Message from the Chair

We have switched our newsletter to an expanded quarterly contribution. The goal is to highlight the exciting science and people in the Department. We are also going to devote space in each newsletter to check in on alumni as well as recognize the generous people and companies who donate to our marine science community. Looking forward into the coming year, while there is uncertainty about the federal focus on research, we continue to have strong support from the University, the state, the nation and world. But we need your support to continue to grow. The community is poised for success having just completed major infrastructure upgrades. Currently there is an ongoing search for a new ecology faculty member with other faculty hires planned in the near future. Research activities span the globe and range from basic exploration, drug discovery, molecular communication, coastal resiliency, fisheries, technology development, and numerical forecasting. To an exciting year where we hope that you will join us.

Oscar

Winter in New Jersey means it is the summer field season for the Rutgers Antarctic research team. The Palmer Long Term Ecosystem Research program just completed its 25th annual field season. The season consists of a six-month field program at Palmer Station in Antarctica and a 6-week ship expedition across the West Antarctic Peninsula (WAP). This year the Rutgers team at Palmer Station was anchored by graduate students Michael Brown and Schuyler Nardelli, post-doctoral researcher Colette Feehan, and Center for Ocean Observing Leadership (COOL) technician, Nicole Waite. Their efforts were complemented by the ship efforts anchored by professors Paul Falkowski and Oscar Schofield, graduate students Schuyler Nardelli (yes she anchored 2 segments) and Yonatan Sherman, and undergraduate Anjali Suman. The projects document how the WAP, one of the world's most rapidly warming regions, is melting and how the physical changes drive changes in Antarctic food web. This was an extremely successful year for these researchers. The team conducted experiments studying how glacial melt influences microbial communities and made the first measurements ever in the Southern Ocean for fluorescence decay kinetics. They also assessed the degree of iron limitation in the marine plankton. The team conducted glider missions in penguin foraging regions and conducted a survey of the southernmost known penguin colony in the WAP (first successful attempt in the last four years). While surveying the southern penguin colony a major weather system piled 1000's of kilometers of sea ice against the ship. After 6 days of being beset, the team was able to navigate the ship's escape. The picture above shows the view as the ship emerged from the ice. Plans for the upcoming 26th field season are already underway.
Silke Severmann has received a new award from the National Science Foundation. With collaborators, she will develop new investigative tools for chemical oceanographers based on the chemistry of marine sediments. Such tools, or proxies, will help us to get a better understanding of past variations in the composition of seawater, environmental conditions, and climate. In order to do so we must understand exactly how the chemical composition of marine sediments is set and how it relates to environmental conditions. The concentrations of trace metals such as uranium and chromium in sediments have been used to reconstruct past variations in ocean biological production, bottom water oxygen concentrations, or both. In her study, Silke will use the isotopes of these two elements, which are potentially even more valuable than absolute concentrations. In order to fully understand and use this tool for interpreting the past, this study will involve a detailed investigation of uranium and chromium isotope chemistry in modern ocean sediments. One graduate student, one postdoctoral researcher, and several undergraduate students will be funded through this project. We are excited for the new program and look forward to seeing exciting results.

In the spirit of the original Challenger Expedition, the first ship-based global ocean science expedition in history, the National Ocean and Atmospheric Administration (NOAA) issued a challenge to have undergraduates anchor a global mission of exploration. On March 9, 2017, the faculty-student team at Rutgers University met this challenge when they recovered the glider Silbo after it crossed the Atlantic Ocean. Month long technical issues plagued the glider causing it to go silent and deep, but the skillful team anchored by partners at Teledyne Webb were able to locate and navigate Silbo to a successful recovery. This 2017 recovery bookends a successful year as in March 2016 another Rutgers glider, RU-29 was recovered offshore South Africa after completing a trek from Brazil. This recovery completed the first glider circumnavigation of an ocean basin in history. Rutgers scientists and students guided this 3-year mission. The glider received technology upgrades before redeployment from the coast of Australia. It is currently sailing south of Indonesia heading to Sri Lanka as part of an attempt for circumnavigation of the Indian Ocean. Once it reaches Sri Lanka the glider will be re-furbished and re-deployed to head towards Africa. The current Challenger efforts are being anchored by a joint effort between the Rutgers, Teledyne Webb, the Vetlesen Foundation, Iridium, the University of Pal-
Rutgers Marine Sciences is increasingly critical to understanding New Jersey's offshore wind resource.

