



Ready . . . Set . . . GEO!

NEWSLETTER

Fall  
2021



THE UNIVERSITY OF ALABAMA®  
Department of Geological Sciences

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Newsletter Design and  
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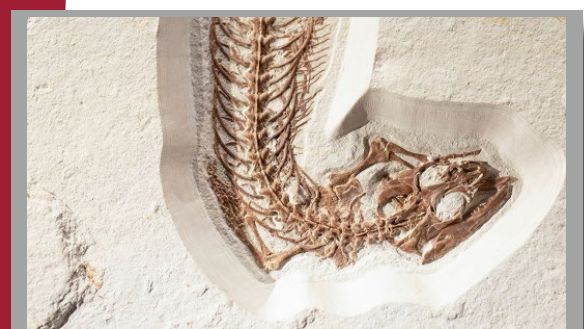
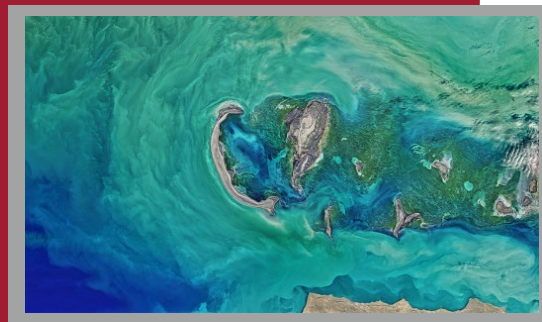
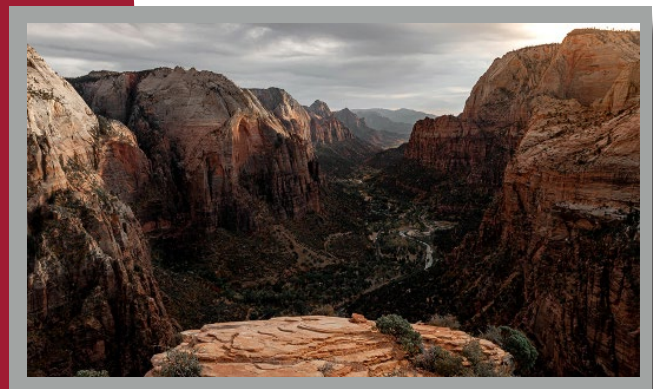
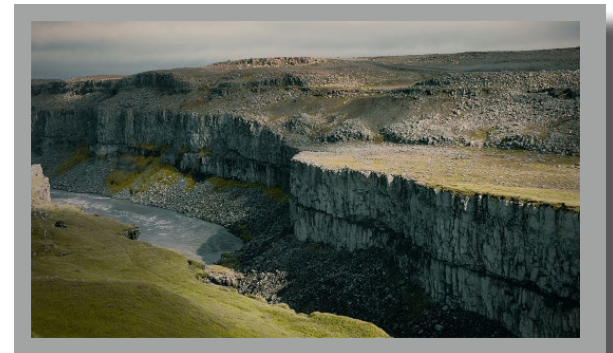
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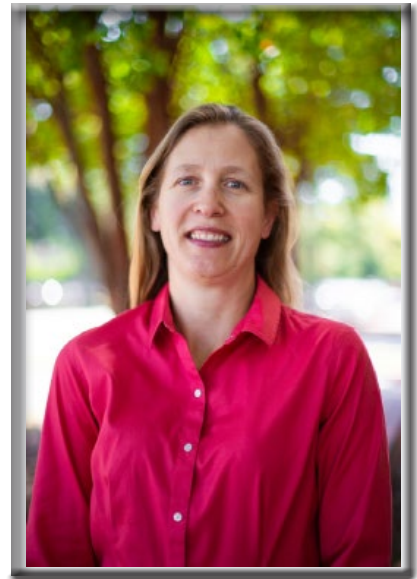
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Photos provided by faculty, staff,  
alumni, and students



# A letter from our Chair

Dr. Delores Robinson



The Department of Geological Sciences has endured a very difficult year with our labs shuttered, field work cancelled, professors and instructors adapting their classes to online and then hybrid modes, and students adapting to the learning modes and limited research. I am very proud of the effort that we put into our teaching and adaptability while continuing to be productive in research, even though we were working at home half the year and isolated from one another. We were allowed to begin opening our labs near the beginning of 2021 but travel was very restricted. By summer 2021, domestic field work and travel to labs was allowed; however, international travel remained (and remains) almost non-existent.

As we begin the Fall semester, we are all vigilant and aware that we may need to adapt more as the coronavirus evolves. Our welcome to the fall semester lunch, all properly masked, right before school started in August was the first time that the Department had been together since March 2020. This 1.5 years of working in isolation and within small lab groups has strained the departmental fabric that is based on friendliness and care for each other. This is the perfect time for our alumni and current students to reach out to faculty, staff, and students to touch base and see how everyone is doing. We all can agree that the pandemic has pushed many of our mental and emotional reserves to the limit. Yet, we persist. That is what I am most proud of in our department. We were given many challenges over the past 1.5 years and we did it. I expect we will continue to do it into the future and thrive. I look forward to this year and all that we will achieve.





# Faculty and Staff



Paul Aharon  
Emeritus/Retired



Fred Andrus  
Chair, Professor



D. Joe Benson  
Emeritus/Retired



Deidra Butler  
Office Associate II



Sid Bhattacharyya  
Mgr/Geochem. Res  
Lab



Julia A. Cartwright  
Assistant Professor



Ibrahim Cemen  
Professor



Natasha T. Dimova  
Associate Professor



Rona Donahoe  
Professor



Debbie Frank  
Support Assitant  
(Budget & Finance)



Kim Genareau  
Associate Professor



Andrew Goodliffe  
Associate Professor,  
Associate Dean of GS



Richard Groshong  
Emeritus/Retired



Samantha Hansen  
Associate Professor,  
Undergrad. Director



Takehito Ikejiri  
Instructor



Joe Lambert  
Env. Isotope Spec.  
ASIL Mgr



Karen Linville  
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Ernest A. Mancini  
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Marcello Minzoni  
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Rebecca Totten Minzoni  
Assistant Professor



Grey S. Nearing  
Assistant Professor



Alberto Perez-Huerta  
Associate Professor



Alain Plattner  
Assistant Professor



Delores M. Robinson  
Professor



Carl Stock  
Emeritus/Retired



Harold Stowell  
Professor



Berry (Nick) H. Tew  
Professor, Director, Center for  
Sed. Basin Research



Geoff Tick  
Professor, Graduate  
Program Director



Tom Tobin  
Assistant Professor



Matthew Wielicki  
Assistant Professor



Michelle Wielicki  
Adjunct Professor



Bo Zhang  
Assistant Professor



Yong Zhang  
Associate Professor



Chunmiao Zheng  
Adjunct Professor

## CONGRATULATIONS TO JIM!



"Mr. James (Jim) Donahoe, a Research Specialist in the DGS, was awarded with the Vergil Parks McKinley, Sr. Employee award by the Human Resources Department at UA.

For over 37 years, Jim has been a valuable member of our department – providing support, brainstorming solutions for problems posed by faculty, staff and students alike, fixing instrumentation, teaching hands-on career skills and working on projects for the DGS.

Jim is truly a "Jim of all trades" with knowledge of experimental instrumentation, computer networks, purchasing, and instrument design. Interacting with undergraduates, graduate students, staff and faculty on a daily basis, he is an important member of our department and is part of the glue that holds it together! Moreover, Jim is innovative with materials that are at hand, saving students, faculty, the DGS and the University valuable time and funds.

Congratulations to Jim!"

- Dr. Julia Cartwright



# Faculty Updates



Fred Andrus  
Professor



Exploring the Wadden Sea on the North Sea Coast of Germany in July 2021. It is a UN World Heritage Site famous as the largest intertidal sand and mud flat on Earth.

I am writing this short update from Germany where I am a visiting researcher with a colleague at the Johannes Gutenberg University of Mainz. I was awarded a travel grant from the German Academic Exchange Service (DAAD) and came here to learn techniques to better image and measure the microstructure of biominerals. This is a key skill for me and the students in my lab group. The trip is part of a larger effort to reinvigorate my research after 7 years as Department Chair through a year-long sabbatical. I expect several new papers and grants will come from this and other experiences I plan.

The students in my group are doing great work. Christine Bassett recently completed her Knauss Fellowship year and accepted a full-time position at NOAA. She is nearly done with her dissertation investigating records of sea ice flux over the past few millennia in the Bering Sea through measuring growth and geochemistry in clam shells from archaeological sites. Similarly, Jamekia Durrough-Pritchard is nearing completion of her MS thesis while working full time at the National Water Center. Her research is measuring how different levels of agricultural waste in streams can be tracked using mussel shell

biogeochemistry. Gozde Degirmen is in the middle of her MS thesis research, co-advised by Tom Tobin, in which she is exploring how isotopic and growth records in ammonite fossils can help us learn more about the life histories of these extinct organisms. Finally, I am pleased to welcome a new MS student, Sarah Olmstead, who joins us from UGA, my alma mater. She and I are exploring several avenues of thesis research, focusing on the geochemistry of marine biominerals.

The projects me and my students are planning will continue to focus on measuring past climate and environmental change, often related to human prehistory and/or ancient ecology. Since the last newsletter, my students and I have published papers on the history of El Niño, fish migration, oceanic upwelling records in abalone shells, Holocene climate of the Alabama coast, Alabama geoarchaeology, and the future of sclerochronology (the main method I use). We hope to initiate new projects as varied as reconstructing the history of the Flower Garden Banks and its algal carbonate reefs, exploring the risks presented by invasive mollusks, and learning more about how ancient people adapted to their changing world from the tropics to the Arctic.



## CONGRATULATIONS, FRED!

In April 2021, Dr. Fred Andrus was presented with the Outstanding Commitment to Students Award from the Leadership Board of the College of Arts and Sciences. The award recognizes a faculty member who has had an impact on students through service outside the classroom in addition to the scope of normal faculty duties. Seven former undergraduate and graduate students wrote letters supporting Fred's nomination. Here are only a small sample of some of their words:

"Dr. Andrus is a caring and compassionate professor who sees value in all of his students and works to make them see that as well. His style is one of equal opportunity, serving to provide limitless prospects for growth and betterment of self. Dr. Andrus shows an unparalleled passion for furthering education in all students, even those who may not yet have faith in themselves the way he does instantly." "The enthusiasm and positivity that Fred brings myself and the rest of his students is apparent through his willingness to always be our number one supporter and to help us out wherever possible." "Fred is a mentor that not only accepts my constant, and sometimes endless, questions about the complexities and interactions of Earth systems, but enthusiastically encourages me to ask even more. I have never had another professor, mentor, or colleague who has gone above and beyond their commitments to students like he has."

We appreciate the hard work and value that Fred adds to the DGS and hope that students will benefit from his mentorship for many more years to come.





## Ibrahim Çemen Professor

Dr. Çemen conducting fieldwork in western Anatolia.

Just like everyone else, the 2020-21 academic year has been unprecedented for me as well. The summer of 2020 was the first summer that I did not get involved in some kind of field work since my senior year in High School. In the last week of February 2020, one of my graduate Students, Robert Wencel, and I went to the field to collect Light Detection and Ranging (LiDAR) Image data for his MS thesis from Woodford Shale Outcrops in Arkoma Basin, Southern Oklahoma (please see the picture below). We had no idea that as soon as we get back to Tuscaloosa, the school will be shut down and everything will be conducted on-line because of the COVID-19 Pandemic. Luckily, we collected enough data for Robert during our research trip. Robert defended his thesis in June 2021 and graduated in July 2021. He is now working for a small geological consultant company. The paper that we wrote based on his findings is being reviewed for a prestigious geological journal. The paper will make an important contribution to natural fracture analysis using LIDAR images.

In addition to Robert, three other MS degree students graduated during the Academic year of 2020-21. Dr. Matthew Wielicki and I co-advised Sam Walker's thesis on the "Structural Evolution of the Mississippian Embayment." Sam graduated in May, 2021 and is now working for a Geological Consultant Company in Atlanta. The paper that we wrote based on Sam's thesis has just been accepted for an upcoming AGU Special Publication. I co-advised Yagmur Yilmaz with Dr. Alain Plattner and Burcu Barin with Dr. Bo Zhang. Both Burcu and Yagmur defended their theses in June and graduated in summer 2021 semester. Yagmur worked with Satellite Gravity data on the Tectonics of Central Anatolia. Burcu worked on the Seismic Stratigraphic analysis of two major sedimentary rock sequences in the North Slope Alaska using a 3D seismic data set. Both Burcu and Yagmur are now working for the Turkish Geological Survey (MTA).

During the fall, 2020 semester, I taught Geo: 365; Structural Geology, and Geo 522; Sedimentary Basin Analysis courses in hybrid mode. Just like many of us in Geological Sciences, this was an entirely new experience for me. In the spring 2021 semester, I taught the AAPG Imperial Barrel Award Competition course as Geo 525, also in Hybrid mode.



Recently, I published two papers with graduate students from the UA-DGS and UT at Austin were published in the academic year of 2020-21. The papers are:

Turkmen O., and Çemen, I., 2021, Role of the Cretaceous normal faults on the formation of the Eocene (Pontide) fold-thrust belt structures in offshore Akcakoca-Amasra area, Western Black Sea basin, Turkey, Bulletin of the MTA, v. 164, n. 164, p. 1-28  
<https://doi.org/10.19111/bulletinofmre.777892>

Etzel, M. T., Catlos, E. J., Çemen, I., Ozerdem, C., Oyman, T., and Miggins, D., 2020, Documenting Exhumation in the Central and Northern Menderes Massif (Western Turkey): New Insights from Garnet-Based P-T Estimates and K-Feldspar  $^{40}\text{Ar}/^{39}\text{Ar}$  Geochronology; Lithosphere Volume 2020, Article ID 8818289, 22 pages <https://doi.org/10.2113/2020/8818289>

As I reported in the fall 2020 DGS Newsletter, during the AGU December 2019 Annual Meeting in San Francisco, I was approached by an editor of the AGU-Wiley publications to edit a multi-volume Tectonics series titled: "Tectonics Processes: a Global View." Working on these volumes took most of my research time during the academic year of the 2020-21 (aka. the year of Pandemic). I am happy to report that we are just about ready to wrap up the first two volumes for publication. The volumes are:

Volume I. Extensional Tectonics: Continental Breakup to Formation of Oceanic Basins;

Edited by Ibrahim Çemen and Elizabeth J. Catlos

Volume II. Compressional Tectonics: Plate Convergence to Mountain Building;

Edited by Elizabeth J. Catlos and Ibrahim Çemen

In the fall, 2021 semester, I am starting a field mapping project in central Alabama with a grant from the USGS. I am looking forward to conducting field mapping with graduate students as I did for many years.



