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Department of Marine Sciences

Fall 2021 Newsletter

GREETINGS FROM THE DEPARTMENT HEAD

As fall descends into winter, it is a good time to reflect on the incredible changes that have occurred over the past year. It began under strict COVID-19 safety guidelines that impacted our research, education, and outreach activities. With the remarkably swift development of vaccines and their distribution, driven by cutting-edge science and technology, the Department was able to return to near-normal activities this summer and fall.

Some of these activities are showcased below. In this issue, you'll find an interview with Dr. Claudia Koerting that highlights her career and work in the Department; a story about a UConn research cruise in Alaska; an interview with Yan Jia '19 Ph.D. about his postdoc experiences with the Connecticut Institute for Resilience and Climate Adaptation (CIRCA); and much more.

Finally, if you have not done so already, we invite you to join the Partners of Marine Sciences. Doing so will keep you informed of the activities and events ongoing in the Department of Marine Sciences, and allow us to reach out to you with special initiatives.

I wish everyone a productive finish to the fall semester and a healthy and happy New Year.

J. Evan Ward

PROFESSOR AND HEAD, DEPARTMENT OF MARINE SCIENCES

WHERE ARE THEY NOW?

Alumni Spotlight – Yan Jia

Dr. Yan Jia is a recent graduate of the Marine Sciences Department — he finished his PhD with Prof. Mike Whitney in 2019. His graduate research used drifters and models to understand the seasonal variation of freshwater discharge from the Connecticut River into Long Island Sound. Yan is currently working as a postdoctoral research associate for the Connecticut Institute for Resilience and Climate Adaptation (CIRCA). In his free time, he likes to collect matchbox cars and spend time with his family and his three children. This interview was carried out by Emma Shipley on October 12, 2021.

Q: HOW DID YOU END UP IN YOUR CURRENT POSITION, AND WHAT DO YOU DO NOW?

When I worked as a PhD student, I didn't pay too much attention to my future work. I knew I wanted to do research, but I didn't try to apply to that many places, maybe 7 or 8 institutions. Sometimes you get denied, and you have to learn not to take it personally. Sometimes it's just the job market, or the time window for the position doesn't line up with your graduation and they are urgently looking for someone to fill the position. Eventually, Jim (Prof. James O'Donnell, UConn) offered this position to me. He was looking for postdocs.

Right now, CIRCA has two postdocs, me and my colleague Chang (Chang Liu, postdoctoral research associate, CIRCA). We are running more realistic studies on how to react to climate change and climate change's impacts on the local area. We established a 100-year return period chart about how strong the storm surge and highest waves will be. We also run simulations more locally, specifically around New Haven harbor and neighboring coastal towns. One of the projects I finished earlier this year was about salt marsh flooding in Guilford. There is a small inlet with a width of only 8 meters, but it controls the water exchange of a 120-acre salt marsh. The local residents want to build a bridge over an old route that goes across the salt marsh; because of the sea level rising there has been more frequent flooding. It may cost millions of dollars, so they want to know what the flooding conditions are like. We run model simulations, but we also want to know if the results are reasonable. Normally people just run one numerical model, like ROMS (the Regional Ocean Modeling System), but what I did was compare four different hydrodynamic models. We can see why each model is different from the rest and which one is better to be applied in Guilford, and that will help future coastal modeling. Also, we simplified those hydrodynamic models to an idealized mathematical model that can predict the water levels inside the salt marsh much, much quicker. This idealized model is 1000x faster than the original hydrodynamic model and can be easily used by other non-modelers.

Q: IT SOUNDS LIKE MOST OF WHAT YOU DO ON A DAY-TO-DAY BASIS IS WORK ON MODELS?

Yes, generally I help supply the scientific results for management and decision making.

Q: WHAT DOES TYPICAL MODELING WORK LOOK LIKE FOR YOU?

Since the summer, I have been working on adding wave forecast to an established operational model. It supplies surface current information for the Coast Guard in case they need to rescue a boat or a person in the Sound. Jim and his team have been collecting buoy-observed wave data for over 15 years. It's one of the longest wave records in a US estuary. We can run hindcast simulations with the historical observations to tune the wave model and find a good set of parameters to support the operational forecast.

