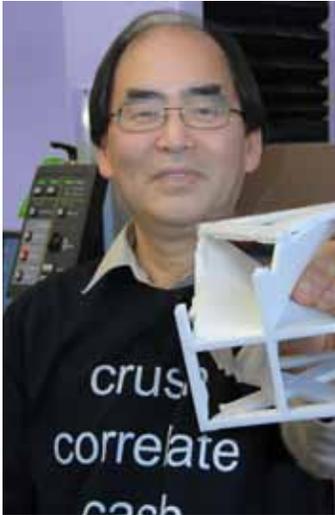
Seahawk pilot Cmdr. Kevin "Sugarbear" Carey has been able to step out of the cockpit and set his flight suit aside to attend the NPS' defense-focused Master of Business Administration degree program. Whether on campus or off, the university's MBA and Executive MBA programs prepare graduates to effectively, and efficiently, manage the business of defense.

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NPS Crushes CubeSats for DARPA Challenge



Professor Young Kwon

The Space Systems Academic Group at NPS is known for being active in developing CubeSats – small, square satellites used for space research. The folks at Defense Advanced Research Projects Agency (DARPA) hoped to determine just how much of a beating the CubeSat can withstand in their journey to space, so they recruited NPS’ Professor Rudy Panholzer and Distinguished Professor Young

Kwon to develop and destroy a plastic CubeSat structure for the 2010 DARPA Digital Manufacturing Analysis, Correlation and Estimation (DMACE) Challenge. Oak Ridge National Laboratory supported the Challenge by similarly producing and destroying a titanium sphere.

The CubeSat structure is fabricated using Digital Manufacturing (DM) on a ‘3D printer’ of sorts. The machine lays out the polycarbonate material layer by layer to form the complete structure. DARPA looked at DM as a cost-effective manufacturing method for small quantities of complex objects. Testing the durability of the objects helps determine if the DM process can produce a product that meets the necessary structural properties for the user.

To determine the load that each of the structures can bear, participants were given data sets containing basic information about the structures, and were tasked with determining how much force would be required to crush the CubeSat and the sphere. Twenty-one teams from around the coun-

try submitted their predictions, and the University of California, Santa Barbara team, led by Professor Frank Zok, emerged the winner.

“The Challenge was a success,” said DARPA Fellow Tim Sands. “The result of this development effort generated methods for predicting the ultimate strength of digitally manufactured structures and also established the first openly available database for the strength of digitally manufactured titanium and polymer structures.”

Renowned Experts in Robotics and Autonomous Systems Lecture at NPS

NPS students, staff and faculty had two opportunities to hear distinguished lecturers share the wonder of robotics and autonomous systems, with lectures by Dr. George Bekey and Dr. Siva Banda as part of the Graduate School of Engineering and Applied Sciences (GSEAS) Distinguished Lecture Series.

Bekey serves as Emeritus Professor of Computer Science at the

University of Southern California, and the Distinguished Adjunct Professor of Engineering at California Polytechnic University, San Luis Obispo. He has an extensive background in robotics, and spoke about the kinds of technologies emerging in the field of autonomous systems. Autonomous systems, those that perform all or some of their activities without human command, are gaining traction in both the military and civilian sectors.

“I’ve been in robotics since the 1980s,” said Bekey. “I’ve seen the field change over time from when a robot was only an arm that lifted an automobile engine and dropped it onto a chassis on an assembly line. Now, robots are everywhere.”

Banda is the Senior Scientist for Control Theory with the Air Force Research Laboratory Air Vehicles Directorate. The Air Force, like the Navy, according to Banda, has placed the highest priority on research and development of unmanned aerial vehicles.

“So where are we going?” he asked rhetorically. “The grand vi-

Alumnus Honored by ASNE for Excellence in Naval Engineering

Cmdr. Bradford Bittle, an NPS electrical engineering graduate, was named the 2009 Claud A. Jones Award winner for his significant contributions to naval engineering by the American Society of Naval Engineers (ASNE). The award, named for Medal of Honor recipient, and NPS electrical engineering alumnus Admiral Claud A. Jones, is given annually by ASNE to a fleet or field engineer who has made significant contributions to improving operational engineering or material readiness of the maritime forces.

Bittle, awarded for his exceptional performance and achievement while

serving as Force Modernization Officer for Commander Naval Air Force and as Chief Engineer of USS Abraham Lincoln (CVN 72), attributes much of his engineering success to the values and lessons learned while at NPS.

“A Master’s in an engineering field has provided me a wide and deep tool kit from which to draw from to help solve the difficult issues facing the Navy today,” said Bittle.

Bittle’s course of study at NPS strengthened his engineering proficiency, and allowed him to hone broader skills and earn qualifications that ultimately led to winning the Jones Award.

ASNE, the seventh oldest technical

society in the United States, is a professional engineering society for engineers, scientists and allied professionals who conceive, design, develop, test, construct, outfit, operate and maintain complex naval and maritime ships, submarines and aircraft and their associated systems and subsystems.



sion, the desired capability, is for all platforms including all manned and unmanned vehicles in all four domains – space, air, ground and sea – to cooperate, share information and make decisions for successful military missions.”

PEO Space Rear Admiral Young Joins NPS' SSAG Students for Midterm Review

Students in the Space Systems Academic Group (SSAG) had a unique opportunity during their Spacecraft Systems II Course (AE4831) midterm review when the Navy's Program Executive Officer (PEO) for Space Systems, Rear Adm. Liz Young, returned to her alma mater. Young took the time from a day of briefings and meetings to attend the review, asking questions and providing feedback on the two group presentations.

“The fact that she would take the time out of her busy schedule to participate shows the students how important she regards their education at NPS for the future of the Navy's space cadre,” explained SSAG Senior Lecturer and retired Navy Capt. Al Scott.

In addition to serving as PEO, Space Systems, Young is the Director of Systems Engineering at the National Reconnaissance Office and Commander of Space and Naval Warfare System Command's Space Field Activity. She received her dual Master's of Science degrees in Physics and Space Systems Operations from NPS in 1990.

“Participation from a flag-level officer such as Rear Adm. Young provides tremendous benefits for the students in our space systems program,” said Scott. “The insight and feedback she can provide helps them better understand the challenges associated with designing space systems to provide support to the warfighter.”

The group presentations represented the culmination of two quarters spent investigating satellite design. The feedback from the panel of guests allowed the students to examine aspects of their project that they may have overlooked, or delve deeper into questions that might affect their end results.

Bestselling Author and Ravens Member Headline Fall Quarter SGLs

NPS welcomed two distinguished lecturers as part of the Secretary of the Navy Guest Lecture (SGL) Series for the Fall quarter. New York Times bestselling author Dr. Thomas Barnett, a nationally-known public speaker and security affairs strategist, lectured on a variety of subjects ranging from the impacts of globalization to the correlation between communications connectivity and regional stability.

Barnett introduced attendees to a “new look” at the world map that suggests rough boundaries can be drawn around the globe. His outline divides the world into two distinct groups: the Functioning Core, characterized by economic interdependence; and the Non-Integrated Gap, characterized by unstable leadership and absence from international trade. He noted almost all post-Cold War conflict and military actions involving the U.S. occurred in the non-integrated regions that find trouble keeping pace in the global economy.

The following month, the Honorable Craig Duehring, former Undersecretary of the Air Force for Manpower and Reserve Affairs, spoke of his time in Vietnam where he became a highly-decorated pilot and member of the Raven Forward Air Controllers, a covert fighter pilot unit that worked closely with the CIA during the Vietnam War.

The Ravens conducted dangerous military operations and,

because of the secretive nature of their missions, the pilots were required to wear civilian clothes and carry no military identification. Many of the pilots would go on missions and disappear without warning to never return, said Duehring.

Duehring gave a detailed sum-

mary of his time with the Ravens, about the dangers he faced, and about the near misses he had in which he could have lost his life. He paused for questions and finished his lecture by reminiscing about his time with the unit and by giving a touching remembrance to his fallen comrades



Ph.D. Alumnus Awarded Top Honor by Human Factors and Ergonomics Society

NPS alumnus Air Force Maj. Christopher McClernon accepted the prestigious Alphonse Chapanis Best Student Paper Award at the Human Factors and Ergonomics Society (HFES) Conference in San Francisco. In an exciting mix of coincidence and fate, McClernon was also given an opportunity to meet the keynote speaker for the conference, Captain Chesley “Sully” Sullenberger, a man whose career McClernon had followed closely in his dissertation research.

