Department of Marine Sciences
Franklin College of Arts and Sciences
Annual Report 2019

Daniela Di Iorio

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From the Department Head

I am pleased to present our annual report that documents our departmental productivity and highlights our ongoing interdisciplinary approach to understanding the marine environment. During this past year we have grown (we welcome new faculty, staff and students), we have shrunk (we wish all our graduates and faculty success in their future endeavors) and we have changed in other ways, but through it all, many milestones were achieved. Special thanks are extended to Tim Hollibaugh who retired from the Department of Marine Sciences after 23 years of service. As a mentor and colleague, and one who made positive contributions to our department, he will be greatly missed and we wish him all the best in his next phase of personal and professional endeavors. Another note of recognition goes out to Christof Meile who served as Graduate Coordinator for the past nine years and made extensive contributions to our MS and PhD programs. We now welcome Renato Castelao as our new Graduate Coordinator.

As you will see, our faculty, postdocs and students are recognized with prestigious awards and recognitions as a result of their scholarly accomplishments and have published important findings in major journals. It is not possible to highlight the 81 peer reviewed manuscripts written and 140 conference presentations given in 2019 but some of the research highlighted in this report gives a sample of the kind of work that our faculty, postdocs and students are engaged in and shows the broad range of marine science research and teaching carried out in our department.

We continue to be grateful and acknowledge the new grants received in 2019 from state, private foundations and national funding agencies. Our funded proposals in 2019 was over $9.6 million in extramural grants and provides a solid foundation for our faculty to carry out their research, mentor students and postdocs and build new relationships in the coming years. A significant portion of this, is the renewal of the Georgia Coastal Ecosystems IV Long Term Ecological Research project that will allow us to continue learning how coastal and estuarine ecosystems function and how they change with time. Over the past 5 years we have received over $9,540 in cash and in kind donations. In honor of David Miklesh, we have supported merit based awards to graduate students for their research and teaching activities. We have also used some of these funds to support student travel to national and international conferences and workshops so students can communicate their research and make connections for future opportunities. Students are attracted to our programs because of the excellent research and mentorship opportunities provided, and in 2019 we graduated 4 MS students and 1 PhD student. These graduates have gone on to pursue a PhD, work with state and national agencies, teach in K-12 education, and pursue postdoctoral studies. Go Dawgs!

Our oceans and coastlines are changing due to climate and human activities and our future depends on our persistence, creativity and innovation. Together we can meet the needs of our state, nation and the world.

Donations to our General Fund will help support the recruitment of diverse students to our academic programs. Funds will also be used to award graduate students who excel as teaching assistants and who have achieved recognition in their research with publications and presentations.

Marine Science Webpage

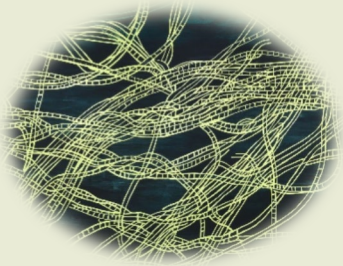
Stay updated with us by visiting our website & following us on social media

Faculty Awards and Recognitions

Merryl Alber

Margaret A Davidson Award for Stewardship from the Coastal and Estuarine Research Federation:

"Dr. Merryl Alber has demonstrated extraordinary leadership, service, innovation, and commitment to the management of estuarine systems. She formed the Georgia Coastal Research Council, which has fostered productive working relationships between over 150 researchers and resource managers for 17 years. Merryl has taught coastal policy courses to graduate students for 20 years and inspired many students to careers in management and policy."



