



ANNUAL REPORT FOR  
THE COLLEGE OF MARINE SCIENCE  
DEAN JACQUELINE E. DIXON

JANUARY 1 – DECEMBER 31, 2014

*Locally Applied, Regionally Relevant, Globally Significant!*

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# THE VIEW FROM THE BRIDGE

## The View from the Bridge



The oceans provide critical food and energy resources, moderate Earth's weather and climate, and enable world-wide commerce. Unfortunately, our oceans are facing a number of assaults, including pollution, increasing temperature and acidification, and over-fishing. Balancing our passions for fossil fuels and for eating fish with our desire for long-term ocean health will challenge our society economically, technologically, and politically. It also challenges our scientific understanding of how the interconnected ocean-atmosphere-cryosphere-solid Earth system works at a fundamental level.

Universities significantly affect the outcomes of these environmental challenges by providing fundamental knowledge and understanding of the oceans, by educating the next generation of leaders, and by passing this knowledge on to the public through outreach. At the University of South Florida (USF) College of Marine Science (CMS), our faculty members do high-impact interdisciplinary research on socially-relevant issues and train graduate students by working shoulder to shoulder with them. Our faculty members are superb citizens, involved in service at the university level, the local, state and federal government levels, and at the international level.

Our interdisciplinary research addresses problems in shelf/coastal and estuarine waters, in the deep ocean, and in the watershed that drains to the coastal zone. This research is locally applied, regionally relevant, and globally significant. These issues include long-term sea-level rise, coral reef demise, recent and past climate change, ocean acidification, harmful algal blooms, fisheries management, water quality, shoreline change, impacts of oil drilling, navigation, and development of new sensing technologies. With the combination of new technologies placed on moorings, unmanned underwater vehicles such as gliders and remotely-operated vehicles (ROVs), combined with real-time satellite data reception, processing and public distribution, our program is at the forefront of marine environmental observations and prediction.

This annual report summarizes our research, education, and outreach activities for an exciting and event-filled 2014. From welcoming new donors and grants to participating in the ever-expanding St. Petersburg Science Festival and Blue Ocean Film Festival, the folks in the College of Marine Science have been busy. I'm pleased to be at the helm as we build on a foundation of excellent work by our faculty, staff, and students, and expand our role in the community.

# COLLEGE OF MARINE SCIENCE SNAPSHOT

## College of Marine Science Snapshot

When was the CMS established?

The USF College of Marine Science began in 1967 as the Marine Science Institute of the University of South Florida and was located in an old U.S. Merchant Marine training station on what would become the 11-acre USF branch campus near the Bayboro Harbor in St. Petersburg, Florida. The first three faculty – Harold Humm (Director, and a marine phycologist), Thomas Hopkins (marine plankton and micronekton ecology), and Hugh Dewitt (ichthyology) – set up laboratories in that facility and began to mentor graduate students working toward master’s degrees. By 1969 the group doubled in size and included Thomas Pyle (marine geology), Kendall Carder (optical/physical oceanography) and Ronald Baird (ichthyology). When Peter Betzer (chemical oceanography) joined the faculty in 1971, all of the major sub-disciplines of oceanography were represented, and the Institute was re-designated as the Marine Science Department within the USF College of Natural Sciences. It was later incorporated into the USF College of Arts and Sciences. In 2000, the Department formally became a separate USF College located on the USF St. Petersburg campus while reporting directly to the USF Provost on the main Tampa Campus.

In the 48 years since its official beginning, Marine Science at USF has greatly expanded in size and capability and is widely recognized as a leader in ocean science. There are now 25 faculty covering the sub-disciplines of oceanography and other earth sciences, ~100 graduate students, ~\$14 million in annual research, a total endowment of ~\$18 million, 47 full-time support personnel and 48 temporary staff.

We are strongly engaged with the community as a member of the St. Petersburg Marine Science District, a group of organizations including USF CMS, USFSP, Eckerd College, the U.S. Geological Survey, the Florida Fish and Wildlife Research Institute, Florida Institute of Oceanography, SRI International, NOAA Fisheries Service, the Tampa Bay Estuary Program, and others. The Marine



Science District contributes to the economic well-being of St.

Petersburg through employment of approximately 800 researchers, engineers, technicians and support staff (an estimated 75% of those employed have advanced degrees; at least 30% of those at the PhD level), an estimated annual payroll of \$64M, and an additional (external market) financial impact of ~\$30M annually.

# COLLEGE OF MARINE SCIENCE LEADERSHIP TEAM

## College of Marine Science Leadership Team

**Jacqueline Dixon**  
**Dean, College of Marine Science**  
**University of South Florida**  
**Ph.D., California Institute of Technology, 1992**  
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Dr. Jacqueline Dixon is Dean of the College of Marine Science at the University of South Florida. She received her bachelor's and master's degrees in geology from Stanford University in 1981 and 1983, respectively, and her Ph.D. in geochemistry from the California Institute of Technology in 1992. From 1992 through 2010, Dr. Dixon was at the University of Miami, where she served as Director of the Abess Center for Ecosystem Science and Policy's Undergraduate Program, Senior Associate Dean for the Life and Physical Sciences, and Interim Dean of the College of Arts and Sciences. She received an Early Career Development award from the National Science Foundation for excellence in research and education, and is internationally recognized for her research on submarine volcanoes and the role of volatiles in magmatic processes.

Dr. Dixon is serving on the External Review Committee for Nanyang Technical University in Singapore. Nationally, she serves on the Executive Board of the Consortium for Ocean Leadership and is a member of the NOAA Ocean Exploration Advisory Board. Within the community, she serves on the board of the Secrets of the Sea Marine Exploration Center and Aquarium, and as a member on the St. Petersburg Ocean Team, the St. Petersburg Downtown Partnership, and the St. Petersburg Chamber of Commerce Grow Smarter Initiative Committee. She has recently been appointed to the Board of Governor's for the St. Petersburg Chamber of Commerce.

**Gary Mitchum**  
**Associate Dean, College of Marine Science**  
**University of South Florida**  
**Ph.D., Florida State University, 1984**  
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Dr. Mitchum is presently a Professor of Physical Oceanography and the Associate Dean in the College of Marine Science at the University of South Florida. After receiving his Ph.D. from the Department of Oceanography at the Florida State University in 1985, he spent 11 years in the Department of Oceanography at the University of Hawaii, first as a postdoctoral researcher and then as a member of the research faculty and as the Director of the University of Hawaii Sea Level Center. He came to the University of South Florida in 1996. His research interests emphasize short-term climate changes, ranging from interannual variations such as ENSO, to decadal processes, to the long-term sea-level rise problem. He has also done work on continental shelf dynamics, mesoscale eddy interactions with mean flows, internal tide generation and

# COLLEGE OF MARINE SCIENCE LEADERSHIP TEAM

propagation, physical controls on fisheries variables, and storminess changes in the southeastern United States. Although he has used many types of data in his research, he is especially interested in analyses of tide gauge and satellite altimetric data, and notably proposed and developed the presently accepted method of estimating temporal drift in altimeters via comparisons with the global tide-gauge network.

## **David Naar**

**Associate Professor, Director of Academic Affairs**  
**College of Marine Science**  
**University of South Florida**  
**Ph.D., Scripps Institution of Oceanography, UCSD, 1990**  
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Dr. Naar is the Director of Academic Affairs in the College of Marine Science at the University of South Florida. He received his bachelor's degree in geology with an emphasis in geophysics from University of California, Santa Barbara in 1982, and his Ph.D. in Earth sciences from Scripps Institution of Oceanography, at the University of California, San Diego in 1990. From 1990 until present, Dr. Naar has been at the University of South Florida's College of Marine Science (previously a department). He started as an assistant professor, then as an adjunct professor at the University of Rhode Island's Graduate School of Oceanography, then associate professor, then co-director of the Center of Coastal Ocean Mapping, and then Director of Academic Affairs. He received funding from the National Science Foundation, Office of Naval Research, the United States Geological Survey, the American Chemical Society Petroleum Research Fund, and NOAA. He has been cited by the Journal for Geophysical Research for excellence in refereeing and is internationally recognized for his research on microplate tectonics, plate motions, seamount chains, & seafloor mapping of marine protected areas. Internationally, Dr. Naar has served on the site characterization panels for IODP and for the second IODP (as an alternate). Nationally, Dr. Naar has served on the ODP United States Scientific Advisory Committee (USSAC) and co-wrote, with Dr. Tim Bralower, the US Proposal to NSF for the US involvement in IODP. Dr. Naar has co-published over 61 peer reviewed manuscripts and has an H-index of 24 and is currently advising 6 graduate students.

## **Chris Schwint**

**Budget Director**  
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Chris Schwint is the Budget Director for the College of Marine Science. He received his BA in 1981 from USF. Worked for the US Department of Labor and the University of South Florida in Budget and Policy Analysis.

# COLLEGE OF MARINE SCIENCE LEADERSHIP TEAM

**Tim Trowbridge**  
**Unit HR Administrator**  
**College of Marine Science**  
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Tim Trowbridge is the Unit HR Administrator for the College of Marine Science. He received his bachelor's degree in business management and minor in leadership studies from the University of South Florida in 2008. Since that time he has been employed by the University of South Florida serving as the Unit HR Coordinator for the Student Affairs Shared Services Center from 2009-2011 and in the College of Marine Science from 2011-2012. In May 2012, Tim Trowbridge was promoted to Unit HR Administrator for the College of Marine Science and continues to serve in this role. He earned his Professional in Human Resources (PHR) certification in December 2013.

**Joseph Donnelly**  
**Facilities Manager, College of Marine Science**  
**University of South Florida**  
**M.S., University of South Florida, 1986**  
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Mr. Donnelly is the Facilities Manager for the College of Marine Science at the University of South Florida. He received his bachelor's degree in marine biology from The University of West Florida in 1980 and master's degree in marine science from USF in 1986. From 1985 through 2006, he was an assistant/associate in research at CMS working with Dr. José Torres studying the biology and ecology of midwater fish and invertebrates. From 1988 to 1997 he also worked as an adjunct instructor in Earth Science and Oceanography at St. Petersburg Junior College (now St. Petersburg College). After recovering from a serious work-related accident in 2006, he took on the newly-created position of CMS Facilities Manager in 2008. Mr. Donnelly currently serves on several CMS committees (Space, Safety, Computer) and is also a member of the USFSP campus Gold Team, which deals with all matters relating to the USFSP Campus Emergency Management Plan (CEMP).

**E. Howard Rutherford**  
**Director of Development**  
**College of Marine Science**  
**University of South Florida**  
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E. Howard Rutherford holds a Bachelor of Science degree in Marine Chemistry from Eckerd College, St. Petersburg, FL and attended graduate school at USF CMS. He returned to CMS as Director of Development

# COLLEGE OF MARINE SCIENCE LEADERSHIP TEAM

after a 13-year tenure as President/CEO with The Pier Aquarium d/b/a Secrets of the Sea Marine Exploration Center and Aquarium. Before his tenure at the aquarium, Howard was a research associate in the nutrient chemistry laboratory at USF-CMS where he participated in research projects from the Bering Sea to the Arabian Sea to the Southern Ocean. He has witnessed firsthand the value and fragility of the marine environment, fueling his passion to share these discoveries with the public. His influence extends beyond Tampa Bay as a leader in ocean science education reform. Currently, Mr. Rutherford is President to the National Marine Educators Association, a national organization powered by 17 individual, regional chapters that provide the on-the-ground efforts that support and promote national initiatives in education and conservation such as ocean literacy. He has actively participated on the City of St. Petersburg's Ocean Team, of which the College of Marine Science plays a major role. As founding Co-Chair, Howard helped to establish the St. Petersburg Science Festival, which is one of four national festivals awarded a grant from the Alfred P. Sloan Foundation to build capacity and mentor three new science festivals in the next two years. Howard is also Co-PI on the Creating a Community of Practice Around a Proven Teen Science Cafe Model, a \$2.6 million project funded by the National Science Foundation. This project is building the first network of ocean science thematic Florida Teen SciCafes in partnership with The Florida Aquarium and Mote Marine Laboratory.

# EVENTS AND HIGHLIGHTS

## Events and Highlights

**Eminent Scholar Lecture Series:** Ocean Health, April 3 to 4, 2014 with four guest lecturers: Bill Lehr, National Oceanic and Atmospheric Administration, “Doing Emergency Science – The Deepwater Horizon Oil Budget Calculator Experience”; Joel D. Blum, University of Michigan, “Mercury in the Oceans: Sources and Pathways into Seafood”; Erin Fougères, National Oceanic and Atmospheric Administration, “Dolphin Die-Offs in 2013: Ocean Health Indicators or Just Unusual Events”; and Steven Katona, Conservation International, “The Ocean Health Index: Results and Lessons from a New Method for Assessing the Health and Benefits of the Ocean”

**St. Petersburg Science Festival:** In mid-October, we proudly participated in the growing St. Petersburg Science Festival held concurrently with the Florida Fish and Wildlife Marine Quest. CMS had seven exhibits ranging from Marine Robot Exploration to Fun with Fish! The festival drew in some 12,500 public visitors, including a Sneak Peek Day for 1,500 4th and 5th grade students and teachers.



