



OFFICE OF NAVAL RESEARCH GLOBAL

FY 2015 ANNUAL REPORT



Rear Adm. Mat Winter
Chief of Naval Research

“ONR Global is THE leader in international science and technology research diplomacy. The outstanding work being done by its science advisors across the fleet/force, and the global research partnerships being forged by its associate science directors, are critical to discovering, developing and delivering the best, most cutting-edge technology for our Sailors and Marines.”



Capt. Clark Troyer
Commanding Officer, ONR Global

This ONR Global report is provided to communicate efforts across the command guided by the Naval S&T Strategy, and directly supporting ONR’s ability to discover, develop and deliver decisive technology to Sailors and Marines. Fiscal Year 2015 was an extremely challenging and successful year and every command member should be extremely proud of the effort put forward to advance Naval Research Enterprise (NRE) connections to the naval fleet and force, and international science and technology communities. We saw an increasing number of science advisors placed across the Navy/Marine Corps team, officially opened the Sao Paulo office and adapted to numerous process changes to ensure our experts and science tools were in place to execute our mission.

The process of developing this report has improved Global’s communication strategy and processes, and future reports will mature information on the networks you are expanding with academia, industry and government organizations. I am extremely proud of the impact made by 82 professionals distributed around the world to expand ONR’s quality, relevant connections and technology awareness. Thank you to each member of our team, and I want to thank the professionals in Corporate Strategic Communications that not only were critical to producing this report, but to all our accomplishments. Well done!

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ONR GLOBAL

The Office of Naval Research [ONR] Global acts as a two-way bridge from the naval fleet and forces, the Office of the Chief of Naval Operations, the international science and technology [S&T] community, and foreign military partners to ONR, the Naval Research and Development Establishment [NR&DE], the Department of Defense and other government agencies. From basic research to technology transition, ONR Global supports the Department of the Navy's full spectrum of research, development, test and evaluation through its International Science, Science Advisor and Naval S&T Cooperation Programs. ONR Global assists ONR in the discovery and delivery elements of its mission.

ONR GLOBAL MISSION STATEMENT

To serve as the preeminent external network facilitator for ONR and the greater NRE by ensuring quality/relevant connections between the international S&T community, naval fleet/force, and NRE regarding both current execution and developing long-range strategic efforts. To remain always focused on the current and future needs of our Sailors, Marines, naval service and international partners.



Four Strategic Principles

- Be forward deployed
- Maintain a high quality staff that is accomplished and cognitively diverse
- Foster a culture of communication and networking
- Portfolio approach to investments and engagements

Discover the Best Science

- Innovative fundamental research
- Help shape future naval investments and strategies
- Engage global S&T talent through cooperation

Maintain Global Technical Awareness

- Prevent technological surprise
- Fundamental research is universal
- Contribute open-source data to global technology awareness

Science and Technology Partnerships and Collaborations

- Advance mutually beneficial science
- Support publication of S&T research
- Foster partnerships between international S&T community and NRE

ONR GLOBAL OVERVIEW

FOCUSING ON SCIENCE AND TECHNOLOGY AROUND THE WORLD



Rear Adm. Mat Winter, center, met with ONR Global staff in Japan.

Science Advisor Program

Our science advisors are scientists and engineers who help introduce technology solutions to the fleet/forces. They are assigned to Navy and Marine Corps commands worldwide to:

- Serve as a command's senior liaison with S&T organizations in government, academia and industry
- Communicate needs and requirements back to ONR and the Naval Research Enterprise
- Facilitate rapid technology insertions and shape future S&T investments

International Science Program

Our associate directors engage foreign academic institutions and industries to enhance or develop new opportunities for cooperative research. They use liaison visits and grants to:

- Discover the best science and engage global S&T talent guided by the Naval S&T Strategy
- Contribute open-source data to global technology awareness
- Build productive S&T relationships and link international researchers to the Naval Research Enterprise

Naval S&T Cooperation Program

Our International Program Officers develop and advance critical U.S. Navy military-to-military international science and technology partnerships to:

- Coordinate interactions and facilitate opportunities for S&T collaboration with foreign military R&D organizations
- Leverage ONR and ONR Global resources to define mutually beneficial mil-mil cooperative projects
- Support CNR contribution to a well-coordinated U.S. Navy theater security cooperation strategy