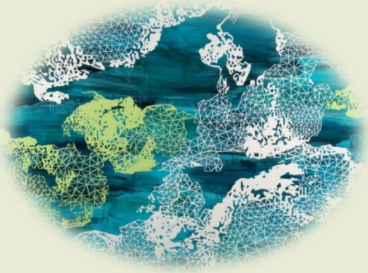
Elizabeth Harvey

Alfred P. Sloan Research Fellowship for "All microbes must die. Investigating the mechanisms of microbial mortality in the ocean"

"Sloan Fellowships are one of the most prestigious monetary awards in the country for faculty in the earlier stages of their careers, and I congratulate Elizabeth and Rachel for being recognized in this remarkable way," said David Lee, vice president for research. "This signifies the quality of young faculty that UGA is recruiting, something we can all take pride in."

Chuck Hopkinson

CERF 2019 Coastal Stewardship Award Selection Subcommittee Chair



Samantha Joye

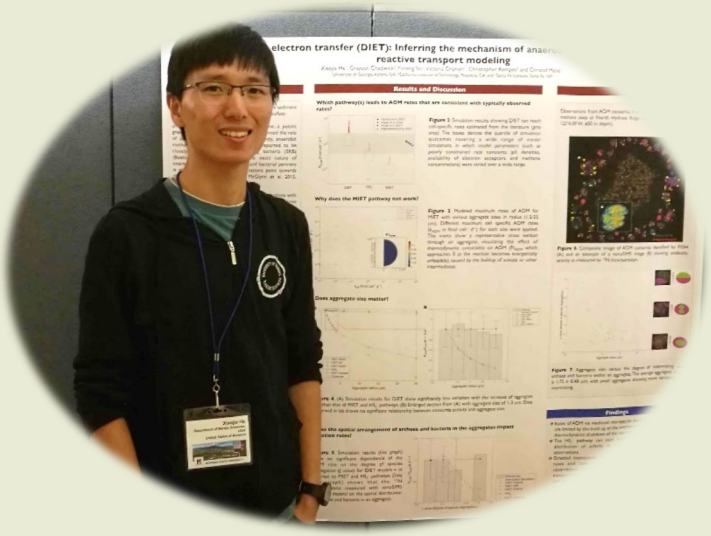
Regents Professor

"Joye is a force of nature, driven by insatiable curiosity and apparently endless energy. She holds herself, her students and colleagues to the highest standards of thoroughness, rigor and integrity. As a person, a professor and a scientist, she is a powerful role model for both men and women," Bess Ward, William J. Sinclair Professor of Geosciences at Princeton University, wrote in a nomination letter. "She is a truly distinguished member of the faculty of the University of Georgia."

Mary Ann Moran

UGA Career Center Recognition Certificate for contributions to undergraduate career development and success

Student and Postdoc Awards



Travel Awards

Graduates

Xiaojia He: UGA Graduate School Travel Grant
Maria Letourneau: UGA Graduate School Travel Award to present at CERF
Sheron Luk: CERF 2019 Student Travel Award
Kun Ma: UGA Graduate School Travel Grant
Brent Nowinski: UGA Foreign Travel Assistance Program Award
Jurjen Rooze: UGA Graduate School Summer Research Travel Grant
William Schroer: UGA Graduate School Summer Research Travel Award

Postdoc

Julian Damashek: UGA Travel Support from Provost to Attend ASLO meeting, Puerto Rico
He Fu: UGA Travel Grant to present at the Marine Particles and Phycospheres Conference, Switzerland

Fellowship and Traineeship

Caitlin Amos: NASA Earth and Space Science Fellowship Renewal
Maria Letourneau: ORISE Postdoctoral Fellowship with the EPA
Kun Ma: NOAA Georgia Sea Grant Research Traineeship Award
Leslie Townsell: NOAA Georgia Sea Grant Research Traineeship

Presentation and Conference Awards

Undergraduates

Erin Malsbury: CURO Scholarship
Theodore Vincent: CURO Conference Participation Grant 2019
Best Use of Quantitative Methods in Conservation Research, AMNH Center for Biodiversity & Conservation Student Conference

Graduates

Caitlin Amos: Best Student Oral Presentation, Eastern Pacific Ocean Conference
Hilde Oliver: Outstanding Student Presentation Award, American Geophysical Union
William Shroer: 2nd Place Poster Award, SE Biogeochemistry Symposium, Columbia SC