A highlight of the festival was the unveiling of “Current Collections”, the largest plastic pollution public art sculpture in the southeastern U.S. Marine debris is a growing and insidious problem in our oceans. With funding from the National Oceanic and Atmospheric Administration Marine Debris Program and in collaboration with Georgia State University Welch School of Art & Design, CMS Professor Frank Muller-Karger and Research Associate CJ Reynolds developed an innovative environmental education program culminating in the sculpture. More than 3,000 children and adults participated in related educational workshops held at the Dali, The Fine Art Museum, and the St. Petersburg Public Library (and in Atlanta, GA), where they created plastic panels for the sculpture. Five branching steel arms reach thirty feet high and forty feet across and represent a rotating ocean vortex. The arms are covered with a multi-colored translucent plastic skin made from melted bags and debris collected by volunteers in coastal cleanups. People walking into the exhibit experience the swirling plastic as if they were underwater. The sculpture will make its way to Atlanta for the spring 2015 Atlanta Science Festival and returns to St. Pete in fall 2015.

**BLUE Ocean Film Festival:** Held for the first time in St. Petersburg, the BLUE Ocean Film Festival was a huge success. More than 20,000 people attended BLUE, there were 150 films screened, and some 49 panels and workshops were held. Some 4000 students participated with over 350 volunteers. BLUE will be held in Monaco in 2015 and will return to St. Petersburg in 2016. In collaboration with organizers, CMS hosted Dr. Callum Roberts, Professor of Marine Conservation at the University of York (UK), as an Eminent Scholar. Associated with the event and to continue the theme of marine debris, CMS students and faculty participated in a beach clean-up event along with volunteers from The Canterbury School, the Tampa Bay Estuary Program, FWRI, the Oceanography Camp for Girls alumna, Tampa Bay Watch, and USFSP. Over five tons of garbage were removed from the area’s coastline.

# EVENTS AND HIGHLIGHTS

## Faculty Awards:

- **Cameron Ainsworth** received the 2014 Outstanding Faculty Award from USF.
- **Mya Breitbart** received the 2014 Outstanding Faculty Award from USF and Florida Trend Magazine's All Star
- **Robert Byrne** was elected Fellow of the National Academy of Inventors
- **Chuanmin Hu** received 2014 Outstanding Research Faculty Award from USF and Faculty Outstanding Research Achievement Award from USF
- **Amelia Shevenell** was selected as a 2014-2015 International Ocean Discovery Program (IODP) Distinguished Lecturer.



*Provost Ralph Wilcox joins Dean Dixon in celebrating the accomplishments of Robert Byrne, Chuanmin Hu, and Cameron Ainsworth at the 2014 USF Faculty Honors and Awards Ceremony.*

## Alumni Success:

- **Rebekah Duncan Baker**, MSc 2008, was promoted to Assistant Editor of the *Journal of Foraminiferal Research* in April 2014. This is an international journal published quarterly by the Cushman Foundation for Foraminiferal Research.
- **David Mearns**, MS 1986; Director of Bluewater Discoveries, West Sussex, UK; David was part of the MUSAHI search (world's largest battleship built by the Japanese). He was in the Sibuyan Sea filming the wreck that they had located. He also created with his team a bathy map of a volcanic ridge that dominates the area, which was needed in advance of the AUV search with SSS. <http://bit.ly/1CZzv0K>

## New Faculty:

- **Kristen Buck** is an expert in biogeochemical cycling of trace metals in marine ecosystems.
- **Brad Rosenheim** is an expert in climate and carbon cycling in the recent geologic past using stable and radiogenic isotopic techniques.
- **Eugene Domack** is an expert in paleoclimate using sediment facies, biotic changes, and ice adjustments in the Antarctic.

# EVENTS AND HIGHLIGHTS

## C-IMAGE - II



**\$20.2 million renewal grant for work in Gulf of Mexico:** In November, we were awarded a renewal grant for C-IMAGE (Center for Integrated Modeling and Analysis of Gulf Ecosystems) by the Gulf of Mexico Research Initiative to continue leading efforts to determine the impacts of the 2010 Deepwater Horizon oil spill. Over the next three years, our professors, post-doctoral scholars, and students at nineteen collaborating institutions, in five countries including Mexico, the Netherlands, Germany, and Canada will work to better understand how the spill impacted the Gulf of Mexico food web. Dr. Steven Murawski is the principal investigator. He holds the St. Petersburg Downtown Partnership – Peter Betzer Endowed Chair of Biological Oceanography, and is focused on understanding the health of key fisheries in the Gulf of Mexico following the spill. See Appendix for full update.

**Endowed Graduate Student Fellowship Luncheon:** October 2014 began with a lunch to celebrate our endowed graduate student fellowships. A print by Diane Peebles was presented to our newest donors, Jane and George Morgan. We're glad to have them aboard! Details are provided in the Graduate Education section.

**CMS Postdoctoral Symposium** was held on December 4<sup>th</sup> in the MSL Conference Room. The symposium was run by postdoctoral fellows and included a Professional Development Panel comprised of CMS faculty.

**Spoonbill Ocean Science Bowl:** February 1st, 2014 was the 10-year anniversary of the Spoonbill Bowl, a regional tournament-style academic competition designed to challenge high school students' knowledge of math and science in the context of the ocean. To date, over 500 students and coaches have participated because of our wonderful volunteers from CMS and our other marine science partners. The winners move on to compete in the National Ocean Science Bowl. This program, sponsored by the Consortium for Ocean Leadership, promotes careers in sciences and engineering and broadens public awareness and understanding of the importance of ocean-related research.

## Research Overview

Research at CMS focuses on **Assessing and Predicting the Health of Ocean, Human Interactions**. Our aim is to understand these interactions well enough to maintain, and hopefully improve, the health of this intimately and intricately interconnected system. The CMS research umbrella emphasizes five areas, including Healthy Ecosystems, Climate Change (past, present, and future), the Ocean-Human Interface, Ocean Observing and Modeling, and Impacts of Deep Drilling for Fossil Fuels. Highlights of research in each of these areas is listed below. For a more thorough summary, a brief summary for each faculty member is given at the end of this section.

### Healthy Ecosystems

- Ernst Peebles and Amy Wallace used eye-lens stable-isotopes to re-create the lifetime geographic and trophic histories of individual fish and to produce the first ever publication on this topic.
- Cam Ainsworth and his team completed development of a marine ecosystem model that enables studies of larval dispersal, spatial management, oil spill and nutrient distributions.
- Mya Breitbart and one of her students identified a new densovirus associated with sea-star wasting disease and mass mortality.
- Frank Muller-Karger was selected to lead the development of a Marine Biodiversity Observation Network (MBON), which is a \$7M project involving 14 institutions, with USF as lead.

### Climate Change

- Al Hine, with help from Don Chambers and Gary Mitchum, led a group developing a book on sea level change in Florida that is presently under consideration by the University Press of Florida.
- Mark Luther and Thomas Wahl were able to show that the amplitude of the seasonal cycle in sea level is increasing at a much faster rate than mean sea level over the past two decades in the eastern Gulf of Mexico.
- Amelia Shevenell and her team spent 46 days in the Antarctic and discovered thick marine sedimentary sequences that contain a detailed ~40 Ma history of East Antarctic Ice Sheet evolution that will be invaluable for studying past climate variations.

### Ocean-Human Interface

- Chris Stallings has obtained funding for the development and testing of culling programs for the invasive lionfish, and for understanding why economically important oyster populations have crashed in Apalachicola Bay.
- Chuanmin Hu and his students published papers describing novel methods to detect and monitor outbreaks of harmful algal blooms from space.

### Ocean Observing

- Bob Byrne is leading a team that entered the highly prestigious \$1M Wendy Schmidt Ocean Health XPRIZE competition focused measuring ocean pH. At this point his team is tied for first place!

# RESEARCH OVERVIEW

- Kendra Daly served as the Co-Chief Scientist on a 52-day cruise (4 legs) for the Ocean Observatory Initiative (OOI) cabled component to install the final infrastructure and sensors in the water column and on the seafloor in the NE Pacific Ocean offshore of Oregon and Washington.

## Impacts of Deep Drilling for Fossil Fuels

- Steve Murawski and David Hollander led the development of the successful \$20.48M C-IMAGE 2 proposal that will continue Deepwater Horizon studies. Research will extend to gulf-wide studies of fishes and to the earlier IXTOC oil spill.
- Steve Murawski with Chad Lembke in COT and Stan Locker secured a \$4.5 million grant from the National Fish and Wildlife Foundation to use state-of-the art mapping and video tools to understand the relationship among fish communities and their habitats.
- Bob Weisberg and his group produced a model that explained why west Florida reef fish were affected by Deepwater Horizon oil, despite no oil being observed on the sea surface, and established a circulation model capable of predicting oil movement along the entire west Florida coast and even into the estuaries in the event of another spill.

## SUCCESSFUL TECHNOLOGY TRANSFER

- **John Paul** established a USF tech spinoff company, PureMolecular LLC, that was grounded in patents that JP and David Fries were awarded for handheld grouper seafood authentication technology.



<http://bit.ly/1C0m3sK>

- **Byrne Competing for XPRIZE:** CMS is excited to have our own Dr. Bob Byrne competing in the \$2M Wendy Schmidt Ocean Health XPRIZE, a global competition to create pH sensor technology that will affordably and accurately measure ocean acidification. Bob has brought together a world-class team of scientists and engineers from CMS, SRI International, and Batelle Memorial Institute to form Team SEAS (Spectrophotometric Elemental Analysis System). One of the requirements during the Ocean Trial Phase of the competition is for the pH sensor to be operable at 3,000 meters. Team SEAS is confident they will be able to develop the next generation pH sensor to reach the required depth.
- Former faculty member, **David Mann**, founded Loggerhead Instruments in 2002 to make underwater passive acoustic recorders available to colleagues. Since that time, Loggerhead has grown to supply recorders to over 15 countries, where they have been used to study whale behavior near South America, illegal fishing in Tanzania, and melting glaciers in Antarctica. Loggerhead has also recently developed open source animal borne motion tags to collect high-speed motion data on diving marine animals. Loggerhead maintains an engineering and manufacturing facility in Sarasota, Florida. David continues his collaboration with USF in working

# RESEARCH OVERVIEW

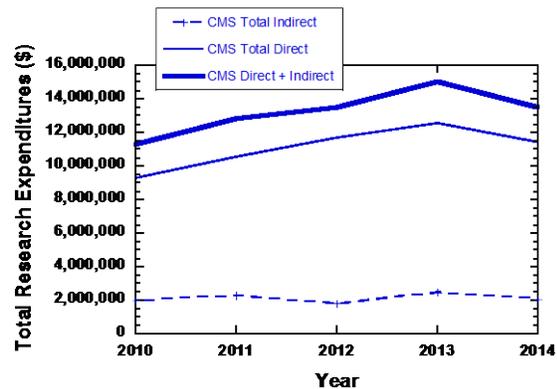
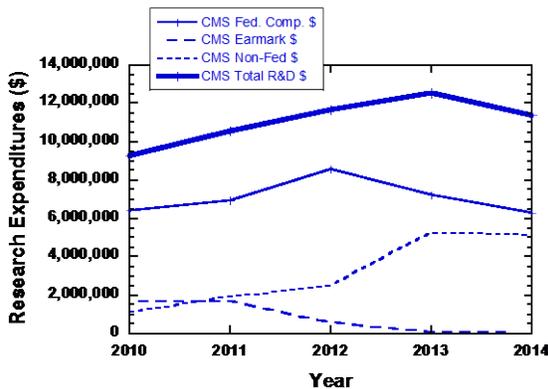
distributions. In early 2014 David co-founded startup Humu Labs (humu.io) to develop a scientific cloud-computing platform. Humu Labs is based in Cambridge, MA, and is designing an online system to provide users with the ability to securely manage, process, and analyze large scientific datasets without programming. The inspiration for Humu Labs came from the years David spent teaching statistics and signal processing to oceanography graduate students.

## RESEARCH ACTIVITIES IN THE DEAN'S OFFICE

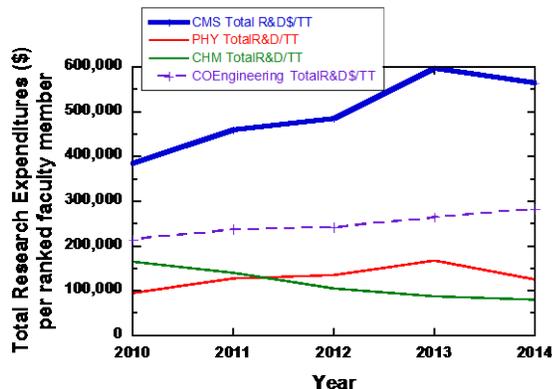
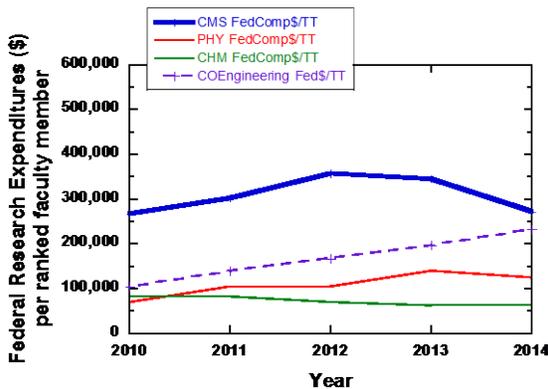
**Gary Mitchum** is the new USF lead for the Florida Climate Institute (FCI), a consortium of nine Florida universities seeking support for climate-related research. Gary is implementing a new vision to create a more inclusive entity joining partners across USF with partners in the other FCI universities to pursue climate-related funding opportunities too large for any individual institution.