“It's still all too surreal. You look at the list of people who have received this award in the past 41 years, and some of them are now leaders in our field. So I am certainly very pleased to be asso-

ciated with that group,” said McClernon. “Captain Sullenberger congratulated me and shook my hand, and it was really one of the highlights of my professional career.”

Sullenberger made headlines, and a spotlight in McClernon's thesis research when, on Jan. 15, 2009, he was forced to land U.S. Airways Flight 1549 on the Hudson River after a flock of geese took out both engines.

In his dissertation, McClernon proposed that the military needs to be able to more rapidly get pilots to that level of expertise, in order to handle the inevitable and ever-changing challenges facing the warfighter. He used Sullenberger as an example, given all of the factors the pilot had to consider in deciding how and where to land the large aircraft in the most densely populated city in the country.

“In many ways,” noted Sullenberger, “my entire life up to that moment had been a preparation to handle that particular moment.”

FACULTY SHOWCASE

OR Professor Receives 2010 Menneken Award



Dr. Johannes O. Royset

Dr. Johannes O. Royset, Assistant Professor of Operations Research, was named the 2010 winner of the Carl E. and Jessie W. Menneken Faculty Award for Excellence in Scientific Research, announced November 22. Royset was recognized for both the quality and quantity of his research, the impact his results have had on the Departments of the Navy and Defense, and his exemplary collaboration with NPS students in all aspects of his research.

His specific area of expertise is in solving optimization problems under uncertainty. "Often, plans look good on paper," he remarked, "but in reality may not be as good as originally thought due to unexpected events." You must plan for unexpected events in an intelligent way, he added, noting that mathematical models that use this reasoning offer decision makers better courses of actions in the presence of uncertainty.

Royset teaches some 70-80 students a year, including distance learning students, and has authored or coauthored 31 publications since joining the NPS community with 21 publications appearing in peer-reviewed journals. One joint paper with student, Maj. D. Reber, received the Military Operations Research Society Symposium Barchi prize for the best paper at the Military

Operations Research Symposium in 2009. Royset has received external funding of over \$2 million in support of his research.

"This award came as a surprise," he remarked. He also noted that he had put in lots of hard work with colleagues and students over the years, work that is to be used by the Navy and other agencies. "I'm glad to join the list of previous winners," he added.

Prof. Sophal Ear Awarded Fulbright Grant

Sophal Ear, an Assistant Professor of National Security Affairs was recently awarded a Fulbright Grant in conjunction with the Fulbright Senior Specialist designation he received earlier this year.

"It's a great honor to have a SIGS [School of International Graduate Studies] faculty member recognized by the Fulbright program in this way," said Dean James Wirtz. "Dr. Ear is having an increasing impact in the study of South East Asia, and I'm excited he has this opportunity to advance his research, service and teaching by spending time in the region and collaborating with colleagues there."



Sophal Ear

Ear was invited by the Director of the Institute of Security and International Studies (ISIS) Thailand for a 2-6 week assignment as a visiting professor under the Fulbright program. Professors par-

ticipating in the Fulbright program traditionally conduct seminars, facilitate workshops and lecture on their areas of expertise – for Ear that means Southeast Asian affairs, focusing on health, security and post-conflict reconstruction.

"I'm looking forward to exchanging ideas with my colleagues at ISIS through talks I'll deliver as well as listening to them and learning from them during my assignment," said Ear. "I am grateful for this wonderful opportunity."

The designation as a Senior Specialist places Ear on the U.S. State Department's roster of academic experts for consultation and assistance in cases of need for project-related advice, service and development assistance. Such projects are proposed by host institutions and approved by the U.S. Embassy or by the Fulbright Commission and the Bureau of Educational and Cultural Affairs.

"This appointment is a well-deserved recognition of Dr. Ear's expertise and experience in security studies. I am pleased that he is able to assist colleagues at Chulalongkorn University, the oldest and most prestigious university in Thailand, and represent NPS in this international initiative," said Dr. Leonard Ferrari, NPS Executive Vice President and Provost.

Committee Works to Develop NPS' Classified Computing Capabilities

The ability to conduct education and research at a classified level is both a unique benefit, and a mission requirement, at an institution such as NPS. But in order to execute this critical task, not only are secure facilities required, secure computing capabilities are equally vital.

Last year, recognizing the need to ensure classified computing capabil-

ities were given due attention, campus leaders convened the Classified Computing Committee to examine the university's current infrastructure, and provide recommendations on how best to move forward.

"We must maintain this core competency," noted NPS President Dan Oliver at the committee's latest meeting, Tuesday, Nov. 31, noting the importance of committing significant resources behind our classified computing capability.

The committee's initial findings echo these sentiments, noting that one of the fundamental issues to come up many times during their discussions with stakeholders across campus is the importance of NPS' ability to engage in classified research and to conduct classified courses. "This is a capability that was important in our resisting BRAC closure and is a capability that is often showcased for important visitors to the campus," noted the committee's initial draft report.

And according to Dr. Christine Haska, Vice President for Information Resources and Chief Information Officer, the committee is well on its way. "This committee has a good battle plan to move forward," she noted, closing by thanking the members for their valued service to the campus community.

The committee includes Chairman Herschel Loomis; faculty members Chris Eagle, Bret Michael, and Chris Olsen; Information Technology and Communications Services representatives Joe LoPiccolo and Terri Brutzman; and Dudley Knox Librarian George Goncalves.

Global Challenges Seminar Series Kicks Off

Initiated by Executive Vice President and Provost Leonard Ferrari, the Global Challenges Seminar Series got underway with featured speaker Giovanni Dosi, Professor

FACULTY SHOWCASE

of Economics at Italy's Scuola Superiore Sant'Anna, at the Monterey Conference Center, Dec. 9.

Dosi presented a moving talk entitled, "Exploring Problems and Solutions in the 21st Century," delving into industry and technologies in foreign countries, trade agreements between nations, and terrorism and rogue nations. Following his speech, he responded with insight and feasible solutions to questions presented before him from the audience about problems facing the nations of the world today.

Global Challenges is a free seminar series sponsored by NPS, CSU Monterey Bay, Monterey Institute of International Studies, and the City of Monterey. Featuring speakers that highlight diverse opinions, the series creates a platform for the community to engage with scholars, scientists, authors and leaders on issues of global importance.

Faculty Recognized at Annual University Celebration

The NPS community gathered on the quarterdeck of Herrmann Hall, Dec. 7, to award and pay tribute to the newest Distinguished Professors as well as this year's award-winning faculty for their contributions to the university's success in 2010.

"As Provost, I am honored to represent a faculty population as driven, intellectually powerful and energetically entrepreneurial as we have here at NPS," remarked Executive Vice President and Provost Leonard Ferrari. "Today, we honor a small group of our colleagues. Faculty who have risen to the challenge posed by our unique mission, and have performed beyond the calling of simply to teach."

Honored during the ceremony were Professor Rene Rendon, Associate Professor of Acquisition Man-

agement in the Graduate School for Business and Public Policy, presented with the 2010 Richard W. Hamming Annual Faculty Award for Achievement in Teaching; Associate Professor Clay Moltz of the School for International Graduate Studies, awarded the Hamming Annual Faculty Award for Interdisciplinary Achievement; Associate Professor Tamour Radko of the Graduate School of Engineering and Applied Sciences was awarded the Rear Adm. John Jay Schieffelin Award for Teaching Excellence; and Assistant Professor Johannes Royset was officially presented the Menneken Award.



Executive Vice President and Provost Leonard Ferrari, left, congratulates Rene Rendon, right.

The evening also provided an opportunity for the campus to formally congratulate NPS' newest Distinguished Professors: Electrical and Computer Engineering Professor Jon T. Butler, Oceanography Professor Ching-Sang Chiu, Business School Professor Kenneth J. Euske, Operations Research Professor Patricia A. Jacobs, Mechanical and Aerospace Engineering Professor Young W. Kwon, and Electrical and Computer Engineering Professor Herschel H. Loomis, Jr.



OR Faculty Honored with Prestigious J. Steinhardt Prize

Two NPS faculty were selected as this year's recipients of the J. Steinhardt prize by the Military Applications Society (MAS) of the Institute for Operations Research and the Management Sciences (INFORMS). The award was presented to Operations Research Senior Lecturer Wayne Hughes, pictured right, and Distinguished Professor Emeritus Al Washburn, pictured left, at the INFORMS Annual Meeting in Austin, Texas, November 7-10.

