

# eGEOTIGER

January 2024



## New Faces



**Thomas Cullen**  
Assistant Professor



**Raphael Gottardi**  
Associate Professor



**Brittany Wheeler**  
Lecturer

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## Greetings from the Chair!

### Dr. Ming-Kuo Lee Professor and Chair

This is a very exciting time to explore Geosciences!! We have built a vibrant and talented faculty cohort providing real-world learning experience and top-notch laboratories where students can gain knowledge and prepare themselves to compete in the marketplace and make impactful contributions. At the undergraduate level, Geosciences is fully committed to teaching both theory and practice, which is reflected in our state-of-the-art classroom, laboratory, and field instructions. This comprehensive approach carries well to our graduate training, which is rooted in high-impact research and professional development to open up career opportunities in academic, government, or industrial sectors in energy, environmental, mining, and geospatial technology. We also reach out to K-12 students and the general public to spark their interests in geosciences and keep them informed of environmental changes and resource needs on our ever-changing planet. The intellectual diversity of our students and faculty is truly a strength of Geosciences and we are excited to see the Department grow and thrive with strong efforts involving all geoscience's stakeholders.

As chair, my job is to inspire and empower everyone to make our department an amazing place to learn, teach, work, and discover. 2024 will mark my last year with the opportunities to serve Geosciences as the Department Chair. I have been thrilled to work with students, faculty, staff, and our alumni who are committed to the journey over the years.



Earth Day Extravaganza, 2023



Presidential Fellowship Reception



## Geography International and Tourism Class Field Trip by Adam A. Payne

Exploring the Tourist Landscape of Stone Mountain:  
In the Fall of 2022, Dr. Adam Payne took his International Travel and Tourism class on a day long field trip to Stone Mountain, Georgia. Dr. Payne began by giving the class a walking lec-



Figure 1: Working in the Field: Students use landscape clues to recreate historic photos. This process lets the students examine landscape change. Photo taken by Adam A. Payne.

ture on the history of the city Stone Mountain and its roots as a quarry town. This included a walk through Shermantown, a neighborhood founded by freed slaves. Then the students were unleashed upon the city to complete a repeat photography project in which they had to recreate a series of photos (figure 1). They would later use these photos and their field notes to create a conference-style poster.

After a quick lunch, the class visited the park, Stone Mountain. They explored the interpretive material inside the park to better understand how it is being sold to visitors. The students then took a ride to the top of the mountain where they discussed their findings and how the interpretive material framed the park (figure 2). The students made connections of how tourism “sells” place by highlighting certain aspects while diminishing, or completely ignoring, other aspects. The field trip helped students connect topics discussed in class to the real world, resulting in rich meaning learning for all.

Figure 2: As Far as the Eye Can See. Tourism students atop Stone Mountain. Photo taken by Adam A. Payne.

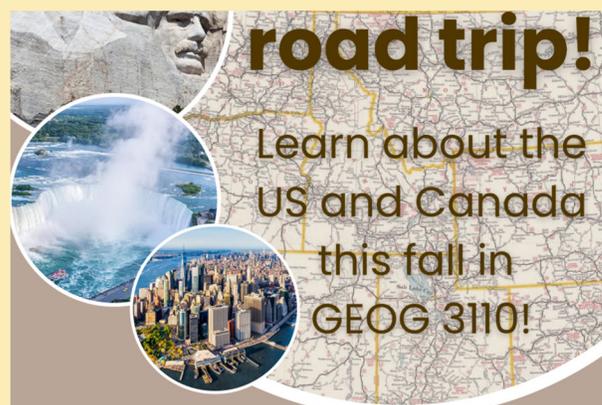


## Geography of US and Canada Class, Celebrates Canadian Day

Geography 3110 class celebrates Canadian Day Pictured left to right we have Braden Jacobs undergraduate student, Dr. Bonnie Bounds, Dr. Stephanie Rogers, and Dr. Tom Cullen.



On November 10th, Dr. Bonnie Bounds's Geography of the US and Canada class (GEOG 3110) celebrated its second annual "Ask a Canadian Day." Students generally enter the class with some background knowledge of US geography, but they are often much less familiar with Canada. On Ask a Canadian Day, students have the opportunity to ask faculty members from Canada about their experiences as Canadians and to benefit from their firsthand knowledge of Canada. Geographer Dr. Stephanie Rogers, who is from Nova Scotia, helped pioneer the first Ask a Canadian Day last year as the original Canadian; this year she was also joined by geologist Dr. Tom Cullen of Ontario and Albertan Dr. Geoffrey Williams of Entomology and Plant Pathology and the AU Bee Lab.



# Geography Sports Geography Class Field Trip by Adam A. Payne

## Exploring Sports and the Landscape

During the 2023 spring semester, Dr. Adam Payne took his Sports Geography class on a full-day field trip to Montgomery, Alabama to explore the impacts of sport on the landscape (figure 3). In class, there were discussions of how sport impacts the changing landscape and how that impact can be felt beyond the stadium. This field trip gave his students a chance to see how geography can be seen in the real world and gave them hands-on experience reading the landscape.

The first part of the day focused on how the landscape has changed in Montgomery. In order to explore these dynamics, the students worked in small groups on a repeat photography project. Each group was given six historic photos that they had to reshoot and reproduce to the best of their ability. They then had to explore the landscape and look for clues that might have aided in the change (of lack of change) they saw between the photos. Once back to campus, each group created a research poster based on the changes they captured.

The second part of the day was spent at a Montgomery Biscuits baseball game (come on...you didn't expect them not to go to a sporting event, right?) (figure 4). Before the game, we met with Chris Walker, the Director of Group Sales for the organization. He gave us an in-depth tour of the stadium and explained how the stadium and organization have helped shape the downtown area (figure 5). Then we proceeded to watch the Biscuits beat the Tennessee Smokies via a walk-off homerun in extra innings!



Figure 3: The Lineup Sports Geography students sitting in front of Riverwalk Stadium, home to the Montgomery Biscuits. Photo taken by Adam A. Payne.



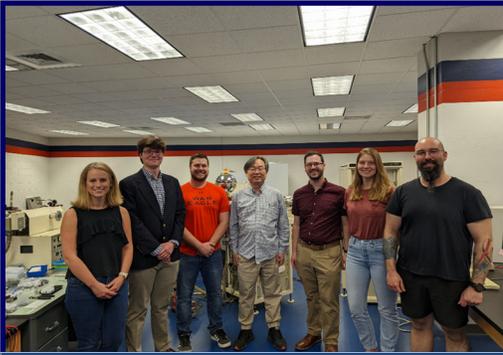
Figure 5: The wind up. Chris Walker, the Director of Group Sales for the Biscuits, giving a talk to students about the history of the stadium and the impacts the organization has had on the city of Montgomery. Photo taken by Adam A. Payne.



Figure 4: Play Ball! Students cheering on the home team! Photo taken by Adam A. Payne.

# Geology in Action

Three graduate students from Zou's group received their graduate degrees in 2023: Sara Speetjens (Ph.D.), Ozan Sinoplu (M.S.), and Josh Lom-



Dr. Zou Research Group

bardo (M.S.). Sara studied petrogenesis and magmatic processes of active volcanos on northwestern Tibetan Plateau; Ozan investigated genesis and evolution of trondhjemite from Appalachian Alabama; and Josh studied young volcanic rocks from Valles Caldera in New Mexico. Sara won the "Savrda" Outstanding Graduate Student Award from Department of Geosciences, Auburn University. Dr. Sara Speetjens is now working as Research Associate at Pacific Northwest National laboratory and enjoys her first academic job in the State of Washington.

Zain Webb worked as Undergraduate Research Assistant in Zou's lab. Zain received COSAM Dean's Medal and his B.S. degree in 2023. Zain is working for Geosyntech.

Mackenzie Benton joined our research group in August 2023. Mackenzie is studying the petrogenesis of Cretaceous nepheline syenites from Arkansas.

In collaboration with Dr. David King, we just completed a research project on the petrology and zircon ages of Cretaceous sandstones from Arkansas. This project was funded by Petroleum



Dr. Haibo Zou doing field work at Caldera (Mount Changbai).

Research Fund of the American Chemical Society. We are in the process of publishing project results.

Haibo serves as Associate Chair for Geology at Auburn University. .

He also serves as Associate Editor (3<sup>rd</sup> term) for Geological Society of America Bulletin (GSA Bulletin) and as Treasurer and Board Director of The Geochemical Society (2<sup>nd</sup> term). Haibo is in the World's Most Influential Scientists list again, created every year by Elsevier and Stanford University. He is also on the list of Best Earth Science Scientists in the 2<sup>nd</sup> edition of Research.com ranking of the best researchers in Earth Science.

## Geology Petroleum Class

Geosciences students and faculty visited the ongoing subsurface drilling wellsite (OASIS) in Shelby County, Alabama on 3<sup>rd</sup> November 2023. This drilling is being carried out as part of the Department of Energy and Southern States Energy Board funded project for potential disposal of liquid CO<sub>2</sub> (i.e., carbon sequestration) in lower Paleozoic clastic and carbonate strata.

Drs. David King and Ashraf Uddin are investigators of the project from Auburn University. The area is

located at the Valley and Ridge province of the Appalachians, which is composed of thrust bounded Paleozoic ductile duplex of thickened mass of mudrocks which additionally could be a potential unconventional reservoir prospect.



# Water Resource Conference in Orange Beach, Al.

One of the largest and most established venues for the state's water resources, the annual Alabama Water Resources Conference, or ALWRC, attracted a record-breaking number of attendees this year.

More people attended sessions earlier this month at the Perdido Beach Resort in Orange Beach, Alabama, than at any time in the previous nearly 35 years. There were over 340 registered participants and over 320 active participants from at least 10 states. The yearly gathering is organized by the Auburn University Water Resources Center.

The ALWRC offers a forum for water experts and academics from the Southeast to connect and share cutting-edge research, initiatives, and outreach strategies. The conference includes keynote speakers who are regional and international experts in water resources, as well as presenters from a wide range of water resources research, management, policy, and outreach backgrounds.

An important event this year was the keynote discussion on Blackbelt infrastructure, which featured Lance LeFleur, director of the Alabama Department of Environmental Management, Sherry Bradley, director of the Alabama Department of Public Health's Bureau of Environmental Services, and Daniel Blackman, administrator of the Environmental Protection Agency's Region 4 office.

The Alabama Chapter of the American Water Resources Symposium marked the beginning of the three-day event. The theme of this year's keynote speeches was ecological infrastructure, and Michael Roberts, president of the Coastal Trust, and Judy Haner, director of marine programs for The Nature Conservancy of Alabama, were the presenters. Renee Collini, a coastal climate resilience specialist with the Mississippi-Alabama Sea Grant Consortium, Leslie Gahagan, the city of Foley's environmental director, and Jeff Collier, the mayor of the city, participated in a subsequent panel discussion on sea level adaptation. Presenters were able to exchange information on new research, interagency programs, and funding opportunities throughout the course of two days of concurrent sessions. A record amount of material was shared at the conference thanks to the more than 120 speakers in concurrent sessions and 38 poster presenters.

The ALWRC, which was planned in collaboration with a multi-agency committee and the Alabama Chapter of the American Water Resources Association, offers opportunities for discussion about multidisciplinary aspects of water resources and connects stakeholders to improve understanding of complex water issues important to this state, the region, and the nation.

For their oral and poster presentations, a number of Auburn University students were recognized with prizes. The following were the student competition winners:

## Oral Competition

First Place: Benjamin Webster, Auburn (Department of Crop, Soils and Environmental Sciences)

Second Place: Giacomo DeLuca II, University of South Alabama (School of Marine and Environmental Sciences)

Third Place: Anna Powell, Auburn (Department of Crop, Soils and Environmental Sciences)

## Poster Competition

First Place: Danyal Aziz, University of Alabama (Department of Civil, Construction and Environmental Engineering)

Second Place: Kelly Kaye, Auburn (Department of Geosciences)

Third Place: Mehrzad Shahidzadehasadi, Auburn (Department of Biosystems Engineering)

The mission of the Auburn University Water Resources Center is to facilitate interdisciplinary collaboration among Auburn faculty and staff on water-related research, outreach and instruction; conduct innovative research to find practical solutions for current and future water issues and empower private citizens to become active stewards of water resources.



