

# Geogram 2023

Photo credit: Jay Kaufman

## LETTER FROM THE CHAIR



James Farquhar

Dear Alumni and Friends,

It is a pleasure to provide my first report in the Geogram as Department Chair, and to invite you to our 50th Anniversary Celebration that will happen this coming fall. You should all have received “save the date” messages, but if not, please reach out to let us know.

This is my third year as Geology Chair having taken the reigns from **Rich Walker**, whose productive term resulted in several new faculty hires and departmental accomplishments. Rich should also be commended for being elected to the National Academy of Sciences and the American Academy of Arts and Sciences, as well as his receipt of a major award from the American Geophysical Union (Hess Medal) and recognition as a UMD Distinguished Professor, during his interval as Chair. As with all new positions, it has taken me a little time to spin up and learn how to balance new administrative duties with my existing scientific program, but looking forward, and working closely with past Chairs **Rich Walker** and **Mike Brown**, I am optimistic about our department and its prospects during the next few years.

I am fortunate to be able to share with you wonderful news about the Geology Department, including accomplishments and

recognitions. An aspect of our department that has always impressed me is how we have succeeded in pursuing excellence across the range of our activities. We have grown to be mid-sized compared to other Geology departments in the US, and we continue to have an outsized impact on the science in the variety of Geoscience subdisciplines. We continue to push and extend the boundaries of what Geology is with research led by our highly successful graduate and undergraduate students, three of whom are highlighted in this Geogram. We have grown in the area of Post-doctoral scholars, those who have Ph.D. degrees and are preparing for their next stage in industry, government, or academics, and we are proud to announce their successes in publication, awards, and job placement.

One area where we are presently pushing and extending the boundaries of our research is in the particularly exciting emerging research related to Solar System exploration, participation in spacecraft missions, and instrument development. Our department continues to make significant contributions through collaborative NASA/UMD efforts via GEODES (Geophysical Exploration of the Dynamics and Evolution of the Solar System - <https://www.geodes.umd.edu/>), a multi-institutional NASA SSERVI node that is led by **Nick Schmerr**, that is studying how geophysical tools will be used in the next generation of lunar exploration. Both **Nick Schmerr** and **Ved Lekic** are active members of the NASA Insight Mission Science Team, and they and their research groups have led studies that have led to the discovery of the martian mantle transition zone, the first detections of surface waves

on Mars, and their work has been recognized with an AAAS Newcomb Cleveland Prize for the participation in the discovery of the Martian core. The collaborative M-CLASS (Measurement of Composition via Laser Ablation Sampling and Spectrometry) Lab led by **Ricardo Arevalo**, has recently demonstrated a technology for detecting signs of life in cryogenic environments (such as those found on Europa and Enceladus), and supported NASA missions targeting exploration of the lunar far side and ocean worlds in the outer Solar System. Continuing this theme, **Megan Newcombe** recently published a major paper in Nature that informs us about the building blocks of inner solar system bodies.

Coming back to ground, **Sujay Kaushal** is a leader in areas related to water quality and what is known as Freshwater Salinization Syndrome, which drives changes in water chemistry that impact how waters affect local, national, and global environments. Likewise, new findings are emerging about the origin of biomineralization and of sponges (that improved water quality at the dawn of animal life) from **Jay Kaufman** from his Fulbright Global Scholar travels last year. These highlights are but a few of the wide range of research topics and successes of our faculty and students over the last several years.

The Geology Department has also teamed up with other units across campus to address societal issues related to energy, climate, and weather impacts through two of the University Grand Challenge Grants. The departments of Geology, AOSC (Atmospheric and Oceanic Sciences),

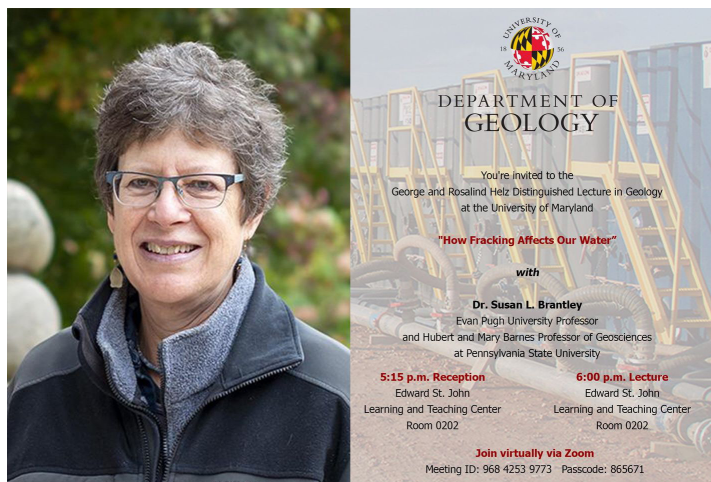
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## HELZ LECTURE SERIES

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### About the Talk

Development of drilling into horizontal layers of gas-containing shale, followed by high-pressure high-volume hydraulic fracturing (fracking) has ushered in a new era of energy development in the USA. At the same time, like older hydrocarbon-extraction industries, shale-gas development has resulted in some water quality impacts. In the mid-2000s, public outcry about “fracking” reached a fever pitch whereas today, the pushback continues but is more muted. In this talk I will look at what has been learned over the last decade and a half about water impacts related to shale development and fracking, including case studies at individual field sites as well as broader state-wide or national investigations. Most of my work has focused on Pennsylvania, a state with the longest history of commercial hydrocarbon extraction in the world, but we

also have extended to national analyses. As concluded by others, the frequency of impact is low compared to the number of shale gas wells. But several studies have shown evidence for some health impacts for residents living near shale-gas wells. Government, academic, and industry entities must work more closely with communities to provide and publicize water quality data to document impacts more accurately and to understand case examples of contamination affecting residents or businesses. Only with such approaches will we enable the public to make decisions about the “social license” for the industry or enable decision-makers to provide guidance for this highly distributed industry.