"The MAS Award is a special honor because J. Steinhardt is one of our greatest pioneers in military operations research, helping to establish our abiding influence in improving Navy operational effectiveness," said Hughes. "I regard my greatest accomplishments as having been in command of two Navy ships and a training establishment ashore. I am proud to have contributed to the best military operations research department in the world and one of the top half-dozen departments who teach operations research, systems analysis, systems engineering or management science."

Hughes also noted that it was an honor to join other distinguished professors from NPS who have received the award, including Washburn, Dave

Schrady and Jack Borsting. His research interests over the years have included tactical and campaign analysis, joint littoral warfare, theory of combat and naval history. With over 40 years experience as a teacher at NPS, Hughes continues advising students and conducting research for the Department of Defense.

"Every well read naval officer knows the name Wayne Hughes," said Senior Lecturer and retired Navy Capt. Jeff Kline. "His seminal book on Fleet Tactics is one of the most read studies by professional maritime officers. I am proud to call him mentor and friend, but I am only one of many, including Admiral Mike Mullen, Chairman of the Joint Chiefs of Staff, who was Wayne's thesis student."

Bringing decades of experience to the OR community, Washburn was inducted into the National Academy of Engineering in 2009. His expertise in mine warfare, antisubmarine warfare, munitions planning and information warfare has benefitted the NPS community since 1970.

Washburn said that he was especially delighted to receive an award that is sponsored by CNA, an organization with roots all the way back to WWII. His research interests include applied probability, search and detection, optimization, combat models, game theory and undersea warfare.



NPS Teams Up with NASA, Industry to Test Groundbreaking Maneuvers on Spacecraft in Orbit

By Amanda D. Stein

Dazzling sun spots and stunning solar flares were just another day in the life of the Transition Region and Coronal Explorer (TRACE) spacecraft over the past 12 years. Designed to record solar activity, TRACE captured images and data to transmit back to NASA until earlier this year when it was set to be shut down and replaced by a newer, more efficient craft.

Before shutting TRACE down, though, NASA decided to give a team of scientists a shot at conducting their experiments on the fully operational vehicle in space. That opportunity made its way to NPS when Professor Mike Ross and Researcher Mark Karpenko received a call, and an offer to control the spacecraft for four weeks of experiments that could transform industry standards.

“When do you ever get a chance to fly something on a satellite?” said

Nazareth Bedrossian, Manned Space Systems Group Leader at Draper Laboratory. “People like us who work in engineering usually don’t get the chance to fly real things.”

TRACE quickly went from being a quiet solar observation satellite to a slewing craft dancing in the sky. NPS joined forces with Draper Laboratory and NASA’s Goddard Space Flight Center to give new life to the craft, and push the limits of what TRACE was designed to do. They hoped to prove their groundbreaking ideas – an alternative method for reorienting spacecrafts using maneuvers that reduce both time and fuel consumption, while taking advantage of the physics of the craft as it orbits. The winding path would, according to their theory, allow the craft to slew more quickly than if it was maneuvered along a straight path.

The idea for the TRACE experiments was a joint effort that Ross and

“If we marry the ideas we demonstrated on TRACE with the correct spacecraft configuration, then we can see real savings ... We will be able to exploit the available control efforts, together with unique configurations, in order to really blow the doors off of what can currently be done using industry standard maneuvers.”

Bedrossian had believed in for many years. TRACE was their chance to relive the successes they had seen when utilizing Zero Propellant Maneuvers (ZPM) on the International Space Station (ISS) in 2006. Bedrossian used his ZPM concept, and the support of DIDO software developed by Ross, to execute the ISS maneuvers, which proved successful. Because of Bedrossian's experience in designing the ISS maneuvers, Ross and Karpenko knew that his involvement would be key to the success of the experiments on TRACE. This time, however, their objective would be to save time, not fuel.

"It was a very tense time for NASA because in its entire history, the vehicle had only slewed once, to 15 degrees," said Karpenko. "These were completely unprecedented maneuvers for the vehicle."

Preparing for the experiments was an exhausting process for the team, all operating from different locations around the country. Bedrossian and his associate, Sagar Bhatt, worked on developing the trajectories for the spacecraft. Back at NPS, Ross and Karpenko were busy ironing out other details of the experiments, refining the trajectories and developing a series of simulation models to test the maneuvers.

All of their hard work paid off on August 10, 2009, when Ross, Karpenko and several others from NASA all gathered at Goddard Space Flight Center in Maryland to execute the first test maneuver. The testing period included two tests a day, three days a week, during which the optimal maneuver commands were transmitted to the satellite, and then executed.

"We wanted to start off small and move

the vehicle only by about 10 degrees to make sure that things were working correctly," said Karpenko. "After our success on the first day, we decided to go for it and do our big test the next day. If we were only going to get one shot at this, this was the test that we really wanted to do."

That test, a 50 degree slew that took the spacecraft off of the sun line, and then back negative 50 degrees, proved to be a success. The tests that followed would slew the spacecraft up to 90 degrees off the sun line before returning back again to its starting point.

In terms of military applications, Bedrossian noted, maneuvers like those performed on the TRACE spacecraft can prove invaluable for timely information gathering. Satellites are key to communications and information for the U.S. military, and are instrumental in gaining access to restricted territory. Quicker maneuvers could mean more information gathered in a shorter period of time.

"The maneuver potentially enhances national security because it essentially improves the agility of your existing assets without touching the flight software. It's simply a matter of uploading commands," explained Bedrossian.

While the team is still reveling in the success of the TRACE experiments, they haven't lost sight of the long-term goals. Whether for NASA or the Department of Defense, their groundbreaking maneuvers have the potential to change the standard on how satellites are re-oriented in orbit.

"If we marry the ideas we demonstrated on TRACE with the correct spacecraft configuration, then we can see real savings," said

Karpenko. "We will be able to exploit the available control efforts, together with unique configurations, in order to really blow the doors off of what can currently be done using industry standard maneuvers." ☆

Student Thesis Initiates Control Theory Research

As with any ground-breaking endeavor, it takes years of painstaking research before a single test can be run. But the ball must get rolling somewhere, and for the optimal control maneuvers studied on TRACE, it was actually an NPS student who initiated the concept.

Back in 2004, NPS Astronautical Engineering student then Navy Cmdr. Andy Fleming was looking for a thesis topic when Ross suggested optimal control maneuvers. He took on the topic in his thesis titled "Real-Time Optimal Slew Maneuver Design and Control," and ultimately helped bring it to the scientific community in the years that followed.

"I think the idea of optimal slew maneuvering has gained traction over the years," said Fleming. "And that's a good thing because the way we control these vehicles really has not changed since the 1970s. We still use very standard control feedback techniques, which are fine if that's all you need the vehicle to do."

After he graduated from NPS, Fleming continued to publish papers on the topic, and provided his experience to relevant projects in need of someone with his level of understanding of optimal maneuvers. Now retired from the Navy and working with Ross as a contractor at NPS, Fleming served as the Spacecraft Systems Engineer for the TRACE experiments, reviewing code and answering engineering questions.

"No one has implemented optimal control on a regular basis on a vehicle in space. And really, nothing has the same gravitas as a flight experiment for showing that something really does work. I think as this gets more and more traction, it's going to revolutionize the way we control these satellites, and allow us to do more with less." ☆

Andy Fleming

A solar flare is captured by the Transition Region and Coronal Explorer spacecraft. Upon completing its mission, control of the craft was turned over to a team of NPS, industry and NASA researchers to test all-new methods to maneuvering the craft.





An F/A-18C Hornet piloted by NPS alumnus Lt. Cmdr. Frank Weisser, assigned to the U.S. Navy flight demonstration team, the Blue Angels, performs during San Francisco Fleet Week 2010's air show.

NPS Alumni Highlight San Francisco Fleet Week Festivities

Want to know how NPS alumni impact the fleet? Look no further than San Francisco Fleet Week for the story ... From leading the week-long event, to providing the ships, to piloting a Blue Angel, NPS alumni touched every part of this Naval showcase.

By MC1 Grant Ammon

From sleek and modern battleships to precision aerial acrobatics performed by the Blue Angels, the Navy showcased the best and brightest Sailors, Marines and military hardware during San Francisco's annual salute to the sea services, Fleet Week 2010, Oct. 7 - 12.

Among the best and brightest was a dedicated group of military professionals who share a common denominator, having graduated from the Naval Postgraduate School.

Serving in a variety of capacities from fleet commander to events director, pilots, ship operators and astronauts, NPS alumni littered Fleet Week in a variety of leadership roles.