# 2023 Water and Climate Symposium

## 2023 Water and Climate Symposium

The NSF Research Traineeship (NRT) program hosted its 2nd annual climate symposium last March. This fast-growing half day event had a climate-hydro in 2023, as the NRT partnered well with the AU Water Resource Center and Water Resources Club. Again, held in the AU Student Ballroom Center, it was designed to share and communicate water and climate research among AU faculty, students and stakeholders to promote future collaboration. And that it did!

Attendance grew to 180 people for this interdisciplinary research collaboration discussion, including faculty and students from over 15 AU units, representatives from 9 different stakeholder groups and 3 additional universities represented. The format still included research lightning talks, student poster presentations (doubling in size) and networking table discussions and reception. However, a stakeholder panel was added that benefitted Faculty and students alike. Eve Brantley, Director of the Water Resources Center, shared her favorite observation of the day, “when 2 undergrad marine science majors, completely enthralled, were asking questions to a MS in Civil & Environmental Engineering about her poster and research.... all women, all interested in different aspects of climate science.” The NRT is continuing the momentum and connections made by holding the symposium for a third time on Tuesday March 19th. Now the focus will be Water, Food and Energy Nexus and plan on having even more stakeholders join the conversations. You may still register for this impactful event until March 4th at [aub.ie/2024climatesymposium](https://aub.ie/2024climatesymposium).

Here are the photos from this event. <https://flic.kr/s/aHBqjAxChU>



# Thomas Cullen's research indicates Tyrannosaurus Rex, Velociraptor dinosaurs had lips, contrary to popular belief

Cullen — an assistant professor in the [College of Sciences and Mathematics' Department of Geosciences](#) — and his colleagues [published their findings](#) on Science.org that contradict the mainstream traditional view about the appearance of the iconic extinct animals. Their groundbreaking research, [originally covered by Science.org](#), has several important implications for understanding the animals' biology and evolution.



“We reconstructed soft tissue anatomy, compared dental measurements and studied dental health and wear records to further uncover that what you are used to seeing on the big screen is not accurate,” Cullen said. “The teeth of these theropod dinosaurs did not experience wear and tear like a crocodile, and most likely had a lip-like covering.”

The scientific findings not only may change the way people will see theropod dinosaurs, but impacts studies of their paleobiology. These animals possessing lips means that their teeth wore down and functioned differently, discoveries that could impact future biomechanical reconstructions. The presence of additional soft tissues also has implications for their feeding ecology and life history.

Overall, these new results create an invaluable framework that impact dinosaur paleontology and studying the structure of ecosystems. Traditionally, animations and CGI of famous T. rex and Velociraptor dinosaurs in blockbuster movies like “Jurassic Park” have featured the animals with their teeth exposed and on display at all times.

But is this popular representation scientifically and historically correct?

Not according to Cullen and the team of researchers. They compared multiple aspects of the paleobiology of theropod dinosaurs, including:

- **Tooth wear** — The amount of wear on the actual enamel and dentine of their teeth showed less wear than those of their closest living relatives, the crocodile;
- **Size and scale** — The size of the skull in approximation to the jaw and teeth prove they could have had lips, and their teeth would not be too large to be covered;
- **Bone anatomy** — The surface features of the bone around the teeth are much more similar to lizards than crocodiles, including the possession of a line of small pits which house blood vessels and nerves for their oral skin and gums.

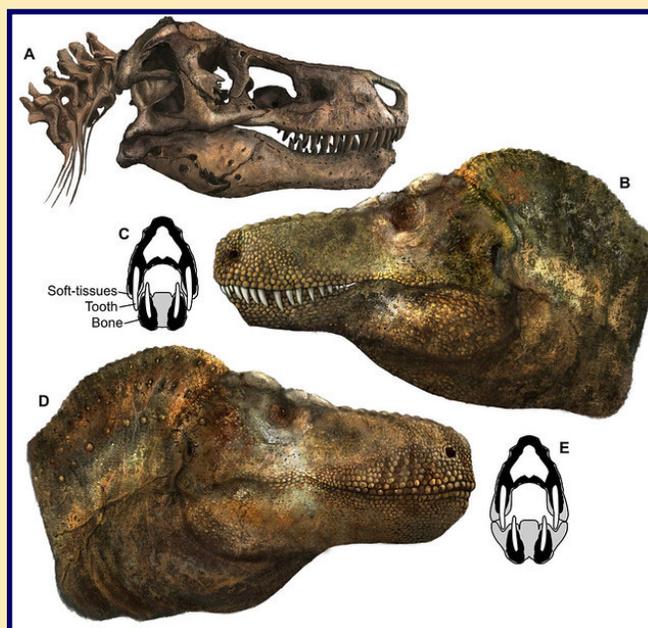
According to the researchers, the theropods' lips were more similar to lizards and were not like the lips of mammals or humans.

“Dinosaur lips would be very different from our lips, in that although they would cover the teeth, they could not really be moved independently, couldn't be curled back into a snarl, or make other sorts of movements we associate with lips in humans (or other mammals),” Cullen said. “In this way, dinosaur lips would be more similar to those of many lizards or amphibians, even if we typically associate the structure of lips with mammals like ourselves.”

The research team includes a wide range of experts, including (but not limited to) Cullen; [Kirstin Brink](#), assistant professor, Department of Earth Sciences at the University of Manitoba; Mark P. Witton, University of Portsmouth; and [Derek Larson](#), collections manager, Royal BC Museum. This project primarily represents a collaboration of former and current students of the two study senior authors. This group of researchers combined their expertise in anatomy, tooth histology, statistical analysis and evolutionary biology to explore this theory.

For Cullen's part, many of the analyses were conducted while he was a post-doctoral student at the Field Museum of Natural History in Chicago, where he is now also a Scientific Affiliate. Measurements taken from the museum's famous skeleton of “SUE” the T. rex played an important part in unraveling the mystery.

[Theropod dinosaur facial reconstruction and the importance of soft tissues in paleobiology | Science](#)



# Lipped or Lipless Predatory Dinosaurs

## Lipped or lipless predatory dinosaurs?

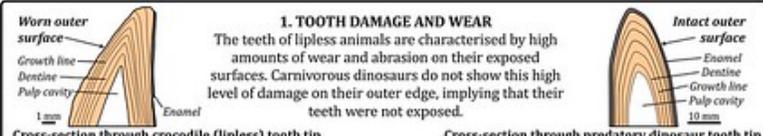
Thomas M. Cullen, Derek W. Larson, Mark P. Witton, Diane Scott, Tea Mabo, Kirstin S. Brink, David C. Evans and Robert Reisz  
*A graphic summary of our paper*  
 Cullen et al. 2023. Theropod dinosaur facial reconstruction and the importance of soft tissues in paleobiology. *Science*, 379, 1348-1352.



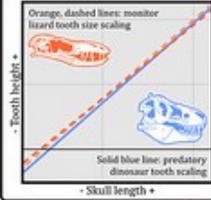
**Scientists and artists have presented varied reconstructions of predatory dinosaur mouths for decades: sometimes with the scaly lips of lizards, sometimes lipless, like crocodiles.**

Lips are absent in crocodiles, which are cousins of extinct dinosaurs, as well as living dinosaurs, the birds. Some researchers have therefore assumed that dinosaurs also had lipless mouths and exposed teeth. But dinosaur tooth and jaw anatomy is quite different from that of crocodiles and, in a new paper, we compare these in several studies to clarify the configuration of predatory dinosaur mouth tissues.

**1. TOOTH DAMAGE AND WEAR**  
 The teeth of lipless animals are characterised by high amounts of wear and abrasion on their exposed surfaces. Carnivorous dinosaurs do not show this high level of damage on their outer edge, implying that their teeth were not exposed.



**2. TOOTH SIZE**  
 Predatory dinosaur teeth are no larger, relative to skull size, than those of modern lizards, implying they are not too big to cover with lips.



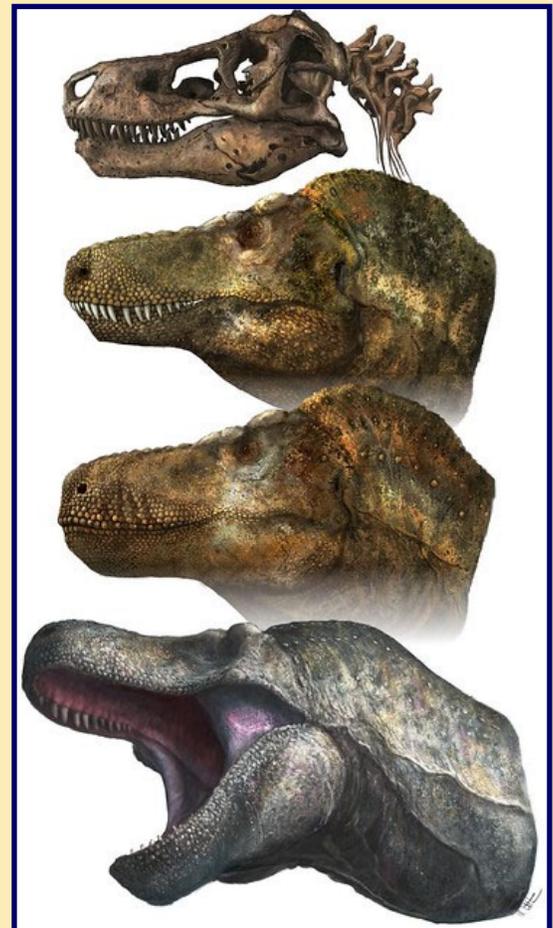
**3. JAW MORPHOLOGY**  
 Perforations around the jaws, which supply sensory pathways and blood vessels to the gums and tissues around the mouth, are more lizard-like in dinosaurs than crocodile-like.

We conclude that predatory dinosaur tooth and jaw morphology is more consistent with a lipped configuration, and that birds and crocodiles evolved their specialised, lipless faces independently.

We further suggest that lizards and their relatives, which possess deep gum tissues as well as scaly lips, are the best modern analogue for predatory dinosaur mouth anatomy. Many of our most iconic dinosaur reconstructions may warrant revision!

*Gaping T. rex showing lizard-like gums and labial scales, our preferred model for predatory dinosaur mouths.*

Want to read our paper right now? Scan this: 



# Extant Dinosaurs Swarm the Coliseum

Over the course of the third week of March, a flock of *Bombycilla cedrorum*, avian descendants of the dinosaurs, took up residence outside the AU Geology Department. Also known as Cedar Waxwings, these miniaturized, flying archosaurs were likely making a migratory pitstop at the restored habitat of Parkerson Mill Creek that lies just south of the Coliseum parking lot. Not unlike the new Buc-see's south of Auburn, the Parkerson Mill Creek restoration area offers plenty of parking (native trees for roosting), clean facilities (flowing water, rocks), and good snack options (nearby holly trees) for avian species.



Cedar Waxwings on the Holly Tree outside the Coliseum. Photo taken by Marilyn Vogel

Although Cedar Waxwings do not categorize as endangered, their migratory, flock-centric lifestyle as well as the loss of habitat around Auburn and general decline of many North American bird species make them a fairly unique and exciting phenomenon to observe. Cedar Waxwings are named for their feeding habits (cedar and holly berries) and their stunning plumage. Their Linnean name, Latin for 'silk tail', also refers to their silken, tawny feathers which are accented by brilliant yellow, black, white, and red tips. Waxwings categorize as 'Passiformes', or perching birds of the class Aves. The Aves of course are the nearest evolutionary neighbors, according to current paradigms, to the Ichthyornis, Enantiornithes, and Archeopteryx, or the avian dinosaurs. The restored habitat of Parkerson Mill Creek is an important teaching and outreach resource of the AU Geology Department. AU Geo faculty have been known to lead field trips, analyze water samples, and even make Parkerson Mill 'popsicles' out of the creek water to demonstrate the importance of surface water resources. The presence of herons, turtles, and Cedar Waxwings around the project demonstrate the effectiveness of urban conservation strategies and efforts to offset ongoing loss of biodiversity. All of these subject areas are relevant to geoscience research and the role of geoscience on a changing planet. To our non-human friends who swing by the Coliseum, we offer a hearty 'Earth Eagle!' and we hope you come back next year.