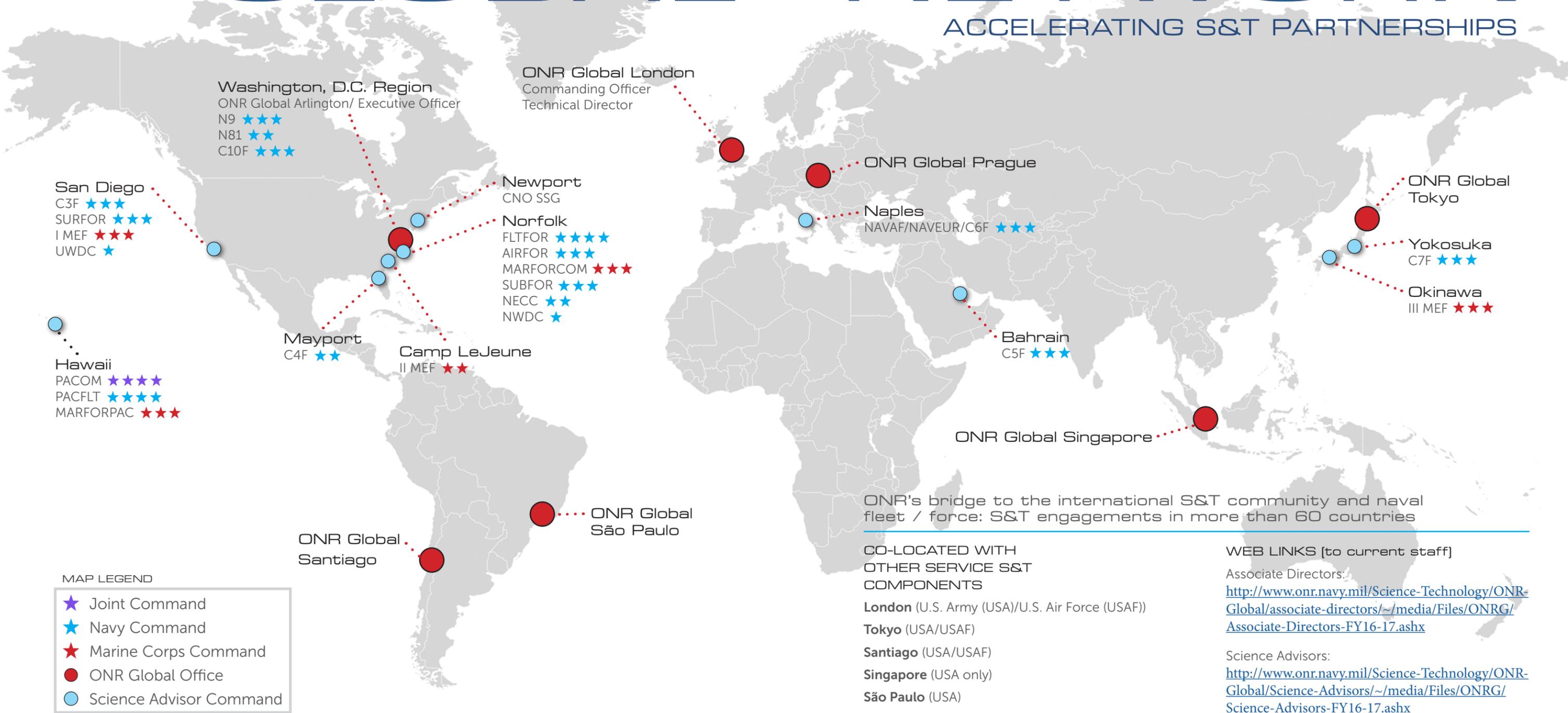


II MEF Science Advisor, Dr. Marcus Tepaske, stands in front of a V-22 Osprey prior to taking a flight.

ONR'S GLOBAL

NETWORK

ACCELERATING S&T PARTNERSHIPS



MAP LEGEND

- ★ Joint Command
- ★ Navy Command
- ★ Marine Corps Command
- ONR Global Office
- Science Advisor Command

ONR's bridge to the international S&T community and naval fleet / force: S&T engagements in more than 60 countries

CO-LOCATED WITH OTHER SERVICE S&T COMPONENTS

- London** (U.S. Army (USA)/U.S. Air Force (USAF))
- Tokyo** (USA/USAF)
- Santiago** (USA/USAF)
- Singapore** (USA only)
- São Paulo** (USA)

WEB LINKS (to current staff)

Associate Directors:
<http://www.onr.navy.mil/Science-Technology/ONR-Global/associate-directors/~media/Files/ONRG/Associate-Directors-FY16-17.ashx>

Science Advisors:
<http://www.onr.navy.mil/Science-Technology/ONR-Global/Science-Advisors/~media/Files/ONRG/Science-Advisors-FY16-17.ashx>



INTERNATIONAL ENGAGEMENTS

Associate directors are tasked with finding the best science and bringing it back to the Naval Research Enterprise.

International program officers develop and advance critical U.S. naval military-to-military international science and technology partnerships.

CNR OPENED THE ONR GLOBAL SAO PAULO OFFICE

Scientific diplomacy took a giant step forward July 24, 2015, as Chief of Naval Research (CNR) Rear Admiral Mat Winter opened the ONR Global Sao Paulo office in Brazil.

Officials note the new office in Brazil will be critical to the advancement of open-source, unclassified knowledge and collaboration in a region marked by rapidly-expanding economies and significant growth in cutting-edge science.

"The opening of the Sao Paulo office reflects the strong, longstanding S&T relationships ONR has with the international community," Winter noted. "This office will serve as a regional hub for collaboration with researchers across South America to share discovery and invention, which are the lifeblood of scientific advancement."

Present at the event were governmental representatives from both the U.S. and Brazil. Members of the academic community were also in attendance at the official opening celebration—some of whom may be involved in the many future S&T-related exchanges and more that will be sponsored by ONR Global as part of the new office's mission.

Recent collaborative research between South American and U.S. scientists includes academic gatherings in the fields of alternative energy, underwater acoustics, augmented reality and more, as well as research projects ranging from flood prediction to materials stress and marine genomics.

The new office will help coordinate activities across the vast South American continent with ONR Global's existing office in Santiago, Chile.

Capt. Clark Troyer, ONR Global's commanding officer, noted that the new Brazil hub is expected to deliver significant positive impacts for the future force.



"The opening of a new office in the largest country in South America is an important development, emphasizing that breakthrough science and technology capabilities generally come about only through collaboration and partnerships," he said. "Those who follow S&T from a naval perspective recognize that Brazil is significant both in its impressive academic and research communities, as well as the wealth of opportunities to conduct research in unique ecological settings."



SAO PAULO, Brazil (July 25, 2015): Ricardo Zuniga, Consul General of the United States to Sao Paulo, left, is joined by Dr. Augustus Vogel, Office of Naval Research Global (ONR Global) associate director for Latin America, and Rear Adm. Mat Winter, right, chief of naval research, during the opening of the ONR Global office in Sao Paulo, Brazil.