Samantha Hansen

George Lindahl III Endowed Professor

Assistant Department Chair

The start of another academic year...a good time to reflect.

While the COVID-19 pandemic certainly presented many challenges, my research team and I still had a busy and productive 2020-2021. Working with colleagues at Arizona State University and The University of Leeds, I developed a new technique based on historical interstation pattern referencing (HIPR) to improve analyses of small amplitude, core-reflected seismic phases. This method is being applied to data recorded in Antarctica to further investigate anomalous structure along the core-mantle boundary, and two associated publications are currently under review. I'm also working with a colleague at New Mexico Tech to develop a continental-scale ambient noise tomography model for Antarctica. The pandemic caused some significant setbacks with planned fieldwork in East Antarctica, but we hope to get a new seismic network deployed there in the next year or two.

M.S. student Ashish Kumar graduated in July, and he has moved to the Colorado School of Mines to pursue his Ph.D. Hesam Saeidi continues to make progress on his new tomographic models for Africa, and he will be completing his 5th semester Ph.D. milestone this fall. Ryan Haag, one of our undergraduate majors, has also been assisting with data processing for the Africa projects. I also have two new graduate students joining my lab this semester: Long Ho, a Ph.D. candidate who recently obtained his M.S. from The University of Houston, and Kayode Agboola, an M.S. student who obtained his undergraduate degree from Obafemi Awolowo University in Nigeria.

On a more personal note, I'm saddened that I cannot share any fun travel pictures from this past year (again – being grounded by the pandemic). So, instead, I'm sharing a photo of my new toy, which I purchased this past November. Her name is Seismo, and minus some minor sunburns, I've had a great time driving her this summer.



Fig3: Seismo, my new Porsche Boxster 718.

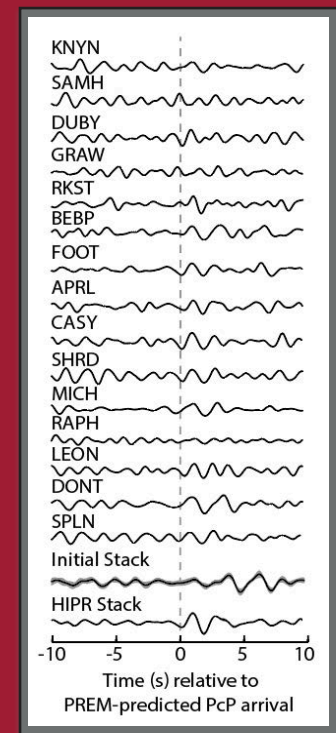


Fig1: Example of HIPR application to core-reflected PcP phases. The weighting and realignment scheme greatly improves the stacked (averaged) signal, which is used to model anomalous core-mantle boundary structure.

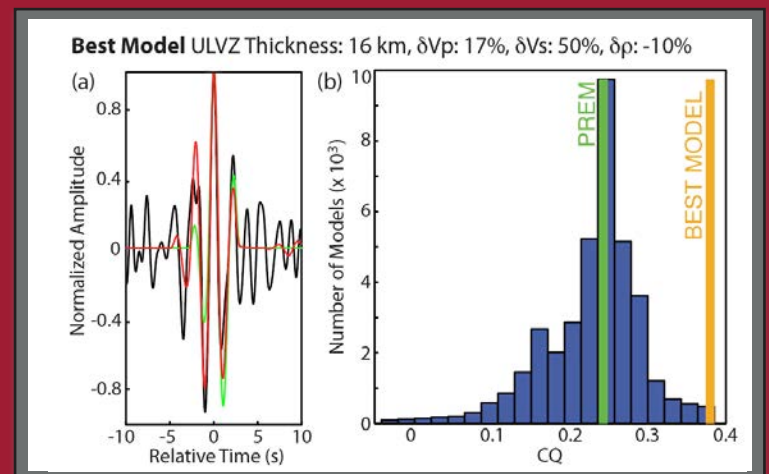


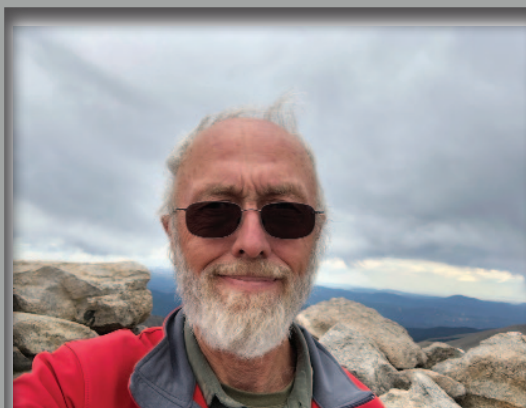
Fig2: PcP modeling to investigate ultra-low velocity zones (ULVZ) along the core-mantle boundary. (a) The stacked PcP waveform (black) compared to that predicted from both the Preliminary Reference Earth Model (PREM, green) and from our best-fit ULVZ model (red). (b) Histogram of comparison quality (CQ) measurements for all examined models, illustrating that a ULVZ-inclusive model fits the data significantly better than PREM.



# Harold Stowell

Professor

[RadIs Lab](#)



I spent the 2020-2021 academic year teaching introduction to mineralogy, and teaching graduate classes on magmatic arcs and techniques in thermal ionization mass spectrometry. Much of the remaining time was spent helping graduate students to finish their degrees. This resulted with Elizabeth Bollen graduating with her PhD in December 2020 and Ian Anderson completing his MS during the summer of 2021.

Although most travel remained on hold during the COVID 19 pandemic, I was able to spend time at my house in Colorado and make two trips to Alaska. The first of the trips to Alaska was a week long contract to work as a naturalist on the MV Sea Lion with Lindblad Expeditions and the second focussed on collecting samples near Wrangell, Southeastern Alaska. The on-going project near Wrangell continued sampling igneous and metamorphic rocks along a traverse across the Coast Mountains batholith that was initiated in British Columbia during the summer of 2019. These samples are being studied in order to reconstruct the magmatic and tectonic history of the largest batholith in the world which stretches from northern Washington State to the Yukon territory, Canada.

Much of my research continues to focus high precision isotope data from the VG Sector 54 thermal ionization mass spectrometer in the RadIs lab (<https://radis.as.ua.edu>). My most recent efforts are to determine the age of garnet growth in metamorphic rocks from continental magmatic arcs exhumed in Fiordland New Zealand and central Southeastern Alaska, and from thrust sheets in the southernmost Appalachians. Ongoing work is evaluating the origin of observed high fluxes of magma during brief periods of arc subduction in both of the magmatic systems, and evaluating crustal flow and thrust stacking sequences in the Appalachians.

Research over the last several years culminated in several products during the 2020-2021 academic year. Including, a new paper in *American Mineralogist* "Timescales and rates of intrusive and metamorphic processes determined from zircon and garnet in migmatitic granulite, Fiordland, New Zealand",

a virtual field trip across the southern Appalachians which will be available online from the Geological Society of America ([https://www.geosociety.org/GSA/Events/Section\\_Meetings/GSA/Sections/se/2021mtg/home.aspx](https://www.geosociety.org/GSA/Events/Section_Meetings/GSA/Sections/se/2021mtg/home.aspx)) and a field guide published by the *Geological Society of America* "Tectonism and metamorphism along a southern Appalachian transect across the Blue Ridge and Piedmont, USA".

So in spite of Pandemic, research and teaching proceeded!







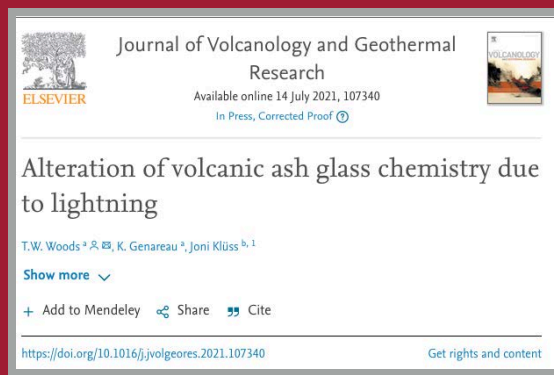
# Kim Genareau

## Associate Professor

## Graduate Program Director

### Tephra Lab

Despite the delays and travel restrictions caused by the pandemic, the Tephra Lab has succeeded in further constraining the causes and consequences of volcanic lightning through a project funded by the National Science Foundation. Taylor Woods (Ph.D. candidate) published a manuscript in the *Journal of Volcanology and Geothermal Research* describing chemical analyses of lightning-induced particles, and how the high temperatures of lightning simulation experiments (i.e., current impulses) melt the igneous minerals contained within ash grains, creating glasses with varied and heterogeneous compositions. Taylor is currently working on another manuscript describing how lightning affects the oxidation state of minerals common in andesite ash samples. She is analyzing these ash samples using X-ray photoelectron spectroscopy and vibrating sample magnetometry. Additionally, Taylor and I travelled to New Mexico during the summer to conduct rocket-triggered lightning experiments at the Langmuir Atmospheric Lab in Socorro. Taylor will be presenting these experimental results, along with her X-ray analyses of affected samples, in two separate presentations at the American Geophysical Union's Fall Meeting this December in New Orleans. For this meeting, I am also convening a session that focuses on lightning experimentation methods. This fall, a new high-voltage testing kit will be installed in the Bevill building through funding provided by the Air Force Office of Scientific Research. This instrument will allow UA to begin development of its own lightning simulation facility, as opposed to relying on outside collaborators for such efforts. I look forward to starting my three-year term as Graduate Program Director and helping all of our graduate students succeed in reaching their career goals.



Rocket launching platform atop South Baldy Peak  
in New Mexico



Tom Tobin  
Associate Professor



I'm beginning my 7th year at UA, and I was recently awarded tenure and promoted to associate professor. My research focuses on the causes, effects, and important casualties (specifically ammonites) of the End Cretaceous Mass Extinction, using a combination of field work and geochemistry. Just like for everyone else, this last year has been full of unique challenges, but there have been exciting new changes in my research group. After lengthy delays, we brought a technician from the UK to install a new clumped isotope ratio mass spectrometer for the Alabama Stable Isotope Laboratory (ASIL). We're still troubleshooting with this instrument, but we hope to be producing new geochemical data soon.

Two new doctoral students have joined my lab over the last year, Sam Stanford in Fall 2020 and Jessie McCraw in Spring 2021. They will be joining Rachel Mohr (Ph.D.) and Gozde Degirmen (M.S., co-advised by Dr. Andrus) pursuing projects related to ammonite taxonomy and paleoecology, and it's exciting to have a large group of students all making progress towards related research questions. Bridget Murray (M.S.) is also in the final stages of her degree, which she is working on remotely after securing a position with the National Park Service.

I've just returned from conducting field work in Montana – everyone there was a little rusty after missing a field season in 2020, but it was good to return to sample collection and to scout some new areas for future research. I look forward to taking a few students there next year to work on several projects exploring the End Cretaceous Mass Extinction. It was also great to resume co-teaching our departmental field camp course in the field (instead of entirely virtually as in 2020); this year we explored some of the local geology in Alabama.

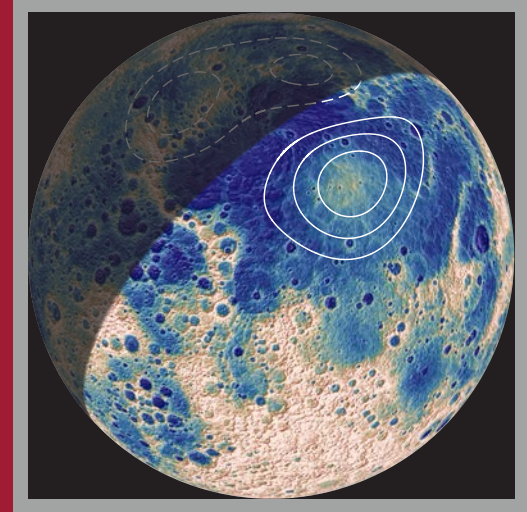




Alain Plattner

Assistant Professor

Plattner Geophysics Group



I am an assistant professor of geophysics. My research focus is on planetary magnetic fields, but also on near surface geophysics applications such as ground penetrating radar and electrical resistivity tomography.

Last year posed quite some challenges for my research group. I had two incoming graduate students who both started at a time when face-to-face meetings were nearly impossible. However, we did the best we could and managed to get some success out of 2020/2021.

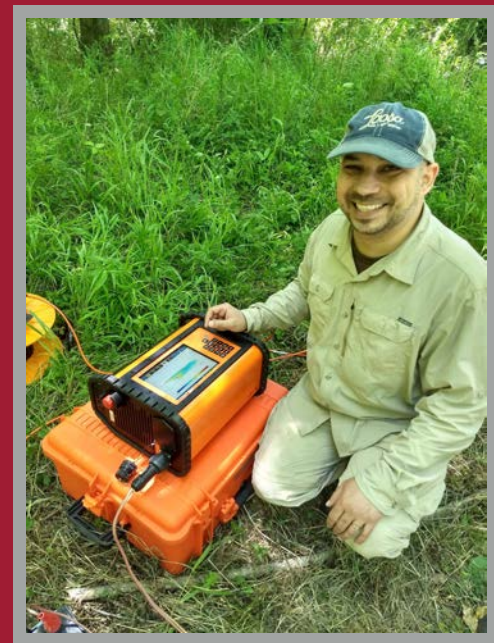
My MS student Yağmur Yılmaz (shared with Çemen) produced a great thesis and graduated this summer. In her work, she used satellite gravity data to study the tectonics underneath central Turkey. My two planetary science graduate students Alyssa Mills and Ramon Richardson are working on their research projects studying the magnetic field of the moon Ganymede and the planet Mercury, respectively. Alyssa has been funded through my NASA Early Career Award. Ramon has been funded thorough my other NASA grant.

Equipment-wise, my lab has seen quite some expansion. Thanks to my startup and previously-existing equipment in the department, our group now has a top-level ground-penetrating radar system (Sensors&Software PulseEKKO Ultra) as well as a top-level electrical resistivity and induced polarization system (ABEM Terrameter LS2). These systems are already in use in a collaboration with archaeologists at the Department of Anthropology here at UA. We have been studying a pre-Columbian Mound close to Tuscaloosa. We are planning to submit our findings for publication later this semester.

My greatest success last year was probably the publication of my findings, that on the planet Mercury, there is a core magnetic field signal that spatially coincides with a 1000 km wide crustal dome. Such a connection between outer-core dynamics and crustal flexure may be possible because Mercury has a relatively thin mantle. The mantle thickness is only about 16% (400 km) of the planet's radius (2440 km).

For comparison, Earth's mantle thickness is around 45% of Earth's radius. The article is freely available from <https://doi.org/10.1029/2021GL094695> At the time of writing, the article was in the final stages of journal production but should hopefully be out in its final form in early September.