# 2023 NRT Immersion



Weeks Bay Nature Reserve, Fairhope, AL.

It was bittersweet as the AU NSF Research Traineeship (NRT) Program on Climate Resilience held its last Immersion experience for its final 4th cohort of Trainees in August 2023. The Immersion is a kick-off 5 day event to the traineeship for the new cohort with field experiences for Trainees to directly observe climate-related impacts, risk, recovery, and critical issues affecting the study region from recent disasters and hear from faculty and stakeholder speakers. The group returned to Weeks Bay Nature Reserve, a member of the National Estuarine Research Reserve System, in Fairhope, AL. The experience included an impacts-discussion tour with affiliate AU faculty member, Dr. Chris Burton including the Hurricane Katrina Memorial, the Biloxi bridge system and sea wall and a comparison of East Biloxi Neighborhoods. In addition to hearing the climate response perspectives of non-profit and extension representatives, the Trainees had a boat tour of the estuary with discussion. It is always an intensive but enjoyable 5 days before the fall semester. As one new Trainee of the 4th cohort shared they enjoyed learning further about climate reliance, getting to know the new trainees, their expected research, and how it fits into the NRT framework during the Immersion.



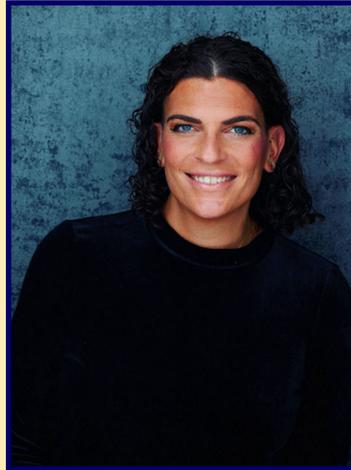
East Biloxi Neighborhood



Chris Burton, Hurricane Katrina Memorial

# Guest Speaker: Dr. Mika Tosca talks about the Importance of STEAM Projects in Combating the Climate Crisis

This year the NSF Research Traineeship (NRT) has focused on improving communication of climate science and bolstering the production of scientific knowledge through art. The trainees have been working on an upcoming art mural design for Auburn's campus to communicate climate science messages to a broad audience. (More to come later about this innovative project.)



In addition, on September 28th the NRT hosted Dr. Mika Tosca to guest speak on Auburn's campus. Dr. Tosca is a climate scientist & associate professor at the School of the Art Institute of Chicago. She led the NSF Trainees in an earlier STEAM (STEM + Art) workshop to help kick start their mural design group discussions before providing her talk:

"Dispatches from a Solarpunk Future: Combining art and science to solve the climate crisis" on campus. There she presented several collaborative projects that combined the scientific method with design and art-making processes. Her message was that these "solarpunk" approaches synthesize art and science toward imagining and building a more optimistic future. It was a full house for her talk with members of the art department, AU outreach, the community as well as the Geo department in attendance.



# Inclusive teaching strategies aim to impact 3,000 undergraduate students through IDEALS program

A collaboration between the Biggio Center and faculty in the College of Sciences and Mathematics, or COSAM, will introduce inclusive teaching strategies to faculty using active learning spaces in the Academic Classroom and Laboratory Complex, or ACLC, that can increase STEM education effectiveness for all Auburn students.

The team pictured to the right includes Melinda Lanius, an assistant professor in the Department of Mathematics and Statistics; Karen McNeal, the Marguerite Scharnagle Endowed Professor in the Department of Geosciences; Stephanie Shepherd, associate professor in the Department of Geosciences; and Lindsay Doukopoulos, associate director for educational development in the Biggio Center.

They will create innovative training opportunities through a new program called Inclusive Design for Enhancing Active Learning in STEM, or IDEALS, for 30 faculty in all of the departments in COSAM including the Department of Biological Sciences, Department of Chemistry and Biochemistry, Department of Geosciences, Department of Mathematics and Statistics, and Department of Physics.

This program not only seeks to train faculty in research-based practices in order to improve STEM education but also seeks to increase how the students are engaged and have a genuine sense of belonging in the classroom. The community, of both students and faculty, formed through this program will additionally support diversity, equity and inclusive efforts throughout the university. Furthermore, programmatic research will be shared to help strengthen training for future graduate students and faculty.

This research is funded by the National Science Foundation.

For more information about this program, contact Lindsay Doukopoulos in the Biggio Center at [lmw0028@auburn.edu](mailto:lmw0028@auburn.edu) or Stephanie Shepherd in the Department of Geosciences at [slshepherd@auburn.edu](mailto:slshepherd@auburn.edu).



Left to right: Melinda Lanius, Karen McNeal, Stephanie Shepherd and Lindsay Doukopoulos.

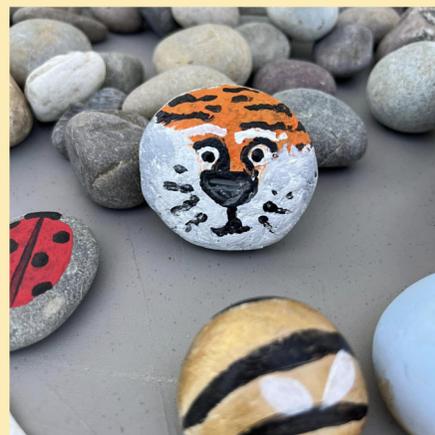
# Earth Day Extravaganza 2023

Earth Day Extravaganza is rapidly approaching!! This was UPC's most attend event last year, and this year will be even bigger. We are reminded how to best care for our planet while still having fun. This event grows every year with more departments participating. Tote bag decorating, plant potting, bouquet-making, free food and more activities were offered. Come join us and learn how to best care for our planet while still having fun!

*Follow @AuburnUPC on Instagram and Facebook for updated details and activities!*

Everyone is welcome, this event strives to foster an atmosphere in which everyone can engage in Student Involvement-sponsored programs and events. If you need an accommodation to attend this event, please contact UPC in advance at 334-844-4788 or [upc@auburn.edu](mailto:upc@auburn.edu).

**Mark your calendar for this year's Earth Day Extravaganza to be held on Campus Green Monday, April 22nd, from 11:00 am to 2:00 pm!**  
***Pictures of last year's event:***



# Earth Day Extravaganza



# Earth Day Extravaganza



# New Faculty Members

## Dr. Thomas Cullen Assistant Professor

I joined the Department of Geosciences in January of 2023 as an Assistant Professor of Paleobiology. I obtained a BSc and MSc in Earth Sciences at Carleton University, in my hometown of Ottawa, Canada, then did a PhD at the University of Toronto, followed by post-doctoral work at the Field Museum in Chicago, NC Museum of Natural Sciences in Raleigh, and through a grant from NSERC (Canada's equivalent to the US National Science Foundation).



In terms of research, I'm primarily a quantitative paleoecologist, and my work examines ecosystem structure and interactions at multiple spatiotemporal scales, principally in Cretaceous greenhouse climates (and often with a focus on dinosaurs). This includes work from the level of the organism (looking at life history, taxonomy, etc.), to the community level (looking at ecological communities and food web structure), all the way up to the more 'macro'-scale (looking at how ecosystems respond to climate changes, and at major biodiversity and evolutionary changes in different groups of vertebrates). I also do a bit of side-research quantifying various biases in the fossil record and finding ways to mitigate them.

I'll mainly be teaching the undergrad Paleobiology course during the Fall, though this Fall I also taught a graduate-level Paleoclimate course alongside Dr. Vachula and will be one of the people teaching Earth and Life Through Time this January. Since arriving, I've recruited a couple of graduate students and should have a postdoc joining the lab soon. In terms of other updates, it's been a productive year for publications, with 6 papers published (4 first-authored, 2 as co-author), and of those, 2 of my papers this year were included in [Smithsonian Magazine's list of "Top 10 Dinosaur Discoveries of 2023"](#), and 1 of my papers was included in [National Geographic's list of "11 Most Astonishing Scientific Discoveries of 2023"](#). I'm looking forward to being here and in building more collaborations within the department and across Auburn!

## Dr. Raphael Gottardi Associate Professor

I joined the Department of Geosciences in August 2023 as Associate Professor of Structural Geology and Tectonics. Native of Grenoble (France), I obtained my BSc in Earth Sciences from the University Joseph Fourier (Grenoble, France), my MS in Alpine and Structural Geology from the University of Lausanne (Switzerland), and my PhD in Geology and Geophysics from the University of Minnesota. Following a one year visiting position at the University of Alaska at Anchorage, I joined the University of Louisiana at Lafayette as an Assistant then Associate Professor of Structural Geology and Tectonics.



My research focuses on the thermomechanical evolution of the lithosphere, in active or exhumed systems, especially the interaction between fluid, rock, and deformation. My approach is primarily field based and combines quantitative structural and microstructural analysis with stable isotope geochemistry, and geothermochronology to study the evolution of the different parameters (temperature, stress, strain rate, role of fluids) that control deformation and exhumation over different timescales.

I will be teaching courses in Structural Geology, Tectonics, and Field Geology. During my ten-year tenure as Field Camp Director at my previous institution, I lead and redesigned field courses and experiences, and implemented safe and inclusive field practices, for which I was awarded the 2020 Field Camp Excellence Award by the Geological Society of America. I am looking forward to implementing similar courses and practices at Auburn.

I am actively recruiting graduate students to establish a research group. I am in the process of setting up a lab dedicated to microtextural and microchemical characterization. Within the next year, this lab will be equipped with a secondary electron microscope equipped with energy-dispersive X-ray spectroscopy, electron backscattered diffraction, and cathodoluminescence. This will be an exciting addition to the capabilities of the Department of Geosciences, and I look forward to collaborations with my amazing colleagues and across the university. I am very excited to be at Auburn!

# New Faculty Members

## Dr. Brittany Wheeler Lecturer

I like to say that I relocated from both the Midwest and the Northeast. In Massachusetts, I earned a PhD in Geography from Clark University (2023) and taught courses on introductory geography, migration, and responsibility and repair at Mount Holyoke College and the University of Massachusetts, Amherst. In Chicago, I worked alongside indigenous groups and museum anthropologists within the Field Museum of Natural History, assessing repatriation requests and facilitating the return of cultural items and ancestral remains. Both geography and museology are an outgrowth of my MAs in Forced Migration Studies (University of the Witwatersrand, South Africa) and International Museum Studies (University of Gothenburg, Sweden).

At Auburn, I have taught Global Geography, Human Geography, and Africa thus far, and students have enjoyed trying to describe 'The South' as a perceptual region to me, when I ask. In return, I share less conceptual impressions (because they ask): that I wasn't expecting Alabama to smell so strongly of pine, or for the autumn to last so wonderfully long, and that the city of Auburn requires far better public transportation options. In focusing on teaching, I have recently been part of a panel on *Reimagining Introductory Courses* at the West Lakes AAG meeting this fall (thanks to the COSAM Faculty Travel Award), a robust conversation which discussed the status and meaning of geography in higher education, the imperatives for introducing the discipline to new students, and the individual institutional contexts that feed possibility in pedagogy and curriculum design. We'll be taking up this topic again at the general AAG conference in Hawai'i this year. Looking forward, I hope to introduce a new class on human mobility at Auburn that marries a focus on international global movement and the relationship between climate change and migration. (Show of hands, please, if you're interested in this class!) My research interests hit several notes. I am beginning to publish the components of my PhD, emphasizing the interconnections of legality, morality, and temporality at various scales as they present in the long-term political relationships between Britain, the United States, and the global oceanic south, which blend affinity, dependency, and displacement injustice. In the migration sector, I am interested in pursuing research on the rise of private



sponsorship of refugees in North America (a topic that was a contender for my PhD). Finally, I am interested in bringing together the threads of my work with human remains and legal futures to query the changing policy landscape around human composting, green burials, and conservation burial easements. All of these research projects center around an interest in bureaucracy, and as such, I am co-chairing a session at the AAG in Hawai'i that will explore both the impact of bureaucratic processes on geographic fieldwork and the way that bureaucracy can be studied in and of itself to reveal notions of responsibility.