The nearly week-long festivities included public ship tours, air shows, parades, astronaut presentations and information displays giving residents a first-hand look at the latest technologies and capabilities the Navy has to offer.

Headlining the demonstrations of military equipment was the fleet's newest and most technologically-advanced amphibious assault ship, the USS *Makin Island*. The 847-foot ship, the first equipped with gas turbines and an electric drive system, offered public tours while docked at the base of the Bay Bridge. The new propulsion method, which replaces the older steam boiler, is similar to that of the hybrid car, enabling longer transit distances using less fuel.

Leading the more than 3,000 Sailors and Marines aboard *Makin Island* was Executive Officer and NPS alumnus Capt. Cedric Pringle.

"Aboard *Makin Island* we are honored to take part in the renewing of San Francisco Fleet Week, and we look forward to any opportunities to return in the future," Pringle said. "I look forward to building upon the relationships fos-

tered during this year's events."

Vice Adm. Richard Hunt, Commander of the U.S. Third Fleet and a 1988 graduate of NPS' Telecommunications Systems Management program, served as the senior officer for Fleet Week festivities. Hunt, who is responsible for the operational control of naval units in some 50 million square miles of the eastern and northern Pacific Ocean, is often credited as the driving force behind bringing the "Fleet" back to this year's Fleet Week.

"In years past, the number of ships in attendance at this long-standing engagement was

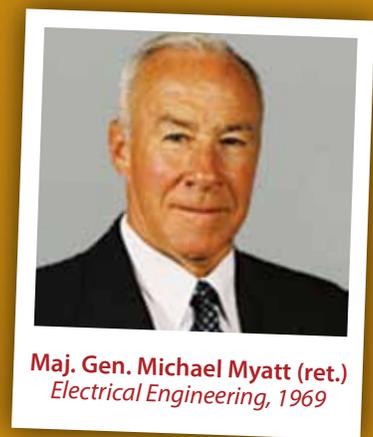
dwindling," Pringle noted. "This year we really put the fleet back into San Francisco Fleet Week. Our success in bringing the ships back is due to the hard work, dedication and leadership of Gen. [Michael] Myatt and Adm. Hunt. They have really gone the extra mile in making this year's festivities relevant."

As chairman of the San Francisco Fleet Week Association, Myatt, a retired Marine Corps Maj. Gen. and 1969 graduate, is the city's civilian representative working behind the scenes to make Fleet Week possible. He also chairs the non-profit Marines' Memorial



Vice Adm. Richard Hunt
Telecommunications
Systems Mgmt., 1988

- Commander, Third Fleet
- Fleet Week's senior officer
- Operational control covering approximately 50 million square miles of the Pacific Ocean



Maj. Gen. Michael Myatt (ret.)
Electrical Engineering, 1969

- SF Fleet Week Association Chairman
- Civilian Fleet Week coordinator
- President and CEO of the Marines' Memorial Association



NPS alumnus Captain Cedric E. Pringle, Executive Officer of the Navy's newest amphibious assault ship USS *Makin Island* (LHD 8) speaks with visitors during public ship tours as part of San Francisco Fleet Week 2010.

efforts to showcase the ships and units – everything from aviation to surface – to the civilian community,” he said. “It’s an excellent way to positively interact with local communities.”

Representing the Navy and the final frontier, the W Foundation hosted a two-day presentation on “The Navy in Space” featuring former NASA astronaut John Herrington, a graduate of NPS’ aeronautical engineering master’s program.

“It’s all about math and science,” Herrington told a group of high school students interested in pursuing aerospace careers. “With my master’s degree I had the education required, but it also took a lot of operational experience,” he said of his path to space travel. ☆

Association which hosted Fleet Week conferences and celebrations, including the kick-off reception where the 1st Marine Division Band played for guests.

Lt. Cmdr. Frank Weisser, a graduate with a master’s degree in Systems Analysis, dazzled the crowds with aerial acrobatics and stunts as the lead soloist for the Blue Angels. Weisser attributes much of his success in the Navy’s highest-visibility squadron to lessons learned while studying at NPS.

“As well as being lead soloist, I’m also the operations officer for the squadron,” Weisser noted. “I have to manage the squadron’s budget, which is a difficult task considering we’re traveling more than 300 days out of the year, all of the flight hours we amass and how spread out our support and staff requirements are. I need to make intelligent decisions on how to provide

the best support to the squadron, and my degree in [systems] analysis allows me to handle these decisions with a logically sound and well-measured approach.”

Weisser views community engagements like Fleet Week as great opportunities to showcase the Navy to local communities that might not have first-hand experience with the military.

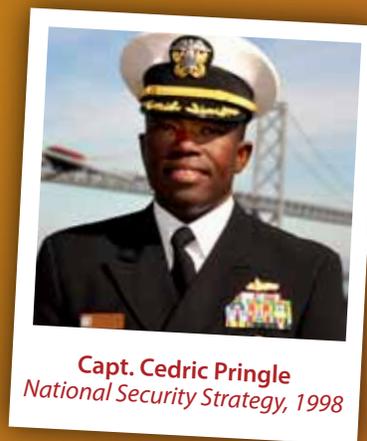
“We participate in these types of outreach

The guided missile destroyer USS *Pinckney* (DDG 91) passes through San Francisco Bay during Fleet Week 2010’s parade of ships.



Cmdr. John Herrington (ret.)
Aeronautical Engineering, 1995

- NASA Astronaut
- Fleet Week “Meet an Astronaut” Volunteer
- Logged 330+ hours in space



Capt. Cedric Pringle
National Security Strategy, 1998

- XO, USS *Makin Island*
- Studied manpower reduction technology
- Leads the Navy’s next gen ship using the same advanced technologies he studied



Lt. Cmdr. Frank Weisser
Master of Systems Analysis, 2009

- Blue Angels Lead Soloist
- Budget lead for Blue Angels Team
- Leads support/staff requirements

The Warrior MBA

*In the
Classroom,
In the Fleet
– This is
DoD's
Niche
MBA*

By Amanda D. Stein





Navy Lt. Brian Blair waits for class outside of Ingersoll Hall. The Graduate School of Business and Public Policy was established in 2002 and has provided a defense-based curriculum to senior-level officers and DoD civilians ever since.

There was never any question about it. When the Naval Postgraduate School (NPS) established the Graduate School of Business and Public Policy (GSBPP) in 2002, leadership knew that the curriculum would have to be as unique as the students who walked the halls. Pilots, submariners, surface warriors and officers from across the services – defense is at the core of their mission, even as graduate students. Thus, NPS joined the growing number of graduate-level institutions offering a niche Master of Business Administration (MBA) degree program.

Unlike other institutions, such as San Diego State University, which boasts a sports management ‘MBA’ program, and Boston College, which offers church management ‘MBA’, NPS’ “Warrior MBA” provides a defense-based management program tailored for military officers and senior Department of Defense (DoD) civilians. Niche MBA programs such as these are specialized to appeal to business students working in a specific field. For NPS’ unique student body, the specialized MBA program provides the most relevant defense education possible for senior leadership.

“What makes our program unique is it is

one of very few MBA programs that are accredited by both the Association to Advance Collegiate Schools of Business [AACSB], the business school accreditation body, and the National Association of Schools of Public Affairs and Administration [NASPAA], which is the public affairs and public administration degree accreditation,” said GSBPP Dean Bill Gates. “That’s really our niche. We are teaching students about how to conduct business. But we are doing it with a very definite public administration and public affairs focus. Our students are really learning the business of government and the business of the public sector.”

What is the most cost-efficient vessel for Irregular Warfare missions in the Philippines? What would the cost be to transition pilots from training in the T-34 to the T-6 aircraft? These are the kinds of questions that NPS’ MBA students look at every day both on campus and in cohorts around the country. As defense acquisition concerns have taken center stage over the past few years, GSBPP has risen to the challenge, preparing students to handle the stringent budgets that will face them in their futures as leaders within the services and DoD.

“When you look at all of the good news sto-

ries coming out of the DoD, they are all about how we have the best weapons systems and the best technology in the world,” explained Gates. “When you look at the bad news stories coming out of the DoD, they seem to always be about business processes, management processes, and cost overruns in weapons systems. So we are trying to help students learn the latest notions in business management to help them address those ‘bad news’ stories. We can design weapons systems using the latest technology, but if we can’t get them out at a reasonable cost, they don’t help DoD.”

Getting those capabilities into the hands of the warfighter is just what NPS’ students are looking to do. For the MBA students, many of whom have spent time on the battlefield, the experience does more than provide them with an understanding of business concepts. The program is designed to allow them to apply the practices they learn in their educational career to issues facing the services and DoD.