### About the Speaker

**Dr. Susan L. Brantley** is Evan Pugh University Professor and Hubert and Mary Barnes Professor of Geosciences at Pennsylvania State University, where she also served as Director of the Earth and Environmental Systems Institute from 2003 to 2022. As a geochemist, Dr. Brantley focuses on understanding what controls the chemistry of natural water and how water interacts with the rocks through which it flows. Her recent work has focused on measuring and modeling how rock turns into soil as well as environmental impacts related to the use of hydraulic fracturing (“fracking”) in natural gas and oil extraction. In studying the effects of fracking in Pennsylvania, she also worked with citizen scientists and watershed groups to understand community concerns. Dr. Brantley has published almost 300 refereed journal articles. She was appointed by President Barack Obama to serve as a member of the Nuclear Waste Technical Review Board in 2012. In that position, which she held until 2021, she worked to advise the USA on developing solutions for disposal of nuclear waste. In 2012, she was elected as a member of the U.S. National Academy of Sciences, and in 2022, as a foreign member of the French Academy of Sciences. She lives with her husband in State College Pennsylvania, and watches from afar the development of her two daughters, both geoscientists living in Minneapolis, MN.

### About the Lecture Series

**George R. and Rosalind Helz** established the George and Rosalind Helz Distinguished Lecture in Geology in 2014 to allow the UMD Department of Geology to host world leaders in science for one or a series of lectures. While George Helz spent his career in UMD's Department of Chemistry and Biochemistry, he greatly enriched the geology program by collaborating with geologists on a variety of scientific projects and student advisement. Many of the Department of Geology's faculty have also had the pleasure of collaborating with Rosalind Helz, most notably in studies on rocks from Hawaii. Rosalind Helz spent most of her career at the U.S. Geological Survey in Reston, Va.



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## 50TH ANNIVERSARY CELEBRATION

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You are cordially invited to the  
**Department of Geology's  
50th Anniversary Celebration**

**Saturday, October 7, 2023**



9-11:30 a.m. Field Trip (meet at Geology Building)  
11:30 a.m.-2 p.m. Explore Downtown College Park for Lunch  
2-5:30 p.m. Lab and Museum Tours (multiple campus buildings)  
6-7 p.m. Welcome Reception  
7-10 p.m. Dinner

**(Samuel Riggs IV Alumni Center, 7801 Alumni Drive, College Park, MD 20742)**

**RSVP by 9/21 and receive a 50th Anniversary t-shirt**

As UMD's Department of Geology completes its 50th year since its inception, we will recognize this milestone by hosting a day full of fun events. Join your fellow classmates, current students, faculty and staff members, and founding faculty members to share stories, get reacquainted, and make new memories. Spouses, partners and children are invited and encouraged to attend. All alumni are invited to share their experiences from their time at UMD and beyond.

For more information, scan the QR code above, visit [www.geol.umd.edu/50th](http://www.geol.umd.edu/50th), or contact **Phil Piccoli** at [piccoli@umd.edu](mailto:piccoli@umd.edu) or 301-405-6966.

**Sarah Penniston-Dorland, Phil Piccoli and Rich Walker** (The 50th Anniversary Planning Committee)





# HELZ LECTURE SERIES

## (CONTINUED)

### April 2024 Helz Lecturer

**Andrew H. Knoll**, the Fisher Professor of Natural Sciences at Harvard University and recent recipient of the Crafoord Prize of the Swedish Academy of Sciences (the highest honor bestowed on a geoscientist worldwide) will be the Helz Lecturer on Thursday, April 4, 2024 in the Edward St. John auditorium room 2208. Knoll is best known for his contributions to Precambrian paleontology and biogeochemistry, and for his leadership on the science team for NASA's MER rover mission to Mars. His lecture, titled **The Deep History of Life** will focus on the 85% of life's history before the familiar world of plants and animals emerged.

For more information, contact **Jay Kaufman** at [kaufman@umd.edu](mailto:kaufman@umd.edu).



Geobiologist Andrew H. Knoll speaking at NASA panel on the origin of hematite blueberries on Mars. He is wearing two watches to keep up with Earth and Mars time simultaneously.

James Farquhar collecting air in Tedlar bags along I-95 for methane extraction and isotopic characterization in the Panorama Laboratory at UMD.

## LETTER FROM THE CHAIR

### (CONTINUED)

Geographical Sciences and MEES (Marine-Estuarine Environmental Sciences) are part of an institutional Grand Challenge Grant led by Distinguished University Professor **Ellen Williams** (<https://research.umd.edu/climatechallenges>) of the Earth System Science Interdisciplinary Center (ESSIC). This Grand Challenge research will work toward building a combination of learning programs for undergraduates through experiential learning, and research focusing on themes related to extreme weather, agriculture and sustainability as well as air/water quality. The second Grand Challenge grant (<https://research.umd.edu/methane>) is a multi-PI effort led by **Dan Lathrop** (joint with Physics, IPST, and IREAP) that spans three colleges (CMNS, AGNR, & BSOS) and

focuses on studies of energy, water quality, and the greenhouse gas methane on campus and across the state of Maryland. This broad range of activities promises to keep our Geology Department active and vibrant in these societally important areas of research and education into the foreseeable future.

A few additional success stories since the last Geogram that I am excited to report include: **Mike Brown** who became an AGU Fellow; our continuation of Fulbright Foundation grant success by **Laurent Montesi**; an NSF Career Award to **Megan Newcombe**; and the Royal Society Wolfson Visiting Fellow to **Mike Evans** supporting his sabbatical year. Most recently, **Mong-Han Huang** was promoted to Associate Professor and **Vedran Lekic** was promoted to Professor.