## News from Faculty

### Dr. Chandana Mitra Associate Professor

The year 2023 was very eventful for me and for the urbanPRism lab. urbanPRism's first ESSI PhD student, Dr. Megha Shrestha, graduated in spring 2023. She is now working as an environmental data analyst at Houston-Galveston Area Council. Three M.S. students, Syeda Nazifa Tasneem, Olivia Ainosoon and Miranda Silano have also graduated under my stewardship in 2023.



Left to right: Kristin, Sukanya, Olivia, Nazifa, Brandon, Megha, Chandana, Subhasis, Miranda, Hang

Nazifa and Olivia are both pursuing their PhD degrees at University of Knoxville and University of Connecticut respectively. Miranda is working as an environmental geologist for Arcadis in Florida. To fill in the void, Faiyad Rishal (not in the group picture) joined the urbanPRism lab in fall 2023. Besides being an avid researcher, he is also a passionate musician. Presently all students in my group are working on different aspects of urban-rural interface, impacts on microclimate, local resiliencys and community engagement and education. *Read more about Brandon/Subhasis/Miranda in the student's achievement section.*

# News from Faculty

Another piece of good news in 2023 was my becoming the PI of the NRT (NSF funded National Research and Training) project. The original PI, Dr. Karen McNeal took up a position at NSF as a Program Director in the Division of Graduate Education (Congratulations Karen!), so I stepped into the PI position. It was a challenging but rewarding experience. I learned new things, which came with added responsibilities and tasks. Thanks to Karen and Katie (Program coordinator) for helping me maneuver through various aspects of NRT smoothly.

Other things worth mentioning are two Auburn University internal funding I have received in 2023. One is a Biggio Center funded AUX: Immersive Learning Experiences grant where virtual reality will be applied to create climate change related labs for two core courses, 'Concepts of Science' and 'Introduction to Sustainability'. Drs' Marilyn Vogel and Miriam Wyman and Geoscience students (Jake Swartz, Al Artat, Nafiz Rahaman and Subhasis Ghosh) are all working together to complete the 'Earth as Art' Interactive Globe Museum' virtual reality project by summer 2024.

The other project funded by Auburn University's Outreach Office is the interdisciplinary science communication project on 'Climate Change Communication through an art mural'. This is a collaborative project between NSF NRT and the Department of Art (Professor Wendy Deschene). Stay tuned for more in the 2024 newsletter on both these innovative and exciting projects.

Besides all this happening within Auburn, the 'outside of Auburn' project which I am excited to be a part of, is the online asynchronous course on 'Teaching for the Future: English Teaching to Take on Climate Change' in collaboration with the English Language Program at Kansas State University (KSU) on an FHI 360 funded grant. FHI 360 is a nonprofit human development organization dedicated to improving lives in lasting ways by advancing integrated, locally driven solutions. FHI 360 serves more than 70 countries and all U.S. states and territories.

In 2023 I was selected as one of the climate change experts to narrate concepts about climate change and urban influences on microclimate, which became part of an eight-module online course. In 2024, this course will become a MOOC serving the international English as a Foreign Language (EFL) educators around the globe.

I cannot end this article without mentioning my conversation with Mr. Koala on climate change and its impact on the animal world (see picture of questioning Koala and me). My best example of science communications ever in life (trying to know my audience). In 2023 I visited Australia to attend the 11th International Conference on Urban Climate (ICUC11), held at UNSW Sydney from Aug 28th to Sep 1st, 2023. It was an extraordinary gathering that brought together over 640 attendees from 49 countries. ICUC



In conversation with a Koala.



Emu at the Zoo.



Feeding a baby Kangaroo.



KSU News

meetings have consistently stood as pivotal moments in disseminating urban climate research, drawing in scholars, urban planners, designers, policymakers, and experts from across the globe. I presented urban-related research conducted by my students Brandon Ryan, Megha Shrestha and Subhasis Ghosh.

As is said, you cannot work if you do not play. So besides one-week of rigorous research conversations,

I took time to feed the kangaroos, check out the Emu, do the 'Happy Feet' dance with penguins, watch a musical at the Sydney Opera House and snorkel with the colorful fishes in the blue waters of the Great Barrier Reef (see pictures). A dream came true!!



Urban Climate Colleagues from around the world.



Presenting Brandon's Research.



Great Barrier Reef

For more updates on urbanPRism research Group: <https://chandana247.wixsite.com/mysite>

# News from Faculty

## Dr. Brian Boston Assistant Professor

My past year ended with a very exciting and stimulating research project by joining the offshore phase of the International Ocean Discovery Program (IODP) Expedition 389: Hawaiian drowned reefs. This 64-day expedition on the vessel *MMA Valour* used a portable seabed drill to core samples around the Island of Hawaii with the main overall goals of: defining the nature of sea level change in the central Pacific, reconstructing the paleoclimate variability, establishing the geologic and biologic response to sea level changes, and elucidate the subsidence and volcanic history of Hawaii. It was exciting to see this kind of new technology being used up close in person. Only initial analysis could take place offshore, so I'm looking forward to seeing the cores again in the upcoming year and continued work with this highly international team of researchers. We also welcomed a new student to the MS GEOL program, Nipa Chakroborty. Her work will utilize seismic reflection data collected during the Cascadia Seismic Imaging Experiment 2021. This has been a very exciting collaboration with Lamont-Doherty, UTIG, OSU, and UW to better understand earthquake and tsunami hazard in the Pacific Northwest. The tectonic and volcanic features represent major geohazards for the local populations and infrastructure of this region.



# News from Faculty

## Dr. Ann Ojeda Assistant Professor Lab Updates

One project that the entire Ojeda lab has been involved in is understanding private wells water quality in Mobile and Baldwin counties of Alabama. Sidney and Emma performed three successful sampling trips to over 40 well owners' homes to sample well water and test the water for a broad range of contaminants. The team is not only working to understand the well water but also how at-home test kits may serve as a resource for well owners to understand their water quality. Natalia has been the lead on the test kit portion of the project, and the team was able to host two workshops in the summer communicating with citizens about water resources and ways to test their water. Sidney gave an oral presentation about the accuracy of at-home test kits at the Alabama Water Resources Conference, and Natalia, Sidney and Ann have a publication in review at Environmental Science and Technology: Water titled: A "First alert" for drinking water quality: commercial water quality testing kits for community-engaged research. The publication addresses the accuracy and applicability of different at-home test kits for well water testing. Spoiler alert- the detection limit matters! Sidney is writing her thesis about spatial and temporal trends in well water quality, and we expect that these analyses will help build resources to help well users know what parameters are most important to measure to ensure safe drinking water supplies.



Ojeda Lab Group, Spring 2024

This year Emma has been working on finishing the first chapter of her master's research on coal combustion products in the Coosa River in east Alabama. So far, she has been able to present her work at two conferences: the International Union for Quaternary Research (INQUA) (pictured) in Rome, Italy and the Alabama Water Resources Conference in Orange Beach, Alabama. She received a GAB travel grant to attend INQUA to share her preliminary results with leading experts in her field in a specialized session. At the AL Water Resources Conference, she presented her final project results as a poster, and won third place in the student poster competition. As the year ends, Emma looks forward to finishing the rest of her lab analyses, publishing the first chapter of her master's thesis, and continuing to enjoy her time at Auburn University in the Department of Geosciences until she graduates in May.

From left to right: Ann Ojeda (Assistant Professor in Geology), Andrea Wren (visiting student through an undergraduate research experience program), Alexa Kloske (intern with the Alabama Cooperative Extension), Jessie Curl (Alabama Cooperative Extension Private Well Program Coordinator), Emma Henderson (MS student in Geology), Sidney Millner (MS Student in Geology), Bethany Foust (MS student in Geography).



The team at a workshop held for private well users in Baldwin Co at the Week's Bay Nature Preserve, June 2023.



Emma at the International Union for Quaternary Research Conference in Rome Italy, July, 2023.

## Ojeda Lab Updates Continued

In 2023, Dr. Malina was promoted to Assistant Research Professor and continued collaboration with Dr. Ojeda's group. She initiated a new research direction focusing on the photodegradation of contaminants in water. Additionally, Dr. Malina is actively involved in an EPRI project that explores the sequestration of molybdenum through bioremediation in contaminated groundwater led by Dr. Ann Ojeda. With graduate students Elyssa Rivera and Shifet Monami, she successfully developed and deployed the down-well sampler and sampled the groundwater microbial community. Throughout the year, Dr. Malina sustained the microbial community's growth and development under laboratory conditions. She looks forward to the continued progress of the project this year.

Additionally, she continues applying the previously developed ICP-MS method to characterize the complexation of arsenic, a common groundwater contaminant, and dissolved organic matter (DOM) in samples from an oil-contaminated site in Bemidji, MN.

To gain a deeper insight into the structure of DOM, Dr. Malina established a collaboration with the National High Magnetic Field Laboratory in Tallahassee, FL. She utilized Fourier Transform Ion Cyclotron Resonance Mass Spectrometry (FT ICR MS) to measure the structure of the high molecular weight fraction of DOM. Preliminary data suggest the success of the developed method, and she eagerly anticipates visiting the facilities to measure different types of DOM.



Dr. Malina preparing the enrichment media "food" for microbial community in the anaerobic chamber.

## Dr. David King Professor of Geology



During the past year, I continued research in two main areas – one basic and the other applied. In basic research, I work on impact craters and planetary surface processes, and in applied research, I work on projects related to disposal of carbon dioxide and of radioactive waste. I have a new federally funded project, with Co-PI Ashraf Uddin, on carbon sequestration aspects of a deep drill core in Shelby County, Alabama. There are two new graduate students working with Dr. Uddin and me on this project – Mayes Mayes and Bryce Hall. I should add that I have three planetary graduate students as well, Tuhi Saumya and Patricia Solana, both of whom are working on Mars surface processes, and Pedro Montalvo, who works on lunar impacts. During 2023, I published another review paper on all the work that I have done in Belize over the past 25 years. The review included the first new chronostratigraphic analysis of the northern and southern basins of Belize since the 1950s. This paper is presently in print in the *GeoGulf Transactions*.

These days, I teach several courses on a regular basis in our department including Dynamic Earth, Earth and Life through Time, Lunar and Planetary Geology, Stratigraphy, and a graduate course in Impact and Planetary Geology. I am planning new courses in Alabama Dinosaurs and Impact Geology, both at the undergraduate level.

As I have been for many years, I am the advisor for the student groups, Sigma Gamma Epsilon and the Auburn chapter of the American Association of Petroleum Geologists. This year (2023) was my 40<sup>th</sup> anniversary as SGE advisor. I have been advisor for AAPG since the chapter started at Auburn in 1986. Also, I continue as the departmental coordinator for the Science Olympiad held on campus each year. Further, I sit on the Alabama Board of Licensure for Professional Geologists as the member representing academic departments of geology in our state. I am pleased to announce that my book, *Alabama Dinosaurs* (4<sup>th</sup> ed., 2022), is now published by Sentia Press of Austin, Texas, and is sold via Amazon.com. I am presently writing another book on the Wetumpka impact crater in Elmore County.

My work at Wetumpka impact crater has been recognized in several displays and graphic presentations that are now open to the public at the city of Wetumpka's Crater Discovery Center, which is located in downtown Wetumpka, Alabama.

I would really enjoy hearing from former students. I have the same email address as I did when email first came to Auburn – kingdat@auburn.edu. Would really like to know about your career and your recollections of Auburn geology back in the day.