Understanding New Jersey's offshore wind is critical to developing state energy plans as well as managing the existing energy grid. New Jersey is one of the prime locations in the United States for developing offshore wind power. This reflects the presence of the significant wind resource offshore and a densely populated shoreline that minimizes the need to transmit the power for great distances. One big question is how large is that offshore wind resource? Offshore wind also has a large impact on the energy required by the shore populations. The use of air conditioners during hot days is a significant energy need however when the sea breeze kicks it greatly obviates the need for energy to power all those air cooling units. So another big question is when and where will the sea breeze be present? Rutgers scientists have been working on these questions for over a decade by developing sea breeze forecasting capabilities as well as deploying a state-wide observation network. The observation network is about to be expanded greatly thanks to a generous donation. The majority of validation and calibration points for the RU-WRF atmospheric forecast model used to analyze New Jersey's offshore wind resource are located primarily over land. The Lockheed-Martin WindTracer (WT) scanning LIDAR (below) provides a powerful and unique opportunity to validate RU-WRF over a broad offshore spatial area. A donation provided by Fishermen's Energy of a LIDAR WindTracer system to RU COOL will enable advanced studies of New Jersey's seabreeze, extreme storms, and will be critical for enhancing the overall understanding of New Jersey's offshore wind resource (example of data coverage is below). Additionally, the 3D wind and turbulence data could provide vital input for air quality impact assessments associated with coastal areas. Furthermore, historic and real-time data can be provided to stakeholders for research and operational applications.
Rutgers Marine Sciences surveys the Western Pacific Warm Pool

The Western Pacific Warm Pool is the name we give to the large body of warm water in the Western Pacific. This warm water has a big impact on global climate and ocean currents. This Western Pacific Warm Pool influences the temperature and water content of the atmosphere near it, which in turn influences global climate. Ocean currents also play a part in global climate as they move very large amounts of heat around the planet. A team of Rutgers DMCS Scientists and affiliates conducted a major expedition aboard the RV Joides Resolution to drill into the sediment in search of clues about the Earth’s past climate. Yair Rosenthal was co-chief scientist on the cruise and was accompanied by Greg Mountain, Tali Babila (former PhD), Sam Bova (post doc) and Stephanie Spary (photo below).

On the 2016 expedition they collected samples of cores of deep sea sediment from key locations. Then scientists identified the different species of plankton in the sediment while others are analyzing the composition of the plankton’s shells. By examining these core samples scientists will gain a greater understanding of past climates and ocean currents in this area. This will help us understand how global warming might change the climate in this area and how this may influence climate elsewhere. The team currently is busy analyzing samples in the lab. We look forward to their discoveries in the coming year!

Understanding ocean acidification along our coastline

Present and future generations in the Mid-Atlantic will be challenged by accelerating global impacts, including rising sea levels, a warming ocean, and estuarine and coastal acidification. Acidification has scientific and societal ramifications including the alteration of ocean biogeochemistry, ecological consequences associated with perturbed ecosystems, and economic losses due to the decrease of commercially important organisms such as shellfish. Recently, Mid-Atlantic Coastal Acidification Network (MACAN) was developed to develop a better understanding of the processes associated with estuarine, coastal, and ocean acidification, predict the consequences for marine resources, and devise local adaptation strategies that enable communities and industries to better prepare and adapt. MACAN is a nexus of scientists, federal and state agency representatives, resource managers, and affected industry partners who seek to coordinate and guide regional observing, research, and modeling of ocean and coastal acidification. MACAN serves as an information hub and exchange among research, industry, and resource managers, focusing on waters and impacted species from south of Long Island down to Virginia. Network members work collaboratively on identifying and pursuing opportunities to address coastal and ocean acidification in the Mid-Atlantic, building upon the skills and interest of individual
members. MACAN also provides a forum to share best practices in monitoring and sampling collection. MACAN is coordinated by Rutgers Assistant Professor Grace Saba (previous page) with the Mid-Atlantic Regional Association Coastal Ocean Observing System (MARCOOS) and Kaity Goldsmith at the Mid-Atlantic Regional Council on the Ocean (MARCO).