As an aside, Yan shared with me a joke about his work:

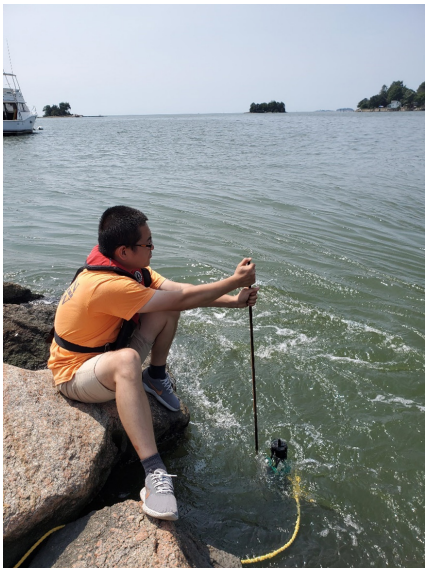
In Chinese, 'physical oceanographer' has a similar pronunciation as the words meaning "an oceanographer who sits inside the room," so that's my job. I just sit inside the room. Very occasionally, I am sent to the field. I think field observations are very necessary. Last spring, I spent several months trying to improve the Guilford simulation, but it wouldn't give the right answer. So, in the summer, I decided that we needed to have a field trip. When I saw the inlet, I realized it was totally different from what the model was trying to predict. That was the starting point to drag me back to the right place. So, I shouldn't stay in the room all the time!

Q: WHAT ABOUT YOUR GRAD SCHOOL EXPERIENCE AT UCONN PREPARED YOU THE BEST FOR THIS JOB?

I worked with Mike and got more familiar with ROMS, which laid the foundation for what I do now. Mike and Jim allowed me freedom, they did not regulate me in certain directions, they allowed me to use my wisdom to decide what direction or question I thought was good to pursue, and they always gave good advice. When I worked with Mike, he encouraged me to learn more simulations not just on the ocean side, but also on the atmospheric side. That helped my work with Jim because to make a good simulation of storm surge, you have to have a good simulation of wind.

Q: DO YOU HAVE ANY ADVICE FOR CURRENT STUDENTS?

One of the good courses I learned from was Jim O'Donnell's mathematical modeling course. I took that course twice. You can bring your own question and get his advice on the direction you should take. My classmates and I all learned a lot from his lecture. And of course, everyone knows to read a lot of papers.



YAN USES A SIDE-LOOKING ADCP TO MEASURE THE INFLOWS AT A GUILFORD SALT MARSH INLET (PHOTO: KAY HOWARD-STROBEL)

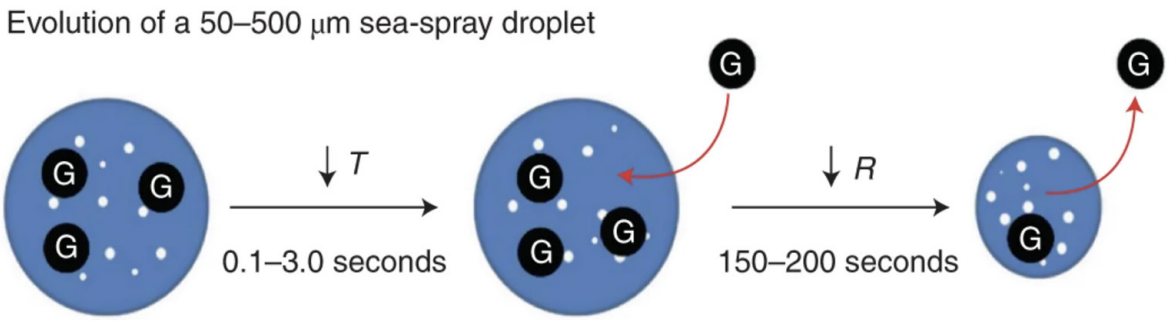
Investigating the Role of Sea Spray in Gas Exchange

When considering the oceans' role in climate change, many people focus on the capability of the oceans to store gases from the atmosphere. However, the transfer of gases between the atmosphere and the ocean is actually a complex process facilitated by multiple mechanisms, including sea spray. Sea spray moves matter and energy between the surface ocean and the atmosphere, and its contribution to gas exchange is not yet fully understood by researchers. Strongly linked to wind conditions, sea spray is predicted to increase as long-term climate trends increase wind speeds, particularly in extreme conditions such as hurricanes. Improving the modeling of gas exchange in these scenarios can help inform climate predictions of the future.

In a recent publication, former graduate student Allison Staniec, Professor Penny Vlahos and Emeritus Professor Edward C. Monahan modeled the sea spray gas exchange of non-reactive gases including argon, helium, neon, nitrogen, and oxygen. The goal of the project was to understand the magnitude of flux of these gases between the ocean and the atmosphere via sea spray. Staniec explained the motivation for the work, "There's been a lot of exploration about how sea spray can carry things like heat and momentum. People have started looking at how it can carry organic compounds. There hasn't been a ton of work on gases, and part of that is because it's really difficult to measure in situ or in the laboratory. We wanted to do a proof of concept of whether this spray-mediated gas exchange could theoretically contribute to overall gas exchange."

