In the University at Albany's 177-year history, there have been few years more challenging than these past two years. However, throughout this very difficult time, UAlbany’s research community has once again made an indelible mark in addressing some of society’s most significant challenges—responding to the global pandemic, investigating systemic racial injustice, seeking to eliminate health disparities, and mitigating the climate crisis.

This year’s Research Report is dedicated to “Resiliency and Research” – spanning areas of science where UAlbany researchers are making a profound difference in responding to the COVID-19 pandemic and other areas of global importance. With an arsenal of intellectual and scholarly assets across UAlbany’s nine colleges and schools and over 50 research centers, our faculty and researchers leveraged their unique expertise and experience to strengthen the resilience of our state, our nation, and beyond.

In this publication, you will be introduced to just a sampling of UAlbany research success stories over the past year, which feature resilience-focused research and more. Despite the crises we have navigated, we have so much to celebrate, including the remarkable achievements and recognitions earned by early-, mid- and senior-level career investigators, including our graduate students, who have demonstrated excellence in the pursuit of research and scholarship.

Meanwhile, we look forward to an extraordinary new beginning as we near completion of the long-awaited $180 million, 240,000 square foot R&D facility, known as ETEC. This pioneering facility is poised to serve as a catalyst to accelerate the development of UAlbany’s portfolio of resiliency research—bringing together the University’s College of Emergency Preparedness, Homeland Security, and Cybersecurity; the Department of Atmospheric and Environmental Sciences within the Colleges of Arts and Sciences; the Department of Environmental and Sustainable Engineering within the Colleges of Engineering and Applied Sciences; and the Atmospheric Sciences Research Center. Through this unique research and academic cluster, UAlbany will advance multidisciplinary research to safeguard our communities and our world.

We hope that these stories, accomplishments and milestones not only highlight the impactful work of UAlbany’s faculty and researchers, but also inspire you to partner with us and become a part of the groundbreaking resiliency-related research at UAlbany in the years to come.

Sincerely,
Havidán Rodríguez          James A. Dias
President           Vice President for Research
COVID-19 and HIV

In July 2020, SPH announced the official designation of the Center for Collaborative HIV Research in Practice and Policy (CCHRPP), designed to address the public health and social justice challenges of persons placed at risk for, or living with, HIV and related diseases in New York State. 

CCHRPP is now an epicenter of HIV epidemic research in the United States. Added to traditional areas of attention, a group of CCHRPP researchers turned to the pandemic’s effect upon the HIV-infected.

Published in the Journal of the American Medical Association’s JAMA Network Open, scientists out of SPH and the AIDS Institute at NYSDOH merged statewide databases for HIV surveillance and COVID-19 diagnoses and COVID-19 hospitalizations. They then compared rates of COVID-19 diagnosis, hospitalization and death between New Yorkers with and without HIV from March to mid-June.

Their results showed that, through the middle of 2020, people diagnosed with HIV infection were significantly more likely to contract, be hospitalized (by 38 percent) and die (by 23 percent) from COVID-19. In total, one in 522 New Yorkers infected with HIV died in the hospital of COVID-19 from March to mid-June. The researchers also found that those with more advanced HIV disease faced even greater risks from COVID-19.

Rosenberg added that, because HIV infection weakens the immune system and is associated with a variety of comorbidities, people living with HIV may be more vulnerable to COVID-19. “The results indicate that prevention and treatment efforts need to give additional consideration and support to the needs and heightened risk of persons living with HIV, including vaccination efforts, when the federal government makes more doses available,” Rosenberg said.

On Multiple Fronts, the School of Public Health Researches a Pandemic

When it came to informing New Yorkers and the nation about COVID-19 — particularly its effect upon the lives of vulnerable populations — UAlbany’s School of Public Health (SPH), in collaboration with the New York State Department of Health (NYSDOH), played a critical role. As COVID-19 reached official pandemic level in March 2020, SPH and NYSDOH had already begun investigating the medical, social and public policy ramifications of the virus on numerous fronts.

Revealing Findings of Its Impact

By early May, SPH and NYSDOH were producing important findings. That month in Clinical Infectious Diseases, they published a vivid March 2020 snapshot of testing, risk factors, outcomes and infections within households in New York State (outside of New York City). It was the first comprehensive epidemiological report on the emergence of COVID-19 from any U.S. state in a peer-reviewed publication.

In June, SPH and NYSDOH provided the first statewide cumulative report on the virus in the nation by race, ethnicity, sex and age. Published in Annals of Epidemiology, the study of antibody serosurvey data showed that more than 2 million adults in New York were infected with SARS-CoV-2, the virus that causes COVID-19, through late March 2020. At that time, only 9 percent of the cases had been diagnosed. These were the first U.S. estimates of transmissions in households and according to age — a key factor in providing schools with fall reopening guidelines.

COVID-19, Ethnicity and Race

Lead author of the antibody serosurvey paper, Dr. Eli Rosenberg, an associate professor of Epidemiology and Biostatistics, detailed how the prevalence of COVID-19 was higher among Latinos, Black and Asian adults than white adults.

This fact was reinforced one month later, when SPH and NYSDOH released results from an epidemiological study in Annals of Epidemiology. It showed, by using estimated per-population COVID-19 fatality rates, that the death rate for Hispanic adults was four times higher than that of white adults (0.12% versus 0.03%), and for Black adults six times higher than among white adults (0.18% versus 0.03%).

The study concluded that disparities among the races were best explained by differences in infection rates and responses to the need for hospitalization. “It is most important to construct policies and programs that address the upstream social determinants of SARS-CoV-2 infection in the first place, rather than wait to intervene near the point of fatality; by then it is too late to prevent and alleviate these disparities,” said Dr. David Holtgrave, dean of SPH and co-author of the article.

Dr. David Holtgrave, dean of SPH

Rising to the Occasion: SPH Students Apply Themselves to the Challenge

More than two dozen School of Public Health students at both the undergraduate and graduate levels adapted their Spring 2020 plans to aid in the public health crisis created by the global pandemic.

• MPH students Monroe Marshall and Makenzy Jabbour, worked with the epidemiology team at the Albany County Department of Health, notifying patients whose tests came back positive and tracing the patients’ contacts who may have been exposed.

• Tristan Nowak, a PhD student in Biomedical Sciences, tracked new case intakes, conducted wellness calls to COVID-19 positive individuals and helped with database management at the Schenectady County Department of Health.

• MPH student Kathry Simpson worked for the New York State Association of County Health Officials, cross referencing resources for local health departments and assessing their funding needs for COVID-19 response. She even drafted correspondence to congressional leaders describing resource gaps.

• Colin O’Connor, a master’s student in Epidemiology, conducted contact tracing and data management for COVID-19 and also created and disseminated case distribution maps for the state.

• Ariela Zamchek, completing a Fellowship of Applied Public Health, worked with the communicable disease division of NYSDOH, helped with advisories, guidelines and as a resource for officers to advise them on the latest guidance and protocols. She also was active in the City of Troy, leading a webinar for community members.

Students appreciated both the experiential education they acquired and the sense of being supportive during a crisis.

“Outbreak investigation and response is what I want to do with my career, so this has been an amazing experience that I couldn’t have gotten in the classroom,” said Jabbour.