ONR GLOBAL INCREASED ENGAGEMENTS IN THE MIDDLE EAST



Dr. Monique Beaudoin, center, with principal investigator Dr. Ammar Nayfeh at Masdar Institute of Science and Technology, Abu Dhabi UAE

In FY15, ONR Global increased S&T partnerships in the Middle East:

- First ONR Global liaison visit to Tunisia, with State Department delegation (OES, STC)
- First ONR Global grant to Lebanon: Traumatic Brain Injury research group visit to ONR Global London
- First ONR Global grant to United Arab Emirates: Photonics Middle East 2015 conference (Masdar Institute for S&T)
- First ONR Global grant to Saudi Arabia: An Integrated Theoretical Approach to Describe the Electronic and

- Optical Processes in Organic Solar Cells (KAUST, Thuwal)
- First ONR Global grant to Oman: Nanotechnology for water treatment and solar energy applications conference (Sultan Qaboos University, Muscat)

Additional FY15 grants

- Oman: Bioluminescent Field of the Omani Coastal Waters (Sultan Qaboos Univ, Muscat)
- Jordan: Fifth Global Conference on Renewables and Energy Efficiency for Desert Regions 2016

- Jordan: Middle East and South Asia Conference on Epigenetics and Genomics of Infectious Diseases
- Jordan: Innovative Applied Renewable Energy Research - the International Conference of Young Scientists
- Saudi Arabia: Third Arab-American Frontiers of Science, Engineering, and Medicine Symposium: Sensing Technologies, Networks and Applications

ASSOCIATE DIRECTORS' TECHNOLOGY AWARENESS AND GRANT HIGHLIGHTS

METAMATERIALS TECHNOLOGY AWARENESS



Dr. Ming-Jen Pan

Metamaterials, with wide media coverage of the potential to be a disruptive technology in cloaking applications, have been a focus at ONR Global, especially the sub-field of acoustic metamaterials.

ONR Global associate directors traversed key countries where ambitious programs exist to determine the state of the art and to provide an assessment to the NRE/DoD leadership.

The ONR community organized Global Technology Awareness briefings at ONR HQ and subsequently at the Pentagon. The knowledge was also widely disseminated throughout the NRE via Global Innovation Webinar and invited talks at NRL and warfare centers.

Dr. Ming-Jen Pan is the Platform Design & Survivability Associate Director focusing on Thailand and Sri Lanka.

He received his Ph.D. in Engineering Mechanics with a minor in Ceramics from Pennsylvania State University, where his research focused on the structure-property relations in ceramic matrix composites. Dr. Pan has authored over 100 journal/conference papers, and has given numerous presentations at technical meetings.



VOICE ID AND EU GRANT



Dr. Leonard Ferrari

VoicelD is a 2014-2016, two year, Naval International Cooperative Opportunities in Science and Technology Program (NICOP) awarded to Horowitz Biometrics Ltd, London, U.K. by the Office of Naval Research Global (ONR

Global) that focuses on the fundamental nature of the acoustic correlates of voice quality based on vocal tract physiology. During the course of the NICOP, the interdependent nature of known acoustic attributes were determined. The NICOP research represents the fifth year of research. The first four years of research focused on initial models of voice quality. The NICOP focused on how the acoustic correlates of voice quality could be used for speaker identification, and eventually form the basis of a commercial voice biometric system. Because of the progress made during the ONR Global NICOP and moreover the distinction of winning a rigorously reviewed NICOP grant, the company, Horowitz Biometrics, was placed in a position where

it could successfully compete for a European Union (EU) grant called SpeechXRays. EU grants are highly competitive, with one out of 100 being funded. SpeechXRays commercializes, to a large extent, the principles and designs derived from the ONR Global NICOP research. Moreover, SpeechXRays adds face biometrics to the acoustic-based speaker identification. In particular, SpeechXRays will correlate dynamic mouth shape and the acoustic correlates of voice.

SpeechXRays is coordinated by Oberthur Technologies and Horowitz Biometrics serves as the technical project manager. The principal investigator is Dr. David M. Horowitz. SpeechXRays is a €5.5 million collaborative project among 10 R&D partners.

HIGH EFFICIENCY PEROVSKITE SOLAR CELLS GRANT



Dr. Judah Goldwasser

As part of the quest to achieve lightweight, low-cost portable power sources for Navy and Marine Corps applications, ONR has been pursuing research to develop and demonstrate photovoltaic cell technologies that exhibit both high solar to electrical power conversion efficiency and are inexpensive to fabricate.

This 2014-2018 Naval International Cooperative Opportunities in Science and Technology Program (NICOP) has been focusing on

development of a new class of photoactive materials called Perovskites. These are metal-based molecular compounds which contain both an organic and a halogen component. Under this NICOP, Dr. Henry Snaith of Oxford University has been conducting research in collaboration with Dr. Alex Jen of the University of Washington (whose work is supported by the ONRHQ photovoltaics program) to study and understand the fundamental mechanisms limiting or enhancing performance, synthesize new materials, learn how to process and integrate them into a multi-layer device, and design, fabricate at low cost, and demonstrate a superior performance solar cell.

The original goal of this NICOP was to achieve a power conversion efficiency (PCE) of greater than 20 percent. They have already achieved that goal, and now expect to demonstrate a PCE of 35 percent before the end of the

project. This has resulted in Dr. Snaith founding a new company, Oxford PV, to commercialize and bring to market these high-efficiency perovskite-based solar cells at an estimated cost of ~\$0.35/Watt. As a point of reference, at the beginning of this NICOP, Perovskite based solar cells had an efficiency at ~10 percent. By comparison the familiar silicon-based solar cells have topped out at less than 25 percent efficiency and at a cost of \$0.50/Watt, even though they have been under development for over 20 years.