## Twenty-five years of research at Wetumpka impact crater, Elmore County: Part 2 (1998-2002) David T. King, Jr. Professor of Geology

As promised in last year's *Geotiger*, I will continue this historical account of research at Wetumpka impact crater, starting with the discoveries made during the interval 1998-2002 that proved Wetumpka is an impact crater – the 157<sup>th</sup> known impact crater on Earth at that time.

On July 1, 1998, just as the CNN cameras were rolling on our morning drill core recovery, cylindrical masses of crystalline rock (namely schist and gneiss) came sliding out of the core barrel. Rarely had we been so happy to see crystalline rock, and now here it was after two weeks of finding only red, clayey sands. What this meant for the story of Wetumpka origin was another matter, and it would be many years later before we really began to understand why these crystalline blocks were in the impact crater fill, at crater center, and about 325 feet below a thick mass of contorted Tuscaloosa Group sediments.

The next day, which was mercifully much cooler (77 °F), we saw a zone of broken rock, known as impact breccia come out as cylindrical drill core from about 375 feet in depth. Impact breccia was key to understanding the origin of one of the original six craters, namely Ries crater in Germany. So, when we saw that breccia emerge from the core barrel, we thought that we had the likely source for shocked quartz because impact breccia at other craters like Ries had yielded such materials. This box of drill core, which is the great treasure from the drilling at Mr. Schroeder's place, was (and still is) marked "discovery box." This is because later laboratory work on that one 10-ft interval of drill core with impact breccia yielded not only the first shocked quartz ever found at Wetumpka, but also faint chemical traces of the exploded asteroid.

The elements cobalt, chromium, nickel, and iridium (in the same proportion to one another as is found in a class of meteorites called carbonaceous chondrites) was recovered from the same breccia zone as the shocked quartz. These findings were published in 2002 in the journal *Earth and Planetary Science Letters*, and the results in that paper established Wetumpka as a bona fide impact crater within the international impact geology community. This paper contained a detailed account of the precise orientation of the tiny, shock-induced layers within 45 quartz grains from the "discovery box," plus the cosmic geochemical analysis just noted.

These data were provided to us by Dr. Christian Koeberl, an imminent impact researcher at the University of Vienna, who was also a co-author of this 2002 paper. After this paper was published, the Alabama Historical Commission placed a sign marking the crater rim on US 231 at the Elmore County Health Department (Fig. 1).

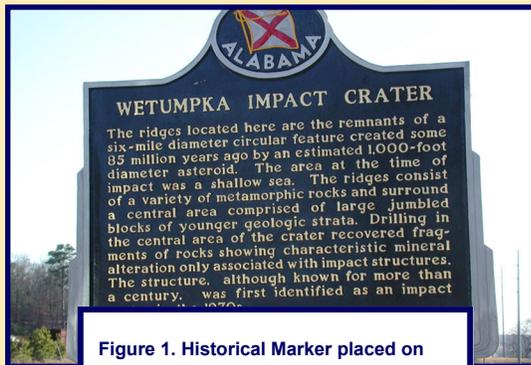


Figure 1. Historical Marker placed on US 231 in Wetumpka on March 7, 2003.

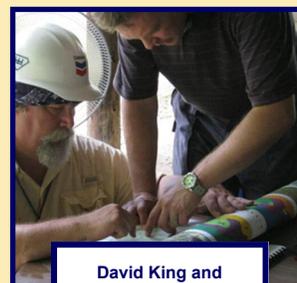
From 1998 to 2000, the first graduate student from Auburn University studied Wetumpka impact crater for her Master's thesis in geology. Anne I. Nelson made a new geological map of the crater area and made extensive collections of samples as part of her work at the crater. She was the only student from Auburn to work only with field data, not drill cores, and her work set a

standard for future student theses for clarity and completeness. Also during 2000, we met a new collaborator who has brought many important insights into Wetumpka's marine origins over the years since. He is Jens Ormö, who at the time had recently finished his Ph.D. at Stockholm under the guidance of the imminent paleontologist and impact geologist, Maurits Lindström. Jens was a post-doctoral researcher in Italy at that time, but would soon after start working at his present job as the impact specialist with the Centro de Astrobiología in Madrid, Spain. In 2000, Jens and Maurits had just published a very important scientific paper, based in part on Jens' dissertation on the Lockne crater in Sweden. Their paper, which is titled "When a cosmic impact strikes the sea bed," essentially launched the discipline of marine impact studies, and was vitally important to the impact community because all the models and concepts about impacts had, up to 2000, been based on dry, hard target impacts on land. As Jens

and Maurits rightly pointed out, marine impacts are very different from dry land impacts. When we saw their paper, it was an epiphany, a very enlightening moment, because it made so many aspects of Wetumpka understandable. Wetumpka was a marine impact, and now what we were seeing with the impacted sediments began to make sense.



Figure 2a, b. Me and Jens Ormö at the crater drilling campaign of 2009



David King and Ormö 2009.

***In next year's Geotiger, I will continue this historical account of research at Wetumpka impact crater, starting with the discoveries made during the interval 2003-2010, including new drilling at the crater, which proved Wetumpka is not only an impact crater, but an impact crater that formed in the shallow ocean waters covering southern Alabama during Late Cretaceous.***

# News from Faculty

## McNeal Lab updates

I am in my eighth year here at Auburn University. I direct the Geoscience Education and Geocognition Research Lab which currently consists of five PhD graduate students. The biggest news I had this year is that I have taken a 75% position to work with the National Science Foundation as a rotator (IPA) where I am a Program Director in the Division of Graduate Education. This position affords me the opportunity to have a national impact on STEM graduate education and to gain valuable experience working at the forefront of science and innovation. The transition came with some growing pains in transitioning four of my NSF projects, but I thank the wonderful colleagues at Auburn that supported me in this opportunity to temporarily serve at the federal level on this detail (special thanks to Drs. Mitra, Shepherd, and Lanius). I am very excited to see how these projects continue to be successful and grow in new and exciting ways with these dedicated faculty leaders. I am also thankful that my graduate students have been flexible and continue to be productive while I have transitioned into this new role. I continue to serve Auburn at 25% time which allows me to work on research projects, advise graduate students, and engage with the university.

This year I was also selected to be one of four AU faculty in the SEC Academic Leadership Program where I have been provided the opportunity to learn about the university system on a broad scale and visit and learn from other SEC campuses. Finally, since I was not able to report last year given the transition to NSF, I wanted to mention a few highlights from 2022 which was a stellar year. I was awarded Auburn's SEC Faculty of the Year, the National Association of Geosciences Transformation Award, and COSAM's Marguerite Scharnagle Endowed Professor. I am both honored and humbled by the many blessings I have received during my tenure at Auburn.

In addition to my own personnel accolades, my research group had five peer-reviewed papers published in 2023. One of these was published in the Journal *Geosphere* by my recently graduated Ph.D. student, Dr. Stephanie Courtney, who is now working as a Assistant Climate Science Liaison for United and South and Eastern Tribes (USET). This article examined how students' perceptions of and ability to use climate graphs varied when provided different versions of graphs during an eye tracking study. Two additional articles were published by two of my soon to graduate Ph.D. students, Tyler Johnson and Haven Cashwell. Tyler published an article in the *Journal of Geoscience Education* that used survey results to determine how the pandemic impacted instructor and departmental use of virtual field trips in undergraduate geology departments across the nation. Haven's paper was published in *Weather, Climate and Society* and examined how a decision support tool should be



designed to most efficiently help users navigate the tool using an eye tracking study approach. Tyler also received the Dept's GAB Graduate Leadership Award and Haven received 1<sup>st</sup> place at the AMS Annual Meeting for the Outstanding Student Oral Presentation Award.

Additionally, my student Haylie Makulik is the first graduate student to serve in a new graduate student Dept. GRA role where she focuses on helping ensure the department is welcoming and inclusive to all students. She has held several townhalls and student socials to help continue to cultivate a strong culture of inclusivity, and collects data to help inform the department how it can continue to improve in recruitment and retention all students. She was also awarded an NSF supplement as part of her NRT Traineeship to visit STEM educators in Ireland, learning from and gaining valuable intercultural experiences conducting research overseas and will soon be beginning her travels abroad.

My third ESSI Ph.D. student at Auburn University graduated in August 2023, Dr. Elijah Johnson, who is now working as a contractor for the United States Geological Survey (USGS). I also graduated my fourth M.S. student at Auburn, Ms. Ally Brown, who is continuing her studies at AU as an ESSI PhD student. Ally was the lead instructor for the recently launched Climate and Weather Intro Class in Geography under Dr. Mitra's guidance in the Fall semester.

As far as grant efforts, we completed the second year of the USGS Climate Adaptation Scientists of Tomorrow Program in Hydroclimate research where four undergraduate students visited AU's campus over two summers and worked in faculty labs. Six AU faculty (Ojeda, Shepherd, Malina, Vachula, Waters, & O'Donnell) have joined me as Co-PIs for a second round of the project where we have funding pending (\$280k) for five more students to come to Auburn the next two summers. We also received a third cycle of funding from the USGS as a University Consortium member in the Southeast Climate Adaptation Science Center (SECASC), which focuses on co-produced actionable science research in the region. The collaborative project was awarded \$7M to NC State with AU receiving ~\$350k in funding and will receive a Graduate Fellow each year. I serve on the executive leadership board for the project and represent AU as PI/Liaison.

Other news is that my family and I built a new home in Auburn to be closer to the kid's school and AU's campus but don't worry we still have the farm, and my husband is still hunting and taking care of our many chickens. My daughter, Holly (12), enjoys music and is learning to play the clarinet, guitar, and piano and has started to run track at Lee Scott Academy. My son, Hunter (9), continues to enjoy the Auburn City Soccer league and also attends school at Lee Scott Academy. Although I am working for the NSF, I still spend most of my time in Auburn on a remote assignment, so please feel free to reach out and connect with me.

# News from Staff Members

## Ashleigh Rudd Office Supervisor

In 2023, I was extremely honored to receive the **“Outstanding Student Support”** award. This award is presented annually and recognizes outstanding academic and professional personnel from across campus for their commitment to improving academic advising and developing innovative programs designed to foster student success. It’s such an honor to work in a Department that recognizes all of my efforts and dedication.

Outside of work, you can usually find Brantley and I at the football stadium, fishing, or hunting. Whether it be an AU game or a JV game that Brantley is playing in, we love Saturdays in the South!

### Testimonies from students

*“Ashleigh is a friend to all she meets, setting a superb example of professional relationships and teaching students and faculty how to have mutual respect for each other. For a long time, I just thought Ashleigh liked me.*

*She has always gone the extra mile with any question or concern I have brought to her. After some time, however, it became apparent that it had nothing to do with me. Ashleigh works that hard for every student, making sure the numerous tasks that largely occur behind the scene are completed without most members of the department even aware of the fact that they needed to be done!”*  
*“Ashleigh is EXTRAORDINARY in all aspects! One example of how she is specifically qualified for the Outstanding Student Support Award is how she handled GTA utilizing research and travel funds. Instead of waiting for issues to present, Ashleigh worked to compile detailed documents instructing how we should go about utilizing funds, giving a detailed presentation. Now, the part of this story that sets her truly above is how she handled the inevitable questions that were already answered through her presentation, documents, etc. She never makes us feel silly, or as if we are wasting time, she answers questions and then works to make the process even clearer during the next iteration of instructions. Ashleigh is a fierce advocate for students and absolutely embodies the role of an outstanding student supporter.”*



2023 COSAM Staff Ceremony



Deep Sea Fishing for the 1st time  
Orange Beach AL– Summer 23



Auburn vs. Georgia Game



Playing Wide Receiver  
Beauregard Hornets vs.  
Beulah Bobcats

## Kiley Coan Administrative Support Associate

This year has flown by, and it seems like there is no slowing down. I am so honored to be a part of the Department of Geosciences. It is wonderful to be a part of such an amazing team. I enjoy assisting our students and watching their accomplishments each year. I am delighted to put together the newsletter and assist our department with the day to day operations. Everyone in the department has the desire to help the students in and outside the classroom to achieve their goals.