Marine Corps Capt. Josh Dixon didn’t start out his time at NPS as an MBA student. After studying the applications of smart phone capabilities in the battlefield as a master’s student in the computer science (CS) program, Dixon

Continued on page 14

“Our mission at NPS is much broader than traditional universities’ MBA programs ... Most business schools are focused primarily on the private sector, and then will often have a public policy school separately. Here, we deal with both.”

Keenan Yoho
Assistant Professor, Graduate School of Business and Public Policy



NPS student, Marine Corps. Capt. Josh Dixon holds up a smart phone, a tool he has studied as both a computer science student and now an MBA student. He hopes to prove that the benefits of the technology for the warfighter outweigh the costs.

graduated six months ahead of schedule and felt that something was missing from his research.

“My computer science thesis basically looked at bringing smart phones to the battlefield through secure methods,” explained Dixon. “Regular smart phones are so vulnerable and the government has been reluctant to adopt those capabilities because of their vulnerabilities. But there was so much missing because the cost behind it was so important.”

That missing cost analysis aspect of his project prompted Dixon to apply for an extension on his time at NPS and enroll in the MBA program, which he will graduate from in March 2011. He took what he had learned about the smart phone capabilities from his CS studies, and developed the cost benefit analysis to round out his research.

“The ubiquitous data capabilities that we have here don’t exist overseas in the battlefield,” explained Dixon. “Smart phones can provide the same capabilities of a computer, but with a smaller screen. It could fit into your shoulder utility pocket. My thesis is essentially creating a business case analysis for those capabilities. I’m looking at whether the benefits outweigh the costs.”

Research projects such as those by Dixon are one of many reasons why the Navy is now, more than ever, committed to promoting education for officers. Given the uniquely demanding careers of NPS’ students, the programs available must be flexible enough to fulfill their purpose in providing a quality, relevant education. For qualified students who are unable, due to duty or extenuating circumstances, to attend courses in Monterey, the Executive Master of Business Administration (EMBA) program is de-

signed to give them a comparable, quality education from wherever they are stationed.

“The Chief of Naval Operations, via the Chief of Naval Personnel, has decided that at some point every officer is going to be offered a graduate education,” said EMBA Program Director Bill Hatch. “But not all officers’ careers can afford to have them come to Monterey for 24 months.”

“The EMBA program is intentionally designed to be very broad, while still having depth. It is not intended to be a replacement for the resident MBA program, but it is effectively as close to a resident program as you can get.”

The two-year, part-time, distributed learning (DL) program allows cohorts of students from around the country to use video teleconferencing (VTC) to interact with NPS professors. One of the highlights of the program, noted Hatch, is that students get ample opportunity to interact with their professors, unlike traditional DL programs, which often rely heavily on computer-based lessons.

Although the program is designed for shore duty, it currently has a student serving shore and sea duty alternately, operating the VTC suite from his cabin aboard the ship. There is also the occasional student completing a quarter from Iraq or Afghanistan. Designed for O-5 and O-6 level officers, and senior level DoD civilians, the program is flexible enough to meet the unique needs of the students.

“Our defense-focused EMBA was originally created to address a problem for Navy aviators whose career milestones make it very difficult for them to come to NPS for resident education. It is hard for them to stay competitive for promotion if they leave their operational tours,” explained Alice Crawford, Associate Dean for Faculty Development.

“These students self-select to the program knowing that they will be pressed to balance family, work and school for a two-year period. The result is that these are very capable and motivated students. Our faculty really enjoy teaching these students who take their skills learned from the program and put them to work immediately for the jobs they are in with immediate benefits for the Navy.”

The benefits to the Navy often begin before the students ever graduate from NPS. The students in the EMBA program are tasked with completing a final thesis project, in the form of applied research, to fulfill their graduation requirements. The students seek out research opportunities within their area of interest, often meeting an existing need for the Navy.

“We use a consulting approach because it is very applied research that our students are doing,” said Senior Lecturer of Management Chip Wood. “It is focused on real-world problems and the end result is usually a recommendation or an analysis of alternative options.”

Real-world problem solving is made possible by the support of leadership like Marine Corps Col. Scott Walsh, former Commander of Training Airwing 5, in Milton, Fla. Walsh now serves as the Combating Terrorism Division Chief and J3 of U.S. Central Command, but in his time at Airwing 5, he worked closely with NPS students to determine solutions for budgeting and manpower issues.

“I am a big fan of the EMBA program because when things come up, we don’t really have excess manpower to do the research,” explained Walsh. “The factory is churning at darn near 100 percent capacity all of the time. So it is very beneficial to the command to have these students who have the time to focus on a project, along with the tutelage of a professor who can support them in how to address issues. They enable us to prepare very convincing arguments or positions to promote the things that we need.”

One such proposal, developed by a group of three EMBA students from a cohort in Pensacola, Fla., looked at the cost of transitioning from the T-34 training aircraft to the T-6 at the Naval Air Stations at Whiting Field and Corpus Christi. The students completed their thesis in 2008, and

“We are teaching students about how to conduct business, but we are doing it with a very definite public administration and public affairs focus. Our students are really learning the business of government and the business of the public sector.”

Dr. Bill Gates
Dean, Graduate School of Business and Public Policy

the recommended changes are now halfway through the four-year implementation period.

“Our thesis undertook the analysis and planning necessary to predict, based on aircraft availability, the proper timing for instructor assignment, training, and integration,” explained NPS alumnus Lt. Cmdr. Luke Patterson, one of the students involved in the project. “This extensive planning identified key chokepoints and overlaps within the timeline. Using this, we were able to make recommendations in order to deliver the correct number of maintenance personnel and flight instructors to ensure maximum efficiency. This analysis and planning, provided free of charge through NPS, saved the

Navy thousands of dollars in consultant fees if outsourced.”

Their analysis of the requirements of such a transition were not only utilized by Airwing 5 to acquire more manpower, but were adjusted to be used by the Chief of Naval Air Training as a template for all Joint Primary Aircraft Training Systems. What began as a student thesis project, culminated in actual cost-efficient changes for the DoD.

The unique applied research at NPS prepares EMBA and MBA students for their futures as leaders within the defense community. The niche defense-based management curriculum provides senior-level officers and DoD

civilians with the tools to not only manage resources, funds and manpower, but also to tap into the public policy side of their education in order to apply those tools to the public sector.

“Students in our Warrior MBA program are coming away with a perspective that is broad in the sense that they are getting the financial, strategic, human resources, human capital, personnel and operational perspectives,” explained MBA Professor Keenan Yoho. “Our mission at NPS is much broader than traditional universities’ MBA programs. Most business schools are focused primarily on the private sector, and then will often have a public policy school separately. Here, we deal with both.” ✪



Associate Professor Ken Doerr instructs EMBA students from around the country using video teleconferencing (VTC). The cohorts meet once a week with their professors via VTC, allowing them to interact as a class and answer any questions they may have in their studies.

Researchers Hope to Solve the Mystery of Hurricane Genesis

Some tropical disturbances intensify into hurricanes – some don't. Professor Michael Montgomery and the PREDICT Team spent weeks flying into the storms to help find out why.



A PREDICT research scientist monitors atmospheric conditions at the St Croix, U.S. Virgin Islands-based operations center.

By MC1 Grant Ammon

Tropical disturbances often brew during the summer months in the North Atlantic. Many fizzle and fade with no consequence, yet a select few grow in strength and bring about devastating results when they make landfall as hurricanes. One of the great remaining mysteries of the tropical atmosphere is determining what conditions lead to the birth, or cyclogenesis, of these potentially life-threatening weather systems. One Naval Postgraduate School professor and his close colleagues believe they have uncovered a critical piece of the complex jigsaw puzzle of tropical cyclogenesis, and recently took to the storm-entrenched Northern Atlantic Ocean to test their overarching hypothesis.

"We've uncovered a key ingredient in the birth of hurricanes," said Dr. Michael Montgomery, a professor of meteorology at NPS, and principal investigator and lead scientist of the Pre-Depression Investigation of Cloud-systems in the Tropics (PREDICT) research project conducted Aug. 15 to Sep. 30.

Supported by funding from the National Science Foundation, PREDICT researchers based an operations center on St. Croix in the U.S. Virgin Islands during the height of hurricane season in hopes of collecting information that would identify precursors to which storms would bring danger and which ones would dissipate over the ocean. Taking to the Atlantic to study hurricanes proved fruitful for PREDICT investigators and atmospheric conditions were ideal for storm observation.