In recognition of his research accomplishments, Dr. Snaith received the 2014 Outstanding Young Investigator Award from the Materials Research Society, was elected Fellow of the Royal Society in 2015, and in 2016 was awarded the EU-40 Materials Prize from the European Materials Research Society.

MICROBIAL FUEL GRANT



Dr. Michael Harper

Scientists from SPAWAR Pacific have completed the initial phase of a benthic microbial fuel cell (BMFC) deployment in Italy, as part of a Coalition Warfare Program

(CWP) that leverages funding provided by ONR and ONR Global. On July 4, 2016, lead scientist Dr. Y. Meriah Arias-Thode met with the Italian naval commander, Cdr Mirko Stiphani, and CWP collaborators from the Fondazione Istituto Ttaliano di Tecnologia (IIT), to discuss the project and planned deployment of four microbial fuel cell units at La Spezia, IT. The Italian Navy and its divers, IIT, along with SPAWAR Pacific scientists will deploy the BMFC's in mid-July.

Three small (~ 0.3m²) benthic microbial fuel cell units will measure baseline power obtainable at the site. A larger grid BMFC (~1 m²) will also be deployed; this

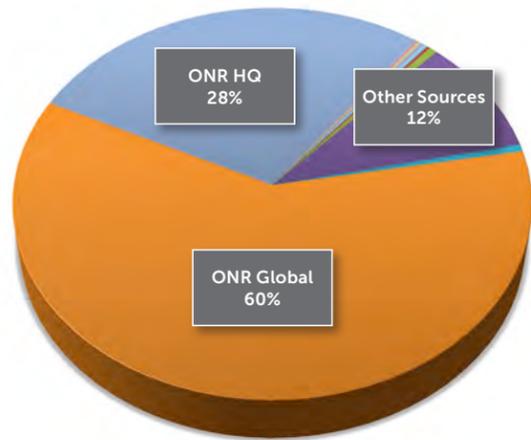
BMFC is expected to produce 250 mW of continuous power and will be used to power a pH meter. The four BMFC units will be monitored via a cabled connection to a shore-side computer, and will utilize an IIT-developed software package for real-time data access. These BMFCs will be deployed through March 2017.

This demo represents the first large-scale deployment of a BMFC system outside of the U.S. BMFCs have proven useful for safe, sustainable powering of many low-power-requiring underwater sensors and communication devices, and may extend mission durations beyond what is currently attainable with conventional batteries.

FY15 GRANT EXECUTION

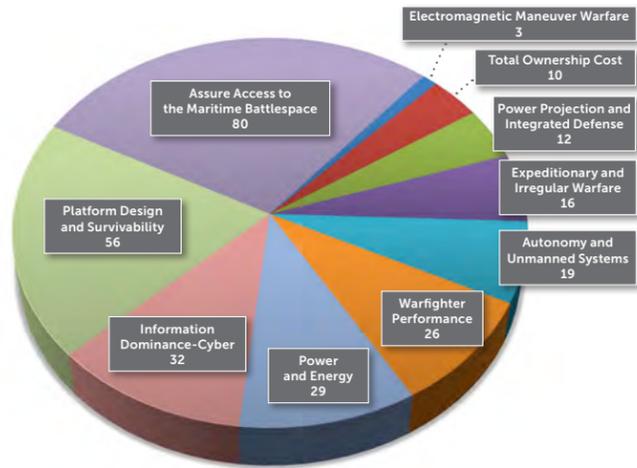
FY15 INTERNATIONAL SCIENCE PROGRAM TOTAL GRANT FUNDING

FY15 Total Grants: 283
 FY15 Grant Total: \$13,526,406



FY 15 INTERNATIONAL SCIENCE PROGRAM GRANT DISTRIBUTION BY S&T FOCUS

Total Grants - 283



FY15 INTERNATIONAL SCIENCE PROGRAM GRANT DISTRIBUTION 283 GRANTS ACROSS 48 COUNTRIES

- | | | | | | | |
|--------------|------------------------------------------------|-----------------------------------------|----------------------------------------|------------------------------------------|----------------------------------------------|----------------------------------------------------|
| EUCOM | Belgium
Croatia
Cyprus
Czech Republic | Denmark
Finland
France
Germany | Greece
Iceland
Ireland
Israel | Italy
Netherlands
Norway
Poland | Portugal
Romania
Russian Fed.
Spain | Sweden
Switzerland
Ukraine
United Kingdom |
|--------------|------------------------------------------------|-----------------------------------------|----------------------------------------|------------------------------------------|----------------------------------------------|----------------------------------------------------|



CHIEF OF NAVAL RESEARCH AND EXECUTIVE DIRECTOR INTERNATIONAL ENGAGEMENTS IN FY15

(73 total engagements over the following 24 countries)



Rear Adm. Mat Winter, center, visiting defense industry facilities in Japan.