## RESEARCH PRODUCTIVITY

The research profile of the college remains strong in spite of increased competition for external grants. In 2013, our total research expenditures were roughly ~\$13.5 M, with ~\$11.4 M in direct research expenditures and ~\$2.1 M in indirect. Anita Thompson, our unit research administrator, continues to the research enterprise running smoothly.



As expected for a research-intensive unit, our faculty have some of the highest per faculty research performance metrics in the university, though the College of Engineering is catching up with respect to federal research expenditures! Below research expenditures per CMS faculty member are compared with those in other highly research active units (Physics, Chemistry, and the College of Engineering).



# FACULTY HIGHLIGHTS

## Faculty Highlights

Below are highlights of faculty, along with their students and staff, accomplishments in 2014. Publications for CMS faculty are listed in a separate section.

**Cameron Ainsworth's** lab completed development of a marine ecosystem model that will contribute to at least four PhD dissertations (Drexler, Dornberger, Masi, and Simpson). They are presently using the model for larval dispersal, spatial management, oil spill and nutrient studies (Drexler & Ainsworth 2013 and Masi et al. 2014). In 2014, Cam submitted 11 proposals or LOIs, obtaining three awards (five are still in review), and supported three student-lead applications, which were all successful. Cam published four articles in 2014, one as first-author, and four technical reports. Cam was a panel member for the Northern Gulf Institute public meeting on Mississippi diversions and also interacted with federal fisheries managers. Notably, Cam graduated his first student in March (Alisha Gray, MS); she is currently working at FWC. Cam's lab has now expanded to five students, a Research Associate and a postdoc.

**Mya Breitbart's** genomics laboratory had an extremely successful year, publishing six papers in 2014 on a diverse range of topics including marine biodiversity, single-stranded DNA phages, RNA plant viruses identified in insects, efficiency of enteric virus removal in wastewater treatment pond systems in Bolivia, and DNA barcoding of fish eggs close to home in Terra Ceia Bay. Notably, Mya Breitbart and graduate student Elizabeth Fahsbender were also involved in a groundbreaking study that identified a new densovirus associated with sea-star wasting disease and mass mortality (published in PNAS). Several members of the Breitbart lab



earned prestigious awards this year, including a NSF Graduate Research Fellowship (Brittany Leigh), a US Fulbright Student Fellowship (Erin Symonds), a Florida Sea Grant Aylesworth Scholarship (Stephanie Lawler), a Roche/ARCS Scholarship (Ryan Schenck), and a Marie Curie Fellowship (Anna Szekely). Mya Breitbart earned Florida Trend Magazine's 2014 All Star Award and a USF Outstanding Faculty Award. She also holds several leadership positions within the American Society for Microbiology (National Councilor for the Florida Branch, Chair-Elect for Division M, Scientific Advisory Board Member) and serves on the Executive Committee of the International Committee on the Taxonomy of Viruses. With collaborator Frank Muller-Karger, the Breitbart lab recently received a new five-year grant to establish marine biodiversity observation networks in three national sanctuaries.

**Kristen Buck** joined the College of Marine Science in January 2014. The Buck Trace Metal Biogeochemistry Lab currently consists of one full time research technician and three graduate students. A significant accomplishment in 2014 included completion of the construction of a clean laboratory facility at the

# FACULTY HIGHLIGHTS

college, which facilitates the state of the art trace metal biogeochemistry measurements conducted in the Buck lab. Two National Science Foundation awards to Buck were transferred to the College in 2014, and work on these projects, including the analyses of U.S. GEOTRACES samples, is underway. Kristen and graduate student Travis Mellett also participated in a 30-day research cruise led by Ken Bruland, and additional ship-time on the *R/V Weatherbird II* was awarded to Buck for a training cruise planned for 2015. Buck was nominated in 2014 to the Ocean Carbon and Biogeochemistry (OCB) Scientific Steering Committee and was nominated into a leadership position with The Oceanography Society (TOS) as the Chemical Oceanography Councilor.

**Robert Byrne** was elected as a Fellow of the National Academy of Inventors. He has not been resting on his laurels, however, but has also published an invited, peer-reviewed feature article in a major journal (Byrne, R.H. 2014. Measuring Ocean Acidification: New Technology for a New Era of Ocean Chemistry. *Environmental Science and Technology* 48: 5352 -5360. [dx.doi.org/10.1021/es405819p](https://doi.org/10.1021/es405819p)). Bob also mentored a student, Bo Yang, who led the publication of another important paper (Yang, B., M.C. Patsavas, R.H. Byrne and J. Ma. 2014, Seawater pH measurements in the field: A DIY photometer with 0.01 pH unit accuracy. *Marine Chemistry*. 160: 75-81), which is currently listed as the most downloaded article in *Marine Chemistry*. Bob also graduated two PhD students (Mark Patsavas, James Patten) and one MS student (Matthias Elliott). Finally, Bob is leading a team that is competing in the Wendy Schmidt Ocean Health XPRIZE. Bob's team is comprised of members from USF, SRI, and Battelle Memorial Institute and their instrument (SEAS-pH) is entered in the pH accuracy competition. After the first round Bob is tied for first place for the \$1M prize!

**Don Chambers** began a term as an editor for the *Journal of Geophysical Research-Oceans*, which is one of the flagship publications in the earth sciences. In addition, Don's student, Michael Kosempa, published the first paper based on his Ph.D. research in the *Journal of Geophysical Research*. Another of Don's students, Jessica Makowski, gave oral presentations as the first author at the AGU Ocean Sciences Meeting in February 2014 and at the Fall Meeting in December 2014. Finally, Don's former post-doc, Scientific Researcher Jenni Bonin, was awarded a prestigious NASA New Investigator Award.

**Kendra Daly** spent a large portion of 2014 at sea. Kendra served as the Co-Chief Scientist on a 52-day cruise (4 legs) for the Ocean Observatory Initiative (OOI) cabled component to install the final infrastructure and sensors in the water column and on the seafloor in the NE Pacific Ocean offshore of Oregon and Washington. She also served as the Co-Chief scientist of a three-month field expedition in McMurdo Sound, Antarctica. Kendra published two papers with a former PhD student on the impacts of the oxygen minimum zone on zooplankton lipid storage and metabolic processes in the eastern tropical north Pacific, and published another paper with a current PhD student concerning measuring age in Tampa Bay blue crabs. Kendra also served as the co-organizer of the Marine Oil Snow Sedimentation and Flocculant Accumulation (MOSSFA) Townhall meeting at the GOMRI Oil Conference in Mobile, Alabama, which was to initiate discussions with federal agency and industry conceding the role of marine snow in sedimentation of oil to the seafloor during the Deepwater Horizon oil spill.

# FACULTY HIGHLIGHTS



*Photo shows an equipment station on McMurdo Sound fast ice. The Conestoga Wagon on a sled contains computers and navigational equipment for the underwater SCINI ROV and acoustic and fluorescence sensors that were deployed thorough holes drilled in the sea ice.*



*Adelie penguin adult, with two chicks starting to molt. Adults were fitted with satellite tags to track diel feeding behavior, location, and depth. Information on diet was observed when penguins returned to feed their chicks.*

**Eugene Domack** joined the college at the beginning of 2014 and a significant accomplishment was successfully moving his office and laboratory from Hamilton College to USF. Gene participated on and provided leadership for a cruise to East Antarctica on the N.B. Palmer and gave an invited talk at the Antarctic Symposium at the Korean Polar Research Institute in Incheon, Republic of Korea. Gene published four papers in top journals, including Science, Earth and Planetary Science Letters, the Bulletin of the Geological Society of America, and Cryosphere. Gene was also busy writing research proposals and submitted three, one to the American Chemical Society to test eustasy across the Late Paleozoic Icehouse to Greenhouse Transition, and two to NSF. The NSF proposals are to study fjord wall geology via drone technology and radiogeochemistry and for the analysis of ultra-high resolution paleoclimate data from Oneida and Glacial Lake Iroquois. Gene also participated in a NSF funded workshop on IsoAstrochronology held in Madison Wisconsin. On the education side, Gene completed the final supervision and approval of three senior theses at Hamilton College.

**Boris Galperin** had a very productive year. Based upon the experiments conducted at the University of Rome with active participation of his PhD student Jesse Hoemann, they have developed a new tool for diagnosing the rate of the inverse cascade and the meridional diffusivity coefficient in macroturbulence. This tool can be applied to diagnose turbulence and diffusion in oceanic and planetary flows even when only limited data is available. This research resulted in a paper published in the Geophysical Research Letters. Boris' other PhD student, Esa-Matti Tastula, made excellent progress towards his graduation. He

# FACULTY HIGHLIGHTS

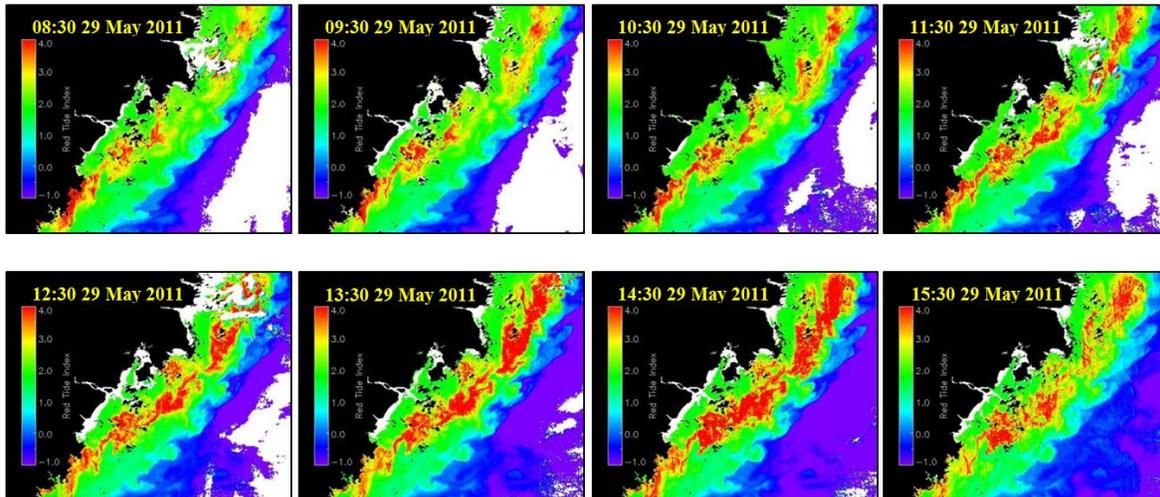
has published two first-author papers, is currently working on two more and is contributing to a multi-author paper describing comparisons of many different models. With a large international group of collaborators, Boris has published a paper on macroturbulence on Jupiter as derived from the Cassini data. In this paper he shows that the large-scale Jovian circulation features the regime of zonostrophic turbulence, the regime first discovered in their 1996 simulations and coined in their 2006 paper. With another large international group of co-authors, Boris is also finishing a large review article on the atmospheric boundary layers that will be submitted to the *Reviews of Geophysics*.

**Albert Hine** developed an online course entitled “Geologic History of Florida”, which is being taught to 23 students in the winter/spring of 2015. Many hundreds of hours by Al and an additional many hundreds of hours by Ana Arellano were required to bring this course to completion. Al led an effort to submit a book on sea level rise in Florida to the University Press of Florida. Al took the lead in creating and developing a CMS alumni newsletter called *Rising Tides*, which is issued twice a year.

**David Hollander** is chief scientist for the successful \$20.2M C-IMAGE-II consortium, with almost \$2M to support the research of David and his group. In addition, David had five active grants in 2014 and submitted three proposals including C-IMAGE-II. David and his colleagues published nine papers in top journals, including *EOS*, *Environmental Science and Technology*, *PlosOne*, *Marine Ecology Progress Series*, *Geochim. Cosmochim. Acta*, *Deep Sea Research*, and 13 others are in press or in review. In addition, David was a session convener for the MOSSFA Town Hall & Biological Impacts session at the GoMRI National Oil Spill and Ecosystem Conference. David supervised three postdocs, was the major professor for two PhD students and served as a committee member for three other PhD students. David also was the coordinator for the Chemical Oceanography core course in 2014. David gave a public lecture at the BLUE Ocean Film Festival, the research was highlighted in the *Tampa Bay Times*, and he gave multiple interviews on the long-term impacts of the Deepwater Horizon oil disaster.

**Chuanmin Hu** had a truly exceptional year with 12 active projects and publication of 24 referred articles and two book chapters. This past year also saw increased external funding with \$2.7M from seven new awards to Chuanmin’s group. Chuanmin was selected to be a science team member of NASA’s MODIS Science Team and NPP Science Team and he also won two USF awards during 2014, a Faculty Outstanding Research Achievement Award and an Outstanding Faculty Award. As usual, most of Chuanmin’s publications are focused on the understanding of the underwater light field, on remote estimates of water’s biogeochemical properties, and on application of novel approaches to address earth science questions such as algal blooms and coastal water quality as well as coastal environmental changes, as illustrated in the accompanying figure. Chuanmin is particularly proud that his first PhD student, Brian Barnes, who won the best USF dissertation award in 2014, and two other students, who published their first refereed papers during their first year at CMS. Chuanmin was selected by Elsevier to be a chief editor of *Remote Sensing of Environment*, the number one journal in this field.