"We were very fortunate for the weather we encountered," noted Montgomery. "Before the experiment started, I thought if we were able to study two developing and two non-developing disturbances then our collection efforts would

be considered successful. During PREDICT, we were able to study four developing and four non-developing storms! Potentially, we hit pay dirt during this experiment."

At the core of PREDICT research was an investigation of tropical waves and sub-tropical disturbances and their roles in producing a dynamically favored "sweet spots." These so-called pockets of air are thought to protect growing storms from conditions that could lead to their demise. This protection zone from hostile storm killers plays a critical role in the spawning of disastrous tropical disturbances, since only about 20 percent of all Atlantic disturbances actually grow into these devastating storms.

"The overarching hypothesis is that the tropical waves that come off the African continent or are spawned in the Atlantic somewhere provide some protection in a particular region of the wave called the moist critical layer," said Montgomery. "This area within the trough axis of the wave may provide a focal point and region of protection to be able to sustain thunderstorm activity and allow these thunderstorms to congeal. In a nutshell, that's the basic idea."

This concept, known as the "marsupial paradigm," was brought forth in a 2009 study published by Montgomery and research colleagues Dr. Zhuo Wang and Dr. Timothy Dunkerton. It hypothesized that storm clusters moving at a similar speed to surrounding air flow in the lower troposphere are largely protected from being torn apart. This protective environment is likened to a marsupial's pouch during gestation, and is thought to be a key ingredient in the birth of hurricanes.

"We call it a marsupial pouch, because it's like a mother kangaroo's pouch that provides a nurturing environment for the storm and gets it to the point where it gains enough strength to jump out of the pouch," noted Montgomery.

The study and understanding of cyclogenesis can help forecasters and scientists better track and forecast these precursory conditions held within these pouches. These clues to hurricane formation can lead to earlier notification and storm tracking times. Ultimately, these deterministic genesis predictions can save lives.

"One of the big questions we're trying to answer is why only a small portion of the many tropical disturbances turn into tropical depressions," said Michael Bell, a PREDICT scientist and research assistant professor at NPS.

Currently many storms develop too quickly for adequate preparations to be made in populated areas that sit in a brewing storm's path. A better forecast into the development of these storms would lead to better warning times for emergency management officials and short-term mitigation efforts.

"Earlier prediction means earlier warning. An earlier warning gives people and customers more time to prepare and get out of the way," said Montgomery.

Montgomery noted also the implications of his research on military operations.

"Better tracking and forecasting the precursors to storms gives more lead time and awareness. It's this situational awareness that is invaluable to military leaders while operating in theatre," he said. "This work is Navy relevant because it's studying severe weather in the tropics, and that is a particular issue that makes the fleet very vulnerable during military

“Better tracking and forecasting the precursors to storms gives more lead time and awareness. It’s this situational awareness that is invaluable to military leaders while operating in theatre.”

Professor Michael Montgomery
PREDICT Project Lead

operations. Fleet commanders don’t want to get hit by a surprise typhoon that costs equipment, time and lives.”

Previous research efforts made progress in the prediction of the formation of tropical depressions, storms and tropical cyclones, but were limited in scope of sampling. To address these limitations, Montgomery and his scientific colleagues worked to dramatically increase the spatial and temporal sampling of tropical disturbances prior to and during their formation. To achieve these objectives, scientists involved in PREDICT utilized the NSF/NCAR Gulfstream V research aircraft.

“We flew 26 flights into eight disturbances. Four of these disturbances — Fiona, Carl, Matthew and Nicole — developed into named tropical storms or hurricanes. Four other disturbances did not form storms,” Montgomery added.

Also known as HIAPER (High-performance Instrumented Airborne Platform for Environmental Research), the specially modified research jet has a range of up to 7,000 miles and operates at an altitude of 43,000 feet. This aircraft provided researchers with the unique capability of sampling candidate tropical disturbances over a deep layer (>10 km) of the atmosphere and permitted sampling of their structure on multiple spatial scales.

An integral tool in the airborne collection efforts was the use of global positioning system (GPS) dropsondes – 500 of these parachute-borne instrument packages were dropped in the path of tropical systems and were used to

collect data such as wind speed and direction, pressure, temperature, and relative humidity.

Researchers also outfitted the unique aircraft with double crews to extend flight hours and sampling periods. Two flight crews meant that scientists taking part in PREDICT could measure storm systems and their precursor environs for up to 16 hours per day in a 24-hour period.

“With the Gulfstream V we were able to fly many consecutive days and collect data on several systems,” said Montgomery. “We didn’t just go out and sample one system and not go back. In one case, we were able to fly one system twice in one day.”

The effectiveness of collection tools and equipment afforded researchers the ability to record storm data, but the ability to properly position the research aircraft was attributed to superb forecasting by the PREDICT research team.

“We developed some new tools for the forecaster,” said Montgomery. “With these forecast products we could identify where the center of those pouches were, and were able to target and construct flight patterns accordingly. We wanted to pinpoint that spot and put our aircraft in the neighborhood. Again and again and again, we were able to place our aircraft right where it needed to be to collect data.

“PREDICT is arguably the most comprehensive sampling of pre-tropical disturbances ever. We’ve never had such a sample of storms like this before,” added Montgomery. “The hope is that this information and insight will

prove useful in the way we analyze data in the future. It should prove useful in allowing us to better understand how these storms form in models and compare that with data.”

The more research and data collected on naturally occurring storms, the more scientists stand to improve current forecasting models.

“This experiment is poised to help shed some light on the ability of our current models to distinguish between forming and non-forming disturbances,” said Montgomery. “Collecting this amount of data has ramifications on our ability to predict these storms as well as integrate our current model’s ability to forecast storms.”

Researchers from PREDICT also worked in tandem with two other studies focusing on hurricanes in the Atlantic this year; NASA’s Genesis and Rapid Intensification Processes (GRIP) and National Oceanic and Atmospheric Administration’s Intensity Forecasting Experiment. Other collaborators taking part in PREDICT research efforts include the University at Albany-State University of New York; the University of Illinois at Urbana-Champaign; the University of Miami; NorthWest Research Associates in Redmond, Wash.; New Mexico Tech; Purdue University; and, the University of Wisconsin-Madison. Preliminary findings of PREDICT research are currently being written up by Professor Montgomery and the PREDICT team for the “Bulletin of the American Meteorological Society”, a monthly journal that reports some of the latest developments in Atmospheric Science. ★

The NSF/NCAR Gulfstream V research aircraft prepares for a data collection flight on St. Croix in the U.S. Virgin Islands. Also known as HIAPER (High-performance Instrumented Airborne Platform for Environmental Research), the specially modified research jet has a range of up to 7,000 miles and observed storms at an altitude of 43,000 feet.



Distinguished Professor Quietly Pursues ‘Meteorological Diplomacy’

With nearly 40 years of NPS service, and an intriguing life history, Distinguished Professor C.P. Chang offers a compelling example of how the power of knowledge recognizes no borders.



Distinguished Professor of Meteorology Chih-Pei “C.P.” Chang stands in front of a photo of Typhoon Megi from mid-October, the strongest tropical cyclone to strike the Western Pacific in two decades. Chang is the Chair of the World Meteorological Organization (WMO) Monsoon Panel, a U.N. agency from which he coordinates global research collaboration on tropical meteorology, and local and planet-wide wind circulation and rainfall over the earth’s monsoon regions.

By Barbara Honegger

For decades, Naval Postgraduate School Distinguished Professor of Meteorology Chih-Pei “C.P.” Chang has quietly pursued a unique synergy of world-class research and “meteorology diplomacy” in a climate of tense relations between China and Taiwan.

Evoking the “Ping Pong diplomacy” through which President Nixon first opened the door to China, Chang, now the Chair of the World Meteorological Organization (WMO) Monsoon Panel, a United Nations agency, has long taken advantage of the fact that super cyclones and monsoons don’t recognize national borders.

“Meteorology – weather research and forecasting – sometimes involves international politics because it requires international cooperation, especially at a time when global climate change is arguably the most important issue

facing humankind,” Chang stressed. “Countries have to work together, because the atmosphere doesn’t recognize national boundaries.”

Chang’s career in meteorology began in his home country of Taiwan, where he hated to study and often skipped classes to follow his passion, chemistry, in libraries and a home laboratory.