Postdoc

Heewon Jung: Best Presentation Award, Korean Society of Soil and Groundwater Environment Conference

Other Notable Awards

Undergraduates

Justin Ebert: Student Employee of the Year Award (Top 100)
Erin Malsbury: Laerm Award, Georgia Museum of Natural History

Graduates

Chandler Countryman: UGA Outstanding Teaching Assistant Award
Acceptance into UGA Emerging Leaders Program
Maria Letourneau: Dissertation Completion Award
Sheron Luk: Ocean Ventures Fund Award
Devon Umstead: SAML's Student Award Program-Kirk Haven Award

Welcome New Faculty and Staff

Holly Bik
Assistant Professor

"My research uses high-throughput – Omics approaches to explore broad patterns in marine microbial taxa with an emphasis on marine sediment habitats. This work includes a strong focus on microbiome sequencing, biomonitoring, and data visualization tools, using cutting-edge technologies to merge hypothesis-driven research with open source software development."

Tyler Cone
Senior Accountant

"I joined the Marine Science office March of 2019. I work with Faculty and staff to make sure the expenses they have for their lab are paid including office supplies, payroll, and new equipment. I also deal with new employee onboarding and helping obtain visa sponsorships for visiting scholars."

Jessica O'Connell
Assistant Research Scientist

Jessica uses remote sensing and field tools to examine coastal plant ecology within marshes and barrier islands. She is interested in plant biomass and relies on remote sensing and flux data to generate site or regional estimates. The remote sensing products that are created can then be used to estimate salt and brackish marsh gross primary productivity

Adam Greer
Assistant Professor

"My research encompasses all aspects of zooplankton ecology – how these "ocean drifters" behave, feed, and avoid predators in their ocean environment. We deploy imaging systems and apply machine learning algorithms that, together, reveal the drivers of zooplankton distributions and preserve spectacular details of never-before-seen organism interactions."

Retiring Faculty

Charles S. Hopkinson
Emeritus Professor

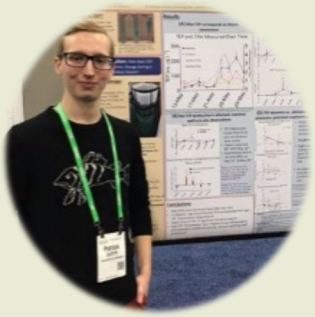
Chuck served as a Marine Sciences faculty member for the past 12 years. He was the Director (2008-2015) for the Georgia Sea Grant College Program at UGA and greatly shaped that program making significant contributions for the state of Georgia. We look forward to continuing our relationship with Dr. Hopkinson as an Emeritus Professor.

James T. Hollibaugh
Emeritus Distinguished Research Professor

Tim served as a Marine Sciences faculty member for the past 23 years. He was the Associate Director (1997-2001) and then Director (2002-2009) for the School of Marine Programs and greatly shaped the direction of Marine Sciences in the State of Georgia. Much of who we are today is because of him. Since 2010 he has held the title of Distinguished Research Professor as a result of his superb scholarly record. We look forward to continuing our relationship with Dr. Hollibaugh as an Emeritus Distinguished Research Professor.

2019 Marine Science Graduates

Master's Theses



Patrick Duffy, M.S.

"Estimating rates of gross TEP production and heterotrophic consumption from natural assemblages", Spring 2019

Patrick Duffy presented "Tracking Transparent Exopolymer (TEP) Production During the MesoHux-2017 Bloom Experiment" at the 2018 Ocean Sciences Meeting in Portland, Oregon

Daniel P. Owen, M.S.

"A "bottom-up" approach to estimate taxon-specific primary production rates on coral reefs", Spring 2019

Daniel Owens has been published in 4 papers and has given 3 presentations of research. Most recently in April 2019 Owens presented, "A bottom-up method to estimate species-specific primary production rates on coral reefs" at the 4th Annual Southeastern Biogeochemistry Symposium in Athens, Georgia.