We have had a particularly strong showing by our students and Post-doctoral scholars with Fellowships from NSF (**Hannah Udell**, **Dottin**, **Haghnegahdar**, and **Hoover**), DOE (**Moyer**), NASA (**Peterson**, **Andrews**,

**Desikamani**, and **Varah-Sikes**). Finally, Geology Department Emerita and alumna continue to be recognized with new awards of the Geochemical Society's VM Goldschmidt Medal (past Chair **Roberta Rudnick**), the John Hayes Award (**Boswell Wing**), the Shen-su Sun Award (**Xiao-Ming Liu**) and the AGU Hisashi Kuno Award (**Andrea Mundl-Petermeier**). I will cap off this successful string of accomplishments by one final recognition that included both students and faculty, the Information Sciences invention of the Year award 2022 to **Dan Lathrop**, **Vedran Lekic**, and **Heidi Myers** who were recognized for their development of a drone-based geophysical and environmental detection system for the identification of land mines.

In closing, it is a pleasure to be able to report on our Departmental activities and accomplishments. I hope to see everyone this fall at the 50th Anniversary Reunion.

A handwritten signature in black ink, likely belonging to the author of the letter.

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# NEW MAJOR TRACK IN EARTH & ENVIRONMENTAL SCIENCES

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An exciting change is coming to Geology's undergraduate curriculum starting this fall - a new major track in Earth and Environmental Sciences. The new track is intended to broaden the utility of the Geology major to address the needs of a wider range of students.

Most Geology majors are enrolled in the Geology Professional Track. This track is specifically meant for people who are planning to enter core geosciences professions or go on to graduate programs in geosciences. In contrast, the Earth and Environmental Sciences Track will address the needs of students who may not be following those pathways but who plan to enter professions where knowledge of geology is foundational, including secondary education, scientific journalism, urban planning, and various elements of public policy. As a result, the new track will place slightly less emphasis on the geology coursework necessary for graduate school or geoscientist industries, and more emphasis on experiential learning, including internships, and coursework in related fields. The track replaces our old Secondary Education Track while continuing to fulfill its functions. Remember, although someone who completes it might possibly pursue a career in geology or enter grad school in geology, the new track is \*not\* intended to prepare the student for that.



A past view to the Geology Building from the welcoming M circle on Campus Drive, which has now been relocated to accommodate the METRO Purple Line currently under construction.

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## IDEA (INCLUSION, DIVERSITY AND EQUITY AWARENESS)

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Our nation and state face many problems associated with climate change, land management, and scarcity of water, mineral, and other resources. These issues can be best addressed by a diverse group of people that can bring different perspectives to these problems. Maryland has a diverse population as does the nation as a whole. The 2020 census indicates Maryland's population is 50% white, 30% Black, 11% Hispanic, and 7% Asian. We have similar numbers of college-age men and women. To serve the state and our nation effectively, we would like to train future Geologists, Geophysicists, Planetary Scientists, and Environmental Geoscientists that are representative of our entire population. Since the founding of the Department in 1973, the proportion of female undergraduate and graduate students has increased significantly; we currently have slightly more than 50% women in our undergraduate and graduate programs. The Geosciences in general have been less successful at recruiting Black, Hispanic, and Asian students into related programs. It is important that the members of our department are concerned that people in our department and the communities that we serve are treated fairly and appropriately. To work on these issues, the Department formed the IDEA Committee to work on building a more inclusive culture, to learn to identify the challenges of diversification and social justice, to communicate and mentor effectively, and to promote engagement across career levels and underserved groups.



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## NEW FACULTY HIGHLIGHT

### MENGQIANG “MIKE” ZHU

By  
MIKE ZHU AND JAY KAUFMAN

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**Mengqiang “Mike” Zhu** is our newest faculty member having joined the UMD Department of Geology as an Associate Professor in July 2023. Previously he had been a faculty member for 10 years at the University of Wyoming. Born in China, Mike started his journey in the USA as a Ph.D. graduate student at the University of Delaware where he obtained his Ph.D. degree in Environmental Soil Chemistry in 2010. His academic path continued to a three-year post-doctoral research at Lawrence Berkeley National Laboratory and the University of California – Berkeley before he took the Wyoming position. Mike and his wife, **Chunyan Yang**, a former Associate Professor at UC-Berkeley, reached a confluence here at UMD uniting their family. Chunyan is currently an Associate Professor in the UMD College of Education. Moving from the west to east coast – particularly to the dynamic and culturally diverse DC area – the family has been enjoying the new life style, and enjoying meeting new friends and colleagues.



Biogeochemist Mengqiang “Mike” Zhu.

Mike specializes in the biogeochemistry of terrestrial ecosystems on modern Earth, specifically soils. Soils are the skin of Earth and the core component of Earth’s critical zone, which extends from the top of the vegetation canopy to the base of the water table beneath our feet, a horizon where rocks meet and interact with life. Soils play critical roles in sustaining nearly all life forms, including human being and civilization. Mike focuses his research on cycling of carbon, nutrients (P and S) and trace elements in soils, as well as the geochemistry of soil minerals in both natural and managed ecosystems. His research is aimed at addressing how biogeochemical processes and environmental factors, such as climate, combine to regulate elemental cycles, and how the improved understanding can assist in developing solutions to climatic and other environmental changes. To address these questions, Mike collects soil samples that span across environmental gradients ranging from local watersheds to continental-scale observatory networks that cover diverse ecoclimatic domains. These include rainfall gradients in the Hawaiian Islands, weathering gradients in Arizona and New Zealand, and soil textural gradients in the deserts of New Mexico. He is also interested in how environmental changes disturb biogeochemical cycles and is initiating projects examining effects of wildfires on soil biogeochemistry. Zhu is also actively looking for opportunities and collaborations to address Maryland-related environmental issues, such as those caused by sea-level rise in the Chesapeake Bay region.