In the near future, my students and I will focus again on the planet Mars. Recent exciting data were collected by NASA's MAVEN satellite. We are also excited that meetings and classes can happen again in person this Fall and that students can come back to the labs. We are crossing fingers that the Fall Meeting of the American Geophysical Union will have an in-person component.



# Research Group Spotlight: The Cartwright Cosmochemistry Lab

## 2020 - 2021 Update

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Well, what a year it has been in the Cartwright Cosmochemistry Lab!

In the summer of 2020, we were still figuring out how to “science”, and our immediate issue was that both of my graduate students, Ioannis and Mark, were trapped in Europe! However, once the border restrictions were eased for those with approved VISAs in late July 2020, they were both able to return and get back to UA to continue with their studies.

### Fall 2020:

Lab access and progress on a few projects was somewhat tricky during the Fall 2020 semester – there were repeated air-circulation-related shut-downs in the building that made it difficult to get into labs that had fume hoods (which my labs do). Additionally, as a parent to young infants, I myself was struggling with finding adequate childcare coverage that would allow me to come in and dedicate significant day-sessions to performing lab work. However, we managed to make it work (just about)!

Key to this success was the perseverance and hard work of the CCL students. Mark and Ioannis kept on with their work with good momentum.

For Mark, we had reached out to colleagues at Oxford University in the early summer 2020 to ask for some help with Atom Probe analyses, as lab access at UA was still a little tricky, and Mark was trapped in the UK. They were super happy to collaborate (yay!), and this marked the start of a really successful relationship. Oxford graduate student Jesse Singh was able to help Mark out with the analysis of his micrometeorite sample, and both Mark and I, with help from Oxford professors Paul Bagot and Michael Moody, were able to work on interpreting the data! Mark worked hard using the Atom Probe software in the Alabama Analytical Research Center (AARC), and was able to establish a suitable dataset to submit some conference abstracts!

For Ioannis, we got a step closer to performing chronological analysis of our meteorite samples. My NASA grant became active during the pandemic, but many things had been delayed. This was a particular problem for the type of analysis that we were planning to perform –  $^{40}\text{Ar}/^{39}\text{Ar}$  dating – because our samples have to be

sent away to a nuclear reactor and irradiated for ~ 100 hours total, which typically takes a few months. From experience, samples for these long irradiations are usually returned to us after about 6 months, and need multiple months to ‘cool down’ (radiation-wise) before we can analyse them on the noble gas mass spectrometer. We managed to get our samples sent out to our colleagues at ASU in November – 9 months later than planned, but we did it! Both Ioannis and myself were able to get materials ready to submit conference abstracts at the end of December for the LPSC conference (virtual, March 2021).

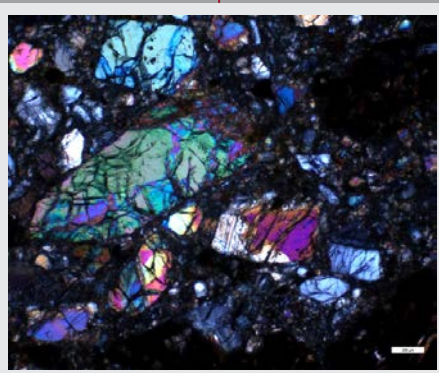
Another aspect of my research that was taking shape during this semester was a characterization project that I was leading, with collaborators from Maths, Chemistry and Physics. The main aim is to use machine learning with hyperspectral data collected from analyses of meteorites to help improve classification protocols of samples, and to help correlate those data with remote sensing data collected from asteroids.

My work on in-situ-resource utilization (ISRU) progressed to the stage of creating regolith bricks using epoxys and analogues of the lunar surface. Having been awarded some SEED funds from the ORED, I was able to purchase some off-the-shelf analogues. Working in collaboration with epoxy experts, Paul Rugar (Chemistry & Biochemistry, UA) and Jason Bara (Chemical & Biological Engineering, UA) to create the bricks, we were then able to start testing their strength using equipment in Samit Roy’s lab (Mechanical Engineering, UA).

### Spring 2021:

We were back into a better state this semester: my childcare situation had improved slightly, so I had a bit more time in the lab. Additionally, I was also on my awarded ASPIRE semester, to allow me to concentrate on research!

This semester, we welcomed graduate student Jessica Clarke to the team. Having taken my ‘Cosmochemistry’ graduate class in the Fall, she decided that she wanted to move in a more planetary direction with her graduate studies! With Tom Tobin as a co-advisor, she decided to take on a project studying Cretaceous-Paleogene (K-Pg) tektites to understand their composition and formation.





One early highlight of the semester was watching the Perseverance rover land on Mars!!

Mark continued to work on his Atom probe data, and also started to experiment with new and exciting sample-mounting methods, as our group became approved to receive cosmic dust materials from the NASA curation team.

Other big news mid-semester was that, having interviewed a number of students for potential graduate positions, we were able to extend offers to three students, who all accepted!

By late spring, with new additions to the gas and water lines in the lab, we were in a position to install some new equipment to allow us to make epoxy mounts (samples are embedded in epoxy and polished to create a flat surface), and we started experimenting! This was particularly important for Ioannis' work, as we started to organize a trip to our collaborator Martin Whitehouse's lab in Sweden. Ioannis had to prepare his samples by making mounts and polishing them to make flat surfaces for SIMs analysis. Our plan is to also analyse these same samples using Ar-Ar dating. Ioannis worked hard through the spring semester and into the early summer, creating mounts, and with his travel approved, we were able to book him a trip to Europe!

Mark did a lot of experimentation with epoxy, crystal bond and even learned how to microtome with help from Dr. Kim Lackey (Biological Sciences). Using volcanic ash and terrestrial dust as analogues for cosmic dust, Mark was able to hone his fine-motor skills and develop valuable techniques for sample handling. By late spring, NASA's labs had started to reopen, and they were able to start sending us out the materials that we needed.

Jess made progress working through a tektite-rich sand collected from Shell Creek Alabama. In searching for other potential materials, she also found a sample within the GSA collection that was rich in tektites!

I made good progress with my characterization and regolith projects, and was able to submit two major grants on these topics in the Spring, including an EPSCoR effort. The ISRU efforts also continued with the new appointment of former astronaut and USGS chief Jim Reilly. As the regolith effort lead, there were regular meetings, and two workshops through the summer 2021 with NASA Huntsville colleagues and researchers at the Colorado School of Mines.

In the late spring/early summer, another project was developing – Kim Genareau (volcanologist extraordinaire) and I have been tinkering with collaboration ideas to combine meteoritics with lightning studies for a couple of years now. We

were able to run some preliminary experiments to try to create phases that resemble some of the earliest formed materials from the early Solar System. Our results so far seem pretty positive – we created spherule-like objects, and we're excited about where this project will go.

### **Summer 2021**

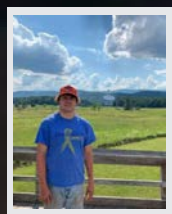
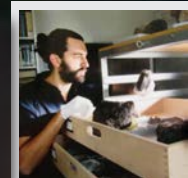
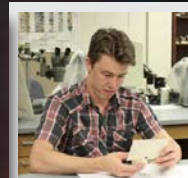
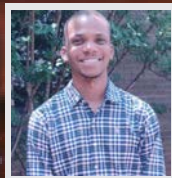
This was a busy summer. With Ioannis' trip to Sweden planned for July, we both worked hard on creating, mounting and polishing samples. Ioannis also created maps of his samples using the SEM, and got ready to head across the pond. With a quick stop in Bern, Switzerland to pick up new samples, Ioannis arrived safely in Stockholm, and once a small hiccup with his hotel reservation was sorted (slight panic there, I'll admit), he was set for the next month. The analyses in Stockholm went extremely well – Ioannis was able to complete his sample preparation, map new samples, and ultimately pick out relevant points for Pb-Pb analysis. He was able to obtain decent Pb isochrons for three eucrite and three mesosiderite meteorites, and get the data ready in time to present it at the Metsoc conference!

Also in July, my howardite samples that Ioannis and I prepared in the Fall were cool enough for Ar analysis! Given that I wasn't able to travel, I had some virtual re-training (new equipment upgrades at ASU), and then, with the help from my ASU colleague Chris McDonald, I was able to run the laser and analyse my materials in Tempe Arizona, from the comfort of my office in Tuscaloosa! The time-difference certainly helped, where I could start analyses early in the morning, while Chris was able to watch things if I had a lunchbreak, and when I was looking after my kids in the evening. The analyses were really successful, and I am excited to work through the data and write up the work.

Mark continued to work on his data and his thesis document, gearing up for his defense. He became my first graduate student to graduate from my group, after successfully defending his work in mid August! We also received our cosmic data materials from NASA late in the summer, which Mark was able to analyse prior to heading out to Chicago for Metsoc. Jess continued to work on her thesis proposal and samples, also gearing up for the Metsoc conference.

Also new to the team this summer was undergraduate student John Barton, who started working on my regolith projects. John has been performing experiments in the lab to make regolith bricks. He has also been working with our colleagues in engineering to use additive manufacturing to create materials that can be used for tooling in planetary environments. John is going to continue working with me into the Fall semester, and I'm looking forward to making more things for the lunar surface!

# Meet the Cartwright Cosmochemistry Lab Team



Dr. Julia Cartwright  
Assistant Professor  
CCL Principal Investigator

Abutu Peter  
Masters Student

Sarah Keenan  
Masters Student

Jessica Clarke  
Masters Student

Mark Boyd  
Masters Student

Nate Limbaugh  
PhD. Student

Ioannis Kouvatiss  
PhD. Student

John Barton  
Undergrad. Student

## November 2020



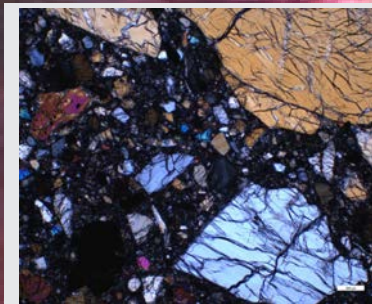
- Ioannis and I made progress in handling and sectioning materials for chronology analysis to be performed at ASU.
- This was delayed by about 6 months due to the pandemic – with the lab being closed, and Ioannis being stranded in Europe, so it was great to get this completed!
- These samples were sent off for irradiation in December, and we expect to start Ar/Ar analysis in the coming weeks of May 2021.

## February 2021



- Cartwright Cosmochemistry Lab watched the NASA Perseverance Rover land on Mars!!!!
- Yay for Science and social distancing!!

## March 2021



- Visit from colleague Dr. Bill Hames, Auburn University.
- Socially distant meeting to discuss collaboration and noble gas analyses.
- New student Abutu's master's project will include noble gas analysis – using facilities down at Auburn!

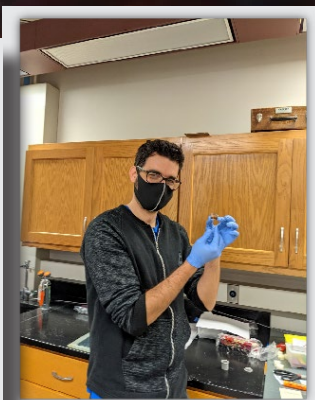
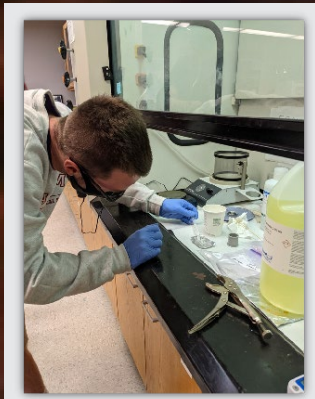
- Masters Student Jessica Clarke joined my research group in the Spring 2021 semester and is working on a project to investigate tektites from the K-Pg boundary.



- She will use geochemical techniques to try to determine the composition of the meteor that caused the extinction.
- Dr. Tom Tobin (pictured) is co-advising the project and is seen here looking at spherules that Jessica has picked from a sample of material from Shell Creek, Wilcox County.
- Mark has been making great progress with his research.
- He is working on his manuscript draft, which includes atom probe data for a micrometeorite, in collaboration with Oxford University.
- Here, he is looking at the mounts that he has made in the dedicated small-sample cabinet in CCL, that include terrestrial dust particles.



## April 2021



- New equipment installed in the CCL, including compressed air line and new water line.
- We now have facilities for making meteorite mounts and sections, which is critical for a number of chronological techniques that we use in our research!
- Ioannis is holding his first epoxy mount of a mesosiderite meteorite from the CCL meteorite research collection.
- Mark is pipetting epoxy into small molds that hold terrestrial dust particles allocated to us by NASA.

## Students!

- Ioannis will be traveling to Sweden in the summer to perform analyses on his achondrite samples.
- Jessica plans to go on fieldwork over the summer to acquire new K-Pg samples for her studies.

I have three incoming students in the Fall!

1. **Abutu Sunday Peter** – Masters – GTA.

Likely project = Noble gas analysis of meteorites.

2. **Sarah Keenan** – Masters – GTA. Co-advised with Dr. Kim Genareau.

Likely project = Lightning studies of meteorite analogues.

3. **Nate Limbaugh** – PhD – 1st year GCF.

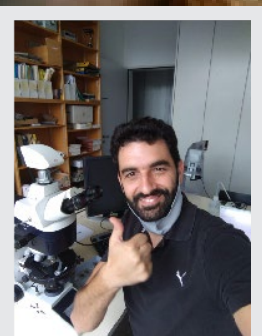
Likely project = IR spectroscopy and geochemical analysis of meteorites to help improve non-destructive classification techniques.

## Summer 2021

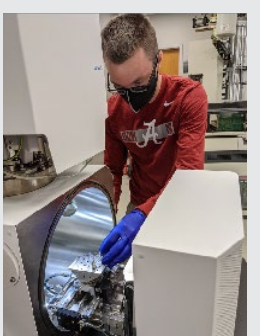
Mark walked for commencement! He is moving to new pastures - having accepted a prestigious fellowship for a PhD. position at Imperial College London.



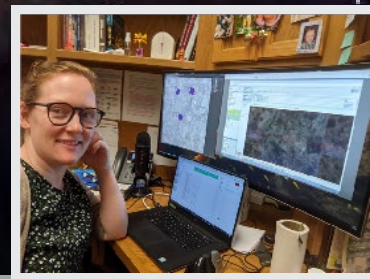
Ioannis checking out samples in Bern.



Mark loading the SEM with cosmic dust samples.



Julia analyzing samples remotely at ASU from her office!



## Conferences 2020 - 2021



- Mark and Ioannis presented their work at the GSA meeting in October.
- Mark presented his work at the DPS conference in early November.
- Dr. Cartwright, Ioannis and Mark all presented their work in poster format at the LPSC conference in March.
- Dr. Cartwright co-chaired a session at LPSC.
- Ioannis and Mark presented their work in oral format at the SE GSA conference in April.
- Dr. Cartwright convened and chaired a session on Planetary Science and Impact Crater themes at the SE GSA.