Colby Peffer, M.S.

"Assessing Long-term and short-term shoreline change of cockspur island in the Savannah RiverEstuary", Fall 2019

Colby Peffer was awarded the Tsunami Award in 2017 from Humboldt State Oceanography Department for her impact on and service to the University, Department, & Community.

Cathrine Shepard, M.S.

"Nutrient availability modulate the effects of Corexit 9500A on oil biodegradation", Spring 2019

Catherine Shepherd presented "The Effects of Surface Application of Oil Dispersant on Oil Degradation" at the Southern Biogeochemical Symposium in Tallahassee Florida, 2018. Shepard was awarded Second Place Poster Presentation at this symposium.

Ph.D. Dissertation

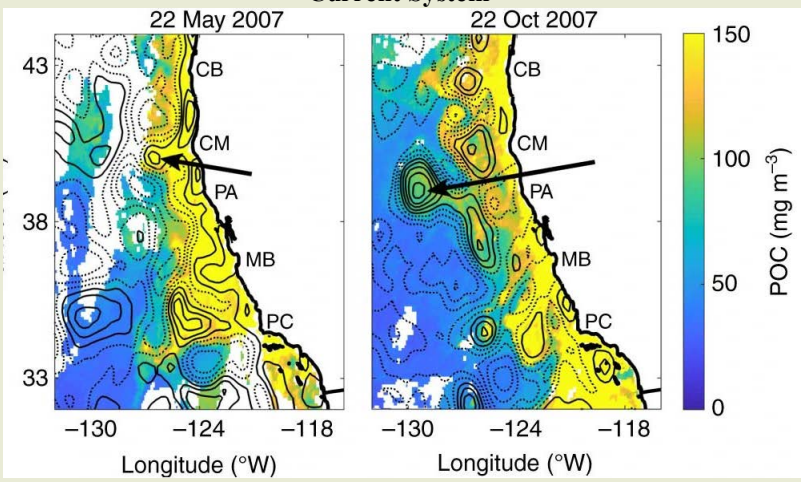
Hilde Oliver, Ph.D.

"Physical Controls on Light and Nutrients in Coastal Regions Receiving Large Fluxes of Glacial Meltwater", Summer 2019

Hilde Oliver has been published in 5 papers and has given 19 presentations of research starting in 2013. Her most recent presentation "Does light or iron control the Amundsen Sea Polynya phytoplankton bloom?" was in June 2018 in Woods Hole Massachusetts for the Ocean Carbon and Biochemistry Summer Workshop. Oliver received the honor of being a National Science Foundation Graduate Research Fellowship recipient from 2015-2020, as well as a University of Georgia Presidential Graduate Fellowship recipient from 2014-2019.

Research Highlights and Selected Publications

Fig. 1 Example of offshore transport by an eddy in the California Current System



Letourneau*, M.L., Medeiros, P.M., 2019. Dissolved organic matter composition in a marsh-dominated estuary: Response to seasonal forcing and to the passage of a hurricane. Journal of Geophysical Research: Biogeosciences 124, 1545-1559.

Dissolved organic matter (DOM) is a crucial component of aquatic ecosystems and characterizing how its composition and concentration change is important to better understand the carbon cycle. Composition and quantity of DOM can vary spatially and temporally due to a variety of factors, including biological activity, precipitation patterns, and proximity to source inputs such as rivers, salt marshes and the open ocean. To track these changes, monthly water samples were collected and analyzed over the course of a year in a marsh- dominated estuary off the Georgia coast, USA. River flow was shown to be an important factor controlling the amount and type of DOM present at both riverine (Altamaha River) and estuarine (Sapelo Sound) locations. In months with high river flow, organic matter contents were higher and had more terrestrially-derived compounds compared to months with low river flow.

Additionally, Hurricane Matthew was shown to significantly alter the organic matter at Sapelo Sound, suggesting that extreme events greatly impact DOM quantity and quality in estuarine regions.