Some of my favorite hobbies include cooking, reading, spending time in nature with our Dog Rosy, and travel. Kaylee my youngest daughter is a fantastic artist. She continues to play soccer with the Auburn Soccer Club. Her team won the state cup for her age group this year.

My oldest daughter, Kamryn, will be an upcoming junior at Auburn High School. She has excelled in her academics, making the all A honor roll and is a part of the HO-SA club. She hopes to pursue a career in the medical field. She will be enrolling in the Auburn First Program and taking some classes in the upcoming year for dual enrollment credit.

I look forward to 2024, and can’t wait to see what the next year holds for the Department of Geosciences! I look forward to more exciting news in 2024! Please email me at [rainskl@auburn.edu](mailto:rainskl@auburn.edu) with any upcoming News for 2024! If you are interested in taking

classes in the Geosciences Department, or want to know more about our classes, come see me in Haley 2046!



Our family Vacation to Seagrove,  
Beach Florida, 2023

# Destination STEM

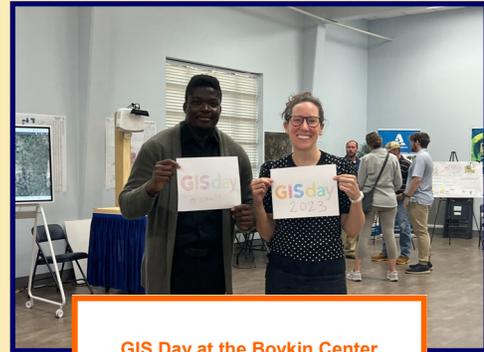
## Destination STEM



Destination STEM was held on October 20, 2023 this year in the Beard-Eaves Memorial Coliseum. Destination STEM is an interactive Open House for Grades 6-9 that are considering careers in Science, Technology, Engineering, and Math. Auburn Faculty and Staff provide hands-on Learning Experiences pertaining to their field of study.

## GIS Day for the Community at the Boykin Center

Auburn University's Department of Geosciences partnered with the City of Auburn, City of Opelika, Lee County Mapping and GIS in celebrating the applications of Geographic Information Systems (GIS) Technology at the Boykin Community Center Auditorium on November 17, 2023. The goal is to educate and bring awareness to the field of Geosciences and GIS. There were many poster presentations and volunteers that showcased their work. Thank you to all the volunteers who made this event possible.



GIS Day at the Boykin Center



# Promotions and Recognitions

## Dr. Adam Payne Senior Lecturer

Dr. Adam A. Payne is a geographer interested in the historical geography of North America, urban studies, and tourism. His research interests have been gentrification and commodification, place promotion, and heritage tourism. Dr.

Payne has been teaching as an adjunct at various colleges and universities for nine years. He accepted a lecture position at the University of Auburn in 2017. Through his many years of teaching he has taught a wide-range of courses including Global Geography, Physical Geography, Economic Geography, Introduction to Geography, and Cultural Geography. Dr. Payne was promoted to Senior Lecturer in the Fall of 2023 and continues to go beyond what is expected from a lecturer.

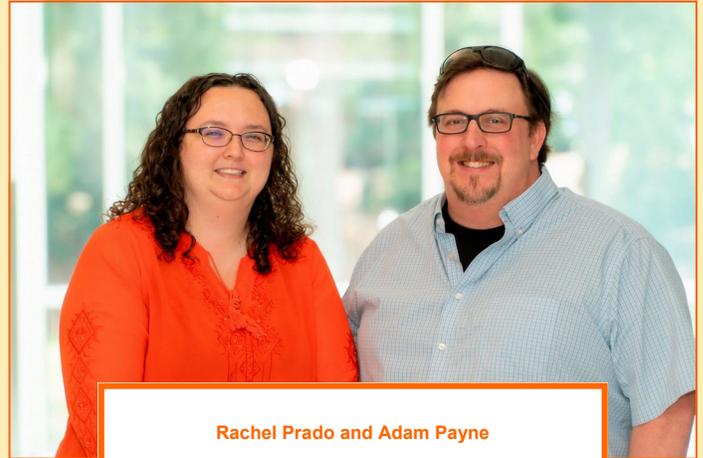
For the academic year 2023-2026, Dr. Adam Payne and Rachel Prado of the College of Sciences and Mathematics (COSAM) have been named Biggio Faculty Fellows. The Biggio Center's mission is to "provide a range of opportunities, such as professional development programs, grant and funding opportunities, teaching and learning services, and ideas and services that enable Auburn's teaching community to prepare our graduates to be creative problem solvers in a global economy."

"I took a Biggio Center workshop on gamification and it rekindled my love for teaching. These kinds of opportunities also allow us to (re)examine and reflect upon the way we teach, enabling us to become better educators and reinforcing the idea of lifelong learning."

And the Biggio Center is helping them to share valuable ideas and techniques to become better educators. COSAM faculty, graduate students and postdoctoral scientists are encouraged to request instructional support online. They can visit [aub.ie/instructionalfeedback](http://aub.ie/instructionalfeedback) and submit the online form.

"The Biggio Center offers several services that COSAM, or anyone on campus, can take advantage of. We offer course observations, small group instructional feedback, and course consultations for a variety of subjects," said Payne.

Payne and Prado began a series of luncheons helping to showcase educational topics and practices.



Rachel Prado and Adam Payne  
Biggio Faculty Fellows from 2023-2026.

## Dr. Marilyn Vogel Senior Lecturer and Concepts of Science Coordinator

Dr. Marilyn Vogel is a geoscientist interested in endemic plant species and the use of narrative in science education. In the past she

has worked in the areas of geochronology, organic geochemistry, and astrobiology. She accepted a lecture position at the University of Auburn in 2017. Through her many years of teaching, she has taught a wide-range of courses including Concepts of Science, Earth and Life Through Time, Sustainability, and Dynamic Earth. Dr. Vogel was promoted to Senior Lecturer in the Fall of 2023 and is writing a science historical biography of the German astronomer Johannes Kepler.



## Eshita Akter Eva Fellowship at Ohio State University



An alumna of Auburn University's Geoscience department, **Eshita Eva** is currently a Ph.D. candidate in The Ohio State University's Geography department. The Ohio State University is one of the most prestigious universities for geography studies. Recently, she has been awarded the prestigious Presidential Fellowship. The Presidential Fellowship is the most prestigious award given by the Graduate School to recognize the outstanding scholarly accomplishments and potential of graduate students entering the final phase of their dissertation research or terminal degree project. Students cannot apply directly to the Graduate School for the Presidential Fellowships. Nominations are made and submitted by Graduate Studies Committee Chairpersons (GSCC). Financial support for Presidential Fellowships allows the fellow to complete the dissertation or degree project full-time for one year, three consecutive semesters, and to graduate without interference from other duties. Additionally, Presidential Fellows are eligible for up to a \$500 travel allowance to present research at a national meeting.

My doctoral dissertation is '*Developing high-resolution soil moisture maps using in situ, satellite, and model-derived data in the contiguous United States by applying artificial intelligence (AI)*'. Applying the techniques of AI to downscale the climate variable is substantial to make the datasets enriched, applicable, and valuable for many applications in real-world problems. My research will address the critical need to enhance the accuracy and utility of national soil moisture products by integrating data sources and downscaling them to farm scale with the help of machine learning (ML) and deep learning (DL). This research aims to create more accurate field-scale soil moisture by achieving three objectives 1) Determine the importance of the variables on the downscaling of soil moisture 2) determine the best techniques for downscaling soil moisture products, and 3) identify the optimal spatial resolution. Three independent sources of soil moisture datasets will be used: in-situ data, satellite data, and model-derived data. Different datasets will be used as the ancillary data such as soil texture data, precipitation, antecedent precipitation index (API), temperature, elevation, slope, aspect, land use, leaf area index (LAI), and normalized difference vegetation index (NDVI). To achieve objective 1, the random forest will be applied to determine which variables influence the field scale soil moisture.

Different machine and deep learning methods (random forest, support vector machine, artificial neural network, convolution neural network, long short-term memory) will be applied and the best method will be determined by accuracy matrices. The best method will be applied to disseminate soil moisture data for the Contiguous United States (CONUS) at varying finer resolutions; that is how the optimal resolution will be identified.

This project will build a scalable data infrastructure system and Application programming interface (API) to support the use of soil moisture data by agricultural producers, agribusinesses, natural resource managers, and scientists. The research findings will be disseminated to stakeholders through the National Integrated Drought Information System (NIDIS), United States Department of Agriculture (USDA). The downscaled products will be made freely available by the scientific community and state and federal agencies.

## AI Emran MS, Geological and Earth Science, Auburn University



Emran is a planetary astronomer with a broad range of research interests. He is currently a postdoctoral fellow at JPL working on characterizing the surface of Mars using NASA's orbital spacecraft observations. During his Ph.D. at Arkansas, his research involved deciphering surfaces of trans-Neptunian and Kuiper belt objects, such as Triton and Pluto, using radiative scattering models, machine learning, and simulated laboratory experiments. He used orbital observations for an improved understanding of dunes on Mars during his graduate research at Auburn. Emran loves his mother planet and also worked on Earth in understanding the dynamics of coastal morphology and vegetation using satellite images. He likes to continue his research emphasizing exploration of the solar system bodies (planets, moons, asteroids, and icy bodies) and beyond (exoplanets).

He is the first Bangladeshi national to have a planet named after him. He has been publishing in top planetary journals focusing lately on Pluto. I hope he can bring back the Pluto to be considered again as a regular planet as it used to be few years ago!!

# Student Achievements and Recognitions

## Shifat Monami PhD. ESSI

Shifat Monami, a doctoral student in Earth System Science, was selected as a fellow for the 2023 G. T. Seaborg Institute Graduate Research Program. The Seaborg Fellowship aims to cultivate the next generation of researchers in nuclear science that integrates focused research with the mission imperatives of Los Alamos. As part of this prestigious fellowship, Shifat spent 12-week at Los Alamos National Laboratory in New Mexico to advance her studies in geochemistry. Shifat worked with Dr. Nathan Alec Conroy, a scientist and team leader of the Radionuclide Geochemistry team to develop geochemical model-based tool to evaluate uranium in situ remediation by introducing reducing and complexing agents. Back at Auburn, Shifat has been actively engaged in cutting-edge research on geochemistry and bioremediation. Under the guidance of Dr. Ming-kuo Lee and Dr. Ann Ojeda, she has been working to address groundwater contamination caused by coal combustion residuals. Shifat's commitment to advancing knowledge in these critical areas showcases her passion for making a positive impact on the environment.



## Dikshya Panta MS Geography

Dikshya Panta, has been selected as the President of the COSAM International Student Association (CISA).

"My time at Auburn University has been more than just academic; it's been a deeply personal exploration into the complex challenges faced by us as international students. From navigating the complexities of finding temporary accommodation and understanding the onboarding processes to overcoming transportation barriers and accessing essential university resources like psychological services and food assistance. This highlights a crucial need for better support systems, not only for new students but also for those who are still discovering what Auburn has to offer. Thus, COSAM International Student Association (CISA) was established to support international students and to make international student feel as if they were part of a bigger community. I express my **deepest gratitude** for the trust and confidence placed in me by electing me as the president of CISA."



## GSA Conference 2023



Graduate Students from the AU department of Geosciences in Pittsburgh, Pennsylvania. Md Mahfuj Rahman, Md Riaz Uddin, and Md Hasnaat Jaman were recognized for "on to the Future" (OTF) awardee with their mentors from the Geological Society of America.

# Student Achievements and Recognitions

## Subhasis Ghosh Ph.D. Earth System Science

Subhasis's year was marked by groundbreaking research, as he and his team offered new insights into how COVID-19 lockdowns impacted global air quality contrary to the common belief.

This work, published in *Physics and Chemistry of the Earth*, Elsevier, became a cornerstone for further discussions on sustainable urban planning and was also highlighted in the COSAM Today newsletter.

This year, Subhasis's journey took him to international conferences, from the vibrant city of Sydney, Australia, the city of pearls - Hyderabad, India to the snow-capped Rockies of Denver, CO. Here, amidst the gathering of minds, he presented his findings and organized sessions on urban micro-hydroclimatology and the emerging concerns of urban climate archipelagoes.