“An outbreak like this is why people choose epidemiology as a career,” said O’Connor. The work of many more students, aiding in the crisis, is ongoing.
Johanne Morne, director of the AIDS Institute and study author, concurred. "As our results clearly establish that more advanced HIV disease is associated with worse COVID-19 outcomes, it is critically important that as soon as additional doses become available from the federal government, people living with HIV have access to and accept vaccination," she said.

Assessing the Wide Range of Pandemic Impact
Throughout 2020 into 2021, SPH researchers explored and updated the region, New York and the nation on various aspects of the disease and its impacts. These included:

- In April 2020, the Health Workforce Technical Assistance Center in SPH’s Center for Health Workforce Studies developed a resource dedicated to developing, deploying and replenishing the health workforce through data and information sharing in response to the pandemic.
- In May, faculty from SPH and SUNY Downstate Health Sciences collaborated with an NGO in the Republic of Georgia on a $1.5 million NIH-supported project to deliver a five-year strategic training initiative for that nation to help combat its AIDS epidemic.
- In May, SPH’s David Holtgrave, Eli Rosenberg, Tomoko Udno and Janine Jurkowski served as NYSDOH’s lead partners on an observational study and study author, published “Core Elements of Multisystem Inflammatory Syndrome in Children (MIS-C) associated with COVID-19.
- In July, SPH and DOH jointly authored a paper in the American Heart Association’s journal, published by Health Policy, Management and Behavior Professor Jennifer Manganello, MPH student Patrick Schumacher and a University of Delaware colleague addressed the major shift in how health-related information has been communicated to the public since the pandemic’s onset.
- In December, a report by a research team led by assistant professors Beth Feingold and Xiaobo X. Romeiko of Environmental Health Sciences examined and recommended improvements to emergency food provisions programs for children and families during the COVID-19 global health crisis.
- In early January 2021, SPH professors Shao Lin and Benjamin Shaw collaborated with a research team from Nanning, China, to evaluate the effect of serum vitamin D levels on COVID-19 infection, concluding that vitamin D deficiency is a risk factor for COVID-19, especially for critical cases.
- In a study released in February 2021, SPH Distinguished Professor Edward Hannan, SPH Services Program Project Director Kimberly Cozzens and colleagues reported that fewer severe heart attack patients pursued percutaneous coronary intervention during the pandemic.

What
The College of Arts & Sciences’ RNA Institute’s COVID surveillance testing program, ongoing into 2021, is overseen by Andy Berglund, Institute director, and managed by Tammy Reid, the Institute’s research and development manager, and John Cleary, an Institute collaborative staff scientist. The testing facility team is composed of technicians from the Institute labs of Berglund, Kaakil Reddy and Ken Halvorsen, as well as technicians hired as program assistants.

The testing facility — dedicated to keeping UAlbany and the New York’s Capital Region safe during COVID-19 — is run by a team of three UAlbany entities: the Institute, the School of Public Health, which handles front-end logistics and data analysis, and UAlbany’s Emergency Management office, which handles the back-end notifications, student/staff interfaces and isolation/quarantines.

This triumvirate works in close contact with UAlbany’s Student Health Services and the Albany County Department of Health, which handles any diagnostically confirmed cases initially identified by the UAlbany surveillance program. The testing facility uses only staff and not graduate students or post-doctoral trainees, so that the Institute can focus on the long-term development of RNA as a tool for science and the advancement of human health.

Who
UAlbany’s saliva test is a PCR-based assay, based upon the Yale SalivaDirect and the University of Illinois tests, both of which directly test saliva for the presence of SARS-CoV-2 viral RNA. Both have a very high accuracy rate — SalivaDirect 94 percent and the Illinois test 99.8-99.9 percent.

“The combination of high specificity combined with frequent testing makes saliva-based testing extremely accurate,” said Berglund.

Additionally, both methods directly test saliva without extensive sample processing, reducing the supply chain burden and simplifying the testing process.

The Who, What, Why and How of a Novel Surveillance Testing Program

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Dr. Alex Valm pandemic with research projects focused on a number in the late summer of 2020, RNA Institute research Although UAlbany’s COVID surveillance program began to A Range of RNA Institute Work on COVID-19 on his team’s nanoparticle technology. cost-efficient and programmable detection based for a project seeking to create an ultrasensitive, bionanotechnology, received SUNY SEED funding how mouth microbial communities function to patients. His research team hopes to understand comparing saliva from healthy and COVID-19 influence patterns of transmission. examining the role of RNA modifications in SARS- pathways, is collaborating with Berglund in how RNA viruses subvert cellular RNA metabolism identified by the surveillance program must undergo a facility is not certified by the regulatory agency demonstrated the utility of testing saliva. Due to the RNA-centric nature of this approach, the Institute was tapped to lead the testing facility portion of the surveillance program. It eventually expanded to testing the entire campus and then external partners. Why In the summer of 2020, the RNA Institute, like many academic research institutions, was running with only essential COVID-19-related research and personnel. However, with the upcoming academic year and growing experience with saliva testing, the Institute explored options to keep the campus community safe and the University open in the first COVID semester. What was needed was an affordable, easy-to-use, rapid and highly sensitive COVID-19 test that didn’t overwhelm the existing diagnostic testing labs. Berglund had existing experience with COVID-19 research, collaborating with SUNY Upstate Medical University to investigate clusters of COVID-19 patients by sequencing RNA from patients, their microbiome and the SARS-CoV-2 virus. This study helped to understand the genetics and transmission of the virus and, along with the Yale and University of Illinois findings, demonstrated the utility of testing saliva.

How The RNA Institute partnered with SPI to provide pooled surveillance testing to all students and staff on UAlbany’s three campuses as well as to external partners — a simple and non-invasive weekly test using a saliva sample. The process: Scientists group four samples together, add a chemical solution, and perform a sensitive PCR-based assay to determine if SARS-CoV-2 viral RNA is present in the pooled samples. The pools are broken down to individual samples and retested to identify the presumed positive individuals.

While the UAlbany program uses the same principles and processes as diagnostic PCR testing, its testing facility is not certified by the regulatory agency overseeing diagnostic labs and so cannot be used for any medical reason. All presumptive positive individuals identified by the surveillance program must undergo a confirmatory diagnostic test.

To date, the UAlbany surveillance program has tested more than 120,000 samples from UAlbany staff, students and faculty, as well as external partners such as SEFCU and Siena College.

Although UAlbany’s COVID surveillance program began in the late summer of 2020, RNA Institute research faculty entered the fight against COVID early on in the pandemic with research projects focused on a number of areas. These include:

- Dr. Ken Halverson’s lab used a National Science Foundation Rapid Award for the development of a rapid SARS-CoV-2 test, delivering results within one hour and without the need of a laboratory.
- Dr. Cara Pager, who specializes in understanding how RNA viruses subvert cellular RNA metabolism pathways, is collaborating with Berglund in examining the role of RNA modifications in SARS-CoV-2 biology. Their project may provide clues to how this virus and others impact patient health and influence patterns of transmission.
- Dr. Alyx Valm, a human microbiome expert, received SUNY SEED funding* for his project comparing saliva from healthy and COVID-19 patients. His research team hopes to understand how mouth microbial communities function to prevent infection.
- Dr. Mehmet Yigit, an expert in chemical bionanotechnology, received SUNY SEED funding for a project seeking to create an ultrasensitive, cost-efficient and programmable detection based on his team’s nanoparticle technology.