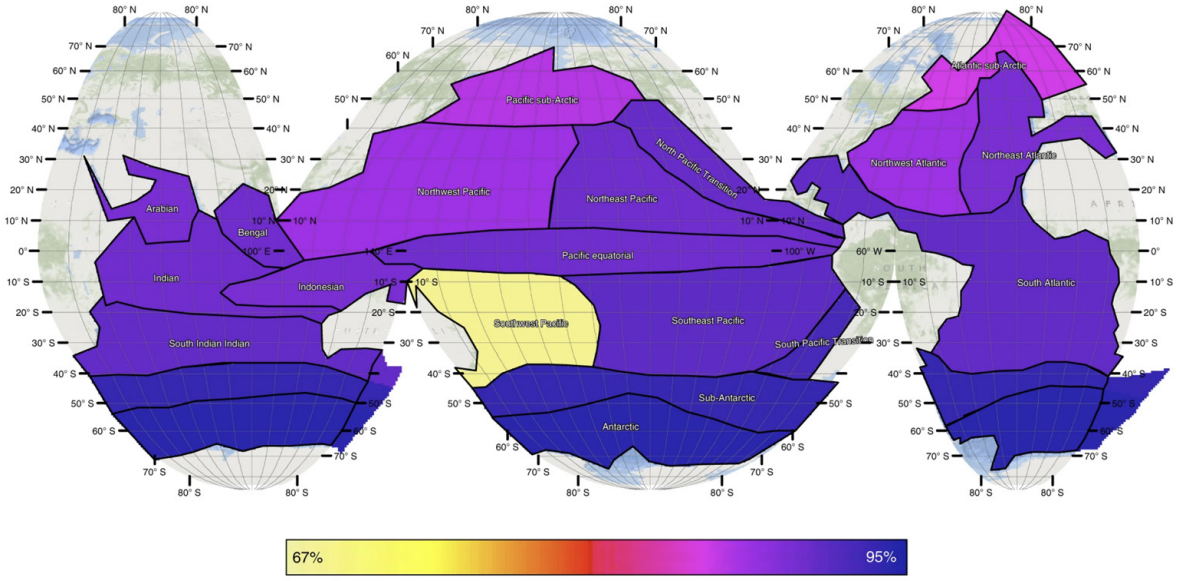
There are several challenges to creating a sea spray model. First, there are many different calculated sea spray generation fluxes from previous work to choose between. Staniec explains that the Anguelova number flux was chosen because it fell right in the middle of the many literature values, but that the range of orders of magnitude of sea spray droplet generation can further complicate calculations. In addition, sea spray droplets have two stages after creation, in the first they cool after separating from the ocean surface and in the second they shrink and evaporate. However, not all droplets have the same fate. Some cool but fall back to the surface before beginning to evaporate, some evaporate entirely, and many fall somewhere in between. Since the studied gases are more soluble at lower temperatures, droplets that cool but then drop back into the ocean transfer gas into the ocean, but droplets that cool and evaporate completely transfer gas into the atmosphere.

After carefully considering how to represent all these factors in their model, the group determined that for gases like He and Ne, sea spray will not have much effect even at high wind speeds. However, for gases like O2, sea spray could have a significant impact on gas



The typical evolution of a sea-spray droplet on injection into the atmosphere. G represents a gas molecule; T, the temperature; R, the radius; white dots represent the salt ions in solution. (Staniec et al. 2021)

flux between the ocean and the atmosphere, particularly at high wind speeds. While this paper doesn't focus on gases that are relevant to climate change, future models can expand the understanding of gas flux to more complicated and climate-relevant gases, such as CO2. Staniec explains, "We didn't do specifically climate change relevant gases because CO2 is complicated by the fact that it reacts when it enters the water. But this is a stepping stone for that." More investigation is needed to understand sea spray mediated gas exchange, particularly in areas of high wind speed such as the Southern Ocean, which is known for high winds and carbon sequestration. Future studies can use the findings and relevant code presented in Staniec's work to further constrain gas exchange in these regions.



Citation: Staniec, A., Vlahos, P. & Monahan, E.C. The role of sea spray in atmosphere–ocean gas exchange. Nat. Geosci. 14, 593–598 (2021). https://doi.org/10.1038/s41561-021-00796-z

Dierssen Hosts the NASA PACE Science Team at Avery Point

Professor Dierssen hosted the 3-day Plankton Aerosol Cloud and ocean Ecosystem (PACE) Science and Application Team Meeting at the University of Connecticut, Avery Point in a hybrid format with 32 in-person attendees and 77 virtual attendees. Twenty-two in-person and twenty-eight virtual presentations were given, including 5 minute lightning talks from each science and application team member. The hybrid meeting format facilitated a best-of-both-worlds opportunity to collaborate, to resolve sticking points, and to build partnerships, while sharing mission and programmatic updates and while advancing the science and societally relevant applications of the PACE mission.