Biogeochemist Mengqiang “Mike” Zhu installing dust collectors in fall 2022 in the Jornada Basin, New Mexico, to evaluate the effect of aeolian dust deposition on soil biogeochemistry.

Mike applies a wide variety of state-of-the-art analytical techniques to his research. He is a veteran user of various techniques based on synchrotron X-rays. He frequently travels with his students and post-docs to Department of Energy-supported national labs, which house synchrotron X-ray beamlines, including Stanford Synchrotron Radiation Lightsource, Argonne National Laboratory, and Brookhaven National Laboratory, as well as Canadian Light Source. Recently, his lab started to use Fourier Transform ion cyclotron resonance mass spectrometry (FT-ICR-MS), a relatively new technique with an ultra-high resolution at the National High Magnetic Field Laboratory. The techniques provide rich and

unprecedented information about chemical forms of elements critical to our understanding of elemental cycles. These techniques will become even more powerful if combined with isotopic techniques on which the UMD Department of Geology has renown expertise.

As a teacher with 10-year experience, Mike has taught a variety of courses in environmental science and biogeochemistry related to soil and water at both undergraduate and graduate levels. He will be teaching Introductory Geology in spring 2024, and likely a low-temperature geochemistry-related course in fall 2024. He also plans to develop courses about Earth's critical zone, which can be in line with the new Earth and Environmental Science track in the Department of Geology (see page 5 for details).

Mike has been enjoying mentoring students at different levels, from high school students to Ph.D. students to post-doc and visiting scholars. He appreciates his mentees for the work they have done and their contributions to his own career development. His mentees are currently working as researchers in national labs, government agencies, and private companies.



Biogeochemist Mengqiang "Mike" Zhu with Chunyan Yang (College of Education) and their sons Calvin, Owen, and Levin.

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## UNDERGRADUATE STUDENT HIGHLIGHT

**CAERWYN HARTTEN**

By  
KAREN PRESTEGAARD

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**Caerwyn Hartten** (class of 2021) is a second generation UMD Geology Graduate. Both of her parents, **Andrew Hartten** and **Kathy Davis**, graduated from the Department in 1986. She was raised in Delaware, where she enjoyed the ocean and observed the damage caused by coastal flooding and erosion. She pursued her interests in the impacts of sea-level rise, climate change, and urbanization on coastal watersheds in her senior thesis: "High Water Levels Generated by Rivers, Tides and Storm Surges in the Anacostia River Upper Estuary". Due



Caerwyn Hartten at field camp in Zion Canyon, Utah, summer 2021 (inset: Andrew Hartten on a field trip in 1986)

to the Covid-19 pandemic, Caerwyn conducted her entire research project while meeting remotely with her thesis advisor, **Dr. Karen Prestegaard**. She presented results of her senior thesis research at the 2021 AGU Fall Meeting.

In the summer of 2021, Caerwyn went to field camp in Utah with Southern Utah University. Although she greatly enjoyed the geology of the Western states, she came back to Maryland to work as a PREP research fellow for the Hurricane Maria Project with the NIST Engineering Lab. This project integrates both social science research with environmental risk analysis. In the Fall of 2022, Caerwyn continued to work for NIST, but she used her expertise in working remotely to move her home base to Colorado and explore more of Western U.S. She plans to continue her work on natural disaster risk, resilience, and mitigation and is currently pursuing an M.S. degree at the University of Denver in Environmental Sciences to further her career. Caerwyn and her parents agree that the senior thesis program played an important role in preparing them for their future careers. Caerwyn's parents also noted some significant changes in the geology program since 1986, such as the expansion of research into geochemistry, geophysics, and planetary sciences, and the large increase in the number of female students.



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# GRADUATE STUDENT HIGHLIGHT

**BEN FARCY**

By

RICARDO AREVALO AND BILL McDONOUGH

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## The Tenacious Scientist

**Benjamin Jacob Farcy** (aka Ben) is one of the most determined students our department has ever encountered. In the face of extraordinary adversity, Ben's resilience, passion, and persistence have been unmatched in our view. During Ben's tenure, our nation has endured a global health pandemic that prompted a complete economic shutdown, a second pandemic of hate crimes targeting underrepresented members of our community, and an unprecedented attack on democracy and the US Capitol. Despite all of these tragedies (and more...), Ben and his Covid classmates managed to persevere their research programs. Ben earned his Ph.D. in fall 2021.

Ben came to UMD following a Master's degree in geology at the University of Southern Illinois, and a two-year stint at NASA Goddard Space Flight Center (GSFC). At GSFC, Ben provided technical support for the SPace Environmental and Composition Investigation near the European Surface (SPECIES) investigation that was proposed for the Europa Clipper mission. Although he enjoyed the challenges of advancing spaceflight technology for planetary exploration, he quickly discovered the internal drive to become a Principal Investigator, leading him to apply to UMD and work towards a Ph.D. He was bound and determined to come to the Department of Geology and enjoy the benefits of co-supervision (the writers of this letter). [I'm not sure if he or us were the crazy ones with this idea.] Nonetheless, our adventure began some four years ago.

Ben and Ricardo Arevalo transitioned to UMD together, both having come from GSFC. For Rick, it was a return to his alma mater after eight years of "learning abroad" (7.1 miles down Greenbelt Road)



**Ben Farcy of the M-CLASS  
(Measurement of Composition  
via Laser Ablation Sampling and  
Spectrometry) Laboratory**

and cultivating a taste for instrument development. For Rick and Ben, who clearly caught the NASA bug, it was easy goings. Bill, however, had no idea what they were talking about given every one of their sentences contained multiple NASA TLAs (three letter acronyms)! [If you are not familiar with it, NASA speak can be completely opaque to the normal human.]