*Click here for more on SUNY SEED funding awards.

UAlbany MBA students offered a pandemic-time boost to the Troy Waterfront Farmers Market, delivering an idea for a subscription service to get the market reopened after lockdown.

The idea came through the Small Business School Challenge, a 48-hour competition where student teams partnered with small businesses in their communities to find creative ways to manage financial hardships caused by the COVID-19 pandemic.

More than 450 MBA students from 11 business schools nationwide participated. UAlbany had 35 students on 11 teams working with restaurants, bakeries, stores and organizations in the Albany-Schenectady-Troy area.

The team assigned to the Troy Waterfront Farmers Market came up with a plan for a subscription box service — a meal prep box filled with farm-fresh ingredients from a variety of market vendors, with recipes included.

“This would provide sustainable income for the farmers market and solve the ‘what’s for dinner’ question for customers for a few nights a week,” said William Wales, Standish Professor of Entrepreneurship in the School of Business (SOB) and one of the mentors for the student group.

For the Troy market, the idea seemed timely. It was spring, and Market Manager Stephen Ridler had just gotten the green light to reopen the market, which had been shuttered in the lockdown.

“The idea is still solid and it is definitely something we’d like to do in the future,” Ridler said.

The Troy market didn’t end up creating the multi-vendor subscription box plan as proposed, mainly because the complications of opening and operating under COVID-19 safety regulations took all their staff resources.

“The beauty of this project is that it is a great example of win-win. Our MBA students are helping the small business community while also engaging in valuable experiential learning,” said Janet Marler, SOB associate dean of graduate programs and a competition organizer.

The Troy market didn’t end up creating the multi-vendor subscription box plan as proposed, mainly because the complications of opening and operating under COVID-19 safety regulations took all their staff resources. “We did encourage vendors to do their own boxes,” Ridler said. “Anyone who did it, did well.”

And the market has not given up on the students’ concept. “The idea is still solid and it is definitely something we’d like to do in the future,” Ridler said.

Health agencies across the globe have played a critical role in informing the public about COVID-19 through actions such as offering guidance on prevention, motivating compliance with health directives and combating misinformation since the start of the pandemic.

Dr. Jeannette Sutton has spent that same time period observing their messaging on social media.

Sutton, an associate professor and the new director of graduate studies at the College of Emergency Preparedness, Homeland Security and Cybersecurity (CEHC), co-published research in *PLOS ONE* last September that analyzed 150,000 tweets about COVID-19 from official accounts of about 700 state and local agencies between February and April 2020. The goal was to determine which messaging tactics led to the greatest engagement (measured by the number of retweets). Understanding the messaging features that most strongly influenced message retransmission; no single topic was most successful.

Their analysis revealed that tweets characterizing the impacts of the virus, its spread, and actions that individuals can take to protect themselves, were all features that most strongly influenced message retransmission.

The researchers also identified a list of COVID-19-related keywords and phrases that were commonly used during the three-month period.

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“We have identified consistent themes across different hazards that are effective,” Sutton said. “At the same time, some of the usual common messaging tactics – like using exclamation points or asking a question – were found to be counterproductive in the first few months of the COVID-19 crisis. This makes sense given that the context of a pandemic differs from a fast-moving threat, like a wildfire or flood.”

Sutton’s co-investigator is Carter T. Butts at the University of California-Irvine. The two are building on their first study and will soon release a secondary analysis from May to August 2020. Their project is funded through an ongoing RAPID grant from the National Science Foundation to examine COVID-19 risk communication on social media.

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Online education is becoming increasingly available and trusted by both employers and students, with many workers turning to it to advance their education and job prospects. Online courses, however, require self-regulation, and that often invites an impediment to learning success — procrastination.

Detecting procrastination early in the online learner and exploring interventions to overcome it is the work of assistant professors Reza Feyzi-Behnagh of Educational Theory & Practice and Shaghayegh Sahebi of Computer Science in their three-year National Science Foundation-supported ($750,000) project, “Cyberlearning: Detecting and Predicting Procrastination in Online and Social Learning,” which runs through July of 2022.

Feyzi-Behnagh and Sahebi are examining both individual and group procrastination behaviors for students doing online course work. This form of learning, said Feyzi-Behnagh, the project's principal investigator, demands effective time management skills, including planning and setting goals, managing time, and working alone or in groups within a less structured environment than an in-person course.

In accordance with his field in the School of Education, said Feyzi-Behnagh, “I initially looked at different current theories of procrastination and existing methods of collecting data on students’ procrastination in different learning environments. I then began examining and implementing different surveys, prompts and scaffolds in the preliminary version of a mobile app developed by one of my doctoral students, Semih Bursali. This enables us to capture key data that help us better understand the underpinnings of procrastination.”

Feyzi-Behnagh has worked on studying students’ self-regulated learning behavior using survey and “trace” data — students’ digital footprints as they work in technology-rich learning environments.

Co-Principal Investigator Sahebi is using her computer science expertise to find methods of modeling students’ procrastination behaviors using machine learning models and computational algorithms. “These models can help us better understand students’ procrastination behavior, how it unfolds and how we can detect it early on,” she said. “They will lead to understanding of what interventions we can implement and when we can provide them to remedy procrastination, given the negative outcomes it has on students’ learning outcomes.”

Sahebi has also created computational models on how students procrastinate in the context of group work, how that differs from individual procrastination, and how it affects not only individual students’ learning outcomes but also their peers.

“Procrastination in accomplishing learning tasks can lead to low self-efficacy, poor performance, and negative emotions such as guilt, shame, anxiety and stress,” said Feyzi-Behnagh. “Students who struggle with self-regulating their learning will be struggling in the online learning environments. Online environments lack certain scaffolds that exist in a face-to-face classroom, such as the teacher prompting students to reflect on a particular question or issue.”

The duo are identifying such learning strategies, with much of their effort abetted by the creation of a mobile app that helps students set goals and sub-goals for their individual and group projects, establish deadlines, report their studying behaviors using a timer, see their progress toward goals, and fill out questionnaires about different facets of their self-regulated learning. The app, to be deployed in several UAlbany online graduate courses, even includes pop-ups to offer encouragement.

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“Detecting students who are procrastinating early on and providing interventions, such as a motivating nudge, a reminder or a suggestion of an effective learning strategy, could make a critical difference in helping students accomplish their tasks on time,” said Feyzi-Behnagh.

The researchers note that the COVID-19 pandemic, which pushed many institutions to synchronous or asynchronous remote learning and required students to manage their learning at home, has intensified the need for more effective time management and the importance of their anti-procrastination study.

In April 2020, New York Governor Andrew Cuomo charged UAlbany with researching why communities of color in New York have been disproportionately impacted by COVID-19. The goal of the research, carried out in partnership with the New York State Department of Health and other partners, was to add to the existing wealth of knowledge about health disparities in the state by identifying the environmental, socioeconomic and occupational factors that explain why COVID-19 has disproportionately harmed Black and Hispanic New Yorkers—and to propose practical intervention strategies to eliminate these disparities and save lives.