# FACULTY HIGHLIGHTS



*The image sequence shows hourly changes of red tides in the East China Sea during one day.*

**Mark Luther**, working with his German post-doc, Thomas Wahl, was able to show that the amplitude of the seasonal cycle in sea level is increasing at a much faster rate than mean sea level over the past two decades in the eastern Gulf of Mexico. Mark and his colleagues found a significant increase in the amplitude of the dominating annual cycle, which is strongest in the eastern part of the Gulf along the coast of West Florida. This amplification of up to 30% has almost doubled the flood risk from hurricane surges associated with sea level rise over the last two decades, i.e. instead of 5 cm increase in sea level (the best global estimate from coastal tide gauges) we saw 10 cm increase in the summer months when hurricanes occur. Second, working with Steve Meyers and Monica Wilson, Mark found a nonlinear relation between the salinity field and the subtidal exchange circulation in Tampa Bay using observational data from 1999-2011. Previously well-known steady-state solutions indicate the exchange circulation should be linearly proportional to the horizontal salinity gradient. The data show the exchange flow is multi-valued with respect to the horizontal salinity gradient, forming a hysteresis loop in parameter space that passes through three dynamical regimes: (i) relatively dry with weak salinity gradients and exchange circulation; (ii) the wet season (June-September) wherein all quantities rapidly increase; and (iii) a period wherein the exchange flow persists even though and the axial salinity gradients are again low.

**Gary Mitchum** splits his time between his professor and his associate dean duties. As a professor, the best part of the past year for Gary was finishing a paper with his last PhD student (Phil Thompson) that solved a problem that had puzzled and confounded him for more than 20 years. Basically, the sea surface height along the western side of the Atlantic goes up and down in lock step from Newfoundland to the Caribbean, which is extremely difficult to reconcile with traditional ideas on ocean dynamics. It's not only nice to see your student get published, but it's even nicer to put such a long-standing puzzle to bed. As the associate dean, the best part of Gary's last year was finding out that we are now in charge of the USF chapter of the Florida Climate Institute, which is something that he has wanted for a long time. This institute has the potential to be a game-changer for us, and Gary is excited to finally have the ability to lead this in a new direction. This new direction will include more people in CMS and across USF, and will involve going after climate-related projects that are larger than we have pursued to date.

# FACULTY HIGHLIGHTS

**Pamela Hallock Muller's** notable accomplishments for 2014 continue to be in the realm of teaching and mentoring. Pam graduated three students, Kristen Netchy (MS) and W. Noland Elssaeser (PhD) in the spring, and Lucy Sprung Bartlett (MS) in the fall. Adrienne George and Natasha Mendez-Ferrer advanced to PhD candidacy, while Elizabeth Brown learned that she had won a Fulbright Fellowship to study at the University of Bremen literally as she was disembarking from IODP Expedition 349. Two current PhD students, one former PhD student, and three former MS students had papers either published or in press. Students upon whose committees Pam served saw comparable achievements. Pam's lab also hosted a Ph.D.



*PHM with Kris Netchy at Spring Commencement 2014*

student from Autonomia University of Barcelona in September and October, and a shorter visit in December from a PhD student from the University of Bremen. In an important service role, Pam served as the faculty mentor for Chuanmin Hu, who earned tenure and promotion to Full Professor, and for Brad Rosenheim, who earned positive responses on his mid-tenure review. In May Pam received the Mentor of the Year Award in the College of Marine Science. As Pam contemplates retirement, she says that her focus over the next 2-3 years will be to graduate her current group of students, publish as many papers as possible from ongoing and past projects, and to continue to serve the international foraminiferal research community as Editor of the Journal of Foraminiferal Research.

**Frank Muller-Karger** leads and supports one of the largest research groups in the college. At present his lab is comprised of five students (one MS, four PhD), five postdocs, one systems engineer and programmer, and an outreach coordinator. Frank and his colleagues published nine peer-reviewed papers on topics ranging from ocean policy to climate change, and an additional five papers have been accepted for publication in 2015. One highlight is a review of changes in oceanographic conditions in the Gulf of Mexico since the early 1990's that documents steadily increasing sea surface temperatures, wind speeds and sea level across the entire Gulf of Mexico. Another highlight is the development of a satellite-derived 250-m turbidity product for use in shallow coastal waters. Frank operates several large programs. The CARIACO Ocean Time Series celebrated its 19th year of monthly cruises and continued funding from the NSF and the Venezuelan government and their website continues to be a resource to the community. The Belmont Forum research on values and beliefs that affect climate change adaptation policies has been successful working in Florida, the UK, and Brazil. And Frank was selected to lead an effort to develop a Marine Biodiversity Observation Network (MBON), which is a \$7M project involving 14 institutions, with USF as lead. At the local level, Frank and his partners launched a public/community engagement activity with the City of St. Petersburg and created a [major sculpture in St. Petersburg](#).

# FACULTY HIGHLIGHTS

**Steve Murawski**-The past year was an important one for Steve Murawski and his lab, and more importantly for CMS, in terms of ongoing research funding and research accomplishments. Steve, with others at CMS and elsewhere, applied for and was the recipient of more than \$25 million in shared funding that will continue through 2017-2018. Chief among these is the renewal of the C-IMAGE-II grant with the Gulf of Mexico Research Initiative (GoMRI), with the new grant (2015-2017) increasing from \$11 million to over \$20 million. About \$1.4 million of the C-IMAGE-II grant will be used to support graduate student projects in Steve's lab, with another \$0.8 m spent for research administration of the grant and a total of over \$9 million coming to USF. Among other things, Steve and his colleagues will not only research contaminant signals, but will also carry out a Gulf-wide survey of fishes during 2015-2017. In addition to the C-IMAGE-II grant, in combination with COT (Chad Lembke) and Stan Locker, Steve secured a \$4.5 million grant from the



National Fish and Wildlife Foundation to continue habitat mapping and video characterization studies on the west Florida Shelf. This grant will use state-of-the art mapping and video tools to understand the relationship among fish communities and their habitats potentially injured by the DWH oil spill. Ongoing studies with NMFS have helped to better understand the behavioral reaction of our towed video platform (C-BASS) and how the presence of the system affects population density estimates. Steve and his colleagues published important research findings the impacts of the DWH spill, and conducted numerous outreach efforts to the public and students at various levels. Most importantly, four of Steve's graduate students (Sarah Grasty, Susan Snyder, Elizabeth Herdter and Susan Snyder) completed their M.S. degree requirements and graduated in November. Three of the quartet will enter as Ph.D. students in Steve's lab and the fourth will work in his lab.

**David Naar's** assistant in the academic affairs office resigned in January as he was leaving for a week-long multibeam refresher course in New Orleans. Upon his return, David trained Monica Wilson as a temporary replacement, dealt with incoming student applications, assisted with recruitment weekend, taught a graduate Seafloor Mapping Course, taught an undergraduate course in Advanced Oceanography with Chris Stallings, taught a portion of the Geological Oceanography core course, started the student fellowship selection process, and began a search for a new Academic Affairs Administrator that resulted in the hiring of Brittany Sheehy. With funding from Innovative Education, Monica Wilson, Ana Arellano, and David helped Kevan Main and Al Hine to convert two course, Marine Aquaculture and The Geological History of Florida, to online courses. In Fall 2014, David and Mark Luther taught Advanced Oceanography again in Tampa. David managed five USGS Student Grants (for two USFSP undergraduates and five CMS graduate students). David served on the PhD committee for an engineering student, Sadia Ahmed, who graduated in Fall 2014, and also served on Elizabeth Brown's PhD committee. David supervised three PhD students, Hughes, Kilborn, Snow (temporary) and three MS students, Brizzolara, Firesinger, and Gray. David helped an Eckerd College graduate, Norris Comer, revise his Senior Thesis into a manuscript for submission to

## FACULTY HIGHLIGHTS

Geology, and he co-authored three peer-reviewed papers in 2014 with former CMS students serving as first-author (Mallinson, Wall, and Mueller).

**John Paul's** biggest challenge and greatest accomplishment in 2014 was the development of a USF tech spinoff company, PureMolecular LLC. This start-up was grounded in patents that JP and David Fries were awarded for their handheld Grouper seafood authentication technology. Fortuitously, Robert Ulrich defended his PhD on this topic in July. His second publication appeared in January 2015 concurrent with a press release. Robert and JP have been highly sought after by press, buyers and investors. They competed in September for a USF Seed Accelerator grant and were awarded one, which was matched by the Florida High Tech Corridor grant. JP had two great PhD students graduate, Brian Zielinski and Robert Ulrich. He also taught an online undergraduate course as well as a graduate lecture course.

**Ernst Peebles** and his colleagues continued using eye-lens stable-isotopes to re-create the lifetime geographic and trophic histories of individual fish. The first publication on this topic (ever) was published in PLoS One during 2014, with student Amy Wallace serving as lead author. Amy's second chapter, which was started during 2014, presents the first successful application of compound-specific (amino acid) stable-isotope analysis to individual eye-lens layers. This procedure allows exact calculation of trophic fractionation. Subtracting trophic fractionation from bulk eye-lens isotopes ( $\delta^{13}\text{C}$  &  $\delta^{15}\text{N}$ ) isolates information on geographic history. Ernst and his lab also wrapped up their three year NOAA MARFIN study that used otolith microchemistry to match individual gag grouper on the WFS to their respective nearshore nursery habitats; this is the first application of this method to fish on the WFS. They found most gag in the offshore fishery originate from southern nurseries (Pinellas to Charlotte counties) rather than from the panhandle area, and will provide NOAA with weighting factors for individual nurseries that will improve prediction of future year-class strengths. On another front, Ernst and his students Jen Granneman and Brock Houston have used LA-ICP-MS to analyze >400 fish specimens from ten species in their search for oil-spill elemental markers. They found elevated  $\text{V}^{51}$ ,  $\text{Fe}^{57}$ ,  $\text{Co}^{59}$ ,  $\text{Ni}^{60}$ ,  $\text{Cu}^{63}$ ,  $\text{Zn}^{64}$ , and  $\text{Cu}^{65}$  in red drum samples from LA and FL. Interestingly, oil-associated metals were elevated both before and after the Deepwater Horizon spill.

**Brad Rosenheim's** effort was dominated by setting up his laboratory at USF. By November, the capabilities of the laboratory at USF were greater than at its former home university, Tulane University. By the time the laboratory was fully functional, Brad and the people in his lab had conducted an ocean-going expedition in the Gulf of Mexico to study oil spill signatures in the water column and were preparing to staff two ocean-going expeditions to the Antarctic. Brad's group was involved in several publications, ranging from permafrost erosion in an Alaskan watershed to estimations of petrocarbon derived from Deepwater Horizon oil that is still in Gulf of Mexico sediments. However, Brad's biggest accomplishment of the year was graduating a Ph.D. student and seeing her first two papers get accepted into peer-reviewed journals. Elizabeth Williams produced a volume of work revolving around technical and chemical aspects of ramped pyrolytic chemistry related to an isotopic method I have developed. She applied her laboratory research in the field, publishing a paper on carbon cycling in the French Guiana mudbanks. She has begun a postdoctoral fellowship at the University of California at Merced, leaving Brad to focus on graduating his last Tulane University student and building his group here at USF.

## FACULTY HIGHLIGHTS

**Amelia Shevenell**-Marine-based Antarctic glaciers are vulnerable to warming ocean waters and undergoing rapid retreat. Amelia Shevenell and her group carry out paleoceanographic research that informs the understanding of the impact of anthropogenic climate change on accelerating polar ice cap melting and the consequences for global sea level rise by anchoring/validating ice sheet models. In 2014, NSF-funded sedimentologic and geochemical research continued to test the hypothesis that past changes in ocean heat impacted the mass balance of East Antarctic outlet glaciers, including the Lambert Glacier-Amery Ice Shelf and the Totten Glacier systems. Results from East Antarctic margin marine sediments reveal a persistent link between ocean temperature and ice sheet extent/stability on geologic timescales. To extend existing knowledge of Antarctic ice sheet-Southern Ocean interactions, Amelia, other USF researchers, students, and their collaborators spent 46 days on the RV/IB Nathaniel B. Palmer conducting geophysical, geological, and oceanographic surveys near the Totten Glacier/Moscow University Ice Shelf, a retreating glacial system at the mouth of the largest marine-based portion of the East Antarctic Ice Sheet. Thick marine sedimentary sequences that contain a detailed ~40 Ma history of East Antarctic Ice Sheet evolution were acoustically imaged, cored, and shore-based analyses are ongoing. These unparalleled sequences will likely be the target of future scientific drilling efforts by the International Ocean Discovery Program (IODP).

**Chris Stallings** published four papers, two as first author and one led by one of his graduate students. Dr. Stallings was also awarded five grant contracts for proposals submitted in 2014. These contracts address important topics to conservation and management of marine resources, including the development and testing of culling programs on the invasive lionfish, understanding why economically important oyster populations have crashed in Apalachicola Bay, quantifying fish production on artificial and natural reefs, and testing alternative methods to reduce post-release mortality of fishes that experience barotrauma. Regarding mentoring highlights, two of his students successfully completed their M.S. degrees in 2014. One of these students (Brittany Hall-Scharf) now has full-time position at the Florida Fish and Wildlife Research Institute and the other (Dinorah Chacin) is continuing graduate school with Dr. Stallings in pursuit of a Ph.D. This year marked the third consecutive that a student in Dr. Stallings' lab was awarded the NSF Graduate Research Fellowship. Joseph Curtis (2014) joined Dinorah Chacin (2012) and Ileana Freytes-Ortiz (2013) as recipients of this highly competitive and coveted fellowship. Last, Orian Tzadik received high honors with the "Early Career Scientist Award" for his doctoral research at the annual meeting of the International Council for the Exploration of the Seas.