Ben has always maintained a very keen interest in understanding the distribution of heat producing elements (potassium, thorium, and uranium) in the Earth and the Moon. These elements provide energy from their decay that ultimately drives the dynamics of the planet (e.g., volcanism, plate tectonics, the earth's dynamo). Ben's first published paper looked back at a decade old study led by Rick and Bill that was recently challenged in the literature. Here we see the persistence of Ben. The reviews from Nature were scathing coupled with a decision of rejection. Ben addressed the reviewers' comments and later prepared the paper for where it was ultimately published in the Journal of Geophysical Research.

Shortly after Ben arrived at UMD, so too did a big grant from NASA: \$1.2M to build a prototype, miniaturized mass spectrometer. Did Ben have a background in building mass spectrometers? No, but how hard could it be? He found out that it is challenging. However, over the course of the next few years, Ben almost single-handedly produced a low power, low gas

guzzler, mass spectrometer that we hope to see analyzing rocks on the Moon in the next decade.

The prototype instrument, an inductively coupled plasma mass spectrometer (ICPMS), is comparable to the commercial instrument Rick worked on for his Ph.D. in the Plasma Lab in the Department of Geology. However, the commercial system takes up about 75 ft.<sup>3</sup>, weighs half a ton, consumes 16 L per minute of argon gas, and requires an enormous amount of power to generate a 1400-watt plasma. Ben's task was to make it something that could fit on a small spacecraft and ultimately fly to the moon.

Ben's doggedness served him again when he submitted his first paper on the development of the prototype mass spectrometer. Here, he accomplished the Herculean task of demonstrating the performance of a plasma that uses only 1% of the amount of gas and power required to drive the commercial instrument. The reviewers were skeptical. However, in the end Ben's data carried the day and the paper was published.

Ben met the challenges of isolation from the lab caused by the COVID pandemic by seeing an opportunity to write another paper. With steadfast resolution, he was ready to get this prototype instrument onto a space mission. This meant writing a paper that specifically identified locations on the moon and scientific targets to address with his prototype ICPMS. He proposed four landing sites and a suite of geochemical proxies that could be accessed by the miniature ICPMS and answer outstanding science questions posed by the lunar community. With this paper he pushed his dream of this prototype instrument working on the moon.

The performance of the prototype so much impressed NASA reviewers that we have just been given the go ahead on a follow-on grant (\$3.2M) to ruggedize the prototype for the vibration, shock, and thermal extremes associated with launch, deployment, and operations on the lunar surface. We are lucky to keep Ben as a postdoc on this next project. His expertise is invaluable to our team.



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## ALUMNI SPOTLIGHT

### EMMA McCONVILLE

By  
PHIL PICCOLI

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#### Making Really Good Lemonade

At some point during 2012, a prospective student walked the halls of the Geology Building looking for a change, looking for a place to call home. As she gleaned at one of the posters that lined the halls, Phil Candela approached and asked if she had questions. She did not. When Phil returned twenty minutes later and asked the same question, she had a different response: “Would the Department consider accepting a student who had no significant background in science?” And with that Emma McConville found herself in a lab at a table with Phil Candela and Phil Piccoli asking and answering questions about life experiences and geology. Emma explained that because of her father’s job, she travelled the world and lived in a variety of foreign destinations. One of those, Chile, made a life-long impact on her. While there, she visited a geothermal plant in the El Tatio near San Pedro de Atacama, and at that point Emma realized she wanted to “run a geothermal plant.” Emma enrolled in Geology.

Emma came to Maryland from Claremont McKenna College and with degrees in Economics, and Philosophy, Politics, and Economics. She found herself immersed in a curriculum that brought her up to speed in the sciences. While at Maryland, she was involved in a variety of activities including being a mentor for Girls Excelling in Math and Science (GEMS), and participated in the Geothermal Energy Academy at the University of Nevada-Reno, GEA International Geothermal Showcase, the U.S. State Department- GEA Geothermal Best Practices for Risk Reduction Workshop, DOE/EERE Clean Energy Workforce Workshop, and U.S. DOE Workshop on Subsurface Technology and Engineering.



Alumna Emma McConville, currently the Development Geoscience Lead at Fervo Energy pictured in Zion National Park, is designing geothermal projects in Nevada and Utah

Emma completed a Senior Thesis on the Evolution of the Karaha-Telaga Bodas Geothermal System based on the Composition of Alteration Minerals under the direction of Phil Candela, Phil Piccoli and Joe Moore (University of Utah). Emma was the student graduation speaker in the Fall of 2015. The following summer, she performed research at the Yellowstone Volcano Observatory under the direction of Jake Lowenstern of the USGS. From there, she went on to pursue a M.S. degree at the University of Nevada-Reno, under the direction of Jim Faulds, the State Geologist at the time. She quickly found herself in Houston working for Exxon drilling wells and characterizing

an oil prospect off the coast of Guyana. She continued that work for three years until COVID had its impact on the oil industry, and she, like many others, received walking papers. That misfortune quickly changed, and she was hired as a Development Geologist by Fervo Energy, a young Houston startup. Today she is the Development Geoscience Lead overseeing the design of two geothermal projects in Nevada and Utah: at home doing what she always wanted to do.

The last part of this journey was chronicled in a piece in the New York Times Energy and the Environment section this past Spring.



bed is proving to contain the most numerous collection of dinosaur fossils in North America east of the Mississippi, so it affords a great learning experience for our students. Here is Dr. Holtz with students from his Spring 2023 GEOL 102 Historical Geology class.