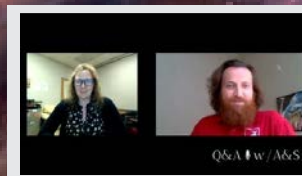


- Mark, Ioannis and Jess all had abstract accepted for poster presentations at Metsoe!
- This was their first in-person conference since joining the department!
- All three students received \$2000 scholarships to attend the conference!

## Other Research!

- Dr. Cartwright was invited to contribute to a white paper solicited by NASA on the theme of returning a sample of Mars atmosphere in the current Perseverance rover, or in a future mission design.
- Dr. Cartwright's involvement with the UA consortium on In-situ Resource Utilization (ISRU) continues - with regular meetings with former USGS chief, and UA team leader Jim Reilly.
- New Point-of-need Manufacturing Center with a focus on ISRU is close to approval.

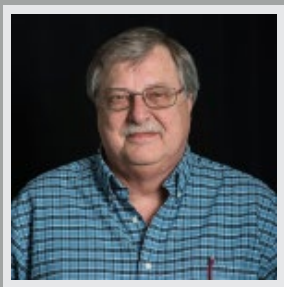
## Outreach



I was interviewed by Franklin Kennamer from A&S about my research!

<https://3min.com/540234232>

# Alumni Spotlight



Name: Thomas H. See

Year Graduated from UA and degree: 1978 BS in Geology; 1985 University of Houston, MS in Geosciences / Planetary Sciences

Current Job Title: Principal Scientist / Group Manager – Science & Exploration

Department – Barrios Technology / Jacob – JETS Contract, Retired, July 1, 2021

Previous Employer: Seiscom Delta – (1978 – 1980); Lockheed Martin – (1980 – 2005), Barrios Technology - (2005 – 2021)

## How did your career path evolve after graduating from Alabama?

Growing up in the late 50's and 60's, I was always fascinated by the US Space Program / NASA. I vividly recall watching all launches and missions in those early days of Mercury, Gemini, and eventually the Apollo programs, and staying up late that night on July 20, 1969, when humans first landed and set foot on the moon. I wanted to do that. Fly in space.

While still in high school, I wrote NASA asking what curriculum they would recommend for me to pursue that would best position me to become an astronaut. The return list of potential occupations was massive and contained well over a thousand professional disciplines. In that letter, NASA invited me down to the Johnson Space Center (JSC) in Houston, Texas to tour and visit with individuals working at the center. Little did I know then that one of the buildings I toured (Building 31- Planetary and Earth Sciences Division) would end up being the building and team of scientist that I would spend 40-plus years of my career working in and with.

In 1977, the Department of Geology and Geography at the University of Alabama organized a 190-mile, seven (7) day / six (6) night rafting trip down the Grand Canyon. On the return drive from the Grand Canyon to Tuscaloosa to start the fall semester in 1977, I detoured through Houston, Texas to interview with a headhunter organization about potential jobs in the Houston area knowing that with a Geology Degree there would be a good chance of landing a job in Houston known as the Oil & Gas Capital of the world.

I finished classes in December 1977 and was offered a position with a geophysical processing company in oil & gas exploration, Seiscom Delta beginning in June 1978. During the interim, I worked at Lang Sporting Goods in McFarland Mall from January - June 1978. In June I packed up my belongings in T-Town and headed for Houston and began working for Seiscom Delta in mid-June 1978. In the spring semester of 1980, I enrolled in graduate school at the University of Houston (UH) and began taking night classes.

During that first semester at UH, I was taking a course entitled Planetary Geology that was being taught by Dr. Elbert A. King, who also happened to have been the first Lunar Curator at JSC overseeing the storage, safety, and distribution of the Lunar Sample Collection (Apollo 11 – 17 rocks). After moving up the ranks at Seiscom for a year and one half I applied and interviewed for a position with Texaco. While in class one evening, Dr. King knew of my passion and love of the space program and told me about a position that had opened at JSC working in the Experimental Impact Laboratory (EIL) as a contractor with Lockheed. So before accepting the position with Texaco, I interviewed with Lockheed and they too offered me a position, but for less money. I told Lockheed that if they would match Texaco's offer that I would come, and they did. On November 3, 1980, I began my career as a Planetary Scientist with Lockheed, later to become Lockheed Martin supporting NASA's Planetary and Earth Sciences Division (SN) that was part of the Directorate of Space and Life Sciences (SA) at JSC. A touch of irony about this situation and job. I ended up working and supporting the EIL and Dr. Fredrich Hörz, who I had visited and talked with several years before when NASA invited me down for the tour at the age of 15.

I spent the next 25 years in the Experimental Impact Lab conducting research related to the Impact Cratering Process and its role in the evolution of planets, the solar system, and possibly life itself. The research included studies of impacts that ranged in size from micrometeorites and man-made orbital debris to planet killing and extinction level events such as the Chicxulub Crater in the Yucatán Peninsula in Mexico some 66 million years ago. This was done via impact simulations in EIL using one of three (3) launch facilities and studying the resulting materials (both coherent and unconsolidated rocks and organic materials), to experiments designed for deployment in low-Earth orbit to capture micrometeorites and orbital debris particles, to the capture and return to Earth for study cometary particles of the Wild-2 comet (i.e., Stardust).

In 2005, Lockheed Martin lost the contract supporting NASA to Jacobs Engineering. Instead of being a single contractor, Jacobs employed a novel approach to win the contract by directly employing ~50% of the employees transitioning from Lockheed Martin, with the other 50% being distributed among nine other companies, most of which were small-disadvantaged businesses (SDB) owned and operated by women and/or minorities. One of those companies was Barrios Technology, Inc. As a result, in 2005, I transitioned from Lockheed Martin to Barrios Technology.



It was shortly after this change that my long-time friend and colleague, Dr. Fredrich Hörz decided to retire after 50-plus years as a Civil Servant and Planetary Scientist at NASA. I had seen Fred's retirement coming for years and began venturing out into other areas and management related activities knowing that I could lose my primary support once Dr. Hörz retired. Dr. Hörz had been encouraging me to do so since the early 2000s, as well as Dr. Mike Zolensky (Stardust, Space Exposed Hardware, and Cosmic Dust Curator).

Over the next 15 or so years I moved up the contract management ladder, first becoming a Project Manager, then supervisor, and finally a Group Manager over seeing some \$33 million dollars in research and curation funding, 30 plus analytical & curatorial labs, and approximately 50 scientist and technicians charged with conducting research and keeping the labs and various sample collections in fully operational order. Shortly before retiring, my team was charged with oversight on the construction of four (4) new curatorial / research labs: Pre- & Final Clean, and Advanced Clean, and Hayabusa 2 & OSIRIS-REx; the latter two for the investigation, storage, and processing of two new extraterrestrial sample collections. These facilities will be coming online in late 2021 and early 2022.

## How did the University and DGS help you in your career?

The University of Alabama Geology and Geography Department provided me with a solid foundation and necessary background to undertake scientific investigation and research using the scientific method, and maybe most important was "paying attention to the details". Not only in the classroom and laboratories, but also the importance of hands-on field work, sample collection, and documentation. The latter paid off when collecting samples from various missions (Long Duration Exposure Facility [LDEF], Orbital Debris Collector [ODC], and Stardust, not to mention field work collecting specimen from Meteor Crater in Arizona.

## What were some of your most memorable experiences at Alabama?

Wow, that is a tough one. I guess I would have to start with the friendships I made in the department, both fellow students, professors, and graduate students as well. During my final year or two in the department, we did a project for the state of Alabama mapping the Cahaba River basin. Students in the department were teamed into twos, and each charged with developing geologic maps of ~15-mile sections of the river. I was teamed with Lee Gilmore, and we canoed our section of the river three (3) to four (4) times in completing our portion of the project.

Another highlight would have to be the Grand Canyon rafting trip during the summer of 1977. What a fantastic trip and adventure, plus a great geologic learning experience with Dr. Tull, Mark LeValle, and 28 or so others from the department. We put in at Lee's Ferry and rafted the Colorado River for seven (7) day and six (6) nights to Whitmore Wash, some 190 miles downriver. Besides being a geologic wonder, the Grand Canyon is one of the most beautiful places in the world. I would recommend this trip to anyone who can do it, although in today's environment that is not as easy as it once was. As a footnote, I have a hilarious story to go along with this trip, but it is too long to go in to here.

Although not an official Geology Department trip, in the summer of 1976, Mark LeValle, K. Brandon (both roommates), and I took a seven (7) week camping trip to the northwest Rocky Mountains. Stops included Jackson's Hole Wyoming, The Grand Tetons, Yellowstone, Sun Valley & the Sawtooth Range / Johnsons Creek in Idaho, Lake Louise / Banff, & the Columbia Ice Fields in Alberta, Canada, and Waterton, Canada / Glacier, Montana.

## What are the most exciting project(s) you have been involved with during your career?

This is an easy one. The three (3) flight projects I was involved with and flying on NASA's KC-135 Zero-G aircraft (i.e., The Vomit Comet). As for the flight projects, those include LDEF (Long Duration Exposure Facility), Orbital Debris Collector (ODC) on MIR (Russian Space Station), and Stardust (US Comet Sample Return).

LDEF – This was my first big break and opportunity to lead a significant project. As I previously mentioned, I started my career in Planetary Sciences working in the Experimental Impact Lab (EIL) with Dr. Fredrich Hörz, PI of the EIL and who was also a PI on LDEF (LDEF experiment A0178 – Chemistry of Micrometeoroids) long before my joining the EIL team in 1980. Dr. Hörz recommended me to Dr. William Kinard of Langley Research Center (LaRC) and the PI on the overall LDEF Project, that I be selected to lead the Meteoroid & Orbital Debris Special Investigation Group (M&D SIG) A-Team at the Kennedy Space Center (KSC) in Florida documenting impacts on all surfaces of the LDEF spacecraft.

I was fortunate enough to lead the M&D SIG A-Team during the entire deintegration of the LDEF spacecraft at KSC from January – May 1990 and beyond through 1994 or so as we continued documenting impact features from experimental and spacecraft surfaces, and publishing papers on the results. My work and success with LDEF lead to Dr. Mike Zolensky of NASA requesting that I lead the Stardust Recovery Team efforts at both JSC and Utah's Dugway Proving Grounds (2000 – 2007).

ODC – Between LEDF and Stardust, Dr. Hörz flew a second experiment (ODC), this time one attached to the MIR Space Station as one of the payloads of the MEEP (Mir Environmental Effects Package) program that was the follow-on to the LDEF program run out of LaRC by Dr. W. Kinard. This package exposed two suit-case sized trays of SiO<sub>2</sub> aerogel blocks (~5” x 5” x ¼” blocks) to the low-Earth orbital environment in the hopes of capturing orbital debris, as well as natural micrometeoroid particles and returning them to Earth for analysis. One tray was deployed in the ram or forward-facing direction, while the other was pointed in the opposite direction. Without getting into details, this mission was very successful and led to the Stardust Science Team deciding to use aerogel as the primary capture medium for that mission.

Stardust – Stardust was a comet sample return mission that launched in early 1999, encountered the comet Wild-2 (pronounced Vilt-2) exposing it collectors of aerogel materials as it passed through the comet tail (coma) in early 2004, and successfully returned to Earth in mid-January 2006. Beside being part of the preliminary science analysis team back at JSC, I also lead the contractor team for designing, building, and outfitting the Stardust Laboratory at JSC, and the Stardust Recovery Team at UTTR (Utah Test & Training Range) in 2006 by preparing a temporary cleanroom at UTTR, and participated in the opening of the sample canister and deintegration at UTTR and getting the canister returned to JSC’s Stardust Lab.

Once back at JSC, I was the lead on separating the cometary and interstellar trays from each other that first night the sample were in the lab and was the Stardust Lab Manager for several years after that. During that time, we removed approximately 30% of the aerogel tiles from the cometary tray documenting each tile at various levels of photography / magnification to identify track locations of captured particle in the aerogel for mining and coordinated analysis of each track and associated particles.

During this time working on Stardust, included my transition from Lockheed Martin to Barrios Technology. Because of my work with Stardust, I was fortunate to be selected as the recipient of the first Barrios Technology’s President’s Award in December 2006.

KC-135 – When the Space Shuttle began flying in 1981, one of the biggest issues encountered in those early days was space / motion sickness by the astronauts. JSC’s Life Science Directorate put out a call for volunteers to participate in motion sickness studies saying that if you participated through the entire program, you would be granted at least one flight on NASA’s KC-135 Zero-G aircraft. Dr. M. Cintala (current PI of EIL) and I volunteered to participate in this study. For what ever reason, I never got sick during these ground-based motion sickness studies.

Successfully completing the ground-based studies lead to our first flight on the KC-135. While on this flight, Dr. Cintala mentioned to me that this would make a great platform for reduced gravity impact experiments to investigate the role of gravity in crater growth, formation, and size. As a result, we submitted a proposal and were awarded funding to carry out such experiments. We built an impact chamber with glass walls and mounted an air-charged pellet gun on top of the chamber and interfaced it with a Compaq portable computer and motion picture camera. We flew this payload about 10 times gathering important information on the role that gravity plays in crater growth and size, as well as morphology, while simulating Martian, Lunar, and Ceres gravity levels.

Because I never experienced motion sickness on the KC-135, I also was asked to fly a dozen or so test payloads supporting other experiments to validate their designs and processes aboard the KC prior to them flying via the Space Shuttle; ~\$10K / flight on KC vs. \$30 million for a Shuttle launch. This led to me getting somewhere on the order of 30 to 40 flight aboard the KC-135.

## What advice can you give to current students who wish to pursue a similar career?

Follow your dreams and your passions. I always wanted to work in the space program, and especially fly as an astronaut. I did not get to fly in space, but I was fortunate to work with some great people and participate in three (3) flight project / mission. Don’t be afraid to offer your inputs / opinion. That is what science is all about and your ideas may lead to something not considered previously; it happened to me more than once during my career. Respect your colleagues, both senior and less experienced, who probably who have been at this longer than you. That is not to say that new ideas are not welcome or bad, just do so it the right way, always respectfully admit you may have been wrong.

Lastly, work hard. Be thankful you have a job, especially if you are fortunate enough to do research / science for a living. No one owes you anything. Always do you best work and never cut corners, and do not put things off and don’t always wait for someone to tell you what needs to be done. Learn your profession and anticipate what is next and tackle it without having to be asked to do so.