Amos, C. M., R. M. Castelao and P. M. Medeiros (2019), Offshore transport of particulate organic carbon in the California Current system by mesoscale eddies. Nature Communications, 10:4940

The California Current System along the west coast of the United States is characterized by upwelling, a process in which deep, cold water rises to the surface of the ocean. This process also brings an abundance of nutrients to the surface, creating a highly productive marine ecosystem along the coast. During the upwelling season, as the coastal ocean current flows southward, spinning masses of water called eddies, with diameters ranging from 50 to 150 miles, often form. Modeling studies suggest that these eddies can trap the nutrient-rich coastal water and transport it offshore. This study used large-scale observational analyses to show for the first time that eddies are in fact capable of trapping upwelled water along the coast and transporting it offshore for hundreds of miles. This process is an important mechanism for expanding the zone of biological productivity in the California Current System.

Spivak, A.C., J. Sanderman, J.L. Bowen, E.A. Canuel, C.S. Hopkinson. 2019. Global change controls on soil carbon accumulation and loss in coastal vegetated ecosystems. Nature Geoscience 12: 685-692.

Coastal vegetated ecosystems play an important role in the global carbon cycle. Much of the organic carbon they store builds up in soils that accumulate over thousands of years. Rapidly changing climate and environmental conditions will impact decomposition and thus the global reservoir of organic carbon stored in coastal soils. Yet, it remains unclear how disturbances will affect the key biogeochemical mechanisms controlling decomposition. In our recent perspective article, we assessed how preservation mechanisms, that are better characterized for terrestrial and marine ecosystems, operate in coastal soils. We developed a conceptual framework that characterizes how the effectiveness of decomposition mechanisms may change over spatial and temporal scales following global change disturbances. We posit that better integration of decomposition mechanisms into ecosystem evolution models may improve predictions of soil carbon reservoirs and facilitate incorporation of coastal environments into global budgets and management tools. Temperate salt marshes (MA, USA). Healthy salt marshes have lush stands of grasses (top). Storms can expose peat deposits that have been buried for thousands of years (bottom). The fate of this soil carbon is unknown, but some fraction is likely respired by microbes and returned to the atmosphere as CO2. Photos: A. C. Spivak

New Grants Funded 2019

National Science Foundation

LTER: Georgia Coastal Ecosystems
ALBER, Merryl: $4,057,200
ALEXANDER, Clark: $338,100
BURD, Adrian: $676,200
CASTELAO, Renato: $338,100
DI IORIO, Daniela: $676,200
MEDEIROS, Patricia: $338,100
MEILE, Christof: $338,100

Supplement to the GCE LTER
ALBER, Merryl: $24,987

Hawaii Aerosol Time-Series (HATS):Quantifying Marine Dust Deposition and Composition in an Oligotrophic Gyre
BUCK, Clifton: $537,057
OHNEMUS, Daniel: $429,646

Effects of Climate Change Variables on Microbial Autotroph-Heterotroph Carbon Flux
MORAN, Mary Ann: $326,342
HOPKINSON, Brian: $336,231

Superoxide Dynamics in Irradiated Seawater
MILLER, William: $318,869

S&AS: INT: COLLAB: Goal-driven Marine Autonomy with Application to Fisheries Science and Management
EDWARDS, Catherine: $250,000

FSML: Acquisition of a Raman Microscope at the Skidaway Institute of Oceanography
BRANDES, Jay: $82,800
BUCK, Clifton: $31,050
FRISCHER, Marc: $31,050
SAVIDGE, William: $31,050
OHNEMUS, Daniel: $31,050

IPA Assignment for Program Director (Physical Oceanography Program)
SAVIDGE, Dana: $148,315

NSFGEO-NERC: Collaborative Research: Using Time-series Field Observations to Constrain an Ocean Iron Model
OHNEMUS, Daniel: $79,500