The Arundel Clay (Lower Cretaceous) of Maryland has produced important fossil discoveries since the 1850s, including Maryland's State Dinosaur, *Astrodon johnsoni*. In Spring 2023 a bone bed with multiple dinosaur species was uncovered at Dinosaur Park in Laurel. Dr. Thomas Holtz has been a consultant for the Park since its conception. This bone

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# RECOGNITION & AWARDS

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## Faculty & Staff

**Professor Mike Brown:** American Geophysical Union Fellow

**Professor Jay Kaufman:** CMNS Board of Visitors Creative Educator Award

**Distinguished University Professor Richard Walker:** Election to the National Academy of Sciences and the American Academy of Arts and Sciences

**Assistant Professor Megan Newcombe:** NSF Faculty Early Career Development (CAREER) Award

**Professors Daniel Lathrop and Vedran Lekic (with Heidi Myers):** UMD Information Sciences Invention of the Year Award

**Professor Laurent Montesi:** Fulbright Foundation Award

**Assistant Professor Mong-Han Huang:** Promotion to Associate Professor

**Associate Professor Vedran Lekic:** Promotion to Professor

**Professor Jessica Sunshine:** Member of Geology Department as a joint appointment with the Astronomy Department

## Graduate Students and Post-Doctoral Fellows

**Jiayang Sun and Carly Maas:** Green Fellowship in Global Climate Change Award

**Lori Willhite:** Amelia Earhart Fellowship Award from Zonta International

**Heidi Myers:** Department of Defense National Defense Science and Engineering Graduate Program Fellow.

**Madeline Raith:** Young Scientist Program researcher at the Blue Marble Space Institute of Science

**Mojhgan Haghnegahdar:** Post-doctoral Fellowship from the National Science Foundation

**Ashley Hanna:** Graduate Research Fellowship from the National Science Foundation

**Liam Peterson:** Graduate School Outstanding Research Assistant Award, and 2022 Geology Best PhD post-candidacy presentation

**Aisha Khatib:** Stephen E. Dworkin Planetary Geoscience Graduate Poster honorable mention at the 53rd Lunar and Planetary Science Conference

**Casey Braccia:** NASA Exploration Science Forum Student Poster Award, and 2022 Geology Best MS presentation

**Amelia Lindsay-Kaufman:** (Pre- and Post-Candidacy) Graduate School Three-Minute Thesis Competition Awards, and 2022 Geology Best PhD pre-candidacy presentation

**Sourabh Shubham:** Kulkarni Foundation Summer Research Fellowship

**Kathrine Udell Lopez:** SESYNC Dr. Richard Payne Graduate Fellowship

**Lucas Andrews, Sumedha Desikamani and Cosmo Varah-Sikes:** NASA FINESST Awards

**Katheryn Gansler:** Best Student Poster (3rd place) at NASA NESF Conference, and Geology Outreach Award

## Alumni

**Dr. Ben Farcy (Ph.D. 2021):** Outstanding Research Assistant Award from the Graduate School

**Dr. Samuel Crossley (Ph.D. 2021):** Lunar and Planetary Institute Career Development Award

**Professor Ming Tang (Ph.D. 2016):** European Association of Geochemistry's Houtermans Award

**Dr. Andrea Mundl-Petermeier (2015-18 Post-doctoral Fellow):** American Geophysical Union Hisashi Kuno Award

**Professor Jingao Liu (Ph.D. 2011):** Goldschmidt Conference Shen-su Sun Award

**Dr. Laura Sammon (Ph.D. 2022):** Ann G. Wylie Fellowship Award, and 2022 Geology graduate student Best Paper Award

**Assistant Professor James Dottin (Ph.D. 2020) and William Hoover (Ph.D. 2021):** NSF Post-doctoral Fellowships

**Professor Boswell Wing (2001-2005 Post-doctoral Fellow):** Geochemical Society John Hayes Award

**Professor Alan Brandon (1997-1999 Post-doctoral Fellow):** International Association of Geochemists Ingerson International Lecturer

**Professor Xiao-Ming Liu (Ph.D. 2012):** GSA Mineralogy Geochemistry Petrology and Volcanology section Young Scientist Award

**Distinguished University Professor (Emerita) and former Chair Roberta Rudnick:** Geochemical Society V.M. Goldschmidt Medal



# CONGRATULATIONS TO OUR RECENT GRADUATES!

## Doctoral Graduates

**Ernest Bell.** Geophysical Exploration of Terrestrial and Lunar Volcanic Fields, *Advisor: Schmerr*, Summer 2021.

**Samuel Crossley.** Geochemical and Spectral Characteristics of Oxidized Planetary Differentiation, *Advisors: Sunshine, Ash*, Fall 2021.

**Benjamin Farcy.** A Prototype Miniature Mass Spectrometer for In Situ Analysis of Trace Elements on Planetary Surfaces, *Advisors: Arevalo, McDonough*, Fall 2021.

**Joseph Galella.** Mobilization of Chemical Cocktails by Freshwater Salinization Syndrome in the Chesapeake Bay Watershed, *Advisor: Kaushal*, Spring 2023.

**Goeun Ha.** Thermal Control on the Location of the Volcanic Arc at Subduction Zones, *Advisors: Montesi, Zhu*, Spring 2023.

**William Hoover.** Characterizing the Duration, Periodicity and Chemical Impact of Fluid Transport in the Subducting Slab: Insights from Isotope Geochemistry of High-Pressure Metamorphosed Oceanic Crust, *Advisor: Penniston-Dorland*, Summer 2021.

**Ziqin (Grace) Ni.** Chemical Signatures of Life via Mass Spectrometry, *Advisor: Arevalo*, Summer 2023.

**Karen Pearson.** Analyzing Time-Varying Seismicity and Aftershock Behavior in Central and Eastern United States, *Advisor: Lekic*, Fall 2021.

**Laura Sammon.** Radiogenic Heat Production and the Composition of the Deep Continental Crust, *Advisor: McDonough*, Spring 2022.