Led by Theresa A. Pardo, the project was anchored by one difficult but inescapable truth: COVID-19 did not create disparities in health outcomes but rather exposed and exacerbated them in ways policymakers cannot ignore. Systemic racism has produced, and continues to produce, deeply entrenched differences in health care and the social, economic and environmental conditions that account for inequities in longevity and the likelihood of disease. The researchers note that this was true long before the first case of COVID-19 was diagnosed in New York and will remain true without resources to make systemic changes.

A true interdisciplinary project at UAlbany, the work involved the School of Public Health, the College of Emergency Preparedness, Homeland Security and Cyberscience, the College of Arts and Sciences, the School of Social Welfare, Rockefeller College of Public Affairs and Policy, CTG UAlbany and the Center for the Elimination of Minority Health Disparities. Together, they looked at factors such as housing and food security, employment opportunities; how communities learned and responded to the dangers of COVID-19; and the availability of and access to health insurance coverage and health care. In reports available at www.albany.edu/mhd, the team developed data-driven strategies to help inform New York’s response to this and future public health threats.

The project is resulting in new extramural funding proposals, strengthened and expanded partnerships and developed new mechanisms for the rapid dissemination of research findings and policy and practice recommendations. Because of this work, the University is poised to continue to inform evidence-based policies and interventions to advance health equity in New York for many years to come.
Careers in the Making — Outstanding Early Career Researchers

University at Albany junior faculty across the disciplines were honored in 2019-20 with national awards for their exceptional promise and ideas.

NSF CAREER Awardees
Presented by the National Science Foundation to junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent teaching and the integration of both within the context of the mission of their organizations.

Mariya Zheleva assistant professor, Computer Science
“Automating the measurement and management of the radio spectrum for spectrum-sharing applications.” $110,494 through 2024

Dr. Zheleva, a computer scientist, conducts research in next-generation wireless-mobile networks. She was assisted in her project by atmospheric sciences graduate student Christopher Lawrence. Zheleva also received the NSF CISE Research Initiation Initiative Award for her project, “Next Generation Spectrum Measurement Algorithms and Infrastructures.”

Sara Lance research associate, Atmospheric Sciences Research Center
“Revitalizing aerosol-cloud-chemistry research at Whiteface Mountain.” $88,698 through 2025

Dr. Lance is conducting her research at the ASRC’s Whiteface Mountain Research Observatory, with a goal of developing a new measurement strategy that will enable a more complete characterization of cloud chemistry. Her award supports a UAlbany graduate assistant for each year of the grant and a free UAlbany chemistry/climate summer camp for students from local urban school districts.

Alan Chen associate professor, Chemistry/RNA Institute
“Predicting High-Resolution RNA Tertiary Structures Using an Experimentally Calibrated Force-Field for RNA Folding.” $836,495 through 2022

Using his expertise in RNA simulation to help fight human disease, Dr. Chen’s goal is to develop accurate computer simulations of RNA molecules by using nanoscale measurements. His 2020 findings published in the journal Nature show that structural changes in an RNA molecule involved in genetic imbalances play a significant role in the control of protein production in the cell. Leveraging these findings will help design better RNA-guided therapeutics in the future.

Dr. Chen is also at work on a five-year $1.8 million National Institute of General Medical Sciences study, “Thermodynamically calibrated RNA simulations to decode mechanisms of RNA molecular recognition.”

Dr. Lance received an additional NSF award to organize a workshop among atmospheric scientists which develops a long-term plan for coordinating research efforts at multiple high-elevation sites within the continental U.S.

Dr. Minder makes use of state-of-the-art model simulations capable of demonstrating how clouds, snow, temperatures and humidity vary over distances of just a few miles. This research also includes high-resolution satellite observations to evaluate how well climate models simulate mountain snow cover.

Jia Sheng associate professor, Chemistry/RNA Institute
“Chemical Biology Approaches to Study 5-Methylcytidine Derivatives in RNA and Develop CRISPR-Tet2-Based Epitranscriptomic Tool for Gene Regulation” $600,000 through 2024

Dr. Sheng is studying the structures and functions of natural ribonucleic acid (RNA) modifications and the development of molecular tools for gene regulation.

Jia Sheng

Daphney-Stavroula Zois assistant professor, Electrical and Computer Engineering

Dr. Zois focuses on wireless body area networks, seeking to expand our understanding of the operation of systems that integrate engineering with the natural world and humans to improve our daily activities.

Dr. Minder

Super Starters
Prestigious awards early in a researcher’s career facilitate grant attainment while providing students with valuable opportunities for experiential learning. The University at Albany participates in the growth of talented junior faculty researchers by providing seed funding and offering workshops in writing strong proposals, facility and compliance support and other expertise.

National Science Foundation Graduate Research Fellowships (2019)

Ales Siemann, double major in Environmental Science and Mathematics, graduated in May 2019. He focused on marine energy technologies, specifically wave energy converters. He also was awarded the Department of Defense’s SMART Scholarship.

Honorable mention: Chelsea Elizabeth Snidle, Atmospheric Sciences. Winner: Heather Sussman, second year Ph.D. student in Atmospheric Sciences and Meteorology.

Honorable mention: Allix Marie Coon, first year Ph.D. student in Chemistry

Institute of Electrical and Electronics Engineers (IEEE) Charles LeGeyt Fortescue Graduate Scholarship, 2019-20 academic year

Andrew Boggio-Dandry was selected as the one student recipient in the United States of this prestigious scholarship, which comes with a stipend of $20,600. Boggio-Dandry, graduated with a UAlbany bachelor’s degree in Computer Engineering.
NSF - CISE Research Initiation Initiative (CRII) Awardees

NSF’s Directorate for Computer and Information Science and Engineering (CISE) supports research independence among early-career academicians who specifically lack access to adequate organizational or other resources.

Chinwe Ekenna
assistant professor
Computer Science

“Adding Exploratory Statistical Analysis and Prediction Support to SPARQL.” 3 years, $174,396

Dr. Chelmis’ research goal is to make accessing and analyzing semantically enriched data easier.

Shaghayegh Sahebi
assistant professor
Computer Science

Dr. Sahebi finished a two year study, “Modeling Student Knowledge and Improving Performance when Learning from Multiple Types of Materials,” in August 2020. She is now examining individual and group procrastination behavior by developing computational models (see page 12).

Dola Saha, Hany Elgala and Aveek Dutta
assistant professors
Electrical and Computer Engineering

“A Cloud-based Hybrid RF-Optical Network Over Synchronous Links.” 3 Years, $765,999

The three researchers will design, build and maintain a multi-node, heterogeneous, wideband, scalable, hybrid and synchronous Cloud Radio Access Network, specifically to support high throughput wireless access for emerging applications like Virtual Reality, Industrial Internet of Things, 3D broadcast video, and tele-surgery.

Dr. Curry provides a new mathematical framework for precisely measuring how much data is lost due to compression when using the most popular methods in Topological Data Analysis, obtaining novel data science tools with greater distinguishing power.

Justin Curry
assistant professor
Mathematics and Statistics

“Enriched Topological Summaries for Inverse Problems.” 3 years, $174,074

Dr. Curry tackles a major obstacle in the current methods of motion planning in robotics research.

Shaghayegh Sahebi
assistant professor
Computer Science

Dr. Sahebi is developing a new class of spacecraft known as nanosatellites.