# Mission Backgrounds

## LONG DURATION EXPOSURE FACILITY (LDEF):

The Long Duration Exposure Facility was placed in low-Earth orbit (LEO) by the space shuttle Challenger in April 1984 and retrieved by the space shuttle Columbia in January 1990. LDEF was a 14-faced (i.e., a 12-sided cylinder and two ends), gravity-stabilized spacecraft that was host to 57 individual scientific experiments. Several of these experiments were designed to characterize various aspects of the meteoroid and orbital-debris environment during the nominal nine-month mission.

## M&D SIG - METEOROID & DEBRIS SPECIAL INVESTIGATION GROUP (1989 - 1994):

Prior to the retrieval of LDEF it was realized that the dedicated meteoroid experiments would not suffice to accomplish the original objectives, and that the systematic scanning of the entire LDEF spacecraft would be necessary to obtain information complementary to, or in addition to, that expected from the dedicated M&D instruments. In addition, previous experience with the impact record on planetary surfaces and retrieved spacecraft components (e.g., Solar Max) revealed the somewhat subjective nature of simple crater counts. Thus, it was decided that a limited number of experienced individuals would be best suited to perform the global LDEF survey in a systematic and internally consistent fashion. This group (e.g., the M&D SIG "A-Team") resided at the Kennedy Space Center (KSC) during the entire LDEF deintegration (i.e., February through April 1990). The A-Team optically scanned and photodocumented all exposed LDEF surfaces for impact-related features (i.e., measured and photographed approximately 4,600 individual impact events: craters >0.5 mm and penetrations >0.3 mm in diameter, as well as other related features [debris, secondaries]), and identified and secured surfaces of special interest.

The LDEF Micrometeoroid and Debris Special Investigation Group (M&D SIG) was organized. Among the major goals of the M&D SIG were:

1. The documentation of the impact record of the entire LDEF spacecraft
2. Characterization of the LEO particulate environment
3. Dissemination of this information, primarily to those interested in the collisional hazard represented by these particles

Efforts toward the accomplishment of these goals include:

1. A publication ([See et al., 1990](#)) describing all observations of impact features made during LDEF's deintegration at KSC by the M&D SIG A-Team
2. The continued examination and documentation of impact features on LDEF hardware
3. Archives of this data, as well as similar information provided by LDEF Principal Investigators, in a public-domain database
4. The generation of compact disks (CD's) which contain copies of all of the stereo images acquired at KSC during LDEF's deintegration
5. The access to all of this information through the Internet

The original M&D SIG was formed and supported by the LDEF Project Office located at NASA's Langley Research Center in Hampton, Virginia ([JSC ARES Website](#)).

## ORBITAL DEBRIS COLLECTOR (ODC):

The Mir Environmental Effects Package (MEEP) was deployed on the Mir space station by STS-76 and retrieved by STS-86 after an 18-month exposure in orbit. The payload, managed by NASA Langley Research Center, included the Orbital Debris Collector (ODC) that was designed and built at JSC. The objective of ODC was to capture and return analyzable residues of the man-made and natural particulate environment in low-Earth orbit for a detailed assessment of its composition and potential origins.

More information can be found from the [SpaceDaily](#) online publication of an article by Dr. F. Hörz, 2004; Mir Orbital Debris Collector Data Analyzed

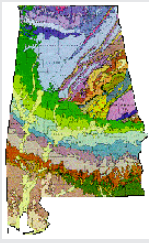
## STARDUST:

Stardust, a NASA Discovery-class mission, was the first to return samples from a comet and from interstellar space. The mission launched on February 7, 1999 and successfully encountered comet Wild-2 on January 2, 2004. As the spacecraft passed through the comet's coma, a tray of silica aerogel was opened and exposed to capture coma dust grains. Following the collection, the aerogel tray was closed for return to Earth. Based on the data returned from the comet encounter and preliminary examination of the Stardust Cometary aerogel, we believe that we captured thousands of grains from Comet Wild-2.

## KC-135 (ZERO-G AIRCRAFT):

The KC-135 is a modified Boeing 707 four-engine turbojet that NASA used to simulate conditions of weightlessness. In a typical flight, it traverses the Gulf of Mexico in a series of large parabolic arcs. Peaking at 32,000 feet, the plane then dives to 24,000 feet, its fuselage pitched down at 40 degrees. At the top of the parabola, passengers lose all sense of gravity and become weightless for a period of roughly 25 seconds. Flying on the KC-135 nauseates passengers so frequently, however, that the plane has been nicknamed the "Vomit Comet." Online movie:

[https://www.cs.cmu.edu/~pausch/Randy/Randy/KC\\_Lo\\_Res.mpg](https://www.cs.cmu.edu/~pausch/Randy/Randy/KC_Lo_Res.mpg)



# 2020 - 2021 Update from the Geological Sciences Advisory Board (GSAB)

## Fall Meeting October 26, 2020

As the pandemic continued and with safety protocols in place by university, local, and state governments, our Fall 2021 GSAB meeting took place virtually via Zoom. We certainly missed the fellowship and in-person activities (dinners and game related activities on-campus) that were commonly held in conjunction with a UA home football game. These activities often result in unplanned but helpful pre-GSAB meeting discussions. However, after months of working and living our lives through electronic media during the pandemic, our virtual GSAB meeting results appear to have been as productive as past in-person meetings.

As in our Spring 2020 virtual meeting, all preparation was handled digitally with data for the various committees and general GSAB member information provided by email prior to the main meeting. The committees met both prior to and the morning of the main meeting also via Zoom. Having committee meetings during the morning prior to the main meeting resulted in a more effective afternoon session with additional time for committee reporting and discussions of both new and old business. The finance, membership, and scholastic committees gave presentations with general GSAB discussion, a State of the Department of Geological Sciences presentation was given by new DGS chair Dr. Delores Robinson, and a State of the College of Arts & Sciences was given by Dr. Joe Messina, Dean of the College of Arts and Sciences. There was general discussion of the goals and objectives of the newly proposed Mentoring committee, although it is in provisional status until its final structure is determined and voted on for standing status by the GSAB. Bob White volunteered to chair this new committee and Harold Stowell will be the faculty representative. This committee will be instrumental in advising and connecting students and DGS faculty in the changing role of geoscience by recognizing transitionally related employment opportunities in the traditional energy industry, new green energy industry and environmental, government, civil, and engineering fields. There will continue to be a significant role for geoscience in many new areas of a changing world as populations increase and the development of countries impact the environment of our planet.

GSAB by-laws changes were made in a couple of key areas. The Young Professional Membership category (individual and married)

previously defined as those in their initial five years of professional employment was revised to include candidates up to age 35 years or younger regardless of length of professional employment. This membership category incentivizes early GSAB membership by reducing the amount of contribution for full GSAB membership. By-laws were also revised regarding the nominating committee process. The new process will include more individuals and reflect a broader representation of GSAB membership. It will also provide for continuity of experience in the committee with the past GSAB Chair as head of the committee.

Membership of the GSAB remained stable with 53 active voting members. As with any large board, there were a couple of individuals stepping down from the GSAB and one new member added, Boone Abbott. Boone was introduced as a young professional member and welcomed to the GSAB. New nominees were also suggested for membership consideration and approval by the GSAB. Future membership efforts will also include retired faculty who will not only bring a great deal of academic expertise but will also be valuable for networking with their former students for GSAB membership consideration. The finance committee reported that \$39,603 in total GSAB funds were raised from GSAB related contributions and from rollover

funds from the prior academic year. All funds were budgeted for student scholarships and departmental needs. Approximately \$20,000 was used for direct student scholarship support. Additionally, GSAB endowment funds earned \$29,400 and the budget for FY 2020 – 2021 was approved. Lastly, a new GSAB related endowment fund was introduced and discussed for consideration.

## Spring Meeting April 30, 2021

As everyone is well aware, the pandemic continued, though declining with a nationwide vaccine effort in place. However, university, local, and governmental restrictions remained in place and our Spring 2021 GSAB meeting was again held virtually. Again, meeting preparation and materials were handled digitally via email with committees meeting virtually prior to and the morning of the main session. The main afternoon meeting lasted approximately three and one-half hours.



GSAB Post-Meet Cheaha State Park Structural Field Trip



Finance, membership, and scholastic committee reports were given and discussed, a state of the DGS presentation was given by chair Dr. Delores Robinson, and the deans' report on the State of the College of Arts & Sciences was given by Dr. Joe Messina, Dean of the College of Arts and Sciences. The finance committee reported for the current academic year that \$38,333 in total GSAB funds were available from GSAB related contributions and rollover funds. These were budgeted for student scholarship and departmental needs. GSAB endowment funds also netted \$32,000. Thirteen graduate students were awarded scholarships with a total of \$23,750. Students had an active part in this meeting with representatives presenting to the GSAB how GSAB funds had been instrumental in allowing them to continue their work during the pandemic. A PDF presentation was also provided from additional students receiving pandemic related scholarships.

Two new GSAB members were introduced, Jack Gambrell and Jerry Bowling, and new nominees were suggested for consideration of GSAB membership with follow up approval made by email after the meeting. Membership was slightly down to 50 active voting members. A new membership category of international membership was suggested and is under discussion. Many international DGS graduates have made both professional and academic contributions that reflect positively on the department and University. As was discussed during the fall meeting, a new GSAB endowment was again reviewed and continues to gain momentum.

We are closely monitoring the pandemic and if there is not a complicating impact from a Covid 19 variant, we hope to have a traditional in-person fall meeting in conjunction with a home football game weekend. Our tentative date for the in-person meeting is for Monday, October 25th following the Tennessee game.

### **History and Information About the GSAB and How to Help**

Founded in 2002 the GSAB consists of membership from alumni, corporate, government, and community that are involved with activity related to the Department of Geosciences and its constituents. The purpose of the GSAB is to support students, faculty, and staff in the Department of Geological Sciences and serve as a liaison with the business community and government to promote the interests of the Department within the University of Alabama, the state, and the nation. A primary goal of the GSAB is also to help recruit and retain talented, competent, motivated students and faculty. This is accomplished by providing scholarships and identifying employment opportunities for students, and to support and retain talented faculty. Through membership contributions, and corporate matches with related contributions, the GSAB has raised and awarded over \$450,000 that has supported over 300 scholarships to both undergraduate and graduate students in the Department of Geological Sciences.

The GSAB holds two meetings annually. Traditionally, the GSAB meets in the fall on the University of Alabama campus on the Monday following a home Alabama football weekend, whereas in the spring, the GSAB commonly meets at a location where DGS related student research is taking place, or at a location where there is a concentration of Alabama alumni. These meetings are typically well attended by members and faculty, with students making presentations of their on-going research. Time is always provided for social events that allow student and GSAB member networking, as well as for field trips to research related or local areas of interest.

In addition to the scholarships funded directly from membership and corporate contributions, the Department of Geological Sciences has endowments valued at more than \$3.6 million to benefit student scholarships and the faculty. Of these, the GSAB has recently led in the establishment of endowed scholarships valued at more than \$670,000 to honor faculty and alumni leaders in the Department of Geological Sciences. These include the Douglas Jones - GSAB Endowed Scholarship, the GSAB-Hooks corpus, the Geological Sciences - Gary Hooks Scholarship Endowment, and the Thomas J. Joiner Endowed Scholarship in Geology. Together, these endowed scholarships



GSAB members receiving a warm welcome from Mission Control at NASA in Houston, TX, Spring 2019

currently generate more than \$32,000 annually in funds to distribute to graduate and undergraduate students within the department. If you combine that with nearly \$22,500 on average available from membership and corporate contributions annually, the GSAB is intimately involved in the distribution of over \$50,000 in scholarships to deserving and needy students pursuing degrees in the field of Geological Sciences.

If you have a desire to help with our efforts, we would love to have you join the GSAB. You do not have to be a graduate of the University of Alabama Department of Geological Sciences to join the Geological Sciences Advisory Board. Although the majority of the GSAB is composed of alumni of the Department of Geological Sciences, we currently have members from other disciplines such as law and engineering from government and industry representatives who attended other well-respected universities. We also have faculty members from other universities such as Auburn University. If interested in joining or if you have questions regarding the GSAB and/or the Department of Geological Sciences at the University of Alabama, please direct those inquiries to Dr. Delores Robinson, chair of the department, at [dmr@ua.edu](mailto:dmr@ua.edu), 205-348-4034, Ron Tisdale, GSAB chairperson, at [rmttri@gmail.com](mailto:rmttri@gmail.com), 205-352-3832, or Kevin Reid, Director of College Support Boards, College of Arts and Sciences, at [krreid@ua.edu](mailto:krreid@ua.edu), 205-348-7009.



# Sakinat Ahmad selected for NOAA Knauss Fellowship



In July 2021, I got selected as a finalist for the National Oceanic and Atmospheric Administration's (NOAA) Sea Grant Knauss Fellowship. As a Knauss fellow, I will spend the next year learning about and contributing my scientific knowledge to marine and coastal policy formulation while working with committees and agencies dealing with coastal issues in a federal office in Washington, D.C. In October, I will interview with several federal offices working on coastal issues to get a placement.

Immediately I saw the announcement for the fellowship, I knew it was something I wanted to do because of its emphasis on coastal and water resource issues. I love water and coastal research, but I have always wanted a way to make my research go beyond the university walls, and this is exactly what the Knauss fellowship offers. I believe my educational, research and work experiences on coastal management issues across three continents (Africa, Europe, and North America) contributed to my selection. I am very excited about this opportunity, and I feel so privileged to have been the only finalist from a university in the states of Alabama and Mississippi.

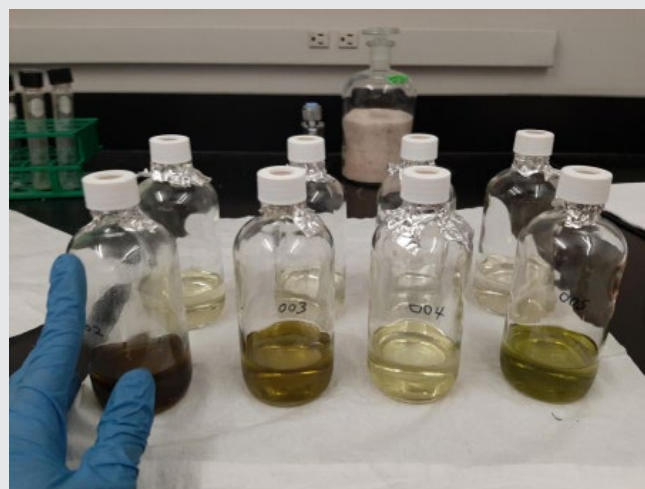
I look forward to working with seasoned coastal/marine experts in such a reputable organization as NOAA. I am very grateful to everyone who made this possible, especially my advisor, Dr. Yuehan Lu, other DGS faculty and researchers - Dr. Delores Robinson, Dr. Fred Andrus, Dr. Ikejiri Takehito, Dr. Man Lu, and Dr. Natasha Dimova, who encouraged me. A very special appreciation goes to Christine Basset, who shared valuable insights about the fellowship and working with NOAA.