The PACE satellite mission is slated to launch in January 2023 with new hyperspectral and polarimetric sensors to revolutionize the way we monitor the oceans and atmosphere from space.

Meet Dr. Claudia Koerting, a Woman who Wears Many Hats

Dr. Claudia Koerting has been working in her current professional faculty position for the past 16 years, although she's had various positions at UConn since 1997. Almost every graduate and undergraduate who gets a degree in the Department of Marine Sciences has had the opportunity to work with Claudia. Her current position includes serving as the marine science undergraduate coordinator and the honors advisor for the major, coordinating the Early College Experience (ECE) Marine Sciences Program, teaching several courses at Avery Point, and maintaining and helping students use the instrumentation in the SMALER (Suspended Matter Analytical Laboratory for Education and Research) Lab.

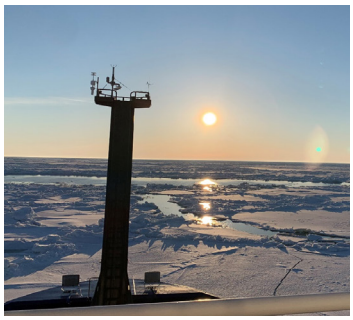
CLAUDIA DRIVING THE SKIFF (PHOTO: CHARLIE WOODS)

Claudia graduated from the University of Rhode Island (URI) with a double degree in chemistry and microbiology, received a Master's from UConn in Oceanography, and completed a PhD in pharmaceutical sciences at URI. Her interdisciplinary background allowed her to work on a variety of research projects, from Lyme disease to marine pathogens to the inhibition of bacteria that degrade oil and fuel. She emphasized the importance of interdisciplinary projects: "I like to combine all my backgrounds, cell biology, chemistry, and microbiology, (in the context of marine sciences) because any of them alone is boring to me." She is particularly apt at analytical work, which made her the perfect fit to run the SMALER Labs at Avery Point. After taking on the role of a PhD level academic assistant for DMS in 2005, she has continued to add to her responsibilities by naturally filling vacuums she has observed, such as oversight of undergraduate lab courses. Of her career path, she says "It's a great example of how everything you've done in your life, no matter how irrelevant it seems at the time, can be relevant to your future work." When asked what a typical day on the job looks like, she laughs and says there is no typical day.

Her favorite parts of the job center around helping students grow as scientists and researchers. "A big part of what I love to do is connecting undergraduates and high school students with research and ideas. I get to see them coming in as freshman, and I get to see them going out as seniors. At the end of the day, when I look back and know that I've helped someone in some way, then I feel like I've done my job. It's gratifying."

Outside of work, Claudia has a passion for being outside, particularly sailing. She loves to be on the water year-round, but when she cannot get out onto the water, she also has a passion for hiking.

Quarantine Cruising: Oceanographic Cruises During COVID



In early May of 2021, two faculty members and four students from our department set out for an Arctic research cruise. Led by faculty member Prof. Rob Mason, the group spent two weeks quarantining on the remote island of Unalaska in the Aleutians before departing on a three-week oceanographic cruise. The cruise was planned to travel northward through the Bering and Chukchi Seas, heading for the marginal ice zone and annual sea ice located around 73° N in the early summer.

The Arctic, defined as the region of the Earth within the Arctic Circle located at approximately 66° 34' N, contains several seas and parts of the United States, Canada, Scandinavia, Iceland, Greenland, and Sweden. The region is unique, with cold temperatures, varying snow and ice cover, and seasonal sea ice. Prevailing water and air currents facilitate the transport of many long-range pollutants to the Arctic, and the region is heavily impacted by climate change. Global warming has caused the loss of annual and seasonal sea ice cover, increased river discharge, and thawing of permafrost. Many climate models predict greater warming in the Arctic than the global average, compounding the effects of these changes. Scientists have increased their focus on this region to better understand how the changing Arctic will affect both environmental and human health. One of the most effective ways to gather data about these ecosystems is through oceanographic cruises.

Multi-week cruises are the backbone of much research in the oceanographic field. The occurrence of these cruises can often be reduced to a few sentences in the methods section, but the execution requires years of work prior to departure. Planning for this trip began in 2017, when Prof. Mason first submitted a proposal to the National Science Foundation (NSF) along with co-investigator Dr. Dave Kadko of Florida International University. He requested funding for a cruise to the Arctic to examine the role of ice in controlling mercury levels in seawater.