## Masters Graduates

**Kiran Almas.** Rb-Sr Radiometric Dating of Rocky Planetary Bodies via LA-ICPMS, *Advisor: Arevalo*, Summer 2021.

**Emily Chiappe.** Genetics, Ages, and Chemical Compositions of the Group IIIIE Iron Meteorites and the Iron Meteorite Lieksa, *Advisor: Walker*, Fall 2022.

**Kathryn Franklin.** Assessing Fault Slip Hazard in Taiwan Using Space Geodesy, *Advisor: Huang*, Summer 2022.

**Sandy Herho.** No Change in ENSO Hydroclimate Variability after the Industrial Revolution as Recorded in  $\delta^{18}O$  of *Tectona grandis* L.f. from Southeast Sulawesi, Indonesia, *Advisor: Evans*, Summer 2023.

**Carly Maas.** Freshwater Salinization Syndrome Limits Management Efforts to Improve Water Quality, *Advisor: Kaushal*, Fall 2022.

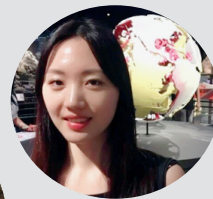
**Joseph Malin.** Longitudinal Stream Synoptic (LSS) Monitoring to Evaluate Water Quality in Restored Streams, *Advisor: Kaushal*, Fall 2023.

**Silvia Castilla Montagut.** Rapid destabilization of deep, superhydrous magma prior to the largest known Plinian eruption of Cerro Machin volcano, Colombia, *Advisor: Newcombe*, Fall 2022.

**Rumya Ravi.** Deciphering Core Records of Carbon and Nitrogen in Typha-Dominated Freshwater Wetlands, *Advisor: Prestegard*, Summer 2022.

**Alexander Taylor.** The Metamorphic History of a Subducted Slab: New Insights from the Catalina Schist, *Advisor: Penniston-Dorland*, Spring 2023.

**Edward Williams.** Deformation and Failure of Lunar Lava Tubes, *Advisor: Montesi*, Summer 2021.



## The Origin of the Geology Senior Thesis Experience

### GEOL 194: RESEARCH PROBLEMS IN GEOLOGY: 1

First and second semester. Open only to geology majors in their final year. The student will select and investigate with departmental assistance a specific library, laboratory, or field study. A written and oral presentation of the study will determine satisfactory completion of the course. (Staff)

(From an early 1970s UMD Course Catalog)

How far it has come! The Department of Geology senior thesis program, coordinated by **Phil Piccoli** since 2017, has been a fixture of the Department of Geology since 1972. Students now deliver four presentations (three oral: one poster) to the department community. This long-established program started fifty years ago and continues to be used as a model of success across campus. We wish each of our departing students – our newest alumni! – the best of luck in their future endeavors. Not even COVID could slow these students down.

### 2021 Spring

**Walter Boger** High Frequency Sampling of the Campus Creek RSC. (Advisors: Kaushal, Reimer); **Alex Bollinger** Flood wave characteristics and sediment transport during storm events at a channel confluence of the Anacostia River. (Advisor: Prestegard); **Jordan Croll** Influence of regional stress field on vent alignment in monogenetic volcanic fields. (Advisors: Montesi, Richardson); **Kendal Grubb** Comparing Changes in Meltwater Accumulation to Glacial Flow in Northwest Greenland. (Advisors: Huang, Schmerr); **Caerwyn Hartten** High Water Levels Generated by Rivers, Tides and Storm Surges in the Anacostia River Upper Estuary. (Advisor: Prestegard); **Sam Hommel** Data Modelling of Marine Paleoclimate Observations for Reconstructing El Niño. (Advisor: Evans); **Braden Lense** Siderophile Element Concentrations and Os Isotopic Compositions Applied to Tracing the Origins of Gold Nuggets. (Advisors: Walker, Ash); **Bill Li** Relationships between dissolved organic carbon, iron and manganese concentrations in the Susquehanna, Patuxent, and Potomac Rivers. (Advisor: Kaushal); **Justus McMillan** Redox geochemistry of the Riddlesburg Shale Member, Rockwell Formation: Trace metal enrichment in seawater and sediments following basal Carboniferous glaciation. (Advisors: Kaufman, Gilleaudeau [GMU]); **Alexis Yaculak** A Longitudinal Study of Redox Sensitive Elements Along a Regenerative Stormwater Conveyance (RSC) System. (Advisors: Kaushal, Reimer).

### Fall 2021

**Abigail Brodsky** Fluid or flop? Investigating the metasomatism at North Doherty pluton (Advisor: Penniston-Dorland); **MaKayla Etheredge** Estimating Magma Decompression Rates of the 3600 yr. BP Plinian Eruption of Cerro Machin Volcano, Colombia. (Advisors: Newcombe, Montagut); **Jeremy Kardon** Crystal Size Distribution (CSD) Analysis Comparison of the Equigranular and Porphyritic Domains of the Half Dome Pluton, Yosemite National Park. (Advisor: Piccoli); **Matthew Kraham** Deposition of Fine and Coarse Grain Sediments Along Two Reaches of the Northwest Branch Anacostia River. (Advisor: Prestegard); **Joseph Malin** Relationship Between Longitudinal and Temporal Streamwater Chemistry Across Streams. (Advisor: Kaushal and Maas).

### Spring 2022

**Tytrice Faison** Investigation of Siderophile Behavior and Tungsten Systematics in Ordinary Chondrites. (Advisor: Ash); **Julianne Farnham** Impact of water level on methane emission in wetlands. (Advisors: Haghnegahdar, Evans); **Alexander Lastner** Investigating Controls on Stream Temperatures in a Small Watershed. (Advisor: Prestegard); **Brendan Shimizu** Systematics of Fine Detail Fossil Preservation: An Elemental Analysis. (Advisors: Holtz, Ash); **Nicole Smith** Exploring the Environmental Tolerance of Pteridosperms. (Advisor: Thomas Holtz); **Sophia Zipparo** Strain Analysis of Ridges on Europa. (Advisors: Montesi, Howell [JPL], Nunez).