**John Walsh**-As co-Director of the CMS Collaboration for Prediction of Red tides (CPR) project, during this past year of 2014, John Walsh initiated an ongoing, joint research program with USF's Morsani College of Medicine on ten-fold increments of aerosolized Harmful Algal Bloom [HAB] triggers of global asthma attacks and associated pneumonia fatalities. Although local pathogenic bacteria are opportunistic invaders of compromised lung tissues, the HAB aerosols have co-travelled with same size [5-10 microns] marine mercury causes of hydrargyria, within 100 km of world-wide sea shores over the past five decades, depending upon onshore wind speeds. Using known County-wide, interannual hospitalization rates of asthma in Florida, Georgia, and South Carolina, particular emphasis is now focused on the Gulf of Mexico and downstream human victims of aerial exports of inhalant HAB and Hg triggers within the southeastern United States, after the Deepwater Horizon oil spills poisoned both herbivores and bacterivores on the West Florida shelf. John's hypothesis is that increased subsequent, wind-borne sources of brevetoxin, palytoxin, and MeHg poisons resulted from uneaten HABs and sulfate-reducing bacteria. Additional proposals were

# FACULTY HIGHLIGHTS

submitted to the Gates Foundation, FWRI, and NOAA, with a LOI to GoMRI for fiscal support to bring to fruition operational forecasts of marine triggers of pulmonary morbidities and mortalities along the SE U.S. seaboard.

**Robert Weisberg** and his group do work that is focused on applying Physical Oceanography to societally relevant topics. Bob and his colleagues maintain a set of offshore buoys that provide atmosphere and ocean data in real time to the general public on the internet and also provide daily nowcasts and forecasts of the coastal ocean circulation, temperature and salinity. Previous analyses of waves have unfortunately been curtailed for lack of salary support. Through scientific analyses, Bob and his group have made progress in several key areas. First, they solved the gag grouper conundrum of how juveniles settle inshore after adults spawn offshore, and, as a corollary, why recruitment successes or failures vary inter-annually. Second, Bob and his group explained why there was no red tide in 2010, and, as a corollary, successfully predicted a red tide in 2014. Third, they explained why west Florida reef fish were affected by DWH oil, despite no oil being observed on the sea surface, and fourth, established a circulation model capable of predicting oil movement along the entire west Florida coast and even into the estuaries in the event of another spill. This model is also relevant for search and rescue. Through Bob's work, it is now understood that everything of an ecological nature (fish, harmful algae, etc.) that occurs off Florida's west coast is controlled to a large degree by the coastal ocean circulation. By adapting our management strategies to this fact, we will become more effective environmental stewards of this precious region where society meets the sea.

## CMS Ocean Technology (COT) Group

The basic situation has not changed since last year. Budget challenges at the federal, state and university levels present to our COT group. In order to maintain the full capabilities of this talented group of people, we adopted a two-fold strategy that requires supporting more salary via external grants and contracts, and increasing revenue by increasing the number of external funded projects.

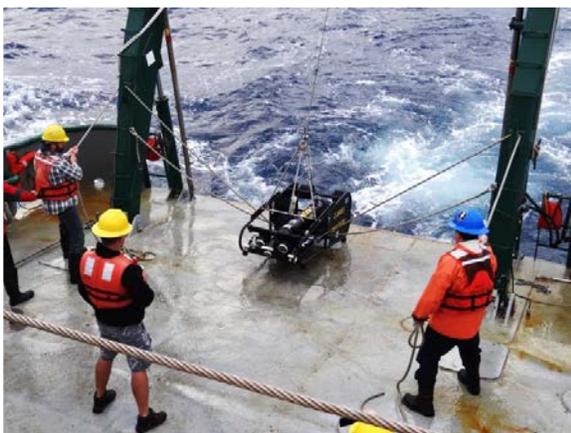
Things have not changed, but things have improved. The major change over the past year is that the COT staff members have completely embraced the new model and are actively seeking out ways to generate additional revenue. They are to be commending for the way that they have responded to these challenges.

We have improved the level of salary charges to grants, but still need to do better in this area. A positive sign is that nearly all of the proposals that are going out now with COT involvement include substantial salary in the budgets. As we said last year, we will have to see how many of these proposals are successful, but we think it is fair to say that we are on track to put the COT on a stable footing funding-wise.

At beginning of 2014 there were seven active projects, four of which were in support of externally funded grants and contracts. Five of these projects were completed in 2014, and two are ongoing. During 2014 twelve new projects were begun. Five were completed in 2014, six are ongoing, and one was not funded. Of the twelve new projects, seven were in support of externally funded grants and contracts. These numbers are all an improvement over 2013.

We are working to expand our glider operations. Multiple deployments have been funded and one of our engineers, Chad Lembke, has been selected to a leadership position in the Gulf of Mexico Coastal Ocean Observing System overseeing the Gulf of Mexico glider observations. Chad has recently submitted substantial proposals to expand our glider operations.

The most successful project in 2014 is the C-BASS camera-based assessment survey system. In combination with COT (Chad Lembke) and Stan Locker, Steve Murawski secured a \$4.5 million grant from the National Fish and Wildlife Foundation to continue habitat mapping and video characterization studies on the west Florida Shelf. This grant will use state-of-the art mapping and video tools to understand the relationship among fish communities and their habitats potentially injured by the DWH oil spill. Ongoing studies with NMFS have helped to better understand the behavioral reaction of our towed video platform (C-BASS) and how the presence of the system affects population density estimates



***Deploying the C-BASS system from the R/V Weatherbird II.***

## Facilities



### ***Facilities Manager Joe Donnelly***

Maintaining and upgrading our buildings is an ongoing challenge. Our Facilities Manager, Joe Donnelly, has had a busy year. Here are just a few highlights.

Five major projects were completed in the past year. First, we finally resolved a long-standing problem with the fume hoods in the recently renovated space at the north end of the MSL building. This was a serious safety issue that proved to be very difficult to solve and the affected lab is now up and running. After some setbacks a new clean room was completed in KRC that allows us to do state of the art trace metal analysis. Also at KRC, a major repair of the concrete outside stairs, which presented serious safety issues, was completed. A medium-sized project that turned into a major one was the replacement of the tile floors on the ground floor of the MSL building. It turned out that asbestos abatement was required, but that serious safety issue was dealt with thoroughly and promptly, and we now have a beautiful upgrade to the MSL. Finally, again in the safety arena, new external lighting was installed around the exterior of the MSL. The new lighting is all LED technology, so we are not only safer, but we are also greener.

Many smaller projects were completed as well. In the interest of space we will mention just a few. One example that is probably the most noticeable is the replacement of the 19<sup>th</sup> century mailboxes in MSL with much more attractive replacements. We have also installed new A/C systems in the closets housing our IT hardware, which will make those annoying network outages much less frequent. We mentioned last year that we created the “Emeritus Wing”, and this year we made upgrades to the electrical and network capabilities in those spaces. We have also done upgrades to casework, air and gas service in one lab, and have upgraded electrical and carried out termite damage abatement in another. Finally, we completed a significant upgrade to the rooms used by our HR team. The new carpet and paint in these areas will put a much brighter face on the space that serves as the introduction to our college to many people.

# GRADUATE EDUCATION AND AWARDS

## Graduate Education and Awards

The following degrees are offered at the College of Marine Science. For more information please [visit our website](#).

### **Graduate Certificate**

Teaching & Communication Ocean Sciences Broader Impacts

### **Master's of Science**

Biological, Chemical, Geological, Marine Resource Assessment (MRA), and Physical Oceanography Concentrations

### **Doctoral (Ph.D.)**

Biological, Chemical, Geological, Marine Resource Assessment (MRA), and Physical Oceanography Concentrations

## STUDENTS GRADUATING IN 2014

### *Masters (15)*

**Netchy, Kristin** advised by Pamela Hallock Muller, spring, "Epibenthic Mobile Invertebrates along the Florida Reef Tract: Diversity and Community Structure"

**Gray, Alisha** advised by Cameron Ainsworth, spring, "Karenia brevis harmful algal blooms: Their role in structuring the organismal community on the West Florida Shelf"

**Vara, Mary Janine** advised by Mark Luther, spring, "Developing an In-season Predictor of Commercial Landings for Quota Monitoring in the U.S. Virgin Islands"

**Watson, Kathleen** advised by David Hollander, spring, "Spatial and Temporal Extent of a Subsurface Hydrocarbon Intrusion Following the Deepwater Horizon Blowout"

**Hopkins, Max** advised by Mya Breitbart, summer, "Investigating the diversity of small, single-stranded DNA bacteriophages in the marine environment:"

**Hall (Scharf), Brittany** advised by Christopher Stallings, summer, "Ontogenetic Diet Shifts and Prey Preference by a Generalist Predatory Fish"

**Chacin, Dinorah** advised by Christopher Stallings, summer, "A Multi-Scale Approach to Study Population Dynamics and Predator-Prey Interactions"

**Snow, Tasha** advised by Amelia Shevenell, summer, "Timing of Svalbard/Barents Sea Ice Sheet Decay during the Last Glacial Termination"

**Deak, Kristina** advised by Steven Murawski, fall, "Cloning and Characterization of IL-1b, IL-8, IL-10, and TNFa from Golden Tilefish (*Lopholatilus chamaeleonticeps*) and Red Snapper (*Lutjanus campechanus*)"

# GRADUATE EDUCATION AND AWARDS

**Bartlett, Lucy** advised by Pamela Hallock Muller, fall, "Dynamics and Survival of Coral and Octocoral Juveniles following Disturbance on Patch Reefs of the Florida Reef Tract"

**Grasty, Sarah** advised by Steven Murawski, fall, "Use of a Towed Camera System for Estimating Reef Fish Populations Densities on the West Florida Shelf"

**Hardy, Robert** advised by Chuanmin Hu, fall, "Assessments of surface-pelagic drift communities and behavior of early juvenile sea turtles in the northern Gulf of Mexico"

**Elliott, Matthew** advised by Robert Byrne, fall, "Distribution of Dissolved Trace Metals and Carbon System Parameters in the Surface Waters of the Hillsborough River and Tampa Bay"

**Herdter, Elizabeth** advised by Steven Murawski, fall, "Growth Rates in Gulf of Mexico Red Snapper, *Lutjanus campechanus*, Before and After the Deepwater Horizon Blowout"

**Snyder, Susan** advised by Steven Murawski, fall, "Polycyclic Aromatic Hydrocarbon Metabolites as a Biomarker of Exposure to Oil in Demersal Fishes Following the Deepwater Horizon Blowout"

*Ph.D. (9)*

**Patsavas, Mark** advised by Robert Byrne, spring, "Improving Spectrophotometric Carbon System Measurements"

**Elsaesser, William** advised by Pamela Hallock Muller and Norman Blake, spring, "Influence of Diet on Element Incorporation in the Shells of Two Bivalve Molluscs: *Argopecten irradians concentricus* and *Mercenaria mercenaria*"

**Goldsmith, Dawn** advised by Mya Breitbart, summer, "Marine Viral Diversity and Spatiotemporal Variability"

**Rolls, Holly** advised by Ernst Peebles, summer, "Using otolith chemistry to track the habitat use, movements, and life-history patterns of fishes in the Tampa Bay estuary"

**Ulrich, Robert** advised by John Paul, summer, "RNA Detection Technology for Applications in Marine Science: Microbes to Fish"

**Williams, Carlie** advised by Amelia Shevenell, summer, "A Multi-Proxy Approach to Understanding Abrupt Climate Change and Laurentide Ice Sheet Melting History Based on Gulf of Mexico Sediments"

**Patten, James** advised by Robert Byrne, fall, "Investigations of the Physical and Analytical Chemistry of Iron in Aqueous Solutions"

**Habtes, Sennai** advised by Frank Muller-Karger, fall, "Variability in the Spatial and Temporal Patterns of Larval Scombrid Abundance in the Gulf of Mexico"

**Zielinski, Brian** advised by John Paul, fall, "Eukaryotic Gene Expression Patterns of Microorganisms in the Amazon River Plume Parallel the Biogeochemistry of Plume Waters"

# GRADUATE EDUCATION AND AWARDS

## STUDENT AND POST-DOC AWARDS AND ACHIEVEMENTS

### Student Awards



**Amanda Piaz** – Department of Defense SMART Fellowship – **33K plus**



**Benjamin Kurth** -- NSF Graduate Research Fellowship Program Fellowship – Honorable Mention



**Brian Barnes** – Outstanding Dissertation Award



**Brittany Leigh** – NSF Graduate Research Fellowship Program Fellowship  
2<sup>nd</sup> Place Graduate Student Oral presentation at the Biomedical and Comparative Immunology Symposium



**Christian Haller** – David Worthington Named Grant  
Jones-O'Neil Grant - \$500



**Cristina Subt** – GSA Graduate Student Research Grant



**Dinorah Chacin** – Roche and ARCS Scholar Award



**Elizabeth Brown** – Loeblich and Tappan Student Research Award - \$2,000



**Erin Symonds** – Fulbright Award



**Joseph Curtis** – NSF Graduate Research Fellowship Program Fellowship  
Guy Harvey Scholarship



**Joshua Breithaupt** – STAR Fellowship from Environmental Protection Agency



**Katie Davis** – Fish Florida Scholarship

# GRADUATE EDUCATION AND AWARDS



**Kristina Deak** – 2014 Guy Harvey Scholarship



**Lindsey Dornberger** – NSF Graduate Research Fellowship Program Fellowship – Honorable Mention



**Orian Tzadik** – The early career scientist awarded Best Poster at the International Council for the Exploration of the Sea (ICES) Annual Science Conference



**Patrick Schwing** – Featured in Ocean – E News – part of Ocean News and Technology



**Ryan Schenck** – Roche and ARCS Foundations Scholar Award



**Susan Snyder** – The first GoMRI Scholar to be highlighted on their website



**Tasha Snow** – Antarctic Science Bursary Award

# EDUCATION & OUTREACH

## Education & Outreach

Teresa Greely and Angela Lodge lead the college's education and outreach (E&O) activities. The E&O year in review reflects a diversity of programs and events that have advanced ocean literacy and research amongst K-12 teachers and their students, undergraduate and graduate students, and the general public. The following highlights major ocean education programs and outreach events for 2014.