International Workshop on Subtropical Shelf Ecosystems - Western Boundary Current Interactions
SAVIDGE, William: $24,916
SAVIDGE, Dana: $24,916

Collaborative Proposal: The importance of particle disaggregation on biogeochemical flux predictions
BURD, Adrian: $32,760

SE Coastal Ocean Observing Regional Association

Purchase and Redeployment of Presently Leased and Deployed High Frequency Radars for IOOS purposes within SECOORA
EDWARDS, Catherine: $190,275
SAVIDGE, Dana: $190,275

Coordinated monitoring, prediction, and assessment to support decision-makers needs for coastal and ocean data and tools, HF-radar component', Year 3
SAVIDGE, Dana: $91,000

Glider Observatory Year 4
EDWARDS, Catherine: $45,000

Hurricane Supplemental-Repairs
SAVIDGE, Dana: $33,772

US Department of Commerce

Cooperative Institute for Satellite Earth System Studies (CISESS) NOAA
CASTELAO, Renato: $100,000

Age of Black Gill
FRISCHER, Marc: $100,000

Optimizing Georgia's Shrimp Fishery in the Georgia Sea Grant, Tidal channel network dynamics and salt marsh ecosystem functioning along the Georgia Coast
SPIVAK, Amanda: $87,852

Southeast Coastal Ocean Observing Regional Association (SECOORA): Hurricane Gliders
EDWARDS, Catherine: $70,000

Development of a Coastal Fetch Tool for the AMBUR R Package (Phase II): Assessment of Georgia's Tier 1 Coastal Counties
ALEXANDER, Clark: $21,998

New Grants Funded 2019

Georgia Department of Natural Resources

Artificial Reefs, Critical Habitat and Bathymetry in Georgia Coastal Waters – Phase II
ALEXANDER, Clark: $135,119

Georgia Coastal Research Council
ALBER, Merryl: 2019, $46,086
2020, $43,243

University of Georgia

President's Interdisciplinary Seed Grant Program, Mitigating emerging disease impacts in fisheries: Adaptive strategies to ensure a safe, healthy seafood supply
FRISCHER, Marc: $50,000

Provost State-of-the-Art conferences
SAVIDGE, William: $4,000

Supplemental Funding Request for an International Workshop on Western Boundary Current-Subtropical Continental Shelf Interactions
EDWARDS, Catherine: $4,000

Other Notable Funds

US Department of Energy Cell to Ecosystem: Understanding methane and associated nutrient cycling by sediment hosted syntrophic consortia and their viral predators
MEILE, Christof: $314,504

Navy/NOAA, Soundscape metrics to support marine protected area management at Gray's Reef National Marine Sanctuary
EDWARDS, Catherine: $136,066

Sloan Foundation, All microbes must die. Investigating the mechanisms of microbial mortality in the ocean
HARVEY, Elizabeth: $70,000

National Aero & Space Admin, The impact of the El Niño-Southern Oscillation on sea surface temperature fronts in the California and Humboldt Current Systems (renewal)
CASTELAO, Renato: $42,850

NATL FISH & WILDLIFE FDN, City of Tybee Island, GA Coastal Marsh and Community Adaptation
ALEXANDER, Clark: $22,350