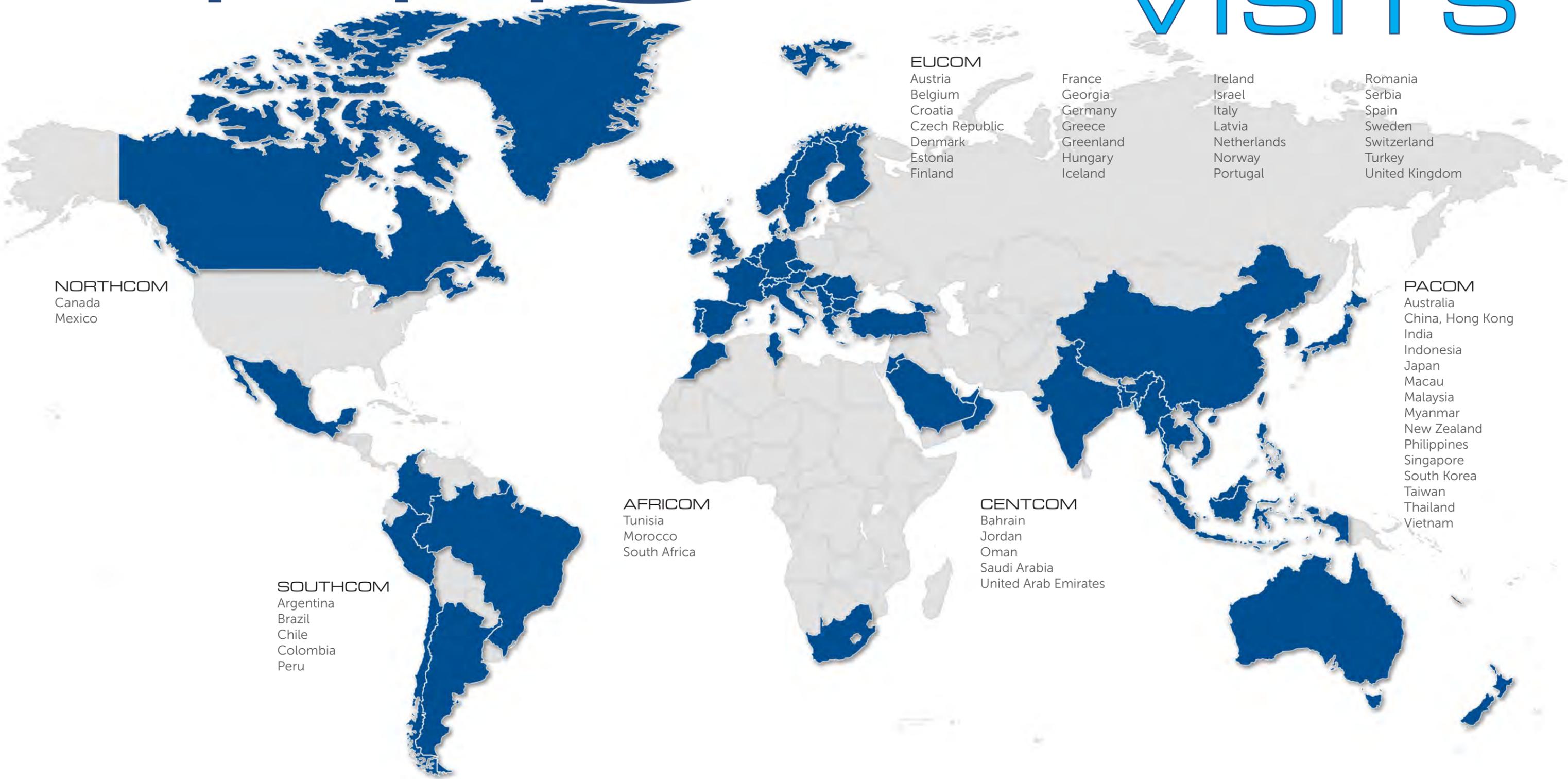
- | | | |
|-----------|-------------|----------------|
| Australia | France | New Zealand |
| Austria | Germany | Norway |
| Bahrain | Iceland | Singapore |
| Brazil | India | South Africa |
| Canada | Israel | Spain |
| Colombia | Italy | Taiwan |
| Denmark | Japan | Turkey |
| Finland | Netherlands | United Kingdom |



Rear Adm. Mat Winter, center, visits the Brazilian Navy Research Lab "Center for Analysis of Naval Systems" (CASNAV) with ONR Global leadership and U.S. Naval Milgroup staff (Lt. Stephan Ritterman and Cdr. Cory Christensen). To the CNR's left is Contra-Almirante Cid Augusto Claro Junior (then-director of CASNAV); to his right is Rear Adm. Contra-Almirante Luis Carlos Delgado, director of another Brazilian naval research lab, the Institute for Naval Research.

CONNECTING THE WORLD THROUGH S&T FY15

LIAISON VISITS



COALITION TACTICAL AWARENESS AND RESPONSE [CTAR] / REGIONAL DOMAIN AWARENESS [RDA] DEMO

COMPACFLT hosted Naval Research Lab scientists conducting a demonstration of CTAR / RDA 17 - 28 August 2015. The demo was funded under an OSD JCTD, and showed the ability to provide unclassified commercial imagery (CTAR) to coalition partners without access to classified networks using an unclassified Common Operational Picture (COP) using the web-enabled RDA.

During the demo, information (including position, size, course, speed and images [where available]) about vessels not using normal reporting was provided to law enforcement agencies of Palau and Micronesia under U.N. mandates on Illegal, Unreported and Unregulated

(IUU) fishing. The demo included one tip that was provided to Palauan law enforcement that resulted in a vessel inspection, with a New York Times reporter on board the law enforcement vessel (no related articles appear to have been published). The demo also featured tracking, imaging and providing over-the-horizon target awareness reporting to a Micronesian patrol boat via RDA.

Engagement included the Palauan Secretary of Justice and the U.S. ambassadors of both Palau and Micronesia.

While an unclassified COP was being provided to Palau and Micronesia, the systems

demonstrated responsiveness to fleet tasking, by imaging targets and areas nominated COMPACFLT watch personnel.