“At that time, in the late 1950s and early 1960s, Taiwan was under martial law and many of the teachers had military backgrounds,” the monsoon expert recalled. “I led my class in protesting the heavy discipline, which normally would have gotten me into big trouble. But I was so young they kicked me out instead of putting me in jail. My father pleaded with the administration not to formally expel me, and they agreed to keep me enrolled if I’d stay at home away from the other students for the rest of the school year. I used those months to

study for the college entrance exam, and ended up being the only student to score high enough to get into university. But it was many points shy of what was needed to get into the field I wanted – chemistry – so I had to enroll in geography to be admitted to the country’s top school, National Taiwan University.

“So it’s by accident that I got into meteorology, which was then a division of the geography department” Chang chuckled.

After receiving his undergraduate degree in meteorology, Chang’s father encouraged him to pursue graduate study in the U.S.

“I kept applying and was finally accepted as a graduate teaching assistant with the U.S. Air Force Meteorology Program at Saint Louis University,” Chang recalled. He accepted the assistantship and moved to the U.S. in 1967, later becoming a research assistant on a doctoral track at the University of Washington (UW).

At UW, Chang joined – and was soon leading – the Seattle Chinese student movement protesting Taiwan’s authoritarian government.

“At that time, no Chinese students from mainland China were in American universities – only from Taiwan and Hong Kong, and some other foreign countries,” he noted. “Because of my activities critical of Taiwan’s authorities, it wasn’t long before I was on their official blacklist, which kept me from being able to return for six years.”

After receiving his doctorate in Atmospheric Sciences in 1972, Chang was offered and accepted an assistant professorship at NPS, soon becoming a naturalized citizen. It was then that Chang embarked on what would become a sterling academic career which, along the way, would grant unique opportunities to bridge academic and political boundaries to advance international understanding and cooperation on weather and climate issues in the Asia-Pacific region.

“In the 1980s, a top priority for the Reagan administration was U.S.-China cooperation as a way to counter the Soviet Union, which meant meteorology went up in strategic geopolitical value, again because the weather knows no boundaries,” Chang said. “I was on the first U.S. delegation to China on monsoon research, and then tapped by NSF and NOAA to be the first U.S. Scientific Coordinator for the U.S. – People’s Republic of China Cooperative Program on Monsoon Research. The second meeting in that series was held here at NPS, in Spanagel Hall in June 1985. The program was a major component of the U.S.-China Agreement for Exchange in Atmospheric Sciences, the first science agreement signed by the two nations after the establishment of diplomatic relations.”

Concurrent with his teaching and research at NPS, Chang has maintained and expanded his ties with Taiwan’s meteorology research and forecasting communities.

“In the 1950 to 1980 time frame, meteorologists from mainland China and Taiwan had never been able to meet because of the conflict

between the two sides,” Chang recalled. “In June 1989, just weeks before a first-of-its-kind meeting I’d been planning for a year to bring them together in Hong Kong, the Chinese government suddenly canceled following the massacre at Tiananmen Square. The entire country was put under martial law, all the universities were closed, and all international interactions frozen.

“Thanks to the then President of the World Meteorological Organization, with whom I’d worked on the conference, the Chinese government reversed its course, even though it was to be held in Hong Kong where a million people were loudly protesting Tiananmen in the streets,” Chang recalled. “This conference was a watershed in relations between the two countries’ weather services. In addition to geopolitics, it was allowed to go forward because monsoons devastatingly impact some of the most densely populated areas in that part of the world.”

After that first International Conference on East Asia and Western Pacific Meteorology and Climate was allowed to proceed in Hong Kong in July 1989, Chang coordinated all three subsequent Taiwan-China bilateral workshops in the field until 1998, when the cross-strait relationship began to improve.

In just 10 years, Chang himself would become Vice Chair of the WMO’s International Panel on East Asian Monsoon Research, in 2000. In 2006, when the U.N. agency consolidated its monsoon panels into the Monsoon Panel of the World Weather Research Program’s Tropical Meteorology Research Working Group, he was elevated to the Chair, a position he still holds today. From this prestigious and influential post, Chang coordinates global research collaboration on tropical meteorology and on local and planet-wide rainfall and wind circulation over the world’s monsoon regions at a time when international calls to mitigate the effects of global warming are increasingly powerful drivers of geopolitical change.

In addition to facilitating meteorology exchanges between the two former enemies

across the Taiwan Strait, Chang has promoted global collaboration on weather and climate studies in Asia and other monsoon regions through his leadership of the WMO Monsoon Panel. He led the organization of three of the four WMO International Workshops on Monsoons held to date – the first in 1995, the third in 2004, and the fourth in 2008.

As for the Naval Postgraduate School, where Chang began his 38th year as a faculty member in September 2010, he says it’s fortunate for his career that he “landed” here.

“The basic research I do on tropical and monsoon meteorology, including tropical cyclones and planetary- and regional-scale wind circulation and rainfall, is important to two-thirds of the world’s population and also to everyone in the Navy,” he stressed. “The NPS Department of Meteorology has a good reputation in this country and the world because of the research of its faculty and students in this area.”

In addition to being a world authority on Asian monsoons with more than 100 papers to his credit, Chang is also an internationally acclaimed author-editor. He is the lead editor of the classic book “Monsoon Meteorology” (1987, Oxford University Press), the editor of “East Asian Monsoon” (2004, World Scientific), and editor or co-editor of six other books in the field.

Chang’s NPS recognitions include a commendation for excellence in teaching and three for outstanding research, including the prestigious Menneken Research Award. Many of his former NPS students and postdoctoral fellows are now faculty members in the U.S. and abroad, many holding national leadership positions.

With nearly 40 years of service to the Navy and the Naval Postgraduate School, Chang says he’s close to official retirement. But that will only mean that NPS’ “meteorology diplomat” will be able to devote even more time to using international cooperation in the study of tropical and monsoonal storms to prevent geopolitical ones. ☆

“Meteorology – weather research and forecasting – sometimes involves international politics because it requires international cooperation, especially at a time when global climate change is arguably the most important issue facing humankind ... Countries have to work together, because the atmosphere doesn’t recognize national boundaries.”

Distinguished Professor C. P. Chang
Department of Meteorology

Commander Third Fleet, Bronze Stars Shine at Fall 2010 Graduation

By Barbara Honegger

Three hundred fifty three U.S. and international students tossed their caps during Fall 2010 graduation ceremonies at the Naval Postgraduate School, Dec. 17.

Officiating at her last commencement before retiring from more than 28 of Naval service, Dean of Students Capt. Janice Wynn kicked off the ceremonies with the presentation of two prestigious Bronze Star awards, to Lts. Frank Morales and James McRandle, both for actions in support of Operation Iraqi Freedom.

NPS President Dan Oliver then took the podium for a ringing introduction of the morning's keynote speaker, Commander Third Fleet and NPS alumnus (Telecommunications Systems Management, 1988) Vice Adm. Richard W. Hunt.

"Admiral Hunt is a consummate seaman, an educated and proven Naval leader, a man of integrity and a gentleman in the finest sense of the word, and we should all be proud that he is an NPS alumnus," Oliver stressed, noting that the speaker would soon be joining the ranks of NPS' Distinguished Alumni at the reception following the ceremony.

"In the 20-plus years that have passed since I was a student here, I truly believe I've used some aspect of my NPS education every day in every assignment I have had – in my operational jobs at sea, in my Pentagon tours on both Navy Staff and Joint Staff, and on the ground," Hunt said. "In that same period, our world, our nation and our military have changed dramatically, and a common thread to addressing the

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Vice Adm. Richard Hunt
Commander, U.S. Third Fleet

new and complex challenges we now face is the necessity to understand how our adversaries think. That information must come from study and interaction, which is what you've had the chance to do here at NPS.

"After having had the opportunity to meet and talk with about a dozen of you who are graduating in a wide range of disciplines, I now have an even greater appreciation for NPS and how it prepares you to meet those challenges. I was impressed with the depth and richness

of your studies, the dedication with which you approach them and how I work with every one of those areas every day in the Third Fleet. We need our best and brightest to aggressively lead us through these issues, and that is exactly what your education here has developed. It is you we are counting on to understand these complex challenges, to identify and analyze courses of action, and provide the wisdom and leadership to guide us through it. It is their complexity that requires us to tap into the experience of every degree awarded here today."

Hunt stressed the value of an NPS education for the graduates' future career paths.