While the RV Sikuliaq, operated by the University of Alaska Fairbanks, can typically host 20 scientists, due to the COVID-19 pandemic, the cruise was limited to 10. COVID-19 required other changes to the typical cruise experience, too. Everyone on the ship had to undergo a two-week quarantine and two COVID-19 tests prior to boarding. The UConn science party quarantined in Unalaska, Alaska, commonly known as Dutch Harbor. During the quarantine, the group hiked to several different sites on the island, including two sites of WWII bunkers and two different mountains.

After boarding the ship, the group settled in for three weeks of data collection. To meet research objectives, UConn's team collected air, water, snow, and ice samples. One unique aspect of cruises to the Arctic is the ability to collect samples from sea ice. During this cruise effort, the science party sampled at 5 different ice stations within the marginal ice zone,

the region of seasonal sea ice surrounding annual ice. Sampling on sea ice is a carefully orchestrated process. The ship's captain and crew meticulously select a section of ice that looks large and stable enough to support several members of the science party. Scientists are briefed on the safe places to walk on the ice, and the Science Operations crew members test the ice before allowing the science party to sample. Equipment and people are typically transported between the ship and the ice using a "man-basket," or a cage attached to a winch. While on the ice, the science party uses ice-corers to collect ice cores, large augur drills to create holes for collecting ice brine and under-ice water, and shovels for snow. The Arctic environment can be harsh and dangerous, and a team of crew and scientists work as look-outs on the bridge for any potential threats, such as roaming polar bears. In fact, the UConn team saw four different polar bears while on the cruise, three of which were visible while ice sampling was taking place. Seeing polar bears in the wild is a truly unique experience, and observing these animals in their natural habitat was commonly mentioned by the science party as one of their favorite parts of the cruise. Rob adds, "Seeing the bears up close was definitely a highlight. Sampling in the ice and getting out there off the ship was special, but overall being in such a remote beautiful place where very few people go was a highlight."

Departmental History: The Feng Graduate Research Colloquium

An Important Professional Development Tool for DMS Graduate Students

The Feng Graduate Research Colloquium has been a tradition in the Marine Science Department since 1996. Named after the first Head of the Department of Marine Sciences, Dr. Sung Y. Feng, the colloquium was started by Prof. Hans Dam. When he joined the department in the early 1990s, he saw a need for better professional development of students, particularly for presenting their research. Hans developed the colloquium to act as a conference in which students receive friendly, constructive criticism, and have the opportunity to work on developing their abstract writing, leadership, and scientific communication skills.

The format has remained similar over the years, until the COVID-19 pandemic threw a wrench into the schedule. The 2020 colloquium was postponed to 2021 and held entirely online, which presented new challenges for the Steering Committee, the group of graduate students who helped Hans organize and run the colloquium. These challenges included choosing a platform for interactive poster presentations and troubleshooting throughout the day. Hans reflects, "The particularly difficult thing was running the poster session. We found this free software that worked, and it worked pretty well, but it was a little difficult to transition from room to room." Hannah Collins, a member of the 2021 Feng Steering Committee, added, "Usually, Feng is such a collaborative thing within the department so the challenge was to replicate that virtually. We did our best to create opportunities for good research discussions, even if it was over a computer screen."

Students benefit in different ways from participating in the colloquium. They prepare by listening to several seminars from faculty about writing abstracts and presenting both posters and oral presentations. Hans works with other faculty to read and critique abstracts students prepare.

Hans adds, “One way to make a reputation is to give good talks, whether at conferences or invited seminars. The colloquium is a way to hone many of the skills of professional development and those that are expected of people who graduate from graduate school. We’ve seen the benefits, because our students do very well at conferences.”

While Masters students typically only have the opportunity to present at one colloquium, PhD students typically get multiple opportunities. Hans acknowledges that he can see improvement in these students from their first colloquium to subsequent ones, “Most PhD students give a poster their first year, so you see that progression from not having an idea formulated to being able to give a talk. The more you present, the better you get, and I see that with the colloquium itself.”

Given the benefits of the colloquium to students and the department, it’s clear that the tradition isn’t going anywhere, and for now, neither is Hans. “Feng is one of my prides. I do it because I love it, and it’s a great thing. At some point I’m sure I’m going to walk away from it and let somebody else do it, but in the meantime, I’m just enjoying it.” The Department looks forward to another successful Feng Colloquium in 2023.