Rutgers marine science is a big presence at the Delaware Estuary Science Summit

Rutgers Marine Sciences was well represented at the recent Delaware Estuary Science Summit in Cape May, NJ. Ben Horton (below) an invited keynote speaker addressed local sea level rise. One of his take home messages, “It takes 10,000 years to form the Antarctic ice sheet and 50 years to undo it”. Daphne Munroe, who also attended, was well represented by her students: Mike Acquafredda, Sarah Borsetti and Joe Caracappa. All presented great student posters about their work on surf clams, oyster spat and blue crab larvae. Joe (left) was awarded best student poster for the conference - congrats Joe!

Rutgers Collaborative for Raritan Education & Observation explores local environment

The Rutgers Collaborative for Raritan Education & Outreach (RCREO) is transforming the Raritan Basin into an interactive field laboratory that enhances the student experience by linking science, engineering, and humanities programs through interdisciplinary classes, projects and activities that take place not only on the banks of but actually on and in the Old Raritan and its tributaries. This lead to the purchase of the new Rutgers teaching laboratory (below) that is going to be a critical component to the undergraduate education.

The Raritan Collaborative just announced winners of a mini-grant competition. Two DMCS faculty were awarded funds to work in the River. Olaf Jensen was provided funds to deploy a video system to monitor fish migration at a fish ladder on the Raritan. His imagery will be freely available and relies on student and citizen science to identify the fish. Josh Kohut was awarded funds to have the New Jersey Department of Environmental Protection train Rutgers undergraduates on the official water quality procedures used by New Jersey. After training, students will use these techniques as part of their class work, and the state will include the data in the state-wide assessments. This will allow undergraduates to fill data gaps of our water.
Congratulations to Filipa Carvalho for completing her PhD!

Her thesis, titled “Coupled Physical and Phytoplankton dynamics in Coastal Antarctica”, focused on understanding how ocean physics drive the growth of the plants (phytoplankton) which are the base of the marine foodweb. Her expansive thesis used robotic gliders, novel sensors developed by Rutgers faculty, and experimental manipulations to assess the critical factors driving phytoplankton growth. She showed the availability of light, influenced by the wind at the sea surface and sea floor topography, was the key driver of the ecosystem. During her thesis, Filipa was often a lead scientist for Rutgers in remote Antarctic locations.

Meet Featured Graduate Student Isabel Hong

Isabel received her B.A. in Geology at Whitman College analyzing the geochemistry of Columbia River Basalt paleosols. She then completed an internship at the U.S. Geological Survey with the physical properties team in the West Antarctic Ice Sheet Divide Ice Core Processing Lab. She also taught English in Germany through a Fulbright Program before getting her M.S. in Geology at Central Washington University (CWU). Her time at CWU was spent chasing paleotsunamis in south-central Chile. Her research now is focused on understanding both short- and long-term coastal landscape changes caused by natural hazards. She has been working in the South Pacific Islands characterizing the overwash sediment deposited by Tropical Cyclone Pam and coastal land-level change caused by Cascadia subduction zone earthquakes.

Congratulations and Good Luck(!!!) to RU Marine Science Alumni Dr. Jay Cullen

Jay Cullen, a former Marine and Coastal Sciences graduate student, and current faculty member at the University of Victoria is literally reaching for the stars. He is now on a shortlist to become one of Canada’s next astronauts. Jay is one of 72 candidates on a shortlist, announced last month, culled from about 4,000 prospects. The Canadian Space Agency is looking for two astronauts. Despite the long odds, Jay believes his extensive experience at sea on research expeditions to remote locations around the world have prepared him for the rigors of space travel. Professor Cullen continued on from PhD at Rutgers to become a world expert in studying metal chemistry in the ocean. The Department is extremely proud of its graduate program and the great people who are the great legacy of our efforts. Additional alumni will be highlighted in the coming year.
Rutgers marine sciences benefits from many generous people and companies who provide increasingly critical support ranging from in-kind contributions to targeted gifts and student endowments. These contributions are critical in helping students, researchers and faculty discover and communicate critical and exciting ocean science for the benefit of society.