During the course of the demo, over 21 million square miles of the earth's surface were imaged. The systems provided 273 frames of imagery, in which were contained 4100 vessels of interest. SAR images were provided within an average of 42 minutes from time of imaging (target time was 30 minutes). Five EO/IR images of areas of interest (60 x 60 NM) were taken during the demo, with an average delivery time of two hours, three minutes from time of imaging.

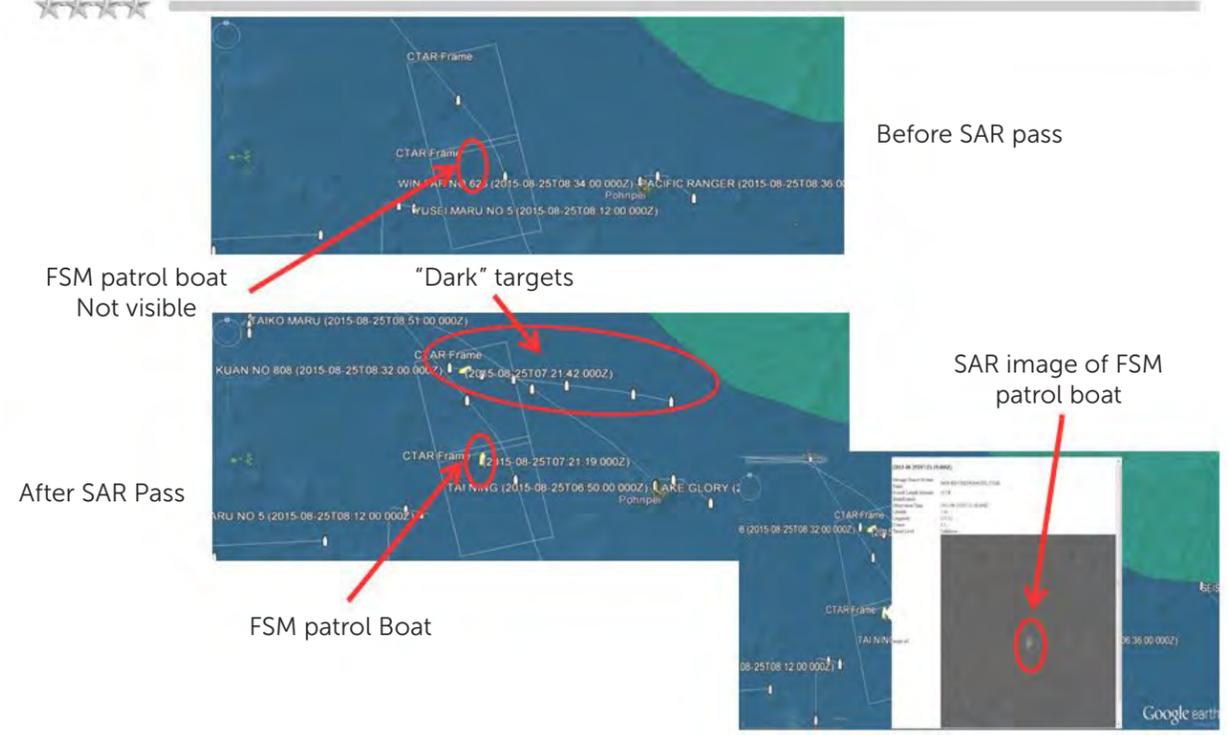


U.S. Naval Fleet and Force Interactions

The ONR Global Science Advisor program consists of 24 science advisors embedded in Navy, Marine Corps and joint commands to connect the warfighter and the Naval Research Enterprise.



2015-08-25 09:17 Zulu / 2015-08-25 20:17
Before and After SAR pass - FSM National Police Request to find FSM Patrol Craft using CTAR and RDA for demonstration purposes



SCIENCE ADVISOR FUTURE NAVAL CAPABILITIES (FNC) ACTIVITIES

SEPN/MAPS

In early 2015 the II MEF science advisor coordinated experimentation with the Squad Electric Power Network (SEPN) and Marine Austere Patrolling System (MAPS) with 2nd Radio Battalion in Camp Lejeune, North Carolina. These capabilities, which were the result of a previous ONR Future Naval Capability, were designed to reduce the combat load on Marines by efficiently generating, storing and managing power across their devices. The result of this effort was intended to inform the Expeditionary Energy Offices future Joint Infantry Company Prototype.



II MEF Science Advisor, Dr. Marcus Tepaske, discusses Squad Electric Power Network (SEPN) applications for Bionic Power's PowerWalk being tested out by Lance Cpl. Corey Champagne.

Squad Electric Power Network (SEPN) being tested on a Marine at the Mountain Warfare Training Center.

LochNESS

In July 2015 the II MEF and CNAL science advisors, along with the SURFLANT S&T lead, participated in a demonstration of the LochNESS system on board the Stiletto. The LochNESS software is able to use video feeds from a number of sensors to autonomously identify objects and vessels of interest. The LochNESS system, developed by BAE, is a critical component of the upcoming Combined EO/IR Surveillance and Response System (CESARS) Future Naval Capability.



LochNESS system (sensors and displays) installed on the Stiletto test ship in Little Creek, Virginia prior to testing.