With NOAA funding E&O continued to bring Florida teachers together to explore and experience Tampa Bay's coastal environments. This Marine Science Field course led teachers through a series of 6 field explorations and trainings to conduct GLOBE environmental monitoring protocols. As a result teachers and their students have collected over 300 hydrologic and atmospheric measurements for the GLOBE International program.



E&O and volunteers celebrated the 10<sup>th</sup> anniversary of the Spoonbill Ocean Sciences Bowl. This annual academic brain bowl hosted over 150 participants, including high school students and teachers from West Florida. Our wonderful volunteers both returning and new represented the FWCC, Eckerd College, USGS, Clearwater Aquarium, FMSEA, FL Sea Grant, Florida Aquarium, Ocean Optics, USFSP, and USF Marine Science. Congratulations to Eastside High School from Gainesville, Florida who placed 5<sup>th</sup> at the NOSB Finals competition in Seattle, WA.



# EDUCATION & OUTREACH

Summer 2014 continued the 24<sup>th</sup> annual Oceanography Camp for Girls, a Pre-college STEM program that encourages teenagers to consider careers in the sciences while developing a positive sense of self, science and the environment. Participants included 30 young ladies, representing 18 Pinellas county schools, 20 college students and professional staff, and 22 participating scientists from FWCC, USGS and USF Marine Science. Over 900 teens and 100 graduate students have experienced the Ocean and made lifetime memories during the OCG.



Other education programs this year included the following. Through C-IMAGE Education, E&O hosted 2 Teachers at Sea during 2014 research expeditions in the Gulf. While aboard, Greely and Florida science teachers hosted Ship to Shore Skype events and posted daily blogs to engage students on shore with the research happening at sea. Visit the Adventures at Sea blog, <http://adventuresatsea.blog.usf.edu/?paged=2>.



GLOBE teacher professional development series provided 30 Florida teachers with training for K-12 students to be citizen scientists by monitoring their local environments Hydrology, Atmosphere and Soils. Greely continued to offer courses outside of the College to include marine sciences content and research as part of the USF Honors College and USFSP College of Education. In partnership with NOAA Ocean Exploration, 50 Florida teachers participated in the How and Why We Explore the Oceans professional development series as part of the *Okeanos Explorer*, the first US ship dedicated to ocean explorations. The College E&O hosted many school groups for Ocean Day visits and lab explorations.

# EDUCATION & OUTREACH



Three major outreach events this year included the following. Through C-IMAGE Outreach and Open Mind Media, two additional podcasts were completed providing Gulf research to public radio listeners. Give them a listen at <http://bit.ly/1GPjix3>. The 4<sup>th</sup> annual St. Petersburg Science Festival, a College-wide outreach, brought over 20,000 visitors to campus to experience the research and E&O programs taking place in the Marine Sciences. <http://www.stpetescifest.org/>. E&O closed out the year by co-sponsoring a Grand Community Cleanup with Keep Pinellas Beautiful and Chart 411. This event had over 450 volunteers from 26 community organizations, including OCG alumnae and Marine Science students, staff and faculty. Thanks to all volunteers, nearly 8271 pounds of debris was removed from our coastal shores.



## OTHER OUTREACH ACTIVITIES

In addition, many faculty and students engaged with the community in creative ways. PhD student Erin Symonds from the Breitbart lab gave a talk and ran a hands-on activity for the Florida Teen SciCafe. In this outreach activity, entitled “Peppers and Poop: A new way to identify pollution”, students learned about new indicators of fecal pollution in coastal marine environments and performed experiments to determine whether the beaches were safe for swimming. PhD student Elizabeth Fahsbender served as a mentor during the Great American Teach In, showing students at Clearwater Fundamental Middle School how to extract DNA from their cheek cells. The Breitbart lab also led activities for the Saint Petersburg Science Festival teaching the public about viruses that are transmitted by insect vectors. As part of this outreach event, kids created “flying syringe” insect vectors and adapted smart phones into microscopes for examining bugs. Finally, using a marine science lab at Girl Scout Camp Wai Lani that Mya Breitbart

# EDUCATION & OUTREACH

designed and equipped, several CMS students led a marine science workshop for a large Girl Scout encampment, where the scouts learned about plankton, performed microscopy, and made fish prints.



Erin Symonds Florida Teen SciCafe



## Saint Petersburg Science Festival



Marine Science Lab at Girl Scout Camp Wai Lani

## Development

### FELLOWSHIPS

On October 3, 2014, CMS recognized fellowship award recipients and their generous supporters at the Third Annual College of Marine Science Fellowship Luncheon held at the Hilton St. Petersburg Bayfront. In addition, CMS recognized George and Jane Morgan for their \$3 million planned gift to establish the George and Jane Morgan Endowment for Excellence for Marine Science. Through the leadership of Dean Jacqueline Dixon and former Deans Peter Betzer and William Hogarth, our \$16.7M endowment provides ~\$308K/yr for endowed fellowships to CMS graduate students. The luncheon provides an opportunity for fellowship recipients to meet the individuals and families who have helped to make it possible for these students to pursue a degree at the College of Marine Science.

The 2014-2015 Endowed Fellowships were provided to the following students:

**Joshua L. Breithaupt** - St. Petersburg Downtown Partnership Fellowship in Coastal Science  
**Marcy Lynn Cockrell**- Gulf Oceanographic Charitable Trust Endowed Fellowship in Marine Science  
**Joseph Curtis** - Garrels Memorial Fellowship in Marine Science  
**Erin Cuyler** – Von Rosenstiel Endowed Fellowship  
**Lindsey Dornberger** - The Jack and Katharine Ann Lake Fellowship in Marine Science  
**Michael Drexler**- Gulf Oceanographic Charitable Trust Endowed Fellowship in Marine Science  
**Elizabeth Fahsbender** - Sanibel-Captiva Shell Club / Mary & Al Bridell Memorial Fellowship  
**Jenny Fenton** - William Hogarth Marine Mammal Fellowship  
**Jennifer E. Granneman** - William and Elsie Knight Endowed Fellowship for Marine Science  
**Jesse Hoemann** - Tampa Bay Parrot Head Fellowship in Marine Science  
**Benjamin N. Kurth** - Paul Getting Endowed Memorial Fellowship  
**Stephanie Nichole Lawler** - George Lorton Fellowship in Marine Science  
**Brittany A. Leigh** - The Wells Fargo Fellowship in Marine Science  
**Jacqueline Long** - Southern Kingfish Association's Fellowship  
**Michelle D. Masi** - Carl Riggs Fellowship in Marine Science  
**Brianna Michaud** – Von Rosenstiel Endowed Fellowship  
**Benjamin J. Ross** - Linton Tibbetts Fellowship  
**Benjamin J. Ross** - Gulf Oceanographic Charitable Trust Endowed Fellowship in Marine Science  
**Ryan O. Schenck**- Gulf Oceanographic Charitable Trust Endowed Fellowship in Marine Science  
**Susan Snyder** - Garrels Memorial Fellowship in Marine Science  
**Shaojie Sun** - The Wells Fargo Fellowship in Marine Science  
**Erin Michelle Symonds** - William and Elsie Knight Endowed Fellowship for Marine Science  
**Kara Vadman** – Von Rosenstiel Endowed Fellowship  
**Mengqiu Wang**- Gulf Oceanographic Charitable Trust Endowed Fellowship in Marine Science  
**Bo Yang** - C. W. Bill Young Fellowship  
**Thomas Zuby** – Von Rosenstiel Endowed Fellowship

# DEVELOPMENT

## Fundraising

In addition to fellowship support, alumni, faculty, staff and friends donated \$211,000 in support for current and new endowment funds as well as for current operations. USF Foundation Board member George Morgan, a 1976 graduate of USF, and his wife Jane, established an \$8 million planned gift to the University of South Florida, which will extend their support of USF in perpetuity. The gift includes **\$3 million** to establish the **George and Jane Morgan Endowment for Excellence for Marine Science**.

While the college currently has many of the basic components in place for achieving preeminence among oceanographic institutions, it seeks to create critical masses of intellectual capital necessary to ensure advancement into the next level of national and international prominence. Funding from state government appropriations and student tuition are limited. Private financial support has become a major and growing source of revenue to fill critical faculty positions, provide state of the art technology and infrastructure, and enable us to attract and adequately support the best and brightest graduate students and postdoctoral associates. To become truly unstoppable, the college must seek private support.

Specifically, we seek support in the following areas:

*Dean's Innovation Endowment for Research Support:* In order to recruit and retain the best and the brightest faculty, significant resources are required to acquire and maintain state-of-the-art instrumentation, to provide technical support personnel, to provide seed funds for research and commercialization of new technologies, to provide competitive start-up packages, and to be able to provide competitive retention packages. Reduction in overall federal funding levels for oceanography (National Science Foundation, Office of Naval Research, National Oceanic Atmospheric Administration), elimination of earmarks, reduction in state appropriations, and reduction in the amount of overhead dollars returned to the college have all impacted our ability to compete. CMS needs to be entrepreneurial in our search for a source of replacement funds and therefore needs to establish an endowment for Research Innovation to maintain and enhance our competitive edge.

*Graduate Excellence:* The College of Marine Science strives to attract and retain the best and brightest graduate students, while also ensuring that its educational programs are available to all qualified students without regard to financial circumstances. The market for highly qualified students is extremely competitive, with many top scholars making decisions based not simply upon the merits of the school, but upon a school's ability to support them. The college seeks to continue to grow our financial assistance opportunities to make CMS competitive among the nation's top universities.

*Postdoctoral Fellowship Program:* Postdoctoral research fellow programs are a long-standing tradition at the nation's best research universities and oceanographic institutions. Postdoctoral fellows bring cutting edge expertise to the college and serve as role models to graduate students. Implementation of a successful postdoctoral research program is pivotal to the success of the college. We hope to create one new postdoctoral position for 24 months in duration.

*Endowed Chairs and Professorships:* To further enhance its ability to undertake fundamental research, CMS seeks to attract and retain key faculty operating on the frontiers of their respective fields. The college's plan is to fill new faculty positions with world-class scientists, through the use of endowed chairs and professorships. We are seeking support for one new endowed chair.

## Publications

### CMS BOOK

**Coble, P.G.**, J. Lead, A. Baker, D.M. Reynolds, and R.G.M. Spencer (2014) Aquatic Organic Matter Fluorescence. *Cambridge University Press*.

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- Burghart, S.E., L. Van Woudenberg, C.A. Daniels, S.D. Myers, **E.B. Peebles**, and **M. Breitbart** (2014) Disparity between planktonic fish egg and larval communities as indicated by DNA barcoding. *Marine Ecology Progress Series* 503, 195-204.
- Byrne, R.H.** (2014) Measuring Ocean Acidification: New Technology for a New Era of Ocean Chemistry. *Environmental Science and Technology* 48, 5352 -5360, dx.doi.org/10.1021/es405819p.