Dolap Saha, Hany Elgala and Aveek Dutta
assistant professors
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Dr. Aksoy looks to find an easier way to calibrate large constellations of CubeSats, a class of spacecraft known as nanosatellites.

One of only nine 2019 winners of this prestigious award, Dr. Aksoy looks to find an easier way to calibrate large constellations of CubeSats, a class of spacecraft known as nanosatellites.

Unal Tatar
assistant professor
Emergency Preparedness, Homeland Security, and Cybersecurity

“SaTC: Graph-based Probabilistic Cyber Risk Modeling.” 2 years, $191,000

Dr. Tatar is developing a probabilistic quantitative cybersecurity risk analysis model to relate asset-level risk to organizational-level risk and supply chain level risk to respond to the deficiencies of the current cyber risk analysis methods.

George Curry
assistant professor

“Adaptive Calibration of CubeSat Radiometer Constellations.” $446,179

Dr. Curry provides a new mathematical framework for precisely measuring how much data is lost due to compression when using the most popular methods in Topological Data Analysis, obtaining novel data science tools with greater distinguishing power.

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NASA Early CAREER Faculty Awardee

Mustafa Aksoy
assistant professor
Electrical and Mechanical Engineering

“Adaptive Calibration of CubeSat Radiometer Constellations.” $446,179

One of only nine 2019 winners of this prestigious award, Dr. Aksoy looks to find an easier way to calibrate large constellations of CubeSats, a class of spacecraft known as nanosatellites.

Institute of Education Sciences (IES) Early Career Awardee

Mariola Moeyaert
associate professor
Educational Counseling and Psychology

“Assessing Generalizability and Variability of Single-Case Design Effect Sizes using Multilevel Modeling including Moderators.” 2 years, $224,998

The recipient of one of only nine Early Career Awards in the category of Statistical and Research Methodology in Education since 2014, Dr. Moeyaert is using modeling to uncover innovative methods of quantitatively summarizing single-case studies popular in many fields.

National Institute on Aging (NIA) — Research Scientist Development Awardee

Julia Jennings
assistant professor
Anthropology

“Kin Networks and Old-Age Survival During the Demographic Transition.” $615,524 through 2023

Dr. Jennings takes a modern look at the role of kinship ties in the wellbeing of older adults by studying Scotland’s aging populations and how it’s been affected by changing kin networks and economic resources.

American Meteorological Society Fellow

June Wang
research associate professor
Atmospheric and Environmental Sciences

Dr. Wang is an expert on climate variability and change, meteorological instrumentation, weather and climate observations and networks, and ground- and space-based Global Navigation Satellite Systems meteorology. Dr. Wang was also named a 2020 Fellow of the American Meteorological Society.
Artificial Intelligence Tools for Real World Weather Impacts

In August 2020, the University’s Atmospheric Sciences Research Center was awarded one of seven National Science Foundation (NSF) artificial intelligence (AI) institutes to advance AI and machine learning technologies to improve the understanding of weather and climate, including their societal impacts.

NSF’s $100 million nationwide initiative included $20 million for an Institute for Research on Trustworthy AI in Weather, Climate and Coastal Oceanography. The University has the largest concentration of atmospheric, climate and environmental researchers in New York State, many dedicated to developing smart weather-based solutions.

Outsmarting Winter

New York is known for its cold and wet winters, with an average snowfall of greater than 70 inches over 60 percent of the state’s area. Rochester gets more snow than any other large city in the U.S., averaging nearly 100 inches. These heavy snow accumulations and accompanying ice storms often wreak havoc across the state including prolonged power outages, road closures and school cancelations.

UAlbany researchers have been awarded $2.4 million by the new NSF institute, which is hosted through the University of Oklahoma, to lead the development of AI-based technologies that will be used to better monitor and predict winter weather, as well as tailor tools that can be utilized for decision making when severe winter storms are looming.

To do so, they are tapping into existing weather data available through the UAlbany-run New York State Mesonet, a network of 126 weather stations across the state, along with the Oklahoma Mesonet, which includes 120 weather stations covering its state. Combining Mesonet data with machine learning techniques offers advanced forecasting insights that can assist public and private sector partners during severe winter weather events.

Along with the NYS Mesonet, research and expertise at other entities within UAlbany’s Weather-Climate Enterprise will also be leveraged, including xCITE (ExTREME Collaboration, Innovation, & TEducation) laboratory, a state-of-the-art data and visual analytics center, and the Center of Excellence in Weather & Climate Analytics.

“The use of AI and machine learning techniques for severe weather prediction is rapidly evolving,” said Chris Thornicroft, who directs ASRC and is co-leading the institute’s winter weather research. “We are looking forward to combining resources with institutions across multiple sectors to discover innovative technologies that can be utilized for decision making when severe winter storms are looming.”

Closing the Special Ed Gap

Across the country, the large gap between the achievement of typical students and those with disabilities is long-standing and without evidence of improvement over many years. In New York, more than 90 percent of all students with disabilities are expected to master the same curriculum as typical students to graduate high school. Only the nature of the school-based support they receive to achieve that goal should vary.

The New York State Education Department’s (NYSED) Office of Special Education (OSE) recently invested in a new statewide network to ensure every student in the state with a disability receives precisely the support they need to be successful in school.

When OSE decided to address this problem in a significant way in 2019, they looked to the University’s Division of Special Education within the School of Education (SOE) to handle the vast academic and behavioral challenges the initiative is designed to address. OSE awarded $15 million to the division through two five-year grants from its new statewide Educational Partnership initiative. The funding supports the Technical Assistance Partnership (TAP) for Academics and another TAP for Behavior at UAlbany.

The reasons NYSED turned to UAlbany were clear. UAlbany’s faculty in special education, which has a strong focus on intervention research for students with disabilities, is nationally and internationally recognized for scholarship.

In addition, said Dr. Kevin Quinn, associate professor of Special Education and principal investigator for both TAPs, “our division’s teacher preparation programs are counted among the strongest across the Northeast region, and our graduates are sought after by superintendents and principals because of how well prepared they are to be successful special education teachers.”

Along with the TAPs for academics and behavior at UAlbany, OSE also funded a TAP for equity at Bank Street College of Education in Manhattan and TAPs for transition and data at Cornell University in Ithaca. All five TAPS work collaboratively, with key stakeholders within NYSED/OSE and with regional educational entities to support school districts and schools in their efforts to improve outcomes for all students, especially those with disabilities.

“We have all worked very well together,” said Quinn. “And this included when the entire enterprise had to abruptly shift to online when the pandemic hit in 2020 and we had to refocus on supporting schools in providing remote education to their students.”
ASRC and U.S. DOE: Partnership to Build a New Cloud Imagery Database

For decades, the U.S. Department of Energy (DOE) has collected millions of digital cloud particle images from under the wing of research aircrafts used during observational field campaigns.

ASRC Research Associate Dr. Cara Sulia is now leading a team of scientists to make sense of this massive dataset. DOE announced, in October 2020, $19 million in funding for 31 new projects that are aimed at improving the power of Earth system models to predict weather and climate, including support for a new database tool that will consolidate and characterize all of its cloud particle imagery.