"From my telecommunications class of about 17 students, three are currently still on active duty as Flag officers, and most of the others are captains or retired captains," he recalled. "So you're on a good course. Take advantage of it for your future careers. The Naval Postgraduate School is a world-class institution, with a world-class faculty and the top officers from nations throughout the world. You've just re-



Vice Adm. Richard Hunt, right, receives a Distinguished Alumnus award from NPS President Dan Oliver at the reception following graduation ceremonies. Hunt, who currently serves as Commander of the U.S. Third Fleet, is a 1988 Telecommunications Systems Management graduate.

ceived the most advanced, up-to-date education and you have become as current as one can get in many demanding technical areas. Use that knowledge and the doors that NPS opens for you. Seize these opportunities, and act upon them, and I'm certain you will also use what you've learned here in your careers every day, sometimes in ways you'd least expect.

"I view today as much more than a graduation," Hunt continued. "It is not the end of your NPS experience, but a new beginning to the next phase in your career, and I ask you to embrace it the same way. As you move on to your next assignments, I ask each of you to consciously think about applying the tools you learned here in Monterey. As you go back to your services and departments, remember to view NPS as a center of excellence and tap into it when you see advantages in doing so. I do that from Third Fleet and the results are impressive. Be proud of what you have accomplished and boldly advance it to the next level. You are our future leaders, and we're counting on you to do just that."

The morning's top student honor – the Navy League Award for the Highest Academic Achievement – went to Lt. Alexander Baynes, an Engineering Duty Officer, for his thesis research on the efficacy of metamaterials and transformational optics to defend against high-energy electromagnetic beams.

"The Naval Postgraduate School needs to be on every officer's radar and should be a priority for most officers in the fleet, because it provides an unparalleled and challenging graduate education tailored to the military professional," Baynes said at the reception following commencement. "There's no other place in the world where a normal Tuesday can include attending classes taught by top professors in the field, heading off to finish an experiment in a multimillion dollar lab, networking at lunch with the best and the brightest officers of the U.S. military services and ending the day with a lecture from a Senator, a Nobel Laureate or the Chief of Naval Operations. This experience has afforded me a unique, world-class graduate education, which will be invaluable to my personal career and, more importantly, to my country."

Other top student awards went to Mr. Matthew C. Dupee, who received the Outstanding Academic Achievement Award for Department of Defense Student; and to Republic of Singapore Navy Maj. Han Wei Lim and Israeli Defense Forces Capt. Yinon Costica, who earned the Outstanding Academic Achievement Awards for International Students.

Receiving a rare four awards from the Graduate School of Business and Public Policy was Cmdr. Paul Lawler. Lawler was honored with the Louis D. Liskin Award for Excellence in Business and Public Policy, the Rear Admiral Thomas R. McClellan Award for Academic Excellence, the Conrad Scholar Award for Distinguished Academic Achievement in Financial Management, and the Department of the Navy Award for Academic Excellence in Financial Management.

"If you have the chance, definitely take advantage of the opportunity



Students line up through Spruance Plaza and into the long corridor of Root Hall as the procession into King Auditorium begins. A total of 353 U.S. and international students graduated from the university this past quarter.

to come to NPS," Lawler said. "It's a once-in-a-lifetime opportunity. Some of the top professors in the country and the world are here. They'll stretch your mind, and it's a lot of work, but it will definitely benefit you when you go back to the fleet."

Of the 353 graduates, 85 were Naval officers, 12 Marine Corps, two Coast Guard, 74 Air Force, 42 Army and one Naval Reserve. The class also included 65 Department of Defense civilians and 72 international students from allied and coalition countries. Degrees awarded were three Ph.D.s, 192 Masters of Science, 112 Masters of Art, 51 Masters of Business Administration, one Mechanical Engineer, and six dual degrees. In addition, 82 students received their Joint Professional Military Education Command and Staff Diplomas from the Naval War College. Due to operational commitments 71 degrees were awarded to students in absentia. ✪

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Lt. Alexander Baynes ('10)
Navy League Award for the Highest Academic Achievement

NPS Inducts Three New Members into Hall of Fame



Following induction ceremonies Friday, December 3, NPS President Dan Oliver welcomed the three newest members to the university's prestigious Hall of Fame. Shown, from left to right, are Oliver; Nancy Hughes, wife of posthumous inductee retired Vice Admiral Thomas Hughes; fellow Hall of Famer and former Monterey Mayor Dan Albert; retired Vice Admiral Patricia Tracey; and retired Admiral T. Joseph Lopez.

By Amanda D. Stein

Friends and family of three new NPS Hall of Fame inductees filled the Quarterdeck of Herrmann Hall with the melodies of the Del Monte Brass playing in the background. It was a warm walk down memory lane when President Dan Oliver took to the podium to present the awards to Nancy Hughes, wife of posthumous inductee retired Navy Vice Adm. Thomas Hughes; retired Navy Adm. T. Joseph Lopez, and retired Navy Vice Adm. Patricia Tracey. Oliver offered personal anecdotes of his interactions with each of the inductees throughout his own career, garnering laughs from throughout the audience and the honorees themselves.

Honoring the first of the three inductees, Oliver recalled the honesty and determination that had earned Adm. Hughes a reputation for being a guy who gets the job done. As the 13th inductee, Hughes was also deservedly the first to ever receive the Hall of Fame honor posthumously. A 1962 Operations Analysis graduate, he also served as a Distinguished Visiting Professor, as well as Acting Dean of the Graduate School of Business and Public Policy before his retirement in 2007.

"He was never concerned about being politically correct," said his widow Nancy Hughes, whose touching tribute to her husband misted

eyes throughout the gathering. "In fact, I don't even think that term was around when he was in the Navy. But he loved the Navy and what it stood for. He was always motivated by what was best for the sailors and the Navy. He was truly my hero."

Adm. T. Joseph Lopez, the second inductee honored, graduated from NPS in 1973 with his Master of Science degree in Management. He is the 14th member of the Hall of Fame to date, has served on the NPS Board of Advisors and is an active player in strategic planning efforts and academic matters for the NPS community. He recalled his days in the Navy with pride.

"There is simply something extraordinary about the United States of America," he said. "I've visited over 60 countries in my Navy career and quite a few more since then. The more I learned about the world, the more I learned about us, and the more extraordinary I find our country. We are not envied so much for our wealth, but for our freedom."

For Oliver, the honor was a proud moment as well. His professional relationship with Lopez spanned throughout both of their careers in the Navy, and Oliver noted it was a privilege to know "the guy who always has the answers."

"I can't even tell you what an honor it is

to stand beside you and present you with this award," Oliver told Lopez.

The third inductee of the afternoon, and 15th member of the Hall of Fame, Tracey, also happened to be the first female inductee. It was a milestone that Oliver explained was no surprise, noting her determination and drive that carried her through her career, becoming the Navy's highest-ranking female officer, and made her somewhat of a celebrity within the defense community.

"I don't want to dwell on the fact that she is the first female inductee," said Oliver. "The fact is, regardless of gender, she always had the chops to do whatever she wanted to do."

"I am so proud to be associated with this institution that makes people think differently about the world around them," said Tracey, a 1980 Operations Research graduate.

The Hall of Fame highlights distinguished alumni and friends who have had a tremendous impact on their communities, their country, and the Naval Postgraduate School. The HOF began in 2001 and now has 15 members including Chairman of the Joint Chiefs of Staff, Mike Mullen; and former Mayor of Monterey, the Honorable Dan Albert, who also attended the induction ceremony this month. ★

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Master of Strategy

For the second year running, NPS Professor John Arquilla was named one of "Foreign Policy" magazine's Top 100 Global Thinkers, proof he has earned his reputation as one of the world's foremost authorities on military and defense affairs. Arquilla, who ranked 70th on the list this year, up nine spaces, spent more than 10 years working for the RAND Corporation before coming to NPS in 1993. Today, he serves as a Professor and Director of the Information Operations Center within the Department of Defense Analysis.

But if you ask Arquilla, he'll tell you he's a "classroom teacher" who is fueled by the connections he makes with students and colleagues, learning from their experiences. He found this, his true calling, over 20 years ago as a professor at the College of San Mateo, and credits the exceptional academic environment at NPS for his success as a professor and scholar.

"If I could, I would share my number 70 with my colleagues, because I don't think any single mind is the product of its own cogitation. We are all formed by those around us, by those with whom we interact. And for an academic, NPS is really an amazing place to be."

As a scholar, Arquilla has written numerous books, advised top military leaders, and been featured in countless publications discussing defense affairs. Several of his concepts, including networks in warfare, have made defense officials stop and listen. But that wasn't always the case, Arquilla noted.

"There are a lot of bumps and bruises and scars that go with that number 70," he said. "But my principle feeling of reward comes from the classroom. And has from the beginning – from the college of San Mateo to the Naval Postgraduate School." 