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10.1371/journal.pone.0108935.
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## CMS OTHER WORKS AND REPORTS

- Dzvonkovskaya, A., C.R. Merz, Y. Liu, **R.H. Weisberg**, T. Helzel, and L. Petersen (2014) Initial surface current measurements on the West Florida Shelf using WERA HF ocean radar with multiple input multiple output (MIMO) synthetic aperture. *Proc. of MTS/IEEE OCEANS 2014*. doi: 10.1109/OCEANS.2014.7003235.
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# ACTIVE RESEARCH AWARDS

## Active Research Awards

Award PI Name	Name - Co PI If Applicable	Sponsor Name	Actual Total Costs	Award Begin Date	Award End Date
Ainsworth		Florida Sea Grant College	46,496.71	2/1/2012	1/31/2015
Ainsworth		Alfred P. Sloan Foundation	5,572.58	9/15/2013	9/15/2015
Ainsworth		Florida State University	12,074.27	8/1/2013	12/31/2015
Ainsworth		Ocean Conservancy	60,156.74	7/1/2013	6/30/2014
Ainsworth		Texas A & M University	1,787.25	9/1/2013	8/31/2016
Ainsworth		Stratus Consulting	0.00	3/20/2014	9/22/2014
Breitbart		National Science Foundation	16,592.41	4/15/2009	3/31/2014
Breitbart		National Science Foundation	84,265.48	9/1/2010	8/31/2014
Breitbart		National Science Foundation	30,460.63	10/1/2010	9/30/2013
Breitbart		US Environmental Protection Agency NV	18,006.61	8/1/2011	10/31/2014
Breitbart		National Science Foundation	205,480.08	12/1/2012	11/30/2017
Breitbart		National Science Foundation	3,519.94	12/1/2012	11/30/2017
Buck		National Science Foundation	27436.26	2/1/2014	2/29/2016
Buck		National Science Foundation	0.00	3/1/2014	8/31/2016
Byrne		Natl Oceanic & Atmospheric Admin	88903.83	9/1/2009	8/31/2014
Byrne		National Science Foundation	73.82	9/1/2010	8/31/2013
Byrne		Pinch A Penny, Inc.	-4.05	7/22/2010	7/21/2013
Byrne		University of Southern Mississippi	50464.57	10/1/2011	9/30/2014
Byrne		National Science Foundation	133216.80	9/15/2012	8/31/2016
Chambers		California Institute of Technology	11956.03	11/23/2009	9/30/2013
Chambers		NASA Jet Propulsion Laboratory	10841.51	3/22/2010	2/28/2014
Chambers		University of Colorado	115770.56	8/8/2011	8/7/2015
Chambers		National Aeronautics & Space Admin	62819.18	8/6/2012	8/5/2016
Chambers		National Aeronautics & Space Admin	89616.09	3/13/2013	3/12/2017
Chambers		NASA Jet Propulsion Laboratory	27923.25	6/1/2013	5/31/2017
Chambers	Mitchum	University of Colorado	81821.52	8/8/2011	8/7/2015
Chambers	Shin	National Aeronautics & Space Admin	24286.02	8/6/2012	8/5/2016
Daly		National Science Foundation	83514.53	6/1/2011	11/30/2015
Daly		University of Washington	15900.96	5/1/2013	8/31/2013
Daly		University of Washington	23418.68	5/1/2014	8/31/2014
Dixon	Naar	National Science Foundation	2004.09	8/15/2010	7/31/2013
Dixon	Van Vleet	US Geological Survey	0.01	12/1/2011	12/31/2012

# ACTIVE RESEARCH AWARDS

Dixon	Mitchum	US Geological Survey	14821.17	8/1/2012	7/31/2017
Dixon	Dixon	US Geological Survey	1063051.00	8/1/2012	7/31/2017
Dixon	Naar	US Geological Survey	29585.22	1/2/2013	12/31/2013
Dixon	Naar	US Geological Survey	6749.95	2/18/2013	12/31/2013
Dixon	Breitbart; Naar	US Geological Survey	14478.98	8/19/2013	8/18/2014
Dixon	Naar	US Geological Survey	53950.93	1/2/2014	12/31/2014
Dixon	Naar	US Geological Survey	4290.00	8/1/2014	7/31/2015
Dixon	Naar	US Geological Survey	7319.63	10/1/2013	3/31/2015
Dixon	Naar	National Science Foundation	0.00	8/15/2010	7/31/2013
Dixon	Naar	US Geological Survey	0.00	1/2/2013	12/31/2013
Dixon	Naar	US Geological Survey	0.00	2/18/2013	12/31/2013
Dixon	Naar	US Geological Survey	0.00	1/2/2014	12/31/2014
Dixon	Naar	US Geological Survey	0.00	8/1/2014	7/31/2015
Dixon	Naar	US Geological Survey	0.00	10/1/2013	3/31/2015
Domack		National Science Foundation	11343.26	1/1/2014	9/30/2014
Domack		National Science Foundation	0.00	1/1/2014	3/30/2014
Domack		National Science Foundation	58116.60	1/1/2014	8/31/2015
Domack		National Science Foundation	0.00	1/1/2014	6/30/2017
Galperin		Department of the Army	-79.78	10/1/2008	5/31/2013
Greely		Natl Oceanic & Atmospheric Admin	36249.89	7/1/2012	11/30/2014
Greely		National Marine Sanctuary Foundation	19373.41	10/15/2012	10/14/2014
Hollander		National Science Foundation	15310.81	9/1/2010	8/31/2013
Hollander		Comer Science and Education Foundation	1587.23	10/25/2010	10/24/2013
Hollander		Florida Fish and Wildlife Conservation	14717.15	9/26/2011	3/31/2013
Hu		National Aeronautics & Space Admin	0.00	01/10/2009	41464.00
Hu		National Aeronautics & Space Admin	130034.21	8/21/2009	8/20/2014
Hu		Florida Fish and Wildlife Conservation	14308.14	4/5/2010	9/30/2014
Hu		National Aeronautics & Space Admin	64190.45	9/1/2010	9/30/2013
Hu		Florida Fish and Wildlife Conservation	1608.71	9/19/2010	8/9/2013
Hu		National Aeronautics & Space Admin	-640.67	7/1/2011	6/30/2013
Hu		UAV Collaborative	98068.36	10/1/2011	9/30/2014
Hu		Texas A & M Research Foundation	1495.00	6/1/2012	6/30/2013
Hu		Florida State University	63302.46	8/17/2012	8/16/2015
Hu		National Aeronautics & Space Admin	123065.74	1/1/2013	12/31/2015
Hu		National Aeronautics & Space Admin	83661.25	1/1/2013	12/31/2015
Hu		National Aeronautics & Space Admin	32747.39	7/15/2013	7/14/2015
Hu		National Aeronautics & Space Admin	56056.36	8/5/2013	8/4/2016
Hu		University of Miami	3318.89	10/1/2013	9/30/2015
Hu		University of Miami	5918.37	7/1/2013	5/31/2015

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Hu		Bubbleology Research International	4525.95	8/1/2013	9/30/2015
Hu	Rhodes	National Aeronautics & Space Admin	0.00	1/10/2009	7/9/2013
Lembke		University of Miami	76208.22	7/1/2013	9/30/2014
Lenes		Florida Fish and Wildlife Conservation	49990.22	7/1/2013	5/31/2014
Lenes	Walsh	Florida Fish and Wildlife Conservation	0.00	7/1/2013	5/31/2014
Lenes	Weisberg	Florida Fish and Wildlife Conservation	50117.31	7/1/2013	5/31/2014
Lenes	Zheng	Florida Fish and Wildlife Conservation	0.00	7/1/2013	5/31/2014
Locker		Florida Fish and Wildlife Conservation	62517.70	5/31/2011	3/31/2014
Luther		Greater Tampa Marine Advisory Council	18,132.12	4/9/2004	3/6/2019
Luther		University of Maryland	72,806.31	6/1/2011	5/31/2015
Luther		Texas A & M Research Foundation	18,163.62	6/1/2011	5/31/2016
Luther	Merz	Southeast Coastal Ocean Observing Region	19,708.50	9/1/2013	2/28/2015
Luther		US Geological Survey	5,654.98	4/21/2014	4/20/2015
Luther	Merz	Southeast Coastal Ocean Observing Region	0.00	9/1/2013	2/28/2015
Merz	Merz	Southeast Coastal Ocean Observing Region	10,084.44	9/1/2012	8/31/2013
Mitchum		National Aeronautics & Space Admin	106,179.20	7/12/2008	7/11/2014
Mitchum		Earth and Space Research	22,421.25	10/1/2008	9/30/2013
Mitchum		University of Colorado	28,056.55	10/1/2008	9/30/2013
Mitchum	Chambers	University of Colorado	22,764.00	10/1/2008	9/30/2013
Mitchum		US Geological Survey	7,270.00	7/15/2012	7/14/2017
Mitchum		Jet Propulsion Laboratory	0.00	10/1/2013	9/30/2017
Mitchum		US Geological Survey	23,152.67	9/13/2013	9/14/2018
Mitchum		University of Colorado	0.00	3/14/2017	3/13/2017
Muller		Florida Fish and Wildlife Conservation	55,580.07	10/4/2010	6/30/2015
Muller		Florida Fish and Wildlife Conservation	12,072.55	10/4/2010	6/30/2015
Muller		Florida Fish and Wildlife Conservation	0.00	10/4/2010	6/30/2015
Muller		Florida Fish and Wildlife Conservation	0.00	10/4/2010	6/30/2015
Muller		Consortium for Ocean Leadership	131.22	2/3/2012	2/16/2015
Muller		Consortium for Ocean Leadership	4,024.70	1/26/2014	2/28/2015
Muller-Karger		National Science Foundation	441,270.26	7/31/2009	11/30/2014
Muller-Karger		National Science Foundation	23,920.84	7/31/2009	11/30/2014
Muller-Karger		National Aeronautics & Space Admin	59,859.07	11/1/2009	10/31/2014
Muller-Karger		UAV Collaborative	54,119.72	10/1/2011	9/30/2013
Muller-Karger		Roffers Ocean Fishing Forecasting Service	115,017.43	9/1/2011	8/31/2015
Muller-Karger		Environmental Protection Agency	304,820.68	6/1/2012	5/31/2015
Muller-Karger		National Aeronautics & Space Admin	30,945.76	9/1/2012	8/31/2015
Muller-Karger		National Aeronautics & Space Admin	23,172.92	1/28/2013	1/27/2015
Muller-Karger		National Science Foundation	87,621.70	9/1/2013	8/31/2016
Muller-Karger		National Aeronautics & Space Admin	31,009.03	8/1/2013	7/31/2015

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Muller-Karger		National Science Foundation	0.00	2/1/2014	1/31/2017
Murawski	Ainsworth	Gulf of Mexico Research Initiative	46,281.86	9/1/2011	9/17/2015
Murawski	Daly	Gulf of Mexico Research Initiative	174,896.83	9/1/2011	9/17/2015
Murawski	Dixon	Gulf of Mexico Research Initiative	185,938.78	9/1/2011	9/17/2015
Murawski	Greely	Gulf of Mexico Research Initiative	152,870.70	9/1/2011	9/17/2015
Murawski	Hollander	Gulf of Mexico Research Initiative	1,516.42	9/1/2011	9/17/2015
Murawski	Hollander	Gulf of Mexico Research Initiative	241,552.57	9/1/2011	9/17/2015
Murawski	Hu	Gulf of Mexico Research Initiative	14,047.89	9/1/2011	9/17/2015
Murawski		Natl Oceanic & Atmospheric Admin	5,821.93	6/1/2011	12/31/2013
Murawski		Natl Oceanic & Atmospheric Admin	146,108.72	10/1/2011	3/31/2015
Murawski		Gulf of Mexico Research Initiative	2,136,977.08	9/1/2011	9/17/2015
Murawski		Gulf of Mexico Research Initiative	206,926.91	9/1/2011	9/17/2015
Murawski		Gulf of Mexico Research Initiative	18,095.86	9/1/2011	9/17/2015
Murawski		University of Miami	285,680.18	9/1/2012	8/31/2014
Murawski		Stratus Consulting	31,704.33	4/25/2013	1/14/2014
Murawski		National Science Foundation	0.00	10/1/2013	9/30/2015
Murawski		Gulf of Mexico Research Initiative	3,435.87	9/5/2013	11/30/2013
Murawski		Stratus Consulting	0.00	1/15/2014	1/14/2016
Murawski	Paul	Gulf of Mexico Research Initiative	121,795.77	9/1/2011	9/17/2015
Murawski	Walsh	Gulf of Mexico Research Initiative	88,699.20	9/1/2011	9/17/2015
Paul		University of Georgia	55,103.43	1/8/2010	4/30/2015
Paul		Gulf & South Atlantic Fisheries Foundation	8,627.15	8/1/2010	12/1/2013
Paul		Mote Marine Laboratory	12,151.65	5/1/2011	4/30/2014
Paul		University of Georgia	0.00	11/6/2011	4/30/2015
Paul		National Fish and Wildlife Foundation	24,940.30	4/27/2013	6/30/2014
Peebles	Peebles	Natl Oceanic & Atmospheric Admin	22,177.27	8/1/2010	7/31/2014
Peebles	Peebles	University of Miami	111,174.55	8/1/2012	7/31/2015
Peebles	Peebles	University of Miami	50,152.33	7/31/2012	7/31/2014
Peebles	Peebles	Atkins North America, Inc.	213,279.36	10/1/2012	9/30/2014
Peebles	Peebles	Tampa Bay Estuary Program	13,018.90	12/10/2013	2/28/2015
Peebles	Peebles	Florida Fish and Wildlife Conservation	4,675.59	12/4/2013	1/31/2015
Rhodes		National Aeronautics & Space Admin	45,786.48	8/23/2010	11/22/2014
Rosenheim	Rosenheim	University of Miami	68,695.89	1/1/2014	12/31/2015
Ryan	Muller-Karger	National Science Foundation	515.29	9/15/2010	8/31/2014
Shevenell	Shevenell	Consortium for Ocean Leadership	4,945.76	8/1/2012	9/30/2013
Shevenell	Shevenell	National Science Foundation	47,365.86	4/1/2013	3/31/2016
Stallings		Florida State University	13,242.59	9/1/2011	8/31/2015
Stallings		Department of Commerce	159,378.53	9/1/2012	8/31/2014
Stallings		Florida Sea Grant College	35,083.12	10/1/2012	9/30/2015

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Stallings		Florida State University	9,724.28	3/1/2013	1/31/2014
Stallings		Florida Fish and Wildlife Conservation	31,529.97	4/10/2013	9/30/2015
Stallings		FL Department Environmental Protection	21,940.15	5/30/2014	6/30/2016
Weisberg	Hollander	Florida State University	522,841.89	10/1/2011	12/31/2015
Weisberg	Locker	Florida State University	140,072.68	10/1/2011	12/31/2015
Weisberg		Florida State University	250,071.50	10/1/2011	12/31/2015
Weisberg		Southeast Coastal Ocean Observing Region	2,521.15	9/1/2012	11/30/2013
Weisberg		Southeast Coastal Ocean Observing Region	-307.53	9/1/2012	5/31/2013
Weisberg		National Aeronautics & Space Admin	120,904.93	1/10/2013	1/9/2017
Weisberg		Southeast Coastal Ocean Observing Region	100,276.19	6/1/2013	11/30/2014
Weisberg		Southeast Coastal Ocean Observing Region	162,129.06	6/1/2013	5/31/2014
Weisberg		Southeast Coastal Ocean Observing Region	0.00	6/1/2014	5/31/2015
Weisberg		Southeast Coastal Ocean Observing Region	8,767.29	6/1/2014	5/31/2015
Zheng		Southwest Florida Water Management	31,451.46	6/25/2013	12/31/2014

# APPENDIX: C-IMAGE I & II REPORT

## Appendix: C-IMAGE I & II Report

### C-IMAGE: THE CENTER FOR THE INTEGRATED MODELING AND ANALYSIS OF THE GULF ECOSYSTEM, DR. STEVEN MURAWSKI, PI

As we begin our last few months of the C-IMAGE I award, we show no signs of slowing down.