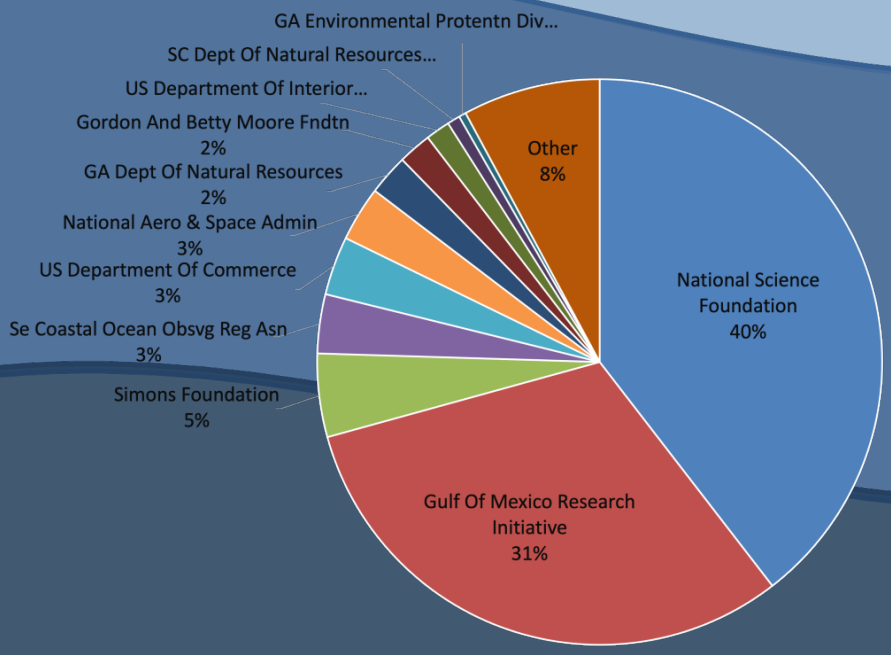
Rensselaer Polytechnic Institute ARMOR: A new tool for managing the spread of invasive aquatic species in NY
FRISCHER, Marc: $18,993

GA DoT, Phase 2: Enhancement and Restoration Interventions for Bird-Long Island Shoreline Alternatives: Design and Modeling for Stewardship
ALEXANDER, Clark: $13,250

SANDIA NATIONAL LABORATORIES, Attached Periphytic Algae Cultivation and Analysis
ALEXANDER, Clark: $7,031

Active Grants 2019

Research Expenditures for 2019: **$6,567,658**



Thank you to all of our Alumni and Friends for your support

Our shared passion for Marine Sciences will inspire and train future leaders and we thank you for investing in us. Below are those who made gifts to the Department of Marine Sciences from January 1st, 2015 - December 31st, 2019

Mrs. Jean Ahrens
Ms. Lydia C. Babcock-Adams
Ms. Elizabeth C. Butler
Ms. Melanie Butler
Dr. Collin J. Closek & Dr. Justin L. Matthews
Dr. Sean L. Coy & Ms. Betty Phan B. Coy
Ms. Tanya L. Crowe Boles & Mr. Craig J. Boles
Mr. Anthony W. Gilkes
Mr. Barry Honeycutt & Mrs. Wanda Honeycutt
Ms. Jordan L. Honeycutt
Mr. William A. Hudson & Ms. Amy Cherry
Ms. Rachel J. Jakuba
Ms. Danielle E. Jenkins
Casey M. Kaliher
Mr. Andrew Miklesh & Ms. Jolene Miklesh*
Dr. William L. Miller & Ms. Joel H. Miller
Mr. Scott P. Mohr
Dr. Karen L. Nelson
Dr. Matthew B. Ogburn & Mrs. Joanna H. Ogburn
Dr. Rachel S. Poretsky
Mr. Clifford S. Shuman III & Ms. Susan L. Shuman
Mr. James A. Sommerville & Mrs. Frances D. Sommerville
Mr. Kevin M. Thompson
Dr. Ming-Yi Sun
Ms. Tara C. Walker
Dr. Amanda B. Wrona
Mrs. Vassy Yeung Pepper & Mr. Randy T. Pepper

*In memory of David Miklesh to support graduate student research

Through the newly launched UGA Mentor Program, we have an excellent opportunity for our Alumni (including faculty and staff) to connect with our students. Please visit mentor.uga.edu and invest in a student's future.

A special thank you to Mr. Jonathan Langham and the GA Aquarium who donated a 6 ft fully functional aquarium and worked with our MSGSA on making that donation happen. The Marine Sciences graduate students have taken the initiative to care for our new coral tank and have developed education materials showing the stresses that coral reefs face in a changing climate.