“A cloud particle imagery probe is onboard most, if not all, aircrafts deployed during DOE-supported field campaigns,” said Sulia, who is also director of UAlbany’s xCITE (ExTREME Collaboration, Innovation, & TEchnology) laboratory. “The probe can capture thousands of individual images during any given campaign, but the data have yet to be organized or run in a useful way, and, given the large numbers, it is the perfect dataset for machine learning and data processing.”

Classifying Clouds

DOE is supporting the database development with $159,204 in funding over the next three years. Sulia’s research team, including Department of Atmospheric and Environmental Sciences graduate student Vanessa Przybylo, has already developed a beta version of the tool that is now going through an extensive testing phase. Once launched, each image in the database will include a characterized list of information, such as the date and time it was taken, altitude, latitude and longitude, and environmental characteristics such as air temperature. Machine learning technologies are used to classify the particle by type, and other AI techniques will be used to extract particle properties, such as its shape and size.

“Every ice particle has a unique growth history,” Sulia said. “Our classification will help better profile the microphysical, thermodynamic, and dynamic processes that may have been happening within the cloud when the image was captured. This not only helps to understand the observed weather and climate conditions, but also to identify any shortcomings in simulations we run of a specific weather event that was happening at that time.”

DOE researchers will be able to interact with the database through a user-friendly web-based interface. It will run a specific cluster of computing resources. DOE will be among the innovative research entities within UAlbany’s $180 million ETEC building in summer 2021.

UAlbany’s xCITE lab is providing technical support and training. The project is also incorporating research findings from Przybylo’s PhD dissertation. She graduates next semester and is planning to transition to a postdoctoral position on the project.

“This database concept in itself is entirely new, but the classification scheme we are proposing in this work is unique and novel and utilizes the most recent and advanced hardware/software tools available today,” Przybylo said. “We believe the accuracy of our scheme will exceed those who have attempted before us to develop methodologies that classify CPI imagery.”

Other collaborators include Zachary Lebo of the University of Wyoming and Carl Schmitt of the University of Alaska, Fairbanks.

CLOSING THE SPECIAL ED GAP

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Since Spring 2019, Quinn — who has worked with the state for a decade on efforts to improve outcomes for students with disabilities — along with his two TAP directors and 10 UAlbany TAP associates, have been creating professional learning content while supporting 16 New York regional teams and their specialists in delivering evidence-based practices with integrity to students with disabilities, and thereby affect improved outcomes.

The work of UAlbany’s TAP for Behavior is led by Erin Brewer, a leading expert on positive behavioral supports and a doctoral candidate in SOE. TAP B is focused on how school personnel can actively promote the healthy social-emotional development of their students.

“Students need to competently interact with other students and with their teachers to succeed in school,” said Quinn. “There exists a strong relationship between students’ social/emotional/behavioral competency and academic achievement.

To promote optimum educational attainment, school personnel must actively support healthy development of the whole child or youth. All students need support in these areas, some just need more than others.”

The TAP for Academics is led by Dr. Ben Solomon, a faculty member in SOE’s School Psychology Program and an internationally recognized expert on academic instruction. Under him, UAlbany associates write much needed professional learning curriculum, coach regional specialists in using best practices to deliver professional development to school personnel, assist specialists in evaluating the effectiveness of the support they provide and consult with the state on policy and procedure.

“If we genuinely believe all students can learn, then it also logically follows that students don’t fail—interventions fail students, and when they do, we need to change our approach using data to guide us,” said Quinn.

He noted that all UAlbany’s associates hold advanced degrees and have applied experience in schools, extensive experience supporting adult learning through various professional development activities and expert knowledge of cutting-edge, evidence-based research. “All of our associates meet these essential criteria, and we are enormously proud of the team we have assembled and the stellar work they do,” said Quinn.
D ecades of research show persistent overrepresentation of Native American and African American children in child welfare services, and along with that, disparate negative outcomes for children and families of color. A researcher at the University’s School of Social Welfare believes greater diversity in the child welfare workforce could make a significant positive difference.

Associate Professor Dr. Catherine Lawrence began her research career at the University in 2004, studying the benefits of training child welfare workers in culturally responsive practices with diverse families. She found that participants not only enthusiastically embraced the training, but wanted even more. Yet, disproportionality for children and families of color, diversity of the child welfare workforce has not improved as quickly as the enthusiasm expressed by those training participants suggested it could. Enthusiastic individuals often work in bureaucratic settings that don’t always know how to nurture that enthusiasm and embrace changes.

Enthusiastic individuals often work in bureaucratic settings that don’t always know how to nurture that enthusiasm and embrace changes. Perhaps, believes Dr. Lawrence, that situation can change. She and colleagues have shown that organizational interventions can improve agency climate and, so, she is now applying such interventions to diversity and inclusivity climates in child welfare agencies. Many of these struggle to recruit and retain a racially diverse workforce that is culturally aware and responsive to community needs.

“Racially diverse organizations are not always inclusive organizations, where people feel fully accepted and valued for the unique aspects of themselves they bring to their jobs,” said Lawrence. “Inclusion means that diverse groups are not just present in an agency, but are also promoted to supervisory and management positions.” Dr. Lawrence and her colleagues found, however, that workers of color are significantly underrepresented in supervisory positions, and this underrepresentation is even more pronounced in management and leadership roles.

The solution? “In my work thus far, most of the research participants, both staff of color and white staff, truly want to see racial equity in the communities they serve and in the agencies where they work,” said Lawrence. “Racism and disparity are devastating to experience and heartbreaking to witness. But the people who work in child welfare leave me humbled by their determination and hope.”

Lawrence and her colleagues are now working with seven child welfare programs through a grant from the U.S. Department of Health and Human Services, which funds the National Child Welfare Workforce Institute (NCWWI), housed at UAlbany’s School of Social Welfare. NCWWI aims to harness the determination, hope and vision of child welfare workers and agency leaders to improve the capacity of organizations to truly support their workforce, including making changes that lead to healthier, more inclusive work environments.

She credits mentors at the University with her own determination to confront racism, especially traveling to South Africa with SSW Distinguished Service Professor Shirley Jones. “While on Robben Island, where the South African government isolated political prisoners, I asked myself what the white people were doing with their outrage at such injustice,” said Lawrence.

“It wasn’t hard to find their history of courage and hard work, and I carry those inspiring stories into my own academic work here at UAlbany.”

ARTIFICIAL INTELLIGENCE TOOLS FOR REAL WORLD WEATHER IMPACTS continued from page 18

that will improve weather-based decision-making in New York, the United States and around the globe.

“It is really important that we focus on developing trustworthy AI solutions that rely on accurate data and can be customized to help those who need it to make better decisions,” added Dr. Kara Sula, ASRC research associate, director of the xCITE Lab and also a co-leader of the institute’s winter weather research.

“We have a niche here at UAlbany of creating actionable, smart, weather-based solutions. Joining this institute is an important next step to continue our work.”

Funding for the institute’s research will extend over the next five years. It will also include training opportunities for students who are interested in learning more about the use of AI for environmental applications.

Support in a Most Challenging Time

The myriad contributions of social workers during the COVID-19 pandemic have been unprecedented. Various studies by School of Social Welfare faculty assessed the role social workers played in helping marginalized people cope in a challenging time.