Our near and far field modeling efforts continue to push quantitative analysis of subsea dispersant application forward. Our near and far field modeling scientists are working closely with our high pressure centers to look at the effects of partitioning and deep biodegradation on dispersed oil plume transport and impact. In 2014, much of our far field modeling effort focused on integrating high pressure biodegradation rates and variable flow rates into the Connectivity Modeling System. The high pressure biodegradation experiments took place at the Hamburg University of Technology using small high pressure chambers populated with *Pseudomonas frederiksbergensis* as an alkane degrading standard (Schedler et al., 2014). By including experimentally derived biodegradation rates and variable flow rates, the model was able to better predict the depth of the deep plume. By using these parameters, it was shown that oil transport predictions can improve, providing a better picture of where the oil mass within the plume interacted with the Mississippi Canyon and may steer coring and MOSSFA studies. (Lindo-Atichati et al., 2014)

The initial droplet size distribution at the blowout site will always be a major unknown when modeling the near field oil transport. To this end, The American Petroleum Institute (API) created an API Intercomparison Workshop to look at the output from 6 different modeling teams. API provided 12 cases of varying initial conditions and our Task 1 team provided both near and far field model output of vertical oil distribution and surface and subsurface oil distribution. The results from this exercise are currently in manuscript progress. This effort highlights the potential for collaborative exercised between the industry and GoMRI funded centers

Technology developments for operational sensors at high pressures are being pushed by our Hamburg team. The endoscope used to measure particle size distributions can do so at 150 bar. While minor modifications are in progress, this endoscope can provide valuable data at the initial conditions of plume formation. Additionally, the oxygen and carbon dioxide concentrations at high pressures (1 to 150 bar) were monitored online during the biodegradation experiment. This has not been done before. (Valladares-Juarez et al., 2014)

Water column data, sediment cores, and biological samples were collected in 2014 on 19 field excursions. The sediment group gathered cores from 32 sites in the northern Gulf of Mexico to form a temporal and spatial framework in which to document the sedimentary fate of the MOSSFA event. Collections also document the recovery of the sedimentary and chemical conditions and health status of the benthic habitat on the outer shelf and slope regions. While C-IMAGE submitted four publications together to document the initial sedimentary impact and recovery, we are pleased that one of them is in the current literature. Hastings et al. (2014) document the changes in the redox conditions of the sedimentary environment. Time series of down-core Mn, Re and pore water oxygen concentrations indicate that sediments near the well head experienced a large marine snow event followed by reducing conditions, caused by respiration of

# APPENDIX: C-IMAGE I & II REPORT

deposited organic material. The consequent increase in Re concentrations signal reducing environments. However, in the latest sampling effort, Re concentrations are decreasing, perhaps suggestive of sedimentary recovery.

Supporting data from Schwing et al. (2015) provides additional argument for a possible recovery scenario. Benthic foraminiferal density was assessed in cores from the NE GoM from December of 2010 to June of 2011. Samples from all locations from December 2010 show a drastic decline of benthic forams, while subsequent sampling in 2011 show a site-specific recovery response. The sites closest to the well head showed an increase in benthic foraminiferal density but sites farther away showed a continued decline in density. This density decline is contemporaneous with an increased sedimentation event, high in PAH compounds. These sites have been sampled annually during the Mud and Blood cruises and in 2014 we extended the time series that documents system recovery.

Laboratory studies at Wageningen University were able to produce exopolymeric substances in small mesocosm studies using seawater, dispersant and algae. While the concentrations of dispersant added to reproduce the mucus are much larger than in the environment, the EPS composition and impact on sedimentary deposition can be evaluated and used in follow up larger mesocosm studies. Additional laboratory studies are ongoing. For this effort, we continue to work with other consortia (ECOGIG, Deep-C) for further MOSSFA related studies. We also continue our relationship with NOAA's Office of Response and Restoration to include the potential impact of a MOSSFA event in a response framework.

C-IMAGE has documented many instances of ecosystem recovery in 2014. Extended time series of biological (fish liver, muscle, otoliths, bile) and acoustic sampling were ongoing in 2014. A recent publication by Murawski et al, 2014 documents an increase of fish lesions in Gulf of Mexico fishes. This publication continues to be listed as the "Most Read" on the Transactions of the American Fisheries Society website. Increased fish lesion frequency was observed in the northern Gulf of Mexico following the DWH blowout event (2011) with a subsequent decline in frequency in 2012. Additional analyses of PAH concentrations in bile, liver, and muscle show increased PAH metabolite concentrations in fish bile and a lower concentration in their liver and muscle, indicating that these fish can efficiently metabolize these compounds. The significant decline from 2011 to 2012 point to an episodic exposure event.

C-IMAGE researchers have looked at using the archived SEAMAP database for impact studies. Fish larvae (species and number) were mapped with surface oil spill coverage, giving species and number of individuals impacted. The study was completed with the DWH oil surface-print as well as two additional modeled oil spill scenarios (Task 1, Theme 2). The number of individuals and the species varied greatly depending on the location of the oil spill. This concept proves to be a useful tool in determining potential ecosystem impact of future spills. This is a great example of our integrative science initiatives and how these directly result in decision making tools.

All publications referenced can be found on our website: <http://bit.ly/1H8mHZ4>

# APPENDIX: C-IMAGE I & II REPORT

## The Next Phase: C-IMAGE II

We are excited to announce our success at getting C-IMAGE II funded! USF College of Marine Science was awarded \$20.2 million for a three year project to extend our studies through 2017 while adding new components to the project. This is the largest non-medical grant in USF's history and we couldn't be more excited to begin this effort.

For the next round of research, we added five new partners. We now represent 18 institutions and five countries: The University of South Florida, Eckerd College, Florida State University, Georgia Tech, Harte Research Institute, Mote Marine Laboratory, Penn State, Scripps Institute of Oceanography, Technical University of Hamburg at Harburg in Germany, Texas A&M University, Wageningen University in The Netherlands, University of Calgary in Canada, University of Miami, University of West Florida, University of South Alabama, University of Western Australia, the Universidad Nacional Autonoma Mexico in Mexico and Woods Hole Oceanographic Institute.

The overarching objective of C-IMAGE II is: *to advance understanding of the processes and mechanisms involved in marine blowouts and their environmental consequences.* Our consortium focuses both on extension of work started under the initial C-IMAGE project, along with three new initiatives: (a) field work at the *IXTOC-1* blowout site, (b) establishment of a marine exposure facility for fishes, and (c) a Gulf-wide assessment of fish and sediment contamination to better understand and predict oil fate and impacts of *DWH* and other spills. C-IMAGE researchers will conduct studies in six Tasks: (1) near-to-far field modeling, (2) high-pressure experimentation, (3) sedimentation of oil and its impacts, (4) impacts on the abundance, contamination and population dynamics of fishes and marine mammals, (5) toxicology studies, and (6) ecosystem modeling. Our focus is on task integration to produce fundamental understanding of basic processes of marine blowouts and ecosystem impacts.

### C-IMAGE PUBLICATIONS (some of these are listed above as well)

- Chanton, J., T. Zhao, **B. Rosenheim**, S. Joye, S. Bosman, C. Brunner, K. Yeager, A. Diercks, and **D. Hollander** (2014) Using natural abundance radiocarbon to trace the flux of petrocarbon to the seafloor following the Deepwater Horizon Oil Spill. *Environmental Science and Technology* 49, 847-854, doi: 10.1021/es5046524.
- Chen, S., and **C. Hu** (2014) In search of oil seeps in the Cariaco basin using MODIS and MERIS medium-resolution data. *Remote Sensing Letters* 5 (5), 442-450, doi:10.1080/2150704X.2014.917218.
- Dahl, K.A., W.F. Patterson, and C.A. Layman (2014) Habitat-Specific Density and Diet of Rapidly Expanding Invasive Red Lionfish, *Pterois volitans*, Populations in the Northern Gulf of Mexico. *PLoS ONE* 9 (8), 1-13, doi:10.1371/journal.pone.0105852.
- Hastings, D.W., **P.T. Schwing**, G.R. Brooks, R.A. Larson, J.L. Morford, T. Roeder, K.A. Quinn, T. Bartlett, I.C. Romero, and **D.J. Hollander** (2014) Changes in sediment redox conditions following the BP DWH blowout event, *Deep-Sea Research II*.
- Joye, S.B., J.P. Montoya, **S.A. Murawski**, T.M. Özgökmen, T.L. Wade, R. Montuoro, B.J. Roberts, **D.J. Hollander**, W.H. Jeffrey, and J.P. Chanton (2014) A Rapid Response Study of the Hercules Gas Well Blowout, *Eos. Transactions American Geophysical Union* 95 (38), 341-342.
- Lindo-Atichati, D., C.B. Paris, M. Le Hénaff, A.G. Valladares-Juárez, M. Schedler, and **R. Müller** (2014) Simulating the effects of droplet size, biodegradation and flow rate on the subsea evolution of deep

## APPENDIX: C-IMAGE I & II REPORT

- plumes from the Macondo blowout. *Deep Sea Research*. Special Issue 47 (14), 9651-9659, 10.1016/j.dsr2.2014.01.01.
- Masi, M., and **C. Ainsworth**, (2014) A probabilistic representation of fish diet compositions from multiple sources: A Gulf of Mexico case study. *Ecological Modelling* 284 (24), 60-74, doi:10.1016/j.ecolmodel.2014.04.005.
- Murawski, S.A., W.T. Hogarth, E.B. Peebles**, and L. Barbeiri (2014) Prevalence of external skin lesions on PAH concentrations in Gulf of Mexico fishes, post-Deepwater Horizon. *Transactions of the American Fisheries Society* 143 (13), 1084-1097, doi:10.1080/00028487.911205.
- Paul, J.** (2014) Response to Comment on "Toxicity and Mutagenicity of Gulf of Mexico Waters During and After the Deepwater Horizon Oil Spill". *Environmental Science and Technology* 48 (6), 3593-3594, doi:10.1021/es405469e.
- Schedler, M., R. Hiessl, A. Valladares Juárez, G. Gust, and **R. Müller** (2014) Effect of high pressure on hydrocarbon-degrading bacteria. *Applied Microbiology and Biotechnology Express* 4 (77), 1-7, doi:10.1186/s13568-014-0077-0.
- Snyder, R.A., M. Ederington-Hagy, F. Hileman, J. Moss, L. Amick, R. Carruth, M. Head, J. Marks, W.H. Jeffrey (2014) Polycyclic aromatic hydrocarbon concentrations across the Florida panhandle continental shelf and slope after the BP MC 252 well failure. *Marine Pollution Bulletin*. doi:10.1016/j.marpolbul.2014.09.057.
- Snyder, R.A., A. Vestal, C. Welch, G. Barnes, M.R. Pelot (2014) PAH concentrations in Coquina (*Donax* spp.) on a sandy beach shoreline impacted by a marine oil spill. *Marine Pollution Bulletin* 83 (1), 87-91, doi:10.1016/j.marpolbul.2014.04.016.
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- Wallace, A.A., **D.J. Hollander, E.B. Peebles** (2014) Stable Isotopes in Fish Eye Lenses as Potential Recorders of Trophic and Geographic History. *PLoS ONE* 9 (10), 1932-6203, doi:10.1371/journal.pone.0108935.
- Weisberg, R.H.**, L. Zheng, Y. Liu, **S. Murawski, C. Hu, D. Hollander, J. Paul**, (2014) Did Deepwater Horizon Hydrocarbons Transit to the West Florida Continental Shelf? *Deep Sea Research*, 10.1016/j.dsr2.2014.02.002.