Filtering water samples from Mobile Bay in Molecular Eco-Geochemistry Laboratory, the University of Alabama.



Processing tree cores for organic contaminant analysis while working on my master's thesis at the University of Bologna, Italy.



Solvent extracted sediments from Mobile bay sediments await molecular analysis at the Molecular Eco-Geochemistry Lab, UA.



# Another (In-Person!) Successful Field Camp



Students looking for contacts around the Hog Mountain Gold Mine in Ashland, Alabama.



Contact between the Hollis Quartzite (top) and Whatley Mill Gneiss (bottom) at Chewacla State Park, Auburn, Alabama (walkie for scale).

This past summer, we completed another successful season of the summer field course (GEO 495). Due to pandemic-related travel uncertainties we held this year's field course entirely within the state of Alabama. The instructors (me and Dr. Tom Tobin) were helped tremendously through the commitment and effort of our two graduate teaching assistants, Taylor Woods and Joel Schiffer. Taylor and Joel provided expert advice to students in their respective fields (igneous/metamorphic petrology and structural geology, respectively) and also gave the 14 undergraduates tremendous moral support in challenging situations. This year, mapping exercises were conducted at Tannehill State Park (McCalla), Hog Mountain Gold Mine (Ashland), and Chewacla State Park (Auburn) after some preliminary training on geolocation and outcrop identification at Sokol Park in Tuscaloosa. Students constructed stratigraphic columns, geologic maps, and cross-sections, and wrote interpretive reports for all locations.

The hot summer temperatures, high humidity, and mosquitoes made the experience physically demanding for students, but they were able to gain expertise in locating and describing outcrops that were often poorly exposed, weathered, and metamorphosed several times in some cases. The five-week course allowed the students to not only learn field mapping skills, but also permitted them to spend time in some of the most beautiful parts of Alabama.



## Unlearning Racism in Geoscience

In Fall 2021, a small group of graduate students joined the NSF-funded program, Unlearning Racism in Geosciences (URGE, [urgeoscienc.org](https://urgeoscienc.org)), with the objective of learning from peer-reviewed research on the subject of institutional and systemic racism in the field of Earth Sciences and participating in surveying and reviewing current practices in our department to look for areas to improve diversity, equity, inclusion and justice in the DGS. After a full semester of time-intensive research by these graduate students, we have constructed deliverables on multiple aspects of the culture and climate of the DGS, and identified areas for growth and improvement to be more welcoming and equitable to all those in our field (You can view our published documents [here](#)). Over the summer, we have been working to pass the torch to DGS faculty members to help push for meaningful change in the department. There is generally lots of support for the initiatives, and enthusiasm for enacting change. We look forward to the continued commitment to making the DGS more inclusive and welcoming to people of all backgrounds!

Signed, your URGE Pod Members:

Jessie McCraw, Christine Bassett, Liz Bollen, Asmara Lehrmann, Rachel Mohr, Samantha Stanford, and Adrian Wiggins



# SGE

## The Society of Sigma Gamma Epsilon Alpha Chi Chapter

### Who We Are:

Sigma Gamma Epsilon is a national honor society. From the SGE website, “The Society of Sigma Gamma Epsilon was established to recognize scholarship and professionalism in the Earth Sciences. It has for its objectives the scholastic, scientific, and professional advancement of its members and the extension of relations of friendship and assistance among colleges and universities which are devoted to the advancement of the Earth Sciences.”

### What We Do:

The University of Alabama has its own chapter of SGE: the Alpha Chi Chapter!

At the Alpha Chi Chapter of SGE, we take part in various activities related to environmentalism and the outdoors. Typically, we go on one camping trip each semester with locations specifically chosen to showcase Alabama and the Southeast’s remarkable geologic features. Another activity we are beginning to include is volunteer-based water monitoring through the Alabama Water Watch program. We also plan day-hikes and fossil hunts in pristine locations such as Cane Creek Canyon, AL. The SGE Alpha Chi Chapter will also host tutoring sessions for undergraduate courses, such as mineralogy, based on student demand. We usually have a few in-person meetings on weekday evenings to eat pizza, plan events, and catch up. However, we are currently transitioning to an activity-based meeting style geared towards local water monitoring and hiking on the weekends.

### How to Join:

If you are interested in joining Sigma Gamma Epsilon’s Alpha Chi Chapter, please contact the chapter President Adrian Wiggins at [aawiggins@crimson.ua.edu](mailto:aawiggins@crimson.ua.edu), or Vice President Jamekia Durrough-Pritchard at [jdawson1@crimson.ua.edu](mailto:jdawson1@crimson.ua.edu).







# Alabama Analytical Research Center

## 2020 - 2021 Update

Progressing through 2020 and into 2021, the Alabama Analytical Research Center (AARC) has seen multiple changes as it continues to grow and strive to better serve the research needs of the University of Alabama and beyond. Fall of 2020 saw the departure of Dr. Michael Buettner from UA for new opportunities outside of Alabama. Fortunately, a new staff hire, Dr. Ilias Bismukhametov, was brought on board to expand the technical capabilities within the center. With his background in transmission electron microscopy and atom probe tomography, Dr. Bismukhametov has quickly become a boon for AARC with his knowledge of advanced analytical techniques.

As students began to return the center in greater and greater numbers, a distinct need to restructure and improve training was becoming clear. With a full suite of technical staff now available, queues for training on instruments such as the Tescan Lyra and Quanta 3D dual beams and JEOL 7000 and Apreo FE-SEM electron microscopes were lowered considerably. Despite the setbacks from working around COVID restrictions, the AARC was able to boost its total number of trained users compared to the previous year thanks to the continued work of the staff.

In the Spring of 2021, another large change would take place with the AARC moving away from the older online reservation system, known as the Alabama Research Management System (ARMS), to a newer and vastly more advanced system known as the Facility Billing System (FBS). This new system would allow the same functionality as ARMS for users to reserve instrumentation while now allowing faculty to directly control their projects and fund information, in addition to expanding the information staff could pull out on the back end when needed.

Have a look at our website to see the capabilities AARC has to offer. Anyone with questions is encouraged to get in touch by email: [raholler@ua.edu](mailto:raholler@ua.edu).

<https://aarc.ua.edu>



Gregory Thompson -  
Director



Robert Holler -  
Manager



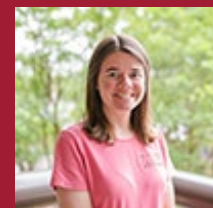
Johnny Goodwin -  
Instrumentation Specialist



Ilias Bismukhametov -  
Materials Characterization  
Specialist



San Dab -  
Materials Characterization  
Specialist



Carrie Martin -  
Program Assistant



Mary Robinson -  
Office Associate Senior

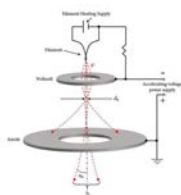
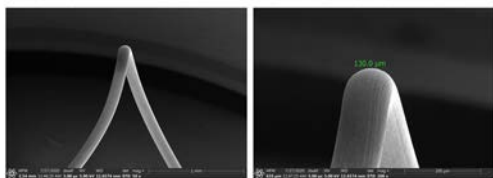
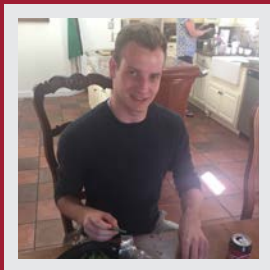


Diagram depicting electron generation from a tungsten filament. Modified from Goldstein, J., et al. Scanning Electron Microscopy and X-ray Microanalysis, 3rd ed., Plenum Press, New York, 2003.





# Graduate Student Updates



Ian Anderson

Recent UA Graduate (MS, 2021)

I graduated with a M.S. in geology this August of 2021. I worked with Dr. Harold Stowell studying the temperature, pressure, and timing of magma intrusion and metamorphism in Fiordland New Zealand. This research provided an opportunity to develop laboratory skills in a variety of techniques such as precise pipetting, liquid ion chromatography, and thermal ionization mass spectrometry. Thanks to this skillset, I will be working at the Pacific Northwest National Laboratory in Washington state. I am grateful for the opportunities and mentors I had in the University of Alabama geology graduate program and look forward to returning the favor one day!



Stephen Anderson

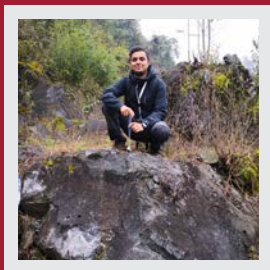
Ph.D. Student

My name is Stephen, and I am a 3rd year student in the Material Sciences tri-campus PhD STEM program for Alabama working with Prof. Natasha Dimova in the Geological Sciences department. I received my BS in Chemical Engineering from UA in 2019 and have been a lifetime fan of Alabama Football, Nintendo, and protecting the environment.

My current research involves studying the movement of anthropogenic chemicals through suspended sediment and atmospheric deposition derived from Coal Fired Power Plants (CFPP) and how they travel throughout the Mobile River Basin that encompasses most of the state. Using a combination of hydrological, geochemical, and mathematical processes, my research team is analyzing suspended sediment collected from an anthropogenically impacted riverbank for the Mobile-Tensaw Delta to assess concentrations of heavy metals (including As, Pb, Cd, etc.) commonly associated with CFPP waste.

Another section of research includes evaluating compositional differences of sediment cores in Alabama's main river basin based on differing geological formations, then using historical  $^{210}\text{Pb}$  and anthropogenic  $^{137}\text{Cs}$  time markers along with  $^{226}\text{Ra}$  and  $^{228}\text{Ra}$  isotope ratios to produce recent (<120 yr) historical rates of sedimentation. This work is done in the hope of improving upon environmental remediation efforts for the state through the means of understanding the historical processes and heavy metal pollution for the Mobile River Basin and Mobile Bay's diverse watershed.

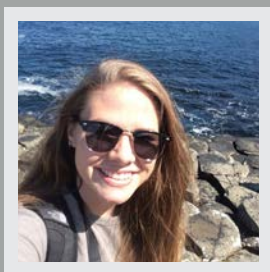




## Souvik Bhattacharjee

### Ph.D. Student

My Name is Souvik and I'm a Phd student from India. I graduated from the Indian Institute of Technology Roorkee, India with a MSc in Applied Geology in 2012, post which I worked as a Production Geologist for Shell & Senior Analyst for Derrick Petroleum Services. I joined Dr. Marcello Minzoni's lab, the University of Alabama Laboratory for Integrated Carbonate Research in Fall 2017. My research involves Stratigraphic Forward Modeling of ramp-shelf carbonates from the Jurassic Smackover Formation, Gulf of Mexico and the Triassic carbonates from the Nanpanjiang Basin, South China to understand the controls on the large-scale architecture and facies distribution of carbonates. I travelled to Guizhou, China for a month in 2019 to map an exposed platform-to-basin transect and collect samples. This summer I presented at the SEPM ISGC 2021 Student and Early Career Virtual Conference on my research on South China. Currently I'm working on 3D stratigraphic forward models for the Smackover Formation from the GOM. When I'm not working, I watch football (soccer) or travel.

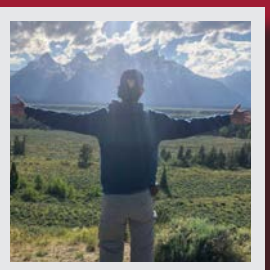


## Chelsea Comans

### Recent UA Graduate (MS, 2021)

### Ph.D. Student

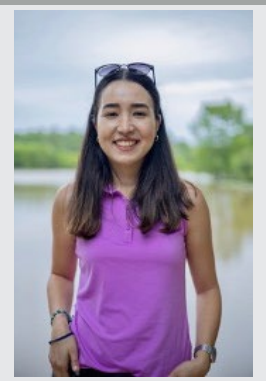
My name is Chelsea Comans, and I am from Chelsea, Alabama (yes, you read that correctly). I received a Bachelor of Science degree in Geology from Auburn University in 2018 and just finished my master's degree here at the University of Alabama in the Department of Geological Sciences. I am excited to start my Ph.D. here in Fall 2021. I work with Dr. Yuehan Lu and Dr. Takehito Ikejiri. My research combines vertebrate paleontology and geochemistry to answer questions relating to mass extinctions, vertebrate evolution, and paleoecology. Currently, I am researching Late Cretaceous shark evolution and extinction in the northern Gulf of Mexico basin. I use tooth morphology (i.e., size and shape) to elucidate information about the dietary habits of sharks and how certain tooth morphologies may have been selectively removed during extinction events. I also use nitrogen isotope analysis of enamel-bound organic matter to infer the trophic level of extinct sharks. Outside my research, I spend my time reading Clive Cussler novels and watching old tv shows and movies.



## Ryan Culp

### Masters Student

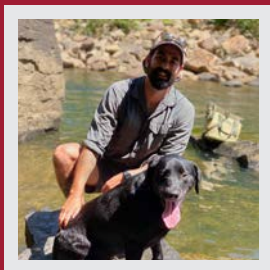
My name is Ryan Culp, and I am finishing my masters this fall under Dr. Matthew Wielicki. I completed my BS in Geology at West Virginia University where I also earned a GIS minor. My research focuses on detrital zircon geochronology of unique sand structures, known as Clayton sand bodies, found at a K-Pg boundary just southwest of Tuscaloosa. The Clayton sand bodies are of interest since they hypothesized to be either an incised valley fill or a magawave deposit from Chicxulub induced tsunamis. I am interested if any zircons related to the Chicxulub impact are present as this can further our understanding of the effects large impacts have on regional environments. My research would also build upon other studies which seek to understand the drainage into the Mississippi embayment at the end of the Cretaceous. Other late Cretaceous sandstones have been found around the Mississippi embayment that have a similar detrital zircon age distribution to the Clayton sand bodies. Exciting stuff! After graduation, I plan to have job working at an environmental consulting firm or the federal government. I would like to stay on the east coast and live outside either Washington DC or Charlotte, NC.



## Gozde Degirmen

### Masters Student

Hi! My name is Gozde Degirmen and I am from Ankara, Turkey. I graduated from Ankara University with a BSc in Geological Engineering (2016). This is my second year of master's degree at the University of Alabama. My advisor is Dr. Fred Andrus and my co-advisor is Dr. Tom Tobin. My research involves interpreting stable isotopes records on ammonite aptychi. I began my education at UA thanks to the overseas graduate scholarship provided by Turkey. After graduation, I am going to work as a geologist in General Directorate of Mineral Research and Exploration, Turkey.