Associate Professor Julia Hastings

Mental health/public health in the Black community. Hastings looks at Black family stress and caregiving of loved ones diagnosed with Alzheimer’s disease. “It is of particular interest to understand the burdens experienced by the adolescents in the home as well as the parents who are charged with caregiving,” she said. The study explores the beliefs and experiences associated with the cognitive decline of African American family members caring for a diagnosed loved one.

Assistant Professor Sarah Mountz

Foster Care Youth/LGBTQ+ Youth. Dr. Mountz studies older youth aging out of foster care during COVID-19, who are entering a poor economy with little to no safety net. “Social workers within child welfare settings must make extra efforts to stay connected to older youth and provide additional education support,” she said.

Associate Professor Heather Larkin Holloway

Adverse Childhood Experiences. Research confirms a link between accumulated adverse childhood experiences (ACEs) and serious health problems, including underlying health issues that make adults more vulnerable to COVID. Simultaneously, parents are under greater stress during the pandemic, said Larkin Holloway, requiring parental supports and community resilience to prevent ACE consequences.
Every year, millions of tons of sewage sludge and food waste are discarded in landfills where they cause serious environmental problems. A team from UAlbany’s Department of Environmental and Sustainable Engineering (ESE) is leading a consortium of universities to dramatically alter the way this waste is handled. The goal is to develop economically viable methods to convert wet organic waste into high-value products.

The Department of Energy has awarded the project $2.7 million. The consortium, which includes the University of Michigan, Argonne National Laboratory and Princeton University, is adding an additional $709,550 to bring the total budget to more than $3.4 million.

“Research and development of clean technologies is not only fundamental to reducing pollution and protecting our air, water and soil, it promotes innovation, supports good-paying jobs and boosts our economy,” U.S. Congressman Paul Tonko said. “Our local colleges and universities are a catalyst for cutting-edge technology innovation and discovery.” The project, said Tonko, “would literally turn waste into wealth by reimagining how waste is used and disposed. The impact on public health, sustainability and the economic well-being of our environment is obvious.”

“Technologies developed through this project will bring revolutionary changes to how we perceive, handle, and use wet waste materials and help broaden the scope of the blooming bioeconomy,” said UAlbany professor of Environmental and Sustainable Engineering (ESE) and principal investigator Dr. Yanna Liang.

According to the Environmental Protection Agency, Americans generate about 250 million tons of solid waste every year, of which about 15 percent is made up of food waste. These wastes can be anaerobically digested to produce biogas, but this conventional approach has many drawbacks. The bottlenecks can include low carbon conversion efficiency, inefficient product separation and CO2 emission.

“To address bottlenecks encountered in the field of converting wet organic waste to commodities, we need to be disposed of with a price tag.”
When it comes to the fight against global warming, our forests offer a valuable service. Trees act as carbon sinks, capturing CO2 — the main greenhouse gas heating up the Earth’s climate — from the air and storing it until they die. But as man-made and natural causes of deforestation intensify, it is unknown how long or to what extent this important environmental service will continue.

In a 2020 study, researchers in UAlbany’s Department of Atmospheric and Environmental Sciences (DAES) turned to more than a century’s worth of data (1901 - 2012) in the International Tree-Ring Data Bank, maintained by the U.S. National Oceanic and Atmospheric Administration, to both analyze historical tree growth at 3,579 forests around the world and create a model for future projections (2045 - 2060).

Their findings show that some of the largest tropical rainforests, such as the Amazon and Congo Basin, may instead benefit from a warmer and more humid planet. Results were published in the peer-reviewed journal Global Ecology and Biogeography.

**Rings Tell a Story**

“One way of studying forest dynamics and its impacts is by analyzing tree-ring variations across time and space,” said Ernesto Tejedor, a DAES postdoctoral research associate and the study’s lead author. “To do this, we assessed climate’s historical impacts, such as changes in precipitation and temperature, on forest tree-ring growth through a concept known as ‘synchrony,’ which relies on the assumption that the world around us is a spatially, auto-correlated system.”

“We believe this approach holds strong potential for diagnosing the future climate effects on trees. Through our model, we were able to detect regional hot spots, highlighting tree populations or locations that are particularly sensitive to climate change, and might require special attention for conservation and management efforts,” he added.

DAES Professor Mathias Vuille, a co-author of the study and mentor to Tejedor, has often turned to historical tree-ring data to gain insight on past climate variations in both North and South America. Every year, trees form new growth rings (also called tree rings). Not only do these rings tell us the age of a tree, but also the climatic conditions occurring during its lifetime.

**Supported Collaborative Science**

Vuille was awarded a five-year $5 million National Science Foundation (NSF) PIRE grant in 2017 to better understand how and why Earth’s climate has varied naturally over the past thousand years. Through the grant, his team (which includes Tejedor) uses tree-ring and cave sediment archives to produce reconstructions of historical extreme weather events, analyze societal responses and better predict future events based on past model-archive comparisons.

“These kinds of global studies wouldn’t be possible without collaborative science — including access to NOAAs tree-ring database and funding through the NSF,” Vuille said. “We are now turning our efforts to develop a new tree-ring network of South American (tropical and alpine) sites by performing intensive field campaigns in Peru, Bolivia, Brazil and Argentina. This new network will provide invaluable information, not only on the ecological impacts of climate change in these forests, but also the greater significance of this current climatic period.”

Vuille and Tejedor collaborated on the study with a team of international atmospheric and climate scientists from the United States, Spain, Germany and United Kingdom. Along with the NSF PIRE grant, the U.S. Department of Agriculture Forest Service provided funding.

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**Can Melting Ice Cause Arctic Warming?**

Why is the Arctic warming at twice the rate of our overall planet? Known as Arctic Amplification (AA), it is a cause of great scientific debate.

In a 2019 study published in Nature Communications, UAlbany atmospheric scientist Aiguo Dai found a physical relationship between AA and the dramatic diminishment of Arctic sea ice — 12.8 percent per decade — that has occurred since 1981.

His team’s study “suggests that the sea ice loss is causing the rapid warming in the Arctic,” said Dai, who turned to historical data and future climate model projections for answers. His analyses showed that AA would not diminish until the 22nd and 23rd centuries, after nearly all of the Arctic’s sea ice had melted away due to increasing CO2 emissions.

“The sea ice melts away completely, this elevated warming will also disappear and the warming rate in the Arctic will be similar to the rest of the world,” Dai concluded.

Large AA occurs from about October to April, when the Arctic Ocean becomes a heat source to the atmosphere, and only in areas that experienced significant sea ice loss during these months. According to the Dai team’s new model simulations, AA would not exist if surface fluxes were calculated with a fixed sea ice cover — again suggesting that sea ice loss is necessary for AA to occur.

The Dai team’s 2021 study, led by his graduate student Matthew Jenkins, confirmed increased winter oceanic heat release and summer oceanic heat absorption due to sea-ice loss as AA’s main causes.

“The take-home message here is that the melting of Arctic sea ice will not only reduce the habitat for polar bears and open new waterways for ships, but also greatly enhance warming in the region for the coming decades,” Dai said. “This could also impact weather patterns in middle latitudes, including the continental U.S.”
The StartUP NY program offers benefits to both the University and the private sector, and a striking example is the startup Key Capture Energy. The company, which comprehensively studies the grid for geographically and electrically beneficial market opportunities and researches and selects the best technology solutions for greater deployment of renewable energy, currently employs 45 full-time and part-time employees —23 based in its Albany headquarters.