Professor Ed Monahan’s “Message in a Bottle” reaches Russia

(This story includes excerpts from “From Galway Bay to Kola Bay – Research bottle set adrift 40 years ago reaches Russia” published in the Irish Examiner, 10/25/2021)

A message in a bottle cast into the ocean off Ireland’s West coast roughly 40 years ago has turned up in Murmansk, Russia last week – some 4,000km away. The bottle was discovered at Kola Bay, an estuary north of the port city of Murmansk, the biggest city in the Russian Oblast of the same name. Contained within the bottle was a small yellow postcard bearing the address of University College Galway – now NUI Galway’s – Oceanography Department, along with a request to return the bottle with details of where and when it was found. Current members of NUI Galway’s faculty identified the bottle as part of a drifter program run by Prof. Ed Monahan in the late 70s and early 80s. Dr. Monahan previously worked at NUI Galway, but is now emeritus faculty at the University of Connecticut. While at NUI Galway in the late 1970s and early 1980s, he conducted research with ‘drifters’ off Ireland.

While it is possible the bottle was picked up by a fishing vessel somewhere in the North or the Norwegian Sea and discarded close to the Russian coast, Dr. White, an oceanographer NUI Galway, believes the most likely explanation is that the bottle simply drifted there via natural currents. “Currents in the Rockall Trough region will flow generally into the northern North Sea area and across to the Scandinavian side and beyond into the Arctic. However, the route would be determined by the winds and at any locality the weather systems so the route could have been very indirect,” Dr. White said.

The man who found the bottle in Kola Bay got in touch with NUI Galway’s College of Science and Engineering by email last week to notify them of his discovery and attached some photographs of it. The photographs appear to show that the serial number on the card – which would allow NUI Galway’s researchers to learn exactly where and when the bottle was sent to sea – has

faded over time. Attempts to get back in touch with the man who discovered the bottle have so far been unsuccessful, but Dr. White's Russian-speaking wife plans to send him another on behalf of the University in a bid to learn more about the bottle's long journey from the west of Ireland to the Northwest of Russia.

Speaking on the re-emergence of one of his projects, he said "For this drift-bottle to be found 35 years after I returned from Ireland, and 15 years after I retired to emeritus status at UConn, was like "a welcome echo from the past." I am pleased that my former colleagues in NUI, Galway, remembered my role in this study, and flattered that they saw fit to mention it to the press. It's rare for a drift-bottle to be found so long after it was set adrift, but I am aware of drifters that have floated longer distances."

DEPARTMENT ACHIEVEMENTS

Awards

Prof. Hans Dam

Received the 2021 UConn Faculty Excellence Award for Graduate Teaching. This Award recognizes a faculty member with a distinguished record of sustained teaching excellence through outstanding instruction, engaging students thoroughly in the process of learning, and contributing significantly to the intellectual life of the University.

Awarded the Melbourne R. Carriker Award from The National Shellfisheries Association.

Grants

CIRCA – Prof. James O'Donnell

The Connecticut legislature's 2021-23 budget provided an additional $5 million to CIRCA to expand Resilient Connecticut activities and advance fundable projects. CIRCA will continue to support development of innovative adaptation approaches for flood and heat vulnerability along with expert advice on climate issues to communities in Hartford, New London, and Middlesex Counties.

Prof. Hannes Baumann

Connecticut SeaGrant: PI Baumann together with collaborators from CTDEEP received funding to investigate the causes and ecosystem consequences of the recent, steep increase in Black Sea Bass in Long Island Sound.

Jo-Marie Kasinak (graduate student, Prof. Vaudrey) & Prof. Jamie Vaudrey

Connecticut SeaGrant: Toward a deeper understanding of human connections with ocean environments: Ocean Identity (OI) as a novel construct, research instrument, and assessment tool. (2022-2024), $143,309, PIs Kelly, Kasinak, McKinley, Vaudrey, & Mattei.

Prof. Robert Mason

NSF Chemical Oceanography: Methylated mercury sources and cycling in the high latitude North Atlantic. (2021-2023), $283,534, PI Mason.

Prof. Samantha Siedlecki

NSF: Regional climate change projections to enable equitable ocean planning for the blue economy (2021-2022), PIs. Pinsky, Hice-Dunton, Siedlecki, & St. Martin. This project aims to enable climate-ready, coordinated, and inclusive decision making throughout the blue economy and spark a new generation of durable blue development.

Prof. Penny Vlahos

NSF: Arctic Marginal Ice Zone Alkalinity (AMIZA). PI Vlahos. This project is studying the components of carbonate alkalinity in the changing Arctic with a focus on the transient ice melt zones.

NIH: Chronic Kidney Disease. PI Vlahos. Lead PI Shuchi Anand, Stanford University. This project is a continuation of our efforts with colleagues in Sri Lanka and at the Stanford to expand our 300 person cohort to a 900 person longitudinal study on the progression of kidney disease and water quality.