The story of this year was also one of personal growth and academic achievement. Supported by the USGS Climate Adaptation Scientists of Tomorrow (CAST) mini-grant award, he visited the National Center for Atmospheric Research (NCAR) in Boulder, CO, and honed his skills in weather research and forecasting (WRF) modeling. These opportunities not only fueled his research but also paved the way for him to become a leading voice in his field.

As an elected student representative for the Regional Development and Planning Specialty Group of the American Association of Geographers (AAG), and as the Geosciences department Senator to the Graduate Student Council (GSC) at Auburn University, Subhasis embraced leadership roles with responsibility and determination. As a peer reviewer of scientific research articles, his contributions to science and the academic community were recognized by multiple prestigious journals from Elsevier, Springer Nature, and Cell Press.

In December 2023, Subhasis earned his second master's degree in Geography from the Department of Geosciences en route to his Doctoral degree in Earth System Science.

To learn more about Subhasis's research, visit [www.subhasisghosh.com](http://www.subhasisghosh.com).



Paper session on Urban, Climate, and Sustainability with Dr. Mitra.



AAG Conference  
Left to Right. Sukanya, Nazifa, and Subhasis



Subhasis Ghosh graduated Fall, 2023 with a Master's in Geography

# Auburn Doctoral Student Challenges Perceptions of COVID-Lockdowns' Impact on Air Quality with International Team of Researchers Through NASA Project

Research has indicated that overall air quality had improved during the lockdown from COVID. Most major cities saw improved air quality, making it healthier for residents during COVID. While this was true, a group of researchers from five countries began brainstorming post-COVID phase, whether air quality had similarly improved regionally and/or globally, and whether this claim was biased towards urban centers only. Among these researchers is Subhasis Ghosh, a doctoral student in the Department of Geosciences at Auburn University who played a pivotal role in conducting research using remote-sensing and cloud computing techniques to debunk the published myth that air quality had overall improved during COVID. The team found that there was a huge gap in the way air quality improvement was perceived at different scales, which they published in the *Physics and Chemistry of the Earth* journal. The article is titled [Have COVID lockdowns really improved global air quality? – Hierarchical observations from the perspective of urban agglomerations using atmospheric reanalysis data](#). The study is part of NASA's Interdisciplinary Research in Earth Science program led by Dr. Chandana Mitra in the Department of Geosciences, which looks at urban agglomerations and their impact on urban microclimate and urban hydrological processes.



"The study is aimed to answer a pressing question that has captured the attention of the world since the pandemic began: Did the COVID lockdowns genuinely lead to significant improvements in global air quality, or is the reality more complex than we initially thought? Most of the research done at the time focused on air quality within city limits and largely overlooked high-level emitters such as heavy factories, coal mines, and power plants located along the city fringes that were significantly contributing to pollution levels to secure continuous energy supply during the lockdown," said Subhasis Ghosh, doctoral student in Earth System Science.

According to Ghosh and Mitra, the reduction in pollution is prejudiced by the scale of observation, whether the observations considered were local or regional. "If you are only looking at pollution emissions from cars and planes, you are only seeing one perspective," explained Ghosh.

The team of researchers completed the first study that includes the missing element by first looking at the bigger picture or global view then narrowing it down to urban agglomerations, and then to just the city level. Urban agglomerations include several large and small urban areas connected to each other economically and physically, spatially spread over large areas, having a collective influence on the region. An example from the US is the urban agglomeration from Boston to Baltimore corridor, all connected and behaving as one unit.

"The research that Subhasis has published is unique as it is not looking at one big city but a group of cities or urban agglomerations," said Chandana Mitra, graduate advisor to Ghosh. "Millions of people live in the major cities around the globe, which has a direct influence on surrounding ecosystems, but the impact gets amplified when you begin to assess the collective influence of a bunch of cities together on the region," Mitra added.



The researchers assessed six major pollution indicators including sulfur dioxide (SO<sub>2</sub>), ozone (O<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>), particulate matter (PM<sub>2.5</sub>), columnar aerosol optical depth at 500 nm (AOD<sub>500</sub>), and UV aerosol index (UAI) in the study.

"We found that the impacts were so dynamic that there were spatial variabilities in air quality levels even within a country. If you look at the city level and then move your observation to the agglomeration level and then the regional level, you may have results very different from each other. We found that PM<sub>2.5</sub> concentrations significantly increased in Ghana and Russia where most of the other countries showed a decrease by 56% compared to 2019. However, at the same time, Ghana also recorded a decrease in NO<sub>2</sub> which was quite interesting to see. Similarly, NO<sub>2</sub> concentrations decreased by 3%–31% in most countries but countries like Turkey and Spain exhibited mixed patterns, and countries such as the UK and South Africa showed increases. All the major pollutant parameters also did not seem to have responded in the same way. For example, the Delhi agglomeration in India (Delhi-NCR) showed a prominent decline of PM<sub>2.5</sub> whereas in most parts, SO<sub>2</sub>, AOD<sub>500</sub>, and UAI presented a mixed pattern fluctuating over the study period. These results clearly indicate that the impact of COVID-lockdown on air quality is completely subjective to the scale of observation and what pollution parameters are being referred to when assessing the air quality standards. It is not a one-size-fits-all scenario," Ghosh said.

The study therefore challenges the blanket assertion of improved air quality during COVID lockdowns. "Understanding these variations is essential for policymakers and environmentalists seeking to make informed decisions about air quality management. The large urban entities have now gradually started to transform into agglomerated urban ecosystems. Collective interactions within such ecosystems have greater impacts on the local environment than the individual cities. Hence, this factor should also be taken into consideration when performing such investigations," Ghosh added.

The international team of collaborators includes Subhajt Bandopadhyay from the University of Southampton, United Kingdom; Rahul Deb Das from IBM, Germany; Mridul Das from Serampore College, India; Mousumi Chowdhury from Indian Institute of Engineering Science & Technology, India; Alexander Cotrina-Sanchez from Università Degli Studi Della Tuscia, Via San Camillo de Lellis, Italy; and Chandan Kumar from Mississippi State University, United States.



# Brandon Ryan's Class Study-Battling Heat at Football Games

Auburn University's football players won't be the only students whose expertise is on display in the heat this Saturday.

Graduate student Brandon Ryan, who is seeking a doctorate in Auburn's Earth System Science program, will be spearheading a heat study project in Jordan-Hare Stadium during the Tigers' game against the University of Massachusetts.

The heat study involves 15 sensors, known as iButtons, that Ryan PhD and his advisor, Chandana Mitra (who is leading the project), have strategically placed in Jordan-Hare to measure temperature and humidity — all aimed at identifying areas in the stadium that are most vulnerable to heat so they can be addressed to keep fans as safe from extreme conditions as possible. This project has been funded by Auburn University's Campus Safety and Athletics offices.



"If we can pinpoint those locations, we can figure out the best places for remediation and cooling stations," Ryan said.

Mitra, an associate professor in the Department of Geosciences, said the project should yield very helpful findings.

"We can find the variability in different parts of the stadium — which side is hotter than the other — so that thermal comfort isn't compromised," Mitra said.

Mitra added it's important to note that thermal discomfort isn't only directly related to sunlight, and that's why the heat sensors measure more than just temperature.

"What we don't realize is that in the evening the humidity can be higher," she said. "The apparent temperature, which is the humidity and temperature, adds up to one's thermal discomfort."

Auburn University Director of Emergency Management Floyd Johnson said the addition of the sensors is greatly appreciated by his department, especially considering that temperatures during the first few games could peak in the mid-to-upper-80s. From an emergency management standpoint, he said the sensors will help identify hot spots so first responders and cooling stations can be placed in the most strategic areas.

"If we can predict it, we can prevent it," he said of the importance of such proactive measures.

One of those efforts will involve new "cooling spots." This year, Carrier cooling stations, which consist of single-unit, ductless air conditioners, will be dispersed around the stadium. There also will be a dedicated cooling tent by the main first-aid station, just inside Gate 16, if fans need additional rest from the heat in a more enclosed area.

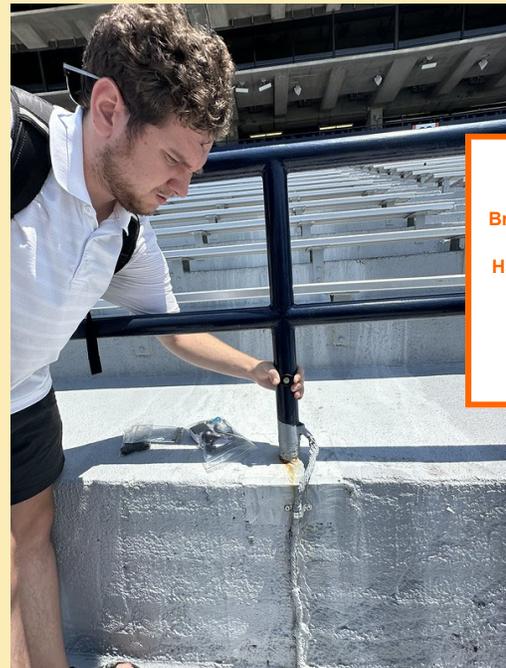
As in past years, 10 large water containers will likewise be present near the concession areas of Jordan-Hare for those in need of refilling water bottles. The containers will be monitored and maintained throughout the game.

Students will be able to grab an ice-cold bottle of water upon entry, provided by Coca-Cola.

Additionally, fans are permitted to bring in their own bottle of water. It must be a clear water bottle that is factory-sealed. Fans also may continue to bring in empty water bottles or cups that can be refilled at the filtered water stations.

As for the sensors, Ryan is excited to see how his study might improve the fan experience at Jordan-Hare. He also said he hopes to use the outcomes of the study to educate and communicate scientific knowledge with a non-science audience. Ryan's PhD research involves STEM.

"At the end of the day, we are part of the Auburn community," he said. "You get to have a real impact on a community that we care about. That is the most exciting part about science, and when we can make real



Brandon Ryan at Jordan-Hare Stadium



## Lee County Emergency Management Team Highlight

Miranda Silano was featured as the Lee County Emergency Management Team Highlight last week. She is graduating with her master's degree from Auburn University and is now interning with this critical service in Lee County.

"Being able to intern with the Lee County Emergency Management Agency (EMA) has been one of the highlights of my time at Auburn University. The tasks that I mostly involve using GIS (Geographic Information System) to shed light on tornado interactions with the residents of Lee County," said Silano. "I have been able to apply skills that I have learned from the GIS classes I took through the Department of Geosciences to satisfy requirements for my Master's of Science in Geography and for the GIS Certificate. These skills include knowing the basics of GIS and what information can be gathered from the maps produced by GIS."

She is applying what she learned in the classroom in her role with Lee County.

"GIS can be used to calculate spatial statistics that I learned about in class, which I hope to use on some of my maps for the Lee County EMA," explained Silano. "The observations seen in maps and the information received from spatial statistics can provide a lot of information into what is being seen in an area. It has been a great learning experience for me to be able to apply concepts learned in the classroom to large-scale scenarios, and I'm grateful that the GIS classes in the Department of Geosciences were able to aid in that."

Those maps might be able to help first responders after a natural disaster.

"In the wake of many natural disasters such as hurricanes, flooding, earthquakes, and wildfires, geospatial data-driven technology such as GIS can be a true lifesaver for many vulnerable populations," said [Ming-kuo Lee](#), chair of the Department of Geosciences. "Miranda's work in Lee County and other communities located along the Gulf of Mexico show how the geographic tools and maps can help the emergency responders to quickly identify the worst-impacted areas in mitigation and recovering from a major disaster." Silano reflects back on the team at Auburn University who supported her.