## Jordan Faltys

### Ph.D. Candidate

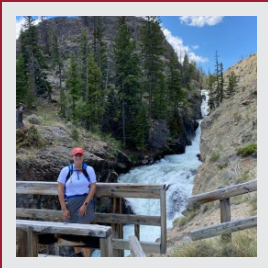
Hi! My name is Jordan Faltys, and I am a Ph.D. candidate studying under Dr. Wielicki. I received my BSc in 2013 from NMSU and MSc here at UA in 2020. My research focuses on extraterrestrial and terrestrial impact-formed zircon to answer questions about the bombardment history, crustal evolution, and habitability of Earth during the Hadean (first 500 Myr of Earth). Fall 2020 I published my first first-author paper in *Lithos* which develops guidelines for using mineral inclusion proportions in terrestrial impact-formed zircon to determine a broad composition of unknown target rocks. Over the Summer I presented a talk at Goldschmidt 2021 (virtually) on the second chapter of my dissertation which investigates the geochemical evolution of impact melt sheets and applies a probabilistic geospatial model to probe how impactors develop crustal compositions into more felsic concentrations. This research sheds light on a mechanism required to produce an evolved crust in the absence of a plate tectonic regime, which many believe is essential in providing the ingredients necessary for life's origin. Currently, myself and Jonathan Frame (below) are in the process of submitting this paper with Dr. Wielicki in the coming weeks. This year I hope to continue working on publishing my final chapter and finish running and analyzing lunar zircon samples on the Local Electrode Atom Probe. When I have free time, I enjoy golfing and camping, when I am not spoiling my black lab, Moose.



## Jonathan Frame

### Ph.D. Candidate

I am Jonathan, from California. Before starting here at UA I was working in the civil engineering industry designing water resources infrastructure and environmental restoration projects. I am advised by Dr. Yong Zhang and Dr. Grey Nearing (Now at University of California, Davis). My research focus is artificially intelligent (AI) water resources modeling. I am trying to develop a deep learning-based theory of global hydrology from 'Explainable AI' (please forgive the lame buzzwords). My first (first author) paper has been accepted for publication, and I have two more in review. I hope to finish my PhD this coming spring with four accepted first author papers (fingers crossed), and about 5 more as co-author. Last year I started working at the U.S. National Water Center (here on the UA campus) helping to develop the Next Generation National Water Model. After grad school I hope to continue this line of research attempting to mitigate impacts from drought/floods and restore our natural resources.



## Mary Brandon Huettemann

### Masters Student

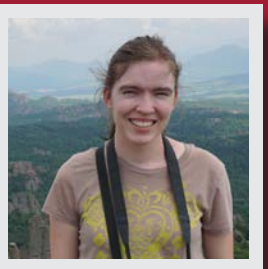
Hi, my name is Mary Brandon Huettemann and I am a second year M.S. student working with Dr. Tick. I am from Mobile and I received my BS from the University of South Alabama. My thesis research is looking at “The Effect of Storm and Storm Surge on Groundwater Quality along Coastal Alabama”. During my free time, I like to hangout with my dog, play tennis, and go to the beach.



## Jessie McCraw

### Ph.D. Student

I was happy to start at Alabama in January after completing my internship with the National Park Service at Badlands National Park last year. Since arriving in ‘Bama, I’ve been on a Graduate Council Fellowship, taking a ton of classes and getting started on my PhD research. I also led an URGE Pod research group over the spring, allowing our department to take part in an NSF-funded reading group on Unlearning Racism in GEoscience. This summer, I attended IsoCamp (a short course in Stable Isotope Biogeochemistry and Ecology) at the University of New Mexico, where I learned from a wide variety of experts in different areas of stable isotope research in Earth Systems. I’ll be giving a talk at GSA in Portland this year on my first PhD project, spatio-temporal paleotemperature reconstructions of the Cretaceous Western Interior Seaway from ammonite fossils. I look forward to what the next year has in store!

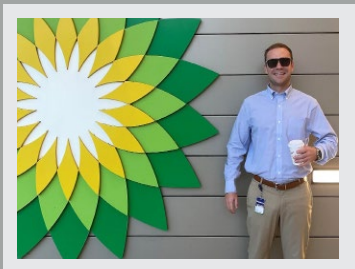


## Rachel Mohr

### Ph.D. Student

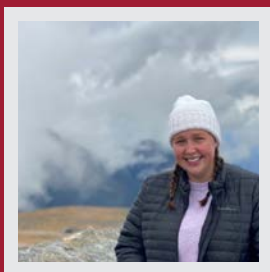
Hello! My name is Rachel Mohr and I am a Ph.D. student in Dr. Tom Tobin’s lab. I’m originally from Minnesota and got my B.A. from Gustavus Adolphus College. I received my M.S. from the University of Alabama in 2018 and also completed the Graduate Certificate in Museum Studies this past year. My dissertation research focuses on the taxonomy and biostratigraphy of Late Cretaceous ammonites from Alabama. In particular, I’m working on a morphometric investigation of the *Placenticer* genus, a group known for its high degree of morphometric variability. I mostly use museum specimens for my research, so I spend a lot of quality time in the collections at the Geological Survey of Alabama, the Alabama Museum of Natural History, and the McWane Science Center. New TAs in the department may encounter me in my one of my roles this semester as a Graduate Teaching Fellow, helping facilitate the GTA training and other workshops this fall.





Lucas Nibert  
Masters Student

This summer I did a Geophysics Internship with bp Exploration. I built an integrated prospect description of a deepwater, subsalt, Lower-Middle Miocene sand in the Gulf of Mexico. I learned a lot about seismic attributes, geophysical modeling, and prospect maturation. It was great to work as a part of a multidisciplinary team and learn about the business side of things. It was an exciting experience and I would love to work in the energy industry after graduation!



Mary Hastings Puckett  
Ph.D. Student

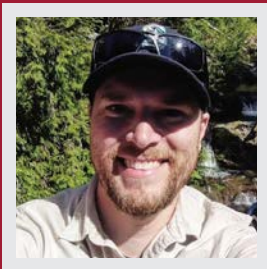
Hi y'all! My name is Mary Hastings, and I am a second year PhD student. I am from a small town on the Alabama Gulf Coast named Magnolia Springs, which also happens to be the study site for my dissertation research. In May 2018 I received my BS in Geology from the College of Charleston and began my M.S. at UA in fall 2018 with Drs Zhang and Lu. My PhD research is advised by Drs Tick and Zhang and focuses on the mechanisms of surface-groundwater interactions in a spring fed river system. In addition to working on my PhD, I am also a full time Geologist in the Groundwater Assessment Program at the Geological Survey of Alabama. In 2021 I have presented at two conferences, with two more planned for the fall and a manuscript in development. This year I am looking forward to starting my dissertation field work and learning more about a watershed that is close to my heart. In my free time, I love being out on the water with my sweet black dog Charlotte.



Hesam Saeidi  
Ph.D. Student

My name is Hesam and I'm a 3rd year PhD student from Iran. I received my BS in Physics and my MS in Earthquake Seismology from Iran. After graduating I spent 3 years working as a Python programmer in my country. I'm a Linux enthusiast and a technophile. I love solving problems using computer algorithms. I recently started to learn machine learning to expand my programming skills.

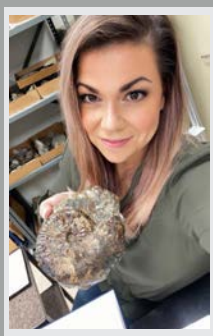
I'm currently working on my dissertation under the supervision of Dr. Hansen. My research is developing body wave traveltime tomography for African continent. Simply put, I am using earthquake waves recorded in Africa to measure the velocity perturbation of seismic waves traveled through the earth, from a reference model. Then we will interpret these velocity perturbations to physical and geochemical properties. With the help of this method, seismic tomography, we can explain how tectonic features such as intraplate volcanoes and rift valleys are related to the subsurface processes.



## Joel Schiffer

### Ph.D. Student

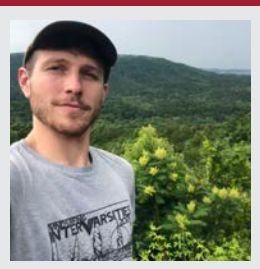
Greetings! I'm Joel, and I'm entering the sixth semester of my Ph.D. studies here at UA. I'm originally from Washington, in the Pacific Northwest, but my road has taken me to quite a few other places, including Texas (BSc, UT Arlington, 2012) and Norway (MSc, University of Tromsø, 2017). My research with Dr. Robinson is investigating the thermokinematic history of the Himalayan fold-thrust belt in northern Pakistan. I'm approaching this by building structural cross-sections and integrating thermochronologic data from zircon and apatite. In the last couple of years, I have completed field work, and most of my thermochronologic data have been acquired. I am now beginning to put all the pieces together, and my first manuscript is nearly ready. I plan to present my recent findings at a couple conferences this fall, GSA in Portland as well as AGU in New Orleans. Our lab group has also just been given a donation of the MOVE structural modelling software, which will allow me to digitally build, analyze, and kinematically restore balanced cross-sections in my study area.



## Samantha (Sam) Stanford

### Ph.D. Student

Hi! I'm Sam, and I am going into my second year as a PhD student here at UA. I received my BS in geology from Columbus State University where I studied Cretaceous crocodylian coprolites (say that 5 times fast) and received my MS in geology from The University of North Carolina at Wilmington where I studied naticid snail drillholes. Here at UA I am working with Dr. Tom Tobin on isotope signatures from Cretaceous ammonite scars. I love all things trace fossil related because body fossils typically get all the glory, but ichnofossils provide us with a ton of important information about extinct organisms; they just aren't as charismatic – the underdogs of paleontology. I have a daughter, 3 dogs and rescue turtle. I love music, kayaking, running, and playing the drums (badly). I occasionally have pink hair and will gladly discuss the history of punk music and which dinosaurs were the coolest over a Guinness.



## Adrian Wiggins

### Masters Student

Hi! My name is Adrian Wiggins and I am originally from the coast of northwest Florida. I attended the University of Alabama for my bachelor's degrees in Chemical Engineering and Geology, and I decided to stay here for my master's. Fall 2021 marks the second year of my master's program where I currently investigate geothermal energy in extended terrains, such as the Buyuk Menderes Graben in western Turkey.

Ultimately, I seek a career in geothermal energy, with special interests in geothermal technology, exploration, production, and modeling. Using fundamentals of physics, chemistry, geology, mathematics, and computer science, I intend to solve technical problems related to geothermal power production. In addition to solving technical problems, I had the amazing opportunity to work a remote internship at the Idaho National Laboratory this past summer, where I investigated non-technical barriers to geothermal energy development in the United States.

Outside of school, I love playing music and doing outdoor activities. If anyone wants to jam, I am ALWAYS up for a jam session, so feel free to reach out! Likewise, if anyone ever wants to go hiking or participate in water sports, like kayaking or paddleboarding, just let me know and we can plan something. Cheers!



## Zach Yates

Recent UA Graduate (MS, 2021)

Ph.D. Student

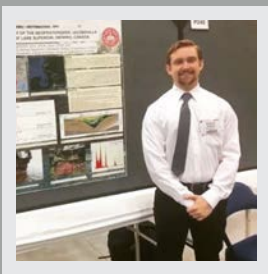
My name is Zach Yates and I am a first year PhD student from a small town in southwestern Virginia called Cedar Bluff. I completed my Bachelor of Science in Geology at Radford University in 2018 and I completed my Master of Science in Geological Science here at UA in spring 2021. Dr. Delores Robinson was my M.S. advisor, and I will be pursuing my Ph.D. under her guidance as well. My Ph.D. research aims to get a better understanding of the evolution of the southern Himalayan- Tibetan orogeny during Paleocene-Eocene time. This project will incorporate geologic mapping, balanced structural cross sections, sediment provenance, and thermochronology to improve our understanding of the evolution of the Tethyan fold-thrust belt of Tibet. My M.S. research focused on using detrital zircon geochronology to understand the provenance of various Carboniferous sandstone units in Alabama. I am currently revising my M.S. thesis work for publication and hope to send it out during the Fall semester of 2021.



## Steven Young

Masters Student

My name is Steven Young Jr. I'm from Lockport, Illinois, about 45 minutes southwest of Chicago. I received my B.S. in geology from Illinois State University in Normal, IL in spring of 2020. I am currently starting the second year of my M.S. as a research assistant under Dr. Rona Donahoe. My thesis research involves analyzing mineralogy and trace element chemistry of bottom sediments from Mobile Bay and the eastern Mississippi Sound. I have been doing these analyses using XRD for mineral identification and ICP-OES for quantification of trace elements. After finishing my thesis and completing my M.S., I plan on renovating and living out of a school bus while working as an environmental consultant. Eventually, I would like to get my PhD and become a professor somewhere out west. Outside of academia, I like to spend my time at music festivals, out in nature, or at home with my partner and our cat.



## Robert Wencil

Recent UA Graduate (MS, 2021)

My name is Rob Wencil and I recently graduated with my MS this past Summer under Dr. Cemen. My thesis was on Terrestrial LiDAR Imaging and Fracture Analysis of the Woodford Shale; Western Arkoma Basin, Oklahoma. After graduating I started working as a Geologist at PELA GeoEnvironmental, an environmental company, here in Tuscaloosa. Day to day work includes groundwater and soil remediation, conservation easements, and Phase I and II environmental site assessments. Unique work includes consulting with mining operations and analyzing karst areas. During my time here at UA, DGS helped me by providing me with a framework to succeed in a professional environment. Managing classes, research, and TA responsibilities all at once translates very well to the working world. My favorite memories of my time at UA have to be the AAPG tailgates before football games and the post-seminar gatherings on a Friday evening. My advice to new students is to take advantage of as many classes as possible, both within the department and in other departments.





# Welcome Our New Graduate Students!



Rita Adamec

## Masters Student

Howdy! My name is Rita Adamec. I am a first year MS student working with Dr. Cemen on a mapping and geochronology project in Northeastern Alabama. I am from Houston, Texas and received my BS from New Mexico State University this past May. When I'm not in the field, you can probably find me on a mountain somewhere or golfing with friends.



Kayode Agboola

## Masters Student

Hi, my name is Kayode Johnson Agboola. I am from Nigeria and I'm an M.S. student working under the supervision of Dr. Samantha Hansen on Seismicity of the Antarctica using the Antarctic dataset. I had my B.S. degree from Obafemi Awolowo University, Nigeria where I worked on the evaluation of petrophysical parameters of some oil wells in the Niger-Delta region of Nigeria. I look forward to the successful completion of my Master's thesis research and starting my pH.D. program. Aside geology, I like teaching high school students Mathematics. For fun, I love watching Action and Thriller movies.



Ben Engleman

## Ph.D. Student

My name is Ben Engleman, and I am a PHD student that received my Masters at the University of North Dakota. I have the pleasure of studying under Marcello Minzoni, my advisor. Over the next few years I look forward to learning from some of the world's leading researches and exploring the great state of Alabama. I enjoy sports and activities, especially wake boarding and SCUBA.