SCIENCE ADVISOR FLEET EXPERIMENTATION / EXERCISES / DEMOS

List of FY15 Science Advisor Fleet Experimentation (FLEX) Events

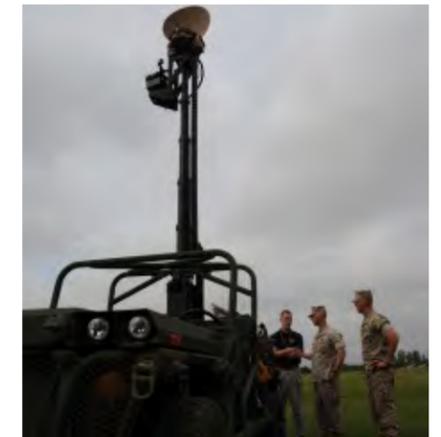
- Locust Workshop
- NGMAC/MAC-E-15-1 CSP
- Counter FIAC Weapons Evaluation At-Sea Experiment
- UDOC-15 At-Sea
- Non-traditional Theater ASW C2 War Game
- Talisman Sabre 15 (TS 15)
- TRIDENT WARRIOR 2015 (TW15)
- Rail Gun Seminar War Game
- NORTHERN EDGE 2015
- T-EPF 2015 Experimentation
- LPD -17 SADC Workshop
- TRIDENT SPECTRE 2015
- 2015 Undersea Innovation War Game
- FY15 UDOC Experimentation Campaign
- NEMESIS Seminar War Game
- EMW Experimentation Campaign 2015
- Solid State Laser – Quick Reaction Capability (SSL-QRC)
- JHSV NEO and HA/DR Event
- BOLD ALLIGATOR 14
- NWDC ONR Code 30 Workshop
- ONR Limited Objective Experiments (LOE)
- NWDC Limited Objective Experiments (LOE)
- USPACOM/CPF PACOM Exercise
- NWDC Advanced Warfighting Experiments
- NWDC War Game
- USPACOM J711 Exercise
- NWDC Limited Objective Experiments (LOE)
- USFF War Game
- NWDC Experimentation Campaign
- ONR Code 31 War Game
- NWDC Experimentation Campaign
- NAVSEA 05T – PMS 405 Demonstration
- 2d MEB and ESG-2 Exercise
- Pandarra Net demonstrations

Science Advisor Highlights

U.S. Naval Forces Central Command/U.S. Fifth Fleet (NAVCENT/C5F) science advisor conceived and managed the demonstration of electro optical and infrared camera systems on two Military Sealift Command ships in the AOR, which resulted in the MSC decision to install camera systems on all military sealift command ships to provide day/night 360-degree situational awareness.

NAVCENT/C5F science advisor spearheaded the demonstration of the Puma unmanned aerial vehicle on board the Bahrain-based patrol craft that resulted in the decision to procure Puma systems for all PCs in the Fifth Fleet. Based on this, Fourth and Seventh fleets are both pursuing Puma deployments on PCs and DDGs.

NAVCENT/C5F science advisor secured funding for the development of a small unmanned surface vessel, which will serve as a mobile communications gateway buoy to support mine countermeasures unmanned underwater vehicle operations. This Mobile Gateway Buoy (MGB) will allow Unmanned Underwater Vehicle (UUV) operators to remotely monitor UUV operations and support future transmission of automated target recognition calls by the vehicles.



II MEF Science Advisor, Dr. Marcus Tepaske, demonstrates the TechSolutions funded GBOSS-ITV system to Marines from 22 Marine Expeditionary Unit

FOURTH FLEET science advisor continued involvement with the U.S. Naval Forces Southern Command (USNAVSO) and Naval Warfare Development Command (NWDC) Fleet Experimentation (FLEX) period held 16 – 21 July 2015 off Key West with the Joint High Speed Vessel. New innovative technologies were experimented with to explore adaptive force packages to supplement the JHSV's abilities.

The Marine Forces Pacific (MARFORPAC) science advisor participated in Balikatan 2015, a bilateral exercise between the U.S. and the Republic of the Philippines. As part of the exercise the science advisor conducted an experiment using a proprietary polymer compound, that when added to



A V-22 Osprey prepares to land and deploy the GBOSS ITV system at an expeditionary training site.

the naturally occurring soil, has the ability to harden the ground making it capable of supporting aircraft operations. The experiment successfully demonstrated the capability to use Earthen Road and Runway System (ERRS) to construct pads for helicopter operations with multiple taxis and landings by H-60, UH-1, and CH-47.



Marines from 2nd Radio Battalion participating in an evaluation of ONR Code 30's Tactical Cyber Range at the MOUT Facility in Camp Lejeune.

MARFORPAC science advisor helped in the coordination of 20 Marines and one aircraft to participate in the Agile Bloodhound 2015 (AB15) C4I and logistics technology demonstration. AB15 was an integration and demonstration event which highlighted 15 R&D efforts and associated technologies that support expeditionary warfighters.



Dr. Duane Burchick, a research physicist at the Naval Research Laboratory, provides NIRO training to Marines from 26 Marine Expeditionary Unit during their pre-deployment training.



View of LHD-3, USS Kearsarge, from the window of a MH-60 as the I MEF science advisor, Jason Langton, and the II MEF science advisor, Dr. Marcus Tepaske are flow out during Exercise Bold Alligator 2014

THIRD FLEET science advisor provided MOC surrogate connection point and C3F HQ personnel via 4G LTE link to Pandarra Net terminal as part of their technology demonstration.

PACOM science advisor served as the operational manager for the Advanced Weapons Enabled by Submarine launched UAS against Mobile targets (AWESUM) Joint Capability Technology Demonstration (JCTD). He also participated on the team that determined fleet requirements, and designed and tested the Submarine Launched Unmanned Aerial System (SL-UAS). This JCTD, which provided a submarine-launched unmanned aerial system (the Blackwing UAV launched from the Hammerhead canister) capability, successfully completed

final Military Use Assessment in August 2015. This capability also included command, control and communications from the submarine to the UAV, as well as communication capabilities from the submarine to the joint commander. The SL-UAS provides a significant advantage to fleet and joint commanders, particularly in the PACOM area of operations.