"There are professors in the Department of Geosciences who are knowledgeable in GIS and provided me with guidance and support through my coursework, and their help has, in turn, allowed me to help the Lee County EMA," she said. "I also took a class called 'Natural Hazard Risk and Disaster Resilience' that helped me understand the impact of natural hazards on society, what we can do to mitigate these hazards, and how to create resilient communities. This class and the knowledge I gained is what inspired my thesis topic (titled 'Tropical Cyclone Risk and Social Vulnerability in Small and Medium-Sized Cities



Along the Gulf of Mexico in the United States') and what sparked my interest in emergency management. For anyone interested in GIS or natural hazards, I suggest looking into some classes offered by the Department of Geosciences."

She conducted research in [urbanPRISM lab](#) with her advisor [Chandana Mitra](#), an associate professor in the Department of Geosciences.

"When an extreme weather event strikes a region, it does not spare any city, be it big, medium or small," said Mitra. "The impact is the same, though the magnitude may differ depending on the size of the city. Unfortunately, small and medium sized cities (SMSC), with their limited resources and lack of integrated services are impacted hugely by the extreme weather events and takes a longer time to recover and recuperate. Miranda's MS thesis addresses the challenges SMSC face in the wake of a hurricane and associated wind damage. She assesses the social vulnerability of five SMSC along the Gulf Coast based on demographic information. Her research is very relevant currently as extreme weather events have become more intense in SE US, according to the IPCC report (IPCC 2023)."

Silano enjoys an array of things in her position. "There are three major things that I have enjoyed while interning with the Lee County EMA. The first is realizing that I am capable of working independently and without any direct guidance, an aspect that isn't taught in a classroom," Silano added. "Working autonomously has helped build my confidence in my skills and knowledge. Next would be getting to work in a team. The other staff at the Lee County EMA have been fun to work with, and I have enjoyed getting to know them and help them in the work they do. They are supportive and also give me practice in communicating the work I am doing to a nontechnical audience. Finally, and probably the biggest one, is knowing that my work not only benefits myself and the Lee County EMA, but it benefits the residents of Lee County. In science, there is a disconnect between the research we do and how it plays into the broader scope of society. This internship has reminded me that my skills as a scientist can go beyond the academic world and are useful in the real world." Her expertise also helps her leave an impact on the entire community.

"It is fulfilling to know that my work for the Lee County EMA will help Lee County become more resilient to tornados and will aid them in tornado preparation," she said. "Emergency management agencies are not who always come to mind when people are preparing or recovering from a hazardous event. However, these agencies, especially the Lee County EMA, along with the county's other first responders, work hard to keep Lee County safe, and I am happy I have been able to contribute to that. I highly encourage anyone interested in emergency management and would like to add to their skillset to apply to intern with the Lee County EMA."

# Department of Geosciences Advisory Board Update



**The GAP Phoenix Crew, 2023**

2023 was a great year for the GAB and also a year of change. We updated our name to the Auburn Geosciences Alumni and Advisory Board (but still the GAB). More excitingly, we added a new Associates Membership for recent graduates, up to five years out of school. We also revised the Charter to put more emphasis on participation rather than on paying dues. GAB dues are now suggested. Our goal for 2024 is to continue to increase awareness of the GAB and boost interaction between the GAB and the Department/Students.

The GAB kicked off 2023 with a spring trip to Phoenix, AZ. The field trip was led by Tim Demko and Alex Woods, and they led us from South Mountain to the Cave Creek area to explore a unique cross section of the Proterozoic geology and associated terranes underlying the Valley. We had so much fun, we turned it into a 12-hour day!

The Fall 2023 meeting was our best ever as we had such great student participation – over 40 students and faculty! The field trip was pulled together with help from John Fronimos and Stephanie Rogers and included sites around Lake Martin. We also had special guests Mark and Laura Steltenpohl. Lunch at Chuck’s Marina included a trivia contest, lead by Stephanie. We all learned how little we know about the Lake Martin area! During the meeting portion of the weekend, several students provided short presentations of their work along with post board presentations. GAB members thoroughly enjoyed getting to talk with all the students about their research and projects.



**GAB Field Trip, Overlooking Lake Martin, 2023**

Bob Fousek, David King, and Bob Cook also led the effort to solicit naming an unnamed creek near the Wetumpka Crater, after Tom Neathery, an Alabama geologist who first described the crater in 1976. The application is still under review, but we hope to hear if Neathery Creek has been approved this year.

The GAB is looking forward to a great 2024 and building on the changes from this past year. We hope to see you all in Auburn, for our spring meeting. Date and details to follow.

# Departmental Awards

The Department of Geosciences hosted this year's Spring Picnic Awards on Saturday, April 29, 2023 at Auburn's North Pavilion. We recognized all of the accomplishments made by our exceptional students in the academic year 2022-2023.

Donations are used in a variety of ways to assist our students and our activities, thanks to gifts from our alumni and other friends of the department. Scholarships and other honors, such as plaques and cash, are one way to honor students who stand out in their fields of study, research, service and or leadership.

We have built a well organized nomination, application and voting process to ensure the success of our departmental Awards. The committee chairs are Phil Chaney, David King, Chandana Mitra and Chuck Savrda. Thanks you for your hard work and dedication to make this possible. Congratulations and best of luck to all of our students in the Geosciences Department!

## Outstanding Leadership Award

Jessica Patrick  
Sukanya Dasgupta  
Tyler Smith

## GAB Outstanding Student Awards

MS	Mahir Tajwar
ESS PhD	Elyssa Rivera

## GAB Research Awards

Zachary Davis	Harnat Haman
Sara Iranmanesh	Sion Brunson
Haylie Mikulak	Shifat Monami

## GAB Travel Grants

### Fall 2022

Dogancan Yasar	Shifat Monami
Riaz Uddin	Nora Lopez Rivera
Nazifa Tasneem	Mallory Jordan
Mahir Tajwar	Elijah Johnson
Sara Speetjens	Subhasis Ghosh
Tyler Smith	Pedro Montalvo
Ozan Sinoplu	Hephzibah Christopher
Miranda Silano	Ryan Brooks
Jessica Patrick	Olivia Ainooson
Taryn Hicks	

## GAB Travel Grants

### Spring 2023

Shirat Monami	Pedro Montalvo
Nora Lopez Rivera	Hephzibah Christopher
Mallory Jordan	Ryan Brooks
Elijah Johnson	Olivia Ainooson
Subhasis Ghosh	

## Student Awards 2022-2023 Outside of the University

### IBA team for 2022 -

Andrew Lipscomb	Bishop Robbins
Mahir Tajwar	Ozan Sinoplu

## COSAM Awards

**Dean's Medalist for Geosciences**  
Zain Webb

**Outstanding Junior in Geosciences-**  
Caroline Locker

**COSAM Research in Geosciences**  
Mahir Tajwar

## Department of Geosciences Awards

The Endowed Dr. Charles E. "Chuck" Savrda Outstanding Graduate Student Award- Sara Speetjens

Robert S. Fousek Naomi Kerschen

## Outstanding Graduate Student Senator Award

Michael Agbozo

## Outstanding Graduate Student Award

Dogancan Yasar PhD Ziaul Haque MS

## GAB Freshmen Scholarships

## Geology Alumni Scholarships

# Spring Picnic and Awards



Ashraf Uddin and Michael Agbozo



Laura Bilenker, Jesse Patrick, Taryn Hicks,



Bob Fousek and Zain Webb



Chuck Savrda and Haylie Mikulak



Tony Hall and Amanda Savrda



Amanda Savrda and Nafiz Rahaman



Olivia Ainooson, Nazifa Tasneem, Chandana Mitra, Michael Agbozo, and Subhasis Ghosh



Amanda Savrda and Olivia Ainooson

# Spring Picnic Awards



Amanda Savrda and Mallory Jordan



Amanda Savrda and Ryan Brooks



Amanda Savrda and Miranda Silano



Amanda Savrda and Shifat Monami



Amanda Savrda and Jessica Patrick



Amanda Savrda and Elyssa Rivera



Chuck Savrda and Hasnat Jaman



Amanda Savrda and Subhasis Ghosh

# A Minor in Geography

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[auburn.edu/geosciences](http://auburn.edu/geosciences)  
Dr. Adam A. Payne  
[aap0047@auburn.edu](mailto:aap0047@auburn.edu)

## A MINOR IN GEOGRAPHY

Geography studies the connections among people, places, and environments. Our geography minor gives students a sound foundation in geography as a research-oriented and policy-related field of study. The minor also offers students the opportunity to acquire a variety of techniques and skills necessary to understand the spatial dimension of human changes in the physical earth, and to identify and analyze urban problems.

Geography as a discipline prepares students for a wide variety of employment opportunities in the public and private sectors, including careers in the fields of planning, transportation, real estate development, publishing, marketing, and resource management.

## MINOR REQUIREMENTS

### Required Courses (6 hour total):

GEOG 1010 Global Geography  
GEOG 2010 Human Geography  
GEOG 2020 Physical Geography

## MINOR REQUIREMENTS CONT.

### Elective Courses (9 hours total):

GEOG 3000 Sports Geography  
GEOG 3110 United States and Canada  
GEOG 3103 Alabama and the Southeast  
GEOG 3130 Latin America  
GEOG 3140 Africa  
GEOG 3300 International Travel and Tourism  
GEOG 3810 Cartography and Graphics  
GEOG 5010 Urban Geography and Sustainability  
GEOG 5210 Climatology  
GEOG 5220 Geomorphology  
GEOG 5350 Economic Geography  
GEOG 5380 Political Geography  
GEOG 5400 Geography of Natural Hazards  
GEOG 5510 Human-Environment Interaction  
GEOG 5550 Geography of Water Resources  
GEOG 5820 Ariel Photography and Remote Sensing  
GEOG 5830 Geographic Information Systems

Students must earn a "C" or better in all minor courses

# Invest in the Geosciences at Auburn!

State funds and tuition pay only a small part of the costs to recruit and retain the best faculty and graduate students and support the undergraduate programs that are the hallmarks of the Auburn experience. Private funds sustain and enhance these extraordinary opportunities for students and faculty. The Department of Geosciences continues to provide the best possible education for our undergraduate and graduate students. Each year, private support provides the funding that helps support Auburn's margin of excellence. With our new Ph.D. program in Earth System Science, private giving is now more critical than ever. Please make your gift today via our secure website:

<https://nam11.safelinks.protection.outlook.com/?url=https%3A%2F%2Falumniq.auburn.edu%2Fgiving%2Fto%2Fgeosciences&data=05%7C02%7Crainskl%40auburn.edu%7C0c569c2df7244904752508dc1b6c00af%7Cccb6deedbd294b388979d72780f62d3b%7C0%7C0%7C638415397883426130%7CUnknown%7CTWFpbGZsb3d8eyJWljiMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6IjEhaWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=yZWAXhL%2FSmnbCeZfrOF%2F2tqZsL9sAFms7UVwLrJ8yM%3D&reserved=0>

We continue to welcome your gifts to any fund in the Department of Geosciences, and we hope you will consider any of the following funding priorities:

**Geosciences Department:** This unrestricted account provides the Chair with the most flexibility to apply support to the Department's most immediate needs, such as student and faculty travel, research, and equipment.

**Geosciences Advisory Board:** Our Advisory Board includes alumni, corporate, governmental, and community members who help support students, faculty, and staff in our department. The Board serves as a liaison with the geoscience business community and government entities to promote the interests of our department within Auburn University, the state, and beyond. The Board helps in our recruiting and retaining the most talented, motivated, and competent students and faculty by providing scholarships, grants-in-aids for research, CO-OPs, and internships, as well as support for our departmental seminar series and the GeoClub.

**Geology Alumni Endowed Scholarship:** Provides scholarships for deserving undergraduate students in geology.

**Nick Hood Memorial Scholarship:** The Nicholas L. Hood Endowed Memorial Scholarship was established by family, friends and classmates in memory of Nicholas L. Hood for the purpose of providing scholarships for students in the College of Sciences and Mathematics with a declared major in Geology.

For questions about creating scholarships and professorships, stock or estate gifts, specific programs, and suggestions on how you can support the Department of Geosciences, please contact COSAM development at the address below:

College of Sciences and Mathematics

Ashley Underwood

[ashley.underwood@auburn.edu](mailto:ashley.underwood@auburn.edu)

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