Publications

Prof. Peter Auster

Prof. Auster presents a chapter as part of an international effort to inform delegations to the United Nations about the status and effects of human activities on the global ocean. (Levin, L. A., Auster, P., Clark, M. R., Hall-Spencer, J. M., Hopcroft, R., Ingels, J., Metaxas, A., Narayanaswamy, B., Tuhumwire, J. T., Yasuhara, M. (2021). Continental slopes and submarine canyons. Chapter 7J, p. 395-420, in: The Second World Ocean Assessment, World Ocean Assessment II. United Nations, New York.)

Prof. Auster addresses the confusion in ecological terminology used in international agreements to manage fisheries impacts on the high seas. (Watling, L., Auster, P. J. (2021). Vulnerable marine ecosystems, communities, and indicator species: confusing concepts for conservation of seamounts. Frontiers in Marine Science 8:622586. 10.3389/fmars.2021.622586)

Prof. Auster and colleagues present a study used by the Biden administration as evidence to restore protections from commercial scale fishing in the Northeast Canyons and Seamounts Marine National Monument. (Redfern, J. V., Kryc, K. A., Weiss, L., Hodge, B. C., O'Brien, O., Kraus, S. D., Quintana-Rizzo, E., Auster, P. J. (2021). Opening a marine monument to commercial fishing compromises ecosystem protections. Frontiers in Marine Science. 8:645314. 10.3389/fmars.2021.645314)

Prof. Auster and colleagues demonstrate that simple GoPro cameras can be used to quantify the role of oyster aquaculture cages as fish habitat. (Mercaldo-Allen, R., Clark, P., Liu, Y., Phillips, G., Redman, D., Auster, P. J., Estela, E., Milke, L., Verkade, A., Rose, J. M. (2021). Exploring video and eDNA metabarcoding methods to assess oyster aquaculture cages as fish habitat. Aquaculture Environment Interactions 13:277-294.)

Prof. Paola Batta-Lona

Prof. Batta-Lona and colleagues examined how environmental conditions affect the distribution of zooplankton in the Gulf of Mexico. (Cicala, F., Arteaga, M., Herzka, S., Martinez, M., Hereu, C., Jimenez Rosenberg, S. P. A., Saavedra, A., Robles, J., Gomez, R., Batta-Lona, P. G., Galindo Sanchez, C. E. (2021). Environmental conditions drive zooplankton community structure in the deep-water region of the southern Gulf of Mexico: a molecular approach. Molecular Ecology. 10.22541/au.162152405.56436864/v1)

Prof. Batta-Lona and colleagues used DNA (metabarcoding) to look at the diversity of zooplankton in the Gulf of Mexico. (Martinez, M., Hereu, C., Galindo Sanchez, C. E., Arteaga, M., Batta-Lona, P. G., Saavedra, A., Robles, J., Jimenez Rosenberg, S. P. A., Herzka, S. (2021). Epipelagic zooplankton diversity in the deep water region of the Gulf of Mexico: A metabarcoding survey. ICES Journal of Marine Science. 10.1093/icesjms/fsab090)

Prof. Zofia Baumann

Prof. Baumann and colleagues present a study that demonstrates the liver detoxifies previously-bioaccumulated methylmercury based on analyses of tissues from three waterbird species. (Poulin, B.A., Janssen, S.E., Rosera, T.J., Krabbenhoft, D.P., Eagles-Smith, C.A., Ackerman, J.T., Stewart, A.R., Kim, E., Baumann, Z., Kim, J.H. and Manceau, A., 2021. Isotope fractionation from in vivo methylmercury detoxification in waterbirds. ACS Earth and Space Chemistry, 5(5), pp.990-997.)

Prof. Ann Bucklin

Ann Bucklin, chair of the Scientific Committee for Ocean Research (SCOR) Working Group WG157 presents with other members of WG157 a review paper examining global patterns of biodiversity of marine zooplankton using DNA barcodes or short sequences of cytochrome oxidase I (COI) that discriminate and identify species and announce a reference database for identification of species from DNA barcoding and metabarcoding of pelagic biodiversity, with advanced search functions by ocean region and taxonomic group. (Bucklin A., Peijnenburg, K. T. C. A., Kosobokova, K. N., O'Brien, T. D., Blanco-Bercial, L., Cornils, A., Falkenhaug, T., Hopcroft, R. R., Hosia, A., Laakmann, S., Li, C., Martell, L., Questel, J. M., Wall-Palmer, D., Wang, M., Wiebe, P. H., Weydmann-Zwolicka, A. (2021). Toward a global reference database of COI barcodes for marine zooplankton. Marine Biology. 10.1007/s00227-021-03887-y.)