A perfect example of collaborative opportunities, Key Capture Energy has hired five UAlbany alums, including co-founder and COO Dan Fitzgerald ’92, since its founding in 2016. Two UAlbany interns are also now full-time employees. The company is also engaging in collaborative research projects with UAlbany’s College of Engineering and Applied Sciences and Center of Excellence in Weather and Climate Analytics.

“Working with exciting new technology companies like Key Capture Energy and seeing firsthand how the collaboration supports their growth in the marketplace is truly a testament to our success as an R1 research institution,” said Matt Grattan, UAlbany’s director of community and economic development.

UAlbany research is funded by many types of sponsors, including the federal government, New York State, private foundations, business, industry and non-federal agencies using federal monies (“flow-through funds”). This chart represents research expenditures by sponsor type.

Skyrocketing Research Growth in an Emerging College

Born in 2016, the College of Engineering and Applied Sciences is one of the youngest and most vibrant engineering and computer science colleges in the United States. Its faculty is engaged in high-impact, transformative research, advancing novel engineering and technology breakthroughs that promise to shape the world around us. In the past two years, the college has grown its extramural research portfolio from $0.63 million to $3.47 million — a staggering increase of 447%. The future is equally bright. The Department of Environmental and Sustainable Engineering is the newest department in CEAS and the first of its kind in the country — focused on both the environment and sustainability.

Investments and Impacts: By the Numbers

UAlbany Alum/Partnership Powering a Transformation in Energy Grid Management

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A perfect example of collaborative opportunities, Key Capture Energy has hired five UAlbany alums, including co-founder and COO Dan Fitzgerald ’92, since its founding in 2016. Two UAlbany interns are also now full-time employees. The company is also engaging in collaborative research projects with UAlbany’s College of Engineering and Applied Sciences and Center of Excellence in Weather and Climate Analytics.

“Working with exciting new technology companies like Key Capture Energy and seeing firsthand how the collaboration supports their growth in the marketplace is truly a testament to our success as an R1 research institution,” said Matt Grattan, UAlbany’s director of community and economic development.
The process can be repeated with multiple doses from the hydrogel to perform its therapeutic function spontaneously, releasing the active cytotoxic compound. Bio-orthogonal agents react with each other “catching” the prodrug and the biomaterial come in contact, the releasable TCO moiety, are systemically injected. When injected in the vicinity of a local tumor. Prodrugs with demand Diels-Alder reaction between tetrazine (Tz) and trans-cyclooctene (TCO). The key element of the Diels-Alder reaction term "catch and release" is based on a bio-orthogonal inverse-electron demand Diels-Alder reaction between tetrazine (Tz) and trans-cyclooctene (TCO). The key element of the design is biocompatible material, modified with Tz, injected in the vicinity of a local tumor. Prodrugs with attenuated activity and minimal side effects, containing a releasable TCO moiety, are systemically injected. When the produgs and the biomaterial come in contact, the bio-orthogonal agents react with each other “catching” the payload. Finally, the resulting intermediate isomerizes spontaneously, releasing the active cytotoxic compound from the hydrogel to perform its therapeutic function locally. The process can be repeated with multiple doses of the systemically administered produgs.

Dr. Maksim Royzen
Dr. Royzen's research aims to develop a drug delivery strategy to treat the solid cancerous tumor soft tissue sarcoma, predicted to cause more than 5,000 U.S. deaths in 2021. The strategy termed “catch and release” is based on a bio-orthogonal inverse-electron demand Diels-Alder reaction between tetrazine (Tz) and trans-cyclooctene (TCO). The key element of the design is biocompatible material, modified with Tz, injected in the vicinity of a local tumor. Prodrugs with attenuated activity and minimal side effects, containing a releasable TCO moiety, are systemically injected. When the produgs and the biomaterial come in contact, the bio-orthogonal agents react with each other “catching” the payload. Finally, the resulting intermediate isomerizes spontaneously, releasing the active cytotoxic compound from the hydrogel to perform its therapeutic function locally. The process can be repeated with multiple doses of the systemically administered produgs.

Dr. Doug Conklin
There exists a continuing unmet need in the treatment of breast and prostate cancer for therapeutics that counter the acquisition of drug resistance and prevent the metastasis of several solid tumor types. Using a $50,000 investment from the SUNY Technology Accelerator Fund to examine the impact of Bruton’s Tyrosine Kinase inhibitors, Dr. Conklin discovered new breast cancer suppression capabilities that were recently patented as Bruton’s Tyrosine Kinase as an Anti-Cancer Drug Target. Additional work resulted in the patent Treating Cancer with Drug Combinations. Dr. Conklin’s startup, Cancer Molecular DesignWorks, is using these technologies to design, develop and commercialize innovative cancer treatment options.

Dr. Hua Shi
In a majority of breast cancers, the estrogen receptor (ER) is overexpressed and estrogen functions as a promoter of cancer cell proliferation. Although many attempts have been made, only a few small molecule compounds have been successfully identified as being capable of effectively inhibiting ER activity. Dr. Hua Shi’s patent describes a novel class of macromolecular reagents that targets non-traditional sites on the ER to improve the treatment of breast cancer as well as other estrogenopathies. Shi’s research that led to the invention was partly funded by a Research Scholar Grant from the American Cancer Society.

The Mission of the Division for Research
“Research Drives our Excellence.”
So states one of the five pillars of the University at Albany’s Strategic Plan, 2018-2023. A legacy of established excellence, in turn, is a priority behind UAlbany’s present and future efforts in scientific exploration, scholarship and creative pursuits. Each area of excellence is focused on addressing societal challenges, advancing human knowledge, and driving innovation and discovery for the greater health and happiness of humankind.
To grow the RI research enterprise at the University, the Division for Research is dedicated to:
1. Recruiting the finest faculty, staff and graduate students that the nation and the world has to offer.
2. Empowering each of these groups to engage individually and collectively in innovative research by building upon a research infrastructure that includes both state-of-the-art facilities and streamlined pre- and post-award support practices for external funding.
3. Identifying and supporting innovative opportunities to maintain a balanced research portfolio by encouraging collaboration across all disciplines.
4. Retaining faculty and staff who strongly contribute to distinctive disciplinary and interdisciplinary research that drives entrepreneurship, public-private partnerships and translational application.
5. Building strategic partnerships and engagement among faculty, students, alumni and diverse external communities — local to global — for the purpose of institutional advancement, societal and scholarly benefit, and economic development. Engaging industry, small businesses and start-up entities to partner with the University to achieve both short- and long-term goals.

As the Division for Research nurtures and enhances an academic and social atmosphere where world-class scientific investigations, diverse fields of scholarship, and artistic endeavors thrive, it leverages distinctive strengths and the competitive advantage of its strategic location in New York’s capital city in ways that enhance reputation, influence and impact.

The Division will continue to enhance UAlbany’s national profile in advancing and disseminating knowledge, discovery and scholarship, while engaging diverse communities in strategic partnerships. In doing so, it adds to its legacy of creating and applying new knowledge that profoundly addresses the critical issues of this and future centuries.