II MEF science advisor worked with the ONR Expeditionary Maneuver Warfare and Combating Terrorism Department cyber program manager to develop the tactical cyber range and demonstrate it during Bold Alligator 2014 (November 2014) in Camp Lejeune, NC. The goal for the Tactical Cyber Range is to extend cyberspace training to the radio frequency (RF) physical environment to better integrate information-related capabilities with traditional fires to support mission objectives at the tactical edge.

II MEF science advisor coordinated and participated in a user evaluation of the NIRO sniper detection with 26 Marine Expeditionary Unit at Ft. AP Hill, Virginia in April 2015. This handheld system, developed by the Naval Research Laboratory, allows Marines to rapidly locate optics that are pointed in their direction which are typically indicators of surveillance or weapon system targeting.

SCIENCE ADVISOR SCIENTIST TO SEA / FIELD / CVN / PIER

73 Scientists to Sea

55 Scientists to Pier

Scientists to Sea

- 12 ships, 47 days underway, 73 participants

Scientists to Pier

- Four events, 62 participants

Scientist to Field

- Two events, 17 participants

TechSolutions Submissions

- Two submissions as a result of "scientists to sea" interactions between participants and host crews C3F SCIAD moderated "Meet the Warfighter" (C3F Deputy Commander and I MEF Science Advisor) Forum for SPAWARSSCOM Pacific technical workforce (24 FEB 2015)

STEM outreach: Tour of USS Somerset (LPD- 25) for FIRST Tech Challenge Teams (19 SEP 2015)

Six C3F "Science Friday" Emerging Capability Overview brownbag lunch series lectures:

- CANES
- ICOP
- NIFC-CA
- NITROS
- PNT
- Space Systems

Jungle Warfare Training Center Scientist to Field

In February 2015 the ONR science advisors to I MEF, II MEF and III MEF participated in a Scientist to Field event at the USMC Jungle Warfare Training Center (JWTC) in Okinawa, Japan. The science advisors were able to gain firsthand experience in the training that Marine and Joint Forces undergo to prepare for the rigors of combat in a dense jungle environment. The instruction focused on building small-unit leadership and a

tactical mindset, while instilling confidence, bolstering leadership, and challenging all individuals who train aboard JWTC. Activities included spending the night in the field, tactical instruction, and completion of the two hour endurance course. At the conclusion of the event the science advisor met with Marine units to identify jungle warfare capability gaps that ONR could help solve.

USS John C. Stennis CVN Fly-on/Fly-off

In January 2015 ONR science advisors from II MEF, 10th Fleet, and SUBLANT, along with distinguished visitors from NRL, visited the USS John C. Stennis aircraft carrier off the coast of San Diego. The visit included a

C-Greyhound (COD) flight out to the ship with an arrested landing, a tour of the ship, engagements with sailors from Airman/Seaman to CO, observation of flight operations, and a catapult launch to go back to shore.



Science advisors capture a close-up of T-45 training aircraft landing on the USS John C. Stennis

NEW S&T PROGRAMS INITIATED BY SCIENCE ADVISORS IN FY15

- The Fourth Fleet and Sixth Fleet science advisors worked with ONR to advocate funding a transition of the Defence Advanced Research Projects Agency (DARPA) program Towed Aerial Lift of Naval Systems (TALONS) for further demonstration and experimentation in both Fourth and Sixth Fleet. TALONS is a tethered shipboard parasail capable of flying various payloads of user choice.
- Meet the Warfighter Forum. C3F science advisor moderated a panel comprised of C3F deputy commander and I MEF science advisor at SPAWAR Systems Center Pacific on February 24, 2015
- C3F Quarterly "Warfighter to Lab" half-day tour series (preps)—First tour conducted October 27, 2015
- C3F science advisor established three-month Deputy Science Advisor tour billet program at COMTHIRDFLT as part of SPAWARSSCOM Pacific's Mid-Career Professional Program. These positions are funded by SSC Pacific twice/year as a means of providing operational fleet perspective to selected scientists and engineers. First MCPP embed reported October 2015.
- UWDC science advisor continues involvement with the Counter-Unmanned Undersea Vehicles (C-UUV) efforts, to include studies by the ONR Reserve Component group. This team will participate in the upcoming DARPA-sponsored Black Swan project, seeking solutions in this area.
- UWDC science advisor will help lead a new Integrated Product Team (IPT) to coordinate efforts in support of Submarine Launched Unmanned Aerial Systems (UAS).
- The MARFORPAC science advisor began a dialogue with University of Hawaii-Manoa representatives who were curious about Science Technology & Engineering (ST&E) in local DoD/federal organizations. The dialogue grew into the establishment of the UH-PACOM Technology Innovation Partnership (TIP) where all PACOM and component commands will be represented in the consortium. The purpose of this partnership is to accelerate the commercialization of innovative "dual-use" technologies in Hawaii by creating mutually beneficial civil-military collaborative partnerships.

FY15 SCIENCE ADVISOR FLORIDA INDUSTRY TOUR

In April 2015 the entire ONR science advisor team participated in a Florida Industry Tour to increase awareness of emerging technology, promote collaboration within the science advisor community, and establish relationships with industry in the region. The group visited United States Special Operations Command, Naval Air Warfare Center Training Systems Division, National Aeronautics and Space Administration, Lockheed Martin, Northrop Grumman, University of Central Florida, SRI International, and Disney Imagineering.



ANNUAL AWARD PRESENTATIONS



ONR Global Associate Director of the Year: Dr. Monique Beaudoin (pictured with CO Capt. Clark Troyer)



ONR Global Science Advisor of the Year: Mr. Wayne Pavalko (pictured with Vice Adm. John Miller, Commander C5F)



ONR Global Civilian Employee of the Year (tied): Eduardo Santos and Pat Harris





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