Long Ho

## Ph.D. Student

My name is Long Ho, and I am from Vietnam. I am an incoming Ph.D. student working with Dr. Samantha Hansen on seismic events around Antarctica. I received my B.S. in Earth Sciences from the University of Minnesota in 2019. I headed to Texas and obtained my M.S. degree at the University of Houston in Geophysics (2021). For my master's thesis, I used shear wave splitting to study spatiotemporal variations in earthquakes' foreshocks in Japan. I am currently working with my coauthor to publish a paper based on my master's research. This year, I am looking forward to developing new skills and gaining new knowledge as I start the first chapter of my dissertation. Outside of research, I enjoy strolling in the park while reading books and savoring local's coffee.



## Paul Kim

### Masters Student

My name is Paul B. Kim. I am an “incoming” M.S. student working for Dr. Geoffrey Tick on contaminant hydrology. I am from Alabama, and I received my BS from the University of Alabama, Roll Tide! I look forward to becoming an expert and meeting my undoubtedly phenomenal new colleagues. I enjoy the outdoors, especially days on the water. I also have an embarrassing love of Old School RuneScape. An interesting fact, I served with distinction with the Army National Guard.



## Nathan Limbaugh

### Ph.D. Student

My name is Nathan Limbaugh and I'm an incoming PhD student working with Dr. Julia Cartwright on meteorite microscopy and cosmochemistry. I am from Saint Charles, Missouri and attended the Missouri University of Science and Technology, where I received my BS and MS in geology & geophysics with an emphasis in geochemistry and igneous petrology. I'm looking forward to using a lot of cool analytical equipment in grad school here at UA, as well as the unique experience of being at a large school like UA where there's plenty of fun activities and involvement opportunities. A few fun facts about me would be that my Greek life band back at S&T just won the annual 'battle of the bands' competition this past spring (I played guitar and did backup vocals) and I enjoy longboarding and going on walks in my free time as well.



## Dipanjan Mitra

### Ph.D. Student

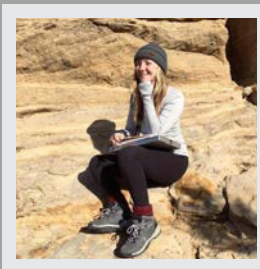
Hi, my name is Dipanjan Mitra. I am a new Ph.D. student starting fall 2021, working with Dr. Ibrahim Cemen on Western Black Sea looking at the basement faults and its evolution during the basin formation. I am from Kolkata India but lived in US most of my adult life in Houston Texas. and I received my MS on carbonate sequence stratigraphy from Rice University Houston, TX. When I am not passionately researching on Geology, I like to cook, camp, hike (if possible) and I spend all my time with my dog Piku a shepherd hound mutt.



## Ibrahim Okunola

### MS Student

My name is Ibrahim Okunola and I am a first year MS student working with Dr. Rona Donahoe. My research focus is on the evaluation of coal, coal-associated sediments, coal combustion and mining wastes as potential feedstock materials for critical minerals (including REE) and non-fuel carbon-based products. I am from Nigeria, where I completed my B.S. in Geology at Obafemi Awolowo University, Ile-Ife, Nigeria in 2013. Upon completion of my undergrad, I worked with the Nigerian government as a geologist at the Federal Ministry of Mines and Steel Development, Abuja, Nigeria. I'm looking forward to an impactful research, gaining relevant skills, knowledge and networking. Outside geoscience, I enjoy travelling, listening to music, exercise and catching up with friends.



## Sarah Olmstead

### Masters Student

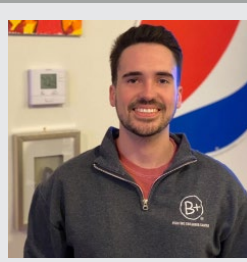
My name is Sarah Olmstead, and I am an incoming master's student. I will be working with Dr. Fred Andrus and am interested in paleoecology and paleoclimatology. I am from Georgia and received my bachelor's of science from the University of Georgia. I am looking forward to learning new research techniques and improve my scientific writing skills. Something I love to do when not in school is go camping! I camped for 15 days straight this summer while roadtripping Colorado, New Mexico, and Utah, and I climbed the tallest peak in New Mexico, Wheeler Peak.



## Abutu Peter

### Masters Student

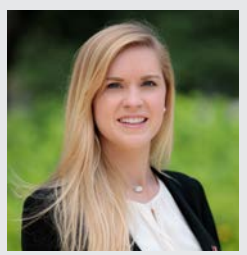
My name is Abutu Sunday Peter. I am pursuing a Master's degree in Geology with a focus on Planetary science. I have Dr Julia Cartwright as my advisor. I had my Bachelors at the Obafemi Awolowo University in Nigeria. I am highly enthused about working on planetary materials with a bid to unravelling their Geological histories within the framework of how our solar system has evolved. Also, I am passionate about contributing to expanding the planetary science frontier within sub-Saharan African space. For fun, I love to binge watch travel videos, and I am big on hiking.



## William Priakos

### Masters Student

Hello, my name is William Priakos and I am a first year MS in geology student working under Dr. Ibrahim Cemen to map a quadrangle. I am from Southlake, Texas and I got my BS in Geology right here at The University of Alabama! The things im looking forward to in graduate school include expanding my knowledge on geology, making connections with like-minded individuals, and furthering my prospects for a future career. An interesting fact about me is that I have 4 pet dogs, 1 cat, and 1 pig!



## Kalyn Tew

### Ph.D. Student

Hey my name is Kalyn Tew and I am beginning my Ph.D. with Dr. Rona Donahoe on beneficial use of coal and coal ash in the Southern Appalachian Basin. I received both my BS and MS from the University of Alabama, and then took a position in Environmental Consulting for a few years. I currently work in the College of Continuing Studies at the University of Alabama as an Environmental Analyst. I am looking forward to returning to the department to get a PhD, so I can pursue a career as a professor in the future. When I'm not working or in classes, I love trying new foods and restaurants. I also love to cook!

Isaiah Daum  
Advisor: Dr. Delores Robinson

Hossein Gholizadeh  
Advisor: Dr. Yong Zhang

Yitao Pu  
Advisor: Dr. Bo Zhang

Chaloemporn Ponprasit  
Advisor: Dr. Yong Zhang

Emre Pacal  
Advisor: Dr. Cemen

Gbenga Okunlola  
Advisor: Dr. Rona Donahoe

Ojo Ogundare  
Advisor: Dr. Geoff Tick

Bahareh Dermeni  
Advisor: Dr. Yong Zhang

Sakinat Ahmad  
Advisor: Dr. Yuehan Lu



# Department Highlights!!

## Research:

During April 1, 2020-March 31, 2021, the Department of Geological Sciences (DGS) faculty had 39 distinct grants in force for a total of \$5,016,892. During the same period, the DGS faculty submitted 42 proposals to external federal, state, industry and non-profit entities for a total of \$8,835,907. In 2020-2021, our faculty had a total of 74 papers as authors and coauthors. Out of these 74 papers, 11 had graduate students as first author. Our papers/faculty increased from 3.7 to 3.9 from last year to this year. Our numbers of abstracts were down (to 70 from 150) because fewer faculty and graduate students attended conferences because of the pandemic. Also, abstracts were only counted once even if more than one faculty member was an author.

## Teaching:

In 2020, the DGS awarded 12 graduate degrees, 4 PhD and 8 MS, the same as in 2019.

In 2020, the DGS had 52 enrolled graduate students, an increase of 1 student from 2019.

In 2020, the DGS awarded 10 BS, BSG and BA degrees, a decrease from 13 in 2019.

In 2020, the DGS had 74 undergraduate majors, a 9% increase from 2019.

We survived having most of our classes and laboratories taught both online and in person, double the teaching duties for faculty and graduate students. The DGS' student enrollment has an upward enrollment trend over the past 3 years of 4.1%. The student credit hours for 2019-20 were 11,224, with a 3-year average increase of 3.9%. The 2019-2020 year had a 100% fill rate for all our classes with an average class size of 23. We continued to fill our classes throughout the pandemic.

## Service:

The DGS faculty served as a member on 29 professional committees, chaired 25 university, college and department committees, and were members of 101 university, college and department committees. We reviewed 123 manuscripts for professional journals, 8 tenure and promotion packages for external departments, reviewed 40 proposal submissions to federal agencies, gave 22 invited talks at other universities and institutions, were on the editorial board of 15 journals, chaired or served on 8 proposal panels, and organized 8 sessions at international conferences. Rona Donahoe finished as faculty senate president for the university. Delores Robinson finished serving as co-chair of the Arts and Sciences faculty advisory council, with Sam Hansen taking over on the council. The governance of the department has also changed this year. Sam Hansen is the Assistant Chair (a new position). Kim Genareau is the Graduate Program Director. Yong Zhang is the Undergraduate Program Director. Julia Cartwright is the supervisor of the 101 laboratory Graduate Teaching Assistants.

## Other:

The DGS has made great progress on diversity, equity and inclusion through our Diversity Alliance, headed by Fred Andrus with Alberto Perez-Huerta taking over in August 2021. The Geological Sciences Advisory Board (GSAB) continues to be a pillar of our department, even though our meetings were virtual. During the 2020-2021 period, 35 graduate students were supported on Graduate Research Assistants or fellowships, with two of those supported with Graduate Research Fellowships through the National Science Foundation. One graduate student finished her NOAA Knauss Fellowship at the National Weather Service in Washington, D.C. and another graduate student earned one of these fellowship for 2022.

## CONGRATULATIONS GRADUATES!!

### FALL 2020

Erik Rheams (MS)  
Rebecca Greenberg (MS)  
Alexander Lamore (MS)  
Harshpal Singh (MS)  
Elizabeth Bollen (PhD)  
Jackson Stewart (MS)  
Alexandra Church (BS)  
Tyler Poe (BS)  
Jarred Johnson (BS)

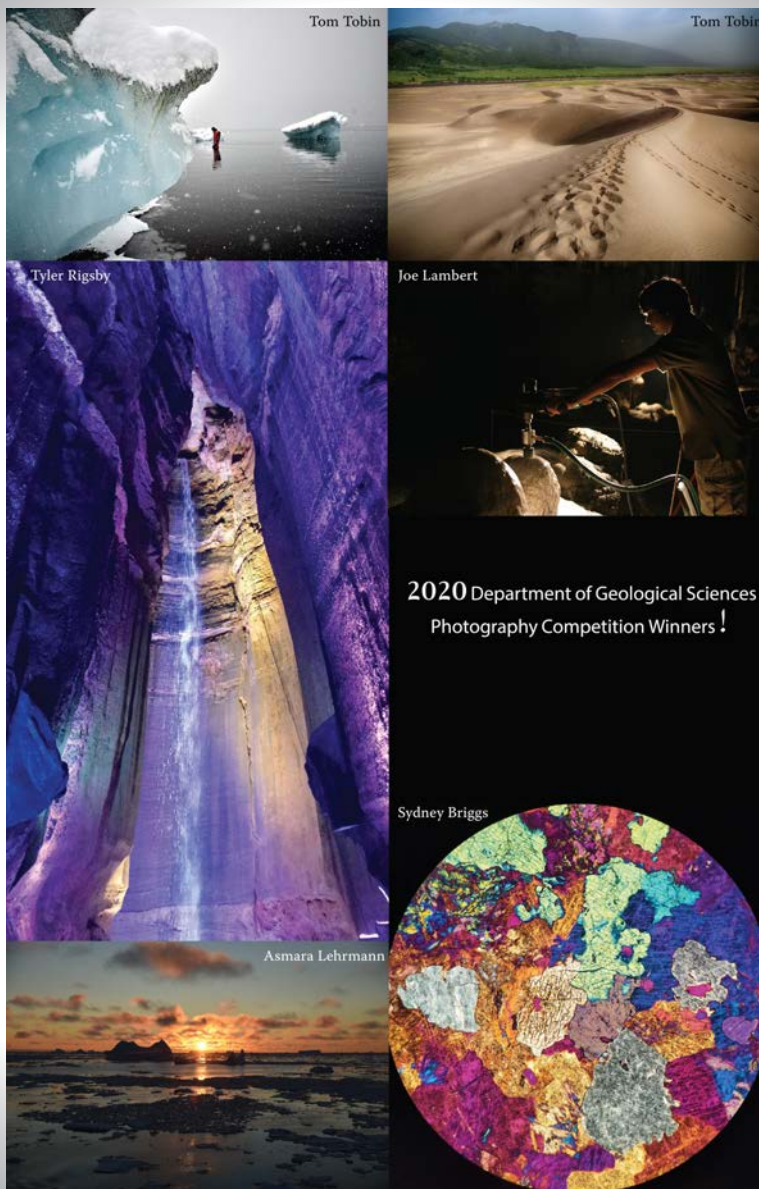
### SPRING 2021

Jonathan Riddle (MS)  
Sydney Briggs (BS)  
Matthew Berger (BS)  
Catherine Ecker (BS)  
Jacob Honeck (BS)  
Katrin Friesen (BS)

### SUMMER 2021

Yagmur Yilmaz (MS)  
Ian Anderson (MS)  
Barin Burcu (MS)  
Zachary Yates (MS)  
Ashish Kumar (MS)  
Robert Wencel (MS)  
Sam Walker (MS)  
William Priakos (BS)

Matthew Adams (BS)  
Molly Savannah Green (BS)  
Robert Beasley (BS)  
William Braidfoot (BS)  
Caroline Doughty (BS)  
Kate Salsky (BS)  
Aryian Dean (BS)  
Justin McCleskey (BS)



## GIVING

Please consider making a gift to the Department of Geological Sciences today.

Giving is quick, easy, and secure:

In the “Find your fund” search box, you can locate the general [Department of Geological Sciences Gift Fund](#) to help us fund our most urgent needs.

Or you can give to one of our specific funds, including:

[Doug E. Jones/Geological Sciences Advisory Board Fund](#) (scholarship)  
[Tom Joiner/Geological Sciences Advisory Board Fund](#) (scholarship)  
[Jen Ho Fang Fund](#) (scholarship)  
[Walter B. Jones Fund](#) (scholarship)

[W. Gary Hooks/Geological Sciences Advisory Board Fund](#) (scholarship)  
[Geology Endowment](#)

[W. Gary Hooks Endowed Fund](#) (student research)

[Richard H. Groshong Fund](#) (field trips)

[Harold H. Stowell Fund](#) (field course)

[P. E. LaMoreaux Fund](#) (international students)

[Wallace C. Johnson Fund](#) (field-based learning)

[Walter B. Jones Fund](#) (geological research in Alabama)

[Nathan L. Green Fund](#) (petrology research)

If you have any questions or would like to discuss other giving opportunities, please call or email Delores Robinson, department chair, at (205) 348-4034 or [dmr@ua.edu](mailto:dmr@ua.edu).



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