Profs. Hans Dam, Michael Finiguerra, Hannes Baumann

Profs. Dam, Finiguerra, and Baumann show that zooplankton adapt quickly, but with limited capacity, to ocean warming and acidification, which is both encouraging and sobering news for the response of animal populations to rapid climate change. (Dam, H. G., deMayo, J. A., Park, G., Norton, L., He, X., Finiguerra, M. B., Baumann, H., Brennan, R. S., Pespeni, M. H. (2021). Rapid, but limited, zooplankton adaptation to simultaneous warming and acidification. Nature Climate Change, 11, 780-786.)

Prof. Leonel Romero

Prof. Romero and colleagues propose a new approach to realistically model wave effects on currents, overcoming several limitations of state-of-the-art coupled wave-ocean models. (Romero, L., Hypolite, D., McWilliams, J. C. (2021). Representing Wave Effects on Currents. Ocean Modelling, 167, 101873.)

Prof. Sandy Shumway

Prof. Shumway edited a book titled "Molluscan Shellfish Aquaculture: A Practical Guide" as a usable manual for those interested in an up-to-date introduction to the field. The book covers each of the major cultured species of cultural importance. (Shumway, Sandy, Ed. (2021) Molluscan Shellfish Aquaculture: A Practical Guide. 5M Publishing.)

Prof. Samantha Siedlecki

Prof. Siedlecki and colleagues present work showing that the projected changes for carbon variables like pCO2 and pH in the California Current System (CCS) using a high resolution model are modified by coastal processes resolved in the downscaled projections relative to the projected global simulation, suggesting downscaled projections are necessary to more accurately project future conditions of these variables. (Siedlecki, S. A., Pilcher, D., Howard, E. M., Deutsch, C., MacCready, P., Norton, E. L., Frenzel, H., Newton, J., Feely, R. A., Alin, S. R., Klinger, T. (2021). Coastal processes modify projections of some climate-driven stressors in the California Current System, Biogeosciences, 18, 2871–2890.)

Prof. Siedlecki, graduate student Kelly McGarry, and colleagues present a combination of regional high-resolution simulations that project ocean acidification (OA) conditions for the Gulf of Maine into 2050, the results of which indicate that the aragonite saturation state (one measure of OA) declines and the entire GOM will experiences biologically critical conditions for most of the year. (Siedlecki, S. A., Salisbury, J., Gledhill, D. K., Bastidas, C., Meseck, S., McGarry, K., … & Morrison, R. (2021). Projecting ocean acidification impacts for the Gulf of Maine to 2050: New tools and expectations. Elementa: Science of the Anthropocene, 9(1):00062. 10.1525/elementa.2020.00062.)

Prof. Penny Vlahos

Prof. Vlahos, graduate student Emma Shipley, and colleagues present an interdisciplinary study that connects drinking water quality to the progression of kidney disease in rice farmers in the Sri Lankan dry zone. (Vlahos, P., Schensul, S., Anand, S., Shipley, E., Diyabalanage, S., Hu, C., Ha, T., Staniec, A., Haider, L., Schensul, J., Hewavitarne, P., Silva, T., Chandrajith, R., Nanayakkara, N. (Accepted). Water Sources and Kidney Function: Investigating Chronic Kidney Disease of Unknown Etiology in a Prospective Study. NPJ Clean Water.)

Halle Berger (graduate student, Profs. Samantha Siedlecki and Catherine Matassa)

Berger and colleagues present a vulnerability assessment for Dungeness crab to climate change which revealed that population-level vulnerability to future hypoxia is most severe overall due to increased exposure of the critical adult stage during the upwelling season. (Berger, H. M., Siedlecki, S. A., Matassa, C. M., Alin, S. R., Kaplan, I. C., Hodgson, E. E., Pilcher, D. J., Norton, E. L., Newton, J. A. (2021). Seasonality and life history complexity determine vulnerability

of Dungeness crab to multiple climate stressors. AGU Advances, 2, e2021AV000456. 10.1029/2021AV000456.)

Tyler Griffin (graduate student, Prof. Evan Ward)

Griffin and colleagues demonstrate that antibiotics can be used as effective tools to experimentally diminish the gut microbiomes of suspension-feeding animals, like oysters and mussels. (Griffin, T. W., Pierce, M. L., Nigro, L. M., Holohan, B., & Ward, J. E. (ACCEPTED, IN PRODUCTION). An examination of the use of antibiotics as a method to experimentally perturb the microbiota of suspension-feeding bivalves. Invertebrate Biology.)

Allison Staniec (PhD graduate, Prof. Penny Vlahos)

Staniec and colleagues present a study identifying the role of sea spray in gas exchange in an article that was also featured in Nature Highlights: Big Potential for Tiny Droplets. (Staniec, A., Vlahos, P., Monahan, E. C. (2021) The role of sea spray in atmosphere-ocean gas exchange. Nature Geoscience, 14, 593-598.)

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