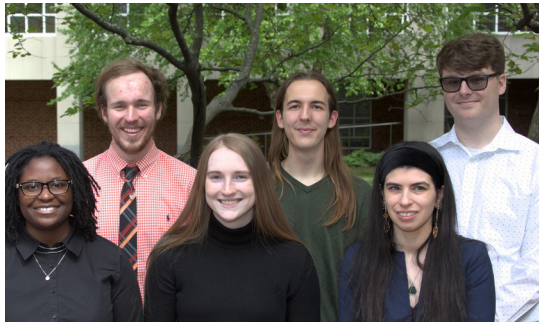
### Fall 2022

**Ayomide Ajayi** What does water in quartz tell us about volcanic processes? (Advisors: Newcombe, Castilla).

### Spring 2023

**Andrew Doerrler** Redox Conditions of Late Neoproterozoic and Early Cambrian Lagerstätten. (Advisor: Kaufman); **Austin Hoyle** A Seismic Reflection Analysis in the San Francisco Volcano Field, AZ. (Advisors: Schmerr, Lekic); **Bennett Kellmayer** Triggered Fault Slip by the 2017 Mw 7.3 Iran-Iraq Earthquake. (Advisor: Huang); **Olayinka Koso-Thomas** Enhanced Compaction of Porous Sandstone Deformed Under High Confining and Pore Fluid Pressures. (Advisors: Zhu, Zega); **Siobhan Light** Using Single Station Seismology to Determine the Structure Beneath the Ross Ice Shelf, Antarctica. (Advisor: Schmerr); **Matthew Pedersen** Decoupling of Carbon and Uranium Isotope Anomalies in Neoproterozoic Carbonates. (Advisor: Kaufman); **Madeline Raith** Mineralogical Effects on Organic Detectability in Mars Analog Sediments. (Advisors: Arevalo, Thorpe, Hanna).





Spring 2023 Senior Thesis graduates (l-r): Olayinka Koso-Thomas, Matthew Pedersen, Madeline Raith, Andrew Doerrler, Siobhan Light, and Bennett Kellmayer.



Spring 2022 Senior Thesis graduates (l-r): Nicole Smith, Alex Lastner, Tytrice Faison, Julianne Farnham, Sophia Zipparo, Brendan Shimizu.

**Marc Lipella** graduated with a degree in Geology in 2004 having completed a senior thesis with **Roberta Rudnick, William McDonough, Richard Ash** and **Phil Piccoli**. He subsequently worked as a research assistant at the National Museum of Natural History at the Smithsonian Institution while he also pursued his love of music as lead guitarist in the group Zen Black. Tragically, Marc passed away in September of 2011 and his parents have set up a foundation in his honor to provide scholarships to worthy Geology students.

AY 23: **Kathryn Bickerstaff, Austin Hoyle, Andrew Simat**

AY 22: **Ayomide Ajayi, Tytrice Faison, Alexander Lastner, Brendan Shimizu**

AY 21: **Andrew Doerrler, Julianne Farnham, Joseph Malin, Adam Margolis, Madeline Raith, Sophia Zipparo**

## Thank you to our annual fund donors!

We are grateful for the generosity and continued commitment of our donors during the past several years, and we salute those of you who make annual gifts to support the department. We acknowledge the importance of each contribution in support of our education and research missions. Making available opportunities for students to be involved in the excitement of advancing knowledge is critical to the development of the next generation of scientists who will solve problems of societal relevance. In addition, for many of our undergraduates our ability to help with the costs of field camp and senior thesis research is critical to their success.

Your generosity benefits our students in many ways. Therefore, once again, we ask for your support. Tax-deductible gifts to the department can be made online through the UMCP Foundation website:

Enter <https://www.geol.umd.edu/departement/contribute.php> in your browser's address field to be taken directly to the Geology Department's gift giving site. If you are writing a check, please be sure to include "Geology Department (and information where gift should be allocated)" in the notes section.

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**Front Row, (l-r):** Philip Piccoli, Richard Walker, Nicholas Schmerr, Jay Kaufman, John Merck, Tracey Centorbi, Michael Brown, Thomas Holtz, James Farquhar, Karen Prestegaard, William McDonough, Mong-Han Huang, Richard Ash, Megan Newcombe, Sarah Penniston-Dorland (with Otis), Daniel Lathrop, Sujay Kaushal

**Second Row, (l-r):** Sandy Herho, Yuval Ravinsky-Gray, Jenna Wollney, Kathryn Gansler, Ashley Hanna, Christiana Hoff, Kathrine Udell Lopez, John Harris, Goeun Ha, Emily Chiappe, Lori Willhite (with Izzy), Megan Perry, Karla Nunez, Linden Wike, Edward Williams, Sourabh Shubham, Mariam Nasseem, Sumedha Desikamani, Heidi Myers, Sydney Shelton, Alexander Taylor, Elaine Jaross

**Third Row, (l-r):** James Bader, Zachary Zega, Jiyang Sun, Joseph Galella, Kathleen Stepien, Joe Malin

**Forth Row, (l-r):** Suzanne Martin, Kyle Kim, Jacob Giles, Valerie Finlayson, Carly Maas, Jan Hellmann, Amelia Lindsay-Kaufman, Bennett Kellmayer, Samantha Volz

Photo Credit: Jay Kaufman

## CONTACT US

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Acknowledgments: We would like to acknowledge Professor Jay Kaufman, Michelle Montero, and Todd Karwoski for their efforts on this year's GeoGram.