Thank you Teledyne Webb Research for generous student support!

Teledyne Webb Research has been a long-standing research partner with RU faculty. The first field deployment of an underwater glider was conducted with Doug Webb (founder of Webb Research) working side-by-side with Rutgers graduate student Josh Kohut (now faculty at RU). Those early efforts over a decade ago blossomed into a fantastic partnership (see Challenger mission this issue). Five years ago Teledyne Webb decided to enable graduate and undergraduate education at Rutgers through a series of fellowships. Their generous support funded 3 PhDs that used gliders to study melting polar oceans to observing the physics of hurricanes and typhoons. Their support of undergraduates, over 10 summer interns, allowed RU undergraduates to make history by navigating gliders across ocean basins. Accolades earned by those students with Teledyne Webb support include making history twice with the first robotic crossing of an ocean basin and the first robot circumnavigation of an ocean basin. Doug Webbs’ life advice to our students is a core principle of what Rutgers Marine Science does, “Work hard, have fun, and change the world!”

Thank you Alumni Class of 1960 for summer undergraduate internship endowment.

Many Rutgers undergraduates are working students, so summers are often spent earning money for the next year. This often means students can’t take advantage of research opportunities during the summer. The Alumni Class of 1960 graciously created an endowment for Rutgers undergraduates to work with cutting edge ocean technology. This endowment provides funds to enable students to take advantage of summer research opportunities. This endowment continues to grow with additional funding from doners each year. This growing legacy was made possible by the 1960 Alumni providing a foundation that now all can build on. Many students are indebted to their generosity.

Remembering Steve Carnahan dedicated champion for New Jersey and the ocean.

We are saddened that Jon Stephen Carnahan, passed away on April 4, 2017. He was 73 years old and had countless friends and even more endless excellent stories. Mr. Carnahan served on the Advisory Committee of the Rutgers New Jersey Agricultural Experiment Station (NJAES), focusing on maritime matters. He was Agricultural Program Associate on the Rutgers Cooperative Extension for Salem County. He served as a Governor’s appointee to the NJ State Dredging and the Delaware Bay Oyster Restoration Task Forces. He was chair of the New Jersey Sea Grant Consortium Advisory Board and a member of the Board of the Rutgers Institute of Marine and Coastal Science. He was also President of the Seaboard Fisheries Institute. He was a great supporter, champion, leader and most important a great friend to many. Thank you Steve, you will be missed.
New Publications


Weekly Seminars

4/10/2017 Mimi Koehl “Swimming and crawling in a turbulent world” University of California, Berkley

4/17/2017 Walt Boynton “Ecosystem ecology” University of Maryland

4/24/2017 Susanne Craig “Remote sensing, ocean optics” Dalhousie University

5/01/2017 Melissa Omand “Observational and biophysical interactions” University of Rhode Island

Seminars are held at 3:45pm in the Alampi Room in the Marine and Coastal Sciences Building on Cook Campus.

New Grants

Elizabeth Sikes “Paleoventilation of the Indian Sector of the Southern Ocean” NSF $428,936

Olaf Jensen “A Pilot Trap Survey of Artificial Reefs in New Jersey for Monitoring of Black Sea Bass, Tautog, and Lobster” DEP $201,905

Donato Giovannelli “Biology Meets Subduction” University of Oxford $85,680

David Bushek “Demonstrating and Evaluating Subtidal Cage Culture Systems in Delaware Bay” NOAA $249,365

Daphne Monroe “Sex and Length of Summer Flounder Discards in the Recreational Fishery, NJ to RI” $10,000